

From: Steve Watson

Sent: Thursday, 12 September 2019 12:21 PM

To: [Access refused under section 47] ganden.com.au>

Cc: [Access refuse] ganden.com.au; Ruth Grant (Ruth.Grant@dsdmip.qld.gov.au)
<Ruth.Grant@dsdmip.qld.gov.au>

Subject: Design Timeframes

Hi [Access re]

Thanks again for talking with us yesterday. We are still working out the best way forward on this project at this time. Some additional questions we did not cover yesterday.

- An estimated timeframe for a review of current proposals and provision of a costed conceptual design with recommendation, including options for STP Type and alternative reticulation methods (i.e. pressure vs gravity) noting capital and operational costs for financial analysis – also a cost estimate for undertaking this work would be useful. (For a replacement facility to service 500EP)
- The estimated timeframe for detailed design works assuming approval of the recommended conceptual design
- Typical construction timeframes for 500 – 1000EP STP facilities

With an understanding of the timeframes we will be in a better position to form a strategy moving forward.

Thanks again for your assistance.

From: Steve Watson

Sent: Friday, 20 September 2019 1:02 PM

To: [Access refused under section] ganden.com.au>; [Access refused under section 47(] ganden.com.au>

Cc: Ruth Grant (Ruth.Grant@dsdmip.qld.gov.au) <Ruth.Grant@dsdmip.qld.gov.au>

Subject: Amended Scope Estimate

[Access refused und]

Thanks for your assistance thus far. At this point our likely scope for any consultancy is likely to differ from a straight STP conceptual design proposal. Council have already developed conceptual design model for a 500EP STP to service on Port Hinchinbrook.

Council have a number of condition report and knowledge of the facility based on their maintaining of the facility for the last 12 months. We are hopeful that works to date will reduce the cost for the next phase report.

The scope we will most likely be looking at will be something like:

1. Review existing STP Replacement conceptual design and suggest improvements in capital expenditure and ongoing operational expenditure through differing design options (If any)
2. Review condition reports on existing Port Hinchinbrook reticulation network to verify repair cost estimates
3. Undertake additional design investigations to provide a report with conceptual designs for :
 - a. PH Only (Pressurised reticulation)

- b. PH Only (Hybrid solution)
 - c. PH + Southern Cardwell/CBD (Pressurised reticulation)
 - d. PH + Southern Cardwell/CBD (Hybrid solution)
4. Provide a report including a costed STP conceptual design with a recommended option.

Council's proposed methodology for item 3 includes:

- A) Develop an indicative Infoworks ICM model of the existing sewerage system, with indicative gravity sewers to get flows to the SPS's and existing pressure pipework, based upon the design plans / overview plans provided with estimated pump curves. I don't seem to have any details of the outfall pipe to the STP from PS09 (this may be critical) and there may be some other gaps that need filling by a quick site inspection.
- B) CCRC to confirm any properties that are currently connected / constructed in addition to those on the provided aerial photo.
- C) Simulate model of current network with existing and build out scenarios based on "design" DWF rates and indicative WWF.
- D) Using the existing network as a base, develop a fully PSS model of the system using the existing infrastructure where possible and make high level assessment of additional required infrastructure.
- E) Wind back the PSS design model to only service existing properties and assess short term infrastructure needs (ie connecting pressure pipe connections around pumping stations, pressure pipe extensions / duplications etc)
- F) Develop say 2 hybrid models / designs that would effectively be possible staging strategies (eg decommission PS 04 and retrofit properties with PSS and say 2 other areas of CCRC choosing)
- G) Prepare a brief report detailing works undertaken with "concept plans", schedules and indicative capital costs

Again without fully scoping the work required, could you estimate a budget for the above works?

From: Steve Watson

Sent: Wednesday, 6 November 2019 10:52 AM

To: [Access refused under section 47(1)] garden.com.au>

Cc: [Access refused under section 47(1)] garden.com.au>; Ruth Grant <Ruth.Grant@dsdmip.qld.gov.au>

Subject: RE: Amended Scope Estimate

Hi [Access r

Thanks for waiting for us to progress this matter a little further. In line with your advice below, can you please confirm the \$50k budget would account for the following scope?

- Item 1 - Review Existing STP Reports/Recommendations
- Item 4 - STP Concept Design, Schedules and Capital Cost Estimates

Specifically the scope should include:

- Review and comment on the options analysis already undertaken by Cassowary Coast Regional Council and advise as to the suitability of the proposed 500EP solution

- Assist to develop any alternative treatment systems, if required
- Provide a report detailing the options and limitations of the site and existing infrastructure, and identifying the most suitable STP option
- Provide concept design of the recommended STP option servicing Port Hinchinbrook only with a view to potential expansion – (electrical, mechanical, civil, structural, hydraulic, and services etc.)
- Provide an indicate project schedule

There will be some urgency in the delivery of this work, ideally a report before the Christmas break, can you also please advise your availability to commence these works and a likely timeframe for delivery?

Apologies for the time pressure noting the delay. At this point we are investigating the procurement matters from our end also. Are you able to provide a formal offer detailing the scope and budget of \$50K on company letterhead?

08/11/2019

Steve Watson
Principal Property Officer
Department of State Development, Manufacturing, Infrastructure and Planning
Level 16, 1 William Street,
Brisbane QLD 4000

Dear Steve,

Re: Port Hinchinbrook STP – Review STP and Preparation of Concept Design

Thank you for the opportunity to provide a quotation for provision of professional engineering services to assist the Department of State Development, Manufacturing, Infrastructure and Planning (DSDMIP) with works associated with the rectification of the Port Hinchinbrook Sewage Treatment Plant (STP) including review of the existing STP documentation and preparation of a concept design.

GANDEN have previously provided support to DSDMIP regarding the STP replacement works and understand the project background and complexity regarding ownership. GANDEN understand the STP is in poor condition and is not operating as per its intended functionality and Cassowary Coast Regional Council (CCRC) have previously undertaken an options analysis and prepared a concept design for the proposed 500EP plant. DSDMIP require GANDEN to undertake a review of the options report and concept designs prepared by CCRC and provide recommendations or alternative solutions for the plant. Following the review, GANDEN will prepare a concept design for the recommended solution which may build on the current design by CCRC (if suitable) or propose an alternative.

Scope

GANDENs understanding of the scope of works is to: -

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Program

The following indicative program/durations for specific project stages are described below.

Project Stage	Est. Timeframe
Kickoff Meeting w/ DSDMIP at 1 William Street, Brisbane	Within 1 week of award
Meeting with CCRC in Innisfail followed by site inspection	Within 2 weeks of award
Options Review Report	Within 4 weeks of award
DSDMIP / CRC Review of Options Report & Recommendations	1 week following submission of report
Concept Design	4 weeks following endorsement of preferred option from DSDMIP/CCRC

Assumptions

GANDEN have made the following assumptions:

- DSDMIP will provide all record information, condition assessment reports, options and concept designs regarding the STP upgrade;
- The proposed program is based on receipt of all information at during the inception phase of the project;
- Concept Design Review Workshop at 1 William Street, Brisbane.

Exclusions

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Fees

GANDEN propose a lump sum fee of **\$48,570 (ex. GST)** for the detailed design of the scope as described above. A breakdown of the fee is provided below.

Project Stage	Fee (ex. GST)
Item 1 - Kickoff Meeting, Site Inspection and Workshop with CCRC & STP Review Report	Access refus
Item 2 – Concept Design	Access refus
Total (ex. GST)	\$48,570

Disbursements

Disbursements and expenses will be charged at Access refused

Terms

Terms would be to DSDMIP general terms and conditions for subcontractors. Invoicing would be done monthly with 30 day payment terms.

Insurances

GANDEN holds the following insurances: -

- Professional Indemnity Insurance: \$10M Resource Underwriting Pacific Pty Ltd
- Public Liability Insurance: \$20M AAI Ltd T/A Vero Insurance
- WorkCover Queensland: Policy Number WCA130518901

Copies of Insurance Certificates of Currency are available in the link below:

<http://www.ganden.com.au/details/>

Quality, Environment, Health & Safety and Risk

All work will be performed to the GANDEN's Integrated Management System that has been third-party certified to be compliant to: -

- AS/NZS ISO 9001:2008 Quality Management Systems,
- AS/NZS ISO 14001:2004 Environmental Management Systems, and
- AS/NZS 4801:2001 Occupational Health and Safety Management.

It is the policy of GANDEN to comply with the terms of all relevant National, State and Territory legislation and the requirements of all of our clients. The certification certificates and GANDEN's policies for Quality, Environment and Occupational Health and Safety are available on our website at:

<http://www.ganden.com.au/quality-environment-safety-and-risk/>

I trust this is to your requirements. Please advise if you require additional information or elaboration on the above.

With regards,

GANDEN Engineers and Project Managers

Access refused under section 47(3)(b) of the RTI Act



Port Hinchinbrook STP Upgrade

STP Review and Options Report

February 20

Rev 0



Principal:

Queensland Government
 Department of State Development,
 Manufacturing, Infrastructure and Planning
 Level 16, 1 William Street
 Brisbane QLD 4000

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Executive Summary

The Department of State Development, Manufacturing, Infrastructure and Planning (DSDMIP) engaged GANDEN Engineers and Project Managers (GANDEN) to undertake a review of existing information and the provision of recommendations for the upgrade of the Port Hinchinbrook Sewage Treatment Plant (STP).

The STP and associated sewer reticulation network servicing the Port Hinchinbrook development were privately owned and operated by the developer, who has since entered liquidation. The sewer network and STP are not owned by the Queensland Government or Cassowary Coast Regional Council (CCRC).

The options assessment is limited to the STP treatment system only and does not assess options for reticulation upgrades or effluent management. Previous reports identify shortfalls within the Port Hinchinbrook reticulation and limited available space for the irrigation of treated effluent. GANDEN were subsequently engaged by DSDMIP to undertake a desktop review the existing irrigation land using the Model for Effluent Disposal using Land Irrigation (MEDLI).

GANDEN's Access refused and Access refused facilitated a workshop with Cassowary Coast Regional Council (CCRC) representatives Geoffrey Smart and Shane Bandeira on 3rd December 2019 to discuss the current state of the plant. Following the workshop, GANDEN visited the Port Hinchinbrook STP, accompanied by a CCRC operator. It's clear from the inspection that the plant is in poor condition and a major upgrade is required. The condition of the plant is documented in numerous condition assessment reports by multiple parties, including CCRC, Cardno and Hydroflux EPCO.

Recommendation

The Port Hinchinbrook STP is located within 600m of the ocean, the environment is highly corrosive in nature and the site is susceptible to flooding. Due to the condition of the existing plant, GANDEN recommend replacement, rather than refurbishment of existing assets.

It is essential that the upgraded Port Hinchinbrook STP is constructed using fit-for-purpose, robust materials, proven in similar environments, meeting the required asset design life.

The recommended plant is a new 500 EP Sequencing Batch Reactor (SBR) with reinforced concrete process tanks. A description of the proposed process is provided in Section 4 of this report.

The existing sewage pump station (SPS 4) feeding the plant is in poor condition and CCRC have identified a requirement for replacement, it is recommended the pump station is replaced as part of the STP upgrade project.

The proposed upgrade comprises the following key components: -

1. Primary Treatment including: -
 - a. Mechanical inlet works comprising a spiral sieve screen (option for grit removal);
 - b. Flow balance tank, including level instrumentation and transfer pumps.
2. Secondary Treatment in for the form of a single train Sequencing Batch Reactor including: -
 - a. Anoxic Zone with submersible mixing;
 - b. Aerobic Zone with fine bubble diffusers, aeration blowers, waste pump, recycle pump and a decanter.
3. Chlorine Disinfection.
4. Tertiary filtration.
5. Effluent storage reservoir (replacement of existing storage tank).
6. Chemical dosing including: -

- a. Sodium Hypochlorite dosing for disinfection;
 - b. Aluminium Chlorohydrate (ACH) dosing for phosphorus removal; and
 - c. Sugar dosing (supplementary for low loading periods) – if required.
7. Sludge Dewatering – Mechanical Screw Press.
 8. New PLC and SCADA system.
 9. New effluent storage tank.

The estimated capital cost for the replacement of the STP and associated infrastructure is estimated to be \$4,344,000. This figure will be further defined following the development of a concept design. No allowance has been made in the estimates for short term refurbishments of the existing plant or upgrades to the existing Port Hinchinbrook reticulation network. The Hunter H₂O Report from March 2019 estimated the cost of refurbishing the STP and the reticulation network to be \$690,000 and \$2,360,000 respectively.

Table 1 – High-Level Cost Estimate (STP Only)

Item	Description	Estimated Cost Baseline	Estimated Cost incl of CCRC preference items
1	500 EP Sewage Treatment Plant	\$2,250,000	\$2,370,000
2	Generator (if required)	\$50,000	\$50,000
3	Dewatering (containerised – as per Hydroflux Estimate)	\$400,000	\$400,000
4	Effluent Storage Tank. Allowance for glass fused steel panel tank	\$665,000	\$800,000
	Sub Total	\$3,365,000	\$3,620,000
	Design 10%	\$336,500	\$362,000
	Project Management 10%	\$336,500	\$362,000
	TOTAL	\$4,038,000	\$4,344,000

The following further works for the Port Hinchinbrook STP are recommended: -

1. Refurbish/undertake maintenance works to enable the exiting plant to operate consistently for the time before the major plant upgrade takes place;
2. Collate historical flow data for the existing Port Hinchinbrook STP to further understand the plant loading;
3. Undertake Geotechnical Investigations, site survey and service location;
4. Undertake detailed site investigations and further MEDLI modelling to confirm maximum irrigation rates to nearby land parcels;
5. Obtain the latest flood modelling data to establish the extent of flooding for the existing STP, noting that critical infrastructure should be installed above the Q100 flood level if possible.

Contents

EXECUTIVE SUMMARY	2
1. INTRODUCTION	7
1.1 BACKGROUND	7
1.2 PORT HINCHINBROOK STP	8
1.2.1 <i>Existing Plant Rectification Works</i>	8
1.3 SITE LOCATION	9
1.3.1 <i>Flooding</i>	9
1.4 DISPOSAL BY IRRIGATION	10
1.5 ENVIRONMENTAL AUTHORITY (EA)	10
1.5.1 <i>Future Upgrade and License Conditions</i>	11
1.6 FINANCIAL CONSIDERATIONS	11
2. INPUTS AND ASSUMPTIONS	12
2.1 PLANT LOADING	12
2.1.1 <i>Influent Flows</i>	12
2.1.2 <i>Plant Loading</i>	13
2.2 ASSET DESIGN LIFE	13
3. PROCESS OPTIONS ASSESSMENT	14
3.1 IDENTIFICATION OF PROCESS OPTIONS	14
3.2 ASSESSMENT OF OPTIONS	14
4. RECOMMENDED STP DESCRIPTION	16
4.1 PLANT OVERVIEW	16
4.2 PRIMARY TREATMENT	17
4.2.1 <i>Inlet Works</i>	17
4.2.2 <i>Flow Balance Tank</i>	18
4.3 SECONDARY TREATMENT	19
4.3.1 <i>Sequencing Batch Reactor (SBR)</i>	19
4.3.2 <i>Decant / Chlorine Contact Tank</i>	21
4.4 CHEMICAL DOSING	21
4.5 TERTIARY FILTRATION	22
4.6 OPERATOR BUILDING	22
4.7 ELECTRICAL SWITCHROOM	22
4.8 EFFLUENT STORAGE TANK	22
4.9 DEWATERING	22
4.10 COST ESTIMATE	22
APPENDIX A - ENVIRONMENTAL AUTHORITY	24
APPENDIX B - MEDLI MODEL REPORT	25
APPENDIX C - CARDNO REPORT	26
Figures	
Figure 1 – Port Hinchinbrook STP Aerial Image (Port Hinchinbrook Land Use)	9
Figure 2 Preliminary Process Flow Diagram	17
Figure 3 - Packaged Inlet Screen and Grit Removal System	18

Figure 4 - Flow Balance Tank.....	19
Figure 5 – SBR General Arrangement.....	21

Tables

Table 1 – High-Level Cost Estimate (STP Only).....	3
Table 2 - Abbreviations	6
Table 3 Summary of Effluent Quality (EPPR00576713).....	11
Table 4 – Design Flows	12
Table 5 – Wastewater Characteristics.....	13
Table 6 – Asset Design Life	13
Table 7 - Multicriteria Analysis Summary	14
Table 8 SBR Operation Cycle Times (example)	19
Table 9 – High-Level Cost Estimate	22

Glossary of Terms

Table 2 - Abbreviations

Abbreviations	
ADWF	Average Dry Weather Flow
BWL	Bottom Water Level
CAPEX	Capital Expenditure
CCRC	Cassowary Coast Regional Council
CCT	Chlorine Contact Tank
DES	Department of Environment and Science
EA	Environmental Authority
EE	Environmental Evaluation
EP	Equivalent Population
GANDEN	GANDEN Engineers and Project Managers
IBC	Intermediate Bulk Containers
kL	Kilo-litre
L/s	Litres per second
MCA	Multicriteria Analysis
MEDLI	Model for Effluent Disposal using Land Irrigation
mg/L	Milligram per litre
ML	Megalitres
mm/min	Millimeters per minute
OPEX	Operational Expenditure
RP	Registered Property
SBR	Sequencing Batch Reactor
STP	Sewage Treatment Plant
TWL	Top Water Level

1. Introduction

The Department of State Development, Manufacturing, Infrastructure and Planning (DSDMIP) engaged GANDEN Engineers and Project Managers (GANDEN) to undertake a review of existing information and the provision of recommendations for the upgrade of the Port Hinchinbrook Sewage Treatment Plant (STP). Following the agreement of the preferred option, a concept design will be developed for the plant upgrade.

The Port Hinchinbrook STP forms part of the Port Hinchinbrook Development. Since the liquidation of the developer, the wastewater infrastructure has been neglected and is in poor condition. The STP is not owned by the Queensland Government or Cassowary Coast Regional Council (CCRC). CCRC are temporarily operating the treatment plant. This report takes into consideration the current state of ownership from a high level, however, does not attempt to identify or describe political or legal issues. The purpose of the report is to consider the upgrade of the STP and make recommendations from a technical perspective only.

The scope of services undertaken by GANDEN were limited to: -

- Stage 1 – Review existing plant information and identify options: -
 - Review of existing information, reports and recommendations for the upgrade of the STP, provided by DSDMIP;
 - Undertake a site inspection of the existing Port Hinchinbrook STP; and
 - Prepare a technical review report (this report) and identify the preferred option for the upgrade of the plant, including high level cost estimates.
- Stage 2 – Preparation of a concept design for the preferred option.

The purpose of this options review report is to: -

- Describe the project background;
- Provide an overview of previous studies and recommendations;
- Review of the proposed options for the upgrade of the plant; and
- Provide recommendations for the upgrade of the Port Hinchinbrook STP.

GANDEN's Access refuse and Access refu attended a meeting with CCRC's Geoffrey Smart and Shane Bandeira on the 3rd December 2019 to discuss the current status of the plant. Following the workshop, GANDEN visited the Port Hinchinbrook STP, accompanied by a CCRC operator.

1.1 Background

The Port Hinchinbrook STP was constructed circa 2005 to service the Port Hinchinbrook development. The STP was privately owned and operated by the Port Hinchinbrook developer, Williams Corporation Pty Ltd. The developer has since ceased trading, resulting in the sewage infrastructure (network and STP) being neglected. The STP and associated reticulation network are in poor condition.

Cassowary Coast Regional Council (CCRC) have been temporarily operating the sewage infrastructure since mid-2018.

In 2018, CCRC undertook a site assessment to establish the overall plant condition and operational shortfalls. The intention of this assessment was to identify critical shortfalls and to establish the minimum refurbishment requirement enable the ongoing operation of the plant, in its current condition. CCRC have undertaken minor maintenance and rectification works to enable the operation of the plant. Currently, operators attend site to two days a week to undertake operational tasks.

A portion of the plant is operated automatically, however due to the condition of the plant, specific operational processes such as wasting of sludge are undertaken manually. Aside from the STP, the existing reticulation network is in poor condition, notably SPS 4 which transfers all of Port Hinchinbrook's sewage to the STP. CCRC have identified the requirement for significant upgrades to the sewer network, including the replacement of sewage pump station SPS 4 as it is in poor condition. It is recommended the refurbishment of the sewer network forms part of the STP upgrade Contract.

Numerous reports are available for the STP, specifically relating to Council's strategy for installing a sewer system to service Cardwell. Whilst these are noted and provide a useful point of relevant information, these planning reports consider upgrade of the plant to service an ultimate population of 2,700EP. The purpose of this report is to consider the upgrade or replacement of the existing STP to service the Port Hinchinbrook population, with consideration to future expansion of the plant servicing the Cardwell scheme.

DSDMIP are investigating options for the upgrade of the STP, with consideration to the long term operation of the plant and transfer of ownership to CCRC, noting at the time of writing, the ownership and responsibility of operating the plant is unresolved. The ownership is subject to Government (Local and State) consideration, approvals and where necessary, negotiations with existing owners.

1.2 Port Hinchinbrook STP

The existing plant is a Hydroflux Epco Roadtrain™ packaged STP, designed to treat Average Dry Weather Flows (ADWF) of 270kL/day, with an ultimate population of 750 EP (as noted by EPCO, however other reports state 500 EP). The existing biological treatment is a continuous flow activated sludge plant with secondary clarification, filtration and disinfection. The existing plant includes the main process steps/units: -

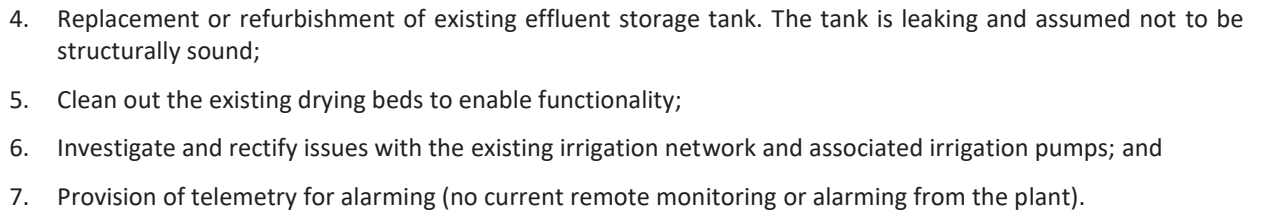
1. Inlet Screen – Coarse bar screen;
2. Aerated Balance tank;
3. Bioreactor tank (aeration tank);
4. Secondary Clarifier;
5. Sand Filters;
6. Waste Activated Sludge Tank;
7. Chlorine Disinfection Tank;
8. Sludge Drying Beds;
9. Effluent Storage tank; and
10. Irrigation pumps and irrigation network.

As documented in numerous reports by CCRC, Cardno and Hydroflux EPCO, the existing plant is in poor condition. The infrastructure is in poor condition and it's clear that the plant is not performing.

1.2.1 Existing Plant Rectification Works

Referring the Hinchinbrook STP Conditions Report Review Tech Memo by Cardno in 2018 (Appendix C - and discussions with CCRC, the following items should be prioritised to allow operation of the existing plant up until commissioning and handover of the new upgraded plant: -

1. Patching of exiting process tanks in areas of major leakage (i.e. hoppers of clarifier);
2. Refurbishment of walkways to ensure safe access and egress for operators. Removal of redundant corroded walkways etc. that pose a safety hazard;
3. Restoration/rectification of the sludge air lift process to transfer solids within the plant; Or replacement of sludge removal system with a progressive cavity pump, connected to the clarifier drain ports;



For subsequent phases of the project, recent flood modelling data is required to establish an accurate understanding of the likelihood and extent of flooding.

1.4 Disposal by Irrigation

DSDMIP and CCRC note the existing irrigation system is in poor condition. Multiple investigation reports describe the existing irrigation land as suitable for 200 EP.

GANDEN have undertaken preliminary MEDLI modelling to determine the suitability of the existing irrigation area. The preliminary modelling was based on meeting the existing EA for 500 EP and typical input values in lieu of site-specific investigations. The main outcomes highlighted the existing area is likely to meet the Environmental Authority (EA) conditions however recommended DSDMIP acquire an additional 2 ha and also irrigate the existing STP site to reduce frequency of water releases. Refer to Appendix B - for the MEDLI modelling Technical Memorandum.

Furthermore, alternative disposal methods should be considered, including the potential for third party consumers such as the golf course and any other agricultural areas. Disposal by irrigation for any future upgrades (i.e. 2,700 EP) will result in the requirement to procure a significantly larger area of land, and, disposal by release to the environment may be required.

1.5 Environmental Authority (EA)

The STP is operated under Environmental Authority (EA) EPPR00576713, issued to The Passage Holdings Pty Ltd on 18 August 2016. The EA provides approval for the development application, number NR0560DA, dated 05-06-2005.

GANDEN obtained the EA from the Department of Environment and Science (DES). The EA is provided as an attachment to this report, refer to Appendix A -

Key conditions of EA include: -

1. Schedule C – Water: -
 - The current licence conditions are for irrigation during dry weather, and only permits release of effluent to One Mile Creek during wet weather scenarios, once the effluent wet weather storage has reached capacity, with a minimum dilution factor of 10 to 1 (Creek flow to effluent). The maximum permitted quantity of release is 412 kL (Condition C3-1 – 6); and
 - The minimum volume for the effluent storage tank, to service 500 EP, is 1.5 ML (Condition C7-1).
2. Schedule F – Land: -
 - Contaminants permitted for release to land during dry weather;
 - The maximum daily release of 620 kL during dry weather; and
 - When conditions prevent irrigation (i.e. wet weather), flows are to be directed to wet weather storage tanks.

The effluent quality requirements for release to land and release to the environment (during wet weather) are summarised in the table below.

Table 3 Summary of Effluent Quality (EPPR00576713)

Quality Characteristics	Minimum	50 th Percentile	Maximum
Suspended Solids (SS)	-	-	5 mg/L
5-day Biochemical Oxygen Demand (BOD)	-	-	10 mg/L
Total Nitrogen (TN)	-	5 mg/L	10 mg/L
Total Phosphorus (TP)	-	1 mg/L	2 mg/L
Faecal Coliform	-	10 cfu/100mL	100cfu/100mL
pH	6.5	-	8.5
Dissolved Oxygen (DO)	2 mg/L	-	-

1.5.1 Future Upgrade and License Conditions

Consideration to future upgrades needs to be accounted for during this assessment. The 500 EP assessment (this report) establishes required treatment to achieve the existing EA release limits. Upgrading the plant, exceeding 1500 EP (current upper EP limit of license) will result in the requirement for new license conditions. The release limits for the 2,700 EP plant are likely to be more stringent than the existing, due to continual improvement in the environmental evaluations for sewage treatment plants in the Great Barrier Reef catchment area. The license conditions for the future 2,700 EP plant with release to the environment should be assumed to be: -

- 5 mg/L Total Nitrogen
- 2 mg/L Total Ammonia; and
- 1 mg/L Total Phosphorus.

1.6 Financial Considerations

The existing STP was constructed and operated by a private developer, who has since ceased trading. The asset is not owned by CCRC or the Queensland Government. Without delving into the particulars of raising capital and funding the ongoing operation of the plant, the following key points raised in consultation with CCRC can be considered: -

- CCRC do not have a mechanism to raise capital funds for the upgrade. Raising capital funds will likely be through multiple funding schemes;
- CCRC note that Cardwell is not serviced by a sewer system and residents don't pay rates for sewer. Funding for the operation of the 500 EP plant would be raised via rates from Port Hinchinbrook development.

2. Inputs and Assumptions

The upgraded plant is to be designed for a population of 500EP, with consideration to future expansion to cater for the ultimate population of 2,700 if the Cardwell sewage scheme is implemented.

2.1 Plant Loading

2.1.1 Influent Flows

Raw sewage volumes have been derived using the FNQROC Development Manual D7 – Sewage System Design Manual, Table 7.2 Sewage Loading. The average dry weather sewerage production is 270 L/EP/day.

No flow data for the plant was provided at the time of writing this report. It is recommended in the subsequent phase of the project, flow monitoring is undertaken to confirm current loading, if the information is not already available.

Table 4 – Design Flows

Scenario	Equivalent Population	Wastewater Production	Average Dry Weather Flow (ADWF)	Peak Wet Weather Flows (PWWF)	Peak Instantaneous Flows (PIF)
Current	-	-	71 kL/day ¹	275 kL/day	SPS 4 Pump Duty
Adopted Current for Design	500	270 L/EP/day	135 kL/day	756 kL/day ² (5.60 x ADWF)	SPS 4 Pump Duty

NOTE:

1. Average daily flow based on CRC flow record from 14/08/2018 to 17/12/2019
2. The plant's current license limits wet weather discharge to 412kL/day, which is approximately 3 x ADWF.

2.1.1.1 Peak Wet Weather Flow (PWWF)

Peaking Factor is the greater of 5 x ADWF or C_1 ADWF.

$$C_1 = 15 \times (EP)^{-0.1587}$$

$$C_1 = 15 \times 500^{-0.1587} = 5.59.$$

A peaking factor of 5.60 x ADWF should be adopted for the hydraulic design of the infrastructure. Noting that the current license only permits the release of 412 kL/day to the environment during wet weather, which is approximately 3 x ADWF.

New license conditions will likely be negotiated with DES for the upgraded plant, at which state the release volumes should be revised to suit the upgraded plant.

2.1.1.2 Peak Dry Weather Flow (PDWF)

$$PDWF = C_2 \times ADWF$$

$$C_2 = 4.7 \times (EP)^{-0.105}$$

$$C_2 = 4.7 \times 500^{-0.105} = 2.44$$

$$PDWF = 2.3 \times ADWF.$$

The PDWF is below the dry weather irrigation volumes (620kL/day), therefore is considered suitable for use.

2.1.2 Plant Loading

At the time of writing this report, no influent data was available for review. For the purpose of this assessment the design influent loadings are based on typical Australian wastewater contributions, which described below.

Table 5 – Wastewater Characteristics

Parameter	Adopted Loading (g/EP/day)
Biochemical Oxygen Demand (BOD)	60
Chemical Oxygen Demand (COD)	125
Total Kjeldahl Nitrogen (TKN)	12
Total Phosphorus (TP)	2.5
Total Suspended Solids (TSS)	65

2.2 Asset Design Life

The overall asset life is a key consideration for the upgrade. As the ongoing costs for the asset will be raised by a relatively small area, the longer the asset life, the lower the ongoing costs will be.

GANDEN propose that the upgraded plant is designed with robust materials, suitable for operating in corrosive environments. The asset design life described in the table below was developed with commentary from CCRC.

Table 6 – Asset Design Life

Item	Minimum Design Life
Major Process Tanks	80 years
Buildings	50 years
Underground Structures and Piping	75 years
Road Pavements	25 years
Mechanical plant and equipment	25 years
Electrical Switchboards	25 years
Electrical Instrumentation	10 years
Polyethylene Tanks	20 years

3. Process Options Assessment

In the past, CCRC have engaged multiple parties to undertake reviews of the existing plant and make recommendations for the upgrade of the plant, based on the supply of a packaged or modular type plant. These reports have been produced with consideration of implementing a sewer scheme in Cardwell which would be serviced by the Port Hinchinbrook STP, with the intention of upgrading the plant for an ultimate population of 2,700EP.

The options identified in this report are for a STP to service an ultimate population of 500EP, with consideration to future upgrades, should the Cardwell Sewer Scheme be implemented.

A preliminary Multicriteria Analysis (MCA) was used to assess the options and determine the most suitable option, satisfying the requirements of this project. Both price (CAPEX and OPEX) and subjective non-price criteria was used to differentiate the options.

The assessment criteria included: -

- A. Operational Reliability and Resourcing Requirements;
- B. Upgradeability (i.e. provision for future upgrades);
- C. Design Life;
- D. Capital Expenditure (CAPEX); and
- E. Operational Expenditure (OPEX).

Each option was ranked from 1 to 4 for each of the criteria listed above (a 1 representing the best score).

The option with the lowest total score was considered the best option for implementation.

Following discussions with CCRC and DSDMIP, the consensus is the upgraded plant should provide a long-term solution and be constructed from robust materials, proven in similar environments.

3.1 Identification of Process Options

GANDEN have dismissed the option for plant refurbishment on the basis it will not meet minimum design life requirements and the extent of refurbishment is unknown.

The following options meet Council's requirements for effluent quality -

- 1. Option 1 - Replace existing plant with 500 EP Packaged STP (as per Hydroflux EPCO Proposal);
- 2. Option 2 - New 500 EP Sequencing Batch Reactor (SBR), with flow balancing;
- 3. Option 3 - New 500 EP Oxidation Ditch; and
- 4. Option 4 - New 500 EP Membrane Bioreactor with flow balancing.

3.2 Assessment of Options

The table below provides a brief of overview of the options, based on the criteria described above. The options have been assessed in relation to each other based on similar sized plants.

Table 7 - Multicriteria Analysis Summary

	Criteria	Option 1 Package STP	Option 2 SBR	Option 3 Oxi Ditch	Option 4 MBR
A	Operational Reliability and Resourcing Requirements	4	1	2	3
B	Upgradability	3	2	4	1
C	Design Life	4	2	1	3
D	Capital Expenditure (CAPEX)	1	2	3	4
E	Operational Expenditure (OPEX)	3	1	2	4
	Total	15	8	12	15

The options presented have been ranked in the following order: -

1. Option 2 - New 500 EP Sequencing Batch Reactor (SBR), with flow balancing;
2. Option 3 - New 500 EP Oxidation Ditch and Clarifiers;
3. Option 1 - Replace existing plant with 500 EP Packaged STP (as per Hydroflux EPCO Proposal); and
4. Option 4 - New 500 EP Membrane Bioreactor with flow balancing.

The most suited option for the replacement of the plant is for a 500 EP SBR to be constructed on the existing site. This is the recommended option for the following reasons: -

- It ranks best with the multicriteria analysis;
- Lowest operational expenditure of all options;
- Will achieve the required design life, with concrete (reinforced or precast panel) tanks; and
- The plant is modular in nature and can be easily upgraded by duplicating the treatment tanks.

An SBR includes both biological treatment and clarification in a single tank, reducing the need for a separate clarifier. Flow balancing will be provided upfront of the plant.

4. Recommended STP Description

4.1 Plant Overview

GANDEN recommend DSDMIP and CCRC consider a single train Sequencing Batch Reactor (SBR) plant to service the Port Hinchinbrook development population of 500 EP.

The plant is modular in nature and can be easily upgraded by duplicating the main process trains and potential conversion to an MBR plant at a later date (to cater for growth without major civil works or if higher effluent quality is required – e.g. reuse).

The Port Hinchinbrook STP is located within 600 m of the ocean, the environment is highly corrosive in nature and the site is susceptible to flooding during storm events. It's essential that the new plant is constructed using robust materials, proven in similar environments, hence the recommendation for the main process tanks to be concrete. Typically, electrical and mechanical assets are rated for a design life of 15 to 20 years, CCRC typically use 25 year design life for these assets. The civil infrastructure (i.e. tanks, piping etc.) should be designed with a life of at least 75 years.

The proposed SBR plant comprises the following key components: -

1. Primary Treatment including: -
 - a. Mechanical inlet works comprising a spiral sieve screen (option for grit removal);
 - b. Flow balance tank, including level instrumentation and transfer pumps.
2. Secondary Treatment in for the form of a single train Sequencing Batch Reactor including: -
 - a. Anoxic Zone with submersible mixing;
 - b. Aerobic Zone with fine bubble diffusers, aeration blowers, waste pump, recycle pump and a decanter.
3. Chlorine Disinfection;
4. Tertiary filtration;
5. Effluent storage reservoir (replacement of existing storage tank);
6. Chemical dosing including: -
 - a. Sodium Hypochlorite dosing for disinfection;
 - b. Aluminium Chlorohydrate (ACH) dosing for phosphorus removal; and
 - c. Sugar dosing (supplementary for low loading periods) – if required.
7. Optional Sludge Dewatering – Mechanical Screw Press (if drying beds are not to be reused);
8. Provision of return line to allow flushing of the rising main and reduce septicity; and
9. New PLC and SCADA system.

If Council foresees the Cardwell Scheme being implemented in the next 5 – 10 years, refurbishment of one of the existing steel treatment tanks, utilising it as an interim flow balance tank may be considered in lieu of constructing a new concrete balance tank – noting the shortened lifespan of the refurbished steel tank. The future concrete balance tank would then be constructed as part of the major plant upgrade in the future.

Existing infrastructure may be retained and reused as part of the upgrade including: -

- Submersible pump stations (used for site returns etc);
- Control building (reuse as switchroom and operator building as per current use); and

- Existing concrete slab supporting the existing plant may be retained and reused to support the dewatering equipment, tertiary filtration and chemical dosing systems. It is unlikely the existing slab would be suitable to support a larger/deeper concrete tank structures as the imposed dead loads would be at least double that of the existing steel tanks.

An indicative process flow diagram for the plant is provided below.

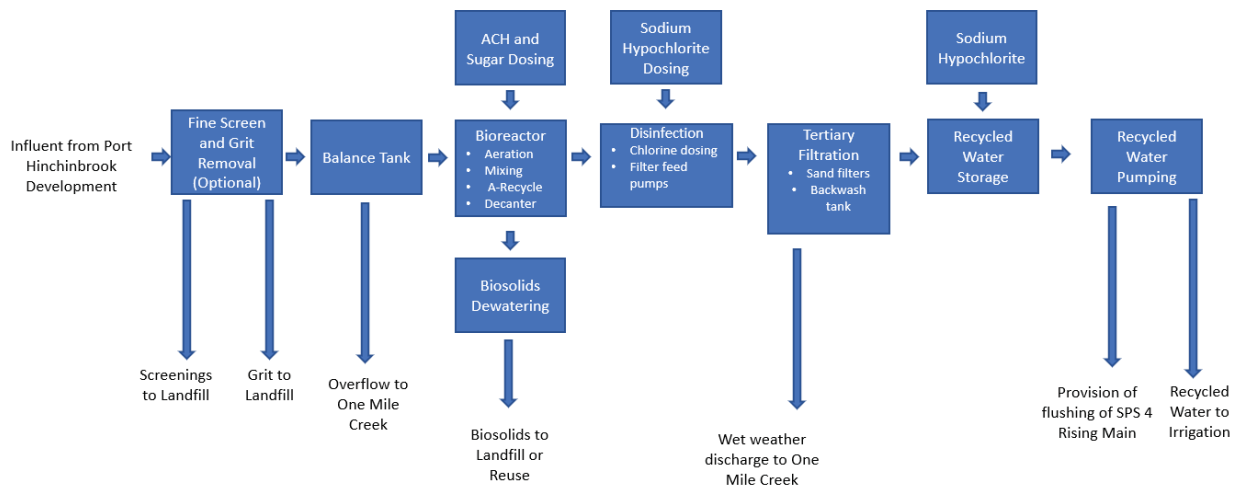


Figure 2 Preliminary Process Flow Diagram

4.2 Primary Treatment

4.2.1 Inlet Works

Port Hinchinbrook subdivision is located adjacent to the ocean and is considered likely to accumulate a significant amount of grit; therefore, grit removal should be considered part of the upgrade. The inlet works shall be sized for the maximum instantaneous flows delivered by the network.

The proposed inlet works comprises: -

- Mechanical spiral sieve screen; and
- Horizontal grit removal chamber.

The packaged system would be specified as stainless steel construction, suitable for the proposed installation. The size of the inlet works is typically based on average and maximum instantaneous flows. Consideration will be given to future upgrades for the inlet works.

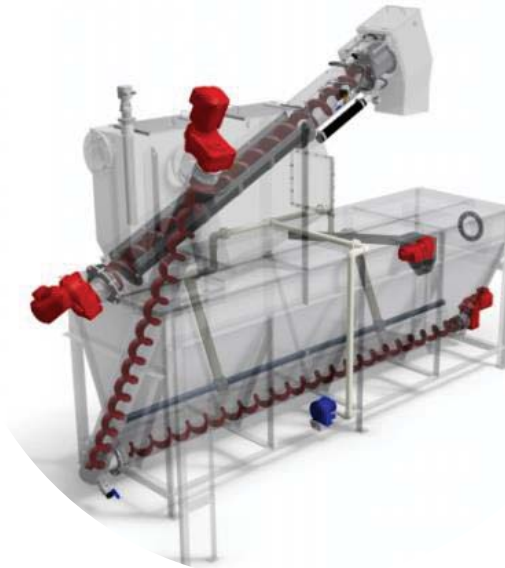


Figure 3 - Packaged Inlet Screen and Grit Removal System

4.2.2 Flow Balance Tank

A new flow balance tank, of concrete construction is proposed.

The flow balance tank receives screened sewage from the inlet works. The balance tank acts as a pump station and delivers flows to the bioreactor during the fill/react tanks. The volume of the balance tank will be confirmed during subsequent stages of the project; however, it is assumed to be in the range of 50 – 100 kL. The balance tank should be sized with enough operational storage to balance peak flows into the plant.

A diversion of greater than 3 x ADWF from the balance tank will be released to environment, ensuring all influent receives screening.

The balance tank includes the following equipment: -

- Duty/Standby submersible pumps (preferentially variable speed); and
- Level instrumentation.



Figure 4 - Flow Balance Tank

4.3 Secondary Treatment

The Secondary Treatment is provided by a single train SBR, operating in a fixed, or alternating cycle. The single train SBR will be sized for a population of 500 EP. If Council wish to upgrade the plant in the future, the SBR can be duplicated and operated as a two-train system.

The secondary treatment train comprises: -

1. A sequencing batch reactor tank; and
2. A decant/chlorine contact tank.

4.3.1 Sequencing Batch Reactor (SBR)

During normal operation, the SBR operates with three distinct cycle steps, as described in the table below.

1. Fill/React Phase – SBR is filling with influent from the balance tank. Process air is introduced as well as constant mixing provided by the mixers, a-recycle pump and aeration.
2. Settle Phase – The SBR is in settling mode and is not receiving any influent. All mechanical equipment is off allowing the mixed liquor to settle, reducing the sludge blanket providing a clear layer of supernatant; and
3. Decant Phase – Settling phase is complete, all mechanical equipment remains off and no influent is received. The decanter operates, slowly driving into the surface and removing the supernatant from the tank, discharging to the decant/chlorine contact tank.

An example of the SBR/IDEA sequencing is provided below, the cycle sequence steps can be modified to suit the plant operation. Once the decant phase is complete, the SBR returns to step 1 and continues to cycle through.

Table 8 SBR Operation Cycle Times (example)

Cycle Time	1	2	3	4	5	6	7	8
Sequence Step	Fill / React	Fill / React	Fill / React	Fill / React	Settle	Settle	Decant	Decant

The SBR tank comprises a new 200 – 250 kL reinforced concrete tank split into the following two zones: -

- Anoxic Zone including: -
 - Submersible mixer;
- Aerobic zone including: -
 - Fine bubble aeration with submersed diffusers;
 - Duty/Standby blowers;
 - Decanter;
 - WAS pump; and
 - A-recycled pump.

The bioreactor would have a maximum operating depth of 4.5 m and bottom water level of approximately 3 m.

Initially, the plant would be operated at a lower mixed liquor content for the 'assumed' current loading. The operating mixed liquor content can be increased as required, to suit the higher loading. For example, initially, the plant may be operated with a mixed liquor content of 2,000 mg/L and when the loading is higher, can be operated at 3,000 – 4,000 mg/L, increasing the biological treatment capacity of the plant at that point in time. During the low loading periods, supplementary carbon dosing (sugar dosing) is facilitated to provide an additional food source. As Port Hinchinbrook is a holiday destination, during the summer months it is assumed the loading will be lower.

The aeration blowers are variable speed and operate to maintain an operator settleable dissolved oxygen concentration within the bioreactor, presumably 2 mg/L.

Internal dividing walls separate the aeration and anoxic zones. Submerged voids hydraulically link the tanks and provides a flow path for the mixed liquor to facilitate continuous mixing. The figure below represents half of a two-train SBR and is of similar size.

A mixer provides constant mixing within the Anoxic Zone and an A-recycle pump transfers aerated sewage from the aeration zone to the anoxic zone at approximately 5 x ADWF.

A single Waste Activated Sludge Pump is provided, removing mixed liquor from the bioreactor for dewatering.

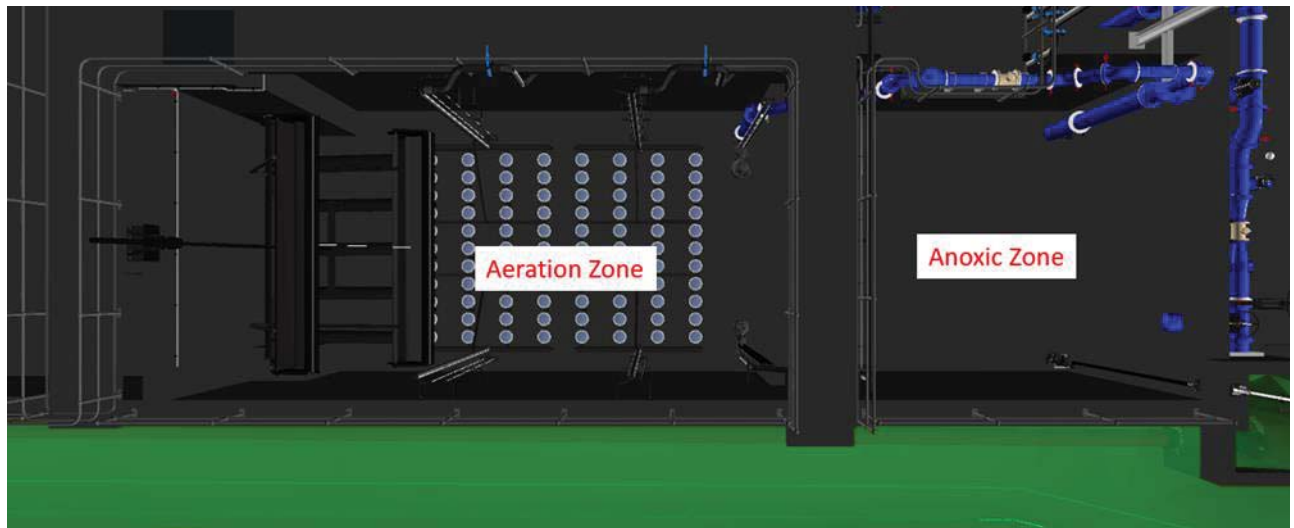


Figure 5 – SBR General Arrangement

4.3.2 Decant / Chlorine Contact Tank

Forming part of the SBR structure, a combined decant/chlorine contact tank is proposed. The tank receives secondary effluent from the SBR via the decanter.

This tank will provide flow balancing and may be used for disinfection, prior to tertiary filtration. To maintain a chlorine residual within the recycled water tank, an additional chlorine dosing point may be required, or direct dosing into the recycled water tank.

The decant tank will operate as a balancing tank upstream of the tertiary filters. Submersible pumps will be installed within the balance tank, transferring secondary effluent to the filters. The chlorine contact tank would include the following equipment: -

- Level instrumentation; and
- Duty/standby or duty/assist submersible pumps.

4.4 Chemical Dosing

The following chemical dosing systems are proposed: -

1. Sodium Hypochlorite dosing for disinfection – The dosing system would comprise duty/standby dosing pumps.
2. Aluminium Chlorohydrate (ACH) for chemical phosphorus removal. Biological phosphorus removal not suitable for plants of this size. Duty/Standby dosing pumps are proposed.
3. Sugar solution for supplementary carbon addition. The plant loading is unknown, and the development is a holiday area, resulting in high loading during the tourist season and lower loading other times of the year. Sugar solution provides a supplementary food source for the mixed liquor during these lower loading periods.

It is proposed all chemicals are stored in Intermediate Bulk Containers (IBC's), reducing the requirement for chemical unloading bunds. The IBC's can be placed on proprietary bunds, like what is currently used on the site. Consideration to manual handling of IBC's and requirement for machinery is to be made. Should IBC's not be suitable, a chemical unloading bund will be required to facilitate bulk chemical deliveries.

4.5 Tertiary Filtration

Tertiary filters will be installed for effluent polishing. Multiple options for the tertiary filtration system are available on the market and may include: -

1. Gravity sand filters;
2. Continuous wash up flow sand filters; or
3. Pressure sand filtration.

Options for the preferred filtration technology can be investigated in the subsequent stages of the project.

4.6 Operator Building

It is proposed the existing operator building is retained, refurbished and reused as part of the upgrade. Due to the possibility of flooding, GANDEN propose the existing building is retained as an operations or storage building.

The new switchboard is installed in a separate building, or externally installed, with immunity to Q100 flooding.

4.7 Electrical Switchroom

A new electrical switchroom, installed above the Q100 flood level is proposed. Council do not prefer prefabricated buildings, as similar installations in the region have been problematic due to the operating climate. The proposed switchroom is required to be a precast concrete or blockwork building.

Prefabricated buildings of suitable materials may be considered, however are not recommended at this stage.

4.8 Effluent Storage Tank

The existing 1.5 ML effluent storage tank is in poor condition and has several leaks. The tank is to be decommissioned and replaced.

4.9 Dewatering

The sludge drying beds appear to be in good condition and would form part of the upgrade works for dewatering. If funds are available, optional dewatering using screw press is recommended.

4.10 Cost Estimate

A high-level cost estimate for the construction of the a new 500 EP Sequencing Batch Reactor, based on similar plants is provided below.

Table 9 – High-Level Cost Estimate

Item	Process Area	Description	Estimated Cost Baseline	Estimated Cost incl of CCRC preference items
1	Inlet Works	Mechanical Inlet Screen, concrete bund and associated infrastructure	\$150,000	\$150,000
2	Balance Tank	Balance tank and pump station	\$200,000	\$200,000
3	Sequencing Batch Reactor (inclusive of decant tank)	Concrete tank, mechanical equipment and instrumentation etc. constructed above ground. Assumed ground conditions suitable, no allowance for piled foundations	\$1,000,000	\$1,000,000
4	Tertiary Filtration	Sand filters, pumps, backwash tank etc.	\$250,000	\$250,000
5	Chemical Dosing Systems	Sodium Hypochlorite (disinfection), ACH for phosphorus removal, Sugar dosing for supplement carbon dosing Includes concrete bund and roof structures, duty/standby dosing skids and associated instrumentation. CCRC - Allowance for chemical delivery bund	\$150,000	\$150,000 \$50,000
7	Site Run Electrical, Switchboard, including PLC and SCADA	CCRC - Additional \$70 k allowance for switchroom.	\$300,000	\$370,000
8	Generator (if required)		\$50,000	\$50,000
9	Dewatering	(Optional – Screw Press in Shed – if drying beds not reused)	\$400,000	\$400,000
10	Effluent Storage Tank	Baseline - Allowance for powder coated steel panel tank with liner. CCRC - Allowance for glass fused steel panel tank	\$665,000	\$800,000
11	Civil Works Allowance		\$200,000	\$200,000
12	Sub Total		\$3,365,000	\$3,620,000
13	Design 10%		\$336,500	\$362,000
14	Project Management 10%		\$336,500	\$362,000
15	TOTAL		\$4,038,000	\$4,344,000

Appendix A - Environmental Authority

Appendix B - MEDLI Model Report

1294-MEM-001 – MEDLI Modelling to Assess Irrigation Land Area

Appendix C - Cardno Report



Department of
**Environment and
Heritage Protection**

19-AUG-2016

To: The Passage Holdings Pty Ltd
PO Box Q361
QVB NSW 1230

Attention: Ian Stephens

Our reference: 264465

Application details

I refer to the application that was received by the administering authority on 05-AUG-2016.

Land description: Port Hinchinbrook STP NR0560 Lot 1 Plan C1043, Lot 3 Plan RP733367, Lot 2 Plan CWL1212, Lot 41 Plan C1043, Lot 42 Plan C1043, Lot 3 Plan C1043; Port Hinchinbrook STP IPDE01020408 Lot 170 Plan SP177389, Lot 2 Plan RP739188, Lot 7 Plan RP732868, Lot 1 Plan RP739188, Lot 1 Plan C1043, Lot 5 Plan RP732868, Lot 6 Plan RP732868.

Decision

Your application has been approved and your environmental authority (reference EPPR00576713) is attached.

Should you have any further enquiries, please contact Veronica Lightfoot on telephone 1300 130 372 (option 4).

Yours sincerely

Signature

18 August 2016

Date

Jodie Brackenbury
Department of Environment and Heritage Protection
Delegate of the administering authority
Environmental Protection Act 1994

Veronica Lightfoot
Permit and Licence Management
Department of Environment and
Heritage Protection
GPO Box 2454
BRISBANE QLD 4001
Phone: 1300 130 372
Fax: (07) 3330 5875
Email: palm@ehp.qld.gov.au
Website www.ehp.qld.gov.au
ABN 46 640 294 485

Enclosed

Permit - environmental authority (reference EPPR00576713)

Environmental authority

This environmental authority is issued by the administering authority under Chapter 5 of the Environmental Protection Act 1994.

Permit¹ number: EPPR00576713

Environmental authority takes effect on 18-AUG-2016.

The anniversary date of this environmental authority remains 27 October. An annual return and the payment of the annual fee will be due each year on this day.

Environmental authority holder(s)

Name	Registered address
The Passage Holdings Pty Ltd	Level 25 25 Bligh Street SYDNEY NSW 2000

Environmentally relevant activity and location details

Environmentally relevant activity(ies)	Location(s)
63-(1b)(ii) Sewage treatment >100 to 1500EP - no IT or IR	Port Hinchinbrook STP IPDE01020408 - Lot 170 Plan SP177389, Lot 2 Plan RP739188, Lot 7 Plan RP732868, Lot 1 Plan RP739188, Lot 1 Plan C1043, Lot 5 Plan RP732868 and Lot 6 Plan RP732868 Port Hinchinbrook STP NR0560 - Lot 1 Plan C1043, Lot 3 Plan RP733367, Lot 2 Plan CWL1212, Lot 41 Plan C1043, Lot 42 Plan C1043 and Lot 3 Plan C1043

Additional information for applicants

Environmentally relevant activities

The description of any environmentally relevant activity (ERA) for which an environmental authority is issued is a restatement of the ERA as defined by legislation at the time the approval is issued. Where there is any inconsistency between that description of an ERA and the conditions stated by an environmental authority as to the scale, intensity or manner of carrying out an ERA, then the conditions prevail to the extent of the inconsistency.


¹ Permit includes licences, approvals, permits, authorisations, certificates, sanctions or equivalent/similar as required by legislation

An environmental authority authorises the carrying out of an ERA and does not authorise any environmental harm unless a condition stated by the authority specifically authorises environmental harm.

A person carrying out an ERA must also be a registered suitable operator under the *Environmental Protection Act 1994* (EP Act).

Contaminated land

It is a requirement of the EP Act that if an owner or occupier of land becomes aware a notifiable activity (as defined in Schedule 3 and Schedule 4) is being carried out on the land, or that the land has been, or is being, contaminated by a hazardous contaminant, the owner or occupier must, within 22 business days after becoming so aware, give written notice to the chief executive.



Signature

Jodie Brackenbury
Department of Environment and Heritage Protection
Delegate of the administering authority
Environmental Protection Act 1994

18 August 2016

Date

Enquiries:
Veronica Lightfoot
Permit and Licence Management
Department of Environment and Heritage
Protection
GPO Box 2454
BRISBANE QLD 4001
Phone: 1300 130 372
Fax: (07) 3330 5875
Email: palm@ehp.qld.gov.au

Obligations under the *Environmental Protection Act 1994*

In addition to the requirements found in the conditions of this environmental authority, the holder must also meet their obligations under the EP Act, and the regulations made under the EP Act. For example, the holder must comply with the following provisions of the Act:

- general environmental duty (section 319)
- duty to notify environmental harm (section 320-320G)
- offence of causing serious or material environmental harm (sections 437-439)
- offence of causing environmental nuisance (section 440)
- offence of depositing prescribed water contaminants in waters and related matters (section 440ZG)
- offence to place contaminant where environmental harm or nuisance may be caused (section 443)

Conditions of environmental authority

The conditions of the this environmental authority are the conditions of the attached Development Approval reference NR0560DA, as they relate to the licensed activities, where any references to the holder of the development approval are taken to refer to the holder of this environmental authority.

Attachments

- Development Approval



COPY

Notice of decision to grant licence (with development approval) Sections 85 and 86 Environmental Protection Act 1994

This statutory notice is issued by the administering authority pursuant to sections 85 and 86 of the Environmental Protection Act 1994, to advise you of a decision or action.

Enquiries to : Barry James
Telephone : (07) 4722 5353
Your reference :
Our reference : TSV4482 (NR0560)

Cardwell Properties Pty Ltd
Bruce Highway
Cardwell QLD 4849

CC: Cardwell Properties Pty Ltd
PO Box 444
Main Beach, Qld 4217

Entered/Validated in Ecotrack

Project Reference

Development Approval #

Registration Certificate #

This version amended on

Cancelled/Surrendered/Transferred Date:

Continuing Registration #

Attention: Russell Cook,

Re: Application for a licence (with development approval) by Cardwell Properties Pty Ltd to carry out Environmentally Relevant Activity (ERA) 15(b) Sewage treatment on land described as Lot 1 on Plan C1043, Lot 2 on Plan CWL1212, Lot 3 on Plan C1043, Lot 41 on Plan C1043, Lot 42 on Plan C1043 and Lot 3 on Plan RP733367 located at Bruce Highway, Cardwell.

Your application for a licence (with development approval), received by this office on 12 May 2004 has been granted.

A copy of the licence No. NR0560 which includes the schedule of conditions, is attached.

This licence takes effect from 26 October 2004.

You may apply to the administering authority for a review of this decision within 14 days after receiving this notice. You may also appeal against this decision to the Planning and Environment Court.

Information outlining the review and appeal processes under the *Environmental Protection Act 1994* is included with this notice. This information is intended as a guide only. You may have other legal rights and obligations.

Signed

Tania Laurencont
District Manager, Townsville
Delegate of Administering Authority
Environmental Protection Act 1994

26 October 2004

Entered/Validated in Ecotrack

Project Reference

Development Approval #

Registration Certificate #

This version amended on

Cancelled/Surrendered/Transferred Date:

Continuing Registration #

Extracts from the Act Regarding Reviews and Appeals

Procedure for review

521.

- (1) A dissatisfied person may apply for a review of an original decision.
- (2) The application must-
 - (a) be made in the approved form to the administering authority within-
 - (i) 14 days after the day on which the person receives notice of the original decision or the administering authority is taken to have made the decision (the "review date"); or
 - (ii) the longer period the authority in special circumstances allows not later than the review date; and
 - (b) be supported by enough information to enable the authority to decide the application.
- (3) On or before making the application, the applicant must send the following documents to the other persons who were given notice of the original decision-
 - (a) notice of the application (the "review notice");
 - (b) a copy of the application and supporting documents.
- (4) The review notice must inform the recipient that submission on the application may be made to the administering authority within 7 days after the application is made to the authority.
- (5) If the administering authority is satisfied the applicant has complied with subsection (2) and (3), the authority must, within 14 days after receiving the application-
 - (a) review the original decision;
 - (b) consider any submissions properly made by a recipient of the review notice; and
 - (c) make a decision (the "review decision") to-
 - (i) confirm or revoke the original decision; or
 - (ii) vary the original decision in a way the administering authority considers appropriate.
- (6) The application does not stay the original decision.
- (7) The application must not be dealt with by-
 - (a) the person who made the original decision; or
 - (b) a person in a less senior office than the person who made the original decision.
- (8) Within 14 days after making the decision, the administering authority must give written notice of the decision to the applicant and persons who were given notice of the original decision.
- (9) The notice must-
 - (a) include the reasons for the review decision; and
 - (b) inform the person of their right of appeal against the decision.
- (10) If the administering authority does not comply with subsections (5) or (8), the authority is taken to have made a decision confirming the original decision.
- (11) Subsection (7) applies despite section *Acts Interpretation Act 1954*, section 27A.
- (12) This section does not apply to an original decision made by-
 - (a) for a matter, the administration and enforcement of which has been devolved to a local government, the local government itself or the chief executive officer of the local government personally; or
 - (b) for another matter-the chief executive personally.

Stay of operation of original decisions

522.

- (1) If an application is made for review of an original decision, the applicant may immediately apply for a stay of the decision to-
 - (a) for an original decision mentioned in schedule 1, part 1 - the tribunal; or
 - (b) for an original decision mentioned in schedule 1, part 2 - the Court.
- (2) The tribunal or Court may stay the decision to secure the effectiveness of the review and any later appeal to the tribunal or Court.



- (3) A stay may be given on conditions the tribunal or Court considers appropriate and has effect for the period stated by the tribunal or Court.
- (4) The period of a stay must not extend past the time when the administering authority reviews the decision and any later period the tribunal or Court allows the applicant to appeal against the review decision.

Who may appeal

531.

- (1) A dissatisfied person who is dissatisfied with a review decision, other than a review decision to which subdivision 1 applies, may appeal against the decision to the Court.
- (2) The chief executive may appeal against another administering authority's decision (whether an original or review decision) to the Court.
- (3) A dissatisfied person who is dissatisfied with an original decision to which section 521 does not apply may appeal against the decision to the Court.



Queensland Government

**Environmental Protection Agency
Queensland Parks and Wildlife Service**

Northern Regional Office (Townsville)
PO Box 5391 TOWNSVILLE MC QLD 4810
Phone: (07) 4722 5353 Fax: (07) 4722 5351
www.epa.qld.gov.au ABN: 87221158786

Licence No. NR0560
(with development approval)
Section 86 Environmental Protection Act 1994

This licence, issued under the Environmental Protection Act 1994, allows the administering authority to make conditions with regard to financial assurances and matters relating to an Integrated Environmental Management System (IEMS). The licence and its conditions must be considered in conjunction with any conditions imposed on your development approval granted under the Integrated Planning Act 1997 or its equivalent.

**Under the provisions of the
Environmental Protection Act 1994 this licence is issued to:**

Cardwell Properties Pty Ltd
Bruce Highway
Cardwell QLD 4849

Cardwell Properties Pty Ltd
P.O Box 444
Main Beach QLD 4217

in respect of carrying out the environmental relevant activity:

15(b) Sewage treatment - Operating a standard sewage treatment works having a peak design capacity to treat sewage of 100 or more equivalent persons but less than 1 500 equivalent persons

at the following place(s):

Lot 1 on Plan C1043, Lot 2 on Plan CWL1212, Lot 3 on Plan C1043, Lot 41 on Plan C1043, Lot 42 on Plan C1043 and Lot 3 on plan RP733367.

located at:

Bruce Highway, Cardwell, QLD 4849.

This licence is subject to the conditions set out in the attached schedules.

The anniversary date of this licence is 26 October.

This licence takes effect from **26 October 2004**.


Signed

26 October 2004

Date

Tania Laurencont
District Manager
Delegate of Administering Authority
Environmental Protection Act 1994

Note: This licence document is not proof of the current status of the licence. The current status of the licence may be ascertained by contacting the Environmental Protection Agency.

Schedule of conditions

The aforementioned description of the ERA for which this authority is issued is simply a restatement of the activity as prescribed in the legislation at the time of issuing this authority. Where there is any conflict between the above description of the ERA for which this authority is issued and the conditions as specified in this authority as to the scale, intensity or manner of carrying out of the ERA, then such conditions prevail to the extent of the inconsistency.

This authority incorporates the following schedules of conditions relevant to various issues:

- Schedule A - General Conditions
- Schedule H - Definitions
- Schedule I - Maps / Plans

Schedule A - General Conditions

There are no conditions prescribed for this Schedule.

END OF CONDITIONS FOR SCHEDULE A

Schedule H - Definitions

Words and phrases used throughout this licence or development approval are defined below:

Where a definition for a term used in this authority is sought and the term is not defined within this authority the definitions provided in the *Environmental Protection Act 1994*, its regulations, and Environmental Protection Policies shall be used.

Word Definitions

“administering authority” means the Environmental Protection Agency or its successor.

END OF CONDITIONS FOR SCHEDULE H

Schedule I - Maps / Plans

There are no attachments to this schedule.

END OF CONDITIONS FOR SCHEDULE I

END OF ENVIRONMENTAL AUTHORITY



Queensland Government

Environmental Protection Agency
Queensland Parks and Wildlife Service

COPY

Northern Regional Office (Townsville)
PO Box 5391 TOWNSVILLE MC QLD 4810
Phone: (07) 4722 5353 Fax: (07) 4722 5351
www.epa.qld.gov.au ABN: 87221158786

Notice of development application decision

Sections 3.5.11 and 3.5.15 *Integrated Planning Act 1997*

This notice is issued by the administering authority pursuant to sections 3.5.11 and 3.5.15 of the Integrated Planning Act 1997, to advise you of a decision or action.

Enquiries to : Barry James
Telephone : (07) 4722 5353
Your reference : NR0560DA
Our reference : TSV4482

Cardwell Properties Pty Ltd
Bruce Highway
Cardwell QLD 4849

CC: Cardwell Properties Pty Ltd
P.O. Box 444
Main Beach QLD 4217

Attention: Mr Keith Williams,

Re: Application (No. NR0560DA) for development approval by Cardwell Properties Pty Ltd for assessable activity to be carried out at a place situated at Bruce Highway, Cardwell, QLD 4849

Pursuant to part 1 and 2 of Schedule 1A of the *Integrated Planning Regulation 1998*, the Environmental Protection Agency is the assessment manager for the development application.

Assessment Manager information

Assessment Manager office: Environmental Protection Agency
Northern Regional Office (Townsville)
Postal address: PO Box 5391 TOWNSVILLE MC QLD 4810
Telephone: (07) 4722 5353
Fax: (07) 4722 5351

The Environmental Protection Agency, acting as assessment manager under the *Integrated Planning Act 1997* for your application, advises that the development application decision notice about development prescribed under a regulation under the *Environmental Protection Act 1994* for schedule 8 part 1 item 6 of the *Integrated Planning Act 1997* is attached.

Entered/Validated in Ecotrack 5.6.05
Project Reference 264465
Development Approval # ENC000214505
Registration Certificate # ENR000214605
This version amended on _____
Cancelled/Surrendered/Transferred Date: _____
Continuing Registration # _____



Y903

Should you require any further information please do not hesitate to contact Barry James on either phone (07) 4722 5353 or e-mail: barry.james@epa.qld.gov.au


Signed

26 October 2004

Date

Tania Laurencont
District Manager
Delegate of Administering Authority
Environmental Protection Agency

Environmental Protection Agency
Queensland Parks and Wildlife Service
Environmental Protection Agency
Queensland Parks and Wildlife Service
Environmental Protection Agency
Queensland Parks and Wildlife Service
Environmental Protection Agency
Queensland Parks and Wildlife Service
Environmental Protection Agency
Queensland Parks and Wildlife Service

Development application decision notice

Section 3.5.11 and 3.5.15 *Integrated Planning Act 1997*

Applicant:	Cardwell Properties Pty Ltd
EPA Development Application number:	NR0560DA
Date application received by EPA:	12 May 2004
Date of decision:	26 October 2004
Relevant Laws and Policies:	<i>Environmental Protection Act 1994</i> and subordinate legislation
Jurisdiction:	Item 7 of Schedule 2 of the <i>Integrated Planning Regulation 1998</i>

Development Description:

Carrying out of Environmentally Relevant Activity (ERA):

15(b) Sewage treatment - Operating a standard sewage treatment works having a peak design capacity to treat sewage of 100 or more equivalent persons but less than 1 500 equivalent persons

at the following place(s):

Lot 1 on Plan C1043, Lot 2 on Plan CWL1212, Lot 3 on Plan C1043, Lot 41 on Plan C1043, Lot 42 on Plan C1043 and Lot 3 on Plan RP733367

located at:

Bruce Highway, Cardwell, QLD 4849

Type of development

Material change of use of premises is:

- the start of a new use of the premises

Decision on Development Application

In deciding the application, the Environmental Protection Agency, as assessment manager approves all of the application and includes in the approval any concurrence agency conditions as a development permit.

Further development permits required

Nil

Referral agencies

Concurrence Agencies: Nil
Advice Agencies: Nil
Referral Agencies: Nil

Additional information for applicants

This approval pursuant to the *Environmental Protection Act 1994* does not remove the need to obtain any further approval for this development which might be required by other State and/or Commonwealth legislation. Applicants are advised to check with all relevant statutory authorities. Applicants also should comply with all relevant legislation.

It is a requirement of the *Environmental Protection Act 1994* that if the owner or occupier of this site becomes aware a Notifiable Activity (as defined under schedule 2 of the *Environmental Protection Act 1994*) is being carried out on this land or that the land has been affected by a hazardous contaminant, they must, within 30 days after becoming aware the activity is being carried out, give notice to the Environmental Protection Agency. A list of Notifiable Activities is provided within Schedule 2 of the *Environmental Protection Act 1994*.

Appeal

When issuing a decision notice under the *Integrated Planning Act 1997*, the assessment manager must state the rights of appeal for the applicant (section 3.5.15(2)(j)). The rights of appeal are attached to the back of this notice.


Signed

26 October 2004

Date

Tania Laurencont
District Manager
Delegate of Administering Authority
Environmental Protection Act 1994

Conditions of the development approval

This development approval consists of the following schedules of conditions relevant to various issues:

The aforementioned description of the environmentally relevant activity (ERA) for which this development approval is issued is simply a restatement of the activity as prescribed in the legislation at the time of issuing this development approval. Where there is any conflict between the above description of the ERA for which this development approval is issued and the conditions as specified in this development approval as to the scale, intensity or manner of carrying out of the ERA, then such conditions prevail to the extent of the inconsistency.

This development approval authorises the ERA. It does not authorise environmental harm unless a concurrence agency condition within this development approval explicitly authorises that harm. Where there is no condition or the development approval is silent on a matter, the lack of a condition or silence shall not be construed as authorising harm.

- Schedule A - Activity
- Schedule B - Air
- Schedule C - Water
- Schedule D - Noise
- Schedule E - Waste
- Schedule F - Land
- Schedule G - Community
- Schedule H - Definitions
- Schedule I - Maps / Plans

Schedule A - Activity

Prevent and /or minimise likelihood of environmental harm

- (A1-1) In carrying out the environmentally relevant activities, you must take all reasonable and practicable measures to prevent and / or to minimise the likelihood of environmental harm being caused. Any environmentally relevant activity, that, if carried out incompetently, or negligently, may cause environmental harm, in a manner that could have been prevented, shall be carried out in a proper manner in accordance with the conditions of this approval.

NOTE: This approval authorises the environmentally relevant activity. It does not authorise environmental harm unless a condition contained within this approval explicitly authorises that harm. Where there is no condition or the approval is silent on a matter, the lack of a condition or silence shall not be construed as authorising harm.

Maintenance of measures, plant and equipment

- (A2-1) The holder must:
- install all measures, plant and equipment necessary to ensure compliance with the conditions of this environmental authority; and
 - maintain such measures, plant and equipment in a proper and efficient condition; and
 - operate such measures, plant and equipment in a proper and efficient manner.
- (A2-2) A visual and audible alarm system shall be installed and maintained to alert the holder to any mechanical or electrical malfunctions of the plant

Site based management plan

- (A3-1) From commencement of the activity, a Site Based Management Plan (SBMP) must be implemented. The SBMP must identify all sources of environmental harm, including but not limited to the actual and potential release of all contaminants, the potential impact of these sources and what actions will be taken to prevent the likelihood of environmental harm being caused. The SBMP must also provide for the review and 'continual improvement' in the overall environmental performance of all Environmentally Relevant Activities that are carried out.

The site based management plan must address the following matters:

- Environmental commitments - a commitment by senior management to achieve environmental goals.
- Identification of environmental issues and potential impacts.
- Control measures for routine operations to minimise likelihood of environmental harm.
- Contingency plans and emergency procedures for non-routine situations.
- Organisational structure and responsibility.
- Effective communication.
- Monitoring of the contaminant releases.
- Conducting environmental impact assessments.
- Staff training.
- Record keeping.
- Periodic review of environmental performance and continual improvement.

Peak Design Capacity

- (A3-2) The development permit only authorises sewage treatment for a maximum daily inflow volume of 412 kilolitres.

Records

- (A5-1) Record, compile and keep all monitoring results required by this document and present this information to the administering authority when requested, in a specified format.

Acid sulphate soils (ASS)

- (A7-1) You must comply with the latest edition of the Queensland Environmental Protection Agency's INSTRUCTIONS FOR THE TREATMENT AND MANAGEMENT OF ACID SULFATE SOILS, 2001, produced by the Queensland Environmental Protection Agency in consultation with the Department of Natural Resources and Mines and the Department of Primary Industries.
- (A7-2) Acid sulfate soils must be managed such that contaminants are not be directly or indirectly released, as a result of the activity, to any waters or the bed and banks of any waters.

Annual monitoring report (Sewage treatment)

- (A8-1) An annual monitoring report must be provided to the administering authority with the annual return. This report shall include but not be limited to:
- a summary of the previous twelve (12) months' monitoring results obtained under any monitoring programs required under this authority and, in graphical form showing relevant limits, a comparison of the previous twelve (12) months monitoring results to both this authority limits and to relevant prior results;
 - an evaluation/explanation of the data from any monitoring programs; and
 - a summary of any record of quantities of releases required to be kept under this authority; and
 - a summary of the record of equipment failures or events recorded for any site under this authority; and
 - an outline of actions taken or proposed to minimise the environmental risk from any deficiency identified by the monitoring or recording programs; and
 - the number of domestic tenements newly connected to the sewage treatment works during the previous twelve (12) months; and
 - the progressive total number of connections; and
 - a summary of any trade waste agreements entered into or amended during the year, including the nature of the industry.

END OF CONDITIONS FOR SCHEDULE A

Schedule B - Air

Nuisance

- (B1-2) The release of noxious or offensive odours or any other noxious or offensive airborne contaminants resulting from the activity must not cause a nuisance at any odour sensitive place.

Dust nuisance

- (B2-1) The release of dust and/or particulate matter resulting from the activity must not cause an environmental nuisance at any dust sensitive place.

END OF CONDITIONS FOR SCHEDULE B

Schedule C - Water

Monitoring

- (C1-1) Monitoring must be undertaken and records kept of contaminant releases to waters from the discharge location for the parameters and not less frequently than specified in Schedule C Table 1. All determinations of the quality of contaminants released must be:
- made in accordance with methods prescribed in the latest edition of the Environment Protection Agency Water Quality Sampling Manual; and
 - carried out on samples that are representative of the discharge.

Schedule C - Table 1 (Release limits)

Monitoring point	Discharge location	Quality characteristics	Release limit			Monitoring frequency
			Minimum	50th Percentile	Maximum	
Outlet from wet weather storage tanks	W1 (One Mile Creek - Upstream side of road culvert under the Bruce Highway adjoining Lot 2 on Plan CWL1212)	Suspended Solids			5 mg/L	At least once during a discharge, then weekly there after during a discharge.
		5 Day - Biological Oxygen Demand			10 mg/L	
		Total Nitrogen		5 mg/L	10 mg/L	
		Total Phosphorous		1 mg/L	2 mg/L	
		Faecal Coliform		10 Colony forming units per 100ml	100 Colony forming units per 100ml	
		pH	6.5 pH units		8.5 pH units	
		Dissolved Oxygen	2 mg/L			

Release to waters

- (C3-2) Contaminants must only be released to waters after wet weather storage has reached capacity due to wet weather conditions preventing irrigation, from the discharge location and in compliance with the release limits listed in Schedule C Table 1.

Discharge Location W1 - namely release of tertiary treated effluent from Cardwell Properties Pty Ltd sewage treatment plant wet weather storage tanks located on Lot 1 on Plan C1043 to One Mile Creek at the upstream side of the road culvert under the Bruce Highway adjoining Lot 2 on Plan CWL1212.

- (C3-3) Withstanding condition C3-2, contaminants must only be released to One Mile Creek when a minimum dilution factor of **10** - Creek flow to **1** - treated effluent is achieved and creek flow overspills the weir located between One Mile Creek and the Grand Canal.
- (C3-4) A flow measurement device to measure creek water flows must be located on One Mile Creek adjacent within Lot 1 on Plan C1043 for the purpose of determining when release can occur in accordance with condition C3-3.
- (C3-5) The daily volume of contaminants released to waters must be determined or estimated by an appropriate method, for example a flow meter, and records kept of such determinations and estimates.
- (C3-6) The total quantity of contaminants released to waters via the release point listed in Schedule C Table 3, must not exceed the respective quantities stated for each release point in Schedule C Table 3 on any wet weather day that prevents irrigation that has resulted in wet weather storage exceeding capacity.

Schedule C - Table 3

Maximum permitted quantity of release	
Release point	Maximum release on any wet weather day **
W1 (One Mile Creek - Upstream side of road culvert under the Bruce Highway adjoining Lot 2 on Plan CWL1212)	412 Kilolitres

** "Maximum release on any wet weather day" means releases may only occur when wet weather prevents irrigation as conditioned in Schedule F and wet weather storage tanks have reached capacity.

Discharge location details

- (C4-2) The discharge location to One Mile Creek must be submerged such that the top of the outfall pipe is at least 0.5 metres under water at all times during discharge.

Stormwater management

- (C5-1) There must be no release of stormwater runoff that has been in contact with any contaminants at the site to any waters, roadside gutter or stormwater drain.

Contaminant and sewage pump station

- (C6-1) Contaminant pumping stations must be fitted with stand-by pumps and pump-failure alarms as well as high level alarms to warn of imminent pump station overflow. All alarms must be able to operate without mains power.

Tank conditions

- (C7-1) All tanks used for the storage or treatment of contaminants, sewage or wastes at or on the authorised place must be constructed, installed and maintained:
- so as to minimise the likelihood of any release of effluent from the tanks to any waters (including ground water);
 - so that releases from the wet weather storage tanks only occurs as a result of the tanks reaching capacity due to weather conditions preventing irrigation; and
 - so that there is a minimum wet weather storage capacity of 1.5 Mega litres per 500 Equivalent Persons.

Release to Groundwater

- (C8-1) A Groundwater Monitoring Program must be developed and implemented prior to the commencement of operations of the sewage treatment system, which will effectively detect the presence and extent of contamination of groundwater from the treated effluent irrigation area as detailed in Schedule F.
- (C8-2) The Groundwater Monitoring Program required under C8-1 must be designed by a suitable qualified person and must include sufficient monitoring points and/or bores to obtain representative samples of groundwater both up-gradient and down gradient of the potential influence of the treated effluent irrigation area as detailed in Schedule F.
- (C8-3) Prior to commencement of the operation of the treated effluent irrigation areas, background groundwater quality monitoring must be conducted at the monitoring bores identified in the Ground

Water Monitoring Program required under condition C8-1 to determine baseline ground water quality characteristics.

- (C8-4) Groundwater monitoring must be undertaken and records kept of a monitoring program that detects any possible impacts on groundwater from releases of contaminants to the irrigation area. Groundwater monitoring must be undertaken at the frequency, and for the parameters specified in Schedule C - Table 4. All determinations of the quality of contaminants released must be:
- made in accordance with methods prescribed in the latest edition of the Environment Protection Agency Water Quality Sampling Manual; and
 - carried out on samples that are representative of the groundwater.

Schedule C - Table 4 (Monitoring program)

Quality characteristics	Units	Frequency
Total Nitrogen (as N)	mg/L	Six Monthly*
Total Phosphorous (as P)	mg/L	
Ammonia (as N)	mg/L	
Nitrate (as N)	mg/L	
Nitrite (as N)	mg/L	
Total Kjeldahl Nitrogen (as N)	mg/L	
Faecal Coliform	Colony forming units per 100 millilitres	
pH	pH units	
Conductivity	Micro siemens / cm	

* Monitoring to be conducted biannually such as possible that both wet and dry seasons are represented.

- (C8-5) Standing groundwater levels in metres must be measured and recorded on each occasion that samples are obtained. Such measurement must be reported as the depth in metres from an established reference point, relative to Australian Height Datum, to water surface within the bore.

END OF CONDITIONS FOR SCHEDULE C

Schedule D - Noise and vibration

Noise nuisance

- (D1-1) Noise from activities must not cause an environmental nuisance at any noise affected premises.

Noise monitoring

- (D2-1) When requested by the Administering Authority, noise monitoring must be undertaken to investigate any complaint of noise nuisance, and the results notified within 14 days to the administering authority. Monitoring must include:
- L_A 10, adj, 10 mins
 - L_A 1, adj, 10 mins
 - the level and frequency of occurrence of impulsive or tonal noise;
 - atmospheric conditions including wind speed and direction;
 - effects due to extraneous factors such as traffic noise; and
 - location, date and time of recording.
- (D2-2) The method of measurement and reporting of noise levels must comply with the latest edition of the Environmental Protection Agency's Noise Measurement Manual.

END OF CONDITIONS FOR SCHEDULE D

Schedule E - Waste

Waste handling

- (E5-1) All regulated waste removed from the site must be removed by a person who holds a current approval to transport such waste under the provisions of the *Environmental Protection Act 1994*.
- (E5-2) Records must be kept for five years, and must include the following information:
- date of pickup of waste;
 - description of waste;
 - cross reference to relevant waste transport documentation;
 - quantity of waste;
 - origin of the waste;
 - destination of the waste; and
 - intended fate of the waste, for example, type of waste treatment, reprocessing or disposal.

NOTE: Records of documents maintained in compliance with a waste tracking system established under the Environmental Protection Act 1994 or any other law for regulated waste will be deemed to satisfy this condition.

END OF CONDITIONS FOR SCHEDULE E

Schedule F - Land

Land disposal

- (F2-1) The only contaminants permitted to be released to land are treated effluents to the areas shown in Figure 1 Schedule I in compliance with the limits levels stated in Table 1 of the Land Schedule and the conditions of this authority.

Schedule F - Table 1 (Release limits - 'Land')

Quality characteristics	Release Limit		
	Minimum	50th Percentile	Maximum
Suspended Solids			5 mg/L
5 Day - Biological Oxygen Demand			10 mg/L
Total Nitrogen		5 mg/L	10 mg/L
Total Phosphorous		1 mg/L	2 mg/L
Faecal Coliform		10 Colony forming units per 100ml	100 Colony forming units per 100ml
PH	6.5 pH units		8.5 pH units
Dissolved Oxygen	2 mg/L		

- (F2-2) The irrigation of effluent must be carried out in a manner such that:
- vegetation is not damaged;
 - soil erosion and soil structure damage is avoided;
 - there is no surface ponding of effluent;
 - percolation of effluent beyond the plant root zone is minimised;
 - the capacity of the land to assimilate nitrogen, phosphorus, salts, organic matter as measured by oxygen demand and water is not exceeded; and
 - the quality of ground water is not adversely affected.
- (F2-3) Notices must be prominently displayed on any effluent irrigation area warning the public that the area is irrigated with effluent and not to use or drink the effluent. These notices must be maintained in a visible and legible condition.
- (F2-5) Monitoring must be undertaken and records kept of a monitoring program of contaminant releases to the irrigation area at the monitoring points, frequency, and for the parameters specified in Schedule F - Table 2.

Schedule F - Table 2 (Monitoring program)

Monitoring point	Quality characteristics	Units	Frequency
Outlet from effluent storage tanks when a discharge occurs.	Suspended Solids	mg/L	Monthly
	5 Day - Biological Oxygen Demand	mg/L	Monthly
	Total Nitrogen	mg/L	Monthly
	Total Phosphorous	mg/L	Monthly
	Faecal Coliform	Colony forming units per 100 millilitres	Monthly
	pH	pH units	Weekly
	Dissolved Oxygen	mg/L	Weekly

- (F2-6) The daily volume of contaminants released to land must be determined or estimated by an appropriate method, for example a flow meter, and records kept of such determinations and estimates.
- (F2-7) When conditions prevent the irrigation of treated effluent to land (such as during or following rain events), the effluent must be directed to wet weather storage tanks.
- (F2-8) The total quantity of treated effluent released to land for the purpose of irrigation via the release point listed in Schedule F Table 3, must not exceed the respective quantities stated for each release point in Schedule F Table 3 on any dry weather day.

Schedule F - Table 3

Maximum daily quantity of treated effluent released on any dry weather day*	
Release point	Maximum daily release
Outlet of effluent storage tank	620 Kilolitres

Notes: * "Dry weather day" means when conditions are such that irrigation will not result in surface ponding or runoff over the irrigation area.

Preventing contaminant release to land

- (F3-2) Spillage of all chemicals and fuels must be contained within an on-site containment system and controlled in a manner that prevents environmental harm.

NOTE: All petroleum product storage's must be designed, constructed and maintained in accordance with AS 1940 - Storage and Handling of Flammable and Combustible Liquids.

END OF CONDITIONS FOR SCHEDULE F

Schedule G - Community

Complaint response

- (G1-1) All complaints received must be recorded including investigations undertaken, conclusions formed and action taken. This information must be made available to the administering authority on request.
- (G1-2) In consultation with the administering authority, cooperate with and participate in any community environmental liaison committee established in respect of either the site specifically, or the industrial estate where the site is located.

END OF CONDITIONS FOR SCHEDULE G

Schedule H - Definitions

Words and phrases used throughout this licence or development approval are defined below:
Where a definition for a term used in this approval is sought and the term is not defined within this approval the definitions provided in the *Environmental Protection Act 1994*, its regulations, and Environmental Protection Policies shall be used.

Word Definitions

"administering authority" means the Environmental Protection Agency or its successor.

"you" means the holder of this Environmental Authority or owner / occupier of the land which is the subject of this Development Approval.

"site" means the place to which this environmental authority relates or the premises to which this development approval relates.

"authorised place" means the place authorised under this environmental authority/development approval for the carrying out of the specified environmentally relevant activities.

"this authority" means this environmental authority/development approval.

"authority" means level 1 licence (without development approval), or level 1 approval (without development approval), or level 2 approval (without development approval) under the *Environmental Protection Act 1994*.

"approval" means 'notice of development application decision' or 'notice of concurrence agency response' under the *Integrated Planning Act 1997*

"dust sensitive place" means -

- a dwelling, mobile home or caravan park, residential marina or other residential place;
- a motel, hotel or hostel;
- a kindergarten, school, university or other educational institution;
- a medical centre or hospital;
- a protected area;
- a park or gardens; or
- a place used as an office or for business or commercial purposes.
and includes the curtilage of any such place.

"odour sensitive place" has the same meaning as a "dust sensitive place"

"dwelling" means any of the following structures or vehicles that is principally used as a residence-

- a house, unit, motel, nursing home or other building or part of a building;
- a caravan, mobile home or other vehicle or structure on land;
- a water craft in a marina.

"noxious" means harmful or injurious to health or physical well being.

"offensive" means causing offence or displeasure; is disagreeable to the sense; disgusting, nauseous or repulsive.

"nuisance sensitive place" includes -

- a dwelling, residential allotment, mobile home or caravan park, residential marina or other residential premises; or
 - a motel, hotel or hostel; or
 - a kindergarten, school, university or other educational institution; or
 - a medical centre or hospital; or
 - a protected area under the Nature Conservation Act 1992, the Marine Parks Act 1992 or a World Heritage Area; or
 - a public thoroughfare, park or gardens; or
 - a place used as a workplace, an office or for business or commercial purposes.
- and includes a place within the curtilage of such a place reasonably used by persons at that place.

" $L_{A 10, \text{adj}, 10 \text{ mins}}$ " means the A-weighted sound pressure level, (adjusted for tonal character and impulsiveness of the sound) exceeded for 10% of any 10 minute measurement period, using Fast response.

" $L_{A 1, \text{adj}, 10 \text{ mins}}$ " means the A-weighted sound pressure level, (adjusted for tonal character and impulsiveness of the sound) exceeded for 1% of any 10 minute measurement period, using Fast response

"noise affected premises" means a "noise sensitive place" or a "commercial place"

"noise sensitive place" means -

- a dwelling, mobile home or caravan park, residential marina or other residential premises; or
 - a motel, hotel or hostel; or
 - a kindergarten, school, university or other educational institution; or
 - a medical centre or hospital; or
 - a protected area; or
 - a park or gardens.
- and includes the curtilage of such place.

"commercial place" means a place used as an office or for business or commercial purposes.

"intrusive noise" means noise that, because of its frequency, duration, level, tonal characteristics, impulsiveness or vibration -

- is clearly audible to, or can be felt by, an individual; and
- annoys the individual.

In determining whether a noise annoys an individual and is unreasonably intrusive, regard must be given to Australian Standard 1055.2 - 1997 Acoustics - Description and Measurement of Environmental Noise Part 2 - Application to Specific Situations.

"waters" includes river, stream, lake, lagoon, pond, swamp, wetland, unconfined surface water, unconfined water natural or artificial watercourse, bed and bank of any waters, dams, non-tidal or tidal waters (including the sea), stormwater channel, stormwater drain, roadside gutter, stormwater run-off, and groundwater and any part thereof.

"50th percentile" means not more than three (3) of the measured values of the quality characteristic are to exceed the stated release limit for any six (6) consecutive samples for a release/monitoring point at any time during the environmental activity(ies) works.

"Maximum" means that the measured value of the quality characteristics or contaminant must not be greater than the higher release limit stated.



"land" in the "land schedule" of this document means land excluding waters and the atmosphere.

"mg/L" means milligrams per litre.

"NTU" means nephelometric turbidity units

"regulated waste" means non-domestic waste mentioned in Schedule 7 of the Environmental Protection Regulation 1998 (whether or not it has been treated or immobilised), and includes:

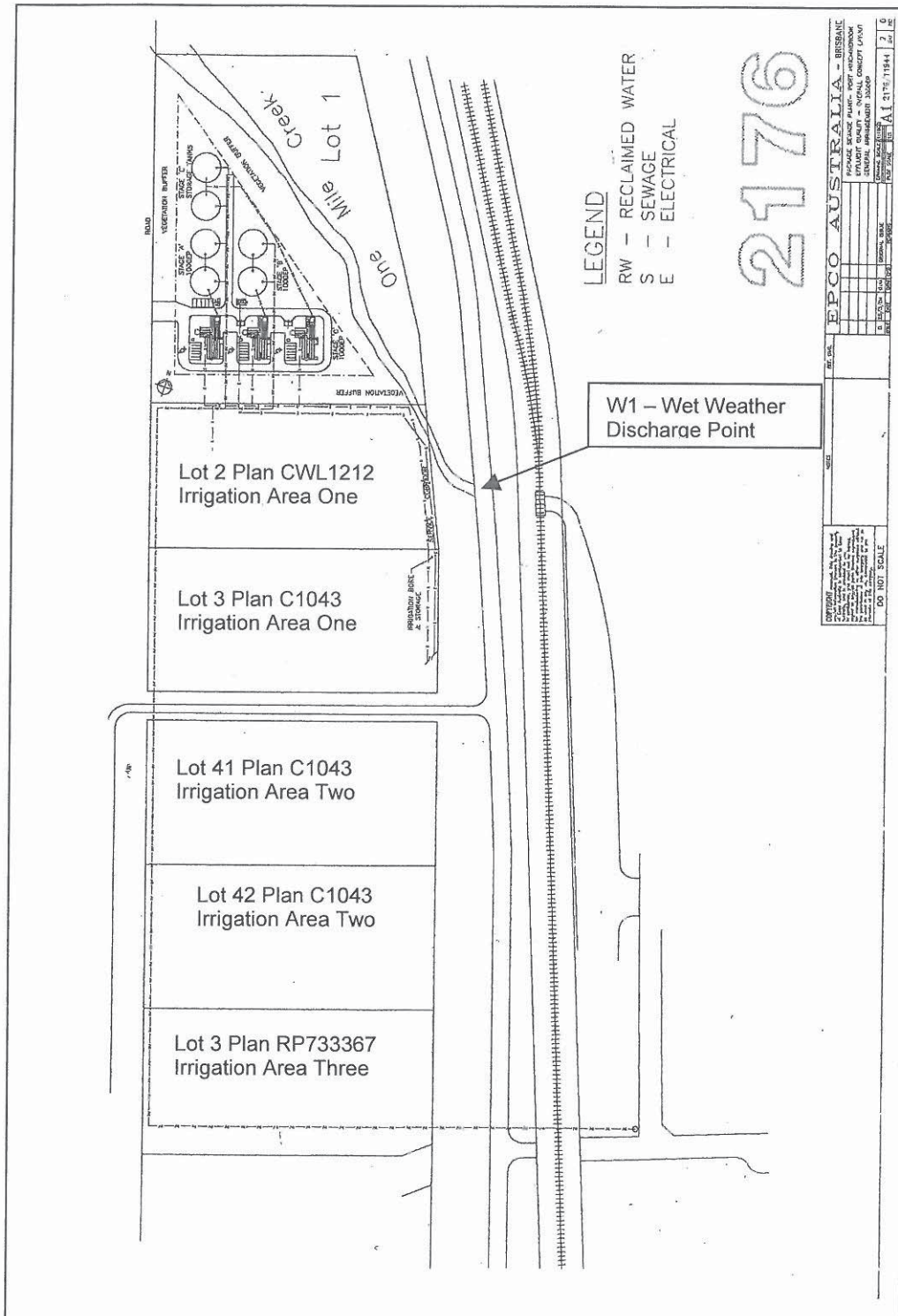
- for an element - any chemical compound containing the element; and
- anything that has contained the waste.

"annual return" means the return required by the annual notice (under section 316 of the Environment Protection Act, 1994) for the section 86(2) licence that applies to the development approval.

END OF DEFINITIONS FOR SCHEDULE H

Schedule I - Maps / Plans

Figure 1: Irrigation Area and Wet Weather Discharge Point



END OF CONDITIONS FOR SCHEDULE I

END OF DEVELOPMENT APPROVAL

Extract from the *Integrated Planning Act 1997*

Division 8—Appeals to court relating to development applications

Appeals by applicants

- 4.1.27 (1) An applicant for a development application may appeal to the court against any of the following -
- (a) the refusal, or the refusal in part, of a development application;
 - (b) a matter stated in a development approval, including any condition applying to the development, and the identification of a code under section 3.1.6;
 - (c) the decision to give a preliminary approval when a development permit was applied for;
 - (d) the length of a currency period;
 - (e) a deemed refusal.
- (2) An appeal under subsection (1)(a) to (d) must be started within 20 business days (the “**applicant’s appeal period**”) after the day the decision notice or negotiated decision notice is given to the applicant.
- (3) An appeal under subsection (1)(e) may be started at any time after the last day a decision on the matter should have been made.

Appeals by submitters

- 4.1.28 (1) A submitter for a development application may appeal to the court about -
- (a) the giving of a development approval, including any conditions (or lack of conditions) or other provisions of the approval; or
 - (b) the length of a currency period for the approval.
- (2) The appeal must be started within 20 business days (the “**submitter’s appeal period**”) after the day the decision notice or negotiated decision notice is given to the submitter.
- (3) If a person withdraws a submission before the application is decided, the person may not appeal the decision.
- (4) If an application involves both impact assessment and code assessment, appeal rights for submitters are available only for the part of the application involving impact assessment.

Appeals by advice agency submitters

- 4.1.29 (1) An advice agency may, within the limits of its jurisdiction, appeal to the court about the giving of a development approval for a development application if -
- (a) the development application involves impact assessment; and
 - (b) the advice agency told the applicant and the assessment manager to treat its response to the application as a submission for an appeal.
- (2) The appeal must be started within 20 business days after the day the decision notice or negotiated notice is given to the advice agency as a submitter.

Appeals for matters arising after approval given (co-respondents)

- 4.1.30 (1) For a development approval given for a development application, a person to whom any of the following notices have been given may appeal to the court against the decision in the notice -
- (a) a notice giving a decision on a request for an extension of the currency period for an approval;
 - (b) a notice giving a decision on a request to make a minor change to an approval.
- (2) The appeal must be started within 20 business days after the day the notice of the decision is given to the person.
- (3) Subsection (1)(a) does not apply if the approval resulted from a development application (superseded planning scheme) that was assessed as if it were an application made under a superseded planning scheme.

Division 9 - Appeals to court about other matters

Appeals for matters arising after approval given (no co-respondents)

- 4.1.31 (1) A person to whom any of the following notices have been given may appeal to the court against the decision in the notice -
- (a) a notice giving a decision on a request to change or cancel a condition of a development approval;
 - (b) a notice under section 6.1.44 giving a decision to change or cancel a condition of a development approval.
- (2) The appeal must be started within 20 business days after the day the notice of the decision is given to the person.

Appeals against enforcement notices

- 4.1.32 (1) A person who is given an enforcement notice may appeal to the court against the giving of the notice.
- (2) The appeal must be started within 20 business days after the day notice is given to the person.

Stay of operation of enforcement notice

- 4.1.33 (1) The lodging of a notice of appeal about an enforcement notice stays the operation of the enforcement notice until -
- (a) the court, on the application of the entity issuing the notice, decides otherwise; or
 - (b) the appeal is withdrawn; or
 - (c) the appeal is dismissed.
- (2) However, subsection (1) does not apply if the enforcement notice is about -
- (a) a work, if the enforcement notice states the entity believes the work is a danger to persons or a risk to public health; or
 - (b) carrying out development that is the demolition of a work.

Appeals against decisions on compensation claims

- 4.1.34 (1) A person who is dissatisfied with a decision under section 5.4.8 or 5.5.3 for the payment of compensation may appeal to the court against -
- (a) the decision; or
 - (b) a deemed refusal of the claim.
- (2) An appeal under subsection (1)(a) must be started with 20 business days after the day notice of the decision is given to the person.
- (3) An appeal under subsection (1)(b) may be started at any time after the last day a decision on the matter should have been made.

Appeals against decisions on requests to acquire designated land under hardship

- 4.1.35 (1) A person who is dissatisfied with a designator's decision to refuse a request made by the person under section 2.6.19, may appeal to the court against -
- (a) the decision; or
 - (b) a deemed refusal of the request.
- (2) An appeal under subsection (1)(a) must be started within 20 business days after the day notice of the decision is given to the person.
- (3) An appeal under subsection (1)(b) may be started at any time after the last day a decision on the matter should have been made.

Appeals from tribunals

- 4.1.37 (1) A party to a proceeding decided by a tribunal may appeal to the court against the tribunal's decision, but only on the ground -
- (a) of error or mistake in law on the part of the tribunal; or
 - (b) that the tribunal had no jurisdiction to make the decision or exceeded its jurisdiction in making the decision.
- (2) An appeal against a tribunal's decision must be started within 20 business days after the day notice of the tribunal's decision is given to the party.

Court may remit matter to tribunal

- 4.1.38 If an appeal includes a matter within the jurisdiction of a tribunal and the court is satisfied the matter should be dealt with by a tribunal, the court must remit the matter to the tribunal for decision.

Division 10 - Making an appeal to court

How appeals to the court are started

- 4.1.39 (1) An appeal is started by lodging written notice of appeal with the registrar of the court.
- (2) The notice of appeal must state the grounds of the appeal.
 - (3) The person starting the appeal must also comply with the rules of the court applying to the appeal.
 - (4) However, the court may hear and decide an appeal even if the person has not complied with subsection (3).

Certain appellants must obtain information about submitters

- 4.1.40 (1) If the applicant or a submitter for a development application appeals about the part of the application involving impact assessment, the appellant must ask the assessment manager to give the appellant the name and address of each principal submitter who made a properly made submission about the application and has not withdrawn the submission.
- (2) The assessment manager must give the information requested under subsection (1) as soon as practicable.

Notice of appeal to other parties (div 8)

- 4.1.41 (1) An appellant under division 8 must, within 10 business days after the day the appeal is started (or if information is requested under section 4.1.40, within 10 business days after the day the appellant is given the information) give written notice of the appeal to -
- (a) if the appellant is an applicant - the assessment manager, any concurrence agency, any principal submitter whose submission has not been withdrawn and any advice agency treated as a submitter whose submission has not been withdrawn; or
 - (b) if the appellant is a submitter or an advice agency whose response to the development application is treated as a submission for an appeal - the assessment manager, the applicant and any concurrence agency; or
 - (c) if the appellant is a person to whom a notice mentioned in section 4.1.30 has been given - the assessment manager and any entity that was a concurrence agency for the development application.
- (2) The notice must state -
- (a) the grounds of the appeal; and
 - (b) if the person given the notice is not the respondent or a co-respondent under section 4.1.43 - that the person, within 10 business days after the day the notice is given, may elect to become a co-respondent to the appeal.

Notice of appeal to other parties (div 9)

- 4.1.42 (1) An appellant under division 9 must, within 10 business days after the day the appeal is started give written notice of the appeal to -
- (a) if the appellant is a person to whom a notice mentioned in section 4.1.31⁷³ has been given - the entity that gave the notice; or
 - (b) if the appellant is a person to whom an enforcement notice is given - the entity that gave the notice and if the entity is not the local government, the local government; or
 - (c) if the appellant is a person dissatisfied with a decision about compensation - the local government that decided the claim; or
 - (d) if the appellant is a person dissatisfied with a decision about acquiring designated land - the designator; or
 - (e) if the appellant is a person who is disqualified as a private certifier - the entity disqualifying the person and if the entity disqualifying the person is not the accrediting body, the accrediting body; or
 - (f) if the appellant is a party to a proceeding decided by a tribunal - the other party to the proceeding.
- (2) The notice must state the grounds of the appeal.

Respondent and co-respondents for appeals under div 8

- 4.1.43 (1) This section applies to appeals under division 8 for a development application.
- (2) The assessment manager is the respondent for the appeal.
 - (3) If the appeal is started by a submitter, the applicant is a co-respondent for the appeal.
 - (4) If the appeal is about a concurrence agency response, the concurrence agency is a co-respondent for the appeal.
 - (5) If the appeal is only about a concurrence agency response, the assessment manager may apply to the court to withdraw from the appeal.
 - (6) The respondent and any co-respondents for an appeal are entitled to be heard in the appeal as a party to the appeal.
 - (7) A person to whom a notice of appeal is required to be given under section 4.1.41 and who is not the respondent or a co-respondent for the appeal may elect to be a co-respondent.

Respondent and co-respondents for appeals under div 9

- 4.1.44 (1) This section applies if an entity is required under section 4.1.42 to be given a notice of an appeal.
- (2) The entity given written notice is the respondent for the appeal.
 - (3) However, if under a provision of the section more than 1 entity is required to be given notice, only the first entity mentioned in the provision is the respondent.
 - (4) The second entity mentioned in the provision may elect to be a co-respondent.

How a person may elect to be co-respondent

- 4.1.45 (1) An entity elects to be a co-respondent by lodging in the court, within 10 business days after the day the notice of the appeal is given to the entity, a notice of election under the rules of court.
- (2) If a principal submitter is entitled to elect to become a co-respondent, any other submitter for the submission may also elect to become a co-respondent to the appeal.

Minister entitled to be represented in an appeal involving a State interest

- 4.1.46 If the Minister is satisfied that an appeal involves a State interest, the Minister is entitled to be represented in the appeal.

Lodging appeal stops certain actions

- 4.1.47 (1) If an appeal (other than an appeal under section 4.1.30) is started under division 8, the development must not be started until the appeal is decided or withdrawn.
- (2) Despite subsection (1), if the court is satisfied the outcome of the appeal would not be affected if the development or part of the development is started before the appeal is decided, the court may allow the development or part of the development to start before the appeal is decided.

Port Hinchinbrook STP Upgrade**Technical Memorandum 1294-MEM-001****Port Hinchinbrook STP Upgrade****MEDLI Modelling to Assess Irrigation Land Area***Revision A**Date: 21/01/2020*

Prepared By: Access refused under s
Reviewed By:
Approved By:

Executive Summary

An assessment of the required land area for irrigation of the Port Hinchinbrook Sewage Treatment Plant (STP) has been completed utilising the Model for Effluent Disposal using Land Irrigation (MEDLI). The MEDLI assessment has been based on:

- Meeting the existing Environmental Authority (EA) EPPR00576713 conditions for 500 EP,
- Utilising the existing wet weather storage volume,
- Utilising Local Climatology for the past 50 years, and
- Typical inputs from MEDLI default libraries in lieu of site investigations.

The existing EA had limits on volume to be discharged to land per day 612 kL and discharge to waters (only permitted on wet weather) of 412 kL per day however no limit on the required percentage of effluent reuse, frequency of overflows or total volume of overflows per year.

The local climatology has significant rainfall in the summer months minimising the likelihood of irrigation during this period. The existing EA allows discharge to waters via the licenced discharge point W1 when wet weather prevents irrigation so increasing storage for these extended periods is not recommend.

When discharging to W1 the EA requires a 10:1 dilution of Creek flow to effluent discharge, a high level assessment of the catchment of One Mile Creek, where W1 is located, indicated that during the wet weather events dilution criteria is likely to be met.

The existing irrigation area of 4 ha is likely to meet the EA conditions, however based on the outcomes of the assessment, it is recommended for Department of State Development, Infrastructure and Planning (DSDMIP) to obtain at least another 2 ha bringing the total to 6 ha and also irrigate the existing STP site (an additional 2.7 ha, and total of 8.7 ha) to reduce the overall frequency of water releases to the licenced discharge point W1 per year.

Port Hinchinbrook STP Upgrade**Background**

GANDEN was engaged by DSDMIP to provide an assessment of the required land area for irrigation for the existing Port Hinchinbrook STP as part of a review and recommendations for an overall STP upgrade.

The existing STP currently services the Port Hinchinbrook Development which has an estimated 200 equivalent persons (EP) and is estimated to increase in future to 500 EP. The wastewater is treated and for the assessment is assumed to meet the EA requirements for effluent quality.

The information regarding irrigation e.g. soil parameters, irrigation method and pasture was limited so, in lieu of performing site investigations, the MEDLI model assessment is to be based on typical values indicative to the area, with a focus to determine the required irrigation land area to provide a sustainable solution and meet the EA requirements.

Summary of Existing Environmental License Requirements

The existing STP is operated under EA EPPR00576713. It is assumed the upgraded STP will continue to operate under this EA. The key conditions for irrigation of land and release to waters of the EA include:

1. Land

- Maximum release of effluent to land on any dry weather day is 612 kL.
 - “Dry weather day” defined as conditions such that irrigation will not result in surface ponding or runoff over the irrigation area.
- When conditions prevent irrigation of land flows are to be directed to wet weather storage tanks.

2. Waters

- The minimum wet weather storage capacity is 1.5 ML per 500 EP.
- Maximum release of effluent to water release point on any wet weather day is 412 kL.
- Release of effluent on any wet weather day may only occur if all of the following are true:
 - Wet weather prevents irrigation (i.e. not a “dry weather day”), and
 - Wet weather storage is full, and
 - A minimum dilution factor of 10x creek flow to 1x treated effluent occurs and creek flow overflows the downstream weir.

Modelling Inputs Assumptions and Assessment Cases

The following assumptions on modelling inputs and assessments have been made:

- Assessment Criteria for Land Sizing has been based on the total quantity of overflows per year and total volume of overflow per year and has not considered the analysis of nutrient uptake, runoff, seepage, groundwater or pathogen risk assessment. (An upgraded treatment plant will have low nutrient concentration and low pathogen risk due to effective treatment and neither is considered a limiting factor).
- The population and wastewater generation have been based on 200 EP and 500 EP.
- The irrigation land is considered to be generally flat.

Port Hinchinbrook STP Upgrade

- The default data libraries within MEDLI were utilised for a number of areas detailed further in below subsections.

Local Climate

The climatology of the site was based on Queensland Department of Environment and Science (DES) Scientific Information for Land Owners (SILO) datasheets for the last 50 years from the Cardwell weather station.

An assessment of the rainfall data (daily average over 50 years) indicates a significant rainfall period occurring from November to April with 86% of the year's total rainfall occurring during this period, the remainder of the year has low rainfall in comparison. Rainfall exceeds 5 mm for a total of 146 days (40% of the year).

Run Period: 01/01/1970 to 31/12/2019 50 years, 0 days

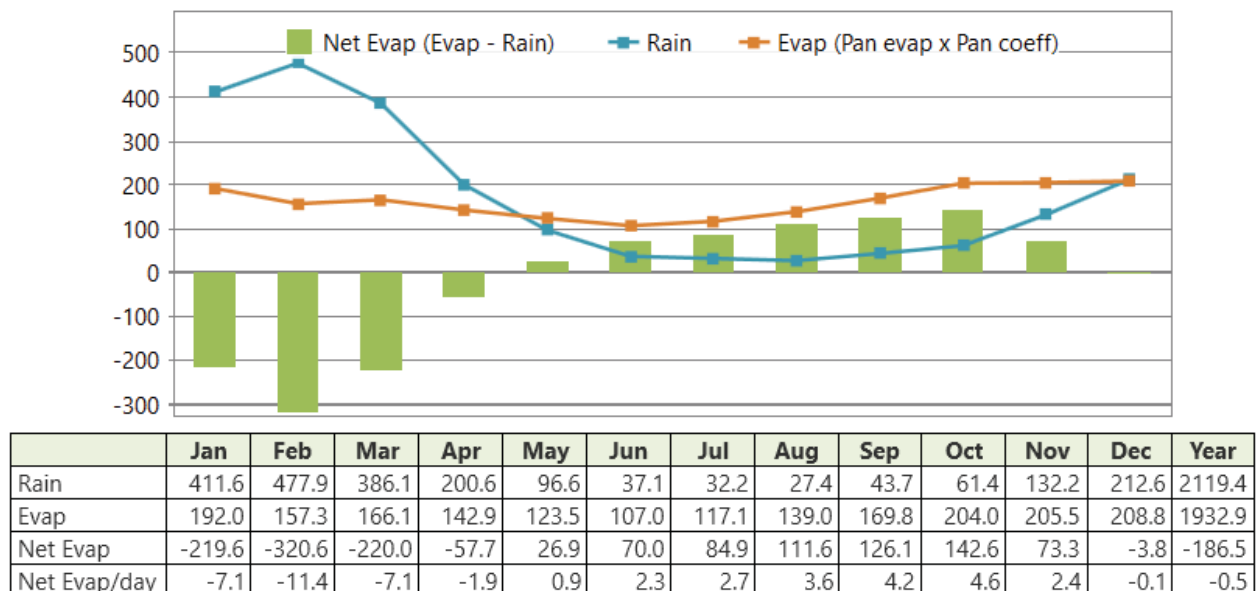


Figure 1: Rain Data

Soil Types

No site investigation works have been completed for soil types on land areas proposed for irrigation. To gain an understanding of the potential soil types in the areas surrounding the STP a number of registered bore hole reports were reviewed which indicated the top two metres to be sand with grey/brown/orange soil with some clays. As a result modelling scenarios were completed using default soil types of "Sand" and "High Permeable Red Brown Earth".

Infiltration

The sewer network is relatively new and is likely to contain very few, if any, illegal stormwater connections. Infiltration into the sewage network during wet weather was assumed to be low due to the age of the development of the network and the licence conditions which included a maximum release of 412 kL under wet weather which is approximately 3xADWF for 500 EP. The MEDLI model assumed a factor of 2.5 x ADWF. It is likely that infiltration is less than this for the network.

Port Hinchinbrook STP Upgrade**Effluent Generation**

Effluent production has been based on the 270 L/EP/d as per *Port Hinchinbrook STP Upgrade, STP Review and Options Report*.

The 50th percentile values from EPPR00576713 for Total Nitrogen and Total Phosphorus have been adopted for Effluent Quality. The MEDLI defaults have been used for Total Dissolved Salts and Electrical Conductivity.

Wet weather storage was based on utilising the existing 1.5 ML enclosed storage tank which meets the minimum wet weather storage requirements of EPPR00576713.

Noting that 1.5 ML of storage at ADWF conditions for 200 EP and 500 EP provides 27 and 11 days storage respectively and at 3xADWF conditions provides 3.7 and 9.3 days storage respectively.

Irrigation and Planting Parameters

Irrigation was assumed to be from fixed sprinklers, triggered to occur when a soil deficit of 0 mm and to be continued to be applied until the soil reached the upper drainage limit. The model was overridden with no irrigation to occur if daily rainfall exceeds 5 mm for any given day (if the soil is likely sand this value may be able to be increased). Irrigation methods were set to maximise effluent reuse by irrigating frequently with smaller amounts and minimise potential soil saturation ponding, and runoff.

An assessment of the exiting irrigation area and adjacent lots from *Queensland Globe* showed a significant area of grassland with a small section of trees on located each lot refer to Figure 2. For the modelling scenarios the planting parameters were assumed to be the MEDLI default values for pasture type "Coastal Couch Grass Pasture".

Irrigation Land Area

Figure 2 shows the irrigation land areas and *Table 1* below captures the assumptions regarding immediately available land for irrigation.

Table 1: Land Area Assumptions

Land Parcel	Area (ha)	Owned	Currently Irrigated	Comments
Lot 1 Plan C1043	2.719	Yes	No	Existing STP Lot
Lot 2 Plan CWL1212	1.973	Yes	Yes	Grass and Palm Trees
LOT 3 C1043	2.023	Yes	Yes	Grass and Mango Trees
Lot 3 RP733367	2.019	No	No	Grass and unknown Trees

Port Hinchinbrook STP Upgrade



Figure 2: Land Parcels for Irrigation

Port Hinchinbrook STP Upgrade**MEDLI Analysis and Recommendations**

The following scenarios were considered for assessment with the items listed in the table changed for each scenario all other modelling inputs remained common across each scenario. A number of iterations were assessed with changes in irrigation area and storage to assess the impact on each of the scenarios.

Table 2: MEDLI Analysis Scenarios

Scenario	EP	Soil Type
S1	200	High Permeable Red Brown Earth
S2	200	Sand
S3	500	High Permeable Red Brown Earth
S4	500	Sand

Assessment of Wet Weather Release 10 : 1 Dilution Requirement

In lieu of any available flow data for One Mile Creek the following were assumed:

- Anecdotal evidence that One Mile Creek is normally dry outside of wet weather,
- A high level assessment of the catchment area is assessed to be approximately 3.24 km² based on gradient and watercourses shown on Queensland Globe refer Figure 3 below, and
- Based on the location of wet weather discharge point W1, the dilution point is at the end of the catchment area.

Based on the above assumptions it is likely that One Mile Creek will start flowing and the dilution requirement will be met for wet weather events in excess of 5 mm/day as summarised below in *Table 3* and *Table 4*.

With the dilution requirement met discharging of waters to the licenced discharge point W1 can commence (if the other licence conditions are also met).

Due to the size of the catchment area there is a potential for delay between rainfall and recording the creek flow, resulting in a similar delay to when discharge can commence.

Port Hinchinbrook STP Upgrade*Table 3: Rain Catchment Area*

Rain event	Volume Captured in Catchment Area	Retention in Catchment (assumed 50%)	Effluent Release Dilution 10:1	Multiplier on ADWF
mm	m ³	m ³	m ³	xADWF _{500EP}
5	16,200	8,100	810	6
6	19,440	9,720	972	7.2
7	22,680	11,340	1,134	8.4
8	25,920	12,960	1,296	9.6
9	29,160	14,580	1,458	10.8
10	32,400	16,200	1,620	12
15	48,600	24,300	2,430	18

Table 4: Rain Catchment Area related to monthly rainfall

Monthly Rain Assumed	Averaged Monthly Rain per day	Volume Captured in Catchment Area	Retention in Catchment (assumed 50%)	Effluent Release Dilution 10:1	Multiplier on ADWF
mm/mth	mm/d	m ³	m ³	m ³	xADWF _{500EP}
27	0.9	2,916	1,458	146	1.1
200	6.7	21,600	10,800	1,080	16
400	13.3	43,200	21,600	2,160	8

This aerial map shows the study area, a large brown-shaded polygon labeled '3.24 km²'. The area is bounded by a road to the north and a road to the east. The map includes labels for 'Tulum' and 'Tulum, Quintana Roo, México'. The map also shows the 'Tulum - Cancun Highway' and the 'Tulum - Cancun Highway'.

Assessment of Overflows and Overflow Volume

Table 5: Frequency of Overflows Outputs for 200 EP and 500 EP

Land Size Increase	200 EP	500 EP
4 ha to 6 ha	Overflows reduced marginally by increasing the surface area from 4 ha to 6 ha (approx. 2 to 4% reduction in overflows)	Overflows reduced significantly by increasing the surface area from 4 ha to 6 ha (approx. 40% reduction in overflows)
6 ha to 8 ha	A significant reduction of overflow frequency when increasing to 8 ha for soil type High Permeable Red Brown earth (approx. 32% reduction from 6 ha) However only a marginal reduction in soil type Sand (approx. 7%).	Some additional reduction when increasing to 8 ha (approx. addition 17% reduction from 6 ha),
Greater than 8 ha		Very marginal decrease in overflow frequency for land area increases beyond this (e.g. < 1% per 2 ha increase beyond)

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Port Hinchinbrook STP Upgrade

significant rainfall over the early months in the year limits the irrigation capacity hence overflowing the storage volume. As the storage volume was maintained at 1.5 ML it is expected that similar overflow volumes would be witnessed. Noting that 1.5 ML of storage at ADWF conditions for 200 EP and 500 EP provides 27 and 11 days storage respectively.

Recommendations

An assessment of the proposed irrigation land requirements was based on the following:

- Current license conditions including minimum wet weather storage requirements and release limits to both land and water,
- Assumptions on modelling inputs and site conditions,
- Initial MEDLI modelling outputs, and
- The above assessment rainfall catchment and the dilution factor.

Based on the assessment, the following recommendations are made:

- The existing storage volume meets the current license conditions, so, in lieu of obtaining additional wet weather storage, additional irrigation area should be obtained by DSDMIP. It is recommended to obtain at least an additional 2 ha i.e. Lot 3 RP7333367 this will equal approx. 6 ha of irrigation area, it is also proposed to irrigate across the existing STP land parcel Lot 1 C1043, with irrigation of both these lots total irrigation area will be approx. 8.7 ha.
- It is recommended to complete soil sampling and testing on the existing lots and the proposed lots above to establish actual soil conditions. Including establishing the current and future usage of each of the lots and percentage area for each prescribed use e.g. trees or pasture.
- Complete additional MEDLI Modelling based on the obtained soil data and planting types for each of the lots to determine a more accurate understanding of the requirements for irrigation land and effect on the soil.
- Monitoring of One Mile Creek should be completed to establish relationship between precipitation time and flow.
- Further investigation into confirming potential for ingress into the network and reducing where possible.

Note that any future increases to the sewage network beyond 500 EP will require further investigation into the effects of storage and irrigation requirements.

Technical Memorandum

Title	Port Hinchinbrook Sewerage Treatment Plant Condition Reports Review		
Client	Department of State Development, Manufacturing, Infrastructure and Planning	Project No	510326
Date	19 June 2018	Status	Draft
Author	Michael Bancroft	Discipline	Civil Engineering
Reviewer	Dominee Rye	Office	Townsville

Introduction

Further to our discussions of June 15, 2018 Cardno has undertaken a review of the various material made available to us. The documentation reviewed includes:

- > Email correspondence dated May 21, 2018 from Mr David Goodman, Director of Infrastructure Services at the Cassowary Coast Regional Council to Mr James Gott, CEO of the Cassowary Coast Regional Council (CCRC).
- > Site and Asset Assessment spreadsheet described as CCRC's preliminary view of the works required to rectify immediate defects at the Sewerage Treatment Plant (STP).
- > Email correspondence dated May 29, 2018 from Mr Brendan Meale, Senior Environmental Compliance Officer of the Department of Environment and Science (DES) to Mr Michael Brennan, Managing Principal of Offermans Partners, Townsville.
- > Cardno on behalf of the Department of State Development, Infrastructure and Planning have previously completed a preliminary assessment of the various civil infrastructure within the Port Hinchinbrook Development in mid-2014 which has been referenced in conjunction with the aforementioned.

The Port Hinchinbrook STP

The Port Hinchinbrook STP was constructed in 2004/05. The main biological treatment step of the STP is a compartmentalised part-anoxic/aerobic continuous flow activated sludge process with a static settling tank (or clarifier) and an air-lift return activated sludge (RAS) mechanism. The plant has a nominal design capacity of 500 EP although the approved effluent discharge area appears limited to 200 EP.

The Operations and Maintenance Manual for the STP stipulates that the existing package plant treatment process capacity could be increased to 1000 EP by replacing the existing coarse bubble cast iron diffusers with fine bubble diffusers. It is stated that the bioreactor tanks have sufficient capacity for 1000 EP with the aeration blowers running full time.

CCRC Inspection of May 18, 2018

CCRC representatives attended site on May 18, 2018 in order to ascertain the condition of the STP and associated Pump Stations. Attendees included various managerial and technical staff from CCRC in addition to Mr Michael Brennan from Offermans Partners, Townsville.

CCRC's inspection solely focused on operation and function and the minimum restoration requirements to enable design intent. The main findings of the inspection included:

- > Overall structure is generally sound with no defects suggesting imminent structural failure;
- > Defects included minor leaks; aeration baffle failure; failed handrail in vicinity of inlet screen; The treatment process is not functioning and the air lift process transferring solids from the final

stages of treatment into the treatment process is not functioning and likely has not for a considerable time.

The recommendations of the report included:

1. Restoration of the air lift process to transfer solids within the plant;
2. Removal of the existing solids from within the plant;
3. Emptying of the Effluent Storage Tank;
4. Seed the plant with live solids from a current functioning STP;
5. Correct the disposal of solids process.

The CCRC commentary noted items 2-5 could be easily achieved however not worthwhile unless Item 1 was first actioned and completed. CCRC took no effluent samples on account it was clear the treatment process was not operational or functional as designed.

CCRC Site and Asset Assessment Spreadsheet

Further to the CCRC site inspection the Site Asset Assessment Spreadsheet provides more detail. A summary of notes follows:

- > Site Generator - Unserviceable, leaking fuel & oil, shows signs of degradation;
- > Irrigation System - Not operational, various issues, needs to be functional for license purposes, more investigations required;
- > Chemical Dosing - Various pumps not working, chemical dosing line open to weather;
- > Drying Beds - Full, all beds need resanding;
- > Waste Tank - Needs replacing;
- > Supernatant Pump Stations - Rails need relacing, Manual stop/start control needs replacing, Access lids need replacing;
- > Transfer Pump Station - 2nd Pump is weathered, perished power cables and circuit breaker;
- > Filtrate Pump Station - 2nd Pump not working, control Station needs replacing, Rails need replacement;
- > Backwash Pumps - Control Station needs replacing, lid and well fittings need rectification;
- > Water Effluent Pump - New pressure vessel required, pressure gauge and switch not working;
- > Balance Tank Blowers - Further investigation required, no guards on driver belts, various parts required, machines not expected to run much longer;
- > Aeration Tank Blowers - Further investigation required, no guards on driver belts, various parts required, machines not expected to run much longer;
- > Air Diffuser System - Some diffusers need replacing, lifting & guide ropes need replacing;
- > Process Air - Solenoid valve and control coil needs replacing;
- > Sand Filters - Clogged and not working, requires top up and proper backwashing;
- > Office / Amenities - Requires new air conditioning and new refrigerator;
- > Hand Testing Equipment - Old and outdated;
- > Tanks & Structures - Clarifier Tank has multiple leaks, various handrails needs replacing;
- > Clarifier Tank - Tank is buckling, requires vacuuming and reseeded;
- > Electrical Issues - Various minor electrical faults for rectification.

DES Inspection of May 27, 2018

DES representatives attended site on May 27, 2018 in order to investigate operational issues of the STP and associated Pump Stations. The number and identity's of attendees is unknown. DES officers have listed a number of observations within the correspondence more acutely focused on the environmental obligations of the Environmental Authority and relevant legislation. Observations included:

- > The Wet Weather Tank is leaking in a number of locations to adjacent grassed areas not approved for contaminate release at an estimated rate of 5L/min;
- > Multiple pump stations are not secure;
- > The Sewerage Sludge Drying Bed has reached capacity;
- > The initial screening area contains a significant amount of debris and requires maintenance;
- > An open pipe well was identified adjacent Pump Station 9;

- > Multiple Pump Stations were identified to be switched to manual operation;
- > The chlorine dosing / flocculation operations were not functional;
- > The effluent irrigation area was overgrown and unable to function as designed.

We note DES officers took samples of effluent and sent them away for analysis. Results have not been observed.

Cardno Preliminary Assessment of Civil Infrastructure (August 2014)

Cardno's Preliminary Assessment of Civil Infrastructure refers to general civil infrastructure across the greater Port Hinchinbrook Site. Sections 7.2 and 7.3 of the report specifically speak to the onsite Pump Stations and STP respectively. It summarises as follows:

- > Onsite discussion with the FTI contracted infrastructure operator on the most recent visit, indicate that:
 - All sludge in the STP is currently being returned to the balance tank to maintain a minimum bio-mass to sustain effluent biological treatment;
 - The sand filters are not currently being used before the treated effluent is pumped to the irrigation storage tank;
 - No sludge is currently being drawn off, aerated, and distributed onto the sludge drying beds;
 - The treated effluent is currently being pumped into the irrigation holding tank which has numerous leaks to ground;
 - No irrigation is currently being carried out to dispose of treated effluent;
 - The existing irrigation area cannot be used due to damage/destruction of the sprinkler grid;
- > The current area of available land of approximately 4.0 Ha, initially used for irrigation purposes for the disposal of treated effluent, limits development to 200 EP unless further land for irrigation purposes is acquired;
- > A non-exhaustive list of repairs and improvements/upgrades to the sewage treatment plant constrained to the current available irrigation area limit of 200 EP include:
 - Undertake a treatment process review analysis to determine changes required to treatment process;
 - Inspect and repair / replace faulty / damaged equipment in the STP Control Switchboard;
 - Replace inlet screen process with an arrangement that meets workplace health and safety requirements;
 - Install flow meters and controls at various positions in the plant to control the treatment process;
 - Repair leaks in the process tanks. Note the tanks may have to be drained, sand blasted and treated with appropriate protective coatings to eliminate internal corrosion;
 - Supply and install new chemical dosing equipment;
 - Repair / replace corroded stairways and walkways to treatment tanks;
 - Inspect and if necessary replace filter media in sand filters;
 - Install pressure differential instrumentation to convert sand filters to automatic backwash from manually controlled backwash;
 - Inspect and repair leaks in irrigation holding tank including replacing liner if required;
 - Replace access ladder on irrigation holding tank;
 - Repair / replace roof to irrigation holding tank;
 - Repair replace effluent level indicator board and float mechanism on irrigation holding tank;
 - Install additional irrigation holding tank (needed so that the existing holding tank can be repaired);
 - Install ventilation and sound attenuation in the blower room building;
 - Inspect and repair irrigation pumps and controls;
 - Repair / replace existing irrigation pump system;
 - Mow / clean up irrigation area, repair / replace broken pipework and sprinkler heads;
 - Repair damage to perimeter fencing;
 - Upgrade the lightly gravelled existing access track to all weather sealed access road standard.

Summary and Recommendations

A review of the recent inspection reports completed by CCRC and DES highlights a reasonable level of consistency amongst the various observations including those made by Cardno in 2014. It is clear the STP has not operated or functioned in accordance with the design intent for many years and furthermore, does not achieve environmental obligations of the Environmental Authority and relevant legislation.

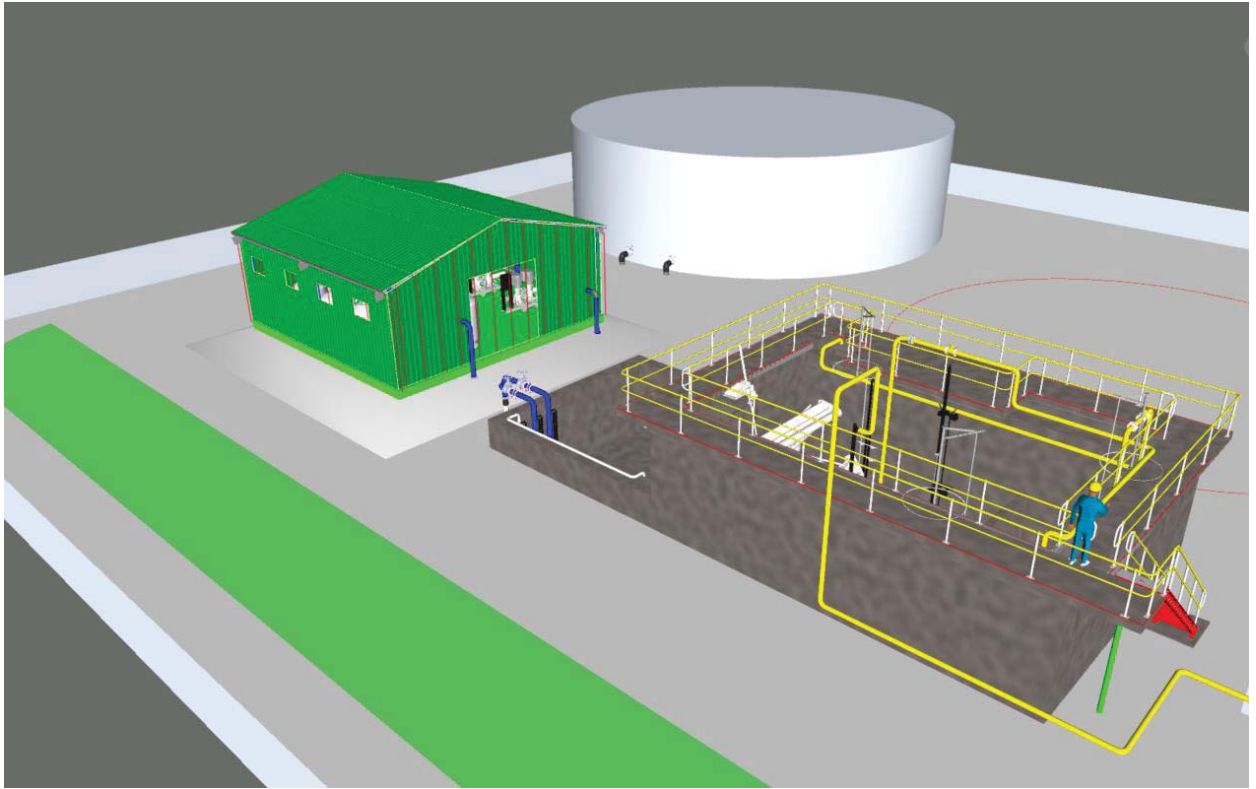
Key themes from the documentation reviewed requiring attention include:

- > **Safety** – all three documents reference various safety concerns with respect to handrails, access ladders, corroded stairways and walkways. The safety of maintenance crews and/or contractors undertaking rehabilitation works moving forward is paramount and should be actioned ASAP ensuring compliance with current workplace, health and safety regulations.
- > **Failures** – substantial failure of various STP components including the aeration baffle, various weathered and defective pumps, numerous electrical and mechanical faults, the waste tank, the irrigation system, chlorine dosing operations and others have occurred rendering the facility not fit for purpose in its current state.
- > **Illegal Discharge** – various leaks have been identified throughout the STP discharging to areas not approved for contaminate release and would appear to have been doing so for well over four years now. Not only are the leaks discharging to areas not approved there is little doubt the discharge is not within the approved limit levels of the Environmental Authority and relevant legislation.
- > **Continued Operations** – Capacity of the STP has been noted given the current area of available land used for irrigation purposes and disposal of treated effluent is approximately 4.0 Ha, limiting treatment capacity to circa 200 EP unless further land for irrigation is acquired.

In light of the above and consistent with commentary within the various documents it is evident further investigation is required in order to comprehensively understand and address safety, operational and legislative shortcomings of the existing STP.

We recommend an STP process review be completed to determine whether or not rectification works would enable the existing plant to comply with licence effluent discharge standards or would it be more economically viable to replace the plant. Furthermore, consideration needs to be given to constraints of the STP with respect to design capacity limitations, actual capacity requirements and future capacity requirements.

Port Hinchinbrook STP Upgrade



STP Concept Design Report

Doc No: 1294-RPT-002

April 20

Rev B



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Rev A	28-02-2020	Draft Concept Design	Access refus	Access refus	Access refus
Rev B	24-04-2020	Final Concept Design	Access ref	Access refus	Access refus

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Contents

1. INTRODUCTION	6
1.1 BACKGROUND	6
1.2 PORT HINCHINBROOK STP	7
1.2.1 Existing Plant Rectification Works.....	7
1.3 SITE LOCATION	8
1.3.1 Flooding.....	8
1.4 DISPOSAL BY IRRIGATION	8
1.5 ENVIRONMENTAL AUTHORITY (EA)	9
1.5.1 Future Upgrade and License Conditions.....	9
1.6 FINANCIAL CONSIDERATIONS	10
2. BASIS OF DESIGN	11
2.1 PLANT LOADING.....	11
2.1.1 Influent Flows	11
2.1.2 Plant Loading.....	12
2.2 ASSET DESIGN LIFE	12
2.3 HYDRAULIC DESIGN BASIS.....	12
3. CONCEPT DESIGN DESCRIPTION.....	14
3.1 PLANT OVERVIEW	14
3.2 CONCEPT DESIGN DRAWINGS	14
3.3 HYDRAULIC DESIGN	15
3.4 SITE LAYOUT AND ACCESS.....	15
3.4.1 General.....	15
3.4.2 Roadworks and Site Access	15
3.4.3 Vehicle Access Requirements	16
3.4.4 Combined Chemical Unloading and Equipment Washdown Bay	16
3.4.5 Roadworks and Pavements	16
3.4.6 Landscaping.....	16
3.5 PRIMARY TREATMENT	16
3.5.1 Inlet Works	16
3.5.2 Flow Balance Tank.....	17
3.5.3 Offline Maintenance Storage Tank.....	17
3.6 SECONDARY TREATMENT	18
3.6.1 Sequencing Batch Reactor (SBR)	18
3.6.2 Anoxic Zone	20
3.6.3 Aerobic Zone.....	20
3.7 DECANT / CHLORINE CONTACT TANK	21
3.8 CHEMICAL DOSING	22
3.9 TERTIARY FILTRATION.....	22
3.9.1 Tertiary Treatment Shed	24
3.10 RECYCLED WATER STORAGE AND PUMPING	24
3.11 SLUDGE MANAGEMENT.....	25
3.11.1 Sludge Thickener & Holding Tank.....	25
3.11.2 Existing Drying Beds	25
3.11.3 Sludge Dewatering Unit (Optional)	25
3.12 GENERAL PURPOSE PUMP STATION	26
3.13 OPERATOR BUILDING	26
3.14 ELECTRICAL	26
3.14.1 Switchroom	26
3.14.2 Electrical Mains	26
3.15 OUTFALL	26
3.16 DECOMMISSIONING AND DEMOLITION	26

3.16.1	Effluent Storage Tank.....	27
3.16.2	Treatment Plant.....	27
3.17	FUTURE PLANT UPGRADE.....	27
4.	COST ESTIMATE	28
4.1	CAPEX.....	28
4.2	OPEX.....	29
4.2.1	OPEX Assumptions.....	30
APPENDIX A -	CONCEPT DESIGN DRAWINGS.....	31
APPENDIX B -	ENVIRONMENTAL AUTHORITY.....	32
APPENDIX C -	FLOOD MAPPING	33
APPENDIX D -	CARDNO REPORT TECH MEMO	34

Figures

Figure 1 – Port Hinchinbrook STP Aerial Image (Port Hinchinbrook Land Use)	8
Figure 2 – Example of a Packaged Inlet Screen and Grit Removal System (Spirac Combiguard).....	17
Figure 3 – Flow Balance Tank and Submersible Pumps	18
Figure 4 – SBR General Arrangement.....	19
Figure 5 – Double Containment Tanks	22
Figure 6 – Tertiary Filtration Multimedia Pressure Filters	23
Figure 7 – Typical Grundfos multistage vertical pump set with integrated control panel.....	25

Tables

Table 1 – Abbreviations	4
Table 2 – Summary of Effluent Quality (EPPR00576713).....	9
Table 3 – Design Flows	11
Table 4 – Wastewater Characteristics.....	12
Table 5 – Asset Design Life	12
Table 6 – SBR Operation Cycle Times (example).....	19
Table 7 – High-Level CAPEX Cost Estimate.....	28
Table 8 – High-Level OPEX Cost Estimate	29

Glossary of Terms

Table 1 – Abbreviations

Abbreviations	
ACH	Aluminium Chlorohydrate
ADWF	Average Dry Weather Flow
BOD	Biological Oxygen Demand
BWL	Bottom Water Level
CAPEX	Capital Expenditure
CCRC	Cassowary Coast Regional Council
CCT	Chlorine Contact Tank
CWUF	Continuous Wash Up Flow
DES	Department of Environment and Science
DSDMIP	Department of State Development, Manufacturing, Infrastructure and Planning
EA	Environmental Authority
EP	Equivalent Population
FNQROC	Far North Queensland Regional Organisation of Councils
GANDEN	GANDEN Engineers and Project Managers
GPPS	General Propose Pump Station
IBC	Intermediate Bulk Containers
kL	Kilo-litre
L/s	Litres per second
MEDLI	Model for Effluent Disposal using Land Irrigation
mg/L	Milligram per litre
ML	Megalitres
OPEX	Operational Expenditure
PDWF	Peak Dry Weather Flow
PWWF	Peak Wet Weather Flow
RP	Registered Property
RWMP	Recycled Water Management Plan

Abbreviations

SBR	Sequencing Batch Reactor
SS	Stainless Steel
STP	Sewage Treatment Plant
TWL	Top Water Level
VSD	Variable Speed Drive
WAS	Waste Activated Sludge

1. Introduction

The Department of State Development, Manufacturing, Infrastructure and Planning (DSDMIP) engaged GANDEN Engineers and Project Managers (GANDEN) to undertake a review of existing information, assessment of options and the development of a concept design for the upgrade of the Port Hinchinbrook Sewage Treatment Plant (STP). Following the agreement of the preferred option, a concept design has been developed for the plant upgrade.

The Port Hinchinbrook STP forms part of the Port Hinchinbrook Development. Since the liquidation of the developer, the wastewater infrastructure has been neglected and is in poor condition. The STP is not owned by the Queensland Government or Cassowary Coast Regional Council (CCRC). CCRC are temporarily operating the sewage network and treatment plant. This report takes into consideration the current state of ownership from a high level, however, does not attempt to identify or describe political or legal issues. The purpose of the report is to describe the proposed concept design for the upgrade of the STP.

The scope of services undertaken by GANDEN were limited to: -

- Stage 1 – Review existing plant information and identify options: -
 - Review of existing information, reports and recommendations for the upgrade of the STP, provided by DSDMIP;
 - Undertake a site inspection of the existing Port Hinchinbrook STP; and
 - Prepare a technical review report and identify the preferred option for the upgrade of the plant, including high level cost estimates.
- Stage 2 – Preparation of a concept design for the preferred option.

The purpose of this concept design report is to: -

- Describe the project background;
- Describe the design basis; and
- Describe the concept design for the upgrade of the STP.

1.1 Background

The Port Hinchinbrook STP was constructed circa 2005 to service the Port Hinchinbrook development. The STP was privately owned and operated by the Port Hinchinbrook developer, Williams Corporation Pty Ltd. The developer has since ceased trading, resulting in the sewage infrastructure (network and STP) being neglected. The STP and associated reticulation network are in poor condition.

CCRC have been temporarily operating the sewage infrastructure since mid-2018.

In 2018, CCRC undertook a site assessment to establish the overall plant condition and operational shortfalls. The intention of this assessment was to identify critical shortfalls and to establish the minimum refurbishment requirement enable the ongoing operation of the plant, in its current condition. CCRC have undertaken minor maintenance and rectification works to enable the operation of the plant. Currently, operators attend site to two days a week to undertake operational tasks.

A portion of the plant is operated automatically, however due to the condition of the plant, specific operational processes such as wasting of sludge are undertaken manually. Aside from the STP, the existing reticulation network is in poor condition, notably SPS 4 which transfers all of Port Hinchinbrook's sewage to the STP. CCRC have identified the requirement for significant upgrades to the sewer network, including the replacement of sewage pump station SPS 4 as it is in poor condition. It is recommended the refurbishment of the sewer network forms part of the STP upgrade Contract.

Numerous reports are available for the STP, specifically relating to Council's strategy for installing a sewer system to service Cardwell. Whilst these are noted and provide a useful point of relevant information, these planning reports

consider upgrade of the plant to service an ultimate population of 2,700 EP. The purpose of this report is to document the concept design for the upgrade of the existing STP to service the Port Hinchinbrook population, with consideration to future expansion of the plant servicing the Cardwell scheme.

DSDMIP are investigating options for the upgrade of the STP, with consideration to the long term operation of the plant and transfer of ownership to CCRC, noting at the time of writing, the ownership and responsibility of operating the plant is unresolved. The ownership is subject to Government (Local and State) consideration, approvals and where necessary, negotiations with existing owners.

1.2 Port Hinchinbrook STP

The existing plant is a Hydroflux Epcor Roadtrain™ packaged STP, designed to treat Average Dry Weather Flows (ADWF) of 270 kL/day, with an ultimate population of 750 EP (as noted by EPCO, however other reports state 500 EP). The existing biological treatment is a continuous flow activated sludge plant with secondary clarification, filtration and disinfection. The existing plant includes the main process steps/units: -

1. Inlet Screen – Coarse bar screen;
2. Aerated Balance tank;
3. Bioreactor tank (aeration tank);
4. Secondary Clarifier;
5. Sand Filters;
6. Waste Activated Sludge (WAS) Tank;
7. Chlorine Disinfection Tank;
8. Sludge Drying Beds;
9. Effluent Storage tank; and
10. Irrigation pumps and irrigation network.

As documented in numerous reports by CCRC, Cardno and Hydroflux EPCO, the existing plant is in poor condition. The infrastructure is in poor condition and it's clear that the plant is not performing.

1.2.1 Existing Plant Rectification Works

Referring the Hinchinbrook STP Conditions Report Review Tech Memo by Cardno in 2018 (Appendix D – and discussions with CCRC, the following items should be prioritised to allow operation of the existing plant up until commissioning and handover of the new upgraded plant: -

1. Patching of exiting process tanks in areas of major leakage (i.e. hoppers of clarifier);
2. Refurbishment of walkways to ensure safe access and egress for operators. Removal of redundant corroded walkways etc. that pose a safety hazard;
3. Restoration/rectification of the sludge air lift process to transfer solids within the plant; Or replacement of sludge removal system with a progressive cavity pump, connected to the clarifier drain ports;
4. Replacement or refurbishment of existing effluent storage tank. The tank is leaking and assumed not to be structurally sound;
5. Clean out the existing drying beds to enable functionality;
6. Investigate and rectify issues with the existing irrigation network and associated irrigation pumps; and
7. Provision of telemetry for alarming (no current remote monitoring or alarming from the plant).

The Hunter H₂O Report from March 2019 estimated the cost of refurbishment of the STP to be \$690,000.

reduce frequency of water releases. The report identifies irrigation of Lot 3 to the south of the STP. The suitability of this land is subject to site investigations, further modelling, and risk assessments. An alternative land parcel or disposal method should be considered as a backup, should this lot not be suitable for irrigation.

Furthermore, alternative disposal methods should be considered, including the potential for third party consumers such as the golf course and any other agricultural areas. Disposal by irrigation for any future upgrades (i.e. 2,700 EP) will result in the requirement to procure a significantly larger area of land, and, disposal by release to the environment may be required.

1.5 Environmental Authority (EA)

The STP is operated under Environmental Authority (EA) EPPR00576713, issued to The Passage Holdings Pty Ltd on 18 August 2016. The EA provides approval for the development application, number NR0560DA, dated 05-06-2005.

GANDEN obtained the EA from the Department of Environment and Science (DES). The EA is provided as an attachment to this report, refer to 0.

Key conditions of EA include: -

1. Schedule C – Water: -
 - The current licence conditions are for irrigation during dry weather, and only permits release of effluent to One Mile Creek during wet weather scenarios, once the effluent wet weather storage has reached capacity, with a minimum dilution factor of 10 to 1 (Creek flow to effluent). The maximum permitted quantity of release is 412 kL (Condition C3-1 – 6); and
 - The minimum volume for the effluent storage tank, to service 500 EP, is 1.5 ML (Condition C7-1).
2. Schedule F – Land: -
 - Contaminants permitted for release to land during dry weather;
 - The maximum daily release of 620 kL during dry weather; and
 - When conditions prevent irrigation (i.e. wet weather), flows are to be directed to wet weather storage tanks.

The effluent quality requirements for release to land and release to the environment (during wet weather) are summarised in the table below.

Table 2 – Summary of Effluent Quality (EPPR00576713)

Quality Characteristics	Minimum	50 th Percentile	Maximum
Suspended Solids (SS)	-	-	5 mg/L
5-day Biochemical Oxygen Demand (BOD)	-	-	10 mg/L
Total Nitrogen (TN)	-	5 mg/L	10 mg/L
Total Phosphorus (TP)	-	1 mg/L	2 mg/L
Faecal Coliform	-	10 cfu/100mL	100cfu/100mL
pH	6.5	-	8.5
Dissolved Oxygen (DO)	2 mg/L	-	-

1.5.1 Future Upgrade and License Conditions

Consideration to future upgrades needs to be accounted for during this assessment. The 500 EP assessment (this report) establishes required treatment to achieve the existing EA release limits. Upgrading the plant, exceeding 1500 EP

(current upper EP limit of license) will result in the requirement for new license conditions. The release limits for the 2,700 EP plant are likely to be more stringent than the existing, due to continual improvement in the environmental evaluations for sewage treatment plants in the Great Barrier Reef catchment area. The license conditions for the future 2,700 EP plant with release to the environment should be assumed to be: -

- 5 mg/L Total Nitrogen;
- 2 mg/L Total Ammonia; and
- 1 mg/L Total Phosphorus.

1.6 Financial Considerations

The existing STP was constructed and operated by a private developer, who has since ceased trading. The asset is not owned by CCRC or the Queensland Government. Without delving into the particulars of raising capital and funding the ongoing operation of the plant, the following key points raised in consultation with CCRC can be considered: -

- CCRC do not have a mechanism to raise capital funds for the upgrade. Raising capital funds will likely be through multiple funding schemes; and
- CCRC note that Cardwell is not serviced by a sewer system and residents don't pay rates for sewer. Funding for the operation of the 500 EP plant would be raised via rates from Port Hinchinbrook development.

2. Basis of Design

The upgraded plant is to be designed for a population of 500 EP, with consideration to future expansion to cater for the ultimate population of 2,700 if the Cardwell sewage scheme is implemented.

2.1 Plant Loading

2.1.1 Influent Flows

Raw sewage volumes have been derived using the FNQROC Development Manual D7 – Sewage System Design Manual, Table 7.2 Sewage Loading. The average dry weather sewerage production is 270 L/EP/day.

No flow data for the plant was provided at the time of writing this report. It is recommended as part of the subsequent detailed design phase, or prior to, that flow monitoring is undertaken to confirm current loading, if the information is not already available.

Table 3 – Design Flows

Scenario	Equivalent Population	Wastewater Production	Average Dry Weather Flow (ADWF)	Peak Wet Weather Flows (PWWF)	Peak Instantaneous Flows (PIF)
Current	-	-	71 kL/day ¹	275 kL/day	SPS 4 Pump Duty 10 L/s (Assumed)
Adopted for Design	500	270 L/EP/day	135 kL/day	756 kL/day ² (5.60x ADWF)	SPS 4 Pump Duty 15 L/s (Assumed Upgraded)

NOTE:

1. Average daily flow based on CRC flow records from 14/08/2018 to 17/12/2019
2. The plant's current license limits wet weather discharge to 412kL/day, which is approximately 3x ADWF.

2.1.1.1 Peak Wet Weather Flow (PWWF)

Peaking Factor is the greater of 5x ADWF or C_1 ADWF.

$$C_1 = 15 \times (EP)^{-0.1587}$$

$$C_1 = 15 \times 500^{-0.1587} = 5.59.$$

A peaking factor of 5.60x ADWF should be adopted for the hydraulic design of the infrastructure. Noting that the current license only permits the release of 412 kL/day to the environment during wet weather, which is approximately 3x ADWF.

New license conditions will likely be negotiated with DES for the upgraded plant, at which state the release volumes should be revised to suit the upgraded plant.

The new plant will be designed to fully treat flows up to 3x ADWF with flows in excess to be screened and released to the licenced discharge point.

2.1.1.2 Peak Dry Weather Flow (PDWF)

$$PDWF = C_2 \times ADWF$$

$$C_2 = 4.7 \times (EP)^{-0.105}$$

$$C_2 = 4.7 \times 500^{-0.105} = 2.44$$

$$PDWF = 2.3x \text{ ADWF.}$$

The PDWF is below the dry weather irrigation volumes (620 kL/day), therefore is considered suitable for use.

2.1.2 Plant Loading

At the time of writing this report, no influent data was available for review. For the purpose of this assessment the design influent loadings are based on typical Australian wastewater contributions, which described below.

Table 4 – Wastewater Characteristics

Parameter	Adopted Loading (g/EP/day)
Biochemical Oxygen Demand (BOD)	60
Chemical Oxygen Demand (COD)	125
Total Kjeldahl Nitrogen (TKN)	12
Total Phosphorus (TP)	2.5
Total Suspended Solids (TSS)	65

2.2 Asset Design Life

The overall asset life is a key consideration for the upgrade. As the ongoing costs for the asset will be raised by a relatively small area, the longer the asset life, the lower the ongoing costs will be.

GANDEN propose that the upgraded plant is designed with robust materials, suitable for operating in corrosive environments. The asset design life described in the table below was developed with commentary from CCRC.

Table 5 – Asset Design Life

Item	Minimum Design Life
Major Process Tanks	80 years
Buildings	50 years
Underground Structures and Piping	75 years
Road Pavements	25 years
Mechanical plant and equipment	25 years
Electrical Switchboards	25 years
Electrical Instrumentation	10 years
Polyethylene Tanks	20 years

2.3 Hydraulic Design Basis

The upgraded STP will be hydraulically designed to provide screening for flows up to a minimum of 5.6x ADWF [756 kL/d] and for secondary treatment and disinfection to influent flows up to 3x ADWF [405 kL/d]. Flows greater than 3x ADWF will be screened and flow from the balance tank to the licensed discharge point.

The process units will be hydraulically sized to cater for at a minimum:-

- Primary Treatment:-
 - Screening and grit removal – PIF 20 L/s (allowance for pump station 4 upgrade)
 - Balance tank pumps – 3x ADWF [405 kL/d]
 - Overflow to One Mile Creek - 10x ADWF [1350 kL/d]
- Secondary Treatment (SBR) –3x ADWF [405 kL/d]

- Decant Tank – 3x ADWF [405 kL/d]
- Activated Sludge Storage – Volume to meet 10 day SRT
 - Optional Sludge Dewatering PIF 4 m³/h
- Tertiary Treatment (Filtration) – 3x ADWF [405 kL/d]
- Disinfection by Chlorination in Decant Tank – 3x ADWF [405 kL/d]
- Recycled Water Storage – 1.5 ML
- Recycled Water Transfer – TBC based on irrigation demands

3. Concept Design Description

3.1 Plant Overview

The proposed concept design for the Port Hinchinbrook STP is a single train two stage sequencing batch reactor (SBR) treatment process. The plant proposed is to provide simple operation with efficient treatment to meet the effluent discharge requirements of the EA. The proposed configuration provides high quality effluent and will require low operator input.

The proposed STP has been designed to provide screening greater than the expected PWWF of 5.6x ADWF and provide secondary and tertiary treatment of flows up to 3x ADWF [405 kL/d].

The proposed design can be constructed completely independently of the existing treatment plant enabling simplicity in cut-over and commissioning prior to demolition of the existing STP infrastructure.

The upgraded plant consist of a number of treatment processes which will be detailed further below and include:

1. Primary Treatment including: -
 - a. Mechanical inlet works comprising a spiral sieve screen and grit removal;
 - b. Flow balance tank, including level instrumentation and transfer pumps.
2. Secondary Treatment in for the form of a single train Sequencing Batch Reactor including: -
 - a. Anoxic Zone with submersible mixing;
 - b. Aerobic Zone with fine bubble diffusers, aeration blowers, waste pump, recycle pump and a decanter.
3. Chlorine Disinfection;
4. Tertiary filtration;
5. Effluent storage reservoir (replacement of existing storage tank);
6. Chemical dosing including: -
 - a. Sodium Hypochlorite dosing for disinfection;
 - b. Aluminium Chlorohydrate (ACH) dosing for phosphorus removal (Option for PACL with Caustic dosing for pH control); and
 - c. Sugar dosing (supplementary for low loading periods) – if required.
7. Sludge Storage; and,
8. General Purpose Pump Station (GPPS)

Existing infrastructure with potential to be retained and reused as part of the upgrade including: -

1. Control building (reuse as operator building as per current use);
2. Existing balance tank (or other process tank) to be retained and used as an influent storage tank for maintenance purposes;
3. Drying Beds (existing drying beds retained and used for alternative sludge management; and
4. Existing concrete slab supporting the existing plant may be retained and reused for future upgrades.

3.2 Concept Design Drawings

Concept design Piping and Instrumentation Diagrams (P&ID) and General Arrangement drawings have been prepared for the upgrade. The Concept Design Drawings are provided in 0

3.3 Hydraulic Design

The proposed STP and associated infrastructure has been designed to be resilient to the nominated 100-year ARI flood levels preventing inundation of any main process tanks and providing a minimum 500 mm freeboard to electrical infrastructure.

The site is understood to be relatively flat with a small change in grade across the site. A site survey was not completed for the Concept Design. The site levels are based on the provided GHD flood mapping appended in Appendix C - . Detailed topographical survey will need to be completed as part of the detailed design phase.

The main process for the proposed STP is pumped, therefore the influence of the ground levels on the main process hydraulics is considered to not have a significant effect with the exception of the outfall to the adjacent One Mile Creek. It is understood there is an existing overflow pipe from the existing storage reservoir which will need to be located and can potentially be reused as part of the design this will need to be confirmed during detailed design including the exiting outfall alignment and levels.

3.4 Site Layout and Access

3.4.1 General

The site layout has been developed to represent the most efficient use of space on site for the proposed process solution. The following key considerations were given to the site layout: -

- Position the new infrastructure such that it can be constructed without affecting the operation of the existing plant until final cut-ins and cutover;
- Ensure sufficient vehicular access to all major process units;
- Major process units, where possible, are positioned with a suitable offset from the boundary to provide protection from bushfires;
- Position major infrastructure above the 100-year ARI flood level;
- Locate the aeration blowers as close to aerated tanks as possible to keep pipework runs to a minimum;
- Locate the switchroom in close proximity to the major drives;
- Consideration of future upgrades to treatment capacity; and
- Ensuring that adequate access for operational staff and third-party contractors for chemical delivery and dewatered sludge skip removals etc. is provided.

3.4.2 Roadworks and Site Access

The upgrade has been designed to provide sufficient access to all major process items where possible. Access to the following areas is crucial and has been considered in the layout of the plant: -

- Site amenities and office;
- Chemical Dosing Deliveries;
- Sludge removal;
- Inlet Works and screenings bins;
- SBR Tank including removal requirements for diffuser grids;
- Pump skids including recycled water, service water, and, backwash pumps;
- Tertiary filtration;
- Aeration Blowers; and
- Switchboard.

3.4.3 Vehicle Access Requirements

The site has been laid out to enable access of an 8.8m long truck for chemical delivery, removal of thickened sludge, and, emptying screenings bins from the inlet works. The proposed layout is based on a three-point turn.

There is ample space available for light vehicle parking spaces for operators adjacent the site amenities building. The site layout and access roads to be further developed during detailed design.

3.4.4 Combined Chemical Unloading and Equipment Washdown Bay

A designated chemical unloading bund is provided at the front of the Chemical Dosing Area. The bund is provided with offline storage which will be sized to meet the chemical delivery trucks maximum single compartment volume. The storage is connected to the GPPS.

The chemical delivery bund is proposed as a dual-purpose area which will enable the diffused aeration grids to be removed from the SBR and cleaned/inspected with any foul water contained and returned to the process for treatment. The final design layouts will dictate the bund requirements. Should a dual purpose bund not be possible, an additional concrete bunded area will be provided for washdown.

3.4.5 Roadworks and Pavements

The required pavements for the site include: -

- Asphalt sealed pavement for roadway access; and
- Concrete for heavy vehicle turning areas and bunding.

3.4.6 Landscaping

It is assumed the existing site that is not being developed will remain with grass cover. Areas around process tanks will include a low maintenance finish (i.e. gravel bluemetal) to reduce ongoing maintenance.

3.5 Primary Treatment

3.5.1 Inlet Works

Port Hinchinbrook subdivision is located adjacent to the ocean and is considered likely to accumulate a significant amount of grit; therefore, grit removal has been considered part of the upgrade. The inlet works has been sized for the maximum instantaneous flows delivered by the network.

The proposed inlet works is a packaged type screen and grit removal unit, which is available from numerous suppliers in the market and comprises of: -

- Mechanical spiral sieve screen, including screenings compaction and washing; and
- Horizontal grit removal chamber, compaction and washing.

The packaged system would be specified as stainless steel construction, suitable for the proposed installation. The size of the inlet works is typically based on average and maximum instantaneous flows. Consideration has been given to future upgrades for the inlet works. The proposed combined spiral sieve screen and grit channel will provide a maximum capacity of 40 L/s which may meet potential future upgrades requirements.

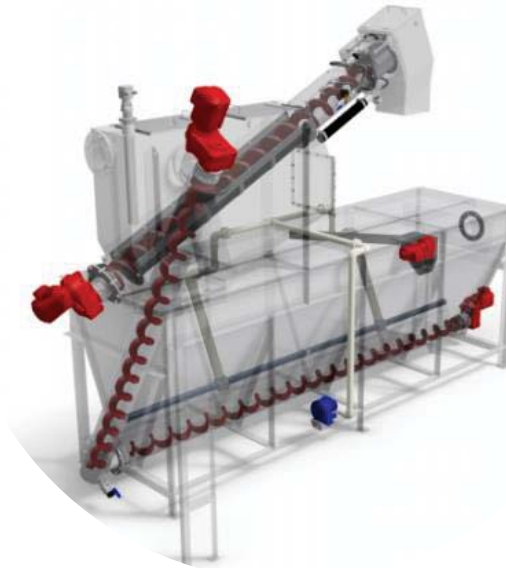


Figure 2 – Example of a Packaged Inlet Screen and Grit Removal System (Spirac Combiguard)

3.5.2 Flow Balance Tank

A new flow balance tank, of concrete construction is proposed to be installed downstream of the inlet works.

The flow balance tank receives screened sewage from the inlet works and is installed with two submersible wastewater pumps e.g. Xylem Flygt NP model pumps or equivalent. The pumps are installed on a proprietary guiderail system complete with localized davit for removal/installation.

The balance tank acts as a pump station and delivers flows to the bioreactor during the fill/react phase. The pumps operate on a variable speed drive (VSD) to provide close to continuous flow to the bioreactor. The volume of the balance tank is proposed to have a minimum working volume of 34 kL which enables two hours of storage at 3x ADWF when the SBR is in a settle or decant phase and not receiving flows.

The balance tank will be fitted with a high level overflow connected to the outfall. Flows in excess of 3x ADWF from the will be released to environment, ensuring all influent receives screening.

The balance tank includes the following equipment: -

- Duty/Standby submersible pumps (preferentially variable speed); and
- Level instrumentation.

3.5.3 Offline Maintenance Storage Tank

CCRC have requested one of the existing steel tanks is retained and used as offline storage for maintenance purposes to allow for major plant shutdowns.

It is proposed the existing balance tank is reused.

Direction of flows to offline storage tank will be a manual task (i.e. does not form part of the plant process). Valving will be provided to allow operators to redirect flows.

A drain from the storage tank to the GPPS will be provided.



Figure 3 – Flow Balance Tank and Submersible Pumps

3.6 Secondary Treatment

The proposed Secondary Treatment process is a single train Sequential Batch Reactor (SBR), operating in a fixed, or alternating cycle. The single train SBR proposed has been sized for a population of 500 EP. If Council wish to upgrade the plant in the future, the SBR can be duplicated and operated as a two-train system or utilised for sludge management (i.e. aerobic digestion). A staged approach can be implemented with additional SBR trains added as required dependent on the population increases.

The secondary treatment train comprises: -

1. A sequencing batch reactor tank with Anoxic and Aerobic zones, separated by internal dividing wall; and
2. A decant/chlorine contact tank (refer section 3.7 for details).

3.6.1 Sequencing Batch Reactor (SBR)

The proposed SBR tank is a single concrete tank sized with approximate internal dimensions of 10 m long, 6 m wide with 5 m wall heights, which enables 0.5 m freeboard and varying water depths (bottom water level (BWL) 3 m to top water level (TWL) 4.5 m relative to floor level in the tank). The SBR is proposed to have a BWL volume of 180 m³ and an ultimate TWL volume of 270 m³.

Alternative methods of construction are available in the market which include traditional cast in-situ and precast solutions. The concept design is based on a typical cast in-situ tank, however pre-cast construction may be accepted further during the detailed design and construction phases.

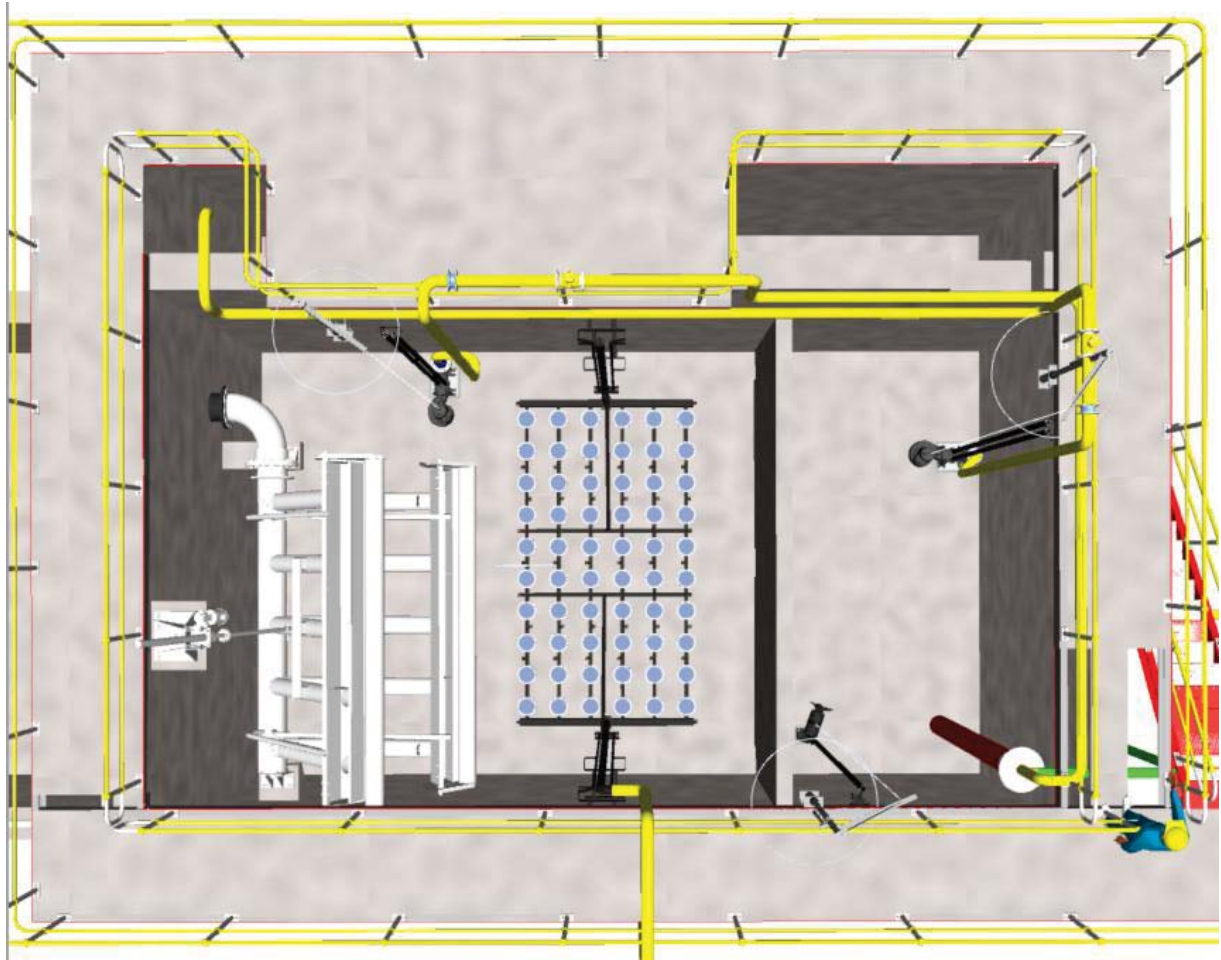


Figure 4 – SBR General Arrangement

The SBR during normal operation is proposed to operate with three distinct cycle steps, as described in the table below.

1. Fill/React Phase – SBR is filling with influent from the balance tank. Process air is introduced as well as constant mixing provided by the mixers, a-recycle pump and aeration.
2. Settle Phase – The SBR is in settling mode and is not receiving any influent. All mechanical equipment is off allowing the mixed liquor to settle, reducing the sludge blanket providing a clear layer of supernatant; and
3. Decant Phase – Settling phase is complete, all mechanical equipment remains off and no influent is received. The decanter operates, slowly driving into the surface and removing the supernatant from the tank, discharging to the decant/chlorine contact tank (CCT).

An example of the SBR sequencing is provided below, the cycle sequence steps can be modified to suit the plant operation. Once the decant phase is complete, the SBR returns to step 1 and continues to cycle through.

Table 6 – SBR Operation Cycle Times (example)

Cycle Time	1	2	3	4	5	6	7	8
Sequence Step	Fill / React	Fill / React	Fill / React	Fill / React	Settle	Settle	Decant	Decant

Initially, the plant would be operated at a lower mixed liquor content for the 'assumed' current loading. The operating mixed liquor content can be increased as required, to suit the higher loading. For example, initially, the plant may be operated with a mixed liquor content of 2,000 mg/L and when the loading is higher, can be operated at 3,000 – 4,000 mg/L, increasing the biological treatment capacity of the plant at that point in time. During the low loading periods, supplementary carbon dosing (sugar dosing) is facilitated to provide an additional food source. As Port Hinchinbrook is a holiday destination, during the summer months it is assumed the loading will be lower.

The SBR incorporates two zones Anoxic Zone and Aerobic Zone with an internal dividing wall which is provided with low voids in the wall to hydraulically link the two zones. Access walkways would be provided to access all equipment installed within the SBR.

3.6.2 Anoxic Zone

The anoxic zone receives influent from the balance tank and return flows from the aerobic zone. The intention of the anoxic zone is to promote denitrification, typically operated at a DO < 0.5 mg/L. The tank would be provided with a submersible propeller mixer e.g. a Flygt SR4630 propeller mixer or equivalent to promote substrate contact and reduce short-circuiting within the SBR tank. The mixer would be supported by a proprietary fixed guide rail and chain to ease removal for maintenance, or rotation if required.

3.6.2.1 WAS Pump and Suction Piping

A single Waste Activated Sludge (WAS) pump is proposed to be installed in Anoxic zone. The pump is proposed to be a submersible sewage pump e. g. Xylem Flygt NP model or equivalent . The WAS pump will transfer mixed liquor to the sludge tank, adjacent to the SBR tank.

3.6.3 Aerobic Zone

The aerobic zone provides BOD removal and Nitrification of Ammonia. The aerobic zone would be installed complete with: -

- Fine bubble aeration with submersed diffusers provided by external blowers;
- Decanter;
- A-recycled pump; and
- WAS discharge piping.

3.6.3.1 Diffused Aeration

The Aerobic zone is supplied with aeration via a fine bubble diffused aeration grid e.g. Xylem Sanitaire fine bubble disc diffusers or MAPAL aeration fine bubble tube diffusers or equivalent. The aeration grid is sized to suit the nominated process requirements.

Aeration is proposed to be supplied via duty/standby rotary lobe blowers e.g. Gardner Denver Robuschi Robox or equivalent. The aeration blowers are variable speed and operate to maintain an operator settleable dissolved oxygen concentration within the bioreactor, presumably 2 mg/L.

The blowers are proposed to be housed inside a blockwork building combine with the switchroom to aid in noise reduction.

3.6.3.2 A-recycle pump

A submersible wastewater pump e.g. Xylem Flygt NP model or equivalent is proposed to be installed within the Aerobic zone to provide return flows of aerated sewage from the aeration zone to the anoxic zone at approximately 5x ADWF. The pump would be operated on a VSD to enable optimization of treatment. The pump would be supported by a proprietary fixed guide rail and chain to ease removal for maintenance.

3.6.3.3 Decanter

The aerobic tank is complete with a 316 Stainless Steel (SS) decanter. The proposed decanter would be a Xylem (Sanitaire) ABJ 12.5 Ft Multiple Downcomer actuated decanter or equivalent. The decanter will decant the effluent from the settled top water layer of the SBR into the Decant / Chlorine Contact Tank.

The decanter is actuated by an electro-mechanical screw jack with a VSD motor. The decant rate will be controlled by the level in the SBR prior to the decant period starting. The decanter is proposed to decant over a period of around 60 minutes (operator-settable) from TWL to BWL.

3.7 Decant / Chlorine Contact Tank

Forming part of the SBR structure, a combined decant/chlorine contact tank is proposed. The tank receives secondary effluent from the SBR via the decanter.

This tank is proposed to provide flow balancing and may be used for disinfection, prior to tertiary filtration. To maintain a chlorine residual within the recycled water tank, an additional chlorine dosing point may be required, or direct dosing into the recycled water tank. The extent of disinfection will need to be confirmed as part of the recycled water management plan (RWMP) development during detailed design phase alternate disinfection which may be considered as part of this RWMP includes ultraviolet disinfection.

The decant tank will operate as a balancing tank upstream of the tertiary filters. Submersible pumps e.g. Xylem Flygt NP model or equivalent. will be installed within the decant tank, transferring secondary effluent to the tertiary filters.

Disinfection in the decant / chlorine contact tank is proposed and would include a submersible recirculation pump which will provide additional mixing in the tank to aid in disinfection.

The chlorine contact tank would include the following equipment: -

- Level instrumentation;
- Duty/standby filter feed pumps, and
- Duty CCT recirculation pump.

3.8 Chemical Dosing

The following chemical dosing systems are proposed: -

1. Sodium Hypochlorite dosing for disinfection – The dosing system would comprise duty/standby dosing pumps.
2. ACH for chemical phosphorus removal. Biological phosphorus removal not suitable for plants of this size. Duty dosing pump are proposed with cold standby.
3. Sugar solution for supplementary carbon addition. The plant loading is unknown, and the development is a holiday area, resulting in high loading during the tourist season and lower loading other times of the year. Sugar solution provides a supplementary food source for the mixed liquor during these lower loading periods.

Chemical Dosing pumps for the above applications are proposed to be digital dosing diaphragm pumps e.g. Grundfos DDA or equivalent. The digital dosing pumps provide flexibility in operation to meet varying process conditions. The dosing requirements for this plant enables the same pump model to be used for all chemicals, as such a single duty pump can be installed for each application and a cold standby could be maintained on site for operator change out in the event of a pump failure. The proposed digital dosing pumps are connected via a 240 V General power outlet and threaded connections enabling ease of change out by an operator.

Chemical dosing pumps are proposed to be housed in an individual a dosing cabinet for each chemical complete with required valving and E-stop.

The chemical dosing and storage design has allowed for bulk chemical deliveries with chemical stored in tanks onsite with bunded area surrounding each tank. Based on bulk chemical deliveries a chemical unloading bund has been provided immediately adjacent the chemical storage area.

An alternative to constructed chemical storage bunds, is to install double containment tanks complete with integrated dosing panels e.g. Polymaster self-bunded tank dosing systems or equivalent. The double containment tank system eliminates ingress of rainwater into traditional concrete bunds, provides reduction in site footprint and reduces construction costs with a simplified concrete slab and removal of shed / roofing requirement.



Figure 5 – Double Containment Tanks

Alternatively all chemicals can be stored in Intermediate Bulk Containers (IBC's), reducing the requirement for chemical unloading bunds. The IBC's can be placed on proprietary bunds, like what is currently used on the site. Consideration to manual handling of IBC's and requirement for machinery would be required.

3.9 Tertiary Filtration

Tertiary filters are proposed to be installed for effluent polishing for effluent irrigation with a capacity up to 3x ADWF. The proposed filters are multimedia pressure filters e.g. Amiad or equivalent. The filters are provided effluent from the decant tank / CCT via the filter feed pumps. The filter vessels operate in parallel with the pumped effluent flow split between each filter vessel. Each filter vessel contains four layers of filter media with progressive reductions in media

size to provide effluent filtration. The filtered effluent is discharged from each vessel and delivered to the recycled water storage tank.

The filters are provided with an external backwash pump system which provides high pressure water to back flush the filter media removing any trapped solids. The backwash water will flow to the GPPS for return to the head of the works.

Coagulant can be dosed to provided increased efficiency in the filters. An allowance for ACH has been made to dose upstream of the filters.

The tertiary filtration proposed for this STP is installed in a N+1 design which enables a single vessel to be taken offline for maintenance or replacement of media with the remaining three vessels providing the required filtered water quality output.

The filters would be installed to be flood immune to a 100-year ARI event.

The extent of filtration for inclusion in the RWMP will need to be confirmed during detailed design.



Figure 6 – Tertiary Filtration Multimedia Pressure Filters

Alternate options for the tertiary filtration system to the proposed pressure multimedia filters include:

1. Gravity sand filters;
 - a. Due to the configuration of the site with effluent storage occurring downstream of the filters this solution would require the filters to be elevated or an additional small holding tank and pump set would be required to lift into the recycled water storage tank.
2. Continuous wash up flow (CWUF) sand filters.
 - a. The CWUF filters are typically a silo style design with overall height of approximately 5 m from surface level. For the proposed concept design configuration the CWUF filters would need to be elevated by an approximate additional 1.5 m in elevation to enable the CWUF filters to discharge via gravity into the recycled water storage tank. Due to the STP being in a cyclonic region the elevated silo style of design would likely require concrete pier foundations and potential additional structural bracing to meet the local conditions. CWUF filters do offer the benefit of continuous back washing where a small air compressor provides air for backwashing eliminating the requirement for a backwash pump.

3.9.1 Tertiary Treatment Shed

The filters will be installed in a proprietary shed structure, combined with the recycled water pump sets. The shed has been designed to allow for future plant expansion and additional filter units.

The shed is fully enclosed, with access provided at either end for maintenance purposes. The final shed layouts can be optimized during detailed design development.

3.10 Recycled Water Storage and Pumping

The existing 1.5 ML effluent storage tank is in poor condition and has several leaks. The tank is proposed to be decommissioned and replaced. The proposed concept design is to construct a steel panel tank in the location behind the existing tank. The site has an existing ring beam foundation, the tank construction recommended would be proposed to remove this foundation and place a new ring beam foundation specific to the selected panel tank supplier.

Alternatively, if the existing footing is to be retained this will require a structural conditional assessment to be completed on the footing and the tank supplier to endorse the footing to ensure the construction of the tank is guaranteed. It is assumed this process will be cost prohibitive with also the risk of having to potentially remove and replace the footing post the condition assessment.

The proposed recycled water storage tank is a powder coated panel tank complete with internal liner to a working capacity of 1.5 ML. The approximate size of this tank is 19.5 m diameter by 5.5 m high with specific dimensions dependent on nominated supplier designs.

An alternate solution includes supply of a glass fused steel panel tank to the similar capacity at an additional cost for a slightly extended lifespan.

Recycled Water Storage Tank provides water for the following purposes:

- Irrigation – Irrigation water is provided for irrigation of the existing paddocks and around the existing site.
- Service Water – Service water is provided around the upgraded STP for washdown hoses and process sprays at the inlet works and SBR
- Filter Backwash – Backwash water is provided to the tertiary filters for backwashing the blinded filter media

Duty / Standby vertical multistage water pumps complete with integrated control e.g. Grundfos MPC CRE Model pumps or equivalent are proposed for the following pump sets:

- Irrigation pumps
- Service Water pumps
- Filter Backwash pumps



Figure 7 – Typical Grundfos multistage vertical pump set with integrated control panel

3.11 Sludge Management

Councils preferred method for sludge management is to provide onsite thickening and holding, with the ability to tanker thicken sludge offsite for dewatering at existing STP's. Should they be in suitable condition, the existing drying beds may be retained for use.

3.11.1 Sludge Thickener & Holding Tank

Mixed liquor is pumped from the SBR to a sludge thickening and holding tank via the WAS pump. The sludge thickening tank will be constructed as part of the SBR tank structure and has been sized for a minimum of 10 days solids retention time (SRT) for 500EP, which equates to 25 days for 200EP, based on thickening of MLSS to 6000mg/L.

The sludge thickening tank provides gravity thickening and holding. The sludge thickening tank will only receive WAS during the fill/react cycle.

To maintain a mixed holding tank and to prevent anaerobic conditions, a jet aerator or coarse bubble diffusers are proposed. The aeration would typically operate intermittently.

Supernatant from the sludge tank overflows the internal weir/wall and discharging to the SBR Anoxic Zone. This reduces the requirement for additional pumping etc.

3.11.2 Existing Drying Beds

The sludge drying beds appear to be in good condition may be retained for opportune use. It is recommended remediation works are undertaken, including the replacement of media and redirection of subnatant flows to the GPPS.

3.11.3 Sludge Dewatering Unit (Optional)

An additional option is to install a mechanical sludge dewatering unit for the STP. This option can be installed instead of, or in addition to the proposed sludge holding tanks.

Mixed liquor/sludge is pumped directly from the SBR, or thickening tank, to a duty mechanical dewatering unit e.g. Huber 280 Screw press or equivalent. The screw press would be installed complete with vendor supplied duty polyelectrolyte dosing skid (e.g. Tomal Polymore) and duty air compressor.

The mechanical dewatering unit would be housed on a platform under a skillion roof for inclement weather protection. Dewatered sludge cake is proposed to be discharged from the screw press direct or via a transfer conveyor into a metal

skip bin for offsite disposal once a week. The skip can be provided with a retractable cover / tarp to prevent wet weather ingress or alternatively walls of the structure sheeted.

3.12 General Purpose Pump Station

Based on the concept design flows and location of the proposed upgraded STP it is likely the existing GPPS will be undersized. It is proposed as part of the concept design to install a new GPPS complete with duty/standby submersible wastewater pumps and associated level instrumentation.

The GPPS will receive bund return flows from filter backwash, chemical dosing areas, subnatant flows from the drying beds, control building drainage, and bund return flows from the inlet works and washdown areas. The GPPS will return flows to the head of the inlet works for screening and return to the treatment process.

3.13 Operator Building

It is proposed the existing operator building is retained, refurbished and reused as part of the upgrade. Due to the possibility of flooding, GANDEN propose the existing building is retained as an operations, laboratory and amenities building or a storage building. The building floor is elevated approximately 700 mm above the surrounding ground level raised so may be immune to high frequency flood events the exact level will need to be confirmed as part of the detailed design phase with confirmation of detailed topographical survey.

3.14 Electrical

3.14.1 Switchroom

A new block work building housing the electrical switchroom, is proposed to be constructed adjacent the SBR, the building will also house the blowers in separate room. Due to the operating climate and councils experience with prefabricated building being problematic in the area a blockwork building has been proposed.

The switchboard will be installed with a 0.5 m freeboard above the 100-year ARI flood event level. It is proposed the switchroom is installed with a suspended floor commonly known as a computer floor, this enables ease of cable installation during construction and any upgrades.

Prefabricated buildings of suitable materials may be considered, however are not recommended at this stage.

3.14.2 Electrical Mains

It is assumed the existing mains power supply is suitable for the proposed upgrade. Liaison with Ergon Energy for any connection or upgrades will be undertaken during the detailed design.

It is noted the existing transformer pole is currently leaning. Rectification or replacement of the pole may be undertaken during the upgrades.

3.15 Outfall

The existing plant outfall to One Mile creek has not been located as part of this concept design. It is assumed to be in working condition. Allowance has been made in the cost estimates for the connection to the exiting outfall pipeline and minor refurbishment works.

A flow meter will be installed on the outfall pipeline to allow for continuous monitoring and flow recording.

3.16 Decommissioning and Demolition

Allowance has been made within the estimates for the provision of decommissioning and demolition of existing redundant assets.

3.16.1 Effluent Storage Tank

The existing effluent storage tank is in poor condition and leaking. This tank requires replacement. The new storage reservoir will be constructed prior to the decommissioning of the existing tank. Replacement of this tank may be undertaken prior to the plant upgrade.

The existing tank is a steel panel tank which is modular in nature which will aid in the decommissioning and removal from site.

3.16.2 Treatment Plant

The existing plant will be decommissioned following the successful cutover and commissioning the new plant. The existing plant is modular in nature, therefore decommissioning works will include removal of electrical and mechanical equipment and piping, followed by removal of tanks.

The existing concrete slab may be retained.

3.17 Future Plant Upgrade

CCRC are in the planning stages of sewerage Cardwell. Should this go ahead, the existing STP site is likely to be utilised and developed further to cater for an ultimate connected population of 2,700 EP.

GANDEN have made allowances and provided a site layout for the future 2,700 EP plant. The future plant utilised the same process technology (SBR/IDEA) and comprises a two-train system. Considerations to the future upgrade include:

-

- Site access and real estate for future SBR/IDEA treatment tanks;
- The 500 EP plant can be repurposed and utilised for sludge management by converting the SBR to an aerobic digester;
- Tertiary filter shed - Allowance for additional filter trains to meet 2,700 EP requirements; and
- Utilisation of chemical dosing systems for 2,700 EP plant.

4. Cost Estimate

High-level budget cost estimates for the capital expenditure (CAPEX) and operational expenditure (OPEX) of the proposed concept for the Port Hinchinbrook STP 500 EP upgrade are provided in the tables below.

4.1 CAPEX

Table 7 – High-Level CAPEX Cost Estimate

Item	Process Area	Description / Comment	Estimated Cost \$	Difference from Rev A Estimate
1	Inlet Works & Balance Tank	Mechanical Inlet Screen, concrete bund and associated infrastructure and Balance Tank Pump Station	\$377,000	\$0
2	Sequencing Batch Reactor (inclusive of CCT and sludge holding tank)	Concrete tank, mechanical equipment and instrumentation etc. constructed above ground. Assumed ground conditions suitable, no allowance for piled foundations	\$1,019,500	+ \$186,800
3	Dewatering	Mechanical Dewatering Removed. Sludge holding included in item 3. Allowances for refurb of drying beds.	\$30,000	- \$375,500
4	Tertiary Filtration & Pump Stations	Sand filters, pumps, backwash tank etc.	\$448,300	+ \$195,300
5	GPPS	General Purpose pump station and pumps	\$87,400	\$0
6	Chemical Dosing	Sodium Hypochlorite (disinfection), ACH for phosphorus removal, Sugar dosing for supplement carbon dosing Includes concrete bund and roof structures, duty/standby dosing skids and associated instrumentation.	\$173,900	\$0
7	Electrical General	Site Run Electrical, Switchboard, including PLC and SCADA	\$447,100	\$0
8	Civil Works	Civil works, piping etc.	\$275,000	+ \$50,000
9	Tertiary Pump Stations	Now combined with Item 4	\$0	- \$138,200
10	Admin Building	Refurbishment of existing building	\$31,000	\$0
11	Effluent Storage Tank	New 1.5ML Effluent Storage Tank	\$800,000	\$0

Item	Process Area	Description / Comment	Estimated Cost \$	Difference from Rev A Estimate
12	Decommissioning / Demolition	Allowance for decommissioning/demolition of redundant infrastructure.	50,000	+ \$50,000
	TOTAL DIRECT COSTS		\$3,739,200	-\$31,600
	Design	(10% of Direct Costs)	\$373,920	-\$3,160
	Indirect Cost Allowance	(15% of Direct Costs)	\$ 616,968	-\$5,214
	Construction Contractor Profit Margin	(10% of Direct Costs, indirect Costs & Commissioning Costs)	\$ 473,009	-\$3,997
	ESTIMATED CONSTRUCTION CONTRACT AWARD SUM	Based on D&C	\$5,203,097	- \$43,971
	Construction Contingency	(30% of Estimated Contract Award Sum and Construction Management Costs)	\$ 1,560,929.04	-\$13,191
	TOTAL CONSTRUCTION COSTS		\$6,764,026	-\$57,163

4.2 OPEX

The high level OPEX has been baselined on STP's of similar design and associated equipment. A summary of costs for 200 EP and 500 EP plant are shown below in Table 8 with assumptions captured below.

Table 8 – High-Level OPEX Cost Estimate

Description	Unit	Annual OPEX based on 200 EP	Annual OPEX based on 500 EP
Population	EP	200	500
Power	kw/yr	103,000	132,000
Power	\$/yr	\$ 33,000	\$ 41,000
Chemical	\$/yr	\$ 7,000	\$ 17,000
Maintenance and Spares incl Operations Daily works	\$/yr	\$ 79,000	\$ 80,000
Sludge Removal	\$/yr	\$ 26,000	\$ 65,000
Potable Water Usage	\$/yr	\$ 1,000	\$ 1,000
TOTAL COSTS	\$/yr	\$146,000	\$204,000

4.2.1 OPEX Assumptions

- Sludge Removal estimates are based on a rate for removal and disposal of \$44 /m³ with a volume of 67.5 m³ removed at frequencies of once in 6 weeks for 200 EP and once in 2.4 weeks for 500 EP. CCRC noted tankering costs may be closer to \$100/m³ which will double the sludge removal costings noted above for each of the noted cases.
- Operator costs were allowed for one operator 2 days per week at a rate of \$90 /hr.
- Electricity and chemical consumption is based on operation of drives at ADWF including returns. No allowance has been made for extended run time due to extended severe weather conditions (flooding/drought), control failure and any other unforeseen events. Equipment drive sizes estimated are typical expected size for this size plant. Electricity rates used \$0.277 /kwh, chemical rates ACH \$1.77/L and Hypo \$1.60 /L.
- Spares and consumables are specific for most of the equipment, typical allowance have been made. Cost may vary depending on the actual equipment selected during construction. Time allowed for maintenance activities has been based on an average skilled personnel.
- Potable water consumption has been estimated based on typical usage. It should be noted that potable water usage may vary largely.
- The estimate costs are all exclusive of GST.
- The prices stated are a best estimate at the time of compiling the estimate.
- No allowance has been made for premature equipment breakdowns and/or replacement due to poor O&M strategies.
- NATA accredited tests and on-site testing consumables for process monitoring has not been included in this estimate.

Appendix A - Concept Design Drawings

Appendix B - Environmental Authority

Appendix C - Flood Mapping

Appendix D - Cardno Report Tech Memo

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LOCALITY PLAN
SCALE N.T.S.

GENERAL	
1294-DWG-GEN-0001	COVER SHEET, SITE LOCALITY PLAN - & DRAWING SCHEDULE
1294-DWG-GEN-0010	SITE LAYOUT - 500EP UPGRADE
1294-DWG-GEN-0011	AREA SITE PLAN - INLET WORKS / BALANCE TANK / CHEMICAL STORAGE
1294-DWG-GEN-0012	AREA SITE PLAN - SECONDARY TREATMENT / SWITCHROOM
1294-DWG-GEN-0013	AREA SITE PLAN - TERTIARY TREATMENT AND PUMPING
1294-DWG-GEN-0014	AREA SITE PLAN - EFFLUENT STORAGE TANK
1294-DWG-GEN-0015	ISOMETRIC VIEWS -
1294-DWG-GEN-0016	SITE LAYOUT - FUTURE 270DEP UPGRADE
PFD	-
1294-DWG-PFD-0100	PROCESS FLOW DIAGRAM -
P&ID	-
1294-DWG-PID-0110	PIPING & INSTRUMENTATION DIAGRAM - LEGEND SHEET 1 OF 2
1294-DWG-PID-0111	PIPING & INSTRUMENTATION DIAGRAM - LEGEND SHEET 2 OF 2
1294-DWG-PID-0120	PIPING & INSTRUMENTATION DIAGRAM - INLET WORKS
1294-DWG-PID-0121	PIPING & INSTRUMENTATION DIAGRAM - BALANCE TANK
1294-DWG-PID-0122	PIPING & INSTRUMENTATION DIAGRAM - SBR BIOREACTOR
1294-DWG-PID-0123	PIPING & INSTRUMENTATION DIAGRAM - CHLORINE CONTACT TANK / DECANT TANK
1294-DWG-PID-0124	PIPING & INSTRUMENTATION DIAGRAM - RECYCLED FILTERS
1294-DWG-PID-0125	PIPING & INSTRUMENTATION DIAGRAM - TERTIARY WATER STORAGE & PUMPING
1294-DWG-PID-0126	PIPING & INSTRUMENTATION DIAGRAM - SBR PROCESS BLOWERS
1294-DWG-PID-0127	PIPING & INSTRUMENTATION DIAGRAM - GENERAL PURPOSE PUMP STATION
1294-DWG-PID-0128	PIPING & INSTRUMENTATION DIAGRAM - SERVICE WATER
1294-DWG-PID-0129	PIPING & INSTRUMENTATION DIAGRAM - SLUDGE THICKENER
1294-DWG-PID-0130	PIPING & INSTRUMENTATION DIAGRAM - SODIUM HYPOCHLORITE DOSING & STORAGE
1294-DWG-PID-0131	PIPING & INSTRUMENTATION DIAGRAM - ACH DOSING & STORAGE
1294-DWG-PID-0132	PIPING & INSTRUMENTATION DIAGRAM - SUGAR DOSING
1294-DWG-PID-0133	PIPING & INSTRUMENTATION DIAGRAM - INFLUENT STORAGE TANK



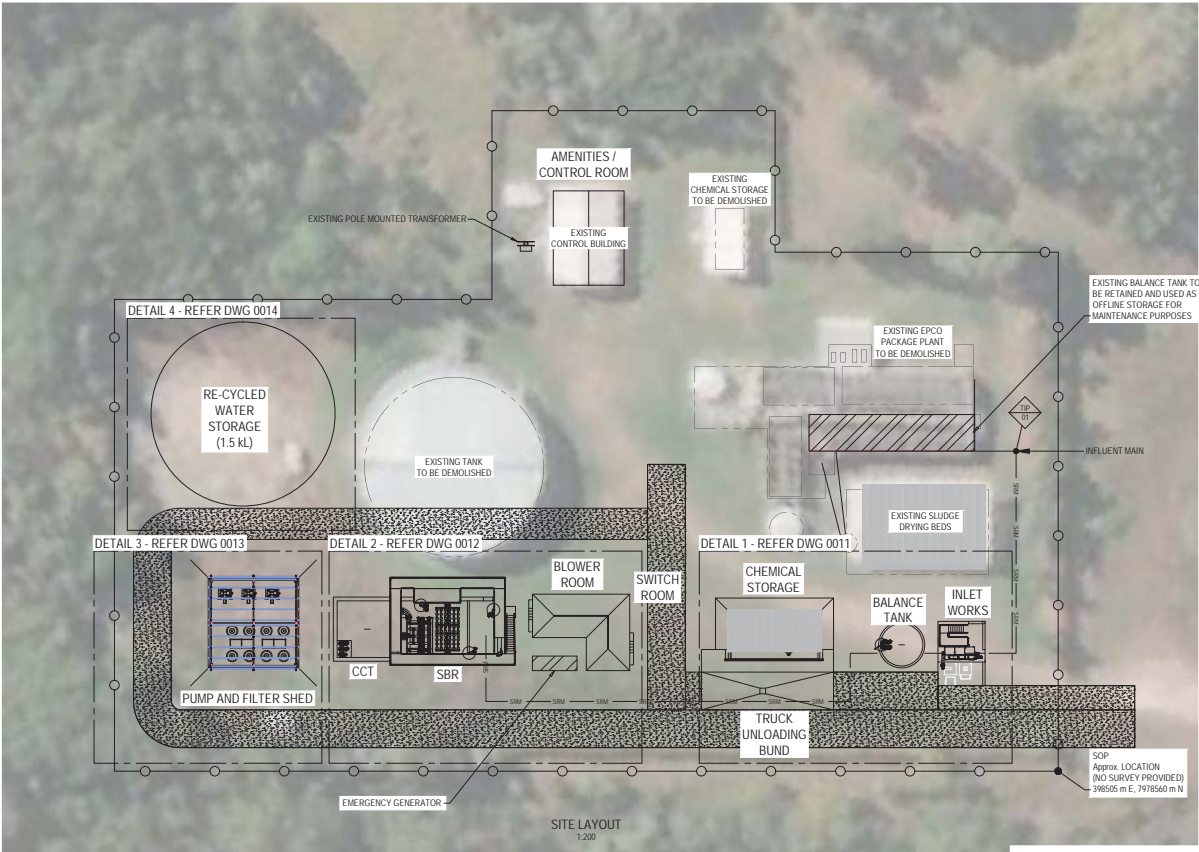
GANDEN
ENGINEERS AND PROJECT MANAGERS

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Suite 106, 20 Lake Orr Drive,
Varsity Lakes, QLD 4227
T 07 5589 1457

<p>SCALES  100mm ON ORIGINAL DRAWING</p>	
<p>ORIG. SIZE</p> <p>A1</p>	

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A	ISSUED FOR DRAFT CONCEPT DESIGN REVIEW	28.02.20	NO				
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DRAWING STATUS		CONCEPT	
TITLE PORT HINCHINBROOK SEWAGE TREATMENT PLANT UPGRADE CONCEPT DESIGN COVER SHEET, SITE LOCALITY PLAN & DRAWING SCHEDULE			
DRAWING NUMBER			REVISION
1294-DWG-GEN-0001			B



NOTE:
PRIMARY FLOW PATH PIPEWORK SHOWN INDICATIVELY
SECONDARY PIPEWORK OMITTED.



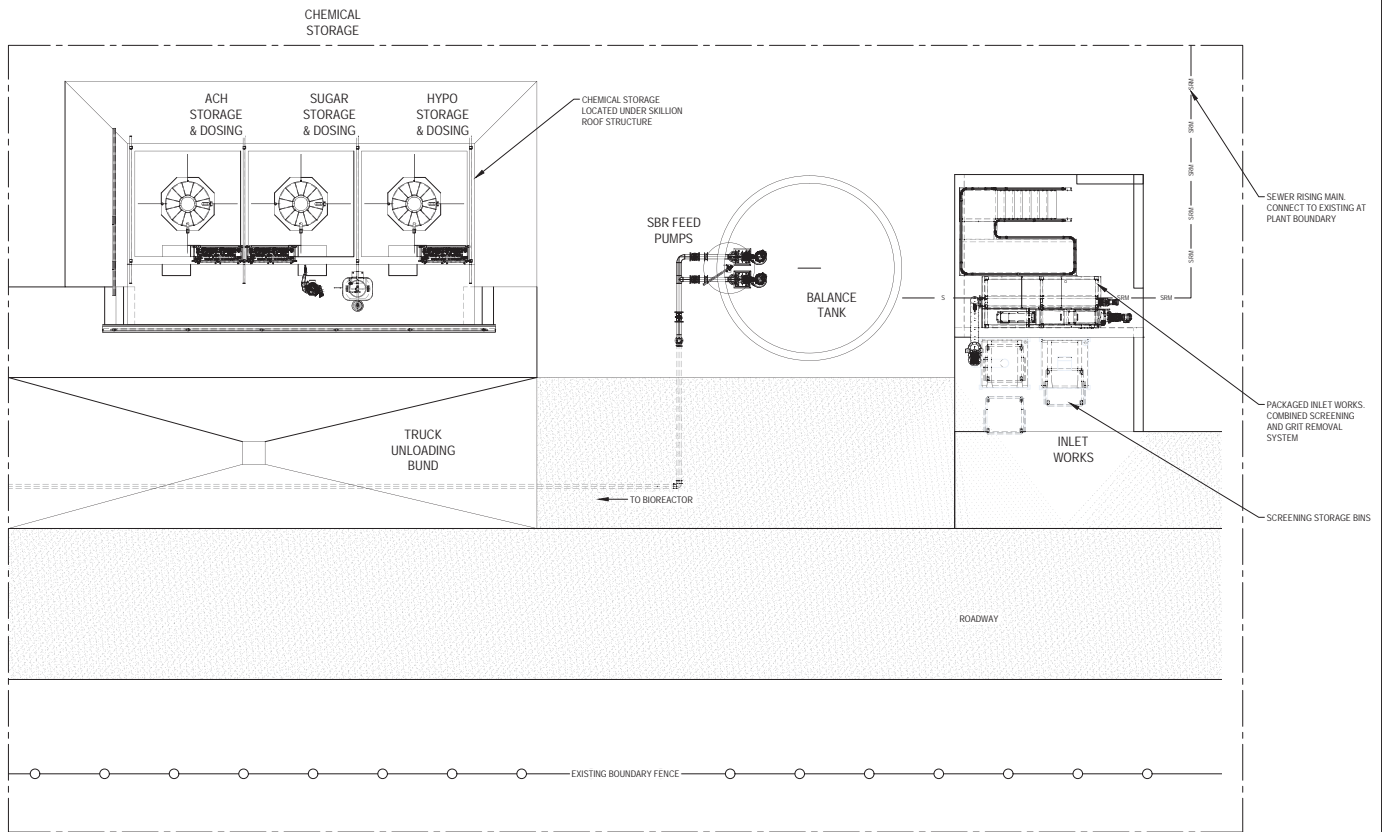
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SUITE 105, 301 LARA DRIVE
GOLD COAST, QLD 4217
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E info@ganden.com.au

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2	FINAL CONCEPT DESIGN ISSUE

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DRAWING STATUS	
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TITLE	
PORT HINCHINBROOK SEWAGE TREATMENT PLANT UPGRADE	
CONCEPT DESIGN	
SITE LAYOUT	
500EP UPGRADE	
DRAWING NUMBER	1294-DWG-GEN-0010
REVISION	B



DETAIL 1
1:50 0010

NOTE:
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SECONDARY PIPEWORK OMITTED



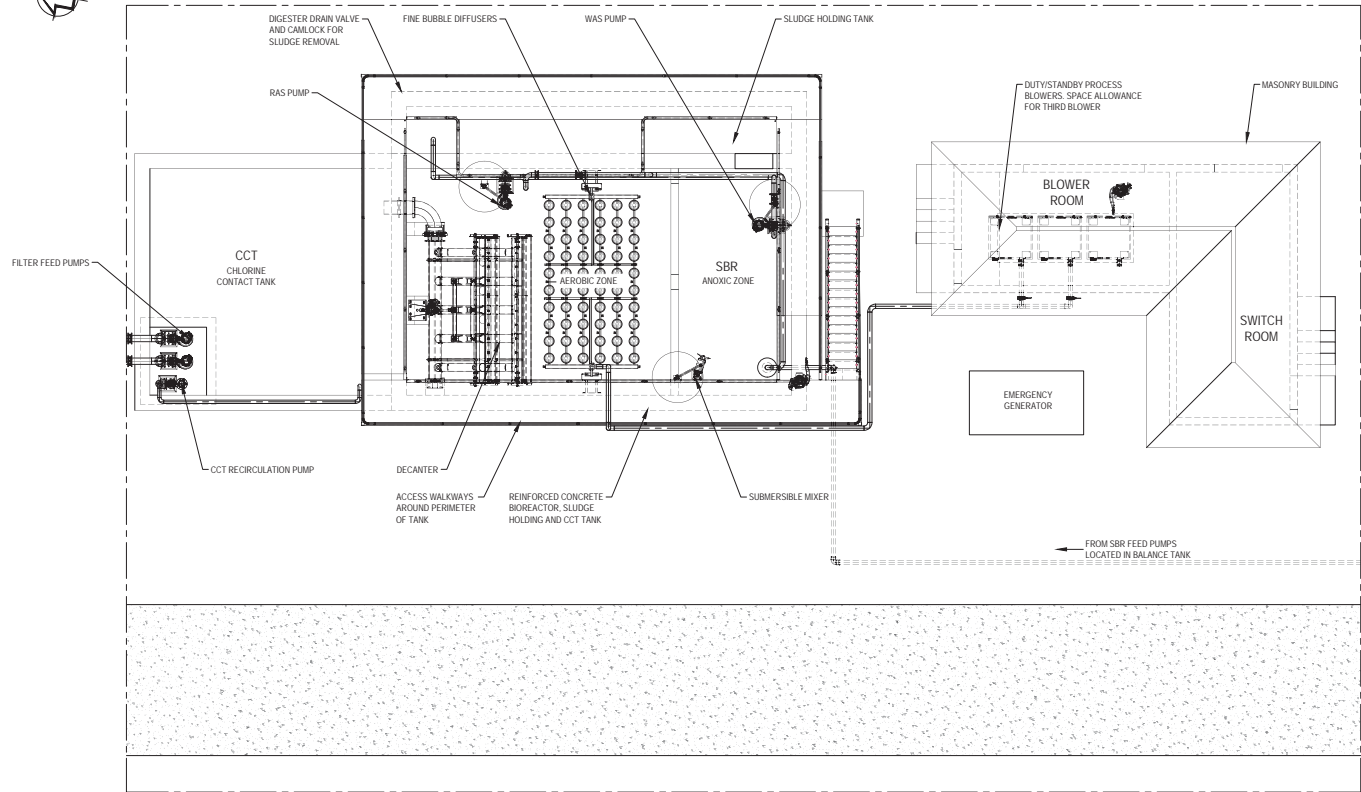
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DRAWING STATUS	
CONCEPT	
TITLE	
PORT HINCHINBROOK SEWAGE TREATMENT PLANT UPGRADE CONCEPT DESIGN AREA SITE PLAN INLET WORKS / BALANCE TANK / CHEMICAL STORAGE	
DRAWING NUMBER	
1294-DWG-GEN-0011	
REVISION	
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DETAIL 2
1:50 0010

NOTE:
PRIMARY FLOW PATH PIPEWORK SHOWN INDICATIVELY
SECONDARY PIPEWORK OMITTED



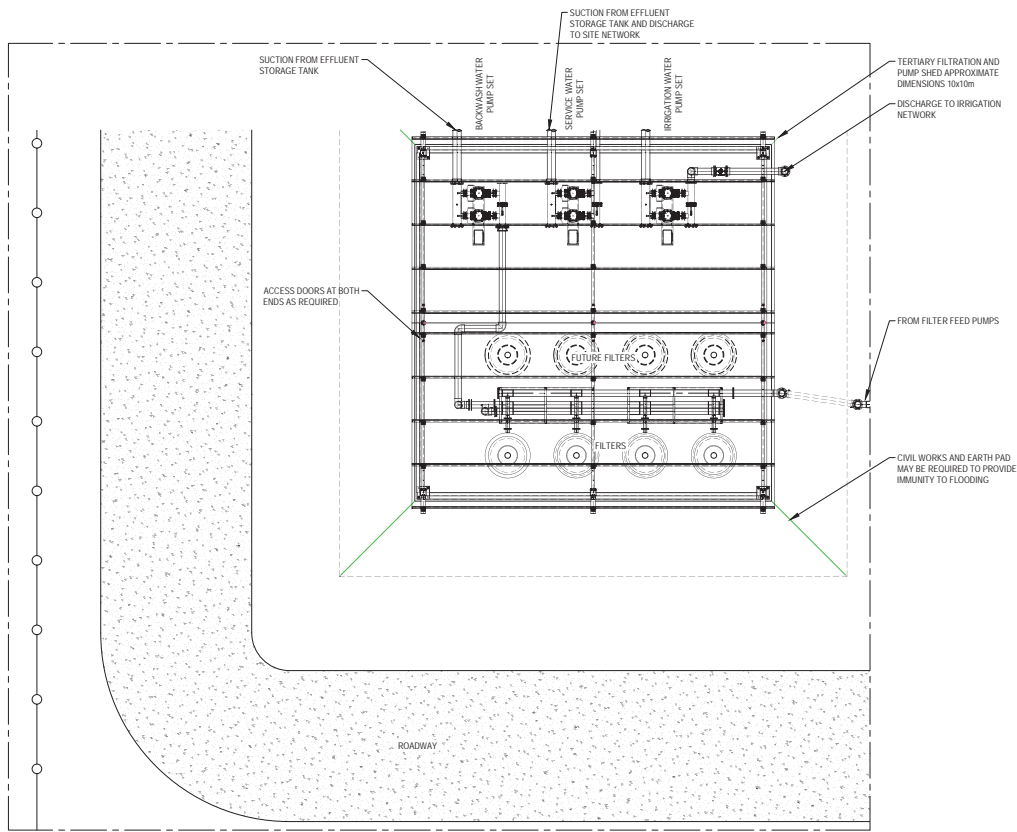
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B	FINAL CONCEPT DESIGN ISSUE	27.04.25	JG	DN
A	ISSUED FOR DRAFT CONCEPT DESIGN REVIEW	28.10.23	BO	AB
REV	DESCRIPTION	DATE	BY	APP
REVISIONS				

DRAWING STATUS	
CONCEPT	
TITLE	
PORT HINCHINBROOK SEWAGE TREATMENT PLANT UPGRADE	
CONCEPT DESIGN	
AREA SITE PLAN	
SECONDARY TREATMENT / SWITCHROOM	
DRAWING NUMBER	1294-DWG-GEN-0012
REVISION	B



DETAIL 1:50 (3/0010)

NOTE:
PRIMARY FLOW PATH PIPEWORK SHOWN INDICATIVELY
SECONDARY PIPEWORK OMITTED



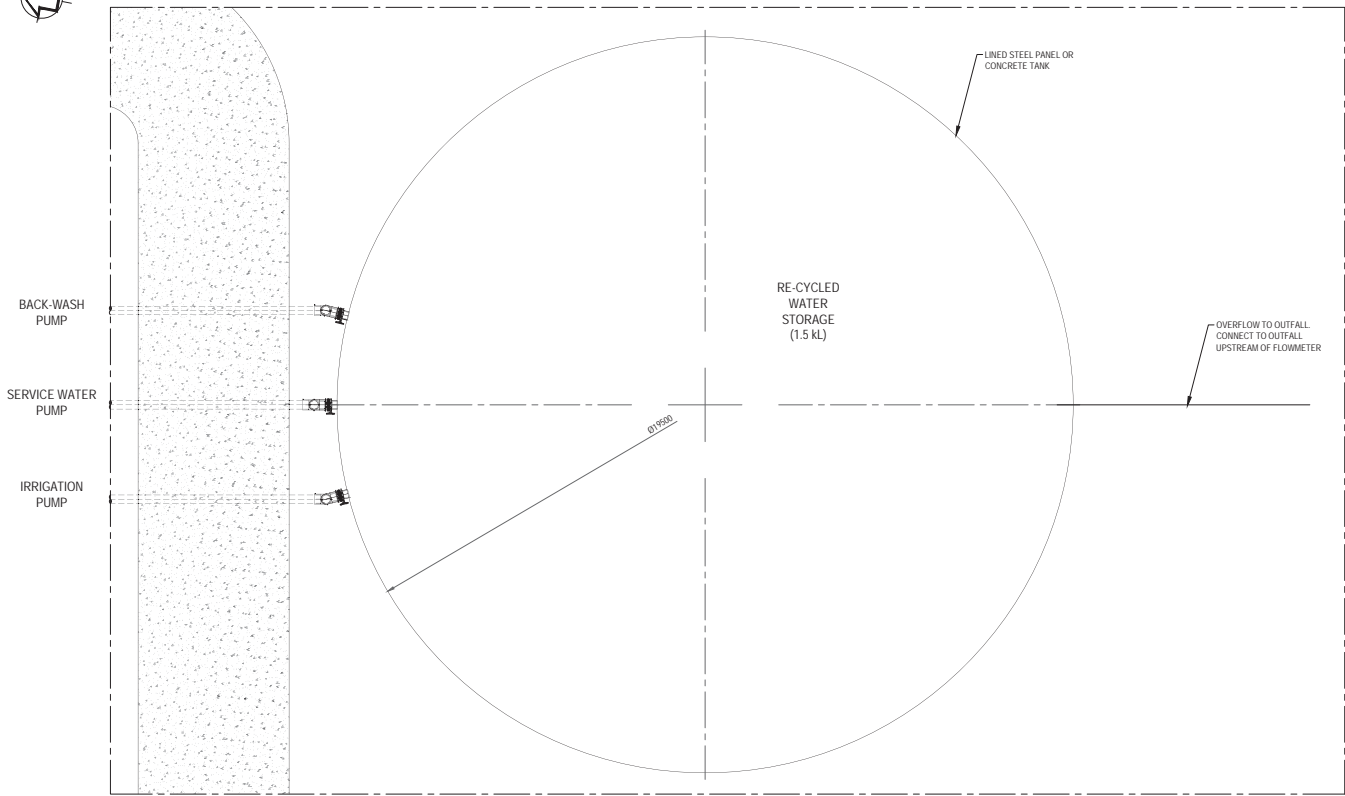
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B	FINAL CONCEPT DESIGN ISSUE
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DRAWING STATUS	
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TITLE	
PORT HINCINBROOK SEWAGE TREATMENT PLANT UPGRADE	
CONCEPT DESIGN	
AREA SITE PLAN	
TERTIARY TREATMENT AND PUMPING	
DRAWING NUMBER	REVISION
1294-DWG-GEN-0013	B



DETAIL
1:50

NOTE:
PRIMARY FLOW PATH PIPEWORK SHOWN INDICATIVELY
SECONDARY PIPEWORK OMITTED



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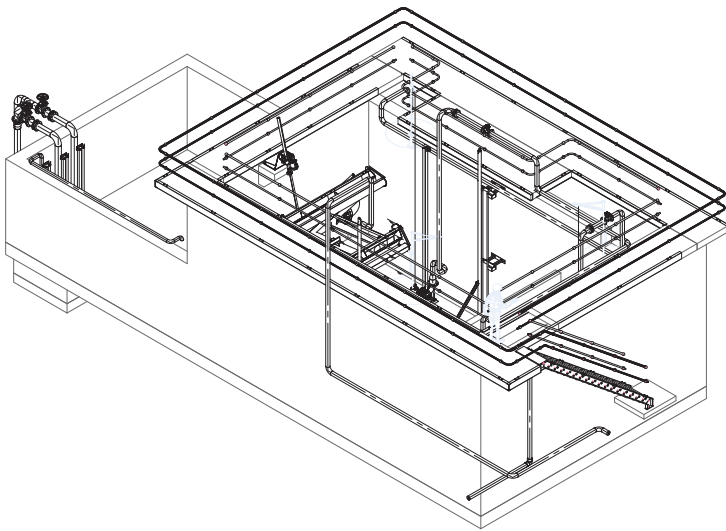
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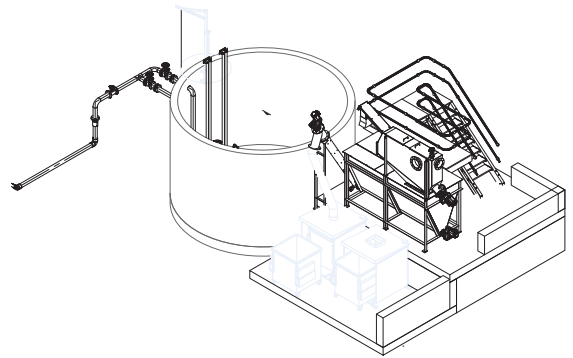
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B	FINAL CONCEPT DESIGN ISSUE	27.04.20	JG	DN
A	ISSUED FOR DRAFT CONCEPT DESIGN REVIEW	26.10.20	BO	AB
REV	DESCRIPTION	DATE	BY	APP
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DRAWING STATUS		CONCEPT
TITLE		PORT HINCINBROOK SEWAGE TREATMENT PLANT UPGRADE CONCEPT DESIGN AREA SITE PLAN EFFLUENT STORAGE TANK
DRAWING NUMBER	1294-DWG-GEN-0014	REVISION B



ISOMETRIC VIEW SBR



ISOMETRIC VIEW INLET WORKS



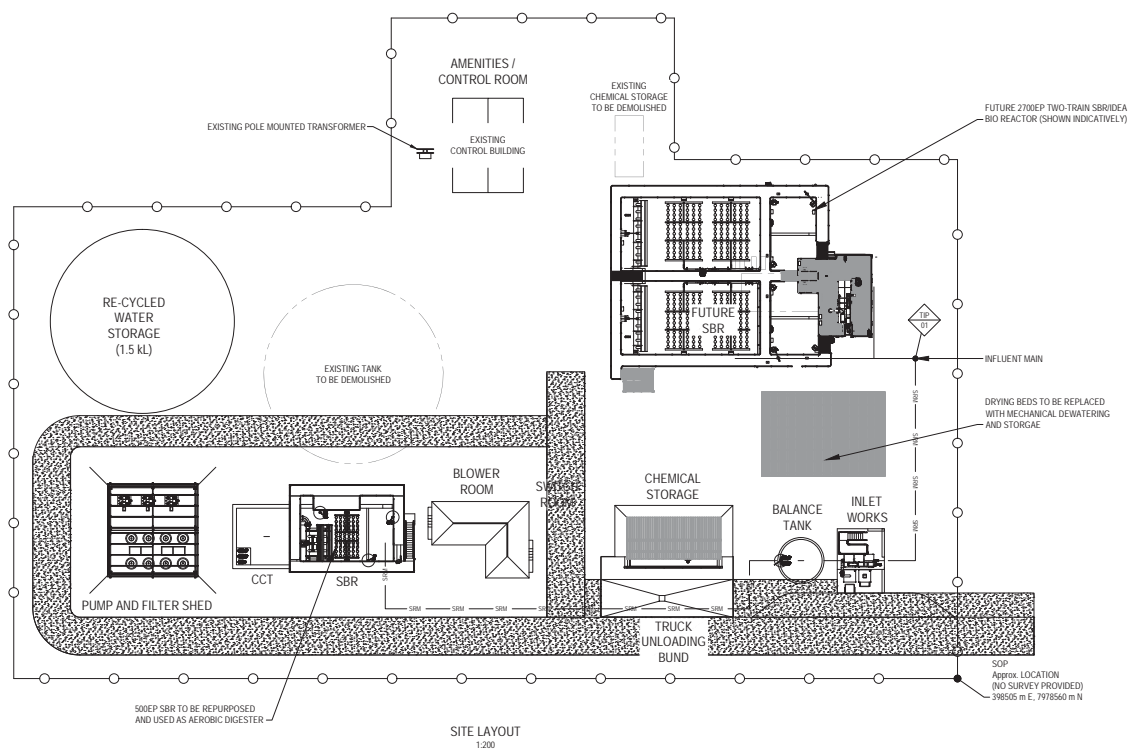
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E enquiries@gandden.com.au

SCALES	
100mm ON ORIGINAL DRAWING	
NOT TO SCALE	
ORIG. SIZE	A1

REV	DESCRIPTION	DATE	BY	APP
B	FINAL CONCEPT DESIGN ISSUE	27.04.20	JG	DN
A	ISSUED FOR DRAFT CONCEPT DESIGN REVIEW	26.03.20	SD	AB

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DRAWING STATUS	CONCEPT
TITLE	PORT HINCHINBROOK SEWAGE TREATMENT PLANT UPGRADE CONCEPT DESIGN ISOMETRIC VIEWS
DRAWING NUMBER	1294-DWG-GEN-0015
REVISION	B



NOTE:
PRIMARY FLOW PATH PIPEWORK SHOWN INDICATIVELY
SECONDARY PIPEWORK.



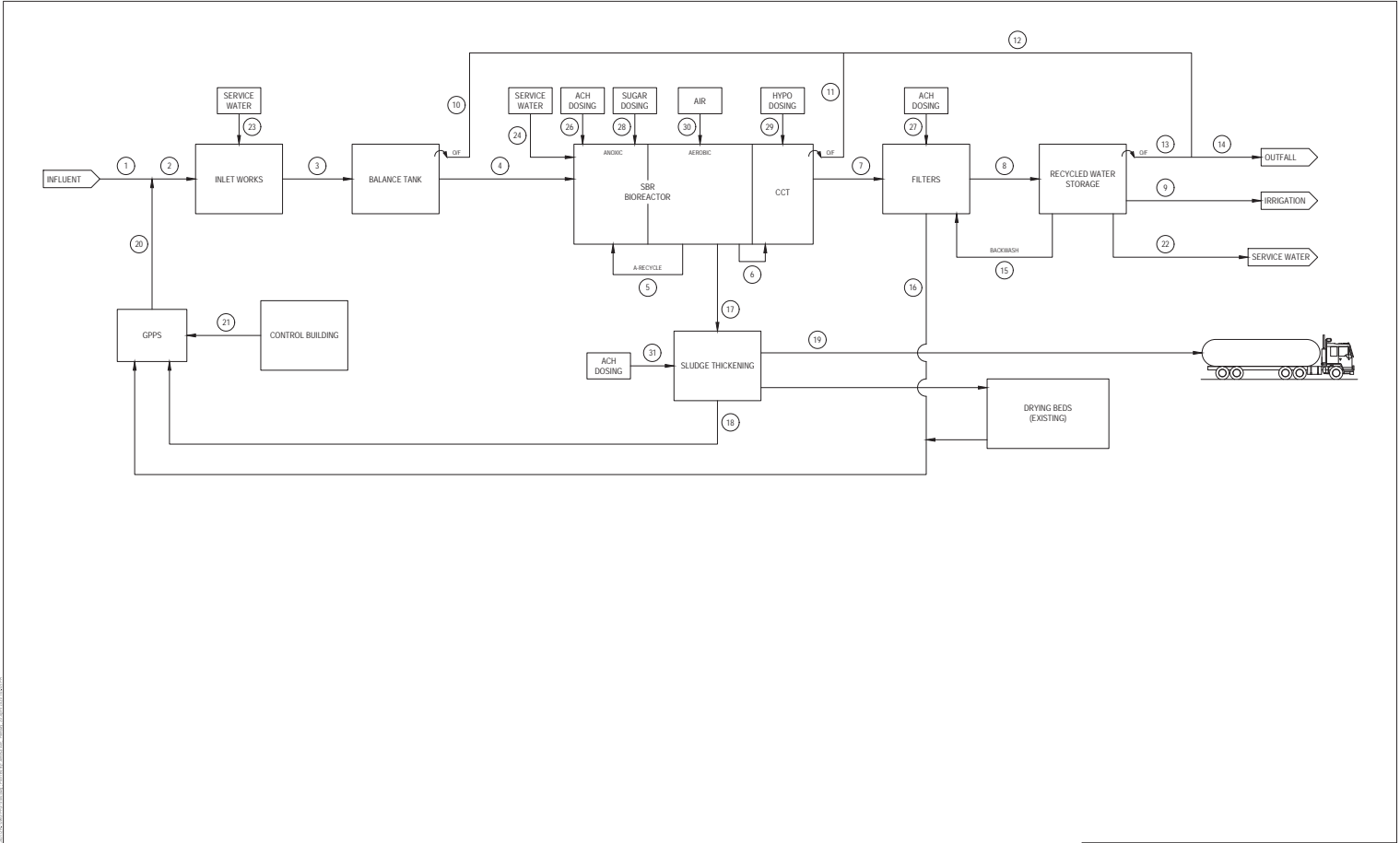
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Queensland, QLD 4217
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SCALES	
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B	FINAL CONCEPT DESIGN ISSUE	27.04.20	JG	DPL
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REVISIONS				

DRAWING STATUS	
CONCEPT	
TITLE	
PORT HINCHINBROOK SEWAGE TREATMENT PLANT UPGRADE	
CONCEPT DESIGN	
SITE LAYOUT	
FUTURE 2700EP UPGRADE	
DRAWING NUMBER	
1294-DWG-GEN-0016	
REVISION	B



<div><div>HEAD OFFICE - GOLD COAST Suite 105, 201 Main St, Gold Coast Queensland, QLD 4217 T 07 5598 1457 E enquiries@gandden.com.au</div></div>		SCALES		100mm ON ORIGINAL DRAWING		DRAWING STATUS		CONCEPT	
		ORIG. SIZE		A1		TITLE		PORT HINCHINBROOK SEWAGE TREATMENT PLANT UPGRADE CONCEPT DESIGN PROCESS FLOW DIAGRAM	
		REV		DESCRIPTION		DATE		DRAWING NUMBER	
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B		FINAL CONCEPT DESIGN ISSUE		20.04.20		AA		1294-DWG-PFD-0100	
A		ISSUED FOR DRAFT CONCEPT DESIGN REVIEW		20.05.20		AA		B	
REV		DESCRIPTION		DATE		DRAWING NUMBER		1294-DWG-PFD-0100	
REV		DESCRIPTION		DATE		DRAWING NUMBER		1294-DWG-PFD-0100	

AREA CODES

PLANT WIDE SYSTEMS (PWSY)

0 GENERAL

1 RAW WATER

2 SERVICE WATER

3 POTABLE WATER

4 FIRE SYSTEMS

5 STORM WATER

6 COMPRESSED AIR

7 ODOUR CONTROL

8 ROADWORKS

9 BUILDINGS

PRELIMINARY TREATMENT - INLET WORKS (NTL)

10 SCREENING

11 GRT

12 FOUL WATER

13 BYPASS

14 BALANCE TANK

15 RAW PUMP STATION

16 INFILTRANT MAINS

17 SEPTAGE RECEIVAL

18 SPARE

PRIMARY & BIOLOGICAL TREATMENT (PBBT)

19 BREAKERS (OXIDATION DITCH)

20 W.A.S. - WASTE ACTIVATED SLUDGE

21 SCUM HARVESTER

22 TO W.A.S. - DIGESTED WASTE ACTIVATED SLUDGE

24 DEWATERING

25 R.A.S. - RETURN ACTIVATED SLUDGE

26 PRIMARY SEDIMENTATION

27 FLOCCULATOR

28 SPARE

29 SPARE

SECONDARY TREATMENT (SECT)

30 SCUM PUMP

31 SECONDARY CLARIFIERS

32 SPARE

33 SPARE

34 SPARE

35 SPARE

36 SPARE

37 SPARE

38 SPARE

39 SPARE

TERTIARY TREATMENT (TERT)

40 CONTACT TANK

41 COAGULATION/FLOCCULATION

42 SEDIMENTATION

43 OXIDATION

44 FILTERS

45 pH CORRECTION

46 CHEMICAL DISINFECTION

47 UV DISINFECTION

48 SPARE

49 SPARE

PROCESS EQUIPMENT (PREQ)

50 AERATION

51 BROADCASTOR BLOWERS

52 SPARE

53 SPARE

54 DIESTER BLOWERS

55 FILTRATION BLOWERS

56 AIR COMPRESSORS

57 SPARE

58 BWW BACKWASH WATER

59 SPARE

CHEMICAL STORAGE & DOSING (CHEM)

60 FERRIC CHLORIDE

61 ALUM. ALUMINIUM SULPHATE

62 CAUSTIC SODA - SODIUM HYDROXIDE

63 CHLORINE GAS

64 POLYMER

65 PAC - POWDERED ACTIVATED CARBON

66 HYPO - SODIUM HYPOCHLORITE

67 SODIUM ASH - SODIUM CARBONATE

68 HYDRATED LIME - HYDRATED CALCIUM HYDROXIDE

69 MISCELLANEOUS

70 SOLIDS HANDLING (SODH)

71 SLUDGE BALANCING

72 SLUDGE THICKENING

73 SLUDGE CONDITIONING

74 DENATURING

75 DRYING BED

76 SLUDGE STORAGE

77 SOLAR DRYER

78 SPARE

79 SPARE

WATER STORAGE & PUMP STATIONS (WSPS)

80 BALANCE TANK

81 CLEAR WATER STORAGE

82 RESERVOIR

83 WATER TOWER

84 TRANSFER PUMP STATION

85 HIGH-LIFT PUMP STATION

86 BOOSTER PUMP STATION

87 WASHWATER PUMP STATION

88 SPARE

89 SPARE

SEWAGE EFFLUENT PUMP STATIONS (SEPS)

90 GENERAL PURPOSE PUMP STATION

91 SEWAGE PUMP STATION

92 EFFLUENT PUMP STATION

93 RECYCLED WATER PUMP STATION

94 EFFLUENT OUTFALL

95 FILTRATE PUMP STATION

96 SPARE

97 SPARE

98 SPARE

99 SPARE

PIPELINE TAG#

900-EW-GRP-001

LINE NUMBER (OMITTED ON EXISTING PIPEWORK)

PIPE MATERIAL

PIPE SERVICE

PIPE SIZE

PIPE SERVICE ABBREVIATIONS

AEA AERATION AIR

ALM ALUM SOLUTION

BWW BACKWASH WATER

CAU CAUSTIC

CP CLEANING IN PLACE

CIT CITRIC ACID

CON CONDENSATE

CPA COMPRESSED AIR

DEF DESINFECTED WATER

DG DISINFECTED WATER

EFF EFFLUENT

FAN FAN

GRT GRT SLURRY

GRT GRT

HYP SODIUM HYPOCHLORITE

MLO MIXED LIQUOR

NUT NUTRIENT WATER

OWR OVERFLOW

PEF PRIMARY EFFLUENT

POL POLYMER SOLUTION

POT POTABLE WATER

PRS PROCESS SEWAGE

RAS RETURN ACTIVATED SLUDGE

RAW RAW SEWAGE

REC RECIRCULATION WATER

SCM SCUM

SCN SCREENINGS

SCS SCREENED SEWAGE

SEF SECONDARY EFFLUENT

SEN SERVICE WATER

SLG SLUDGE

STM STORMWATER

SUG LIQUID SUGAR

SUP SUPERNATANT

TEF TERTIARY EFFLUENT

WAS WASTE ACTIVATED SLUDGE

PIPE MATERIAL ABBREVIATIONS

ABS ABS PLASTIC (ACSB18)

AC ASBESTOS CEMENT

CS CARBON STEEL

CU COPPER

DCL DUCTILE IRON (CEMENT LINED)

DPC DUCTILE IRON FUSION COATED

FEP FLUORINATED ETHYLENE PROPYLENE

GMS MILD STEEL (GALVANISED)

GRP GLASS REINFORCED PLASTIC

HDPE POLYETHYLENE (HIGH DENSITY)

MS MILD STEEL

PE POLYETHYLENE

PVC PVC Class 12

PVC PVC-U (BREE) (Schd 80)

PVC PVC-U (BREE) (Schd 10)

RCP REINFORCED CONCRETE PIPE

SK-BS SINKING (BURNER RING JOINT)

SSI SPIRAL WOUND SS316 (7 bar)

SS2 SPIRAL WOUND SS316 (FOR AIR SERVICES)

SS3 SPIRAL WOUND SS316 (Schd 10)

UPVC UPVC (100mm)

UPVC-S PVC-U (STORMWATER)

UPVC-V PVC-U (ASTM F1555) (50mm)

UPVC-M PVC-U (Series 2) (ASTM)

EQUIPMENT / VALVE TAG#

NRV-11014

SEQUENCIAL NUMBER (3 DIGITS)

AREA CODE (2 DIGITS)

EQUIPMENT CODE

EQUIPMENT TAG ABBREVIATIONS

AC AIR COMPRESSOR

ACF ACTIVATED CARBON FILTER

ACR AIR COOLER

ACU AIR CONDITIONING UNIT

AD AIR DRYER

AEX ANION EXCHANGER

ESP EXHAUSTOR OR PADDLE

ALT ALTERNATOR

AS ALARM STATION

BAT BATTERY

BCH BATTERY CHARGER

BGS BRIDGE (FIXED)

BHP BELL FILTER PRESS

BCL BRIGLINDER

BN BIN (BOLD OF HOPPER)

BLD BUILDING

BLW BLOWER (HIGH V. LOW P)

BND BUND

BRB MECHANICAL BRIDGE

CAP CAPACITOR BANK

CAB CARABOGE (BAGGING)

CED CATION EXCHANGER

CFG CENTRIFUGE

CHB CHAMBER

CHN CHANNEL

CLB CLARIFIER

CMP COMMUNICATIONS PANEL

CNL CANAL

CNP CONTROL PANEL

CON CONVEYOR (BELT OR BUCKLE)

CPT CATCH POINT

CPU CATHODIC PROTECTION UNIT

CRN CRANE

CRU CRUISER

CS COMPOSITE SAMPLER

CT CALIBRATION TUBE

CTV CLOSED CIRCUIT TELEVISION

CTW COOLING TOWER

CYC CYCLONE

CYL CYLINDER

DAM DAM

DCS DISTRIBUTED PROCESS CONTROL SYSTEM

DEC DECANTER

DHR DRAIN

DF DIFFUSER

DIG DIG

DMP DUMP

DOR DRAIN

DRM DRAIN

DWL DRAIN

ESP EXHAUST

ENG ENGINE

EPS EPS

ESP EXHAUST

EXP EXHAUST FAN

FAB FAB

FEP FLOW

FEN FEN

FI FILTER

FIP FIP

FLM FLM

FTP FTP

GAL GAL

GAT GAT

GBM GBM

GEN GENERATOR

HRV HOSE REEL

HTR HTR

HYD HYD

KW KW

LCP LCP

LCS LCS

LFT LFT

LSP LSP

MCC MOTOR - FIXED SPEED

MCR MOTOR - FIXED SPEED

MFM MFM

MH MANHOLE

MV MOTOR - VARIABLE SPEED

MIX MIXER

OCU OCU

ODS ODS

PD PULSATION DAMPER

PPC PPC

PS PS

PFC PFC

PMD PUMP - DOSING

PMP PUMP - GENERAL

PRN PRN

PSB PUMP (HIGH V. LOW P)

PST PST

PVL PVL

RSD REMOVABLE DOSING QUILL

RES RES

CEX CATION EXCHANGER

RMU RMU

ROB ROB

ROT ROT

RTU RTU

SMP SMP

SCB SCB

SCN SCREEN

SCP SCREW CONVEYOR

SFT SFT

SGP SGP

SHS SHS

SIL SIL

SP SP

SRM SRM

SLO SLO

SM STATIC MIXER

SMP SMP

SMB SMB

SPB SPB

SPP SPP

SPS SPS

SSE SAFETY SHOWER / EYE WASH STATION

SSS SSS

SSI SSI

STR STRAINER

STP STP

STR STR

STR STR

TBO TBO

THK THK

TNK TANK

TNL TNL

TSP TSP

TWB TWB

UPS UPS

UVB UVB

WSP WSP

WVB WVB

WSD WSD

WVL WVL

WBN WASH BASIN

WCN WCN

WCP WCP

WEL WEL

WER WER

WPR WPR

WPS WPS

WPS WPS

WSL WSL

WSP WSP

WTP WTP

VALVE TAG ABBREVIATIONS

ARV AIR RELEASE VALVE

FCV FLOW CONTROL VALVE (REGULATING)

FCV FLOW SWITCHING VALVE (OPEN CLOSED)

HV HAND VALVE

HVY HYDRANT

HRV NON-RETURN VALVE

PEN PENSTOCK

PRV PRESSURE REDUCING/REGULATING VALVE

PSV PRESSURE SUSTAINING VALVE

RPZ REDUCED PRESSURE ZONE

SB STOP BOARD

SRY SAFETY RELIEF VALVE

SV SOLID VALVE

INSTRUMENT TAG#

LIT 99999

INSTRUMENT CODE

SEQUENTIAL NUMBER (3 DIGITS)

AREA CODE (2 DIGITS)

INSTRUMENT ALPHA CODES

FIRST LETTER

SECOND & SUCCEEDING LETTERS

EXAMPLE EXCEPTION LETTERS

A ANALYSIS

ALARM

B BURNER FLAME

STATE OR STATUS DISPLAY

C CONDUCTIVITY

CONTROL

D DENSITY SG / SOLIDS

DIFFERENTIAL

E ELECTRICAL VARIABLE

PRIMARY ELEMENT OR SENSOR

F FLOW

RATIO OR FRACTION

G GAGING (DIMENSIONAL)

OBSERVATION GLASS

H HAND MANUALLY INITIATED

HIGH

I CURRENT

INDICATION

J POWER

SCAM

K TIME OR TIME PROGRAM

BARRIER

L LEVEL

LOW

M MOTION

UNALLOCATED

N MOTOR

UNALLOCATED

O UNALLOCATED

ORIFICE

P PRESSURE OR VACUUM

POINT (TEST CONNECTION)

Q QUANTITY OR EVENT

INTEGER OR TOTALISER

R RADIATION (NUCLEAR)

RECORDER OR DIGITAL TRENDRING

S SPEED OF FREQUENCY

SWITCH

T TEMPERATURE

TRANSMITTER

U MULTI VARIABLE

MULTI FUNCTION

V VIBRATION

VALVE DAMPER OR LOUVER

W WEIGHT OR FORCE

BELL

X TORQUE

CATHODE RAY TUBE

Y VISCOSITY

RELAY, CONVERTER OR COMPUTER

Z POSITION

EMERGENCY OR SAFETY ACTING

AS CONSTRUCTED

REV

NAME

DATE

SIGNATURE

REP'D NO.

FOR CONSTRUCTION

REV

NAME

DATE

SIGNATURE

REP'D NO.

SCALES

100mm ON ORIGINAL DRAWING

ORIG. SIZE

A1

REVISIONS

B FINAL CONCEPT DESIGN ISSUE

20.04.20

AA

DN

A ISSUED FOR DBMT CONCEPT DESIGN REVIEW

20.05.20

AA

DN

REV

DESCRIPTION

DATE

OWNER

APP

DRAWING STATUS

CONCEPT

TITLE

PORT HINCHINBROOK SEWAGE TREATMENT PLANT UPGRADE

CONCEPT DESIGN

PIPING & INSTRUMENTATION DIAGRAM

LEGEND SHEET 1 OF 2

DRAWING NUMBER

1294-DWG-PID-0110

REVISION

B

RT2021-038-QT - Documents for release - Page 126 of 287

PIPING, JOINTS & ACCESSORIES		VALVES		DRIVES, ACTUATORS & CONTROL EQUIP.	FLOW ELEMENTS	MISCELLANEOUS EQUIP.	
	PRIMARY PROCESS LINE	N/OPEN	N/CLOSED	O9-7777	MAGNETIC FLOWMETER		
	PRIMARY PROCESS LINE (EXISTING)			O9-7777	MASS FLOWMETER		
	SECONDARY PROCESS LINE			M9-7777	ULTRASONIC FLOWMETER		
	SECONDARY PROCESS LINE (EXISTING)			M9-7777	ROTAMETER		
	CROSSING PIPE, NOT CONNECTED						
	JUNCTIONS				ORIFICE PLATE		
	TEE				RESTRICTION ORIFICE		
	FLEXIBLE PIPE / HOSE				ORIFICE PLATE INLINE CHANGE FITTING		
	DIRECTION OF FLOW				VENTURI TUBE		
	EXPANSION JOINT				FLOW NOZZLE		
	STRAINER / CARTRIDGE FILTER				PILOT TUBE		
	STRAINER, Y-TYPE				FLUME		
	REDUCER				WEIR		
	BLANKED END						
	CAP FLANGE						
	SCREWED						
	FLANGED CONNECTION				FILTER		
	UNION				PRESSURE PUMP		
	END SOCKET & SPIGOT				RECEIVING VESSEL		
	END CAP						
	KAMLOK OR HOSE COCK (HOSE CONNECTION)						
	OVERFLOW/DRAIN				LEVEL ELEMENTS		
	VENT				ULTRASONIC		
	PIGTAIL SIPHON				LASER, RADAR		
	ANTI-SIPHON LOOP				CAPACITANCE OR DIELECTRIC		
	HOSE REEL				HYDROSTATIC LEVEL MEASUREMENT		
	EMERGENCY SHOWER AND EYEWASH				LEVEL SWITCH, PADDLE WHEEL OR FLOAT TYPE		
	HANDBASIN AND EYEWASH				MAGNETIC LEVEL INDICATOR		
	VENT (VERMIN SCREEN)				RADIOACTIVE		
	SILENCER OR FILTER						
	BREAK SYMBOL						

HEAD OFFICE - GOLD COAST
SUITE 105, 201 LARA DR COAST
MURRAY BRIDGE QLD 4207
T 07 5588 1407
E enquiries@ganden.com.au

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B	FINAL CONCEPT DESIGN ISSUE	20.04.20	AA	DN
A	ISSUED FOR DRAFT CONCEPT DESIGN REVIEW	20.03.20	AA	DN
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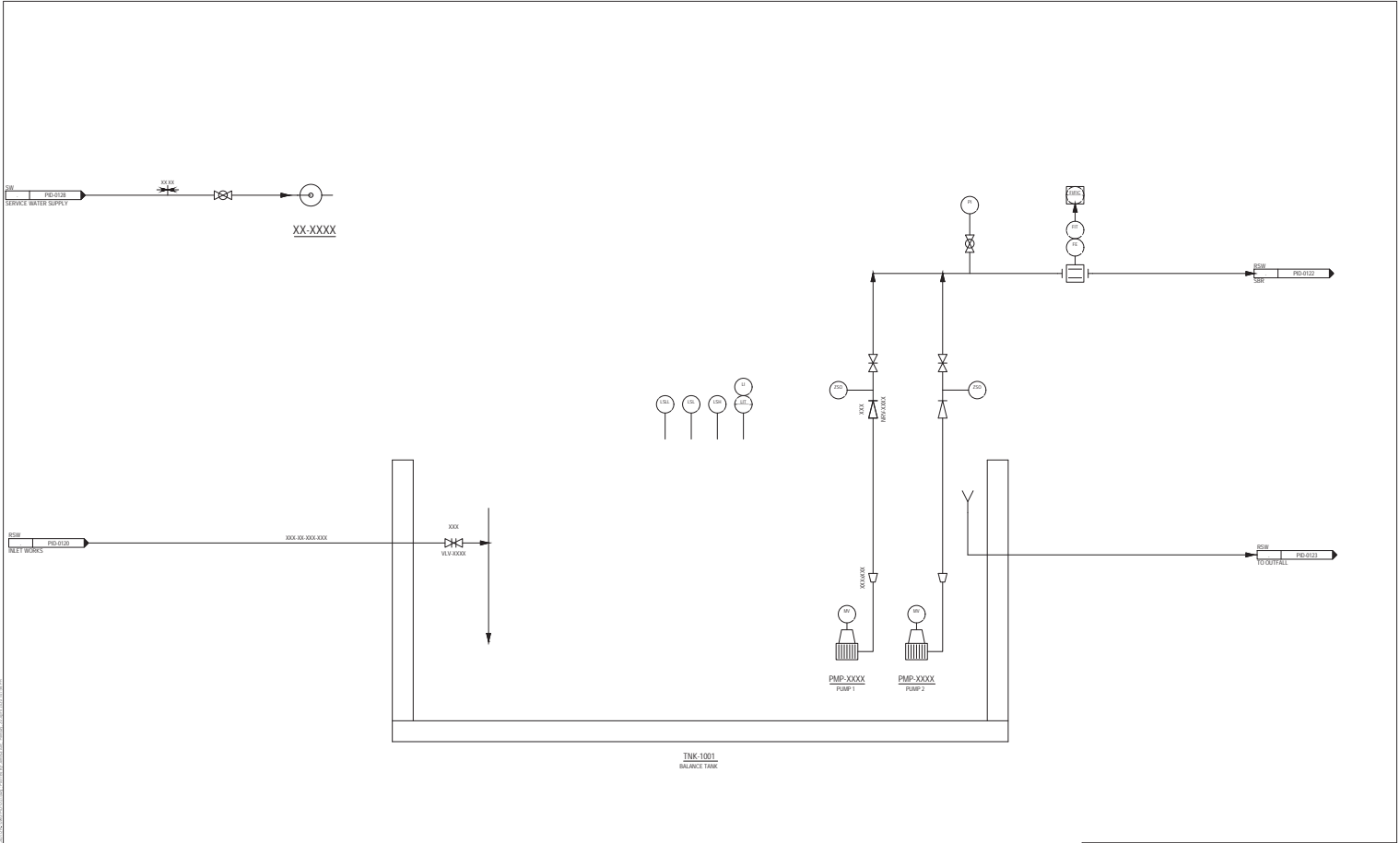
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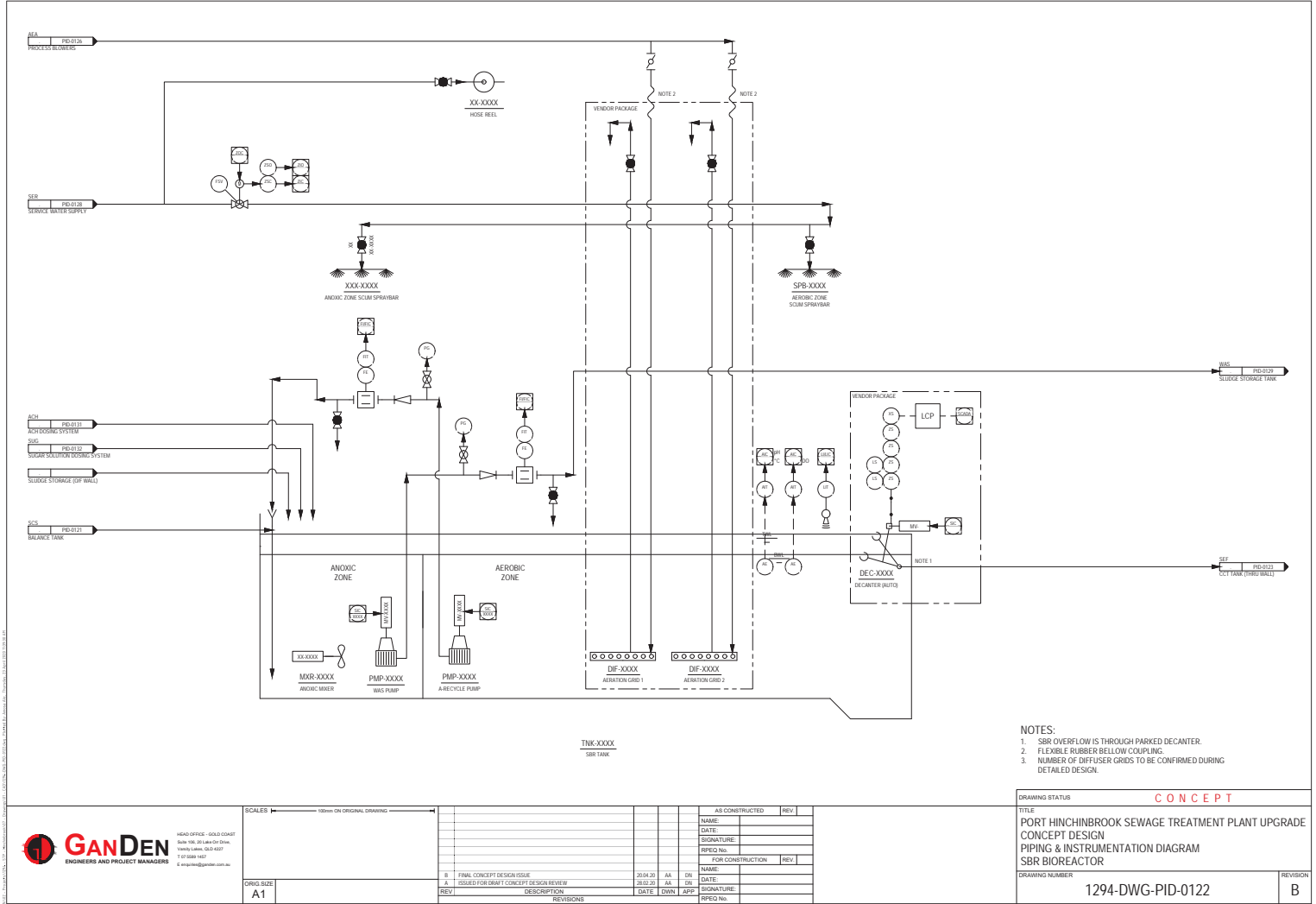
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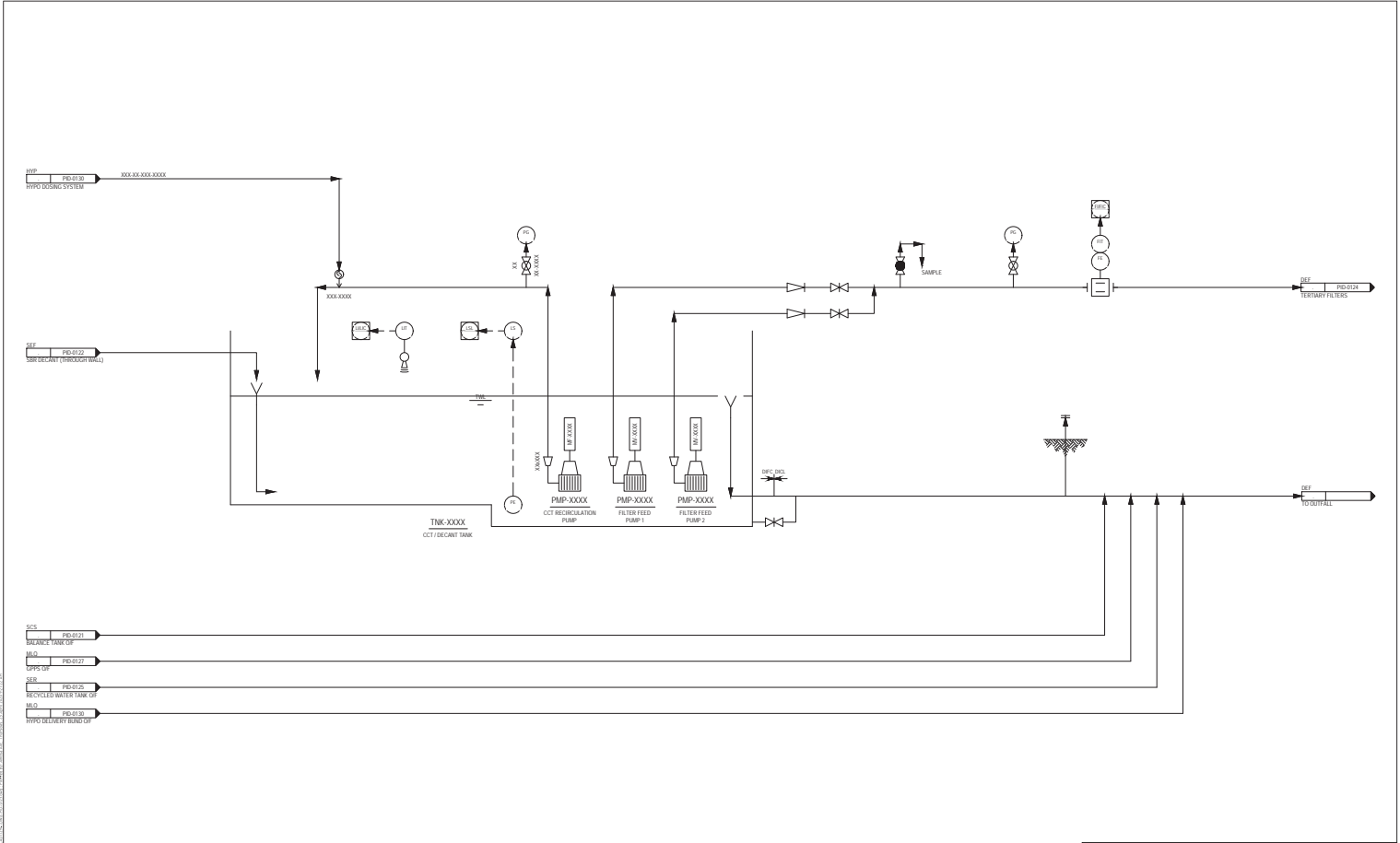
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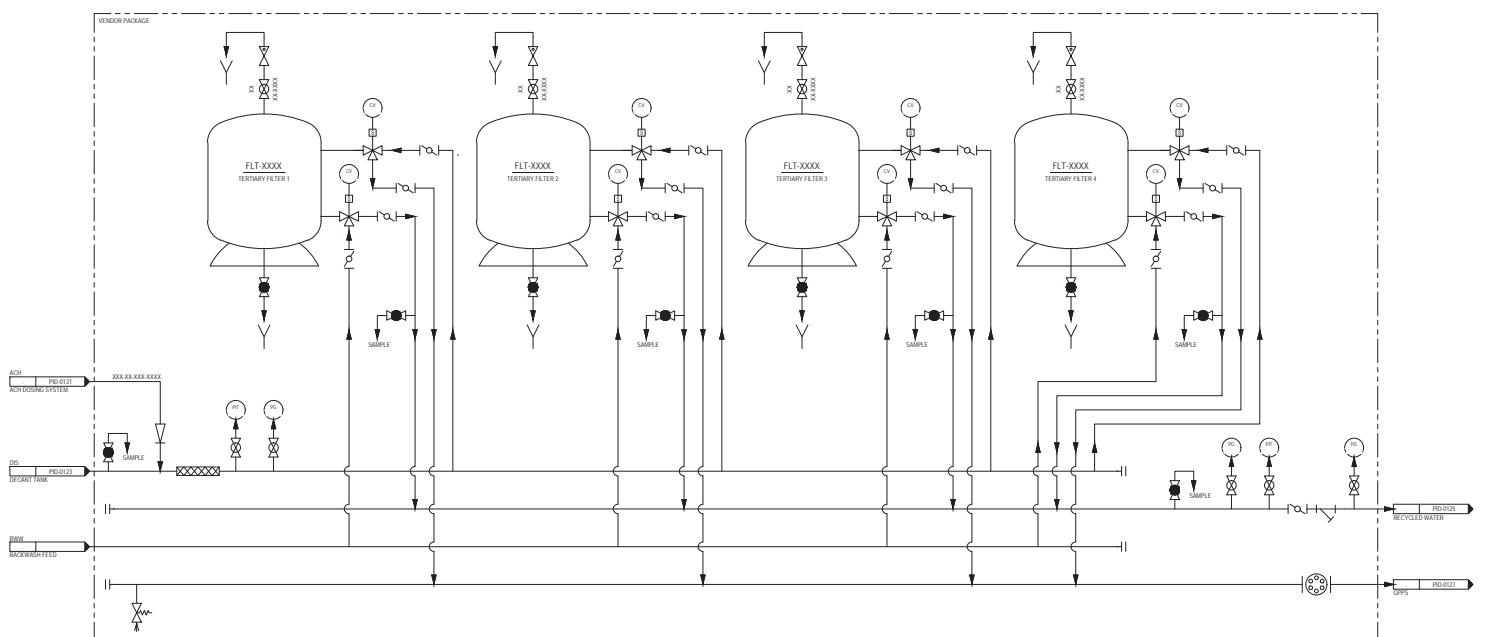


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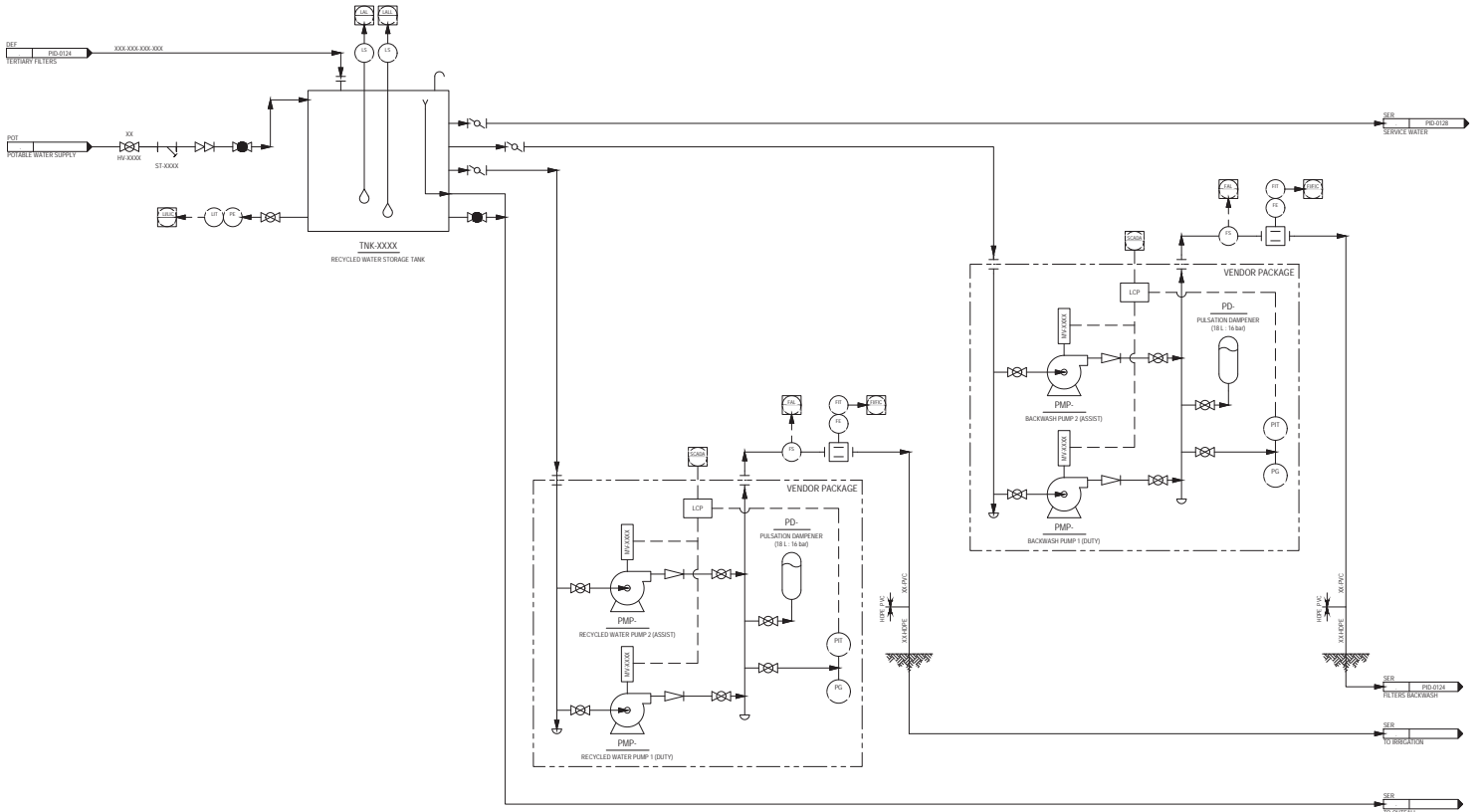
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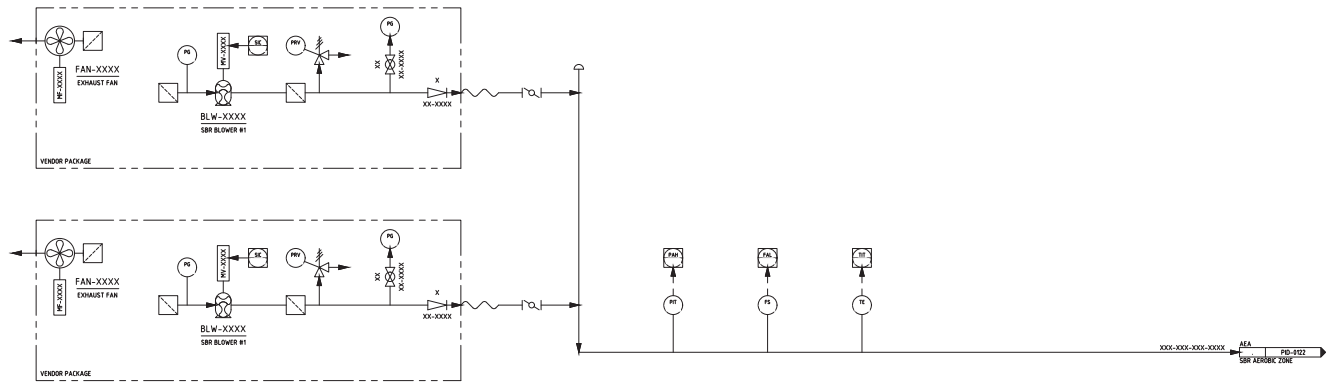
HEAD OFFICE - GOLD COAST
 Suite 101, 301 Main St, Gold Coast
 QLD 4217
 T 07 5599 1407
 E info@ganden.com.au

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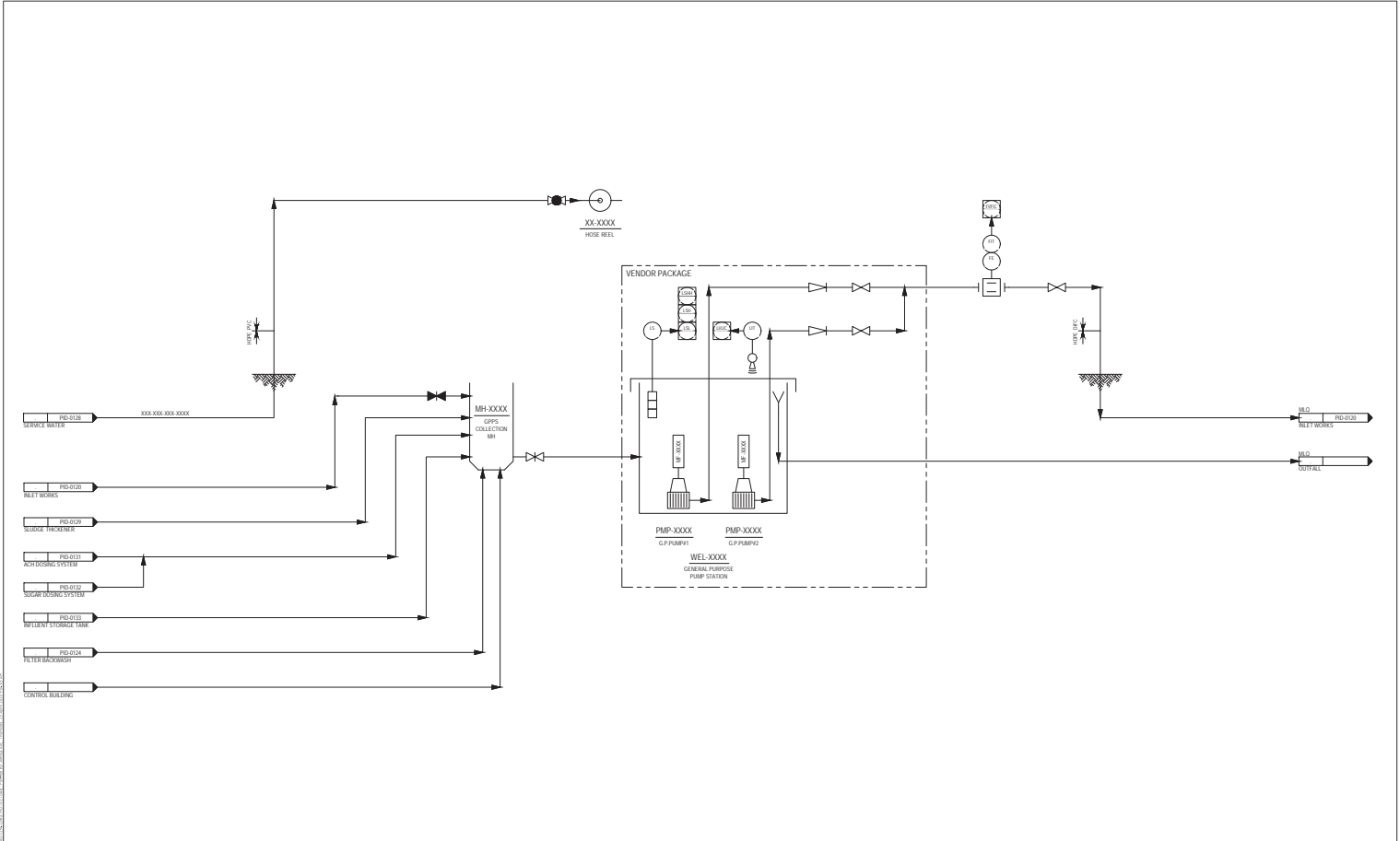
HEAD OFFICE - GOLD COAST
 Suite 105, 201 Main St, Gold Coast
 QLD 4217
 T 07 5598 1457
 E info@ganden.com.au


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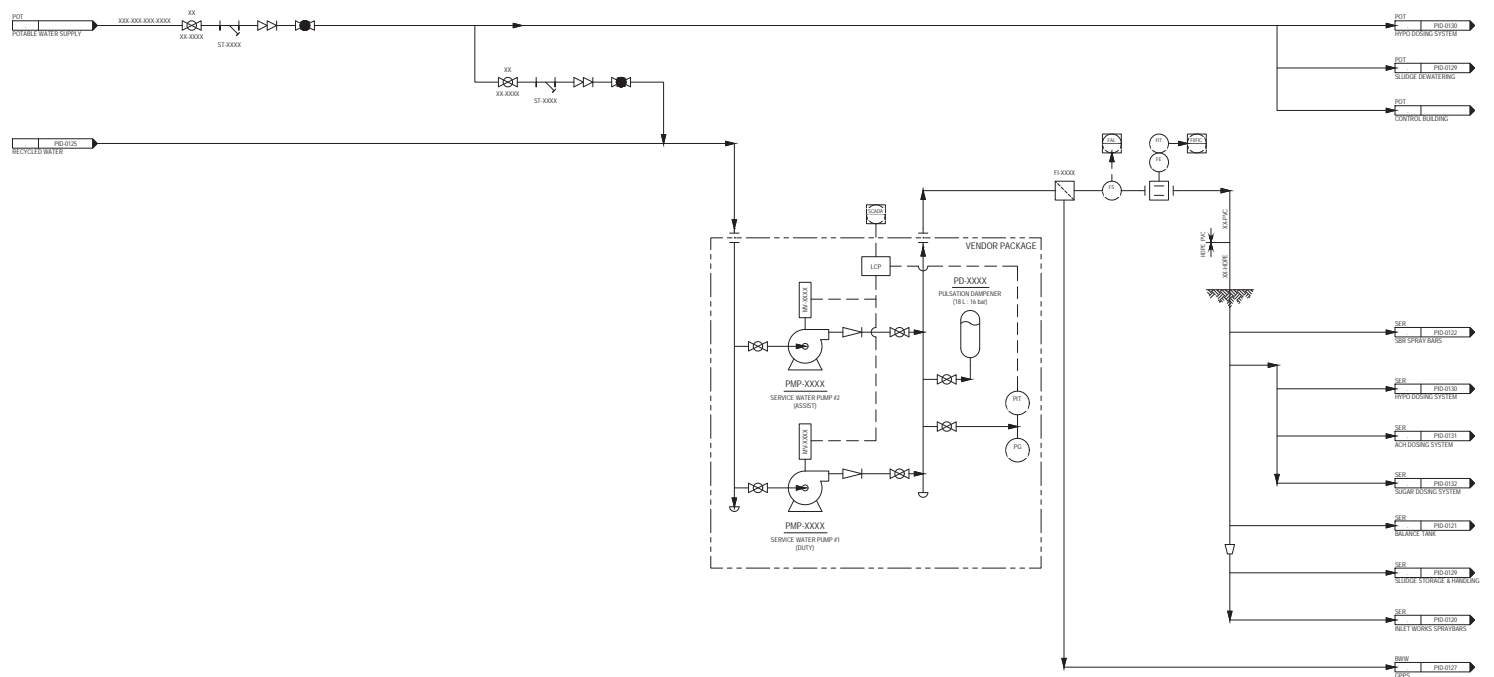
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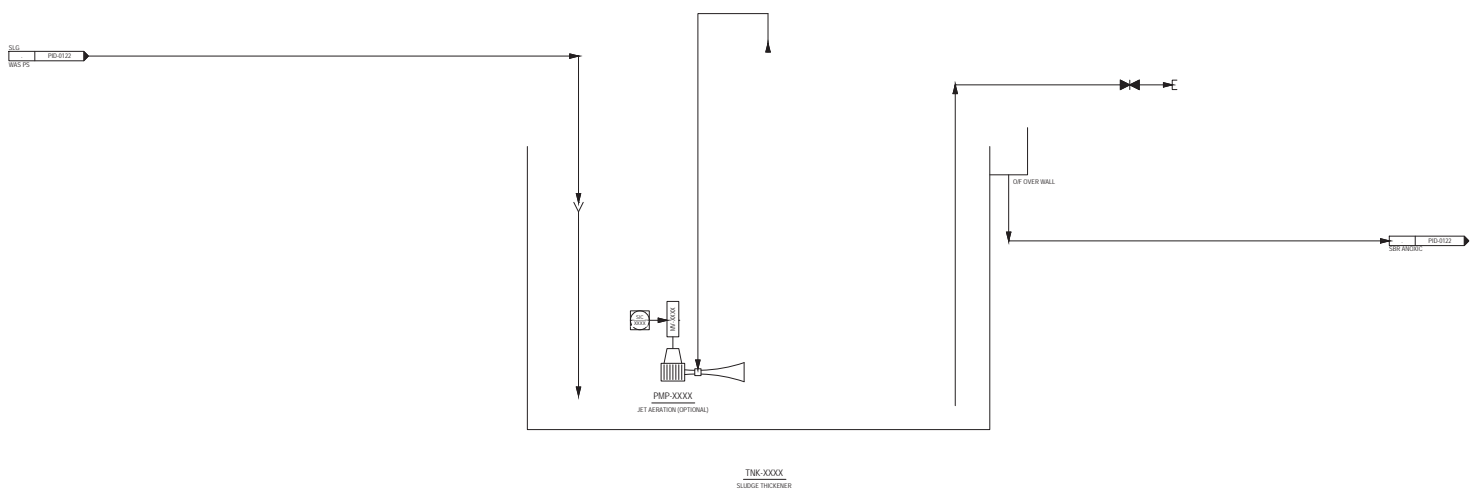
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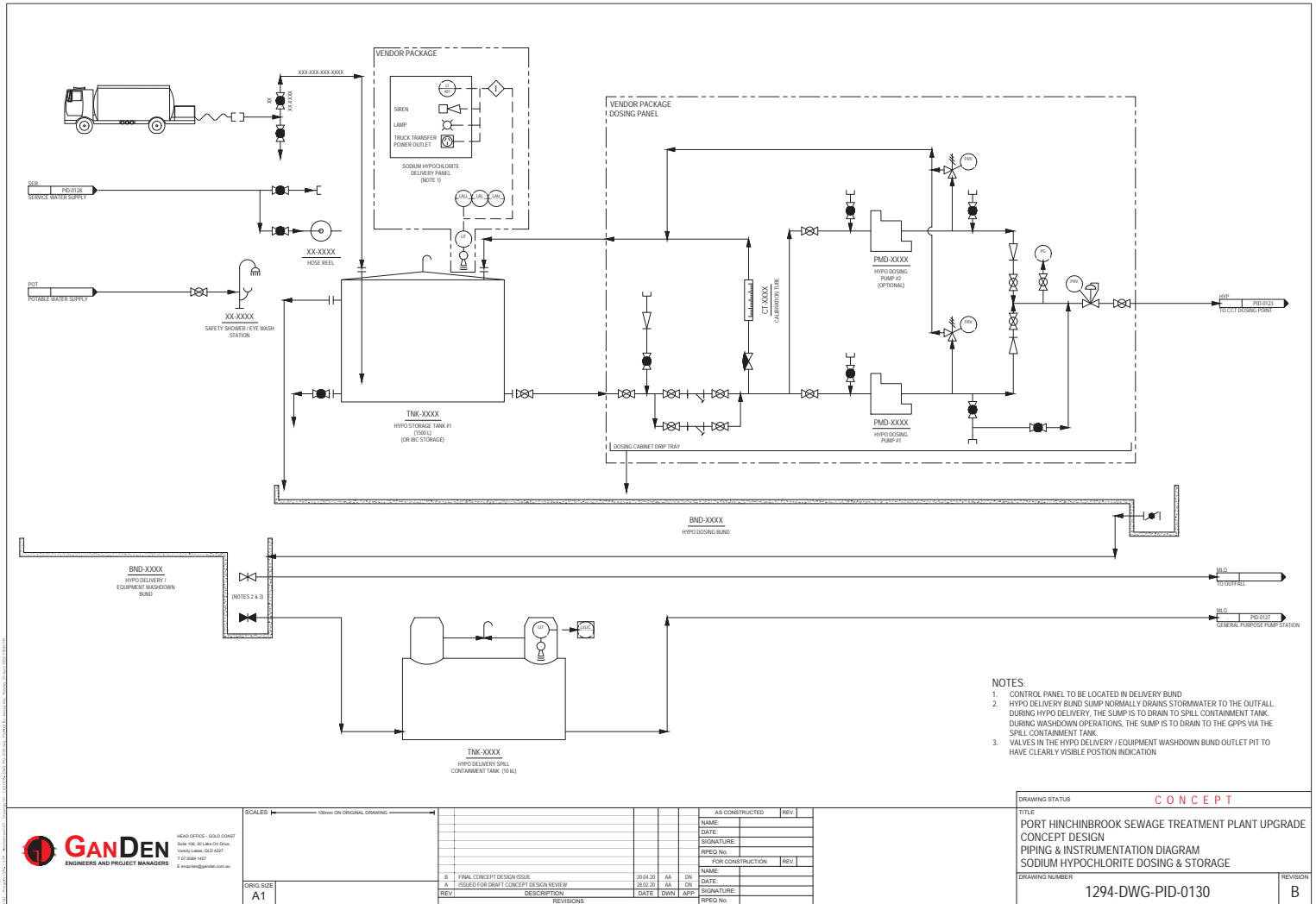
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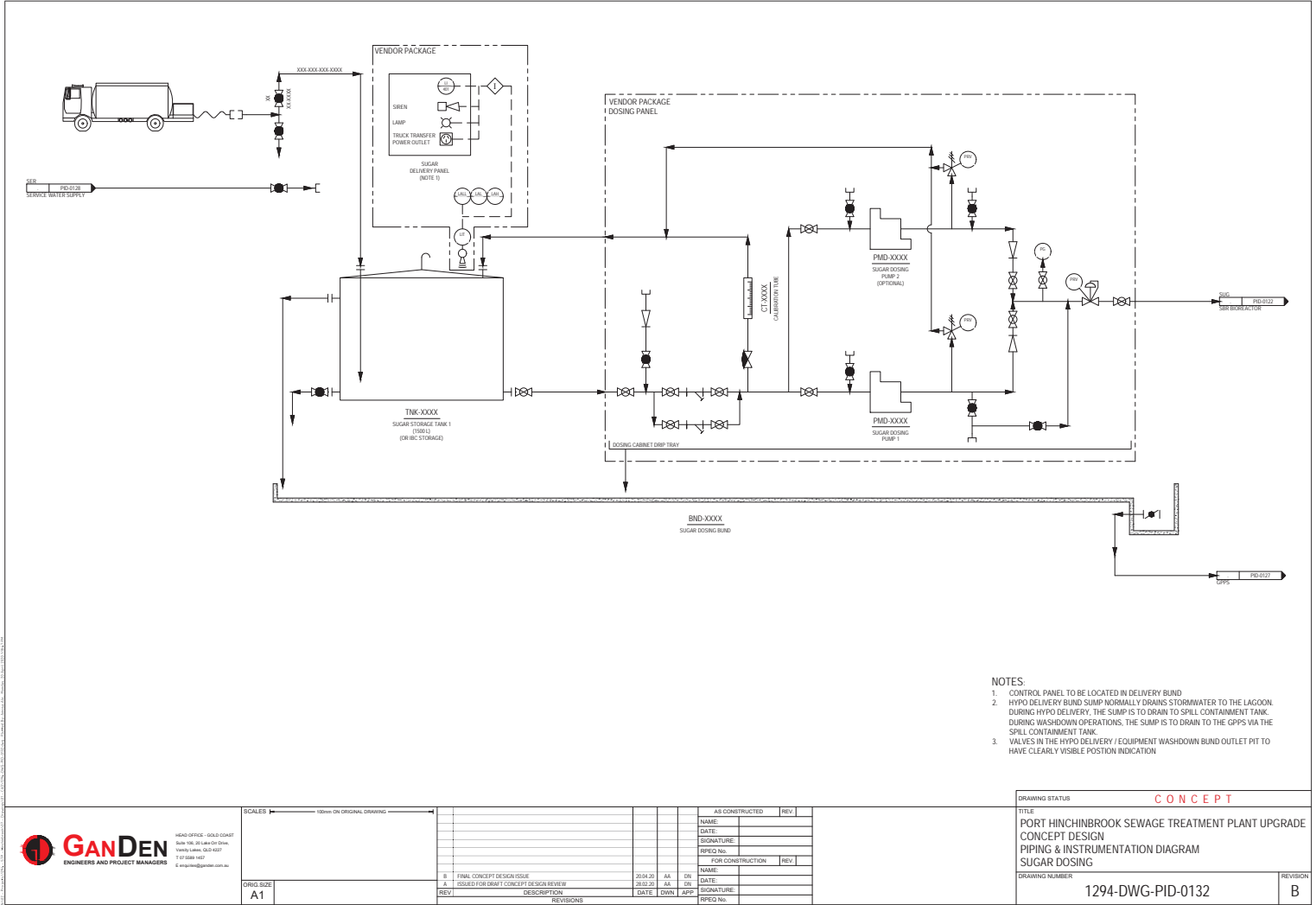


TNK-XXXX
SLUDGE THICKENER

HEAD OFFICE - GOLD COAST
Suite 106, 20 Lake Orr Drive,
Varsity Lakes, QLD 4227
T 07 5589 1457
E enquiries@garden.com.au

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Suite 105, 301 Main St, Gold Coast, QLD 4217
T 07 5598 1437
E info@ganden.com.au

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GANDEN
ENGINEERS AND PROJECT MANAGERS



Department of
**Environment and
Heritage Protection**

19-AUG-2016

To: The Passage Holdings Pty Ltd
PO Box Q361
QVB NSW 1230

Attention: Ian Stephens

Our reference: 264465

Application details

I refer to the application that was received by the administering authority on 05-AUG-2016.

Land description: Port Hinchinbrook STP NR0560 Lot 1 Plan C1043, Lot 3 Plan RP733367, Lot 2 Plan CWL1212, Lot 41 Plan C1043, Lot 42 Plan C1043, Lot 3 Plan C1043; Port Hinchinbrook STP IPDE01020408 Lot 170 Plan SP177389, Lot 2 Plan RP739188, Lot 7 Plan RP732868, Lot 1 Plan RP739188, Lot 1 Plan C1043, Lot 5 Plan RP732868, Lot 6 Plan RP732868.

Decision

Your application has been approved and your environmental authority (reference EPPR00576713) is attached.

Should you have any further enquiries, please contact Veronica Lightfoot on telephone 1300 130 372 (option 4).

Yours sincerely

Signature

18 August 2016

Date

Jodie Brackenbury
Department of Environment and Heritage Protection
Delegate of the administering authority
Environmental Protection Act 1994

Veronica Lightfoot
Permit and Licence Management
Department of Environment and
Heritage Protection
GPO Box 2454
BRISBANE QLD 4001
Phone: 1300 130 372
Fax: (07) 3330 5875
Email: palm@ehp.qld.gov.au
Website www.ehp.qld.gov.au
ABN 46 640 294 485

Enclosed

Permit - environmental authority (reference EPPR00576713)

Environmental authority

This environmental authority is issued by the administering authority under Chapter 5 of the Environmental Protection Act 1994.

Permit¹ number: EPPR00576713

Environmental authority takes effect on 18-AUG-2016.

The anniversary date of this environmental authority remains 27 October. An annual return and the payment of the annual fee will be due each year on this day.

Environmental authority holder(s)

Name	Registered address
The Passage Holdings Pty Ltd	Level 25 25 Bligh Street SYDNEY NSW 2000

Environmentally relevant activity and location details

Environmentally relevant activity(ies)	Location(s)
63-(1b)(ii) Sewage treatment >100 to 1500EP - no IT or IR	Port Hinchinbrook STP IPDE01020408 - Lot 170 Plan SP177389, Lot 2 Plan RP739188, Lot 7 Plan RP732868, Lot 1 Plan RP739188, Lot 1 Plan C1043, Lot 5 Plan RP732868 and Lot 6 Plan RP732868 Port Hinchinbrook STP NR0560 - Lot 1 Plan C1043, Lot 3 Plan RP733367, Lot 2 Plan CWL1212, Lot 41 Plan C1043, Lot 42 Plan C1043 and Lot 3 Plan C1043

Additional information for applicants

Environmentally relevant activities

The description of any environmentally relevant activity (ERA) for which an environmental authority is issued is a restatement of the ERA as defined by legislation at the time the approval is issued. Where there is any inconsistency between that description of an ERA and the conditions stated by an environmental authority as to the scale, intensity or manner of carrying out an ERA, then the conditions prevail to the extent of the inconsistency.

¹ Permit includes licences, approvals, permits, authorisations, certificates, sanctions or equivalent/similar as required by legislation

An environmental authority authorises the carrying out of an ERA and does not authorise any environmental harm unless a condition stated by the authority specifically authorises environmental harm.

A person carrying out an ERA must also be a registered suitable operator under the *Environmental Protection Act 1994* (EP Act).

Contaminated land

It is a requirement of the EP Act that if an owner or occupier of land becomes aware a notifiable activity (as defined in Schedule 3 and Schedule 4) is being carried out on the land, or that the land has been, or is being, contaminated by a hazardous contaminant, the owner or occupier must, within 22 business days after becoming so aware, give written notice to the chief executive.



Signature

Jodie Brackenbury
Department of Environment and Heritage Protection
Delegate of the administering authority
Environmental Protection Act 1994

18 August 2016

Date

Enquiries:
Veronica Lightfoot
Permit and Licence Management
Department of Environment and Heritage
Protection
GPO Box 2454
BRISBANE QLD 4001
Phone: 1300 130 372
Fax: (07) 3330 5875
Email: palm@ehp.qld.gov.au

Obligations under the *Environmental Protection Act 1994*

In addition to the requirements found in the conditions of this environmental authority, the holder must also meet their obligations under the EP Act, and the regulations made under the EP Act. For example, the holder must comply with the following provisions of the Act:

- general environmental duty (section 319)
- duty to notify environmental harm (section 320-320G)
- offence of causing serious or material environmental harm (sections 437-439)
- offence of causing environmental nuisance (section 440)
- offence of depositing prescribed water contaminants in waters and related matters (section 440ZG)
- offence to place contaminant where environmental harm or nuisance may be caused (section 443)

Conditions of environmental authority

The conditions of this environmental authority are the conditions of the attached Development Approval reference NR0560DA, as they relate to the licensed activities, where any references to the holder of the development approval are taken to refer to the holder of this environmental authority.

Attachments

- Development Approval



COPY

Notice of decision to grant licence (with development approval) Sections 85 and 86 Environmental Protection Act 1994

This statutory notice is issued by the administering authority pursuant to sections 85 and 86 of the Environmental Protection Act 1994, to advise you of a decision or action.

Enquiries to : Barry James
Telephone : (07) 4722 5353
Your reference :
Our reference : TSV4482 (NR0560)

Cardwell Properties Pty Ltd
Bruce Highway
Cardwell QLD 4849

CC:

Cardwell Properties Pty Ltd
PO Box 444
Main Beach, Qld 4217

Entered/Validated in Ecotrack

Project Reference

Development Approval #

Registration Certificate #

This version amended on

Cancelled/Surrendered/Transferred Date:

Continuing Registration #

Attention: Russell Cook,

Re: Application for a licence (with development approval) by Cardwell Properties Pty Ltd to carry out Environmentally Relevant Activity (ERA) 15(b) Sewage treatment on land described as Lot 1 on Plan C1043, Lot 2 on Plan CWL1212, Lot 3 on Plan C1043, Lot 41 on Plan C1043, Lot 42 on Plan C1043 and Lot 3 on Plan RP733367 located at Bruce Highway, Cardwell.

Your application for a licence (with development approval), received by this office on 12 May 2004 has been granted.

A copy of the licence No. NR0560 which includes the schedule of conditions, is attached.

This licence takes effect from 26 October 2004.

You may apply to the administering authority for a review of this decision within 14 days after receiving this notice. You may also appeal against this decision to the Planning and Environment Court.

Information outlining the review and appeal processes under the *Environmental Protection Act 1994* is included with this notice. This information is intended as a guide only. You may have other legal rights and obligations.

Signed

Tania Laurencont
District Manager, Townsville
Delegate of Administering Authority
Environmental Protection Act 1994

26 October 2004

Entered/Validated in Ecotrack

Project Reference

Development Approval #

Registration Certificate #

This version amended on

Cancelled/Surrendered/Transferred Date:

Continuing Registration #

Extracts from the Act Regarding Reviews and Appeals

Procedure for review

521.

- (1) A dissatisfied person may apply for a review of an original decision.
- (2) The application must-
 - (a) be made in the approved form to the administering authority within-
 - (i) 14 days after the day on which the person receives notice of the original decision or the administering authority is taken to have made the decision (the "review date"); or
 - (ii) the longer period the authority in special circumstances allows not later than the review date; and
 - (b) be supported by enough information to enable the authority to decide the application.
- (3) On or before making the application, the applicant must send the following documents to the other persons who were given notice of the original decision-
 - (a) notice of the application (the "review notice");
 - (b) a copy of the application and supporting documents.
- (4) The review notice must inform the recipient that submission on the application may be made to the administering authority within 7 days after the application is made to the authority.
- (5) If the administering authority is satisfied the applicant has complied with subsection (2) and (3), the authority must, within 14 days after receiving the application-
 - (a) review the original decision;
 - (b) consider any submissions properly made by a recipient of the review notice; and
 - (c) make a decision (the "review decision") to-
 - (i) confirm or revoke the original decision; or
 - (ii) vary the original decision in a way the administering authority considers appropriate.
- (6) The application does not stay the original decision.
- (7) The application must not be dealt with by-
 - (a) the person who made the original decision; or
 - (b) a person in a less senior office than the person who made the original decision.
- (8) Within 14 days after making the decision, the administering authority must give written notice of the decision to the applicant and persons who were given notice of the original decision.
- (9) The notice must-
 - (a) include the reasons for the review decision; and
 - (b) inform the person of their right of appeal against the decision.
- (10) If the administering authority does not comply with subsections (5) or (8), the authority is taken to have made a decision confirming the original decision.
- (11) Subsection (7) applies despite section *Acts Interpretation Act 1954*, section 27A.
- (12) This section does not apply to an original decision made by-
 - (a) for a matter, the administration and enforcement of which has been devolved to a local government, the local government itself or the chief executive officer of the local government personally; or
 - (b) for another matter-the chief executive personally.

Stay of operation of original decisions

522.

- (1) If an application is made for review of an original decision, the applicant may immediately apply for a stay of the decision to-
 - (a) for an original decision mentioned in schedule 1, part 1 - the tribunal; or
 - (b) for an original decision mentioned in schedule 1, part 2 - the Court.
- (2) The tribunal or Court may stay the decision to secure the effectiveness of the review and any later appeal to the tribunal or Court.



- (3) A stay may be given on conditions the tribunal or Court considers appropriate and has effect for the period stated by the tribunal or Court.
- (4) The period of a stay must not extend past the time when the administering authority reviews the decision and any later period the tribunal or Court allows the applicant to appeal against the review decision.

Who may appeal

531.

- (1) A dissatisfied person who is dissatisfied with a review decision, other than a review decision to which subdivision 1 applies, may appeal against the decision to the Court.
- (2) The chief executive may appeal against another administering authority's decision (whether an original or review decision) to the Court.
- (3) A dissatisfied person who is dissatisfied with an original decision to which section 521 does not apply may appeal against the decision to the Court.



Queensland Government

**Environmental Protection Agency
Queensland Parks and Wildlife Service**

Northern Regional Office (Townsville)
PO Box 5391 TOWNSVILLE MC QLD 4810
Phone: (07) 4722 5353 Fax: (07) 4722 5351
www.epa.qld.gov.au ABN: 87221158786

Licence No. NR0560
(with development approval)
Section 86 Environmental Protection Act 1994

This licence, issued under the Environmental Protection Act 1994, allows the administering authority to make conditions with regard to financial assurances and matters relating to an Integrated Environmental Management System (IEMS). The licence and its conditions must be considered in conjunction with any conditions imposed on your development approval granted under the Integrated Planning Act 1997 or its equivalent.

**Under the provisions of the
Environmental Protection Act 1994 this licence is issued to:**

Cardwell Properties Pty Ltd
Bruce Highway
Cardwell QLD 4849

Cardwell Properties Pty Ltd
P.O Box 444
Main Beach QLD 4217

in respect of carrying out the environmental relevant activity:

15(b) Sewage treatment - Operating a standard sewage treatment works having a peak design capacity to treat sewage of 100 or more equivalent persons but less than 1 500 equivalent persons

at the following place(s):

Lot 1 on Plan C1043, Lot 2 on Plan CWL1212, Lot 3 on Plan C1043, Lot 41 on Plan C1043, Lot 42 on Plan C1043 and Lot 3 on plan RP733367.

located at:

Bruce Highway, Cardwell, QLD 4849.

This licence is subject to the conditions set out in the attached schedules.

The anniversary date of this licence is 26 October.

This licence takes effect from **26 October 2004**.


Signed

26 October 2004

Date

Tania Laurencont
District Manager
Delegate of Administering Authority
Environmental Protection Act 1994

Note: This licence document is not proof of the current status of the licence. The current status of the licence may be ascertained by contacting the Environmental Protection Agency.

Schedule of conditions

The aforementioned description of the ERA for which this authority is issued is simply a restatement of the activity as prescribed in the legislation at the time of issuing this authority. Where there is any conflict between the above description of the ERA for which this authority is issued and the conditions as specified in this authority as to the scale, intensity or manner of carrying out of the ERA, then such conditions prevail to the extent of the inconsistency.

This authority incorporates the following schedules of conditions relevant to various issues:

- Schedule A - General Conditions
- Schedule H - Definitions
- Schedule I - Maps / Plans

Schedule A - General Conditions

There are no conditions prescribed for this Schedule.

END OF CONDITIONS FOR SCHEDULE A

Schedule H - Definitions

Words and phrases used throughout this licence or development approval are defined below:

Where a definition for a term used in this authority is sought and the term is not defined within this authority the definitions provided in the *Environmental Protection Act 1994*, its regulations, and Environmental Protection Policies shall be used.

Word Definitions

“administering authority” means the Environmental Protection Agency or its successor.

END OF CONDITIONS FOR SCHEDULE H

Schedule I - Maps / Plans

There are no attachments to this schedule.

END OF CONDITIONS FOR SCHEDULE I

END OF ENVIRONMENTAL AUTHORITY



Queensland Government

Environmental Protection Agency
Queensland Parks and Wildlife Service

COPY

Northern Regional Office (Townsville)
PO Box 5391 TOWNSVILLE MC QLD 4810
Phone: (07) 4722 5353 Fax: (07) 4722 5351
www.epa.qld.gov.au ABN: 87221158786

Notice of development application decision

Sections 3.5.11 and 3.5.15 *Integrated Planning Act 1997*

This notice is issued by the administering authority pursuant to sections 3.5.11 and 3.5.15 of the Integrated Planning Act 1997, to advise you of a decision or action.

Enquiries to : Barry James
Telephone : (07) 4722 5353
Your reference : NR0560DA
Our reference : TSV4482

Cardwell Properties Pty Ltd
Bruce Highway
Cardwell QLD 4849

CC: Cardwell Properties Pty Ltd
P.O. Box 444
Main Beach QLD 4217

Attention: Mr Keith Williams,

Re: Application (No. NR0560DA) for development approval by Cardwell Properties Pty Ltd for assessable activity to be carried out at a place situated at Bruce Highway, Cardwell, QLD 4849

Pursuant to part 1 and 2 of Schedule 1A of the *Integrated Planning Regulation 1998*, the Environmental Protection Agency is the assessment manager for the development application.

Assessment Manager information

Assessment Manager office: Environmental Protection Agency
Northern Regional Office (Townsville)
Postal address: PO Box 5391 TOWNSVILLE MC QLD 4810
Telephone: (07) 4722 5353
Fax: (07) 4722 5351

The Environmental Protection Agency, acting as assessment manager under the *Integrated Planning Act 1997* for your application, advises that the development application decision notice about development prescribed under a regulation under the *Environmental Protection Act 1994* for schedule 8 part 1 item 6 of the *Integrated Planning Act 1997* is attached.

Entered/Validated in Ecotrack 5.6.05
Project Reference 264465
Development Approval # ENC000214505
Registration Certificate # ENR000214605
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Should you require any further information please do not hesitate to contact Barry James on either phone (07) 4722 5353 or e-mail: barry.james@epa.qld.gov.au

Signed

26 October 2004

Date

Tania Laurencont
District Manager
Delegate of Administering Authority
Environmental Protection Agency

Development application decision notice

Section 3.5.11 and 3.5.15 *Integrated Planning Act 1997*

Applicant:	Cardwell Properties Pty Ltd
EPA Development Application number:	NR0560DA
Date application received by EPA:	12 May 2004
Date of decision:	26 October 2004
Relevant Laws and Policies:	<i>Environmental Protection Act 1994</i> and subordinate legislation
Jurisdiction:	Item 7 of Schedule 2 of the <i>Integrated Planning Regulation 1998</i>

Development Description:

Carrying out of Environmentally Relevant Activity (ERA):

15(b) Sewage treatment - Operating a standard sewage treatment works having a peak design capacity to treat sewage of 100 or more equivalent persons but less than 1 500 equivalent persons

at the following place(s):

Lot 1 on Plan C1043, Lot 2 on Plan CWL1212, Lot 3 on Plan C1043, Lot 41 on Plan C1043, Lot 42 on Plan C1043 and Lot 3 on Plan RP733367

located at:

Bruce Highway, Cardwell, QLD 4849

Type of development

Material change of use of premises is:

- the start of a new use of the premises

Decision on Development Application

In deciding the application, the Environmental Protection Agency, as assessment manager approves all of the application and includes in the approval any concurrence agency conditions as a development permit.

Further development permits required

Nil

Referral agencies

Concurrence Agencies: Nil
Advice Agencies: Nil
Referral Agencies: Nil

Additional information for applicants

This approval pursuant to the *Environmental Protection Act 1994* does not remove the need to obtain any further approval for this development which might be required by other State and/or Commonwealth legislation. Applicants are advised to check with all relevant statutory authorities. Applicants also should comply with all relevant legislation.

It is a requirement of the *Environmental Protection Act 1994* that if the owner or occupier of this site becomes aware a Notifiable Activity (as defined under schedule 2 of the *Environmental Protection Act 1994*) is being carried out on this land or that the land has been affected by a hazardous contaminant, they must, within 30 days after becoming aware the activity is being carried out, give notice to the Environmental Protection Agency. A list of Notifiable Activities is provided within Schedule 2 of the *Environmental Protection Act 1994*.

Appeal

When issuing a decision notice under the *Integrated Planning Act 1997*, the assessment manager must state the rights of appeal for the applicant (section 3.5.15(2)(j)). The rights of appeal are attached to the back of this notice.


Signed

26 October 2004

Date

Tania Laurencont
District Manager
Delegate of Administering Authority
Environmental Protection Act 1994

Conditions of the development approval

This development approval consists of the following schedules of conditions relevant to various issues:

The aforementioned description of the environmentally relevant activity (ERA) for which this development approval is issued is simply a restatement of the activity as prescribed in the legislation at the time of issuing this development approval. Where there is any conflict between the above description of the ERA for which this development approval is issued and the conditions as specified in this development approval as to the scale, intensity or manner of carrying out of the ERA, then such conditions prevail to the extent of the inconsistency.

This development approval authorises the ERA. It does not authorise environmental harm unless a concurrence agency condition within this development approval explicitly authorises that harm. Where there is no condition or the development approval is silent on a matter, the lack of a condition or silence shall not be construed as authorising harm.

- Schedule A - Activity
- Schedule B - Air
- Schedule C - Water
- Schedule D - Noise
- Schedule E - Waste
- Schedule F - Land
- Schedule G - Community
- Schedule H - Definitions
- Schedule I - Maps / Plans

Schedule A - Activity

Prevent and /or minimise likelihood of environmental harm

- (A1-1) In carrying out the environmentally relevant activities, you must take all reasonable and practicable measures to prevent and / or to minimise the likelihood of environmental harm being caused. Any environmentally relevant activity, that, if carried out incompetently, or negligently, may cause environmental harm, in a manner that could have been prevented, shall be carried out in a proper manner in accordance with the conditions of this approval.

NOTE: This approval authorises the environmentally relevant activity. It does not authorise environmental harm unless a condition contained within this approval explicitly authorises that harm. Where there is no condition or the approval is silent on a matter, the lack of a condition or silence shall not be construed as authorising harm.

Maintenance of measures, plant and equipment

- (A2-1) The holder must:
- install all measures, plant and equipment necessary to ensure compliance with the conditions of this environmental authority; and
 - maintain such measures, plant and equipment in a proper and efficient condition; and
 - operate such measures, plant and equipment in a proper and efficient manner.
- (A2-2) A visual and audible alarm system shall be installed and maintained to alert the holder to any mechanical or electrical malfunctions of the plant

Site based management plan

- (A3-1) From commencement of the activity, a Site Based Management Plan (SBMP) must be implemented. The SBMP must identify all sources of environmental harm, including but not limited to the actual and potential release of all contaminants, the potential impact of these sources and what actions will be taken to prevent the likelihood of environmental harm being caused. The SBMP must also provide for the review and 'continual improvement' in the overall environmental performance of all Environmentally Relevant Activities that are carried out.

The site based management plan must address the following matters:

- Environmental commitments - a commitment by senior management to achieve environmental goals.
- Identification of environmental issues and potential impacts.
- Control measures for routine operations to minimise likelihood of environmental harm.
- Contingency plans and emergency procedures for non-routine situations.
- Organisational structure and responsibility.
- Effective communication.
- Monitoring of the contaminant releases.
- Conducting environmental impact assessments.
- Staff training.
- Record keeping.
- Periodic review of environmental performance and continual improvement.

Peak Design Capacity

- (A3-2) The development permit only authorises sewage treatment for a maximum daily inflow volume of 412 kilolitres.

Records

- (A5-1) Record, compile and keep all monitoring results required by this document and present this information to the administering authority when requested, in a specified format.

Acid sulphate soils (ASS)

- (A7-1) You must comply with the latest edition of the Queensland Environmental Protection Agency's INSTRUCTIONS FOR THE TREATMENT AND MANAGEMENT OF ACID SULFATE SOILS, 2001, produced by the Queensland Environmental Protection Agency in consultation with the Department of Natural Resources and Mines and the Department of Primary Industries.
- (A7-2) Acid sulfate soils must be managed such that contaminants are not be directly or indirectly released, as a result of the activity, to any waters or the bed and banks of any waters.

Annual monitoring report (Sewage treatment)

- (A8-1) An annual monitoring report must be provided to the administering authority with the annual return. This report shall include but not be limited to:
- a summary of the previous twelve (12) months' monitoring results obtained under any monitoring programs required under this authority and, in graphical form showing relevant limits, a comparison of the previous twelve (12) months monitoring results to both this authority limits and to relevant prior results;
 - an evaluation/explanation of the data from any monitoring programs; and
 - a summary of any record of quantities of releases required to be kept under this authority; and
 - a summary of the record of equipment failures or events recorded for any site under this authority; and
 - an outline of actions taken or proposed to minimise the environmental risk from any deficiency identified by the monitoring or recording programs; and
 - the number of domestic tenements newly connected to the sewage treatment works during the previous twelve (12) months; and
 - the progressive total number of connections; and
 - a summary of any trade waste agreements entered into or amended during the year, including the nature of the industry.

END OF CONDITIONS FOR SCHEDULE A

Schedule B - Air

Nuisance

- (B1-2) The release of noxious or offensive odours or any other noxious or offensive airborne contaminants resulting from the activity must not cause a nuisance at any odour sensitive place.

Dust nuisance

- (B2-1) The release of dust and/or particulate matter resulting from the activity must not cause an environmental nuisance at any dust sensitive place.

END OF CONDITIONS FOR SCHEDULE B

Schedule C - Water

Monitoring

- (C1-1) Monitoring must be undertaken and records kept of contaminant releases to waters from the discharge location for the parameters and not less frequently than specified in Schedule C Table 1. All determinations of the quality of contaminants released must be:
- made in accordance with methods prescribed in the latest edition of the Environment Protection Agency Water Quality Sampling Manual; and
 - carried out on samples that are representative of the discharge.

Schedule C - Table 1 (Release limits)

Monitoring point	Discharge location	Quality characteristics	Release limit			Monitoring frequency
			Minimum	50th Percentile	Maximum	
Outlet from wet weather storage tanks	W1 (One Mile Creek - Upstream side of road culvert under the Bruce Highway adjoining Lot 2 on Plan CWL1212)	Suspended Solids			5 mg/L	At least once during a discharge, then weekly there after during a discharge.
		5 Day - Biological Oxygen Demand			10 mg/L	
		Total Nitrogen		5 mg/L	10 mg/L	
		Total Phosphorous		1 mg/L	2 mg/L	
		Faecal Coliform		10 Colony forming units per 100ml	100 Colony forming units per 100ml	
		pH	6.5 pH units		8.5 pH units	
		Dissolved Oxygen	2 mg/L			

Release to waters

- (C3-2) Contaminants must only be released to waters after wet weather storage has reached capacity due to wet weather conditions preventing irrigation, from the discharge location and in compliance with the release limits listed in Schedule C Table 1.

Discharge Location W1 - namely release of tertiary treated effluent from Cardwell Properties Pty Ltd sewage treatment plant wet weather storage tanks located on Lot 1 on Plan C1043 to One Mile Creek at the upstream side of the road culvert under the Bruce Highway adjoining Lot 2 on Plan CWL1212.

- (C3-3) Withstanding condition C3-2, contaminants must only be released to One Mile Creek when a minimum dilution factor of **10** - Creek flow to **1** - treated effluent is achieved and creek flow overspills the weir located between One Mile Creek and the Grand Canal.
- (C3-4) A flow measurement device to measure creek water flows must be located on One Mile Creek adjacent within Lot 1 on Plan C1043 for the purpose of determining when release can occur in accordance with condition C3-3.
- (C3-5) The daily volume of contaminants released to waters must be determined or estimated by an appropriate method, for example a flow meter, and records kept of such determinations and estimates.
- (C3-6) The total quantity of contaminants released to waters via the release point listed in Schedule C Table 3, must not exceed the respective quantities stated for each release point in Schedule C Table 3 on any wet weather day that prevents irrigation that has resulted in wet weather storage exceeding capacity.

Schedule C - Table 3

Maximum permitted quantity of release	
Release point	Maximum release on any wet weather day **
W1 (One Mile Creek - Upstream side of road culvert under the Bruce Highway adjoining Lot 2 on Plan CWL1212)	412 Kilolitres

** "Maximum release on any wet weather day" means releases may only occur when wet weather prevents irrigation as conditioned in Schedule F and wet weather storage tanks have reached capacity.

Discharge location details

- (C4-2) The discharge location to One Mile Creek must be submerged such that the top of the outfall pipe is at least 0.5 metres under water at all times during discharge.

Stormwater management

- (C5-1) There must be no release of stormwater runoff that has been in contact with any contaminants at the site to any waters, roadside gutter or stormwater drain.

Contaminant and sewage pump station

- (C6-1) Contaminant pumping stations must be fitted with stand-by pumps and pump-failure alarms as well as high level alarms to warn of imminent pump station overflow. All alarms must be able to operate without mains power.

Tank conditions

- (C7-1) All tanks used for the storage or treatment of contaminants, sewage or wastes at or on the authorised place must be constructed, installed and maintained:
- so as to minimise the likelihood of any release of effluent from the tanks to any waters (including ground water);
 - so that releases from the wet weather storage tanks only occurs as a result of the tanks reaching capacity due to weather conditions preventing irrigation; and
 - so that there is a minimum wet weather storage capacity of 1.5 Mega litres per 500 Equivalent Persons.

Release to Groundwater

- (C8-1) A Groundwater Monitoring Program must be developed and implemented prior to the commencement of operations of the sewage treatment system, which will effectively detect the presence and extent of contamination of groundwater from the treated effluent irrigation area as detailed in Schedule F.
- (C8-2) The Groundwater Monitoring Program required under C8-1 must be designed by a suitable qualified person and must include sufficient monitoring points and/or bores to obtain representative samples of groundwater both up-gradient and down gradient of the potential influence of the treated effluent irrigation area as detailed in Schedule F.
- (C8-3) Prior to commencement of the operation of the treated effluent irrigation areas, background groundwater quality monitoring must be conducted at the monitoring bores identified in the Ground

Water Monitoring Program required under condition C8-1 to determine baseline ground water quality characteristics.

- (C8-4) Groundwater monitoring must be undertaken and records kept of a monitoring program that detects any possible impacts on groundwater from releases of contaminants to the irrigation area. Groundwater monitoring must be undertaken at the frequency, and for the parameters specified in Schedule C - Table 4. All determinations of the quality of contaminants released must be:
- made in accordance with methods prescribed in the latest edition of the Environment Protection Agency Water Quality Sampling Manual; and
 - carried out on samples that are representative of the groundwater.

Schedule C - Table 4 (Monitoring program)

Quality characteristics	Units	Frequency
Total Nitrogen (as N)	mg/L	Six Monthly*
Total Phosphorous (as P)	mg/L	
Ammonia (as N)	mg/L	
Nitrate (as N)	mg/L	
Nitrite (as N)	mg/L	
Total Kjeldahl Nitrogen (as N)	mg/L	
Faecal Coliform	Colony forming units per 100 millilitres	
pH	pH units	
Conductivity	Micro siemens / cm	

* Monitoring to be conducted biannually such as possible that both wet and dry seasons are represented.

- (C8-5) Standing groundwater levels in metres must be measured and recorded on each occasion that samples are obtained. Such measurement must be reported as the depth in metres from an established reference point, relative to Australian Height Datum, to water surface within the bore.

END OF CONDITIONS FOR SCHEDULE C

Schedule D - Noise and vibration

Noise nuisance

- (D1-1) Noise from activities must not cause an environmental nuisance at any noise affected premises.

Noise monitoring

- (D2-1) When requested by the Administering Authority, noise monitoring must be undertaken to investigate any complaint of noise nuisance, and the results notified within 14 days to the administering authority. Monitoring must include:
- L_A 10, adj, 10 mins
 - L_A 1, adj, 10 mins
 - the level and frequency of occurrence of impulsive or tonal noise;
 - atmospheric conditions including wind speed and direction;
 - effects due to extraneous factors such as traffic noise; and
 - location, date and time of recording.
- (D2-2) The method of measurement and reporting of noise levels must comply with the latest edition of the Environmental Protection Agency's Noise Measurement Manual.

END OF CONDITIONS FOR SCHEDULE D

Schedule E - Waste

Waste handling

- (E5-1) All regulated waste removed from the site must be removed by a person who holds a current approval to transport such waste under the provisions of the *Environmental Protection Act 1994*.
- (E5-2) Records must be kept for five years, and must include the following information:
- date of pickup of waste;
 - description of waste;
 - cross reference to relevant waste transport documentation;
 - quantity of waste;
 - origin of the waste;
 - destination of the waste; and
 - intended fate of the waste, for example, type of waste treatment, reprocessing or disposal.

NOTE: Records of documents maintained in compliance with a waste tracking system established under the Environmental Protection Act 1994 or any other law for regulated waste will be deemed to satisfy this condition.

END OF CONDITIONS FOR SCHEDULE E

Schedule F - Land

Land disposal

- (F2-1) The only contaminants permitted to be released to land are treated effluents to the areas shown in Figure 1 Schedule I in compliance with the limits levels stated in Table 1 of the Land Schedule and the conditions of this authority.

Schedule F - Table 1 (Release limits - 'Land')

Quality characteristics	Release Limit		
	Minimum	50th Percentile	Maximum
Suspended Solids			5 mg/L
5 Day - Biological Oxygen Demand			10 mg/L
Total Nitrogen		5 mg/L	10 mg/L
Total Phosphorous		1 mg/L	2 mg/L
Faecal Coliform		10 Colony forming units per 100ml	100 Colony forming units per 100ml
PH	6.5 pH units		8.5 pH units
Dissolved Oxygen	2 mg/L		

- (F2-2) The irrigation of effluent must be carried out in a manner such that:
- vegetation is not damaged;
 - soil erosion and soil structure damage is avoided;
 - there is no surface ponding of effluent;
 - percolation of effluent beyond the plant root zone is minimised;
 - the capacity of the land to assimilate nitrogen, phosphorus, salts, organic matter as measured by oxygen demand and water is not exceeded; and
 - the quality of ground water is not adversely affected.
- (F2-3) Notices must be prominently displayed on any effluent irrigation area warning the public that the area is irrigated with effluent and not to use or drink the effluent. These notices must be maintained in a visible and legible condition.
- (F2-5) Monitoring must be undertaken and records kept of a monitoring program of contaminant releases to the irrigation area at the monitoring points, frequency, and for the parameters specified in Schedule F - Table 2.

Schedule F - Table 2 (Monitoring program)

Monitoring point	Quality characteristics	Units	Frequency
Outlet from effluent storage tanks when a discharge occurs.	Suspended Solids	mg/L	Monthly
	5 Day - Biological Oxygen Demand	mg/L	Monthly
	Total Nitrogen	mg/L	Monthly
	Total Phosphorous	mg/L	Monthly
	Faecal Coliform	Colony forming units per 100 millilitres	Monthly
	pH	pH units	Weekly
	Dissolved Oxygen	mg/L	Weekly

- (F2-6) The daily volume of contaminants released to land must be determined or estimated by an appropriate method, for example a flow meter, and records kept of such determinations and estimates.
- (F2-7) When conditions prevent the irrigation of treated effluent to land (such as during or following rain events), the effluent must be directed to wet weather storage tanks.
- (F2-8) The total quantity of treated effluent released to land for the purpose of irrigation via the release point listed in Schedule F Table 3, must not exceed the respective quantities stated for each release point in Schedule F Table 3 on any dry weather day.

Schedule F - Table 3

Maximum daily quantity of treated effluent released on any dry weather day*	
Release point	Maximum daily release
Outlet of effluent storage tank	620 Kilolitres

Notes: * "Dry weather day" means when conditions are such that irrigation will not result in surface ponding or runoff over the irrigation area.

Preventing contaminant release to land

- (F3-2) Spillage of all chemicals and fuels must be contained within an on-site containment system and controlled in a manner that prevents environmental harm.

NOTE: All petroleum product storage's must be designed, constructed and maintained in accordance with AS 1940 - Storage and Handling of Flammable and Combustible Liquids.

END OF CONDITIONS FOR SCHEDULE F

Schedule G - Community

Complaint response

- (G1-1) All complaints received must be recorded including investigations undertaken, conclusions formed and action taken. This information must be made available to the administering authority on request.
- (G1-2) In consultation with the administering authority, cooperate with and participate in any community environmental liaison committee established in respect of either the site specifically, or the industrial estate where the site is located.

END OF CONDITIONS FOR SCHEDULE G

Schedule H - Definitions

Words and phrases used throughout this licence or development approval are defined below:
Where a definition for a term used in this approval is sought and the term is not defined within this approval the definitions provided in the *Environmental Protection Act 1994*, its regulations, and Environmental Protection Policies shall be used.

Word Definitions

"administering authority" means the Environmental Protection Agency or its successor.

"you" means the holder of this Environmental Authority or owner / occupier of the land which is the subject of this Development Approval.

"site" means the place to which this environmental authority relates or the premises to which this development approval relates.

"authorised place" means the place authorised under this environmental authority/development approval for the carrying out of the specified environmentally relevant activities.

"this authority" means this environmental authority/development approval.

"authority" means level 1 licence (without development approval), or level 1 approval (without development approval), or level 2 approval (without development approval) under the *Environmental Protection Act 1994*.

"approval" means 'notice of development application decision' or 'notice of concurrence agency response' under the *Integrated Planning Act 1997*

"dust sensitive place" means -

- a dwelling, mobile home or caravan park, residential marina or other residential place;
- a motel, hotel or hostel;
- a kindergarten, school, university or other educational institution;
- a medical centre or hospital;
- a protected area;
- a park or gardens; or
- a place used as an office or for business or commercial purposes.
and includes the curtilage of any such place.

"odour sensitive place" has the same meaning as a "dust sensitive place"

"dwelling" means any of the following structures or vehicles that is principally used as a residence-

- a house, unit, motel, nursing home or other building or part of a building;
- a caravan, mobile home or other vehicle or structure on land;
- a water craft in a marina.

"noxious" means harmful or injurious to health or physical well being.

"offensive" means causing offence or displeasure; is disagreeable to the sense; disgusting, nauseous or repulsive.

"nuisance sensitive place" includes -

- a dwelling, residential allotment, mobile home or caravan park, residential marina or other residential premises; or
 - a motel, hotel or hostel; or
 - a kindergarten, school, university or other educational institution; or
 - a medical centre or hospital; or
 - a protected area under the Nature Conservation Act 1992, the Marine Parks Act 1992 or a World Heritage Area; or
 - a public thoroughfare, park or gardens; or
 - a place used as a workplace, an office or for business or commercial purposes.
- and includes a place within the curtilage of such a place reasonably used by persons at that place.

" $L_{A 10, \text{adj}, 10 \text{ mins}}$ " means the A-weighted sound pressure level, (adjusted for tonal character and impulsiveness of the sound) exceeded for 10% of any 10 minute measurement period, using Fast response.

" $L_{A 1, \text{adj}, 10 \text{ mins}}$ " means the A-weighted sound pressure level, (adjusted for tonal character and impulsiveness of the sound) exceeded for 1% of any 10 minute measurement period, using Fast response

"noise affected premises" means a "noise sensitive place" or a "commercial place"

"noise sensitive place" means -

- a dwelling, mobile home or caravan park, residential marina or other residential premises; or
 - a motel, hotel or hostel; or
 - a kindergarten, school, university or other educational institution; or
 - a medical centre or hospital; or
 - a protected area; or
 - a park or gardens.
- and includes the curtilage of such place.

"commercial place" means a place used as an office or for business or commercial purposes.

"intrusive noise" means noise that, because of its frequency, duration, level, tonal characteristics, impulsiveness or vibration -

- is clearly audible to, or can be felt by, an individual; and
- annoys the individual.

In determining whether a noise annoys an individual and is unreasonably intrusive, regard must be given to Australian Standard 1055.2 - 1997 Acoustics - Description and Measurement of Environmental Noise Part 2 - Application to Specific Situations.

"waters" includes river, stream, lake, lagoon, pond, swamp, wetland, unconfined surface water, unconfined water natural or artificial watercourse, bed and bank of any waters, dams, non-tidal or tidal waters (including the sea), stormwater channel, stormwater drain, roadside gutter, stormwater run-off, and groundwater and any part thereof.

"50th percentile" means not more than three (3) of the measured values of the quality characteristic are to exceed the stated release limit for any six (6) consecutive samples for a release/monitoring point at any time during the environmental activity(ies) works.

"Maximum" means that the measured value of the quality characteristics or contaminant must not be greater than the higher release limit stated.



"land" in the "land schedule" of this document means land excluding waters and the atmosphere.

"mg/L" means milligrams per litre.

"NTU" means nephelometric turbidity units

"regulated waste" means non-domestic waste mentioned in Schedule 7 of the Environmental Protection Regulation 1998 (whether or not it has been treated or immobilised), and includes:

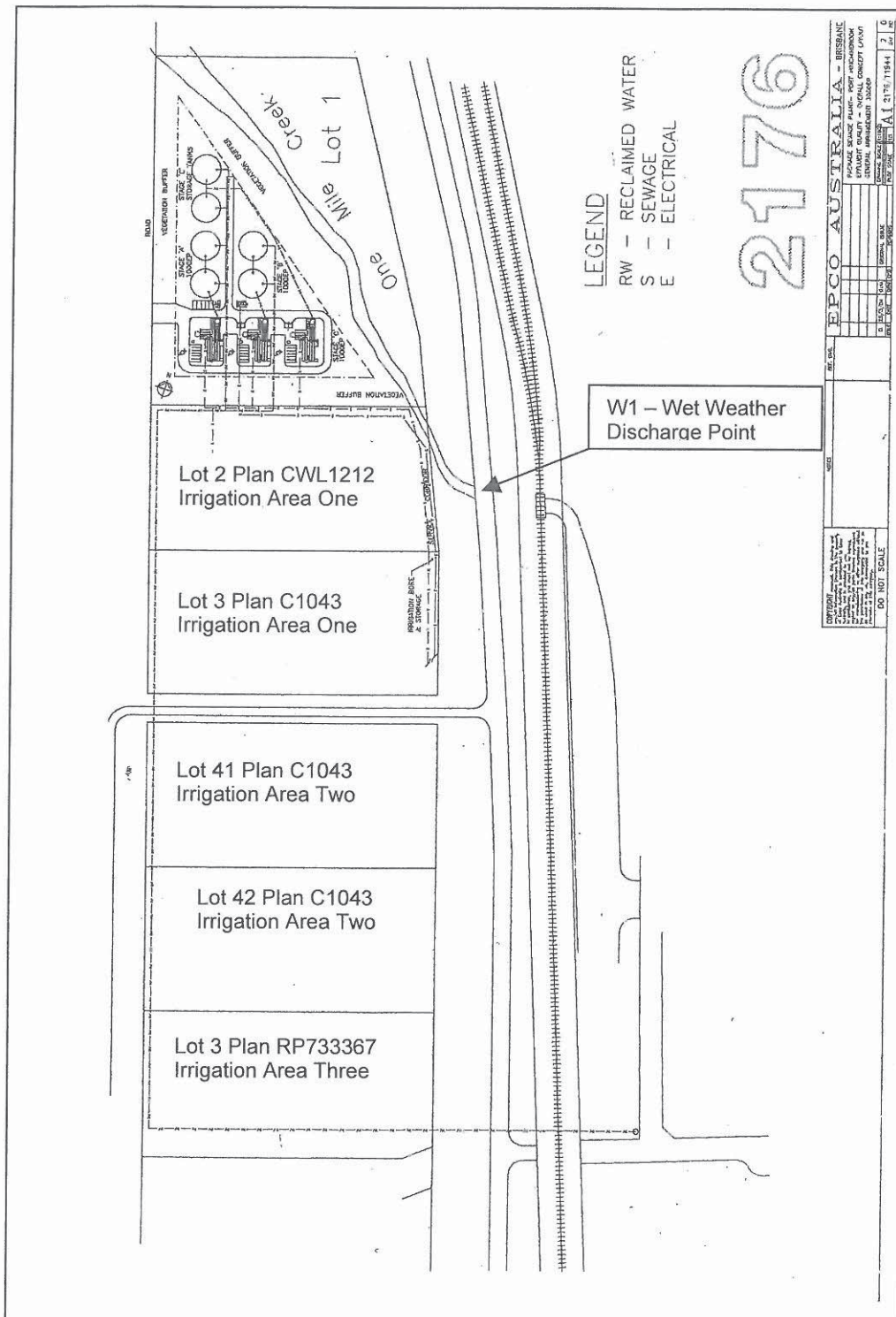
- for an element - any chemical compound containing the element; and
- anything that has contained the waste.

"annual return" means the return required by the annual notice (under section 316 of the Environment Protection Act, 1994) for the section 86(2) licence that applies to the development approval.

END OF DEFINITIONS FOR SCHEDULE H

Schedule I - Maps / Plans

Figure 1: Irrigation Area and Wet Weather Discharge Point



END OF CONDITIONS FOR SCHEDULE I

END OF DEVELOPMENT APPROVAL

Extract from the *Integrated Planning Act 1997*

Division 8—Appeals to court relating to development applications

Appeals by applicants

- 4.1.27 (1) An applicant for a development application may appeal to the court against any of the following -
- (a) the refusal, or the refusal in part, of a development application;
 - (b) a matter stated in a development approval, including any condition applying to the development, and the identification of a code under section 3.1.6;
 - (c) the decision to give a preliminary approval when a development permit was applied for;
 - (d) the length of a currency period;
 - (e) a deemed refusal.
- (2) An appeal under subsection (1)(a) to (d) must be started within 20 business days (the “**applicant’s appeal period**”) after the day the decision notice or negotiated decision notice is given to the applicant.
- (3) An appeal under subsection (1)(e) may be started at any time after the last day a decision on the matter should have been made.

Appeals by submitters

- 4.1.28 (1) A submitter for a development application may appeal to the court about -
- (a) the giving of a development approval, including any conditions (or lack of conditions) or other provisions of the approval; or
 - (b) the length of a currency period for the approval.
- (2) The appeal must be started within 20 business days (the “**submitter’s appeal period**”) after the day the decision notice or negotiated decision notice is given to the submitter.
- (3) If a person withdraws a submission before the application is decided, the person may not appeal the decision.
- (4) If an application involves both impact assessment and code assessment, appeal rights for submitters are available only for the part of the application involving impact assessment.

Appeals by advice agency submitters

- 4.1.29 (1) An advice agency may, within the limits of its jurisdiction, appeal to the court about the giving of a development approval for a development application if -
- (a) the development application involves impact assessment; and
 - (b) the advice agency told the applicant and the assessment manager to treat its response to the application as a submission for an appeal.
- (2) The appeal must be started within 20 business days after the day the decision notice or negotiated notice is given to the advice agency as a submitter.

Appeals for matters arising after approval given (co-respondents)

- 4.1.30 (1) For a development approval given for a development application, a person to whom any of the following notices have been given may appeal to the court against the decision in the notice -
- (a) a notice giving a decision on a request for an extension of the currency period for an approval;
 - (b) a notice giving a decision on a request to make a minor change to an approval.
- (2) The appeal must be started within 20 business days after the day the notice of the decision is given to the person.
- (3) Subsection (1)(a) does not apply if the approval resulted from a development application (superseded planning scheme) that was assessed as if it were an application made under a superseded planning scheme.

Division 9 - Appeals to court about other matters

Appeals for matters arising after approval given (no co-respondents)

- 4.1.31 (1) A person to whom any of the following notices have been given may appeal to the court against the decision in the notice -
- (a) a notice giving a decision on a request to change or cancel a condition of a development approval;
 - (b) a notice under section 6.1.44 giving a decision to change or cancel a condition of a development approval.
- (2) The appeal must be started within 20 business days after the day the notice of the decision is given to the person.

Appeals against enforcement notices

- 4.1.32 (1) A person who is given an enforcement notice may appeal to the court against the giving of the notice.
- (2) The appeal must be started within 20 business days after the day notice is given to the person.

Stay of operation of enforcement notice

- 4.1.33 (1) The lodging of a notice of appeal about an enforcement notice stays the operation of the enforcement notice until -
- (a) the court, on the application of the entity issuing the notice, decides otherwise; or
 - (b) the appeal is withdrawn; or
 - (c) the appeal is dismissed.
- (2) However, subsection (1) does not apply if the enforcement notice is about -
- (a) a work, if the enforcement notice states the entity believes the work is a danger to persons or a risk to public health; or
 - (b) carrying out development that is the demolition of a work.

Appeals against decisions on compensation claims

- 4.1.34 (1) A person who is dissatisfied with a decision under section 5.4.8 or 5.5.3 for the payment of compensation may appeal to the court against -
- (a) the decision; or
 - (b) a deemed refusal of the claim.
- (2) An appeal under subsection (1)(a) must be started with 20 business days after the day notice of the decision is given to the person.
- (3) An appeal under subsection (1)(b) may be started at any time after the last day a decision on the matter should have been made.

Appeals against decisions on requests to acquire designated land under hardship

- 4.1.35 (1) A person who is dissatisfied with a designator's decision to refuse a request made by the person under section 2.6.19, may appeal to the court against -
- (a) the decision; or
 - (b) a deemed refusal of the request.
- (2) An appeal under subsection (1)(a) must be started within 20 business days after the day notice of the decision is given to the person.
- (3) An appeal under subsection (1)(b) may be started at any time after the last day a decision on the matter should have been made.

Appeals from tribunals

- 4.1.37 (1) A party to a proceeding decided by a tribunal may appeal to the court against the tribunal's decision, but only on the ground -
- (a) of error or mistake in law on the part of the tribunal; or
 - (b) that the tribunal had no jurisdiction to make the decision or exceeded its jurisdiction in making the decision.
- (2) An appeal against a tribunal's decision must be started within 20 business days after the day notice of the tribunal's decision is given to the party.

Court may remit matter to tribunal

- 4.1.38 If an appeal includes a matter within the jurisdiction of a tribunal and the court is satisfied the matter should be dealt with by a tribunal, the court must remit the matter to the tribunal for decision.

Division 10 - Making an appeal to court

How appeals to the court are started

- 4.1.39 (1) An appeal is started by lodging written notice of appeal with the registrar of the court.
- (2) The notice of appeal must state the grounds of the appeal.
 - (3) The person starting the appeal must also comply with the rules of the court applying to the appeal.
 - (4) However, the court may hear and decide an appeal even if the person has not complied with subsection (3).

Certain appellants must obtain information about submitters

- 4.1.40 (1) If the applicant or a submitter for a development application appeals about the part of the application involving impact assessment, the appellant must ask the assessment manager to give the appellant the name and address of each principal submitter who made a properly made submission about the application and has not withdrawn the submission.
- (2) The assessment manager must give the information requested under subsection (1) as soon as practicable.

Notice of appeal to other parties (div 8)

- 4.1.41 (1) An appellant under division 8 must, within 10 business days after the day the appeal is started (or if information is requested under section 4.1.40, within 10 business days after the day the appellant is given the information) give written notice of the appeal to -
- (a) if the appellant is an applicant - the assessment manager, any concurrence agency, any principal submitter whose submission has not been withdrawn and any advice agency treated as a submitter whose submission has not been withdrawn; or
 - (b) if the appellant is a submitter or an advice agency whose response to the development application is treated as a submission for an appeal - the assessment manager, the applicant and any concurrence agency; or
 - (c) if the appellant is a person to whom a notice mentioned in section 4.1.30 has been given - the assessment manager and any entity that was a concurrence agency for the development application.
- (2) The notice must state -
- (a) the grounds of the appeal; and
 - (b) if the person given the notice is not the respondent or a co-respondent under section 4.1.43 - that the person, within 10 business days after the day the notice is given, may elect to become a co-respondent to the appeal.

Notice of appeal to other parties (div 9)

- 4.1.42 (1) An appellant under division 9 must, within 10 business days after the day the appeal is started give written notice of the appeal to -
- (a) if the appellant is a person to whom a notice mentioned in section 4.1.31⁷³ has been given - the entity that gave the notice; or
 - (b) if the appellant is a person to whom an enforcement notice is given - the entity that gave the notice and if the entity is not the local government, the local government; or
 - (c) if the appellant is a person dissatisfied with a decision about compensation - the local government that decided the claim; or
 - (d) if the appellant is a person dissatisfied with a decision about acquiring designated land - the designator; or
 - (e) if the appellant is a person who is disqualified as a private certifier - the entity disqualifying the person and if the entity disqualifying the person is not the accrediting body, the accrediting body; or
 - (f) if the appellant is a party to a proceeding decided by a tribunal - the other party to the proceeding.
- (2) The notice must state the grounds of the appeal.

Respondent and co-respondents for appeals under div 8

- 4.1.43 (1) This section applies to appeals under division 8 for a development application.
- (2) The assessment manager is the respondent for the appeal.
 - (3) If the appeal is started by a submitter, the applicant is a co-respondent for the appeal.
 - (4) If the appeal is about a concurrence agency response, the concurrence agency is a co-respondent for the appeal.
 - (5) If the appeal is only about a concurrence agency response, the assessment manager may apply to the court to withdraw from the appeal.
 - (6) The respondent and any co-respondents for an appeal are entitled to be heard in the appeal as a party to the appeal.
 - (7) A person to whom a notice of appeal is required to be given under section 4.1.41 and who is not the respondent or a co-respondent for the appeal may elect to be a co-respondent.

Respondent and co-respondents for appeals under div 9

- 4.1.44 (1) This section applies if an entity is required under section 4.1.42 to be given a notice of an appeal.
- (2) The entity given written notice is the respondent for the appeal.
 - (3) However, if under a provision of the section more than 1 entity is required to be given notice, only the first entity mentioned in the provision is the respondent.
 - (4) The second entity mentioned in the provision may elect to be a co-respondent.

How a person may elect to be co-respondent

- 4.1.45 (1) An entity elects to be a co-respondent by lodging in the court, within 10 business days after the day the notice of the appeal is given to the entity, a notice of election under the rules of court.
- (2) If a principal submitter is entitled to elect to become a co-respondent, any other submitter for the submission may also elect to become a co-respondent to the appeal.

Minister entitled to be represented in an appeal involving a State interest

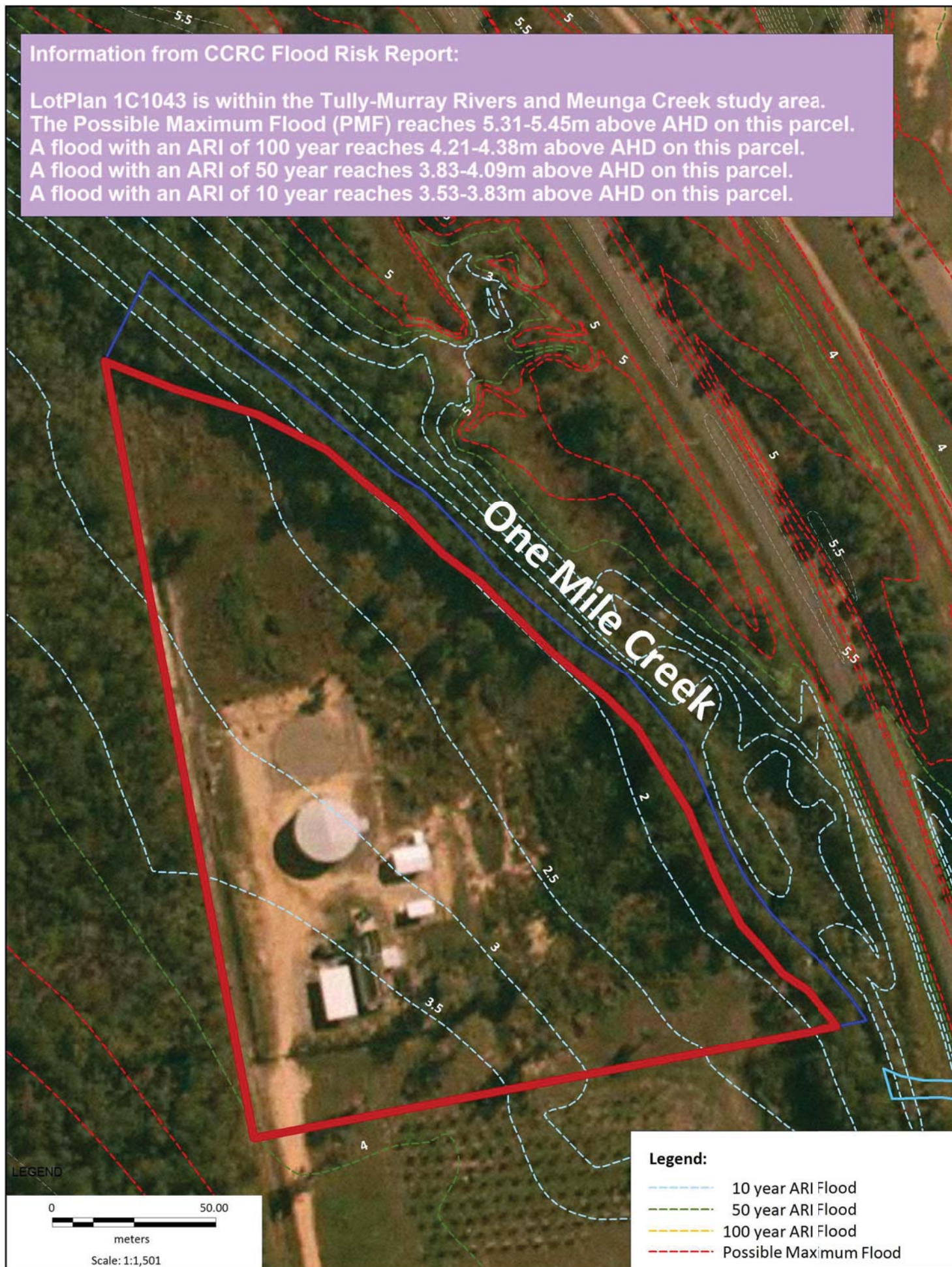
- 4.1.46 If the Minister is satisfied that an appeal involves a State interest, the Minister is entitled to be represented in the appeal.

Lodging appeal stops certain actions

- 4.1.47 (1) If an appeal (other than an appeal under section 4.1.30) is started under division 8, the development must not be started until the appeal is decided or withdrawn.
- (2) Despite subsection (1), if the court is satisfied the outcome of the appeal would not be affected if the development or part of the development is started before the appeal is decided, the court may allow the development or part of the development to start before the appeal is decided.

Information from CCRC Flood Risk Report:

LotPlan 1C1043 is within the Tully-Murray Rivers and Meunga Creek study area.
The Possible Maximum Flood (PMF) reaches 5.31-5.45m above AHD on this parcel.
A flood with an ARI of 100 year reaches 4.21-4.38m above AHD on this parcel.
A flood with an ARI of 50 year reaches 3.83-4.09m above AHD on this parcel.
A flood with an ARI of 10 year reaches 3.53-3.83m above AHD on this parcel.



Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid of Australia, Zone 55



Cassowary Coast Regional Council
Cardwell STP Planning Study

Job Number 41-24272
Revision A
Date 07 Feb 12

Existing Port Hinchinbrook STP

Figure H-2

Technical Memorandum

Title	Port Hinchinbrook Sewerage Treatment Plant Condition Reports Review		
Client	Department of State Development, Manufacturing, Infrastructure and Planning	Project No	510326
Date	19 June 2018	Status	Draft
Author	Michael Bancroft	Discipline	Civil Engineering
Reviewer	Dominee Rye	Office	Townsville

Introduction

Further to our discussions of June 15, 2018 Cardno has undertaken a review of the various material made available to us. The documentation reviewed includes:

- > Email correspondence dated May 21, 2018 from Mr David Goodman, Director of Infrastructure Services at the Cassowary Coast Regional Council to Mr James Gott, CEO of the Cassowary Coast Regional Council (CCRC).
- > Site and Asset Assessment spreadsheet described as CCRC's preliminary view of the works required to rectify immediate defects at the Sewerage Treatment Plant (STP).
- > Email correspondence dated May 29, 2018 from Mr Brendan Meale, Senior Environmental Compliance Officer of the Department of Environment and Science (DES) to Mr Michael Brennan, Managing Principal of Offermans Partners, Townsville.
- > Cardno on behalf of the Department of State Development, Infrastructure and Planning have previously completed a preliminary assessment of the various civil infrastructure within the Port Hinchinbrook Development in mid-2014 which has been referenced in conjunction with the aforementioned.

The Port Hinchinbrook STP

The Port Hinchinbrook STP was constructed in 2004/05. The main biological treatment step of the STP is a compartmentalised part-anoxic/aerobic continuous flow activated sludge process with a static settling tank (or clarifier) and an air-lift return activated sludge (RAS) mechanism. The plant has a nominal design capacity of 500 EP although the approved effluent discharge area appears limited to 200 EP.

The Operations and Maintenance Manual for the STP stipulates that the existing package plant treatment process capacity could be increased to 1000 EP by replacing the existing coarse bubble cast iron diffusers with fine bubble diffusers. It is stated that the bioreactor tanks have sufficient capacity for 1000 EP with the aeration blowers running full time.

CCRC Inspection of May 18, 2018

CCRC representatives attended site on May 18, 2018 in order to ascertain the condition of the STP and associated Pump Stations. Attendees included various managerial and technical staff from CCRC in addition to Mr Michael Brennan from Offermans Partners, Townsville.

CCRC's inspection solely focused on operation and function and the minimum restoration requirements to enable design intent. The main findings of the inspection included:

- > Overall structure is generally sound with no defects suggesting imminent structural failure;
- > Defects included minor leaks; aeration baffle failure; failed handrail in vicinity of inlet screen; The treatment process is not functioning and the air lift process transferring solids from the final

stages of treatment into the treatment process is not functioning and likely has not for a considerable time.

The recommendations of the report included:

1. Restoration of the air lift process to transfer solids within the plant;
2. Removal of the existing solids from within the plant;
3. Emptying of the Effluent Storage Tank;
4. Seed the plant with live solids from a current functioning STP;
5. Correct the disposal of solids process.

The CCRC commentary noted items 2-5 could be easily achieved however not worthwhile unless Item 1 was first actioned and completed. CCRC took no effluent samples on account it was clear the treatment process was not operational or functional as designed.

CCRC Site and Asset Assessment Spreadsheet

Further to the CCRC site inspection the Site Asset Assessment Spreadsheet provides more detail. A summary of notes follows:

- > Site Generator - Unserviceable, leaking fuel & oil, shows signs of degradation;
- > Irrigation System - Not operational, various issues, needs to be functional for license purposes, more investigations required;
- > Chemical Dosing - Various pumps not working, chemical dosing line open to weather;
- > Drying Beds - Full, all beds need resanding;
- > Waste Tank - Needs replacing;
- > Supernatant Pump Stations - Rails need relacing, Manual stop/start control needs replacing, Access lids need replacing;
- > Transfer Pump Station - 2nd Pump is weathered, perished power cables and circuit breaker;
- > Filtrate Pump Station - 2nd Pump not working, control Station needs replacing, Rails need replacement;
- > Backwash Pumps - Control Station needs replacing, lid and well fittings need rectification;
- > Water Effluent Pump - New pressure vessel required, pressure gauge and switch not working;
- > Balance Tank Blowers - Further investigation required, no guards on driver belts, various parts required, machines not expected to run much longer;
- > Aeration Tank Blowers - Further investigation required, no guards on driver belts, various parts required, machines not expected to run much longer;
- > Air Diffuser System - Some diffusers need replacing, lifting & guide ropes need replacing;
- > Process Air - Solenoid valve and control coil needs replacing;
- > Sand Filters - Clogged and not working, requires top up and proper backwashing;
- > Office / Amenities - Requires new air conditioning and new refrigerator;
- > Hand Testing Equipment - Old and outdated;
- > Tanks & Structures - Clarifier Tank has multiple leaks, various handrails needs replacing;
- > Clarifier Tank - Tank is buckling, requires vacuuming and reseeded;
- > Electrical Issues - Various minor electrical faults for rectification.

DES Inspection of May 27, 2018

DES representatives attended site on May 27, 2018 in order to investigate operational issues of the STP and associated Pump Stations. The number and identity's of attendees is unknown. DES officers have listed a number of observations within the correspondence more acutely focused on the environmental obligations of the Environmental Authority and relevant legislation. Observations included:

- > The Wet Weather Tank is leaking in a number of locations to adjacent grassed areas not approved for contaminate release at an estimated rate of 5L/min;
- > Multiple pump stations are not secure;
- > The Sewerage Sludge Drying Bed has reached capacity;
- > The initial screening area contains a significant amount of debris and requires maintenance;
- > An open pipe well was identified adjacent Pump Station 9;

- > Multiple Pump Stations were identified to be switched to manual operation;
- > The chlorine dosing / flocculation operations were not functional;
- > The effluent irrigation area was overgrown and unable to function as designed.

We note DES officers took samples of effluent and sent them away for analysis. Results have not been observed.

Cardno Preliminary Assessment of Civil Infrastructure (August 2014)

Cardno's Preliminary Assessment of Civil Infrastructure refers to general civil infrastructure across the greater Port Hinchinbrook Site. Sections 7.2 and 7.3 of the report specifically speak to the onsite Pump Stations and STP respectively. It summarises as follows:

- > Onsite discussion with the FTI contracted infrastructure operator on the most recent visit, indicate that:
 - All sludge in the STP is currently being returned to the balance tank to maintain a minimum bio-mass to sustain effluent biological treatment;
 - The sand filters are not currently being used before the treated effluent is pumped to the irrigation storage tank;
 - No sludge is currently being drawn off, aerated, and distributed onto the sludge drying beds;
 - The treated effluent is currently being pumped into the irrigation holding tank which has numerous leaks to ground;
 - No irrigation is currently being carried out to dispose of treated effluent;
 - The existing irrigation area cannot be used due to damage/destruction of the sprinkler grid;
- > The current area of available land of approximately 4.0 Ha, initially used for irrigation purposes for the disposal of treated effluent, limits development to 200 EP unless further land for irrigation purposes is acquired;
- > A non-exhaustive list of repairs and improvements/upgrades to the sewage treatment plant constrained to the current available irrigation area limit of 200 EP include:
 - Undertake a treatment process review analysis to determine changes required to treatment process;
 - Inspect and repair / replace faulty / damaged equipment in the STP Control Switchboard;
 - Replace inlet screen process with an arrangement that meets workplace health and safety requirements;
 - Install flow meters and controls at various positions in the plant to control the treatment process;
 - Repair leaks in the process tanks. Note the tanks may have to be drained, sand blasted and treated with appropriate protective coatings to eliminate internal corrosion;
 - Supply and install new chemical dosing equipment;
 - Repair / replace corroded stairways and walkways to treatment tanks;
 - Inspect and if necessary replace filter media in sand filters;
 - Install pressure differential instrumentation to convert sand filters to automatic backwash from manually controlled backwash;
 - Inspect and repair leaks in irrigation holding tank including replacing liner if required;
 - Replace access ladder on irrigation holding tank;
 - Repair / replace roof to irrigation holding tank;
 - Repair replace effluent level indicator board and float mechanism on irrigation holding tank;
 - Install additional irrigation holding tank (needed so that the existing holding tank can be repaired);
 - Install ventilation and sound attenuation in the blower room building;
 - Inspect and repair irrigation pumps and controls;
 - Repair / replace existing irrigation pump system;
 - Mow / clean up irrigation area, repair / replace broken pipework and sprinkler heads;
 - Repair damage to perimeter fencing;
 - Upgrade the lightly gravelled existing access track to all weather sealed access road standard.

Summary and Recommendations

A review of the recent inspection reports completed by CCRC and DES highlights a reasonable level of consistency amongst the various observations including those made by Cardno in 2014. It is clear the STP has not operated or functioned in accordance with the design intent for many years and furthermore, does not achieve environmental obligations of the Environmental Authority and relevant legislation.

Key themes from the documentation reviewed requiring attention include:

- > **Safety** – all three documents reference various safety concerns with respect to handrails, access ladders, corroded stairways and walkways. The safety of maintenance crews and/or contractors undertaking rehabilitation works moving forward is paramount and should be actioned ASAP ensuring compliance with current workplace, health and safety regulations.
- > **Failures** – substantial failure of various STP components including the aeration baffle, various weathered and defective pumps, numerous electrical and mechanical faults, the waste tank, the irrigation system, chlorine dosing operations and others have occurred rendering the facility not fit for purpose in its current state.
- > **Illegal Discharge** – various leaks have been identified throughout the STP discharging to areas not approved for contaminate release and would appear to have been doing so for well over four years now. Not only are the leaks discharging to areas not approved there is little doubt the discharge is not within the approved limit levels of the Environmental Authority and relevant legislation.
- > **Continued Operations** – Capacity of the STP has been noted given the current area of available land used for irrigation purposes and disposal of treated effluent is approximately 4.0 Ha, limiting treatment capacity to circa 200 EP unless further land for irrigation is acquired.

In light of the above and consistent with commentary within the various documents it is evident further investigation is required in order to comprehensively understand and address safety, operational and legislative shortcomings of the existing STP.

We recommend an STP process review be completed to determine whether or not rectification works would enable the existing plant to comply with licence effluent discharge standards or would it be more economically viable to replace the plant. Furthermore, consideration needs to be given to constraints of the STP with respect to design capacity limitations, actual capacity requirements and future capacity requirements.

PORT HINCHINBROOK STP UPGRADE



1645-RPT-0001 DETAILED DESIGN REPORT

Doc No: 1645-RPT-0001

November 2020

Rev 0



Principal:

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Revision	Date	Description	Author	Reviewed	Approved
Rev 0	27/11/2020	Issued for Construction	Access refus	Access refus	Access refu

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Contents

1. EXECUTIVE SUMMARY	8
2. BACKGROUND	9
2.1 PORT HINCHINBROOK STP	9
2.1.1 Existing Plant Rectification Works	10
2.2 SITE LOCATION	10
2.3 DISPOSAL BY IRRIGATION	11
2.3.1 Existing Irrigation Network	11
2.4 ENVIRONMENTAL AUTHORITY (EA)	11
2.4.1 Future Upgrade and License Conditions	12
3. BASIS OF DESIGN	13
3.1 SITE SPECIFIC	13
3.1.1 Site Location	13
3.1.2 Site Conditions	13
3.1.3 Flood Protection	13
3.1.4 Site Visit	13
3.1.5 Survey Investigations	13
3.1.6 Geotechnical Site Investigation Summary	14
3.1.7 Existing Drawings and Documentation	14
3.2 PROCESS DESIGN INPUTS	14
3.2.1 Influent Flows	14
3.2.2 Plant Loading	15
3.2.3 Influent Temperature Profile	15
3.2.4 Internal Recycles	15
3.2.5 Effluent Release Limits	16
3.2.6 Septage Receival	16
3.2.7 Recycled Water Quality	16
3.3 HYDRAULIC DESIGN BASIS	16
3.4 PROCESS REDUNDANCY	17
3.5 ELECTRICAL AND CONTROLS DESIGN	17
3.5.1 Mains Power	17
3.5.2 Backup Power	17
3.5.3 Main Switchboard	17
3.5.4 SCADA and PLC	18
3.5.5 Lightning Protection	18
3.6 BUILDINGS, AMENITIES AND SITE SERVICES	18
3.6.1 Control Building	18
3.6.2 Switchroom	18
3.6.3 Generator Structure	19
3.7 SITE LAYOUT AND ACCESS	19
3.7.1 General	19
3.7.2 Roadworks and Site Access	19
3.7.3 Vehicle Access Requirements	19
3.7.4 Combined Chemical Unloading and Equipment Washdown Bay	20
3.7.5 Roadworks and Pavements	20
3.7.6 Landscaping	20
3.8 CONSIDERATION TO FUTURE PLANT UPGRADES	20
3.9 ASSET DESIGN LIFE	20
4. DESIGN DESCRIPTION	22
4.1 DESIGN AND DOCUMENTATION	22
4.2 EQUIPMENT SPECIFICATION AND PROCUREMENT	22

4.3	CONTRACTOR/VENDOR DESIGN AND DOCUMENTATION	23
4.4	PROCESS MODELLING	23
4.5	SAFETY	24
4.5.1	<i>Safety in Design Assessment</i>	24
4.5.2	<i>Identification of Risks</i>	24
5.	PROCESS DESIGN DESCRIPTION	26
5.1	GENERAL	26
5.2	PROCESS OVERVIEW	26
5.3	HYDRAULIC DESIGN	26
5.3.1	<i>Flooding</i>	26
5.3.2	<i>Hydraulic Capacity</i>	26
5.3.3	<i>Hydraulic Grade Lines</i>	27
5.4	SITE LAYOUT AND ACCESS	27
5.4.1	<i>Vehicle Access</i>	28
5.4.2	<i>Submersible Equipment Access</i>	28
5.4.3	<i>Lighting</i>	28
5.5	INLET WORKS	28
5.5.1	<i>Inlet Screen and Grit Removal with Manual Bypass Screen</i>	29
5.5.2	<i>Manual Bypass to Offline Storage</i>	29
5.6	BALANCE TANK	29
5.6.1	<i>Balance Tank Pump Selections</i>	30
5.7	SECONDARY TREATMENT - BIOREACTOR	30
5.7.1	<i>Anoxic Zone</i>	32
5.7.2	<i>Aerobic Zone</i>	33
5.8	CHLORINE CONTACT TANK / DECANT TANK	34
5.8.1	<i>Filter Feed Pumps</i>	35
5.8.2	<i>CCT Recirculation Pump</i>	35
5.9	TERTIARY FILTRATION SYSTEM	35
5.10	BACKWASH PUMPS	36
5.11	SERVICE WATER PUMPS	36
5.12	BIOSOLIDS MANAGEMENT	37
5.12.1	<i>Sludge Thickener</i>	37
5.12.2	<i>Sludge Drying Beds</i>	38
5.13	CHEMICAL DOSING	38
5.13.1	<i>Chemical Storage</i>	39
5.13.2	<i>Chemical Truck Unloading</i>	39
5.13.3	<i>Chemical Truck Delivery Panels</i>	39
5.14	SEPTAGE RECEIVAL STATION	40
5.15	OFFLINE MAINTENANCE STORAGE TANK	40
5.16	RECYCLED WATER STORAGE AND PUMPING	40
5.17	IRRIGATION PUMPS	41
5.18	GENERAL PURPOSE PUMP STATION	41
5.19	SUPERNATANT PUMP STATION	41
5.20	POTABLE WATER SUPPLY	42
5.21	OPERATOR BUILDING	42
5.22	CONSTRUCTION STAGING	42
5.22.1	<i>Major Process Tank Settlement & Staging</i>	42
5.22.2	<i>Recycled Water</i>	42
5.22.3	<i>Cutover</i>	42
5.23	DECOMMISSIONING AND DEMOLITION	43
6.	ELECTRICAL & CONTROLS DESIGN	44
6.1	COMPANION DOCUMENTATION	44
6.2	ELECTRICAL DESIGN CRITERIA	44
6.3	POWER AND CONTROLS DESIGN	44
6.3.1	<i>Main Switchboard MSB01 Details</i>	45

6.3.2	New MSB01 Switchboard Design Bases	46
6.3.3	Switchboards Capacity and Sizing	46
6.3.4	Switchboards Short Circuit Fault Current Ratings	46
6.3.5	Protection Devices and Settings Used in MSB01	46
6.3.6	Arc Flash Category and PPE Requirements of the New Switchboard	47
6.3.7	Motor Starters	47
6.3.8	Local Control Stations	48
6.3.9	Main Switchroom	48
6.3.10	Power Outages	48
6.3.11	Cabling, conduit and ladder supports systems	48
6.3.12	Instrumentation	48
6.3.13	Lightning protection	49
6.3.14	Electrical Earthing and Bonding	49
6.4	PLC AND SCADA SYSTEM	49
6.4.1	Control Philosophy of the STP	49
6.5	SWITCHROOM	50
6.6	GENERATOR	50
7.	CAPITAL COST ESTIMATE	51
7.1.1	CAPEX Assumptions	51
APPENDIX A -	ENVIRONMENTAL AUTHORITY	52
APPENDIX B -	PUMP SYSTEM CURVES	53
APPENDIX C -	CAPITAL COST ESTIMATE	58
Figures		
Figure 1 –	Port Hinchinbrook STP Aerial Image (Port Hinchinbrook Land Use)	10
Figure 2 -	3D Pictorial View	22
Figure 3:	Process Flow Diagram from BioWin®	23
Figure 4 –	Inlet Works	29
Figure 5 –	Balance Tank	30
Figure 6 –	SBR General Arrangement	31
Figure 7 –	Chlorine Contact / Decant Tank	35
Figure 8 -	Tertiary Filtration Multimedia Pressure Filters	36
Figure 9 –	Backwash, Service Water & Recycled Water Pumps (within Tertiary Filter Building)	36
Figure 10 –	Chemical Storage & Dosing Area	39
Tables		
Table 1 –	Abbreviations	6
Table 2 –	Summary of Effluent Quality (EPPR00576713)	11
Table 3	Site Conditions	13
Table 4 –	Design Flows	14
Table 5 –	Wastewater Characteristics	15
Table 6 –	Wastewater Characteristics	15
Table 7 –	Asset Design Life	20
Table 8:	Example of Biological Treatment Sequence typical duration	31
Table 9 :	Example of Biological Treatment Sequencing	32

Table 10: Tank Volumes	32
Table 11: SBR Operating Levels.....	34
Table 12: Load Summary Results	46
Table 13: Summary of Maximum Short Circuit Fault Currents Under Mains Supply	46
Table 14: Summary of Protection Devices and Settings	47
Table 15: Arc Flash Category and PPE Requirements	47

Glossary of Terms

Table 1 – Abbreviations

Abbreviations	
ACH	Aluminium Chlorohydrate
ADWF	Average Dry Weather Flow
BOD	Biochemical Oxygen Demand
BWL	Bottom Water Level
CAPEX	Capital Expenditure
CCRC	Cassowary Coast Regional Council
CCT	Chlorine Contact Tank
CWUF	Continuous Wash Up Flow
DES	Department of Environment and Science
DSDTI	Department of State Development, Tourism and Innovation
EA	Environmental Authority
EP	Equivalent Population
FNQROC	Far North Queensland Regional Organisation of Councils
GANDEN	GANDEN Engineers and Project Managers
GPPS	General Purpose Pump Station
IBC	Intermediate Bulk Containers
kL	Kilo-litre
L/s	Litres per second
MEDLI	Model for Effluent Disposal using Land Irrigation
mg/L	Milligram per litre
ML	Megalitres
OPEX	Operational Expenditure
PDWF	Peak Dry Weather Flow
PWWF	Peak Wet Weather Flow
RP	Registered Property
RWMP	Recycled Water Management Plan

Abbreviations

SBR	Sequencing Batch Reactor
SS	Stainless Steel
STP	Sewage Treatment Plant
TWL	Top Water Level
VSD	Variable Speed Drive
WAS	Waste Activated Sludge

1. Executive Summary

The Department of State Development, Tourism and Innovation (DSDTI) engaged GANDEN Engineers and Project Managers (GANDEN) to undertake detailed design for the upgrade of the Port Hinchinbrook Sewage Treatment Plant (STP).

The existing Port Hinchinbrook STP consists of a packaged treatment plant with a balance tank, drying beds, supernatant pump station, recycled water storage tank and irrigation pump station, and was constructed circa 2005 to service the Port Hinchinbrook development. The STP was privately owned and operated by the Port Hinchinbrook developer, Williams Corporation Pty Ltd. The developer has since ceased trading, resulting in the sewerage infrastructure (network and STP) being neglected. The STP and associated reticulation network are in poor condition.

CCRC have been temporarily operating the sewerage infrastructure since mid-2018. The detailed design and documentation for the upgrade will be provided to CCRC to allow a Contractor to undertake the construction and commissioning of the facility. GANDEN was previously commissioned by DSDTI to undertake a review of existing information, assessment of options and preparation of a concept design for the upgrade of the plant. The concept design developed was used as the basis of the Detailed Design.

The overall objectives for the delivery of the STP upgrade include:

- Construct a modern, safe, and efficient treatment plant
- Comply with regulatory requirements, and
- Complying with the existing Environmental Authority (EA) release conditions.

This report provides an overview of the Detailed Design for the 500 EP Port Hinchinbrook STP which comprises:

- Inlet works consisting of a spiral sieve screen unit, manual bypass screen and grit removal
- Balance Tank Pump Station
- Secondary Treatment – Single-train Sequencing Batch Reactor (SBR) consisting of anoxic and aerobic tanks and, mechanical equipment
- Decant/Chlorine Contact Tank with Filtration Feed Pumps and a Recirculation Pump
- Tertiary Filtration consisting of multimedia pressure filters and backwash pumps
- Sludge Storage/Holding Tank including jet aeration
- 1.5ML Recycled Water Storage and Irrigation Pumps
- Site service water system
- Retained Drying Beds
- Supernatant Pump Station
- Chemical Dosing – Aluminium Chlorohydrate (ACH), Sodium Hypochlorite and Sugar dosing systems
- New Switchroom
- Electrical, Instrumentation and Controls
- Chemical unloading and laydown bund
- General Purpose Pump Station
- Septage Receival, and
- Access roads and pavements.

2. Background

The Port Hinchinbrook STP was constructed circa 2005 to service the Port Hinchinbrook development. The STP was privately owned and operated by the Port Hinchinbrook developer, Williams Corporation Pty Ltd. The developer has since ceased trading, resulting in the sewerage infrastructure (network and STP) being neglected. The STP and associated reticulation network are in poor condition.

CCRC have been temporarily operating the sewerage infrastructure since mid-2018.

In 2018, CCRC undertook a site assessment to establish the overall plant condition and operational shortfalls. The intention of this assessment was to identify critical shortfalls and to establish the minimum refurbishment requirement enable the ongoing operation of the plant, in its current condition. CCRC have undertaken minor maintenance and rectification works to enable the operation of the plant. Currently, operators attend site two days a week to undertake operational tasks.

A portion of the plant is operated automatically, however, due to the condition of the plant, specific operational processes, such as wasting of sludge, are undertaken manually. Aside from the STP, the existing reticulation network is in poor condition, notably SPS 4 which transfers all of Port Hinchinbrook's sewage to the STP. CCRC have identified the requirement for significant upgrades to the sewer network, including the replacement of sewage pump station SPS 4 as it is in poor condition. Upgrade of the sewer network is outside of the scope of this project. It is recommended the refurbishment of the sewer network forms part of the STP upgrade Contract.

Numerous reports are available for the STP, specifically relating to Council's strategy for installing a sewer system to service Cardwell. Whilst these are noted and provide a useful point of relevant information, these planning reports consider upgrade of the plant to service an ultimate population of 2,700 EP. The purpose of this report is to document the detailed design for the upgrade of the existing STP to service the Port Hinchinbrook population, with consideration to future expansion of the plant servicing the Cardwell scheme.

2.1 Port Hinchinbrook STP

The existing plant is a Hydroflux Epco Roadtrain™ packaged STP, designed to treat Average Dry Weather Flows (ADWF) of 270 kL/day, with an ultimate population of 750 EP (as noted by EPCO, however other reports state 500 EP). The existing biological treatment is a continuous flow activated sludge plant with secondary clarification, filtration, and disinfection. The existing plant includes the main process steps/units: -

1. Inlet Screen – Coarse bar screen
2. Aerated Balance tank
3. Bioreactor tank (aeration tank)
4. Secondary Clarifier
5. Sand Filters
6. Waste Activated Sludge (WAS) Tank
7. Chlorine Disinfection Tank
8. Sludge Drying Beds
9. Effluent Storage tank, and
10. Irrigation pumps and irrigation network.

As documented in numerous reports by CCRC, Cardno and Hydroflux EPCO, the existing plant is in poor condition and requires significant refurbishment works to return the plant to original condition.

2.1.1 Existing Plant Rectification Works

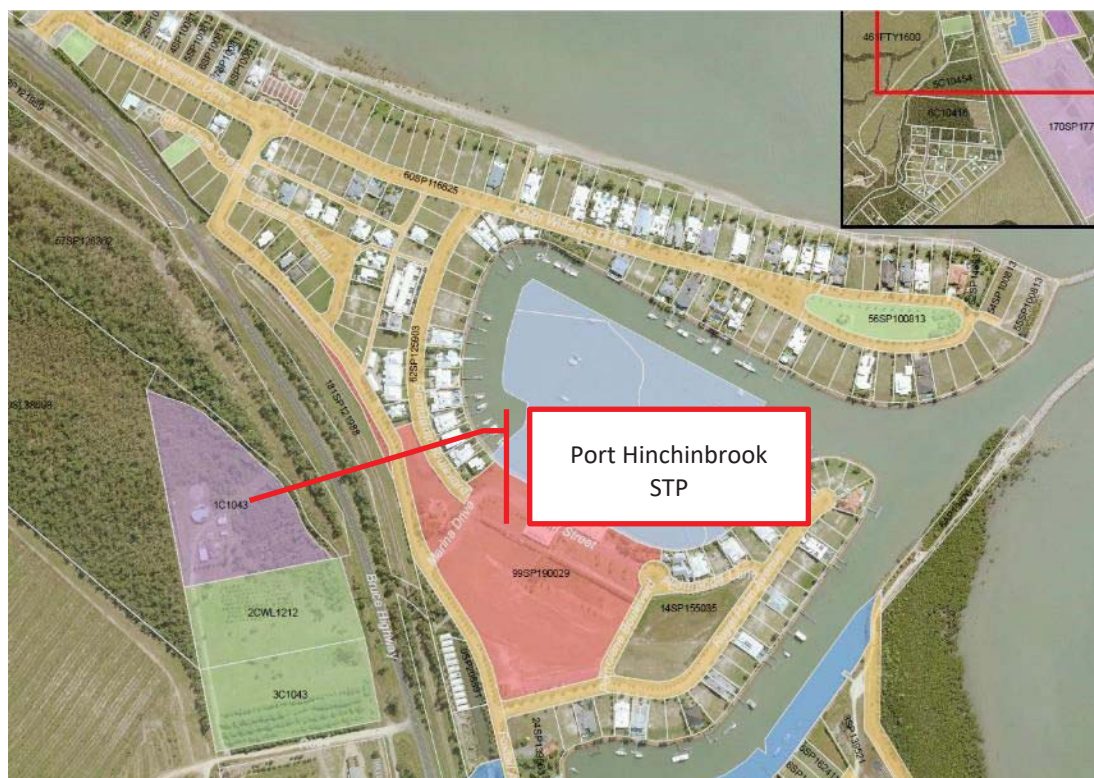
A technical memorandum provided by Cardno in 2018 titled “Hinchinbrook STP Conditions Report Review Tech Memo” provided a review of the STP and made recommendations for prioritisation of refurbishment works. The report, and further discussions with CCRC indicated the plant was in poor condition and the following rectification works are required to allow operation of the existing plant up until commissioning and handover of the new upgraded plant: -

1. Patching of exiting process tanks in areas of major leakage (i.e. hoppers of clarifier)
2. Refurbishment of walkways to ensure safe access and egress for operators. Removal of redundant corroded walkways etc. that pose a safety hazard
3. Restoration/rectification of the sludge air lift process to transfer solids within the plant; Or replacement of sludge removal system with a progressive cavity pump, connected to the clarifier drain ports
4. Replacement or refurbishment of existing effluent storage tank. The tank is leaking and assumed not to be structurally sound
5. Clean out the existing drying beds to enable functionality
6. Investigate and rectify issues with the existing irrigation network and associated irrigation pumps, and
7. Provision of telemetry for alarming (no current remote monitoring or alarming from the plant).

A Hunter H₂O Report from March 2019 estimated the cost of refurbishment of the STP to be \$690,000.

2.2 Site Location

The Port Hinchinbrook STP is located to the south of Cardwell on Lot 1 Plan C1043, opposite the Port Hinchinbrook development.



2.3 Disposal by Irrigation

DSDTI and CCRC note the existing irrigation system is in poor condition. Multiple investigation reports describe the existing irrigation land as suitable for 200 EP.

GANDEN previously undertook MEDLI modelling to determine the suitability of the existing irrigation area. The modelling was based on meeting the existing EA for 500 EP and typical input values in lieu of site-specific investigations. The main outcomes highlighted the existing area is likely to meet the Environmental Authority (EA) conditions however recommended DSDTI acquire an additional 2 ha and irrigate the existing STP site (if possible) to reduce frequency of water releases. The report identifies irrigation of Lot 3 to the south of the STP. The suitability of this land is subject to site investigations, further modelling, and risk assessments. An alternative land parcel or disposal method should be considered as a backup, should this lot not be suitable for irrigation.

Furthermore, alternative disposal methods should be considered, including the potential for third-party consumers such as the golf course and any other agricultural areas. Disposal by irrigation for any future upgrades (i.e. 2,700 EP) will result in the requirement to procure a significantly larger area of land, and disposal by release to the environment may be required.

2.3.1 Existing Irrigation Network

GANDEN contacted the original supplier of the irrigation system requesting available information. Only minor information was provided. The quotation from the original system was in the order of \$45k which included the pumps, pipework, and irrigation controller.

The replacement of the irrigation pumps has been allowed in the construction estimate for the STP Upgrade. No allowance has been made for the replacement or upgrade of the field network or controller. Based on the original quotation, a budget of \$30 – 40k would be estimated for the replacement and upgrade of the existing network.

2.4 Environmental Authority (EA)

The STP is operated under Environmental Authority (EA) EPPR00576713, issued to The Passage Holdings Pty Ltd on 18 August 2016. The EA provides approval for the development application, number NR0560DA, dated 05-06-2005.

The EA from the Department of Environment and Science (DES). is provided as an attachment to this report, refer to Appendix A - Environmental Authority.

Key conditions of EA include: -

1. Schedule C – Water: -
 - The current licence conditions are for irrigation during dry weather, and only permit release of effluent to One Mile Creek during wet weather scenarios, once the effluent wet weather storage has reached capacity, with a minimum dilution factor of 10 to 1 (creek flow to effluent). The maximum permitted quantity of release is 412 kL/day (Condition C3-1 – 6), and
 - The minimum volume for the effluent storage tank, to service 500 EP, is 1.5 ML (Condition C7-1).
2. Schedule F – Land: -
 - Contaminants permitted for release to land during dry weather
 - The maximum daily release of 620 kL during dry weather, and
 - When conditions prevent irrigation (i.e. wet weather), flows are to be directed to wet weather storage tanks.

The effluent quality requirements for release to land and release to the environment (during wet weather) are summarised in the table below.

Table 2 – Summary of Effluent Quality (EPPR00576713)

Quality Characteristics	Minimum	50 th Percentile	Maximum
Suspended Solids (SS)	-	-	5 mg/L
5-day Biochemical Oxygen Demand (BOD)	-	-	10 mg/L
Total Nitrogen (TN)	-	5 mg/L	10 mg/L
Total Phosphorus (TP)	-	1 mg/L	2 mg/L
Faecal Coliform	-	10 cfu/100mL	100cfu/100mL
pH	6.5	-	8.5
Dissolved Oxygen (DO)	2 mg/L	-	-

2.4.1 Future Upgrade and License Conditions

The 500 EP assessment (this report) establishes treatment to achieve the existing EA release limits. Upgrading the plant, exceeding 1500 EP (current upper EP limit of license) will result in the requirement for new license conditions. The release limits for the 2,700 EP plant are likely to be more stringent than the existing, due to continual improvement in the environmental evaluations for sewage treatment plants in the Great Barrier Reef catchment area. The license conditions for the future 2,700 EP plant with release to the environment should be assumed to be: -

- 5 mg/L Total Nitrogen
- 1 mg/L Total Ammonia
- 1 mg/L Total Phosphorus.

3. Basis of Design

The upgraded plant is to be designed for a population of 500 EP, with consideration to future expansion to cater for the ultimate population of 2,700 EP if the Cardwell sewage scheme is implemented.

3.1 Site Specific

3.1.1 Site Location

The Port Hinchinbrook STP is located to the south of Cardwell on Lot 1 Plan C1043, opposite the Port Hinchinbrook development.

3.1.2 Site Conditions

The site conditions are as captured in the table below.

Table 3 Site Conditions

Description	Site Condition
Site location	Lot 1 Plan C1043
Ambient Air Temperature Range	0°C – 45°C
Average Rainfall per annum	> 2,000mm
Flood conditions – Q100 flood level	4.2 mAHD

3.1.3 Flood Protection

The STP will be designed to withstand a 100 Year ARI flooding event (Q100 flood). CCRC provided a Q100 flood level of 4.2mAHD for the site. All electrical and mechanical equipment not rated for submersion was designed for installation with immunity to Q100 flood events. Electrical switchboards have been designed to be installed a minimum 300mm above the Q100 flood level.

No structures shall be subject to inundation or hydrostatic uplift, because of a 100 Year ARI flood event, with the exception of equipment and tanks specifically designed to operate under water.

3.1.4 Site Visit

GANDEN attended the Port Hinchinbrook site on a number of occasions during the development of the detailed design development. The inspections were to view the existing plant, gain an appreciation of the existing site and for the management of site investigations, including survey, electronic services location, potholing and geotechnical investigations.

3.1.5 Survey Investigations

Survey Investigations were carried out by RPS Group, which included capturing all infrastructure within the plant boundary fence and the outfall discharge location. The site survey was incorporated into the detailed design.

Additional potholing and survey works were completed to gain further information outside the boundary fence line, as well as identification of the incoming sewer and outgoing effluent mains.

The survey captured the level and location of the plant outfall headwall at the licensed discharge point to One Mile Creek. The size, material, alignment, and depth of the outfall from the plant boundary to the discharge point is unknown.

Electronic and Ground Penetrating Radar (GPR) survey was completed as part of the initial survey works. The Construction Contractor will be required to verify the location of all existing services. This includes, but it not limited to the incoming sewer, potable water mains, recycled water mains, electrical and telecommunications.

Potholing was completed to identify the following services: -

- Incoming Sewer Rising Main (SRM)
- Recycled Water Main, and
- Outfall (within the plant boundary).

3.1.6 Geotechnical Site Investigation Summary

A geotechnical site investigation was completed by Golder Associates. Subsequent modelling and a settlement analysis was undertaken to inform the structural design of major structures.

The Geotechnical Investigation Reports are provided as part of the design documentation. Refer to the following reports: -

- 20350739-001-R-Rev0 Geotech Investigation
- 20350739-002-TM-Rev1 Tank Settlement Analysis, and
- 20350739-003-TM-Rev0 ASS Lab Testing Results

3.1.7 Existing Drawings and Documentation

Record drawings for the plant were high-level in nature and did not accurately portray the existing plant. These were used as preliminary information and have been superseded by the site survey.

3.2 Process Design Inputs

3.2.1 Influent Flows

Raw sewage volumes were derived using the FNQROC Development Manual D7 – Sewage System Design Manual, Table 7.2 Sewage Loading. The average dry weather sewerage production is 270 L/EP/day.

Flow data was provided by CCRC from August 2019 to July 2020. GANDEN interrogated the data to establish average dry weather flows and average flows for the period. The average flows calculated were: -

- Average Daily Flow (Wet & Dry) = 73.70kL/day
- Average Dry Weather Flows (Dry days only) = 58.50kL/day
- Maximum Daily Flow = 231kL.

Table 4 – Design Flows

Scenario	Equivalent Population	Wastewater Production	Average Dry Weather Flow (ADWF)	Peak Wet Weather Flows (PWWF)	Peak Instantaneous Flows (PIF)
Current	-	-	58.50 kL/day ¹	231 kL/day	SPS 4 Pump Duty 10 L/s
Adopted for Design	500	270 L/EP/day	135 kL/day	756 kL/day ² (5.60x ADWF)	SPS 4 Pump Duty 15 L/s (Upgraded)

NOTE:

1. Average daily flow based on CRC flow records from 14/08/2018 to 21/07/2020
2. The plant's current license limits wet weather discharge to 412kL/day, which is approximately 3x ADWF.

3.2.1.1 Peak Wet Weather Flow (PWWF)

Peaking Factor is the greater of 5x ADWF or C_1 ADWF.

$$C_1 = 15 \times (EP)^{-0.1587}$$

$$C_1 = 15 \times 500^{-0.1587} = 5.59.$$

A peaking factor of 5.60x ADWF was adopted for the hydraulic design of the infrastructure. Noting that the current license only permits the release of 412 kL/day to the environment during wet weather, which is approximately 3x ADWF.

The plant was designed to fully treat flows up to 3x ADWF with flows in excess to be screened and released to the licenced discharge point.

3.2.1.2 Peak Dry Weather Flow (PDWF)

$$PDWF = C_2 \times ADWF$$

$$C_2 = 4.7 \times (EP)^{-0.105}$$

$$C_2 = 4.7 \times 500^{-0.105} = 2.44$$

$$PDWF = 2.3 \times ADWF.$$

The PDWF is below the dry weather irrigation volumes (620 kL/day).

3.2.2 Plant Loading

At the time of writing this report, no influent data was available for review. The design influent loadings are based on typical Australian wastewater contributions, described below.

Table 5 – Wastewater Characteristics

Parameter	Adopted Loading (g/EP/day)
Biochemical Oxygen Demand (BOD)	60
Chemical Oxygen Demand (COD)	125
Total Kjeldahl Nitrogen (TKN)	12
Total Phosphorus (TP)	2.5
Total Suspended Solids (TSS)	65

3.2.3 Influent Temperature Profile

Table 6 – Wastewater Characteristics

Parameter	Value
Adopted maximum influent temperature	30°C
Adopted minimum influent temperature	15°C
Average temperature	20°C

3.2.4 Internal Recycles

Internal recycles from the plant are returned to the Balance Tank and include: -

- Filter backwash
- Sludge holding tank supernatant, and
- Drying bed filtrate.

3.2.5 Effluent Release Limits

The effluent release limits for the existing plant are summarised in section 2.4. The plant was designed with consideration to future license conditions in the Great Barrier Reef Catchment which includes: -

- Nitrogen < 5mg/L
- Ammonia < 1mg/L
- Phosphorus < 1mg/L

3.2.6 Septage Receival

Allowance was made for the receival of septic waste from the Cardwell area. Due to the size of the plant, the number of deliveries and total volume of septage will be limited. This will be dependent on the plant loading at the time and septage characteristics.

The design includes the provision for the receipt of 2 – 3 septage loads per week.

3.2.7 Recycled Water Quality

The existing STP license allows for the release of effluent to the land parcel adjacent to the treatment plant site and has Faecal coliform limits of maximum 100 colony forming units per 100 mL. The upgraded STP and associated recycled water system was designed to meet the existing recycled water quality and EA requirements.

Based on the Public Health Regulation 2018, *s59 Quality standard A, B, C or D Recycled Water*, the upgraded STP is estimated to achieve Class B effluent which requires:

- Each month, the samples of water, other than resamples, taken to test for Escherichia coli during the preceding 1-year period must be reviewed; and*
- At least 95% of the samples reviewed must contain less than the following amounts of Escherichia coli*
 - For Class B recycled water < 100 cfu/100mL or MPN/100mL*

Note that faecal coliforms and E. coli are different parameters for contamination of water with sewage and results are not directly comparable (E. coli is a faecal coliform but not all faecal coliforms are E. coli) for the purposes of the categorisation and, due to limited data available, this has not been further explored.

Full assessment of the recycled water management scheme was not a part of this scope, including development of recycled water management plans, providing further treatment or recycled water management risk assessments etc.

3.3 Hydraulic Design Basis

The upgraded STP was hydraulically designed to provide screening for flows up to a minimum of 5.6x ADWF [756 kL/d] and for secondary treatment and disinfection to influent flows up to 3x ADWF [405 kL/d]. Flows greater than 3x ADWF will be screened and flow from the balance tank to the licensed discharge point.

The process units were hydraulically sized to cater for at a minimum: -

- Primary Treatment: -
 - Screening and grit removal – PIF 40 L/s (allowance for pump station 4 upgrade)
 - Balance tank pumps – 3x ADWF [405 kL/d]
 - Overflow to One Mile Creek - 10x ADWF [1,350 kL/d]
- Secondary Treatment (SBR) – 3x ADWF [405 kL/d]
- Decant Tank – 3x ADWF [405 kL/d]
- Activated Sludge Storage – Volume to meet 10 day SRT
- Tertiary Treatment (Filtration) – 3x ADWF [405 kL/d]
- Disinfection by Chlorination in Decant Tank – 3x ADWF [405 kL/d]

- Recycled Water Storage – 1.5 ML, and
- Recycled Water Transfer – 9.8L/s (to meet the requirements of the existing system).

3.4 Process Redundancy

The plant is designed with the following redundancy: -

- Offline storage – to facilitate major plant shutdowns (short term)
- Primary treatment single automatic screen and grit removal unit, with a manual screen used as backup
- The biological treatment tank and equipment are duty only. Cold spares may be provided for duty only equipment (i.e. mixers and actuators)
- Balance Tank Pumps duty / standby
- Aeration Blower's duty / standby (current loads if future loads increase arrangement is duty / assist with option for third standby blower)
- Filter Feed Pumps duty / standby
- Recycled Water Pumps duty / standby
- Service Water pumps duty / assist
- Tertiary Filters designed for duty/duty/duty/standby for ultimate flows
- Filter Backwash Pumps duty / standby
- Septage Receival Screen duty only
- Chemical Dosing Pumps duty/standby
- GPPS Pumps duty/standby, and
- Supernatant Return Pumps duty/standby

Stocking of cold spare equipment onsite is recommended to only include maintenance spares.

3.5 Electrical and Controls Design

3.5.1 Mains Power

Electrical mains power to the existing STP is provided via a pole mounted 100kVA transformer (size to be confirmed by the Contractor). Maximum demand of the upgraded plant is in the order of 86kVA which can be fed from the existing transformer.

The existing plant's power supply Ergon meters will be replaced by a new metering box supplied and installed by the Contractor. The Contractor will liaise with Ergon Energy to confirm the requirement for new metering box and meters.

3.5.2 Backup Power

A new 110kVA backup generator will be used to operate the plant during mains power failure. Automatic changeover facilities will be provided on the Main Switchboard.

3.5.3 Main Switchboard

A suitably sized Main Switchboard (MSB01) will be supplied to run the entire plant. The new switchboard is to be installed within an air conditioned switchroom.

Light and distribution boards will be provided across the plant for lighting and power outlets as shown on the electrical design drawings.

Local Control Stations (LCS) will be provided for all electrical equipment for local operation and isolation for maintenance purposes.

The main switchboard and electrical equipment not rated for submersion will be installed a minimum of 300mm above the Q100 flood level.

3.5.4 SCADA and PLC

A new Supervisory Control and Data Acquisition (SCADA) systems will be installed. The new STP SCADA system is a Schneider CitectSCADA that is widely used across the water industry and is Council's preferred SCADA platform.

CCRC's preferred PLC, Allen Bradley ControlLogix, is specified.

The PLC and SCADA integration will be undertaken by the Contractor.

3.5.5 Lightning Protection

A lightning protection system was specified in accordance with AS/NZS 1768 Lightning protection that includes the following: -

- Surge protection for incoming mains
- Surge reduction filter for critical control equipment fed from an uninterrupted power supply (UPS) power supply
- Surge protection devices on all analogue input signals at the switchboard end and at field instrument terminals if the instrument is located outside of buildings, and
- Surge protection devices on all analogue output signals at switchboard end only.

The above lightning protection measures are common industry practice.

3.6 Buildings, Amenities and Site Services

3.6.1 Control Building

The existing Control Building will be retained and refurbished by the Contractor. The Control Building currently includes a storage shed, toilet, laboratory bench and sink, switchboard, and desks.

The Control Building will be refurbished, and the electrical switchboard is to be decommissioned.

The Control Building will include, as a minimum: -

- Reverse cycle split system air conditioning
- Control station area complete with: -
 - Desk to house SCADA server and two (2) off 23" monitors
 - Photocopier/printer
- Full height partition wall to separate the laboratory/bench & sink from the office area
- Kitchenette, complete with: -
 - Sink with drainer, and
 - Bench space to house a microwave and kettle

3.6.2 Switchroom

A switchroom shall be provided to house the main switchboard, motor drive units and lighting distribution board. The structure shall be an air-conditioned blockwork building with clearances and access in accordance with the electrical standards.

3.6.3 Generator Structure

The generator will be installed on a concrete hardstand with a Colourbond roof. The generator structure is part of the switchroom structure.

3.7 Site Layout and Access

3.7.1 General

The site layout was developed to represent the most efficient use of space on site for the proposed process solution. The following key considerations were given to the site layout: -

- Position the new infrastructure such that it can be constructed without affecting the operation of the existing plant until final cut-ins and cutover (excludes Recycled Water Storage Tank replacement)
- Ensure sufficient vehicular access to all major process units
- Major process units, where possible, are positioned with a suitable offset from the boundary to provide protection from bushfires
- Position major infrastructure above the 100-year ARI flood level
- Locate the aeration blowers as close to aerated tanks as possible to keep pipework runs to a minimum
- Locate the switchroom near the major drives
- Consideration of future upgrades to treatment capacity on the existing cleared portion of the site, and
- Ensure that adequate access for operational staff and third-party contractors for chemical delivery and dewatered sludge skip removals etc. is provided.

3.7.2 Roadworks and Site Access

The upgrade was designed to provide sufficient access to all major process items where possible. Access to the following areas is crucial and was considered in the layout of the plant: -

- Site amenities and office
- Chemical deliveries
- Sludge removal
- Inlet Works and screenings bins
- SBR Tank including removal requirements for diffuser grids and equipment
- Pump skids including recycled water, service water, and backwash pumps
- Tertiary filtration
- Aeration Blowers
- Generator, and
- Switchboard.

3.7.3 Vehicle Access Requirements

The site was laid out to enable access of an 8.8 m long truck for chemical delivery, removal of thickened sludge, and, emptying screenings bins from the inlet works and septage receiveal screen. The proposed layout reduces the requirement for 3-point turns for large vehicles.

Dedicated light vehicle parking spaces for operators were positioned adjacent the site amenities building.

3.7.4 Combined Chemical Unloading and Equipment Washdown Bay

A designated chemical unloading bund was provided at the front of the Chemical Dosing Area. The bund has offline storage sized to capture the chemical delivery truck's maximum single compartment volume. The storage is connected to the GPPS.

The chemical delivery bund is proposed as a dual-purpose area which will enable the diffused aeration grids to be removed from the SBR and cleaned/inspected with any foul water contained and returned to the process for treatment. The final design layouts will dictate the bund requirements. Should a dual-purpose bund not be possible, an additional concrete bunding area will be provided for washdown.

3.7.5 Roadworks and Pavements

The required pavements for the site include: -

- Asphalt sealed pavement for roadway access, and
- Concrete for heavy vehicle turning areas and bunding.

3.7.6 Landscaping

It is assumed the existing site that is not being developed will remain with grass cover. Landscaping will be limited to rehabilitation of ground disturbed by construction by seeding and areas identified as subject to erosion (i.e. swales) will be turfed.

Areas around process tanks will include a low maintenance finish (i.e. gravel bluemetal).

3.8 Consideration to Future Plant Upgrades

CCRC are in the planning stages of sewerage Cardwell. Should this go ahead, the existing STP site is likely to be utilised and developed further to cater for an ultimate connected population of 2,700 EP.

The process units are modular, however the step from 500 EP to 2,700 EP is significant requiring a new biological process tank to be constructed to cater for the larger population.

The future plant can utilise the same process technology (SBR/IDEA) and comprises a two-train system. Considerations to the future upgrade include: -

- Site access and real estate for future SBR/IDEA treatment tanks
- The 500 EP plant can be repurposed and utilised for sludge management by converting the SBR to an aerobic digester
- Tertiary filter shed – Space allowance for additional filter train to meet 2,700 EP requirements, and
- Utilisation of chemical dosing systems for 2,700 EP plant.

3.9 Asset Design Life

The overall asset life is a key consideration for the upgrade. As the ongoing costs for the asset will be raised by a relatively small area, the longer the asset life, the lower the ongoing costs will be.

The upgraded plant was designed with robust materials, suitable for operating in corrosive environments. The asset design life described in the table below was developed with commentary from CCRC.

Table 7 – Asset Design Life

Item	Minimum Design Life
Concrete Tanks	80 years
Buildings	50 years

Underground Structures and Piping	75 years
Road Pavements	25 years
Mechanical Plant and Equipment	25 years
Electrical Switchboards	25 years
Electrical Instrumentation	10 years
Polyethylene Tanks	20 years
Recycled Water Storage Tank	50 years

4. Design Description

4.1 Design and Documentation

GANDEN developed an integrated 3D model to facilitate the design of the new STP with modelling undertaken as follows:

- Civil and below ground assets were modelled using AutoCAD Civil 3D
- Structural assets were modelled using Revit
- Mechanical assets and above ground pipelines were modelled using AutoCAD Plant 3D.

The 3D model was utilised for the following during the detailed design development: -

- Concept & Detailed Design Review Workshops - 3D model of the works provided an opportunity for participants to visualise the project during the concept design review and safety in design workshops, especially with regard to access around equipment.
- HAZOP Workshop – The 3D model was utilised as a visual aid during the HAZOP workshop. The 3D model assisted all stakeholders with conceptualisation of the proposed engineering solution.

This model formed the basis of generation of the 2D detailed design drawings that form part of the Tender documentation. The final 3D model and 2D CAD files will be issued to the Contractor to allow for any necessary design modifications during the construction stage and for the production of the “as-constructed” drawings.

A screenshot from the 3D model, is provided below.

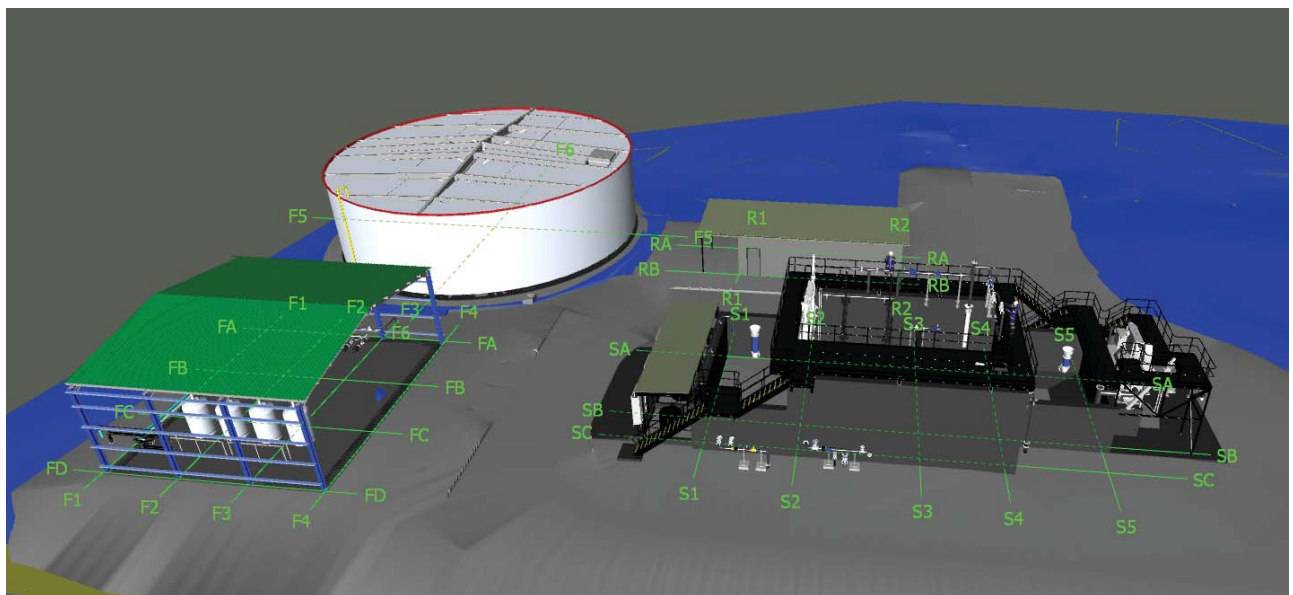


Figure 2 - 3D Pictorial View

4.2 Equipment Specification and Procurement

The final design drawings and documentation include Vendor equipment, selected to meet the required application and performance requirements. Equipment selections were made in liaison with suppliers.

CCRC provided preferred electrical and instrument lists which have been specified, where appropriate.

Where CCRC did not have preferred equipment vendors, equipment was selected to ensure it was fit-for-purpose and was proven in the industry.

GANDEN have selected and developed the design based on the equipment specified within the various project registers. Should a Contractor offer alternative equipment, it must offer the same or improved performance and be accepted by CCRC. The Contractor is responsible for any redesign for alternative equipment.

4.3 Contractor/Vendor Design and Documentation

GANDEN has consulted with several Vendors to establish Vendor equipment arrangements and details during design development.

The final detailed design and documentation of Vendor-supplied equipment will need to be undertaken by the successful Contractor/Vendor. Should any modifications be necessary to the design (e.g. due to alternative equipment being offered and approved), then these design modifications will need to be undertaken by the Contractor/Vendor and submitted to CCRC for approval. Alternate equipment must be nominated at tender stage. No changes to equipment will be allowable post-tender unless there is a justifiable reason to change (e.g. supply chain issues). Cost reduction to benefit the contractor is not a justifiable reason to change equipment.

Shop drawings will need to be prepared by the Contractor/Vendor for CCRC approval prior to fabrication.

The final design details along with any necessary modifications to the design will need to be incorporated into the as-constructed drawings by the Contractor/Vendor.

4.4 Process Modelling

Extensive process modelling was undertaken to establish an appropriate engineered solution. This was to ensure the proposed treatment solution was effective and efficient under the specific local conditions applied for the Port Hinchinbrook STP. GANDEN developed a model of the biological treatment process utilising the EnviroSim BioWin® software, supported by various inhouse developed calculations.

The proposed STP was, initially, sized using standard industry calculations and internal reference designs from similar operating plants. This initial sizing was used as inputs into the BioWin® modelling for sizing and operational setpoints to streamline the process modelling works.

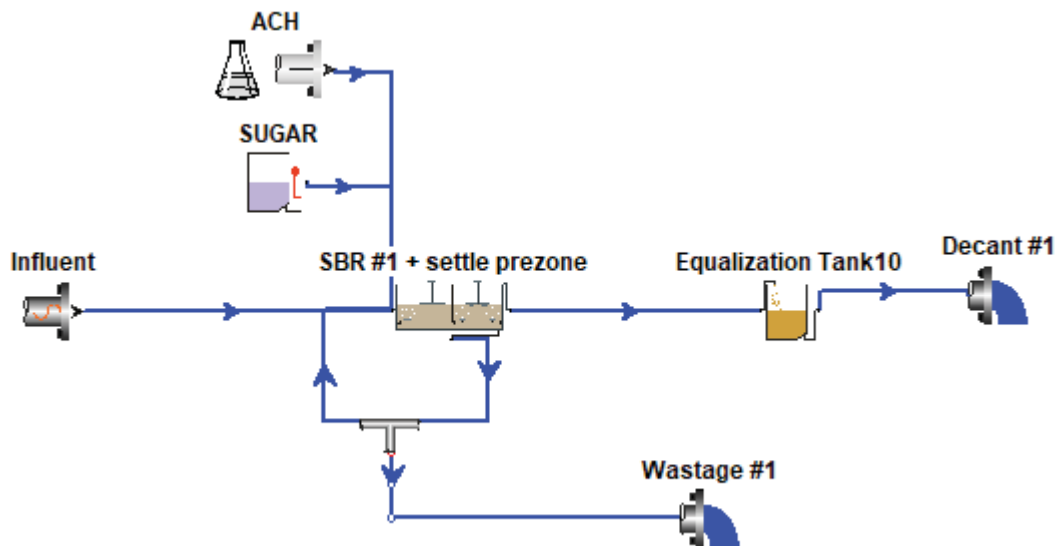


Figure 3: Process Flow Diagram from BioWin®

The influent characteristics as captured in 3.2 Process Design Inputs were modelled as a continuous flow into the proposed plant to reach a steady state solution with compliant effluent quality, determining bioreactor sizing and operational setpoints.

To confirm the design will achieve compliant effluent quality for the design life of the plant, likely peak process modelling scenarios were assessed. Compliant effluent to the existing EA and the potential future more stringent effluent release conditions as captured in 3.2.5 Effluent Release Limits was achieved.

4.5 Safety

4.5.1 Safety in Design Assessment

A Safety in Design (SID) assessment was undertaken to ensure the design development process takes account of Safety in Design considerations including the following:

- Safe to operate, and where required, provide appropriate walkways, access hatches, guards, double isolation, signage and the like
- Minimise requirement to enter confined spaces or hazardous gas areas for any regular operations or maintenance activities
- Limit any environmental impact, including odour, noise and spillages, and
- Comply with all relevant design standards, licence conditions and legislative requirements, including State and Australian Standards.

This Safety in Design Risk Assessment was performed using the *Guidance on the Principals of Safe Design for Work, Australian Safety and Compensation Council*. The Safety in Design Risk Assessment is fully compliant with:

- Occupational Health and Safety Act 2004 (mandatory)
- Occupational Health and Safety Regulations 2017 (mandatory)
- Various Queensland Workplace Health and Safety Codes of Practice, and
- AS/NZS ISO 31000:2009 Risk Management Principals and Guidelines (guideline).

The Safety in Design process was used to identify, assess and apply risk mitigation measures for risks identified during the detailed design stages of the Contract. The next phase of the works should maintain this document through the detailed design and construction phases, updating with any additional identified risks and mitigation. These risks are anticipated over the entire asset lifecycle, including the following stages: -

- Concept Design
- Detailed Design
- Construction and manufacture
- Supply and installation
- Commissioning and use
- Maintenance, repair, cleaning and modification
- Demobilisation and demolition, and
- Disposal.

All risks and their assessments and risk mitigation methods were established. All residual risks were given a risk rating of medium or low after risk mitigation methods were applied.

Refer to 1645-SID-001 *Safety in Design Report* for details. The SiD report is a **LIVE** document and is intended to be maintained during the entire asset lifecycle. Ownership of this document remained with GANDEN, until handover to CCRC at the end of the Detailed Design Contract. The Contractor will be responsible for reviewing, updating and maintaining the SiD risk register throughout the construction contract until handover to CCRC.

4.5.2 Identification of Risks

Potential risks have been identified and captured throughout the design phase of upgrades to date, including: -

- Site visit
- Site investigations
- Development of 60% detailed design
- HAZOP and design review workshop, and
- Development of IFC design, incorporating Principals.

The Safety in Design Report was updated to address the outcomes of the HAZOP and IFC workshops. For details of the outcomes from the HAZOP refer to *1645-HAZ-0002_ HAZOP Report*.

5. Process Design Description

5.1 General

The proposed treatment plant is a single train SBR treatment plant, with chemical phosphorus removal and supplementary carbon dosing to promote denitrification. This configuration provides high quality effluent and requires minimal operator input.

The upgraded Port Hinchinbrook STP will be hydraulically designed to provide screening for flows up to a minimum of 5.6x ADWF [756 kL/d] and for secondary treatment and disinfection to influent flows up to 3x ADWF [405 kL/d]. Flows greater than 3x ADWF will be screened and will bypass the secondary treatment by overflowing from the balance tank, discharging to the licenses release point.

5.2 Process Overview

The plant was designed to provide simple operation with efficient treatment. The SBR operates on a fixed cycle process and is sized to suit an EP of 500.

The upgraded plant model meets the nitrogen and phosphorus requirements of the current EA license conditions and was designed to meet the potential future ammonia limits, should the license be revised as nominated in Section 3.2.5 Effluent Release Limits.

The plant's flow paths are captured on *1645-DWG-PFD-0001 Process Flow Diagram Sheet 1*.

For a detailed description of the process and plant operation refer to the *1645-MCP-0001 Monitoring and Control Philosophy*.

5.3 Hydraulic Design

5.3.1 Flooding

The new Port Hinchinbrook STP was designed to be resilient to the 100-year ARI flood levels. Consideration was made for all weather access and site accessibility during flood events.

The effluent outfall from the plant remains the same, discharging to One Mile Creek. The outfall will be fully submerged during Q100 flood events.

5.3.2 Hydraulic Capacity

The process units were hydraulically sized to cater for at a minimum: -

- Primary Treatment: -
 - Screening and grit removal – PIF 40 L/s (allowance for pump station 4 upgrade)
 - Balance tank pumps – 3x ADWF [405 kL/d]
 - Overflow to One Mile Creek - 10x ADWF [1350 kL/d]
- Secondary Treatment (SBR) – 3x ADWF [405 kL/d]
- Decant Tank – 3x ADWF [405 kL/d]
- Activated Sludge Storage – Volume to meet 10 day SRT
- Tertiary Treatment (Filtration) – 3x ADWF [405 kL/d]
- Disinfection by Chlorination in Decant Tank – 3x ADWF [405 kL/d]

- Recycled Water Storage – 1.5 ML, and
- Recycled Water Transfer – 9.8 L/s (to meet the requirements of the existing system).

5.3.3 Hydraulic Grade Lines

The aerated SBR tank is designed with a scum and foam freeboard of 500 mm, all other unaerated process tanks are designed with a minimum freeboard of 300 mm.

The STP receives influent from the Port Hinchinbrook development area. The main will be intercepted at the plant boundary and redirected to the new inlet works structure. Future upgrades to the pump station feeding the plant shall take into consideration the additional head produced by raising the inlet works and the length of the rising main.

The hydraulic constraint for the plant is the existing outfall and flood levels. The main process for the proposed STP is pumped, therefore the influence of the ground levels on the main process hydraulics is considered to not have a significant effect, with the exception of the outfall to the adjacent One Mile Creek. The existing DN300 outfall pipeline discharging to One Mile Creek will be retained and reused. The overflows from the Balance Tank, CCT/Decant Tank and Recycled Water Storage Tank connect to the existing outfall within the plant boundary.

Manholes were provided at connections and major changes in direction. Due to the relatively flat site, manhole lids are to be bolted down to allow release during wet weather events. Above ground tee's with bolted blank flanges were provided at two junctions immediately adjacent the SBR tank for scouring and access. Increased flexibility in pipework is required as a result of the local geotechnical investigations to allow for settlement.

The level constraints include: -

- Effluent Outfall to One Mile Creek: -
 - DN300 PVC SN8
 - Length – 205m (alignment unknown and assumed based on best route)
 - Invert level of pipe at outlet headwall – RL 1.160 mAHD, and
 - 100-Year ARI Flood Level in One Mile Creek – RL 4.200 mAHD.

Refer to drawings 1645-DWG-HGL-0001 and 1645-DWG-HGL-0002 for the applicable Hydraulic Grade Line.

5.4 Site Layout and Access

The upgraded STP was designed to provide sufficient access to all major process items where possible. Access to the following areas is crucial and was considered in the layout of the plant:

- Site office
- Switchroom
- Inlet works
- Balance tank
- Septage receival
- SBR tanks
- Tertiary filtration
- Recycled water equipment
- Chemical dosing storage for deliveries
- Sludge storage tank
- Sludge Drying Beds, and
- Aeration Blowers.

5.4.1 Vehicle Access

The access road is designed to enable access of an 8.8m long truck for chemical deliveries, removal of thickened sludge and emptying screenings bins from the Inlet Works. Three-point turns are not required for vehicles to access the plant areas.

Entry to the site is via the existing access road and gate. The gate will be reviewed and replaced by the Contractor as required.

5.4.2 Submersible Equipment Access

The plant shall have two (2) portable davits for the removal of submersible pumps and mixers. Each submersible pump and mixer shall have a local davit base plate installed to allow removal from the tanks for maintenance and inspections utilising the common site davits. The SBR walkways will be provided with an additional davit base plate at a truck loading point to enable lowering of equipment to ground level. The davit will be a portable davit suitable for lifting by an operator. A platform trolley will be provided to transport removed pump/mixer from the SBR tank to/from the truck loading point davit along the SBR walkways. A Flygt Pump Lift is recommended to be supplied as part of the construction contract to enable single lift removal of submersible pumps; this accessory was nominated in the Technical Specification.

5.4.3 Lighting

Access lighting shall be provided to enable access around the plant with local (General Power Outlets) GPO's provided at critical infrastructure for powering mobile task lights to provide supplemental lighting of working areas as required.

Security lighting via flood lights shall be installed at the entry gate and control building.

5.5 Inlet Works

The Inlet Works for the Port Hinchinbrook STP is a proprietary packaged inlet works comprising a spiral sieve screen and grit removal channel system. The packaged inlet works includes a manual bypass screen for use if the screen blinds for any reason (e.g. excessive flows, power outage etc.).

The Inlet Screen receives raw sewage from: -

- Influent main
- General Purpose Pumping Station (GPPS), and
- Supernatant Pumping Station (SPS).

The GPPS and SPS rising mains connect to the DN150 single feed upstream of the Inlet Works Screen. A DN150 isolation valve is provided on the inlet to the primary screen and the manual bypass screen.

Valving is provided to allow plant bypass to the offline storage tank (existing Balance Tank).

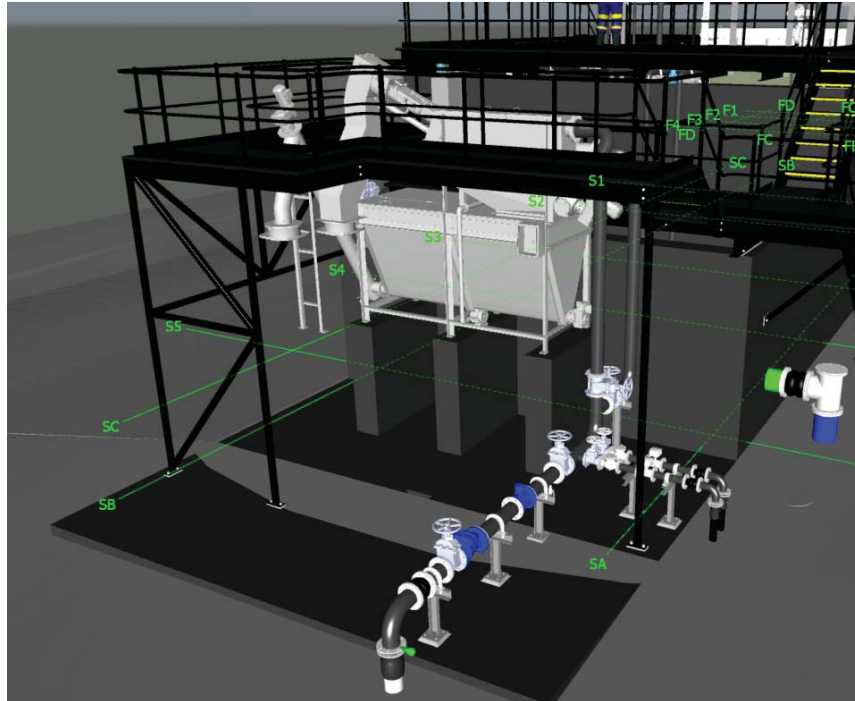


Figure 4 – Inlet Works

5.5.1 Inlet Screen and Grit Removal with Manual Bypass Screen

The inlet screen, manual bar screen and grit removal channel components were designed and specified as a vendor package. The inlet works was designed to incorporate a prefabricated Spirac SPIROGUARD® CG200P COMBIGUARD® combined inlet screen and grit removal channel system (or approved equivalent).

The screen has 3 mm perforations and shall be installed within a proprietary stainless-steel tank.

If the mechanical screen blinds, or influent flows exceed the screen capacity of 40 L/s, flows will back up on the upstream side of the screen and overflow into a bypass manual screen containing a 10 mm manually raked bar screen. In the event of complete blinding of the manual bar screen, flow can overtop the bar screen and continue to the balance tank.

Screened sewage discharges into a grit removal channel, comprising of a grit conveying screw, grit elevating screw and coarse air diffusers for grit separation and to ensure organic matter in the raw sewage is maintained in suspension and transferred to secondary treatment. A single duty blower provides process air to the coarse diffusers within the tank.

Hinged lids were provided to allow inspection of/access to the screenings screw and grit channel.

Screenings and grit are transferred to separate bins. Screenings are washed utilising service water during conveying in the screw conveyor and prior to discharge into the screenings bin. An access hatch will be provided in the screenings discharge chute to enable manually raked screens to be deposited in the same chute from the platform level.

5.5.2 Manual Bypass to Offline Storage

There is provision for all network flows to be diverted to the existing storage tank on site. The existing rising main is to be retained with isolation valves installed at the connection location. Bypass to the offline storage tank would only occur in the event of catastrophic failure of the SBR process or major plant shutdowns. Bypass to the offline storage tank is a manual process.

5.6 Balance Tank

A reinforced concrete Balance Tank forms part of the major secondary treatment tank.

The Balance Tank receives: -

- Screened and de-gritted flows from the Inlet works

- Supernatant from the Sludge Storage tank, and
- Filter Backwash.

The Balance Tank was designed as a rectangular submersible pump station, open to the atmosphere. The Balance Tank shall be constructed of reinforced concrete and forms part of the major SBR structure.

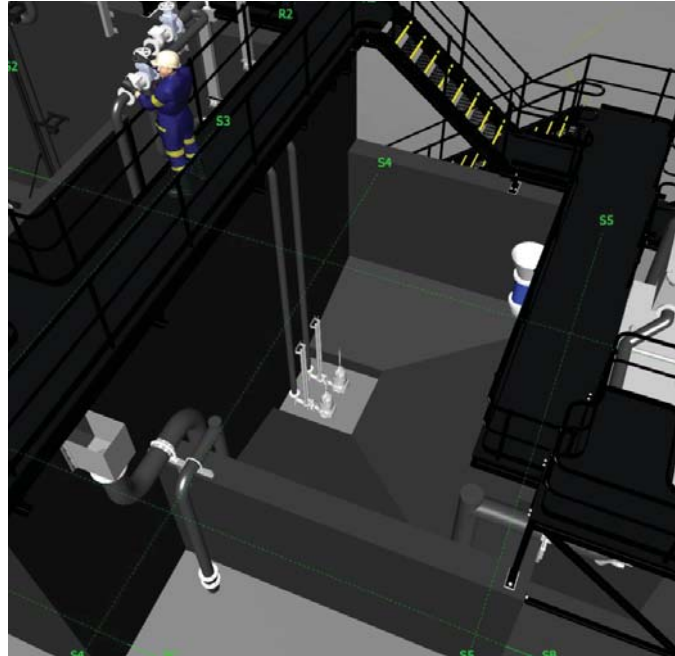


Figure 5 – Balance Tank

The Balance Tank is used to balance incoming flows to provide a steady feed into the bioreactor as well as provide a buffer and hold flows during the settle and decant phases.

The Balance Tank has a minimum working volume of 34 kL which enables two hours of storage at 3x ADWF when the SBR is in a settle or decant phase and not receiving flows. Flows in excess of 3x ADWF from the inlet works shall be released to environment via the existing outfall pipe, ensuring all influent receives screening.

The Balance Tank is controlled by the SBR sequencing and a series of level instrumentation. During the fill/react SBR sequence the Balance Tank operation will be based on the level within the tank with feedback from the ultrasonic level instrumentation. During the settle and decant phases the Balance Tank will be interlocked and will hold all flows.

A sharp crested weir (bellmouth) will be installed for the Balance Tank overflow. The weir will be used in conjunction with the level instrument for a virtual flowmeter. When the overflow level is triggered, the virtual flowmeter will record volume released to the environment. This will be calculated using a lookup table with level vs flow. Due to the site constraints, it is not possible to install an electromagnetic flowmeter on the overflow and it's not considered viable or accurate to install a partial flowmeter, which can be problematic and block up with grit and rags.

5.6.1 Balance Tank Pump Selections

Duty / Standby variable speed submersible sewage pumps shall be installed within the Balance Tank. Each pump has a maximum capacity of 12 L/s. The variable speed pumps will be operated at lower setpoints to maintain level within the Balance Tank and reduce pump starts and stops. During high flow events, the pump speed will increase to meet plant inflows.

5.7 Secondary Treatment - Bioreactor

Secondary treatment shall be provided by the utilisation of a single train SBR. SBR treatment is appropriate for the treatment volumes and the expected effluent quality at Port Hinchinbrook STP. The plant will be configured such that flows up to 3 x ADWF can be treated with the plant operating as an SBR. All flows exceeding 3 x ADWF will bypass the SBR and be discharged at the nominal outfall outlet.

The proposed SBR tank is a single concrete tank sized with approximate internal dimensions of 10 m long, 6 m wide with 5 m wall heights. The SBR varies in water depth with a bottom water level (BWL) of 3 m and a top water level (TWL) of 4.5 m, with a 500 mm freeboard throughout. The SBR is proposed to have a BWL volume of 180 m³ and TWL volume of 270 m³. The tank was designed as a cast in-situ reinforced concrete tank. Alternative pre-cast construction methods may be proposed by Contractors, providing they offer advantages to Council and consider all site conditions.

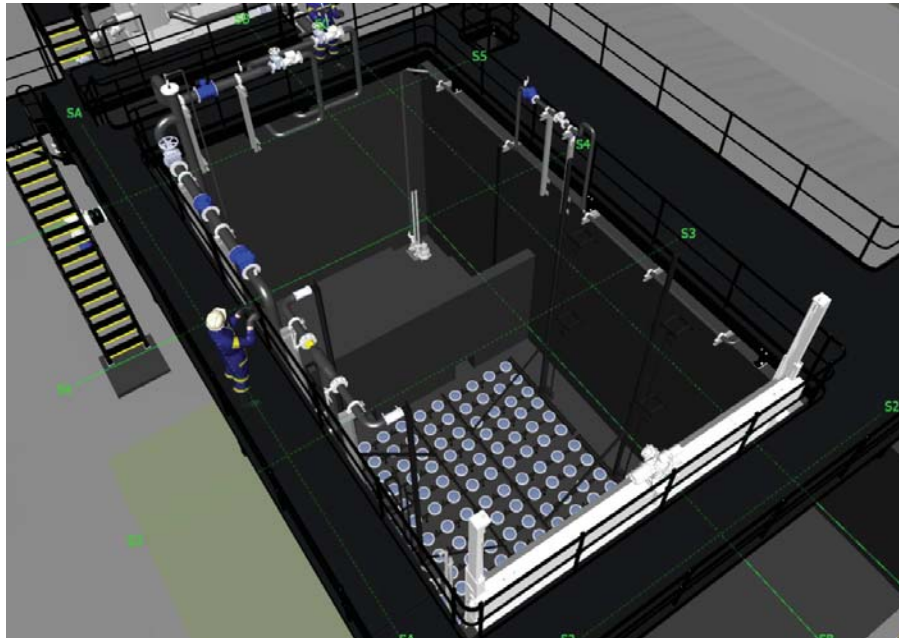


Figure 6 – SBR General Arrangement

The SBR incorporates two zones Anoxic Zone and Aerobic Zone with an internal dividing wall which is provided with low voids in the wall to hydraulically link the two zones.

Initially, the plant would be operated at a lower mixed liquor content for the 'assumed' current loading. The operating mixed liquor content can be increased as required, to suit the higher loading. For example, initially, the plant may be operated with a mixed liquor content of 2,000 mg/L and when the loading is higher, can be operated at 3,000 – 4,000 mg/L, increasing the biological treatment capacity of the plant at that point in time. During the low loading periods, a supplementary carbon source (sugar solution) is dosed into the bioreactor. As Port Hinchinbrook is a holiday destination, plant loading is assumed to be lower during the summer months (wet season).

Aluminium Chlorohydrate (ACH) is dosed directly into the bioreactor for phosphorus removal.

The biological treatment is achieved in a three (3) phase sequential process within the SBR via: -

1. Fill / React phase – The SBR receives influent and is filled. Biological treatment (aerobic and anoxic) occurs through aeration and mixing during this phase.
2. Settle phase – Influent is stored in the Balance Tank and not transferred to the SBR. Process equipment within the SBR switches off (aeration/mixing) to allow the mixed liquor to settle.
3. Decant phase – The SBR decants the clear effluent from the top layer of the SBR via the Weir Decanter, discharging water to the Chlorine Contact Tank / Decant Tank (CCT/DT).

Each phase duration is adjustable within upper and lower limits as further detailed in *1645-MCP-0001 Monitoring and Control Philosophy*.

Table 8: Example of Biological Treatment Sequence typical duration

Treatment Phase	Unit	Normal Mode
React phase	hrs	2
Settle phase	hrs	1

Treatment Phase	Unit	Normal Mode
Decant phase	hrs	1

An example of the SBR sequencing is provided below, the cycle sequence steps can be modified to suit the plant operation. Once the decant phase is complete, the SBR returns to step 1 and continues to cycle through.

Table 9 : Example of Biological Treatment Sequencing

Cycle Time	1	2	3	4	5	6	7	8
Sequence Step	Fill / React	Fill / React	Fill / React	Fill / React	Settle	Settle	Decant	Decant

The volumes of the SBR tanks is provided below.

Table 10: Tank Volumes

Tank	Effective Volume at BWL (m3)	Effective Volume at TWL (m3)
Anoxic 1 Zone	72	108
Aerobic Zone	108	162
TOTAL	180	270

5.7.1 Anoxic Zone

The Anoxic Zone receives influent from the Balance Tank and return flows from the Aerobic Zone. The intention of the Anoxic Zone is to promote denitrification. The Anoxic zone is typically operated at a DO < 0.1 mg/L. Screened sewage is discharged from the Balance Tank into the Anoxic Zone at a low-level (via a dropper pipe) promoting mixing with the mixed liquor and minimising the release of H₂S. The raw sewage inlet is connected to the A-Recycle pump discharge main, promote additional mixing, upstream of the dropper pipe.

The Anoxic zone includes the following equipment: -

- Anoxic Mixer, and
- Waste Activated Sludge Pump.

5.7.1.1 Anoxic Zone Mixer

A single duty fixed speed propeller mixer is installed within the Anoxic Zone to promote substrate contact, solids suspension and reduce short-circuiting within the tank. The mixer is supported by a fixed guide rail and chain to enable removal for maintenance, or rotation if required. A davit base is provided at the mixer location to facilitate removal, which is accessible from the access platforms.

A dry hot-swappable spare is to be stored onsite for replacement in the case of a failure. The loss in the process efficiency will be considered acceptable over the short term as some mixing will be provided from the A-recycle pump and incoming influent.

5.7.1.2 WAS Pump

A single duty fixed speed submersible Waste Activated Sludge (WAS) pump is in the Anoxic zone. The WAS pump removes mixed liquor from the sequencing batch reactor during the fill/react phase, transferring to the Sludge Thickener for thickening prior to removal for dewatering. The WAS pump will operate to waste a set volume per day (operator settable) and will cease operation for the day once the setpoint is reached. The wasting will occur in each cycle during the Fill / React phase.

The pump is supported by a fixed guide rail and chain to ease removal for maintenance, or rotation if required. A davit base is provided at the mixer location to facilitate removal, which is accessible from the access platforms.

5.7.2 Aerobic Zone

The Aerobic Zone is hydraulically connected to the Anoxic Zone. The Aerobic Zone provides BOD removal and nitrification of ammonia. During the fill/react cycle, the Aerobic Zone is aerated and fully mixed, typically operating with a dissolved oxygen content of 1.5 – 2 mg/L. Sensors are installed to monitor the tank level, dissolved oxygen content, pH and temperature within the Aerobic Zone.

The Aerobic Zone includes the following equipment: -

- A-recycle pump
- Fine bubble diffusers
- Bioreactor Outlet Weir Penstock (Decanter), and
- Level, pH and Dissolved Oxygen sensors.

5.7.2.1 A-Recycle Pump

A variable speed submersible pump is installed in the Aerobic Zone, adjacent to the weir decanter. The A-Recycle pump is used to pump flow from the Aerobic Zone to the Anoxic Zone at an operator-settable rate, up to 15 x ADWF. The flow rate will be operator adjustable via SCADA, which will also allow for intermittent operation controlled by timers and SBR level.

The pump is supported by a fixed guide rail and chain to ease removal for maintenance, or rotation, if required. A davit base is provided at the mixer location to facilitate removal, which is accessible from the access platforms.

A dry hot swappable spare shall be stored onsite for replacement in the case of a failure.

5.7.2.2 Diffused Aeration

The Aerobic Zone is supplied with aeration via a fine bubble diffused aeration grid (e.g. Xylem Sanitaire fine bubble disc diffusers or equivalent). The aeration grid is sized to suit the nominated process requirements. The diffuser grids are supplied with a support bracket, fixed to one end of the tank. Lifting points are provided on either side of each grid allowing them to be removed, via crane, for maintenance. A lugged butterfly valve was provided on the inlet of each diffuser grid. The valve can be closed, and the adjacent flange unbolted to allow removal of the grids.

The grids are to be installed with a flexible connection to enable ease of removal and alignment.

Each diffuser grid is installed with a purge line connected to the grids manifold. The purge line is used to expel any condensation and is also used as an indication to when the diffuser membranes fail and there is ingress of sludge into the diffuser grids.

Multipurpose sockets are provided for the provision of flow monitoring, pressure monitoring and/or acid vapour injection to each train of diffusers.

5.7.2.3 Process Blowers

Duty / Standby rotary lobe process blowers can supply up to 180 Nm³/hr each of process air to the diffusers to maintain a DO set point. The blowers are housed in a skillion-roofed structure adjacent to the Aerobic Zones to reduce the aeration pipework runs.

The selection of the nominated blowers for aeration was sized for multiple parameters including process requirements, operational flexibility, power usage and noise. Operation of the proposed blowers is on a VSD enabling a turndown of up to 40%. The duty nominated is based on a peak scenario where one (1) blower is required to meet the peak demand of the SBR train and still achieve the required turndown to achieve the minimum air requirements. The size of the blowers enable operation under typical scenarios at a lower speed on the VSD curve resulting in lower noise outputs and power savings.

5.7.2.4 Decanter

The Aerobic Zone is complete with a 5400W x 1500H 316 Stainless Steel (SS) decanter. The proposed decanter shall be a AWMA Decanter Gate (or approved equivalent). The decanter will decant the effluent from the settled top water layer of the SBR into the Decant / Chlorine Contact Tank.

The decanter is actuated by a Rotork IQ actuator. The decant rate will be controlled by the level in the SBR prior to the decant period starting. The decanter is proposed to decant over a period of around 60 minutes (operator-settable) from TWL to BWL.

The decanter was sized to achieve the max scour velocity of 60 m/h and based on period of operation during the SBR operating cycle which determined the maximum flow requirement under PIF conditions.

Note: The decanting period is 54 min allowing 6 min (operator adjustable) for the decanter to enable the penstock to be raised clear of submergence prior to the React phase and aeration commencing.

The decanter operation and associated instrumentation levels are determined by the size of the SBR and the incoming flows.

Table 11: SBR Operating Levels

Description	Operating Level ¹ (m)
SBR BWL	3.000
SBR TWL	4.500
Interlock cut out of aeration and mixing based on LIT instrument	4.400
Decanter park position, utilised as SBR overflow level	4.500

¹The bottom of the tank is at level 0 m. Final levels to be confirmed during Construction.

5.8 Chlorine Contact Tank / Decant Tank

The CCT/DT concrete tank forms part of the overall concrete bioreactor structure. The CCT/DT receives secondary effluent from the SBR during the decant phase. The purpose of the CCT/DT is to provide sufficient storage (contact time) to allow disinfection to occur within this tank. The disinfected secondary effluent is pumped via the filter feed pumps to the tertiary filtration system.

The CCT/DT was designed to hold a minimum of a complete decant volume at 3 x ADWF without pumping and without overflowing of the tank. A high-level overflow via bellmouth is provided which connects to the outfall pipeline and will be used in the event of filter feed pumps fail. This overflow will enable secondary treatment to continue and the CCT/DT will fill up and discharge via the overflow.

The CCT/DT is installed with a level instrument to monitor the level in the CCT/DT and provide control feedback to the filter feed pumps and CCT Recirculation pump.

The chlorine contact/decant tank includes the following equipment: -

- Level instrumentation
- Duty/standby filter feed pumps, and
- Duty CCT recirculation pump.

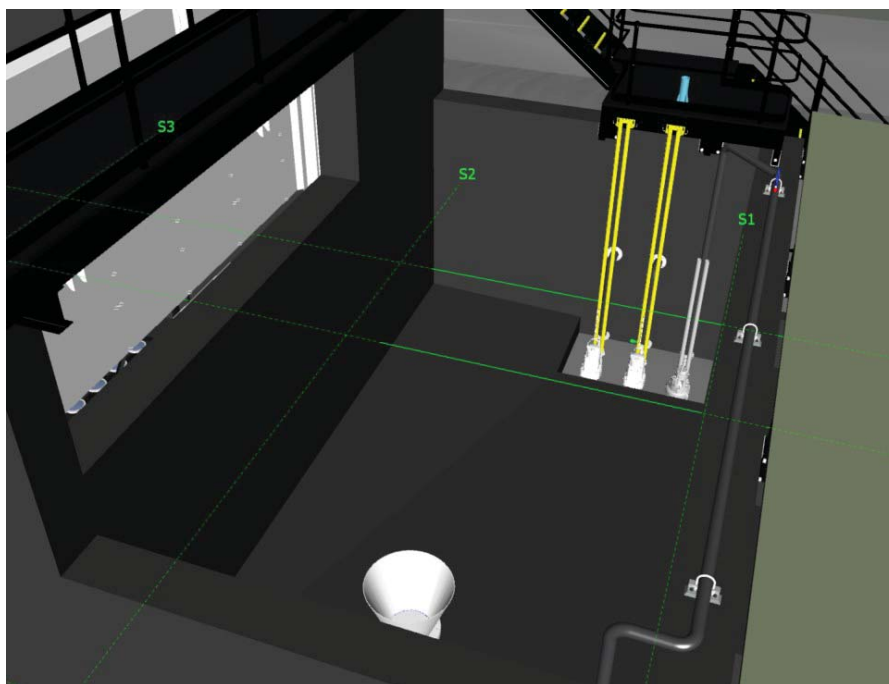


Figure 7 – Chlorine Contact / Decant Tank

5.8.1 Filter Feed Pumps

Secondary effluent shall be pumped from the CCT/DT to the tertiary filters by variable speed submersible pumps, operating in a duty /standby mode. The pump set will provide near continuous feed of secondary effluent to the tertiary filtration system, varying flow to suit near continuous feed to the tertiary filters.

The pumps speed is limited to PIF of the downstream filters to ensure the tertiary process is not overloaded. An electromagnetic flowmeter on the common discharge pipe will provide constant feedback to control the speed of the pumps to meet minimum and maximum flow requirements.

5.8.2 CCT Recirculation Pump

A single fixed speed CCT recirculation pump installed adjacent to the Filter Feed Pumps will provide constant mixing within the CCT during disinfection.

Sodium hypochlorite is dosed directly into the recirculation line via a dosing quill. The volume of chlorine will be dosed based on the calculated decant volume and operator settable residual.

5.9 Tertiary Filtration System

Four Amiad Deep Bed FRP Media Filters (or approved equivalent), are provided for effluent polishing (i.e. solids removal). Disinfected secondary effluent is pumped from the CCT/DT via the filter feed pumps to the tertiary filtration system. Filtered effluent discharged into the Recycled Water Storage Tank downstream of the filters.

Tertiary filters shall be installed with a capacity up to 3x ADWF.

The filters shall provide a filtered quality for total suspended solids of maximum <5 mg/L during operation.

ACH is dosed to an inline static mixer upstream of the Amiad filters to provide increased efficiency of the filters if required.

A chlorine analyser is installed downstream of the filters for monitoring of tertiary effluent chlorine content to ensure adequate free chlorine residual is maintained within the system. Additional chlorine can be dosed into the Recycled Water Tank, or by increasing dosage in the CCT during the next decant cycle.

The filters are provided with an external backwash pump system which provides high pressure water to back flush the filter media removing any entrained solids. Backwash water discharges into the Balance Tank.

The tertiary filtration proposed for this STP is installed in a N+1 design which enables a single vessel to be taken offline for maintenance or replacement of media with the remaining three vessels providing the required filtered water quality output.

The filters are supplied with a proprietary PLC. The Contractor will be required to ensure the supplied PLC is compatible with the plant PLC and can be incorporated into the overall plant control.



Figure 8 - Tertiary Filtration Multimedia Pressure Filters

5.10 Backwash Pumps

Variable speed dry mounted submersible centrifugal pumps provide backwash water to the tertiary filters. The backwash pumps operated in a duty / standby arrangement.

The backwash pumps are installed within the Tertiary Filter shed and share a common suction manifold from the Recycled Water Storage Tank with the Service Water and Recycled Water Pump sets.

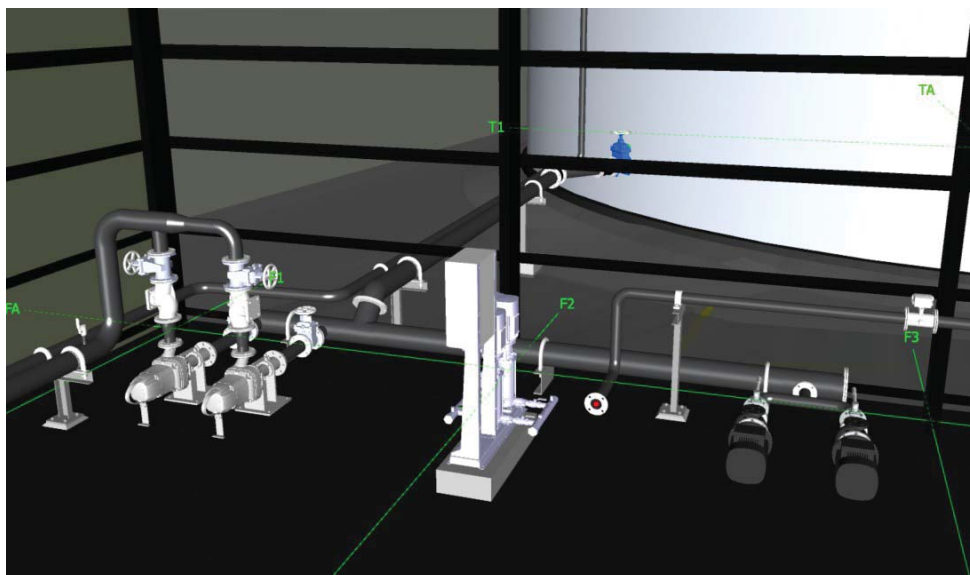


Figure 9 – Backwash, Service Water & Recycled Water Pumps (within Tertiary Filter Building)

5.11 Service Water Pumps

A new packaged service water pump station comprising of duty/assist vertical multistage pumps will provide recycled water for screen sprays and washdown across the site.

The estimated service water demands are as follows:

- Inlet works sprays – 0.8 L/s
- Grit Removal sprays – 0.39 L/s
- SBR - Anoxic Zone Scum Sprays – 0.6 L/s
- SBR - Aerobic Zone Scum Sprays – 0.6 L/s
- Septage Receiving Sprays – 1.2 L/s, and
- Site Hose Reels – 1.0 L/s.

Not all of these demands would occur simultaneously. The maximum service water pump station duty was estimated as 4.5 L/s @ 61m.

A multistage booster system will be provided to deliver the required maximum duty. A 200-micron self-cleaning filter was provided to on the pump discharge to remove solids from the service water to prevent potential blockages at the sprays.

The pumps will withdraw recycled water from a common manifold off the Recycled Water Storage Tank. A level switch was provided in the Recycled Water Storage Tank to protect the pumps against dry running.

The service water pumps will operate on VSD control to maintain a constant pressure setpoint in the service water discharge.

The Recycled Water Storage Tank is to have a connection to the potable water fill line, complete with a RPZD, to be used as a backup supply should the tertiary filtration system be taken offline. A physical air-break will be required between the discharge and the tank.

Service water hoses shall be installed at numerous locations around the plant to enable washdown of areas and equipment under normal operational requirements which include:

- Inlet Screen
- Inlet Works bund
- SBR access platform - At multiple locations to allow coverage of the entire tank
- Chlorine Contact Tank/Decant Tank
- Chemical Storage, and
- Septage Receiving / Tertiary Filter Building

For specific locations of service water hoses refer to the P&IDs and 3D model.

5.12 Biosolids Management

Biosolids (waste activated sludge) management shall be provided via onsite thickening and holding, with the ability to tanker thicken sludge offsite for dewatering at Council's Tully STP.

The existing Sludge Drying Beds are to be retained and utilised by Council as an emergency backup, should tankering not be possible for any reason.

5.12.1 Sludge Thickener

Mixed liquor is pumped from the SBR to a sludge thickening and holding tank via the WAS pump during the Fill/React phase of the SBR cycle. The sludge thickening tank provides gravity thickening and holding. The sludge thickening tank will be constructed as part of the SBR tank structure and was sized for a minimum of 10 days solids retention time (SRT) for 500 EP, which equates to 25 days for 200 EP, based on thickening of MLSS to 6,000 mg/L.

A level instrument will be installed within the tank to provide level feedback and to be used to interlock the aerator during periods of low level (following removal of sludge).

A Jet Aeration Pump is installed within the Sludge Thickening Tank to provide mixing and aeration, and to prevent the tank from going anaerobic. The aeration would operate intermittently.

Supernatant from the sludge tank overflows the internal weir/wall and discharges to the Balance Tank. This reduces the requirement for additional pumping.

5.12.1.1 Jet Aerator

A single duty Jet Aeration Pump (Flygt or approved equivalent) will be installed within the Sludge Thickening Tank. The Jet Aerator will be operated in an on/off sequence for a set duration per hour (e.g. 10 mins every hour). To prevent excessive solids carryover into the Balance Tank, the jet aerator will be interlocked and prevented from operating when the WAS pump is operating.

5.12.2 Sludge Drying Beds

Six (6) existing sludge drying bed bays shall be utilised if offsite transport of thickened sludge is not possible. The drying beds have minimal capacity and are not used for normal operation of the plant.

5.13 Chemical Dosing

Three (3) chemicals are proposed for use in the sewage treatment process and dosed at variable rates into specific locations within the plant. The chemicals used as part of the process at Port Hinchinbrook are:

- Sodium Hypochlorite (Hypo) - Disinfection and chlorine residual in the filter feed water and recycled water reticulation networks. Provision was made to also dose into the Recycled Water Storage Tank if necessary. Duty/standby pumps to be provided.
- ACH - Dosed into the bioreactor into the Anoxic Zone to assist with phosphorus removal, and, ACH is used as a coagulant for tertiary filtration dosed into a static mixer upstream of the Amiad filters. Duty/duty pumps provided.
- Sugar solution - Dosed into the Anoxic Zone as a supplementary carbon source to assist in denitrification. Duty/standby pumps to be provided.

Based on future plant loading (500 EP) the calculated average peak design chemical dosing rates are:

- ACH dosed to Bioreactor 11 L/d
- ACH dosed to Filters 0.54 L/d
- Sodium Hypochlorite to CCT 7.4 L/d, and
- Sugar – 30 L/d.

Where specified, all dosing pumps are to be supplied in N+1 arrangement. A hot swappable pump is to be provided as redundancy to the ACH dosing system.

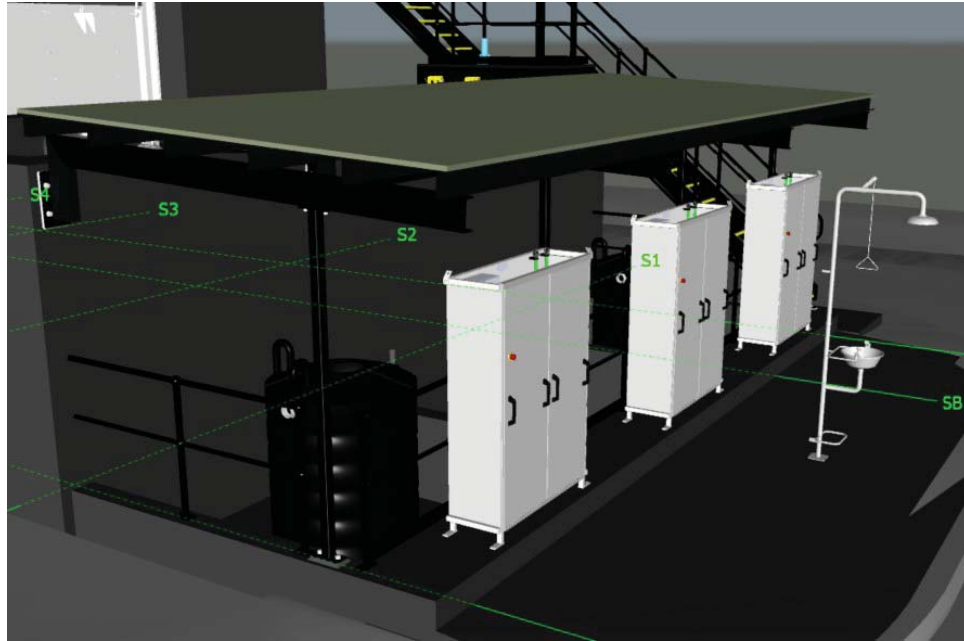


Figure 10 – Chemical Storage & Dosing Area

5.13.1 Chemical Storage

A chemical storage area is provided adjacent to the bioreactor. A skillion roof is provided to protect the chemicals from direct sunlight and the storage bunds from rainfall. Dosing of each chemical is via duty Grundfos DDA pumps installed within a screened dosing control panel accessible from outside the bund. Chemical storage was sized to achieve a minimum of 30 days storage at future plant loadings.

ACH shall be dosed from a 1,500 L poly storage tank.

Sugar if required shall be dosed from a 1,500 L poly storage tank.

Hypo shall be dosed from a 1,500 L poly storage tank.

Each poly storage tank is fitted with a sight glass for local level indication and an ultrasonic level sensor for level feedback and control.

The chemical tanks and dosing panels sit inside individual concrete bunds. In the event of a spillage/leak within the bund the chemicals will drain to the sump and will need to be pumped out or removed via a vacuum truck. Each concrete bund was designed to contain a minimum of 120% of the stored chemicals. Safety shower, connected to the potable water network, shall be installed at accessible location to each chemical dosing area where there is potential for operators to come into contact with the chemical. Refer to the design drawings for locations of safety showers.

Alternative chemical storage and dosing systems may be offered by the Contractor, to be accepted by the Principal. These may include self-bunded tanks and panels (e.g. Polymaster combined storage and dosing tanks), removing the requirement for concrete bunding. A skillion roof structure is proposed to protect the equipment from UV degradation.

5.13.2 Chemical Truck Unloading

A chemical truck delivery bay shall be located adjacent the chemical storage bunds. The delivery bay is a bunded area where chemical delivery trucks will park to unload chemical. The delivery bay is provided with a 10,000 L offline storage, delivery bund containment, in the event of a chemical spill. The chemical unloading bay is fitted with two manual valves from the outlet pit; one which shall remain open during chemical deliveries which directs any spills to the storage tank. When chemical deliveries are not occurring, this valve is to be closed and the other open to free discharge to stormwater. The storage tank is fitted with a high level sensor indicating the containment is full.

5.13.3 Chemical Truck Delivery Panels

It was assumed that the chemical delivery trucks are equipped with an onboard transfer pump. Truck delivery panels for each chemical shall be installed adjacent the chemical truck delivery bay with any spills drained back into the chemical bund. The panel will consist of the following:

- Panel will be housed in an 316SS box or directly on the tank in a PE
- Camlock connection point (low level) with clear identification of the chemical being unloaded
- Drain and depressurization valve draining back into bund
- Display of the level within the tank(s) in volume and %
- An emergency stop (E-Stop) for the entire system
- GPO which isolates when the chemical storage tank reaches a high level; and
- High level alarm (audible and visible).

The high level overflow of chemical tanks shall be in line of sight from the delivery panel. The camlock connection is located at low level to limit manual handling and to prevent unnecessary strain on pipework and hoses. No alternative GPO will be made available to prevent unintentional usage of this GPO rendering the safety systems useless.

5.14 Septage Receival Station

A septage receival station shall be provided for receival of septage from offsite tankers. A septage receival station is provided complete with an automated screen and camlock fittings for tanker connection.

The septage receival screen was designed to receive septage via gravity from trucks with a discharge point above 750 mm from grade.

The septage screen is to be supplied complete with local control panel. The screen is to be installed complete with unloading valve which automatically closes on a high level when the screen can't clear. The screen is to incorporate a bypass with manual bar screen in the event of blinding of the automated screen. Process interlocks within the control system may be preferred over a manual bypass, should CCRC wish to remove the bypass from the design during the construction phase.

The septage flows under gravity to the General Purpose Pumping Station. A visual level indicator shall be provided at the septage receival station to provide tanker operators a visual indication of the GPPS level.

5.15 Offline Maintenance Storage Tank

CCRC have requested one of the existing steel tanks is retained and used as offline storage for maintenance purposes to allow for major plant shutdowns.

It is proposed the existing balance tank is reused as offline storage. The existing tank inlet pipe, flowmeter and static rundown screen will be retained and reused.

Direction of flows to offline storage tank will be a manual task (i.e. does not form part of the plant process). Buried valving will be provided at the tie in location to allow operators to redirect flows to the Balance Tank.

The Contractor will be required to design and install a drainage pipe (i.e. DN100) from the storage tank to the Supernatant Pump Station. Draining of the tank will be a manual task and require monitoring of the level within the pump station to ensure it is not surcharged during the activity.

The Contractor will be required to repair any leaks and significant corrosion on the existing steel tanks.

5.16 Recycled Water Storage and Pumping

The existing 1.5 ML effluent storage tank is in poor condition and has several leaks. The existing tank will be decommissioned and replaced. A new 1.5ML Glass-Fused Steel Panel tank will be constructed and used for storage of recycled water. The new tank will be procured as a Design & Construct item in the Contract.

The existing ring beam (not currently used) will be demolished to facilitate the construction of the new tank.

The Recycled Water Storage Tank provides water for the following purposes:

- Storage of Effluent for Irrigation – Irrigation water is provided for irrigation of the existing paddocks and around the exiting site
- Storage for wet weather periods when irrigation is not possible
- Service Water – Service water is provided around the upgraded STP for washdown hoses and process sprays at the inlet works and SBR, and
- Filter Backwash – Backwash water is provided to the tertiary filters for backwashing the blinded filter media.

5.17 Irrigation Pumps

Duty / Standby centrifugal Irrigation Pumps are to be installed within the Tertiary Treatment structure. The pumps share a common manifold with the service water and backwash pump sets.

The pumps have been selected to match the existing Irrigation Pumps installed at the plant, with an approximate duty of 9.6 L/s. The pumps will operate based on level within the Recycled Water Storage Tank and will have the ability to operate based on feedback from a future irrigation controller.

No modifications are proposed to the irrigation network as part of this report. The network is noted to be in poor condition and reticulation pipework, valving and spray nozzles require replacement.

5.18 General Purpose Pump Station

A new General Purpose Pump Station (GPPS) is proposed to service the site. The GPPS will receive waste streams from:

- Inlet works bund
- Septage receival screen
- Tertiary filters shed
- Chemical delivery bund, and
- Chemical dosing bund.

The GPPS pumps will operate in a duty/standby configuration and will transfer waste streams to the inlet works. The GPPS will be a proprietary packaged pump station, design, supplied and constructed by the Contractor and will be of FRP/GRP or precast concrete construction.

Due to the high groundwater level (refer Geotechnical Reports) and potential for inundation during flooding, the GPPS will require concrete ballast to resist uplift.

5.19 Supernatant Pump Station

The existing Supernatant Pump Station located adjacent to the Sludge Drying Beds will be retained, refurbished and reused as part of the upgrade. The following refurbishment works will be completed: -

- Removal and replacement of all mechanical equipment, pipework, instrumentation, and valves
- Pressure cleaning of the wet well and assessment of the existing concrete condition
- Sealing of existing pump station at construction joints (precast concrete construction)
- Repair of concrete (if required) and application of approved protective coating, and
- New rising main to connect to the new inlet work structure.

5.20 Potable Water Supply

During the detailed design phase the survey identified the site potable water on the existing site, no local water meter was identified for the site. Further site investigations identified a water meter on the south eastern boundary of Lot 3 C1043 adjacent the access track from the Bruce Highway. This was assumed to deliver water to the site.

Details of the existing site water supply have been requested from CCRC and were unidentified at the time of writing this report. As part of the Construction Contract, the Contractor shall locate and identify the site potable water supply and retrofit a new water meter on the site in consultation with CCRC to confirm final location and any modifications to the existing water mains. The Contractor shall confirm the supply pressure and flow rate at the connection of the new water meter.

Locations of potable water connections on the upgraded STP site have been identified on the design drawings and are to be installed with RPZD's as nominated.

5.21 Operator Building

The existing operator building shall be retained, refurbished and reused as part of the upgrade. Due to the possibility of flooding, the existing building is retained as an operations, laboratory and amenities building or a storage building. The building floor is elevated approximately 700 mm above the surrounding ground level raised which is above the Q100 level.

For details of refurbishment refer to section 3.6.1 Control Building above.

5.22 Construction Staging

5.22.1 Major Process Tank Settlement & Staging

Initial settlement of the major process tanks (SBR, Balance Tank, CCT & Recycled Water Storage Tank) is expected. The settlement will occur during construction and following the initial filling of the tanks and loading. Refer to the Geotechnical Investigation Reports for further information.

The Contractor consider and sequence the construction of the tanks with consideration to the initial settlement. This includes all hardstands, steelwork, pipework, and the like connecting to the SBR structure.

The Contractors Construction Management Plan is to be provided to Council for review and approval and must include all sequencing, acknowledge risks and mitigation measures for the safe construction of the facility.

Flexibility in the design has been provided with consideration to long term settlements.

5.22.2 Recycled Water

The Contractor must stage the decommissioning of the existing Recycled Water Tank and construction of the new Recycled Water Tank whilst maintaining the current release of effluent to the network.

The existing Recycled Water Tank will require demolition to facilitate the construction of the switchroom and access roads.

5.22.3 Cutover

The new STP can be constructed independently without major impact on the biological process of the existing STP. The management of effluent will be required during the construction of the new Recycled Water Tank, refer section above.

Cutover consists of cutting into the existing rising main, recycled water main and outfall which can all be staged with minimal impact on the operation of the existing plant. Sacrificial valving will be used for the cut-in to the Influent Main and the Recycled Water Main.

The new plant will be fully commissioned and operational prior to the cutover.

5.23 Decommissioning and Demolition

The existing plant will be decommissioned following the successful cutover and commissioning the new plant. The existing plant is modular in nature; therefore decommissioning will include all electrical and mechanical equipment and piping and tanks.

The existing plant tanks, concrete slabs, pump stations etc. will be retained in place. Any decommissioned pipes directly associated with the upgrades will be cut below ground and capped in accordance with the specification.

6. Electrical & Controls Design

The Electrical design for the Port Hinchinbrook STP is based on CCRC, industry and Australian Standards.

6.1 Companion Documentation

This report should be read in conjunction with the following IFT design documentation:

- Power System Analysis and Protection Coordination Report
- Full set of Electrical Drawings issued for Construction
- Full set of P&IDs issued for Construction
- Monitoring and Control Philosophy (Functional Description) issued for Construction, and
- Full set of PLC IO List, Drive List and Cable Schedules issued for Construction.

6.2 Electrical Design Criteria

The electrical design for the works have been based on the following criteria:

- Provision of a design that facilitates the electrical requirements of the plant upgrade
- Provision for future capacity upgrades, and
- Generator backup rated for plant operation during mains power outages. A 110kVA generator is proposed.

In addition to the above listed electrical design criteria, the following criteria have also been adopted:

- Design to be safe to protect people by complying with all relevant electrical and safety standards;
- Design to protect plant and equipment by following all guidelines for equipment protection given in relevant standards
- Arc flash categorisation for the entire LV Switchboards to specify appropriate PPE for electrical maintenance and operation
- Consideration of innovative approach to project scope to achieve better outcomes with significant cost savings, and
- CCRC's standard specification and Preferred Equipment List have been used as the design bases for the upgraded plant.

6.3 Power and Controls Design

(Refer to full set EI&C Drawings 1645-DWG-ELE-1002)

Mains power to the upgraded plant via the existing 100 kVA pole mount transformer.

The standby power will be provided by a new 110 kVA generator that will connect to an Automatic Transfer Switch to be installed in the MSB01.

The new MSB01 will be installed inside a new Switchroom as shown on the layout drawings.

New consumer mains cables will be installed to connect from pole mount transformer to new MSB01. It is intended to install all new cabling and equipment while the existing plant is on-line.

The new Switchroom will incorporate the following:

- MSB01 incorporating a Process distribution board (DB)
- PLC Panel as part of MSB01
- Wall mounted VSDs controlled by MSB01
- Light and Power DB02, and
- A 3 kVA UPS Cabinet complete with a bypass switch and UPS Power DB03.

The existing Control Room is to be refurbished that will incorporate the following:

- Comms Cabinet including CitectSCADA Primary Server and Network Switches
- Engineering Workstation, and
- Operator Workstation.

CCRC will supply all of the SCADA PCs for the Contractor to install SCADA software.

As shown on the MSB01 Single Line Diagram the main switchboard is supplying the entire plant loads and nearly all of its outgoing circuits are sub-main feeders to Power Distribution Boards and starter modules for most of the plant equipment.

All VSDs are SchneiderSchneider Altivar ATV630 IP54 wall mounted in the switchroom which are linked to PLC/SCADA via Modbus TCP data communication loop network for both control and monitoring.

6.3.1 Main Switchboard MSB01 Details

(Refer to MSB01 Single Line Diagram Drawing No. CCRC1645-DWG-ELE-1005 to 1007 inclusive)

New consumer mains cables from the new pole mount transformer will be provided to power up the new Main Switchboard MSB01.

The Supply Authority's new Metering Box will be mounted outside switchroom on the wall for easy access.

CCRC's new 110 kVA standby generator will be mounted on a platform and its new cables will be connected to the MSB01 Automatic Transfer Switch (ATS) that will change over from mains to generator power supply during mains blackouts.

The maximum demand load of the entire plant is 69.2 kW (112 A) after applying an overall plant diversity factor of 0.9 which is in line with the guidelines given in AS/NZS 3000:2018. All new equipment was sized to handle this load with plenty of spare capacity (i.e. 160 A rated switchboard).

The new MSB01 is provided with the following features:

- MSB01 is to be indoor mounted (IP54) inside a new air conditioned switchroom with two incomers: one from a 100kVA mains transformer and one from a 110kVA emergency supply standby generator.
- The Switchboard's short circuit fault withstand is rated at 36 kA for 1 sec with Form 4a segregation for incomers and Busbars and Form 3b for starters.
- The Switchboard busbars are rated at 400 Amps.
- The mains incomer Circuit Breaker (CB) is rated at 160 A and the Generator incomer CB is rated at 160 A.
- An ATS is included in the MSB01 to implement the required interlocks and automatic power transfer from mains to generator and vice versa.

As shown on the MSB01 Single Line Diagrams, the following motor control centres and DBs are fed from this main switchboard:

- MSB01 on-board Process Distribution Board DB01
- Switchroom Light and Power DB02
- Existing Control Room Light and Power DB04, and

- Chemical Building DB05.

6.3.2 New MSB01 Switchboard Design Bases

A comprehensive power system analysis, load flow and voltage drop, short circuit fault current studies, protection coordination, arc flash evaluation and harmonic analysis (PSA Report) was carried out for the upgraded Port Hinchinbrook STP using an Engineering Software Program called: SKM PowerTools.

This Section details the bases upon which the design of the new switchboard was undertaken using the PSA results.

6.3.3 Switchboards Capacity and Sizing

As part of the PSA Report, the load flow and voltage drop calculations study was carried out with the following load summary results:

Table 12: Load Summary Results

Switchboards and DBs (Mains Supply)	Maximum Demand Load (kW)
415V Main Switchboard - MSB01	69.2kW (112A)
Switchboards and DBs (Generator Supply)	Generator Demand Load (kW)
415V Main Switchboard - MSB01	69.2kW (112A)

On the bases of the above calculated results the new switchboard was sized as follows;

- MSB01 Main Busbars: 400 A
- MSB01 Main Incomer CB fed from 100 kVA transformer: 160 A
- MSB01 Generator Incomer: 160 A, and
- New Standby Generator size is 110 kVA.

6.3.4 Switchboards Short Circuit Fault Current Ratings

As part of the PSA Report, the short circuit fault current studies were carried out with the following summary results:

Figures on the following table extracted from the PSA report show the maximum short circuit fault currents under mains supply that have been used to design the new Switchboard MSB01.

Table 13: Summary of Maximum Short Circuit Fault Currents Under Mains Supply

MSB01 Switchboard	Maximum Three Phase & Single Phase to Ground Faults (kA)- Under Mains Supply	Minimum Three Phase & Single Phase to Ground Faults (kA) - Under Generator Supply
415V Main Switchboard - MSB01	3P: 3.25 (kA), SLG: 3.16 (kA)	3P: 1.15 (kA), SLG: 1.09 (kA)

Based on the above calculated short circuit fault currents, the proposed short circuit fault current withstand rating of MSB01 36 kA for 1 sec. and all distribution boards equipment have been selected at 10 kA fault rating which are well above the maximum calculated fault levels of 6.136 kA.

6.3.5 Protection Devices and Settings Used in MSB01

The protection devices selection and settings for new switchboard have been determined as part of PSA report which are summarised below:

Table 14: Summary of Protection Devices and Settings

Device ID	Manufacturer	Model	Required Settings
QM1	Terasaki	S160NJ	Sensor / Trip = 160A Ir= 1.0 Ii = 6 (960A)
QG1	Terasaki	S160NJ	Sensor / Trip = 160A Ir= 1.0 Ii = 6 (960A)
1Q1, 1Q2, 1Q44	Schneider	NSX100F_TM63D	Trip / Plug = 63A Im = 7.94 (500A)
1Q16, 1Q17	Schneider	NSX100F_TM25D	Trip / Plug = 25A Im = 12.5 (312.5A)
1Q13, 1Q33, 1Q43	Schneider	NSX100F_TM50D	Trip / Plug = 50A Im = 10 (500A)
16Q1, 17Q1	Schneider	GV2	Frame = P08 Trip / Plug = 4A Im = 13xIn (52A)
1Q20	Schneider	NSX100F-TM32D	Trip / Plug = 32A Im = 12.5xIn (400A)
1Q4, 1Q9, 1Q27, 1Q29	Schneider	GV2	Frame = P16 Trip / Plug = 14A Im = 13xIn (448A)
1Q8, 1Q10	Schneider	GV2	Frame = P14 Trip / Plug = 6A Im = 13xIn (78A)
1Q11, 1Q26	Schneider	GV2	Frame = P20 Trip/Plug = 18A Im = 13xIn (234A)

6.3.6 Arc Flash Category and PPE Requirements of the New Switchboard

The arc flash category and PPE requirements for new switchboard have been determined as part of PSA report which are summarised in the following table:

Table 15: Arc Flash Category and PPE Requirements

Detail	Arc Flash Category - Mains	Arc Flash Category - Generator
Main Switchboard MSB01	Category 0	Category 0

Based on the above results, the arc flash category of the lineside of normal supply main switch is Cat.0 which is desirable.

The arc flash labels for each of the new switchboards and distribution boards at the plant are included in the PSA report that should be installed on each of the switchboards after applying the recommended settings for protection devices.

6.3.7 Motor Starters

Typical motor starter schematic diagrams accepted by CCRC as part of Concept Design for VSD starters and DOL starters have been used to develop the detail design for all motor loads included in the Drive List.

Modbus TCP data communications network was used for Schneider VSDs control and monitoring to minimise physical IO wiring into PLC and for DOL starters the industry's common and most reliable design practice of relay logic with physical IO to PLC was adopted.

6.3.8 Local Control Stations

Local Control Stations (LCS) will be provided for each drive as shown on the drives schematic diagrams that will include the following devices:

- Lockout stop
- Control mode selector switch
- Full load current Isolator
- Start/stop pushbuttons, and
- Voltage free contacts is provided on field isolators to provide feedback to PLC / SCADA to say, "Field isolated";

All LCSs will be installed as close to the motor as practicable. Where LCSs require pedestal mounting, the details shown on the LCS GA Drawing must be complied with.

6.3.9 Main Switchroom

The MSB01 will be located in the Main Switchroom as shown on the site layout diagrams. The switchroom was sized to accommodate all equipment that is intended to be located in it. It will be fire-proof and air conditioned and will be designed and constructed to full requirements of AS/NZS 3000:2018.

It is intended to provide a single sided MSB01 and PLC Panel located in the switchroom with adequate clearances at its sides and front. The light and power DBs and VSDs will be mounted on the opposite walls inside the switchroom.

Cables bottom entry into the MSB01 and PLC Panel will be via cable trench underneath the switchboards with adequate access at the front of the switchboards.

The switchroom will be provided with one double equipment door and one egress door on the opposite side as per the requirements of AS/NZS 3000:2018. All signages, fire extinguisher and rescue kits will be provided inside the switchroom.

UPS Cabinet and UPS DB, Main Light & Power DB and Fire Indication Panel will also be located inside the switchroom.

6.3.10 Power Outages

Council's supplied new 110 kVA standby generator will be connected to the MSB01 Generator Incomer Module to run the STP's critical loads during mains power blackout. The MSB01 was provided with an Automatic Transfer Switch to automatically start the generator and transfer power supply on to generator up on detection of mains power failure for a limited period of time. The transition from mains supply to generator supply and vice versa will be optimised so that the plant loads will be brought on-line in a controlled manner to avoid any unintended trips or shutdowns.

6.3.11 Cabling, conduit and ladder supports systems

Underground conduits will be installed from switchroom to cable pits adjacent to process areas and then cable ladders or trays will carry all the cables to their destinations.

Cable runs on the structures such as tanks and buildings will be on cable ladders or trays. Cable ladders and trays in outdoor locations will be provided with covers to protect cables from sunlight. Cables shall be installed within wiring enclosures to provide the degree of mechanical protection required to achieve the WS classification of the wiring system to AS/NZS 3013.

All requirements of concept design on cable ladders, ladder supports, conduits, cable pits, etc. have been fully met during detail design of the project.

6.3.12 Instrumentation

The P&IDs and Instrument Schedule provide full inventory of instrumentation to be supplied. The types of instrumentation was selected from the agreed equipment list to CCRC's approval.

All instruments have been selected to be suitable for continuous unattended operation and to maintain their rated accuracy with a minimum of maintenance or need for calibration and adjustment.

The selected analytical instruments include the analogue output of 4 to 20 mA capable of operating into a minimum load of 600 Ω . Where possible the power supply to instruments was selected to be 24V DC Extra Low Voltage (ELV) supply. In the absence of the ELV supply, 240V AC was used as per the vendor's recommendation.

Discrete outputs (on/off) of all electromechanical equipment such as flow switches, pressure switches, level switches, valve position switches, relay circuits, etc., and of all electronic switching devices such as electronic level and limit switches, etc., have been selected as voltage-free contacts rated for at least 1 A at 240 VAC and the voltages/currents as per above paragraph.

6.3.13 Lightning protection

Lightning Protection System for the electrical equipment was designed with the following features:

- Surge Diverters on incoming mains for MSB01
- Surge Reduction Filters on 240V AC Critical Loads such as UPS supply, etc
- Transient Barriers on all analog input signals to PLC coming from field mounted instrumentation, and
- Transient Barriers on the field terminals of analog instrumentation (where possible) to protect critical instrumentation.

Note: the above lightning protection design is industry standard practice.

6.3.14 Electrical Earthing and Bonding

The site earthing and bonding diagrams detail the proposed connections and methods of attachment for the site wide earthing and bonding system. Refer to detail design drawings for LV earthing installation details.

6.4 PLC and SCADA system

The Port Hinchinbrook STP's PLC/SCADA requirements for control, logging, data handling, alarm management and monitoring have been met by the use of the nominated brand of PLCs as Allen Bradley ControlLogix as per the CCRC's preferred equipment list.

As shown on the PLC & SCADA System Network Schematic Diagram, it is intended to install a Multi-Mode Fibre Optic Cable Local Area Network (LAN) across the plant and provide one main PLC inside a dedicated PLC Panel which is located adjacent to the Main MSB01. Any vendor supplied packages that include on-board PLCs will be connected to the main PLC and SCADA Server via the Ethernet LAN using Modbus TCP Protocol.

The SCADA system was designed to fully integrate with the CCRC's future SCADA and IT systems.

The preferred SCADA system is CitectSCADA that will be installed on the main Server to be located in the Control Room. It is expected that some of the vendor packages will include their own HMI for local operation of the vendor supplied equipment, such packages are:

- UV Package Control Panel complete with its own PLC/HMI
- SPIRAC SPIROGUARD PTA Package Unit
- Grundfos Water Pumps Package Unit, and
- FPG414 Flygt Pumps Controllers.

The PLC/SCADA systems will be fitted with 2-hour limited battery backed on-line uninterruptible power supplies to enable the basic plant status to be monitored during short power supply failures.

6.4.1 Control Philosophy of the STP

The following brief description of the equipment operation and control philosophy is provided as part of the design report. Please refer to the detailed plain english Monitoring and Control Philosophy (MCP) 1645-MCP-001 for more information on the plant control philosophy.

Every electrical equipment shall have three modes of operation selectable from a three position (Rem/Off/Loc) mode selector switch mounted in the LCS. Every electrical equipment shall also have local start/stop and Lockout Stop mounted on the drives LCS. The LCS will also have a full load current isolator for local isolation of the drive during any field maintenance works.

Local Mode Operation

This mode is active when the mode selector switch is selected in “LOC” mode. In “LOC” mode, the drive can be controlled using the LCS Start/Stop push buttons. The operator can start and stop drive from LCS via the Start/Stop push buttons if the drive’s hardwired start and run interlocks are healthy. The drive will stop if the operator presses Stop push button on the LCS or if any of the hardwired run interlocks become faulty.

SCADA Manual Mode

This mode is active when the mode selector switch is selected in “Rem” mode and the operator has selected manual from the Auto/Manual selection on the SCADA system. In SCADA manual mode, the operator can start and stop the drive from the SCADA system using the control popup faceplate (start/stop/reset buttons) if run and start conditions are healthy. The drive will also stop if any of the run interlocks become faulty.

SCADA Auto Mode

This mode is active when the mode selector switch is selected in “Rem” mode and the operator has selected Auto from the Auto/Manual selection on the SCADA system. In SCADA Auto mode, the drive is controlled by run request input from the PLC as part of automatic process control logic. The drive will stop once stop command is issued by the PLC.

Drive Field Lock-out Stop

Drive Field Lockout Stop is active in all control modes and will stop the drive up on activation. This device is a safety device and it should only be used for emergency stopping of the drive and will prevent automatic starting of the drive until drive Fault Reset Button is pressed after release of the Lock Out Stop

6.5 Switchroom

A new block work building housing the electrical switchroom is proposed. Councils preference is for a blockwork building to withstand the climatic conditions in Cardwell, however a prefabricated building may be offered should it provide benefit to Council.

The switchboard will be installed with a 0.5 m freeboard above the 100-year ARI flood event level. It is proposed the switchroom is installed with a suspended floor commonly known as a computer floor, enabling ease of cable installation during construction and any future upgrades.

6.6 Generator

The 110kVa diesel generator will be installed on a concrete hardstand adjacent to the switchroom. A standalone or lean to roof structure will be provided to protect the generator. The generator will include fuel storage to allow for a minimum of 24 hours continuous operation.

7. Capital Cost Estimate

A cost estimate has been developed for the Capital Expenditure (CAPEX) for the proposed plant. The estimate is provided in Appendix C - .

7.1.1 CAPEX Assumptions

- CAPEX developed using GANDEN's inhouse developed estimating libraries. Pricing stated are best estimate at the time of compiling the estimate.
- No allowance for inflation or current fluctuations.
- No allowance has been made for the upgrade of the transformer. It is assumed the existing incoming electrical mains are suitable for the upgraded plant.
- No allowance for the upgrade or replacement of the existing sewerage or irrigation networks.
- Costs for equipment and instrumentation nominated in the respective schedules have been based on vendor quotes and where lacking, similar designs. Where vendor quotes are unavailable an allowance has been made based on similar installations and sizing.
- The estimate does not consider any lost time due to inclement weather.
- No allowance for CCRC Project Management of delivery costs have been made.
- Allowance of \$50k for decommissioning. No allowance has been made for the salvaging for existing infrastructure.

Appendix A - Environmental Authority



Department of
**Environment and
Heritage Protection**

19-AUG-2016

To: The Passage Holdings Pty Ltd
PO Box Q361
QVB NSW 1230

Attention: Ian Stephens

Our reference: 264465

Application details

I refer to the application that was received by the administering authority on 05-AUG-2016.

Land description: Port Hinchinbrook STP NR0560 Lot 1 Plan C1043, Lot 3 Plan RP733367, Lot 2 Plan CWL1212, Lot 41 Plan C1043, Lot 42 Plan C1043, Lot 3 Plan C1043; Port Hinchinbrook STP IPDE01020408 Lot 170 Plan SP177389, Lot 2 Plan RP739188, Lot 7 Plan RP732868, Lot 1 Plan RP739188, Lot 1 Plan C1043, Lot 5 Plan RP732868, Lot 6 Plan RP732868.

Decision

Your application has been approved and your environmental authority (reference EPPR00576713) is attached.

Should you have any further enquiries, please contact Veronica Lightfoot on telephone 1300 130 372 (option 4).

Yours sincerely

Signature

18 August 2016

Date

Jodie Brackenbury
Department of Environment and Heritage Protection
Delegate of the administering authority
Environmental Protection Act 1994

Veronica Lightfoot
Permit and Licence Management
Department of Environment and
Heritage Protection
GPO Box 2454
BRISBANE QLD 4001
Phone: 1300 130 372
Fax: (07) 3330 5875
Email: palm@ehp.qld.gov.au
Website www.ehp.qld.gov.au
ABN 46 640 294 485

Enclosed

Permit - environmental authority (reference EPPR00576713)

Environmental authority

This environmental authority is issued by the administering authority under Chapter 5 of the Environmental Protection Act 1994.

Permit¹ number: EPPR00576713

Environmental authority takes effect on 18-AUG-2016.

The anniversary date of this environmental authority remains 27 October. An annual return and the payment of the annual fee will be due each year on this day.

Environmental authority holder(s)

Name	Registered address
The Passage Holdings Pty Ltd	Level 25 25 Bligh Street SYDNEY NSW 2000

Environmentally relevant activity and location details

Environmentally relevant activity(ies)	Location(s)
63-(1b)(ii) Sewage treatment >100 to 1500EP - no IT or IR	Port Hinchinbrook STP IPDE01020408 - Lot 170 Plan SP177389, Lot 2 Plan RP739188, Lot 7 Plan RP732868, Lot 1 Plan RP739188, Lot 1 Plan C1043, Lot 5 Plan RP732868 and Lot 6 Plan RP732868 Port Hinchinbrook STP NR0560 - Lot 1 Plan C1043, Lot 3 Plan RP733367, Lot 2 Plan CWL1212, Lot 41 Plan C1043, Lot 42 Plan C1043 and Lot 3 Plan C1043

Additional information for applicants

Environmentally relevant activities

The description of any environmentally relevant activity (ERA) for which an environmental authority is issued is a restatement of the ERA as defined by legislation at the time the approval is issued. Where there is any inconsistency between that description of an ERA and the conditions stated by an environmental authority as to the scale, intensity or manner of carrying out an ERA, then the conditions prevail to the extent of the inconsistency.


¹ Permit includes licences, approvals, permits, authorisations, certificates, sanctions or equivalent/similar as required by legislation

An environmental authority authorises the carrying out of an ERA and does not authorise any environmental harm unless a condition stated by the authority specifically authorises environmental harm.

A person carrying out an ERA must also be a registered suitable operator under the *Environmental Protection Act 1994* (EP Act).

Contaminated land

It is a requirement of the EP Act that if an owner or occupier of land becomes aware a notifiable activity (as defined in Schedule 3 and Schedule 4) is being carried out on the land, or that the land has been, or is being, contaminated by a hazardous contaminant, the owner or occupier must, within 22 business days after becoming so aware, give written notice to the chief executive.



Signature

Jodie Brackenbury
Department of Environment and Heritage Protection
Delegate of the administering authority
Environmental Protection Act 1994

18 August 2016

Date

Enquiries:
Veronica Lightfoot
Permit and Licence Management
Department of Environment and Heritage
Protection
GPO Box 2454
BRISBANE QLD 4001
Phone: 1300 130 372
Fax: (07) 3330 5875
Email: palm@ehp.qld.gov.au

Obligations under the *Environmental Protection Act 1994*

In addition to the requirements found in the conditions of this environmental authority, the holder must also meet their obligations under the EP Act, and the regulations made under the EP Act. For example, the holder must comply with the following provisions of the Act:

- general environmental duty (section 319)
- duty to notify environmental harm (section 320-320G)
- offence of causing serious or material environmental harm (sections 437-439)
- offence of causing environmental nuisance (section 440)
- offence of depositing prescribed water contaminants in waters and related matters (section 440ZG)
- offence to place contaminant where environmental harm or nuisance may be caused (section 443)

Conditions of environmental authority

The conditions of this environmental authority are the conditions of the attached Development Approval reference NR0560DA, as they relate to the licensed activities, where any references to the holder of the development approval are taken to refer to the holder of this environmental authority.

Attachments

- Development Approval



COPY

Notice of decision to grant licence (with development approval) Sections 85 and 86 Environmental Protection Act 1994

This statutory notice is issued by the administering authority pursuant to sections 85 and 86 of the Environmental Protection Act 1994, to advise you of a decision or action.

Enquiries to : Barry James
Telephone : (07) 4722 5353
Your reference :
Our reference : TSV4482 (NR0560)

Cardwell Properties Pty Ltd
Bruce Highway
Cardwell QLD 4849

CC: Cardwell Properties Pty Ltd
PO Box 444
Main Beach, Qld 4217

Entered/Validated in Ecotrack

Project Reference

Development Approval #

Registration Certificate #

This version amended on

Cancelled/Surrendered/Transferred Date:

Continuing Registration #

Attention: Russell Cook,

Re: Application for a licence (with development approval) by Cardwell Properties Pty Ltd to carry out Environmentally Relevant Activity (ERA) 15(b) Sewage treatment on land described as Lot 1 on Plan C1043, Lot 2 on Plan CWL1212, Lot 3 on Plan C1043, Lot 41 on Plan C1043, Lot 42 on Plan C1043 and Lot 3 on Plan RP733367 located at Bruce Highway, Cardwell.

Your application for a licence (with development approval), received by this office on 12 May 2004 has been granted.

A copy of the licence No.NR0560 which includes the schedule of conditions, is attached.

This licence takes effect from 26 October 2004.

You may apply to the administering authority for a review of this decision within 14 days after receiving this notice. You may also appeal against this decision to the Planning and Environment Court.

Information outlining the review and appeal processes under the *Environmental Protection Act 1994* is included with this notice. This information is intended as a guide only. You may have other legal rights and obligations.


Signed

Tania Laurencont
District Manager, Townsville
Delegate of Administering Authority
Environmental Protection Act 1994

26 October 2004

Entered/Validated in Ecotrack

Project Reference

Development Approval #

Registration Certificate #

This version amended on

Cancelled/Surrendered/Transferred Date:

Continuing Registration #

Transferred Date:

Received by:

Received at:

Remarks:

[illegible]

Extracts from the Act Regarding Reviews and Appeals

Procedure for review

521.

- (1) A dissatisfied person may apply for a review of an original decision.
- (2) The application must-
 - (a) be made in the approved form to the administering authority within-
 - (i) 14 days after the day on which the person receives notice of the original decision or the administering authority is taken to have made the decision (the "review date"); or
 - (ii) the longer period the authority in special circumstances allows not later than the review date; and
 - (b) be supported by enough information to enable the authority to decide the application.
- (3) On or before making the application, the applicant must send the following documents to the other persons who were given notice of the original decision-
 - (a) notice of the application (the "review notice");
 - (b) a copy of the application and supporting documents.
- (4) The review notice must inform the recipient that submission on the application may be made to the administering authority within 7 days after the application is made to the authority.
- (5) If the administering authority is satisfied the applicant has complied with subsection (2) and (3), the authority must, within 14 days after receiving the application-
 - (a) review the original decision;
 - (b) consider any submissions properly made by a recipient of the review notice; and
 - (c) make a decision (the "review decision") to-
 - (i) confirm or revoke the original decision; or
 - (ii) vary the original decision in a way the administering authority considers appropriate.
- (6) The application does not stay the original decision.
- (7) The application must not be dealt with by-
 - (a) the person who made the original decision; or
 - (b) a person in a less senior office than the person who made the original decision.
- (8) Within 14 days after making the decision, the administering authority must give written notice of the decision to the applicant and persons who were given notice of the original decision.
- (9) The notice must-
 - (a) include the reasons for the review decision; and
 - (b) inform the person of their right of appeal against the decision.
- (10) If the administering authority does not comply with subsections (5) or (8), the authority is taken to have made a decision confirming the original decision.
- (11) Subsection (7) applies despite section *Acts Interpretation Act 1954*, section 27A.
- (12) This section does not apply to an original decision made by-
 - (a) for a matter, the administration and enforcement of which has been devolved to a local government, the local government itself or the chief executive officer of the local government personally; or
 - (b) for another matter-the chief executive personally.

Stay of operation of original decisions

522.

- (1) If an application is made for review of an original decision, the applicant may immediately apply for a stay of the decision to-
 - (a) for an original decision mentioned in schedule 1, part 1 - the tribunal; or
 - (b) for an original decision mentioned in schedule 1, part 2 - the Court.
- (2) The tribunal or Court may stay the decision to secure the effectiveness of the review and any later appeal to the tribunal or Court.



- (3) A stay may be given on conditions the tribunal or Court considers appropriate and has effect for the period stated by the tribunal or Court.
- (4) The period of a stay must not extend past the time when the administering authority reviews the decision and any later period the tribunal or Court allows the applicant to appeal against the review decision.

Who may appeal

531.

- (1) A dissatisfied person who is dissatisfied with a review decision, other than a review decision to which subdivision 1 applies, may appeal against the decision to the Court.
- (2) The chief executive may appeal against another administering authority's decision (whether an original or review decision) to the Court.
- (3) A dissatisfied person who is dissatisfied with an original decision to which section 521 does not apply may appeal against the decision to the Court.



Queensland Government

**Environmental Protection Agency
Queensland Parks and Wildlife Service**

Northern Regional Office (Townsville)
PO Box 5391 TOWNSVILLE MC QLD 4810
Phone: (07) 4722 5353 Fax: (07) 4722 5351
www.epa.qld.gov.au ABN: 87221158786

Licence No. NR0560
(with development approval)
Section 86 Environmental Protection Act 1994

This licence, issued under the Environmental Protection Act 1994, allows the administering authority to make conditions with regard to financial assurances and matters relating to an Integrated Environmental Management System (IEMS). The licence and its conditions must be considered in conjunction with any conditions imposed on your development approval granted under the Integrated Planning Act 1997 or its equivalent.

**Under the provisions of the
Environmental Protection Act 1994 this licence is issued to:**

Cardwell Properties Pty Ltd
Bruce Highway
Cardwell QLD 4849

Cardwell Properties Pty Ltd
P.O Box 444
Main Beach QLD 4217

in respect of carrying out the environmental relevant activity:

15(b) Sewage treatment - Operating a standard sewage treatment works having a peak design capacity to treat sewage of 100 or more equivalent persons but less than 1 500 equivalent persons

at the following place(s):

Lot 1 on Plan C1043, Lot 2 on Plan CWL1212, Lot 3 on Plan C1043, Lot 41 on Plan C1043, Lot 42 on Plan C1043 and Lot 3 on plan RP733367.

located at:

Bruce Highway, Cardwell, QLD 4849.

This licence is subject to the conditions set out in the attached schedules.

The anniversary date of this licence is 26 October.

This licence takes effect from **26 October 2004**.


Signed

26 October 2004

Date

Tania Laurencont
District Manager
Delegate of Administering Authority
Environmental Protection Act 1994

Note: This licence document is not proof of the current status of the licence. The current status of the licence may be ascertained by contacting the Environmental Protection Agency.

Schedule of conditions

The aforementioned description of the ERA for which this authority is issued is simply a restatement of the activity as prescribed in the legislation at the time of issuing this authority. Where there is any conflict between the above description of the ERA for which this authority is issued and the conditions as specified in this authority as to the scale, intensity or manner of carrying out of the ERA, then such conditions prevail to the extent of the inconsistency.

This authority incorporates the following schedules of conditions relevant to various issues:

- Schedule A - General Conditions
- Schedule H - Definitions
- Schedule I - Maps / Plans

Schedule A - General Conditions

There are no conditions prescribed for this Schedule.

END OF CONDITIONS FOR SCHEDULE A

Schedule H - Definitions

Words and phrases used throughout this licence or development approval are defined below:

Where a definition for a term used in this authority is sought and the term is not defined within this authority the definitions provided in the *Environmental Protection Act 1994*, its regulations, and Environmental Protection Policies shall be used.

Word Definitions

“administering authority” means the Environmental Protection Agency or its successor.

END OF CONDITIONS FOR SCHEDULE H

Schedule I - Maps / Plans

There are no attachments to this schedule.

END OF CONDITIONS FOR SCHEDULE I

END OF ENVIRONMENTAL AUTHORITY



Queensland Government

Environmental Protection Agency
Queensland Parks and Wildlife Service

COPY

Northern Regional Office (Townsville)
PO Box 5391 TOWNSVILLE MC QLD 4810
Phone: (07) 4722 5353 Fax: (07) 4722 5351
www.epa.qld.gov.au ABN: 87221158786

Notice of development application decision

Sections 3.5.11 and 3.5.15 *Integrated Planning Act 1997*

This notice is issued by the administering authority pursuant to sections 3.5.11 and 3.5.15 of the Integrated Planning Act 1997, to advise you of a decision or action.

Enquiries to : Barry James
Telephone : (07) 4722 5353
Your reference : NR0560DA
Our reference : TSV4482

Cardwell Properties Pty Ltd
Bruce Highway
Cardwell QLD 4849

CC: Cardwell Properties Pty Ltd
P.O. Box 444
Main Beach QLD 4217

Attention: Mr Keith Williams,

Re: Application (No. NR0560DA) for development approval by Cardwell Properties Pty Ltd for assessable activity to be carried out at a place situated at Bruce Highway, Cardwell, QLD 4849

Pursuant to part 1 and 2 of Schedule 1A of the *Integrated Planning Regulation 1998*, the Environmental Protection Agency is the assessment manager for the development application.

Assessment Manager information

Assessment Manager office: Environmental Protection Agency
Northern Regional Office (Townsville)
Postal address: PO Box 5391 TOWNSVILLE MC QLD 4810
Telephone: (07) 4722 5353
Fax: (07) 4722 5351

The Environmental Protection Agency, acting as assessment manager under the *Integrated Planning Act 1997* for your application, advises that the development application decision notice about development prescribed under a regulation under the *Environmental Protection Act 1994* for schedule 8 part 1 item 6 of the *Integrated Planning Act 1997* is attached.

Entered/Validated in Ecotrack 5.6.05
Project Reference 264465
Development Approval # ENC000214505
Registration Certificate # ENR000214605
This version amended on _____
Cancelled/Surrendered/Transferred Date: _____
Continuing Registration # _____



COPY

Should you require any further information please do not hesitate to contact Barry James on either phone (07) 4722 5353 or e-mail: barry.james@epa.qld.gov.au

Signed

26 October 2004

Date

Tania Laurencont
District Manager
Delegate of Administering Authority
Environmental Protection Agency

Development application decision notice

Section 3.5.11 and 3.5.15 *Integrated Planning Act 1997*

Applicant:	Cardwell Properties Pty Ltd
EPA Development Application number:	NR0560DA
Date application received by EPA:	12 May 2004
Date of decision:	26 October 2004
Relevant Laws and Policies:	<i>Environmental Protection Act 1994</i> and subordinate legislation
Jurisdiction:	Item 7 of Schedule 2 of the <i>Integrated Planning Regulation 1998</i>

Development Description:

Carrying out of Environmentally Relevant Activity (ERA):

15(b) Sewage treatment - Operating a standard sewage treatment works having a peak design capacity to treat sewage of 100 or more equivalent persons but less than 1 500 equivalent persons

at the following place(s):

Lot 1 on Plan C1043, Lot 2 on Plan CWL1212, Lot 3 on Plan C1043, Lot 41 on Plan C1043, Lot 42 on Plan C1043 and Lot 3 on Plan RP733367

located at:

Bruce Highway, Cardwell, QLD 4849

Type of development

Material change of use of premises is:

- the start of a new use of the premises

Decision on Development Application

In deciding the application, the Environmental Protection Agency, as assessment manager approves all of the application and includes in the approval any concurrence agency conditions as a development permit.

Further development permits required

Nil

Referral agencies

Concurrence Agencies: Nil
Advice Agencies: Nil
Referral Agencies: Nil

Additional information for applicants

This approval pursuant to the *Environmental Protection Act 1994* does not remove the need to obtain any further approval for this development which might be required by other State and/or Commonwealth legislation. Applicants are advised to check with all relevant statutory authorities. Applicants also should comply with all relevant legislation.

It is a requirement of the *Environmental Protection Act 1994* that if the owner or occupier of this site becomes aware a Notifiable Activity (as defined under schedule 2 of the *Environmental Protection Act 1994*) is being carried out on this land or that the land has been affected by a hazardous contaminant, they must, within 30 days after becoming aware the activity is being carried out, give notice to the Environmental Protection Agency. A list of Notifiable Activities is provided within Schedule 2 of the *Environmental Protection Act 1994*.

Appeal

When issuing a decision notice under the *Integrated Planning Act 1997*, the assessment manager must state the rights of appeal for the applicant (section 3.5.15(2)(j)). The rights of appeal are attached to the back of this notice.


Signed

26 October 2004

Date

Tania Laurencont
District Manager
Delegate of Administering Authority
Environmental Protection Act 1994

Conditions of the development approval

This development approval consists of the following schedules of conditions relevant to various issues:

The aforementioned description of the environmentally relevant activity (ERA) for which this development approval is issued is simply a restatement of the activity as prescribed in the legislation at the time of issuing this development approval. Where there is any conflict between the above description of the ERA for which this development approval is issued and the conditions as specified in this development approval as to the scale, intensity or manner of carrying out of the ERA, then such conditions prevail to the extent of the inconsistency.

This development approval authorises the ERA. It does not authorise environmental harm unless a concurrence agency condition within this development approval explicitly authorises that harm. Where there is no condition or the development approval is silent on a matter, the lack of a condition or silence shall not be construed as authorising harm.

- Schedule A - Activity
- Schedule B - Air
- Schedule C - Water
- Schedule D - Noise
- Schedule E - Waste
- Schedule F - Land
- Schedule G - Community
- Schedule H - Definitions
- Schedule I - Maps / Plans

Schedule A - Activity

Prevent and /or minimise likelihood of environmental harm

- (A1-1) In carrying out the environmentally relevant activities, you must take all reasonable and practicable measures to prevent and / or to minimise the likelihood of environmental harm being caused. Any environmentally relevant activity, that, if carried out incompetently, or negligently, may cause environmental harm, in a manner that could have been prevented, shall be carried out in a proper manner in accordance with the conditions of this approval.

NOTE: This approval authorises the environmentally relevant activity. It does not authorise environmental harm unless a condition contained within this approval explicitly authorises that harm. Where there is no condition or the approval is silent on a matter, the lack of a condition or silence shall not be construed as authorising harm.

Maintenance of measures, plant and equipment

- (A2-1) The holder must:
- install all measures, plant and equipment necessary to ensure compliance with the conditions of this environmental authority; and
 - maintain such measures, plant and equipment in a proper and efficient condition; and
 - operate such measures, plant and equipment in a proper and efficient manner.
- (A2-2) A visual and audible alarm system shall be installed and maintained to alert the holder to any mechanical or electrical malfunctions of the plant

Site based management plan

- (A3-1) From commencement of the activity, a Site Based Management Plan (SBMP) must be implemented. The SBMP must identify all sources of environmental harm, including but not limited to the actual and potential release of all contaminants, the potential impact of these sources and what actions will be taken to prevent the likelihood of environmental harm being caused. The SBMP must also provide for the review and 'continual improvement' in the overall environmental performance of all Environmentally Relevant Activities that are carried out.

The site based management plan must address the following matters:

- Environmental commitments - a commitment by senior management to achieve environmental goals.
- Identification of environmental issues and potential impacts.
- Control measures for routine operations to minimise likelihood of environmental harm.
- Contingency plans and emergency procedures for non-routine situations.
- Organisational structure and responsibility.
- Effective communication.
- Monitoring of the contaminant releases.
- Conducting environmental impact assessments.
- Staff training.
- Record keeping.
- Periodic review of environmental performance and continual improvement.

Peak Design Capacity

- (A3-2) The development permit only authorises sewage treatment for a maximum daily inflow volume of 412 kilolitres.

Records

- (A5-1) Record, compile and keep all monitoring results required by this document and present this information to the administering authority when requested, in a specified format.

Acid sulphate soils (ASS)

- (A7-1) You must comply with the latest edition of the Queensland Environmental Protection Agency's INSTRUCTIONS FOR THE TREATMENT AND MANAGEMENT OF ACID SULFATE SOILS, 2001, produced by the Queensland Environmental Protection Agency in consultation with the Department of Natural Resources and Mines and the Department of Primary Industries.
- (A7-2) Acid sulfate soils must be managed such that contaminants are not be directly or indirectly released, as a result of the activity, to any waters or the bed and banks of any waters.

Annual monitoring report (Sewage treatment)

- (A8-1) An annual monitoring report must be provided to the administering authority with the annual return. This report shall include but not be limited to:
- a summary of the previous twelve (12) months' monitoring results obtained under any monitoring programs required under this authority and, in graphical form showing relevant limits, a comparison of the previous twelve (12) months monitoring results to both this authority limits and to relevant prior results;
 - an evaluation/explanation of the data from any monitoring programs; and
 - a summary of any record of quantities of releases required to be kept under this authority; and
 - a summary of the record of equipment failures or events recorded for any site under this authority; and
 - an outline of actions taken or proposed to minimise the environmental risk from any deficiency identified by the monitoring or recording programs; and
 - the number of domestic tenements newly connected to the sewage treatment works during the previous twelve (12) months; and
 - the progressive total number of connections; and
 - a summary of any trade waste agreements entered into or amended during the year, including the nature of the industry.

END OF CONDITIONS FOR SCHEDULE A

Schedule B - Air

Nuisance

- (B1-2) The release of noxious or offensive odours or any other noxious or offensive airborne contaminants resulting from the activity must not cause a nuisance at any odour sensitive place.

Dust nuisance

- (B2-1) The release of dust and/or particulate matter resulting from the activity must not cause an environmental nuisance at any dust sensitive place.

END OF CONDITIONS FOR SCHEDULE B

Schedule C - Water

Monitoring

- (C1-1) Monitoring must be undertaken and records kept of contaminant releases to waters from the discharge location for the parameters and not less frequently than specified in Schedule C Table 1. All determinations of the quality of contaminants released must be:
- made in accordance with methods prescribed in the latest edition of the Environment Protection Agency Water Quality Sampling Manual; and
 - carried out on samples that are representative of the discharge.

Schedule C - Table 1 (Release limits)

Monitoring point	Discharge location	Quality characteristics	Release limit			Monitoring frequency
			Minimum	50th Percentile	Maximum	
Outlet from wet weather storage tanks	W1 (One Mile Creek - Upstream side of road culvert under the Bruce Highway adjoining Lot 2 on Plan CWL1212)	Suspended Solids			5 mg/L	At least once during a discharge, then weekly there after during a discharge.
		5 Day - Biological Oxygen Demand			10 mg/L	
		Total Nitrogen		5 mg/L	10 mg/L	
		Total Phosphorous		1 mg/L	2 mg/L	
		Faecal Coliform		10 Colony forming units per 100ml	100 Colony forming units per 100ml	
		pH	6.5 pH units		8.5 pH units	
		Dissolved Oxygen	2 mg/L			

Release to waters

- (C3-2) Contaminants must only be released to waters after wet weather storage has reached capacity due to wet weather conditions preventing irrigation, from the discharge location and in compliance with the release limits listed in Schedule C Table 1.

Discharge Location W1 - namely release of tertiary treated effluent from Cardwell Properties Pty Ltd sewage treatment plant wet weather storage tanks located on Lot 1 on Plan C1043 to One Mile Creek at the upstream side of the road culvert under the Bruce Highway adjoining Lot 2 on Plan CWL1212.

- (C3-3) Withstanding condition C3-2, contaminants must only be released to One Mile Creek when a minimum dilution factor of **10** - Creek flow to **1** - treated effluent is achieved and creek flow overspills the weir located between One Mile Creek and the Grand Canal.
- (C3-4) A flow measurement device to measure creek water flows must be located on One Mile Creek adjacent within Lot 1 on Plan C1043 for the purpose of determining when release can occur in accordance with condition C3-3.
- (C3-5) The daily volume of contaminants released to waters must be determined or estimated by an appropriate method, for example a flow meter, and records kept of such determinations and estimates.
- (C3-6) The total quantity of contaminants released to waters via the release point listed in Schedule C Table 3, must not exceed the respective quantities stated for each release point in Schedule C Table 3 on any wet weather day that prevents irrigation that has resulted in wet weather storage exceeding capacity.

Schedule C - Table 3

Maximum permitted quantity of release	
Release point	Maximum release on any wet weather day **
W1 (One Mile Creek - Upstream side of road culvert under the Bruce Highway adjoining Lot 2 on Plan CWL1212)	412 Kilolitres

** "Maximum release on any wet weather day" means releases may only occur when wet weather prevents irrigation as conditioned in Schedule F and wet weather storage tanks have reached capacity.

Discharge location details

- (C4-2) The discharge location to One Mile Creek must be submerged such that the top of the outfall pipe is at least 0.5 metres under water at all times during discharge.

Stormwater management

- (C5-1) There must be no release of stormwater runoff that has been in contact with any contaminants at the site to any waters, roadside gutter or stormwater drain.

Contaminant and sewage pump station

- (C6-1) Contaminant pumping stations must be fitted with stand-by pumps and pump-failure alarms as well as high level alarms to warn of imminent pump station overflow. All alarms must be able to operate without mains power.

Tank conditions

- (C7-1) All tanks used for the storage or treatment of contaminants, sewage or wastes at or on the authorised place must be constructed, installed and maintained:
- so as to minimise the likelihood of any release of effluent from the tanks to any waters (including ground water);
 - so that releases from the wet weather storage tanks only occurs as a result of the tanks reaching capacity due to weather conditions preventing irrigation; and
 - so that there is a minimum wet weather storage capacity of 1.5 Mega litres per 500 Equivalent Persons.

Release to Groundwater

- (C8-1) A Groundwater Monitoring Program must be developed and implemented prior to the commencement of operations of the sewage treatment system, which will effectively detect the presence and extent of contamination of groundwater from the treated effluent irrigation area as detailed in Schedule F.
- (C8-2) The Groundwater Monitoring Program required under C8-1 must be designed by a suitable qualified person and must include sufficient monitoring points and/or bores to obtain representative samples of groundwater both up-gradient and down gradient of the potential influence of the treated effluent irrigation area as detailed in Schedule F.
- (C8-3) Prior to commencement of the operation of the treated effluent irrigation areas, background groundwater quality monitoring must be conducted at the monitoring bores identified in the Ground

Water Monitoring Program required under condition C8-1 to determine baseline ground water quality characteristics.

- (C8-4) Groundwater monitoring must be undertaken and records kept of a monitoring program that detects any possible impacts on groundwater from releases of contaminants to the irrigation area. Groundwater monitoring must be undertaken at the frequency, and for the parameters specified in Schedule C - Table 4. All determinations of the quality of contaminants released must be:
- made in accordance with methods prescribed in the latest edition of the Environment Protection Agency Water Quality Sampling Manual; and
 - carried out on samples that are representative of the groundwater.

Schedule C - Table 4 (Monitoring program)

Quality characteristics	Units	Frequency
Total Nitrogen (as N)	mg/L	Six Monthly*
Total Phosphorous (as P)	mg/L	
Ammonia (as N)	mg/L	
Nitrate (as N)	mg/L	
Nitrite (as N)	mg/L	
Total Kjeldahl Nitrogen (as N)	mg/L	
Faecal Coliform	Colony forming units per 100 millilitres	
pH	pH units	
Conductivity	Micro siemens / cm	

* Monitoring to be conducted biannually such as possible that both wet and dry seasons are represented.

- (C8-5) Standing groundwater levels in metres must be measured and recorded on each occasion that samples are obtained. Such measurement must be reported as the depth in metres from an established reference point, relative to Australian Height Datum, to water surface within the bore.

END OF CONDITIONS FOR SCHEDULE C

Schedule D - Noise and vibration

Noise nuisance

- (D1-1) Noise from activities must not cause an environmental nuisance at any noise affected premises.

Noise monitoring

- (D2-1) When requested by the Administering Authority, noise monitoring must be undertaken to investigate any complaint of noise nuisance, and the results notified within 14 days to the administering authority. Monitoring must include:
- L_A 10, adj, 10 mins
 - L_A 1, adj, 10 mins
 - the level and frequency of occurrence of impulsive or tonal noise;
 - atmospheric conditions including wind speed and direction;
 - effects due to extraneous factors such as traffic noise; and
 - location, date and time of recording.
- (D2-2) The method of measurement and reporting of noise levels must comply with the latest edition of the Environmental Protection Agency's Noise Measurement Manual.

END OF CONDITIONS FOR SCHEDULE D

Schedule E - Waste

Waste handling

- (E5-1) All regulated waste removed from the site must be removed by a person who holds a current approval to transport such waste under the provisions of the *Environmental Protection Act 1994*.
- (E5-2) Records must be kept for five years, and must include the following information:
- date of pickup of waste;
 - description of waste;
 - cross reference to relevant waste transport documentation;
 - quantity of waste;
 - origin of the waste;
 - destination of the waste; and
 - intended fate of the waste, for example, type of waste treatment, reprocessing or disposal.

NOTE: Records of documents maintained in compliance with a waste tracking system established under the Environmental Protection Act 1994 or any other law for regulated waste will be deemed to satisfy this condition.

END OF CONDITIONS FOR SCHEDULE E

Schedule F - Land

Land disposal

- (F2-1) The only contaminants permitted to be released to land are treated effluents to the areas shown in Figure 1 Schedule I in compliance with the limits levels stated in Table 1 of the Land Schedule and the conditions of this authority.

Schedule F - Table 1 (Release limits - 'Land')

Quality characteristics	Release Limit		
	Minimum	50th Percentile	Maximum
Suspended Solids			5 mg/L
5 Day - Biological Oxygen Demand			10 mg/L
Total Nitrogen		5 mg/L	10 mg/L
Total Phosphorous		1 mg/L	2 mg/L
Faecal Coliform		10 Colony forming units per 100ml	100 Colony forming units per 100ml
PH	6.5 pH units		8.5 pH units
Dissolved Oxygen	2 mg/L		

- (F2-2) The irrigation of effluent must be carried out in a manner such that:
- vegetation is not damaged;
 - soil erosion and soil structure damage is avoided;
 - there is no surface ponding of effluent;
 - percolation of effluent beyond the plant root zone is minimised;
 - the capacity of the land to assimilate nitrogen, phosphorus, salts, organic matter as measured by oxygen demand and water is not exceeded; and
 - the quality of ground water is not adversely affected.
- (F2-3) Notices must be prominently displayed on any effluent irrigation area warning the public that the area is irrigated with effluent and not to use or drink the effluent. These notices must be maintained in a visible and legible condition.
- (F2-5) Monitoring must be undertaken and records kept of a monitoring program of contaminant releases to the irrigation area at the monitoring points, frequency, and for the parameters specified in Schedule F - Table 2.

Schedule F - Table 2 (Monitoring program)

Monitoring point	Quality characteristics	Units	Frequency
Outlet from effluent storage tanks when a discharge occurs.	Suspended Solids	mg/L	Monthly
	5 Day - Biological Oxygen Demand	mg/L	Monthly
	Total Nitrogen	mg/L	Monthly
	Total Phosphorous	mg/L	Monthly
	Faecal Coliform	Colony forming units per 100 millilitres	Monthly
	pH	pH units	Weekly
	Dissolved Oxygen	mg/L	Weekly

- (F2-6) The daily volume of contaminants released to land must be determined or estimated by an appropriate method, for example a flow meter, and records kept of such determinations and estimates.
- (F2-7) When conditions prevent the irrigation of treated effluent to land (such as during or following rain events), the effluent must be directed to wet weather storage tanks.
- (F2-8) The total quantity of treated effluent released to land for the purpose of irrigation via the release point listed in Schedule F Table 3, must not exceed the respective quantities stated for each release point in Schedule F Table 3 on any dry weather day.

Schedule F - Table 3

Maximum daily quantity of treated effluent released on any dry weather day*	
Release point	Maximum daily release
Outlet of effluent storage tank	620 Kilolitres

Notes: * "Dry weather day" means when conditions are such that irrigation will not result in surface ponding or runoff over the irrigation area.

Preventing contaminant release to land

- (F3-2) Spillage of all chemicals and fuels must be contained within an on-site containment system and controlled in a manner that prevents environmental harm.

NOTE: All petroleum product storage's must be designed, constructed and maintained in accordance with AS 1940 - Storage and Handling of Flammable and Combustible Liquids.

END OF CONDITIONS FOR SCHEDULE F

Schedule G - Community

Complaint response

- (G1-1) All complaints received must be recorded including investigations undertaken, conclusions formed and action taken. This information must be made available to the administering authority on request.
- (G1-2) In consultation with the administering authority, cooperate with and participate in any community environmental liaison committee established in respect of either the site specifically, or the industrial estate where the site is located.

END OF CONDITIONS FOR SCHEDULE G

Schedule H - Definitions

Words and phrases used throughout this licence or development approval are defined below:
Where a definition for a term used in this approval is sought and the term is not defined within this approval the definitions provided in the *Environmental Protection Act 1994*, its regulations, and Environmental Protection Policies shall be used.

Word Definitions

"administering authority" means the Environmental Protection Agency or its successor.

"you" means the holder of this Environmental Authority or owner / occupier of the land which is the subject of this Development Approval.

"site" means the place to which this environmental authority relates or the premises to which this development approval relates.

"authorised place" means the place authorised under this environmental authority/development approval for the carrying out of the specified environmentally relevant activities.

"this authority" means this environmental authority/development approval.

"authority" means level 1 licence (without development approval), or level 1 approval (without development approval), or level 2 approval (without development approval) under the *Environmental Protection Act 1994*.

"approval" means 'notice of development application decision' or 'notice of concurrence agency response' under the *Integrated Planning Act 1997*

"dust sensitive place" means -

- a dwelling, mobile home or caravan park, residential marina or other residential place;
- a motel, hotel or hostel;
- a kindergarten, school, university or other educational institution;
- a medical centre or hospital;
- a protected area;
- a park or gardens; or
- a place used as an office or for business or commercial purposes.
and includes the curtilage of any such place.

"odour sensitive place" has the same meaning as a "dust sensitive place"

"dwelling" means any of the following structures or vehicles that is principally used as a residence-

- a house, unit, motel, nursing home or other building or part of a building;
- a caravan, mobile home or other vehicle or structure on land;
- a water craft in a marina.

"noxious" means harmful or injurious to health or physical well being.

"offensive" means causing offence or displeasure; is disagreeable to the sense; disgusting, nauseous or repulsive.

"nuisance sensitive place" includes -

- a dwelling, residential allotment, mobile home or caravan park, residential marina or other residential premises; or
 - a motel, hotel or hostel; or
 - a kindergarten, school, university or other educational institution; or
 - a medical centre or hospital; or
 - a protected area under the Nature Conservation Act 1992, the Marine Parks Act 1992 or a World Heritage Area; or
 - a public thoroughfare, park or gardens; or
 - a place used as a workplace, an office or for business or commercial purposes.
- and includes a place within the curtilage of such a place reasonably used by persons at that place.

"L_A 10, adj, 10 mins" means the A-weighted sound pressure level, (adjusted for tonal character and impulsiveness of the sound) exceeded for 10% of any 10 minute measurement period, using Fast response.

"L_A 1, adj, 10 mins" means the A-weighted sound pressure level, (adjusted for tonal character and impulsiveness of the sound) exceeded for 1% of any 10 minute measurement period, using Fast response

"noise affected premises" means a "noise sensitive place" or a "commercial place"

"noise sensitive place" means -

- a dwelling, mobile home or caravan park, residential marina or other residential premises; or
 - a motel, hotel or hostel; or
 - a kindergarten, school, university or other educational institution; or
 - a medical centre or hospital; or
 - a protected area; or
 - a park or gardens.
- and includes the curtilage of such place.

"commercial place" means a place used as an office or for business or commercial purposes.

"intrusive noise" means noise that, because of its frequency, duration, level, tonal characteristics, impulsiveness or vibration -

- is clearly audible to, or can be felt by, an individual; and
- annoys the individual.

In determining whether a noise annoys an individual and is unreasonably intrusive, regard must be given to Australian Standard 1055.2 - 1997 Acoustics - Description and Measurement of Environmental Noise Part 2 - Application to Specific Situations.

"waters" includes river, stream, lake, lagoon, pond, swamp, wetland, unconfined surface water, unconfined water natural or artificial watercourse, bed and bank of any waters, dams, non-tidal or tidal waters (including the sea), stormwater channel, stormwater drain, roadside gutter, stormwater run-off, and groundwater and any part thereof.

"50th percentile" means not more than three (3) of the measured values of the quality characteristic are to exceed the stated release limit for any six (6) consecutive samples for a release/monitoring point at any time during the environmental activity(ies) works.

"Maximum" means that the measured value of the quality characteristics or contaminant must not be greater than the higher release limit stated.



"land" in the "land schedule" of this document means land excluding waters and the atmosphere.

"mg/L" means milligrams per litre.

"NTU" means nephelometric turbidity units

"regulated waste" means non-domestic waste mentioned in Schedule 7 of the Environmental Protection Regulation 1998 (whether or not it has been treated or immobilised), and includes:

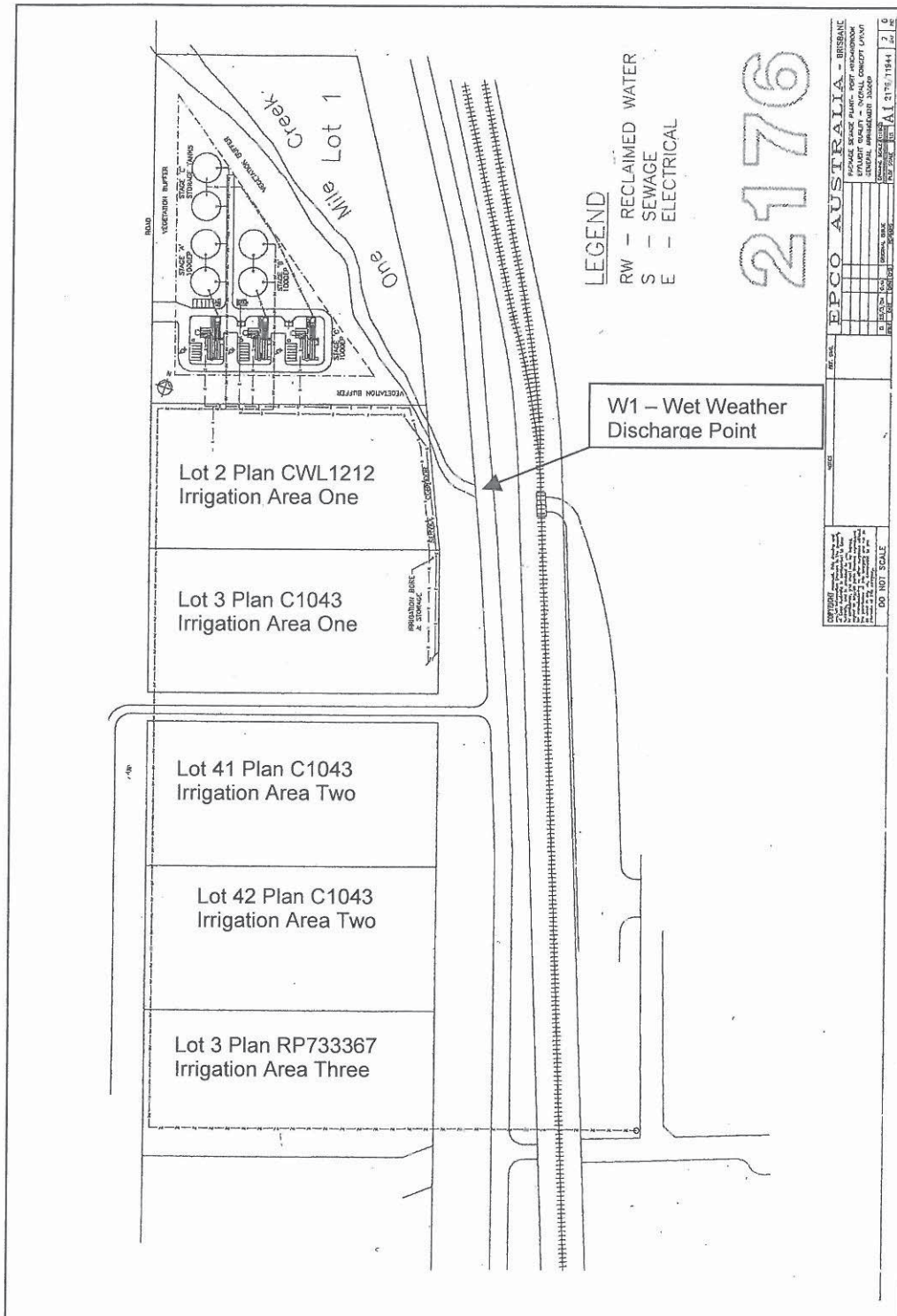
- for an element - any chemical compound containing the element; and
- anything that has contained the waste.

"annual return" means the return required by the annual notice (under section 316 of the Environment Protection Act, 1994) for the section 86(2) licence that applies to the development approval.

END OF DEFINITIONS FOR SCHEDULE H

Schedule I - Maps / Plans

Figure 1: Irrigation Area and Wet Weather Discharge Point



END OF CONDITIONS FOR SCHEDULE I

END OF DEVELOPMENT APPROVAL

Extract from the *Integrated Planning Act 1997*

Division 8—Appeals to court relating to development applications

Appeals by applicants

- 4.1.27 (1) An applicant for a development application may appeal to the court against any of the following -
- (a) the refusal, or the refusal in part, of a development application;
 - (b) a matter stated in a development approval, including any condition applying to the development, and the identification of a code under section 3.1.6;
 - (c) the decision to give a preliminary approval when a development permit was applied for;
 - (d) the length of a currency period;
 - (e) a deemed refusal.
- (2) An appeal under subsection (1)(a) to (d) must be started within 20 business days (the “**applicant’s appeal period**”) after the day the decision notice or negotiated decision notice is given to the applicant.
- (3) An appeal under subsection (1)(e) may be started at any time after the last day a decision on the matter should have been made.

Appeals by submitters

- 4.1.28 (1) A submitter for a development application may appeal to the court about -
- (a) the giving of a development approval, including any conditions (or lack of conditions) or other provisions of the approval; or
 - (b) the length of a currency period for the approval.
- (2) The appeal must be started within 20 business days (the “**submitter’s appeal period**”) after the day the decision notice or negotiated decision notice is given to the submitter.
- (3) If a person withdraws a submission before the application is decided, the person may not appeal the decision.
- (4) If an application involves both impact assessment and code assessment, appeal rights for submitters are available only for the part of the application involving impact assessment.

Appeals by advice agency submitters

- 4.1.29 (1) An advice agency may, within the limits of its jurisdiction, appeal to the court about the giving of a development approval for a development application if -
- (a) the development application involves impact assessment; and
 - (b) the advice agency told the applicant and the assessment manager to treat its response to the application as a submission for an appeal.
- (2) The appeal must be started within 20 business days after the day the decision notice or negotiated notice is given to the advice agency as a submitter.

Appeals for matters arising after approval given (co-respondents)

- 4.1.30 (1) For a development approval given for a development application, a person to whom any of the following notices have been given may appeal to the court against the decision in the notice -
- (a) a notice giving a decision on a request for an extension of the currency period for an approval;
 - (b) a notice giving a decision on a request to make a minor change to an approval.
- (2) The appeal must be started within 20 business days after the day the notice of the decision is given to the person.
- (3) Subsection (1)(a) does not apply if the approval resulted from a development application (superseded planning scheme) that was assessed as if it were an application made under a superseded planning scheme.

Division 9 - Appeals to court about other matters

Appeals for matters arising after approval given (no co-respondents)

- 4.1.31 (1) A person to whom any of the following notices have been given may appeal to the court against the decision in the notice -
- (a) a notice giving a decision on a request to change or cancel a condition of a development approval;
 - (b) a notice under section 6.1.44 giving a decision to change or cancel a condition of a development approval.
- (2) The appeal must be started within 20 business days after the day the notice of the decision is given to the person.

Appeals against enforcement notices

- 4.1.32 (1) A person who is given an enforcement notice may appeal to the court against the giving of the notice.
- (2) The appeal must be started within 20 business days after the day notice is given to the person.

Stay of operation of enforcement notice

- 4.1.33 (1) The lodging of a notice of appeal about an enforcement notice stays the operation of the enforcement notice until -
- (a) the court, on the application of the entity issuing the notice, decides otherwise; or
 - (b) the appeal is withdrawn; or
 - (c) the appeal is dismissed.
- (2) However, subsection (1) does not apply if the enforcement notice is about -
- (a) a work, if the enforcement notice states the entity believes the work is a danger to persons or a risk to public health; or
 - (b) carrying out development that is the demolition of a work.

Appeals against decisions on compensation claims

- 4.1.34 (1) A person who is dissatisfied with a decision under section 5.4.8 or 5.5.3 for the payment of compensation may appeal to the court against -
- (a) the decision; or
 - (b) a deemed refusal of the claim.
- (2) An appeal under subsection (1)(a) must be started with 20 business days after the day notice of the decision is given to the person.
- (3) An appeal under subsection (1)(b) may be started at any time after the last day a decision on the matter should have been made.

Appeals against decisions on requests to acquire designated land under hardship

- 4.1.35 (1) A person who is dissatisfied with a designator's decision to refuse a request made by the person under section 2.6.19, may appeal to the court against -
- (a) the decision; or
 - (b) a deemed refusal of the request.
- (2) An appeal under subsection (1)(a) must be started within 20 business days after the day notice of the decision is given to the person.
- (3) An appeal under subsection (1)(b) may be started at any time after the last day a decision on the matter should have been made.

Appeals from tribunals

- 4.1.37 (1) A party to a proceeding decided by a tribunal may appeal to the court against the tribunal's decision, but only on the ground -
- (a) of error or mistake in law on the part of the tribunal; or
 - (b) that the tribunal had no jurisdiction to make the decision or exceeded its jurisdiction in making the decision.
- (2) An appeal against a tribunal's decision must be started within 20 business days after the day notice of the tribunal's decision is given to the party.

Court may remit matter to tribunal

- 4.1.38 If an appeal includes a matter within the jurisdiction of a tribunal and the court is satisfied the matter should be dealt with by a tribunal, the court must remit the matter to the tribunal for decision.

Division 10 - Making an appeal to court

How appeals to the court are started

- 4.1.39 (1) An appeal is started by lodging written notice of appeal with the registrar of the court.
- (2) The notice of appeal must state the grounds of the appeal.
 - (3) The person starting the appeal must also comply with the rules of the court applying to the appeal.
 - (4) However, the court may hear and decide an appeal even if the person has not complied with subsection (3).

Certain appellants must obtain information about submitters

- 4.1.40 (1) If the applicant or a submitter for a development application appeals about the part of the application involving impact assessment, the appellant must ask the assessment manager to give the appellant the name and address of each principal submitter who made a properly made submission about the application and has not withdrawn the submission.
- (2) The assessment manager must give the information requested under subsection (1) as soon as practicable.

Notice of appeal to other parties (div 8)

- 4.1.41 (1) An appellant under division 8 must, within 10 business days after the day the appeal is started (or if information is requested under section 4.1.40, within 10 business days after the day the appellant is given the information) give written notice of the appeal to -
- (a) if the appellant is an applicant - the assessment manager, any concurrence agency, any principal submitter whose submission has not been withdrawn and any advice agency treated as a submitter whose submission has not been withdrawn; or
 - (b) if the appellant is a submitter or an advice agency whose response to the development application is treated as a submission for an appeal - the assessment manager, the applicant and any concurrence agency; or
 - (c) if the appellant is a person to whom a notice mentioned in section 4.1.30 has been given - the assessment manager and any entity that was a concurrence agency for the development application.
- (2) The notice must state -
- (a) the grounds of the appeal; and
 - (b) if the person given the notice is not the respondent or a co-respondent under section 4.1.43 - that the person, within 10 business days after the day the notice is given, may elect to become a co-respondent to the appeal.

Notice of appeal to other parties (div 9)

- 4.1.42 (1) An appellant under division 9 must, within 10 business days after the day the appeal is started give written notice of the appeal to -
- (a) if the appellant is a person to whom a notice mentioned in section 4.1.31⁷³ has been given - the entity that gave the notice; or
 - (b) if the appellant is a person to whom an enforcement notice is given - the entity that gave the notice and if the entity is not the local government, the local government; or
 - (c) if the appellant is a person dissatisfied with a decision about compensation - the local government that decided the claim; or
 - (d) if the appellant is a person dissatisfied with a decision about acquiring designated land - the designator; or
 - (e) if the appellant is a person who is disqualified as a private certifier - the entity disqualifying the person and if the entity disqualifying the person is not the accrediting body, the accrediting body; or
 - (f) if the appellant is a party to a proceeding decided by a tribunal - the other party to the proceeding.
- (2) The notice must state the grounds of the appeal.

Respondent and co-respondents for appeals under div 8

- 4.1.43 (1) This section applies to appeals under division 8 for a development application.
- (2) The assessment manager is the respondent for the appeal.
 - (3) If the appeal is started by a submitter, the applicant is a co-respondent for the appeal.
 - (4) If the appeal is about a concurrence agency response, the concurrence agency is a co-respondent for the appeal.
 - (5) If the appeal is only about a concurrence agency response, the assessment manager may apply to the court to withdraw from the appeal.
 - (6) The respondent and any co-respondents for an appeal are entitled to be heard in the appeal as a party to the appeal.
 - (7) A person to whom a notice of appeal is required to be given under section 4.1.41 and who is not the respondent or a co-respondent for the appeal may elect to be a co-respondent.

Respondent and co-respondents for appeals under div 9

- 4.1.44 (1) This section applies if an entity is required under section 4.1.42 to be given a notice of an appeal.
- (2) The entity given written notice is the respondent for the appeal.
 - (3) However, if under a provision of the section more than 1 entity is required to be given notice, only the first entity mentioned in the provision is the respondent.
 - (4) The second entity mentioned in the provision may elect to be a co-respondent.

How a person may elect to be co-respondent

- 4.1.45 (1) An entity elects to be a co-respondent by lodging in the court, within 10 business days after the day the notice of the appeal is given to the entity, a notice of election under the rules of court.
- (2) If a principal submitter is entitled to elect to become a co-respondent, any other submitter for the submission may also elect to become a co-respondent to the appeal.

Minister entitled to be represented in an appeal involving a State interest

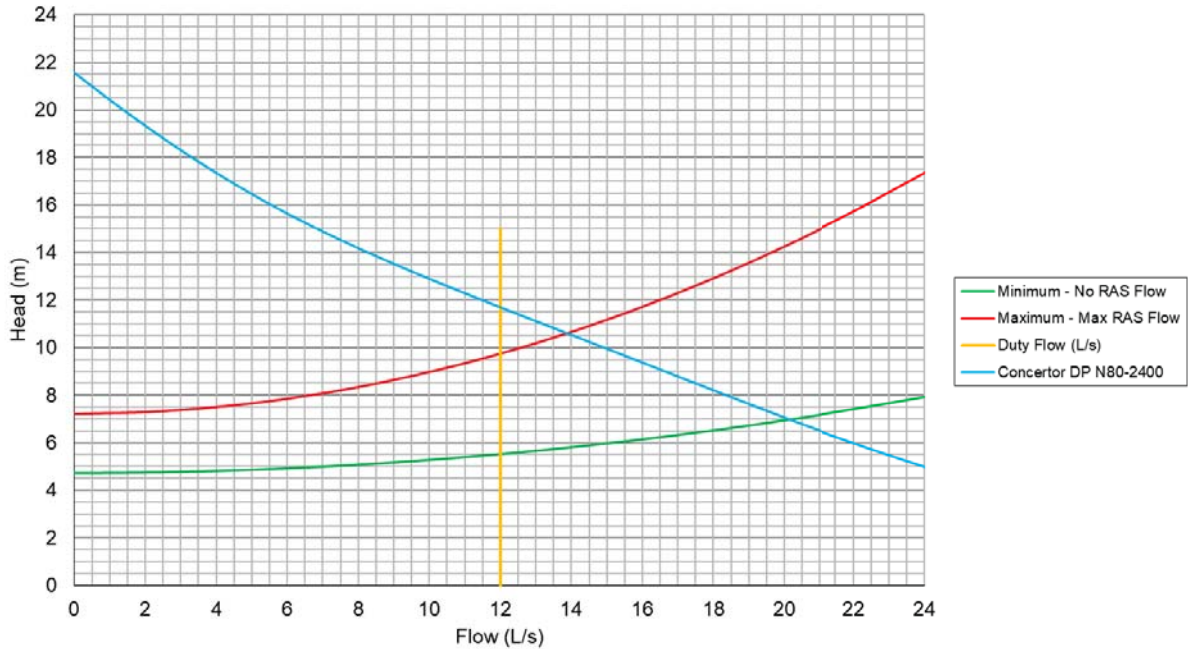
- 4.1.46 If the Minister is satisfied that an appeal involves a State interest, the Minister is entitled to be represented in the appeal.

Lodging appeal stops certain actions

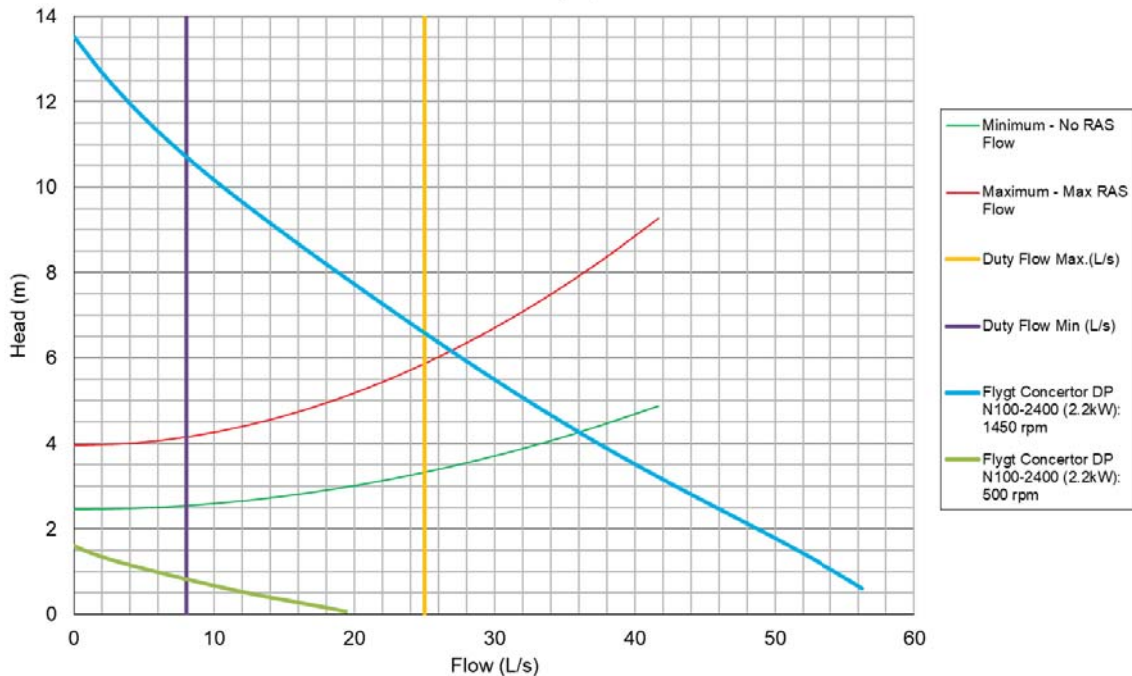
- 4.1.47 (1) If an appeal (other than an appeal under section 4.1.30) is started under division 8, the development must not be started until the appeal is decided or withdrawn.
- (2) Despite subsection (1), if the court is satisfied the outcome of the appeal would not be affected if the development or part of the development is started before the appeal is decided, the court may allow the development or part of the development to start before the appeal is decided.

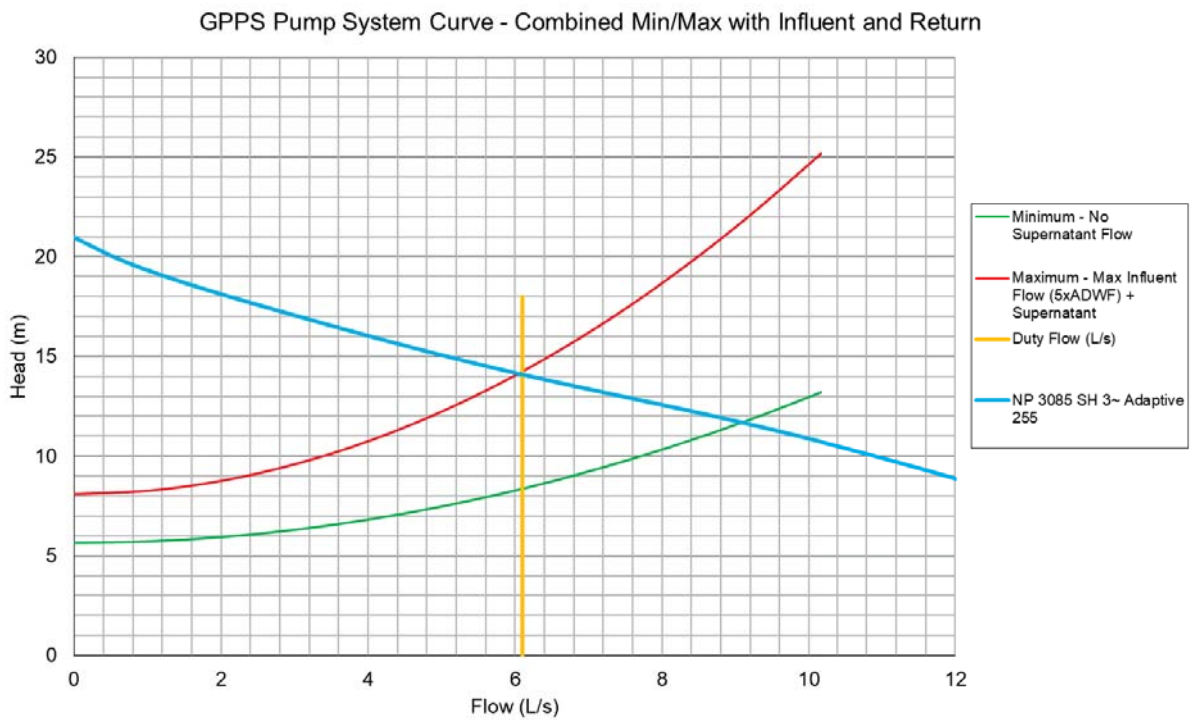
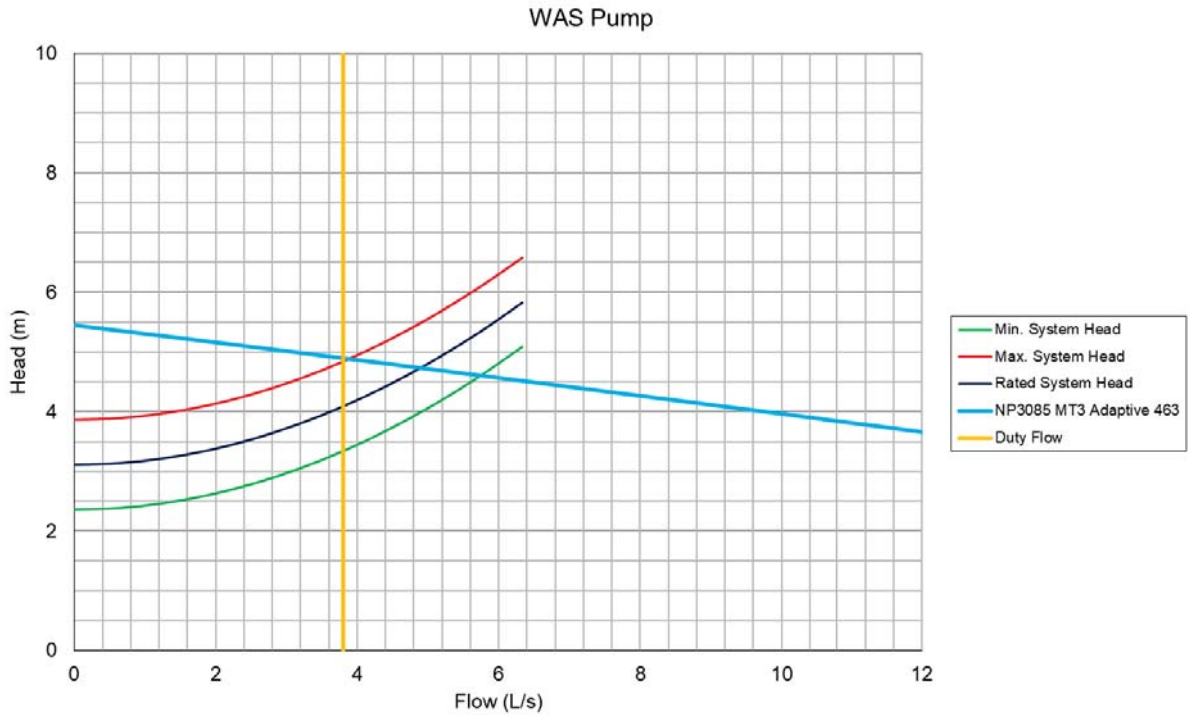
Appendix B - Pump System Curves

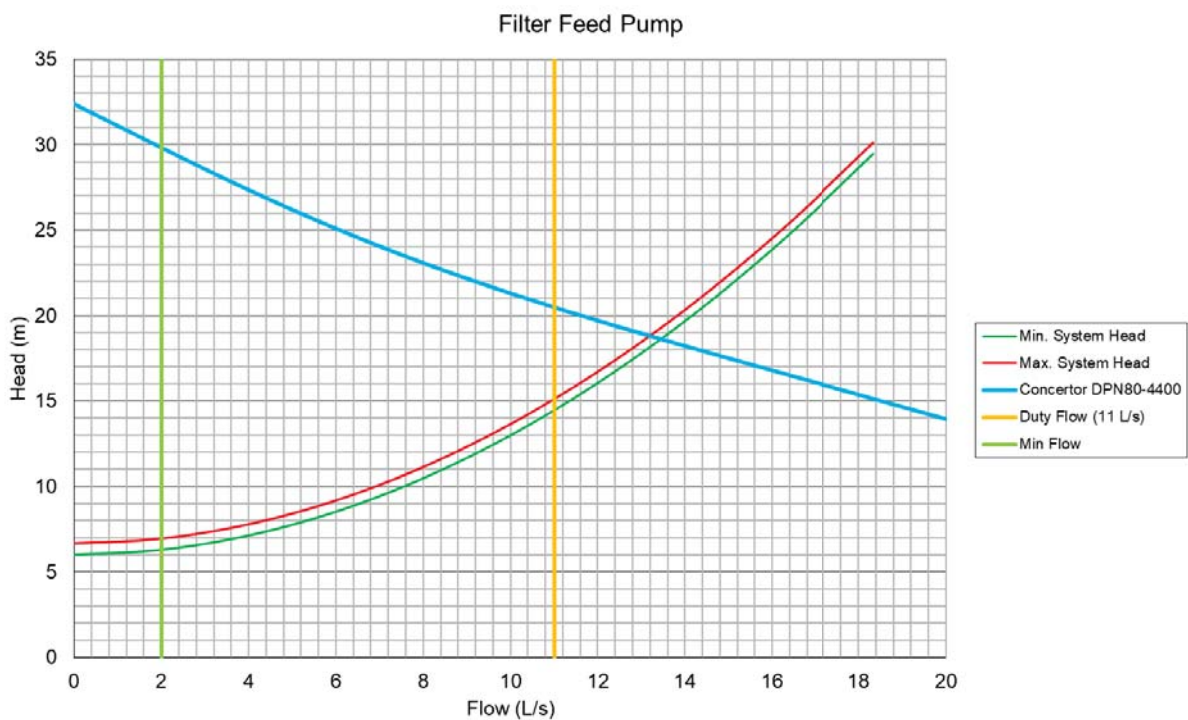
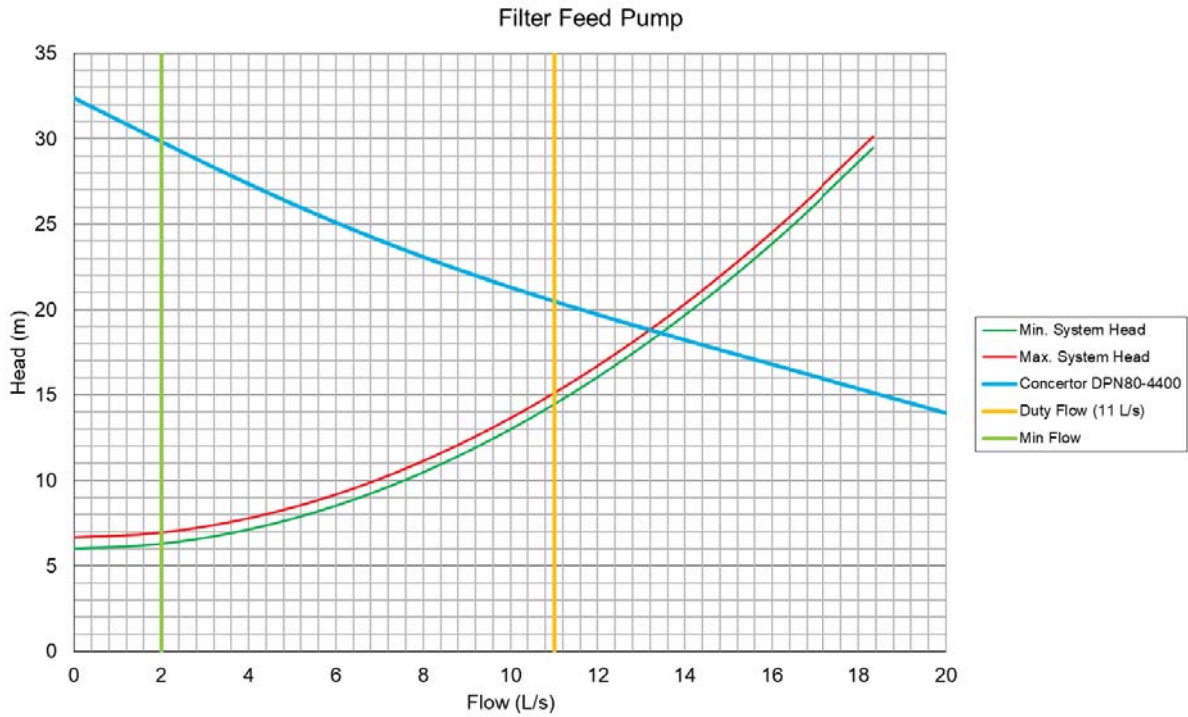
SBR Feed Pump System Curve - Combined Min/Max System Curves with RAS Return
Discharge through Common Dropper Pipe into SBR

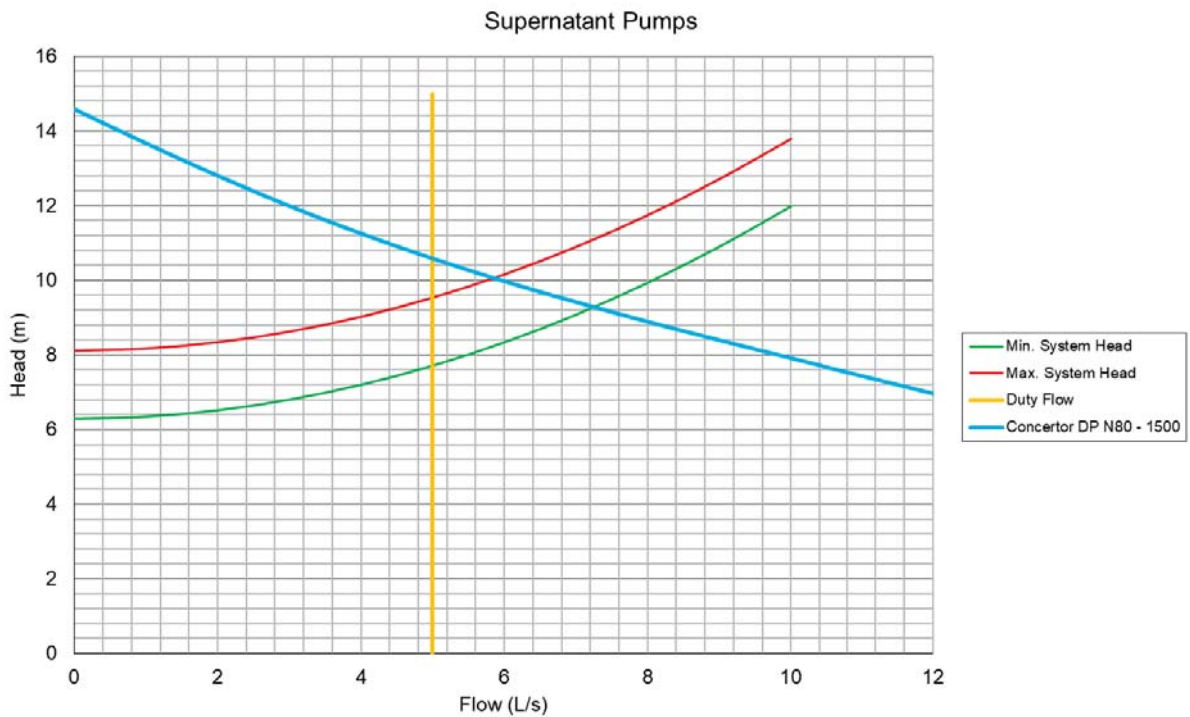
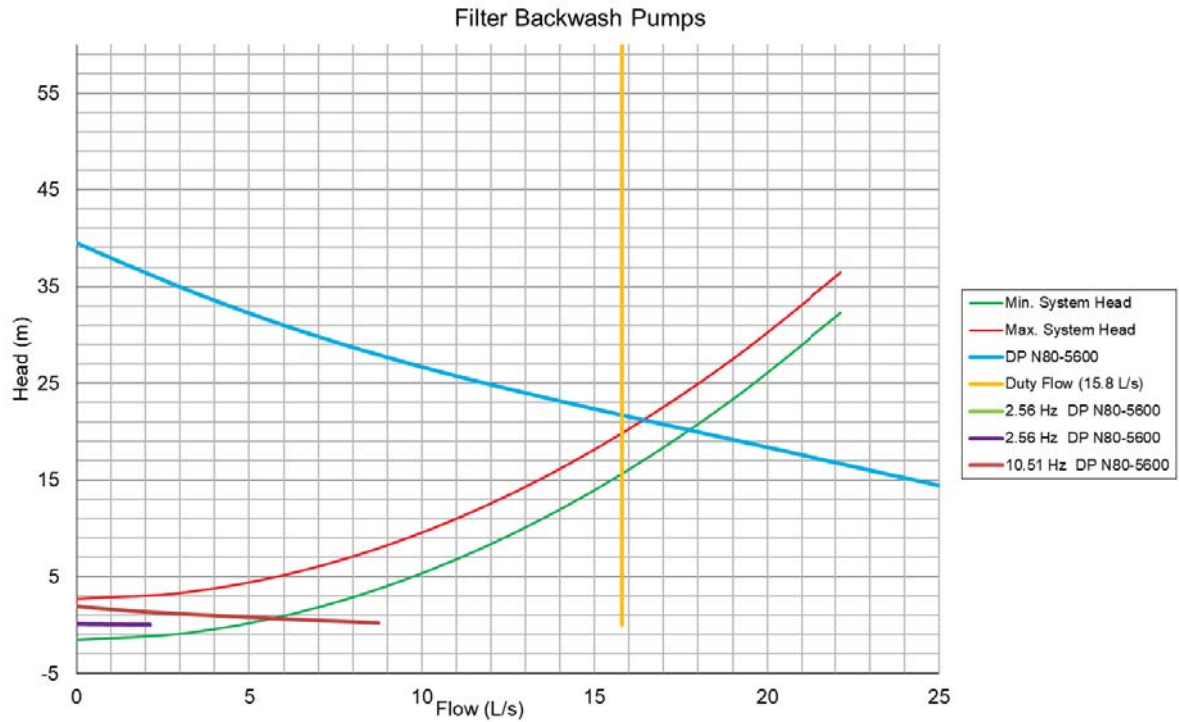


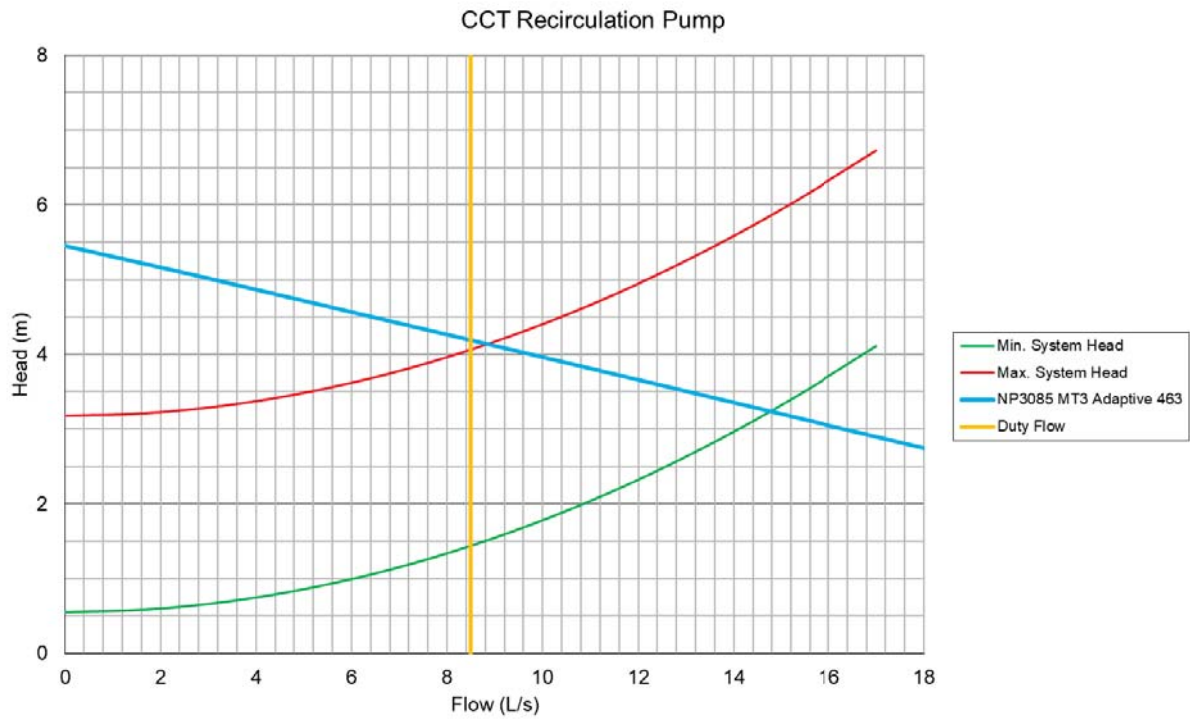
RAS Pump System Curve











Appendix C - Capital Cost Estimate

Port Hinchinbrook STP Upgrade 1645-EST-001 CAPEX Cost Estimate Cost Estimate Summary - Rev 0 Progress Estimate							
Date: 27/11/2020				Comparison to Revision C to 0			
Process Area / Major Item	Additional Details and Comments	Price (Ex. GST)	CCRC Preferences (Additional Items)	Comments	Rev C Estimate	Rev C & B Difference	
1 - Inlet Works	Packaged Type Inlet Works	\$ 296,900	\$ -	Significant steelwork required for raised structure, platform & pipework	\$ 298,400	-1,500.00	
2 - SBR	Balance Tank, Bioreactor, CCT & Sludge Storage Tank	\$ 1,318,800	\$ -	Significant steelwork, pipework and concrete due to raising of structure	\$ 1,242,900	75,900.00	
3 - Tertiary Filtration	Tertiary Filters & Pump Sets (Backwash, Recycled Water & Service Water Pumps)	\$ 450,200	\$ -	Larger footprint to allow for future filters and storage as requested by CCRC	\$ 443,500	6,700.00	
4 - Recycled Water Storage	1.5ML Recycled Water Storage Tank (Glass Fused Steel Panel Tank)	\$ 539,756	\$ -		\$ 582,256	-42,500.12	
5 - GPPS	Packaged type pump station	\$ 123,300	\$ -		\$ 111,400	11,900.00	
6 - Chemical Dosing	Chemical Storage and Dosing, including concrete bund and roof structure	\$ 174,900	\$ -		\$ 192,700	-17,800.00	
7 - Electrical General	Switchboard, PLC, SCADA, Site Run Electrical & LCPs and Generator (includes switchroom)	\$ 726,300	\$ -	Final switchboard sizing changed building size.	\$ 624,800	101,500.00	
8 - Civil Works	Earthworks, Roadworks, civil pipework and landscaping	\$ 364,600	\$ -	Nil	\$ 282,600	82,000.00	
9 - Supernatant PS	Refurbish Existing Supernatant Pump Station, no allowance for epoxy coating	\$ 53,000	\$ -	To be revised following completion of full design	\$ 53,500	-500.00	
10 - Admin Building	Refer attached area estimate	\$ 40,000	\$ -	Nil	\$ 40,000	0.00	
11 - Septage Receiving	Allowance for discharge into GPPS	\$ 82,800	\$ 82,800	To be revised following completion of full design	\$ 104,000	-21,200.00	
12 - Decommissioning	Allowance for decommissioning / disconnections of existing plant	\$ 50,000	\$ -	Nil	\$ 50,000	0.00	
	TOTAL DIRECT COSTS	\$ 4,220,556	\$ 82,800		\$ 4,026,096	\$ 194,459.36	
Commissioning	5% Direct Costs	\$ 211,028	5%		\$ 201,363.00	9,724.79	
Indirect Cost Allowance	15% of Direct Costs & Commissioning Costs	\$ 664,738	15%		\$ 634,104.00	30,633.55	
Contractor Profit Margin	10% of Direct Costs, indirect Costs & Commissioning Costs	\$ 509,632	10%		\$ 486,146.00	23,486.12	
	ESTIMATED CONSTRUCTION CONTRACT AWARD SUM	\$ 5,605,953			\$ 5,347,669	\$ 258,344.35	
Design and Investigation Costs	Design & Investigation Costs	\$ 373,920.00		Current costings	\$ 373,920.00	0.00	
Additional Design/Investigations	Additional geotechnical investigations, service location and survey	\$ 30,000		Additional survey and geotech investigations	\$ 30,000.00	0.00	
Construction Project Management	CCRC Costs excluded from estimate	-		CCRC Costs excluded from estimate	-	-	
Construction Contingency	10% of Estimated Contract Award Sum and Construction Management Costs	\$ 597,987.33	10%	Reduced contingency to 10% for the Rev 0 estimate.	\$ 858,229.31	-260,241.98	
	TOTAL CONSTRUCTION COSTS	\$ 6,607,861			\$ 6,609,758	\$ 1,897.35	
TOTAL COST ESTIMATE		\$ 6,607,861	\$ -		\$ 6,609,758	-\$ 1,897.35	

Notes and Assumptions

- The estimate costs are all exclusive of GST
- The prices stated are a best estimate at the time of compiling the estimate
- There has been no allowance for inflation or currency fluctuations
- The costs have been developed and are limited to the scope of the design with estimates based on quantities available from the IFC drawings
- No allowance has been made for the upgrade of the transformer. It is assumed the existing incoming electrical mains are suitable for the upgraded plant.
- Costs for equipment and instrumentation nominated in the respective schedules have been based on vendor quotes and where lacking, similar designs. Where vendor quotes are unavailable an allowance has been made based on similar installations and sizing
- The estimate does not take into account any lost time due to inclement weather.

Port Hinchinbrook STP Upgrade
1645-EST-001 CAPEX Cost Estimate
Cost Estimate
1 - Inlet Works

	CAPEX Total	Comments
ITEM DESCRIPTION		
Major Equipment	\$ 158,700.00	
New Packaged Inlet Works (include bagging unit, grit blowers)	\$ 158,300	
Wheely Bins 240L	\$ 400	
Pipework & Fittings	\$ 33,500.00	
150-RAW-SS3-1001 Pipe & Fittings	\$ 3,500	
150-SCS-SS3-1002 Pipe & Fittings	\$ 2,800	
200-SCS-SS3-1010 Pipe & Fittings	\$ 4,100	
150-RAW-SS3-1000 Pipe & Fittings	\$ 9,500	
DN100 Gate Valves	\$ 1,000	
DN150 Gate Valves	\$ 5,100	
DN200 Gate Valves	\$ 800	
DN80 Gate Valves	\$ 1,100	
DN80 Non-Return Valves	\$ 1,500	
DN150 Non-Return Valves	\$ 900	
Misc Allowances for Tappings/Fittings	\$ 3,200	
Instrumentation	\$ 3,100.00	
DN150 Magflow Flowmeter	\$ 3,100	
DN80 Magnetic Flowmeter	\$ 5,300	GPPS & Supernatant Flowmeters
Civil / Structural / Concrete Works	\$ 87,400.00	
Inlet Works Concrete Hardstand	\$ 8,000	
Screen Support Plinths	\$ 2,900	
Access Stairs	\$ 24,000	
Structural Steel for Inlet Works	\$ 52,500	Additional steelwork for raised structure
GRP Grating	\$ 6,600	
Structural Steel (Pipe Supports)	\$ 2,300	Allowance
Sub Total	\$ 296,900	

Port Hinchinbrook STP Upgrade
1645-EST-001 CAPEX Cost Estimate
Cost Estimate
2 - SBR

	CAPEX Total	Comments
ITEM DESCRIPTION		
Major Equipment	\$ 364,000.00	
Submersible WAS pump	\$ 11,500	
Bioreactor Mixers inc devit assembly	\$ 11,200	
Aeration Grids incl. SOTR factory testing	\$ 70,100	
A-Recycled Pump	\$ 13,500	
Weir Penstock (incl. Local control box)	\$ 143,200	
Aeration Blowers (Duty/Standby)	\$ 19,300	
Filter Feed Pumps	\$ 28,000	
CCT Recirculation Pump	\$ 11,500	
Balance Tank Pumps	\$ 21,500	
Digester Jet Aerator Pump	\$ 33,800	
Balance Tank Pipe & Fittings	\$ 19,200.00	
DN100 SS Balance Tank Pumps Feed Pipework	\$ 6,000	
DN100 SS Balance Tank Pumps Feed Pipe Fittings	\$ 1,000	
DN150 SS Balance Tank Pumps Feed Pipework	\$ 2,100	
DN150SS Balance Tank Pumps Feed Pipe Fittings	\$ 2,100	
DN100 NRV	\$ 900	
DN100 Gate Valves	\$ 1,000	
DN250 Balance Tank Overflow bellmouth (above ground)	\$ 2,100	
DN200 SS Digester Q/P Pipework	\$ 2,000	
SBR Pipework & Valves	\$ 26,400.00	
DN80 SS WAS Pipework	\$ 6,000	
DN150 RAS Pipework	\$ 8,000	
DN80 SS WAS NRV	\$ 400	
DN150 NRV	\$ 1,300	
DN25 scum spray bars pipework PE	\$ 1,800	
DN25 scum spray bars solenoid valve	\$ 900	
Additional Fittings Etc.	\$ 5,000	
SBR Inlet Pipework Dropper Inculding bellmouth	\$ 3,000	
CCT Pipework and Valves	\$ 22,600.00	
DN100 Filter Feed Pipework (inclusive AG & BG)	\$ 10,000	
DN80 CCT Recirculation Pipework	\$ 4,500	
DN100 NRV	\$ 2,400	
DN100 Gate Valves	\$ 1,200	
DN80 NRV	\$ 400	
DN80 Gate Valve	\$ 500	
DN250 CCT Overflow bellmouth (above ground)	\$ 3,600	
Aeration Pipework, Fittings and Valves	\$ 9,300.00	
DN150SS Air Header Pipework	\$ 4,000	
DN100 Butterfly Valves	\$ 2,300	
DN100SS Air Pipework	\$ 3,000	
Instrumentation	\$ 23,700.00	
Level Switch (Floats) - CCT & Balance Tank	\$ 500	
Balance Tank Level Instrument (Radar Level Instrument)	\$ 1,100	
Pumps Discharge Pressure Gauges (various)	\$ 500	
DN65 WAS Flowmeter	\$ 2,600	
DN150 A-Recycled and SBR Feed Flowmeters	\$ 6,100	
pH/Temp + Mounting Arm	\$ 2,200	
DO Meter + Mounting Arm	\$ 3,800	
pH/Temp & DO Meter Controller (inc Network Module)	\$ 3,300	
Sludge Thickener Level Instrument (Radar)	\$ 1,100	
SBR Level Instrument (Radar)	\$ 1,100	
SBR Blowers Discharge Pressure Transmitter	\$ 400	
SBR Blowers Discharge Flow Switch	\$ 500	
SBR Blowers Discharge Temperature Transmitter	\$ 500	
Civil Works	\$ 712,400.00	
SBR, CCT & Balance Tank - Base Slab	\$ 143,200	
SBR, CCT & Balance Tank - blinding	\$ 7,000	
Concrete Walls (500mm thick)	\$ 400,400	
Concrete Walls (400 thick)	\$ 107,800	
Epoxy Coating (2mm)	\$ 46,800	SBR coating (300mm below BWL), CCT all coated)
SBR Blower Concrete Slab	\$ 7,200	
Platforms and Walkways	\$ 141,200.00	
New walkways, kickplates, grating and handrails	\$ 52,800	
Access stairways	\$ 24,000	
Blowers Skillion Roof Structure	\$ 21,600	
Structural Steel (Pipe Supports)	\$ 30,000	Additional steelwork required for elevated structure
Balance Tank / CCT Benching	\$ 12,800	
Sub Total	\$ 1,318,800	

Port Hinchinbrook STP Upgrade
1645-EST-001 CAPEX Cost Estimate
Cost Estimate
3 - Tertiary Filtration

ITEM DESCRIPTION	CAPEX Total	Comments
Major Equipment	\$ 263,100.00	
Tertiary Filters Skid, Including pipework, valves and instrumentation	\$ 146,900	
Filter Backwash Pumps	\$ 48,100	
Service Water Pumps	\$ 34,700	
Recycled Water Pumps	\$ 33,400	
Instrumentation	\$ 6,700.00	
DN100 Filter Feed, Recycled Water and Service Water Flowmeters	\$ 3,000	
Flow Switch to Drainage	\$ 600	
DN150 Backwash Flowmeter	\$ 3,100	
Allowance for Additional Service Water/Backwash Instruments	\$ 10,700	
Pipework, Fittings and Valves	\$ 59,300.00	
Filter Outlet Pipework to Recycled Water Tank	\$ 18,000	
Backwash Pipework (Filter Connection to Balance Tank)	\$ 30,000	
Recycled Water Tank Outlet and Common Pipe Manifold to Pumps	\$ 11,300	
Concrete & Proprietary Shed Structure	\$ 110,400.00	
Hardstand/Slab	\$ 14,400	
Foundations	\$ 24,000	
Shed Structure (Proprietary Shed Structure)	\$ 72,000	Estimate/m2 shed rate
	\$ -	
Sub Total	\$ 450,200	

Port Hinchinbrook STP Upgrade
1645-EST-001 CAPEX Cost Estimate
Cost Estimate
4 - Recycled Water Storage

		CAPEX Total	Comments
ITEM DESCRIPTION			
Major Equipment	\$	400,300	
Glass Fused Steel Panel Tank	\$	400,300	
Instrumentation	\$	6,100	
Pressure Instrument (Level)	\$	2,400	
Level Switch (Floats)	\$	200	
Free Chlorine Analyser	\$	3,500	
Pipework	\$	13,300	
Outlet Nozzles & Flexibility Deisgn (i.e. bellows)	\$	7,000	
DN200 SS Overflow / Drainage Pipework A/G	\$	4,500	
DN200 Outlet Valves	\$	1,800	
Civil Works	\$	120,000	
600mm Foundation Beam Foundation & 250mm Slab	\$	120,000	
Sub Total	\$	539,700	

Port Hinchinbrook STP Upgrade
1645-EST-001 CAPEX Cost Estimate
Cost Estimate
5 - GPPS

	CAPEX Total	Comments
ITEM DESCRIPTION		
Major Equipment	\$ 89,100.00	
Packaged Pump Station including pumps (2x 10.5L/s), internal pipework, instrumentation, electrical and controls	\$ 89,100	Note additional storage allowance for septage recieval.
Pipework, Fittings and Valves (inc all Valves from P&ID-0013)	\$ 15,300.00	
OD90 HDPE Rising Main to Inlet Works (below ground)	\$ 7,500	
DN100 SS Rising Main (above ground)	\$ 1,500	
DN150 PVC Pipework	\$ 1,300	
DN150 PVC GPPS Overflow to Grade	\$ 3,000	
DN25 Ball Valve	\$ 100	
DN100 Gate Valve	\$ 900	
DN100 Non Return Valve	\$ 500	
DN25 RPZD	\$ 500	
DN25 Strainer	\$ -	
Instrumentation	\$ -	
		Included in packaged PS quote
Civil Works	\$ 16,500.00	
Detailed Excavation	\$ 1,600	
Backfill	\$ 1,300	
Concrete slab	\$ 6,400	
Collection Manhole (includes excavation) - (100mm x 3500mm)	\$ 6,000	
Pipe Supports	\$ 1,200	
Mass Concrete Ballast	\$ 2,400	
Sub Total	\$ 123,300.00	

Port Hinchinbrook STP Upgrade
1645-EST-001 CAPEX Cost Estimate
Cost Estimate
6 - Chemical Dosing

	CAPEX Total	Comments
ITEM DESCRIPTION		
Major Equipment	\$ 96,000.00	
Sugar Dosing Skid	\$ 28,400	
Hypo Dosing Skid	\$ 28,400	
ACH Dosing Skid	\$ 28,400	
Storage Tank (1000L Poly Tank)	\$ 8,000	
Safety shower w/ eyewash	\$ 2,800	
Pipework, Fittings and Valves	\$ 9,100.00	
DN25 PVC Chemical Delivery Pipework (various)	\$ 7,500	
DN20 PVC Ball Valves	\$ 200	
DN25 PVC Ball Valves	\$ 200	
DN32 PVC Ball Valve	\$ 200	
DN50 Ball Valve uPVC	\$ 200	
DN100 Gate Valve (bund drain)	\$ 300	
DN150 Gate Valve (Delivery bund drain)	\$ 300	
DN25 RPZD	\$ 100	
DN25 Strainer	\$ 100	
Instrumentation	\$ 6,000.00	
Radar Level Instrument	\$ 3,000	
Flow Switch	\$ 1,500	
Pressure Switch	\$ 1,500	
Civil Works	\$ 63,800.00	
Concrete Slab & Bund	\$ 35,000	
Skillion roof including steel structure	\$ 28,800	
Sub Total	\$ 174,900.00	

**Port Hinchinbrook STP Upgrade
1645-EST-001 CAPEX Cost Estimate
Cost Estimate
7 - Electrical General**

		CAPEX Total	Comments
ITEM DESCRIPTION			
General Electrical	\$	561,300	
Switchboard incl. SCADA & PLC	\$	250,000	Estimate
Other Elec Works incl. LV cabling, lighting, data, controls etc.	\$	275,000	Estimate
Emergency Generator	\$	36,300	Estimate
Civil Works	\$	165,000	
Switchboard Building (includes slab, walls roof)	\$	165,000	
Sub Total	\$	726,300	

**Port Hinchinbrook STP Upgrade
1645-EST-001 CAPEX Cost Estimate
Cost Estimate
8 - Civil Works**

	CAPEX Total	Comments
ITEM DESCRIPTION		
Bulk Earthworks	\$ 104,500	
Topsoil clearing and stockpile onsite	\$ 12,800	
Cut to fill onsite	\$ 4,000	
Cut to spoil	\$ 22,400	
Imported Fill	\$ 24,300	
Erosion and sediment control - silt fence	\$ 4,000	
Turf Swales	\$ 3,000	
Seeding of site	\$ 30,000	
Infill with Bluemetal	\$ 4,000	
Roadworks	\$ 133,400	
Subgrade Placement for concrete (300mm thick DGS20)	\$ 7,200	
Concrete road pavement (200mm thick, 32MPA, SL92 mesh)	\$ 36,000	
Chip Seal	\$ 8,800	
Subbase for chip seal road (150mm Class 2 DGB)	\$ 13,200	
Subgrade for chip seal road (150mm DGS 20)	\$ 13,200	
Concrete kerb	\$ 6,000	
Subsoil drains (e.g. below kerbs)	\$ 4,000	
Stormwater Field inlet pit	\$ 6,000	
Chemical Delivery Bund - SL82 Mesh, 40MPA Concrete	\$ 18,000	
Offline Storage Below Bunds	\$ 21,000	
Civil Piping	\$ 106,700	
DN150 PVC	\$ 5,200	
DN100 PVC	\$ 10,000	
DN250 PVC	\$ 7,000	
DN300 PVC	\$ 14,500	
DN375 PVC	\$ 17,000	
DN225 DI CL	\$ 18,000	
OD63 HDPE Service Water Pipe Site Run	\$ 15,000	
OD110 STP Inlet Pipe		
Allowance for Manholes <3m deep	\$ 20,000	
Electrical Conduits & Cable Pits	\$ 20,000	
Sub Total	\$ 364,600	

Port Hinchinbrook STP Upgrade
1645-EST-001 CAPEX Cost Estimate
Cost Estimate Summary - Rev 0 Progress Estimate
9 - Supernatant PS

	CAPEX Total	Comments
ITEM DESCRIPTION		
Major Equipment	\$ 44,600.00	
Refurbish/Reseal Existing Pump Station	\$ 25,500	
New Pumps (if required)	\$ 19,100	
Pipework, Fittings and Valves (inc all Valves from P&ID-0013)	\$ 7,500.00	
OD90 HDPE Rising Main to Inlet Works (below ground)	\$ 7,500	
Instrumentation	\$ 900.00	
New Float Switches	\$ 900	
	\$ -	
Sub Total	\$ 53,000.00	

**Port Hinchinbrook STP Upgrade
1645-EST-001 CAPEX Cost Estimate
Cost Estimate
10 - Admin Building**

	CAPEX Total	Comments
ITEM DESCRIPTION		
Equipment Supply	\$ 40,000	
Allowance for refurbishment of existing building	\$ 25,000	Allowance only
Laboratory Equipment, Operator Computer Etc.	\$ 15,000	Allowance only
Sub Total	\$ 40,000	

Port Hinchinbrook STP Upgrade
1645-EST-001 CAPEX Cost Estimate
Cost Estimate Summary - Rev 0 Progress Estimate
11 - Septage Receival

	CAPEX Total	Comments
ITEM DESCRIPTION		
Major Equipment	\$ 64,000.00	
Septage Receival Screen	\$ 64,000	
Wheely Bins 240L	\$ 200	
Pipework, Fittings and Valves (inc all Valves from P&ID-0013)	\$ 15,000.00	
Allowance for Pipework Etc.	\$ 15,000	Allowance only
Civil Works	\$ 3,600.00	
Concrete Hardstand	\$ 3,600	
	\$ -	
	\$ -	
Sub Total	\$ 82,800.00	

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