

Selfs Point Sewage Treatment Plant Upgrade **TasWater**

Environmental Impact Statement | April 2024

Aboriginal acknowledgement

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They are the original custodians of our land, sky and waters. We respect their unique ability to care for country and deep spiritual connection to it.

We honour and pay our respect to Elders past and present, whose knowledge and wisdom has and will ensure the continuation of culture and traditional practices.

We acknowledge that their sovereignty has never been ceded.

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Glossary

Abbreviation	Definition
ADCP	acoustic Doppler current profiler
ADWF	average dry weather flow
AMP	ambient monitoring plan
AMR	ambient monitoring report
AMT	accepted modern technology
ANZG	Australian and New Zealand guidelines (for fresh and marine water quality)
ASS	acid sulfate soils
BNR	biological nutrient removal
BOD	biochemical oxygen demand
CDO	TasWater Capital Delivery Office
CEMP	Construction Environmental Management Plan
CSA	Contaminated Site Assessment
dB	decibel
dB(A)	the A-weighted sound pressure level in decibels
DBP	disinfection by-product
DCCEEW	The Department of Climate Change, Energy, the Environment and Water
DEP	Derwent Estuary Program
DGVs	default guideline values
EIS	Environmental Impact Statement (this document)
EMPC Act	<i>Environmental Management and Pollution Control Act 1994 (Tas)</i>
EPA	Environment Protection Authority Tasmania
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (Cth)</i>
EPN	Environmental Protection Notice
HCC	Hobart City Council

Abbreviation	Definition
kL	kilolitre
LAeq	The A-weighted equivalent continuous sound level
LOR	limits of reporting
MBR	membrane bioreactor
ML	megalitres
ml	millilitres
NBES	North Barker Ecosystem Services
NOI	Notice of Intent
Noise EPP	<i>Environment Protection Policy (Noise) 2009</i>
OCU	odour control unit
OEMP	Operational Environmental Management Plan
OU	odour unit
PEVs	Protected Environmental Values
PWWF	peak wet weather flow
SCADA	supervisory control and data acquisition
SOER	standard odour emission rate
SPS	sewage pumping station
STP	sewage treatment plant
SWL	Sound power level
TDS	total dissolved solids
TKN	Total Kjeldahl nitrogen
TSS	Total suspended solids
TOC	total organic carbon
TSP Act	<i>Threatened Species Protection Act 1995 (Tas)</i>
TW	Tasmanian Water and Sewerage Corporation, trading as TasWater
UST	underground storage tank

Abbreviation	Definition
WAS	waste activated sludge
WQO	water quality objective
µg	microgram (one millionth of a gram)

Executive summary

TasWater is proposing to replace the existing sewage treatment plant (STP) at Selfs Point in New Town, southern Tasmania, with a new, contemporary STP. The project will use the existing Selfs Point STP site and a parcel of adjacent land.

The primary objective of the project is to amalgamate sewage treatment from the existing Macquarie Point STP and existing Selfs Point STP into a single modern plant, to enable the Macquarie Point STP to be decommissioned and enable the redevelopment of Macquarie Point. This will enable Macquarie Point to be utilised as a mixed-use zone for commercial and residential purposes, which cannot currently be achieved with the STP in place due to planning constraints.

A Notice of Intent for the project was submitted to the Environment Protection Authority (EPA) Tasmania in August 2020, with the EPA determining the project would require a class B assessment as a level 2 activity under the *Environmental Management and Pollution Control Act 1994*, requiring the submission of an Environmental Impact Statement (EIS) to the EPA for approval (this document). The project is also subject to planning requirements under the *Land Use Planning and Approvals Act 1993* through the Hobart City Council.

The project involves the development of the new STP at the existing STP site, with retention of minor pieces of infrastructure from the existing Selfs Point STP site as part of the new design. The project also includes the replacement of the existing local Selfs Point effluent outfall pipeline with a completely new effluent pipeline and diffuser several hundred metres downstream of the existing outfall. The project does not consider any upstream infrastructure associated with the redirection of sewage from Macquarie Point to the new plant or any additional downstream infrastructure associated with the main Selfs Point STP discharge location at the Blinking Billy effluent outfall off Long Beach in Sandy Bay; where required, these works will be assessed as part of separate projects.

The project includes the following key aspects that will allow the new Selfs Point STP to treat the combined Macquarie Point and Selfs Point catchment flows to a high quality:

- New inlet works
- A new bioreactor
- A new 8.5 ML treated effluent storage tank
- A new sludge treatment system
- A new odour treatment system
- Replacement and relocation of the existing local Selfs Point effluent outfall pipeline.

The bulk of the existing STP infrastructure will eventually be decommissioned following commissioning of the new plant, with only minor decommissioning required as part of project construction.

The new STP will enable treatment of all predicted flows from the Selfs Point and Macquarie Point catchments until the year 2054, which equates to 24.9 ML/day average dry weather flow (ADWF).

The construction of the project is planned to commence during FY24-25 and is estimated to take approximately 18 - 24 months to complete, followed by a commissioning period. The total cost of the project is in excess of \$100 million.

The potential for environmental impacts to occur during construction are considered low with appropriate management and mitigation measures in place. The key focus areas for construction management include noise from construction machinery, odour emissions during decommissioning of existing odorous STP components, minimising impact to blue gums that occur within the site and provide potential foraging habitat for the threatened swift parrot, and potentially contaminated soils associated with historical reclamation and landfill around the existing site.

Operationally, there are unlikely to be any substantive changes from the air and noise emissions currently experienced at receptors around the project site; if anything, odour is expected to improve according to modelling results. Odour modelling undertaken for the project predicted the regulatory 2 OU boundary

limit would be met at the boundary of the STP when modelled using Sydney Water database figures for the treatment equipment proposed to be used for the project.

The project will result in a net environmental benefit to the Derwent Estuary by reducing the amounts of nitrogen and phosphorus entering the estuary from the current Selfs Point and Macquarie Point STPs (combined flows) by 58% and 42% respectively. The project will also prevent non-emergency discharges from the Macquarie Point effluent outfall, and will as far as practicable discharge dry weather effluent flows to the Blinking Billy effluent outfall (with occasional wet weather discharge at the local Selfs Point effluent outfall), which provides superior mixing and dilution of effluent.

Overall the project is expected to be of significant benefit to the community and the aquatic environment and will enable the progression of the development of Macquarie Point, a key project for Hobart and Tasmania.

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Appendix C Noise

Appendix D Odour

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1 Introduction

1.1 Title of project

This Environmental Impact Statement (EIS) has been prepared to seek approval for the proposed **Selfs Point Sewage Treatment Plant Upgrade Project**.

1.2 Project overview

The Tasmanian Water and Sewerage Corporation (TW) owns and operates the Selfs Point Sewage Treatment Plant (STP) in southern Tasmania. The STP is a level 2 advanced secondary treatment facility licensed under Environmental Protection Notice (EPN) 8548/1, EPN 9797/1 and EPN 10344/1 to treat an average dry weather flow (ADWF) of 13 ML of sewage per day. The STP currently treats approximately 8.1 ML/day of primarily residential wastewater from a catchment including New Town, Lenah Valley, Sandy Bay and Taroona via a 'Biodenipho' bioreactor system.

The project is for the replacement of the Selfs Point STP, with the retention of some minor infrastructure from the existing STP, to increase its treatment capacity to 24.9 ML/day ADWF and improve its efficacy to allow the acceptance of additional flows from the nearby Macquarie Point STP, which will be decommissioned as part of the planned Macquarie Point redevelopment.

The Macquarie Point STP currently receives approximately 10.4 ML/day of mainly residential sewage, along with some industrial waste streams from the surrounding Hobart catchment. These flows are proposed to be pumped to the Selfs Point STP via a new sewage pumping station (SPS) to be located at the decommissioned Macquarie Point STP site, and a new pipeline between the SPS and Selfs Point STP; these components, along with the decommissioning of the Macquarie Point STP, do not form part of the proposed project.

The proposed project includes the following key components:

- New inlet works and primary treatment
- Installation of new bioreactors
- Installation of a new 8.5 ML treated effluent storage tank to balance flows
- New sludge treatment system
- Installation of a new odour treatment system
- Replacement of the existing local Selfs Point effluent outfall pipeline.

Some minor components of the existing STP will be retained and repurposed in the new design, including the Blinking Billy pumping station and outfall, chlorine building, laboratory, operator office, and control room building. The remaining existing STP infrastructure will be decommissioned under the EPN for the existing STP.

Collectively, the above components are referred to as 'the Project' throughout this document. The location of the Project with respect to Macquarie Point and other existing components is shown in Figure 1-1 and the layout of the Project components are shown in Figure 2-3 (the Project footprint).

Construction of the Project is planned to commence in 2024, with an approximate 18 – 24 month construction window prior to commissioning. The Project total construction cost will be in excess of \$100 million.

1.3 Project location

The proposed Project will be located at Selfs Point, in the suburb of New Town in southern Tasmania. The Project occurs within the existing Selfs Point STP property boundary as well as within a portion of adjacent land, currently owned by the Hobart City Council, which will be acquired by TW.

This EIS relates only to the development of the new Selfs Point STP and excludes the sewage pipeline from Macquarie Point STP (and associated decommissioning and SPS) up to the connection with the new inlet works portion of the Project. As such the boundaries of the land for the purpose of this EIS are:

- Selfs Point Sewage Treatment Plant – 12 Selfs Point Rd, New Town, Tasmania (PID 3286956) and 10A Selfs Point Rd, New Town, Tasmania (Title Reference 163940/3)
- A portion of 10 Selfs Point Rd, New Town, Tasmania (Title Reference 163941/1)
- A portion of Crown land from the high-water mark at Selfs Point, offshore to the terminal end of the proposed local Selfs Point effluent outfall pipeline.

Collectively, these land parcels are referred to as “the Land” for permitting purposes and define the area in which the level 2 activity will occur. Throughout this document “the Land” is referred to as the Project Site. The Project Site is illustrated in Figure 1-2.

The Project Site contains a mix of already developed land, concrete hardstands, roads, and the now obsolete artificial wetland system that was created adjacent to the existing STP. Considering the overall level of disturbance, the Project Site would be considered a brownfield site, with the possible exception of the outfall extension area on the seafloor.

1.4 Project context and background

The need for the Project arose as a result of the requirement to decommission the Macquarie Point STP in response to the Macquarie Point redevelopment, which is transitioning the site from an industrial use to a mixed use area. The redevelopment includes the repurposing of the existing Macquarie Point railyard area into a new multipurpose precinct for commercial, residential, and public space use. Decommissioning the Macquarie Point STP is necessary to minimise land use conflicts with sensitive uses, such as residential.

In light of this, TW signed a memorandum of understanding with the Macquarie Point Development Corporation and the Crown to manage the decommissioning of the Macquarie Point STP and the redistribution of its sewage catchment flows.

After review of several options for the redistribution of the sewage flows, the most viable option identified was to redirect the flows to the Selfs Point STP, several kilometres to the north of the site, and to upgrade its capacity to cope with the additional throughput.

An options analysis found that the most cost-effective approach to this was to completely replace the Selfs Point STP (with the exception of some minor infrastructure components) and continue using the existing outfall location at Blinking Billy Point. The new STP will drastically improve performance and capacity compared to the existing combination of the current Selfs Point STP and the Macquarie Point STP and will result in significant improvements to the current effluent quality discharged to the Derwent Estuary from these plants, resulting in a net environmental benefit as well as achieving the goals of the redevelopment project.

1.5 Legislative framework

TW submitted a Notice of Intent (NOI) for a similar project in 2016, which was issued with Project Specific Guidelines (PSGs) but was not progressed to the submission stage. In August 2020 a revised NOI was submitted for the current Project by the TasWater Capital Delivery Office (CDO). Following receipt of the NOI, the EPA determined the Project to be a level 2 activity under the *Environmental Management and Pollution Control Act 1994* (EMPC Act), due to its association with wastewater treatment works, and determined that the Project would require a class 2B assessment under the Act. In September 2020, the EPA issued PSGs for the Project, requiring the submission of an Environmental Impact Statement (EIS) (this document).

This EIS has been prepared in accordance with those PSGs and the EPA Guidelines for Preparing an Environmental Impact Statement (March 2019); both documents are available on the EPA website at the time of publishing.

The Project will be subject to assessment under Section 25 of the EMPC Act through the lodgement of a planning permit application to Hobart City Council (HCC) (along with a copy of this EIS) which will then be referred by HCC to the EPA for assessment of environmental matters.

The terrestrial portion of the buried local Selfs Point effluent outfall pipeline is considered prescribed works under the *Water and Sewerage Industry (General) Regulations 2019* and is therefore exempt from planning approval requirements and exempt from assessment as part of the Project. It is included in this document for context only and does not form part of the application.

The Project footprint has been subject to ecological survey by North Barker Ecosystem Services (NBES), which found potential swift parrot foraging habitat in the form of blue gums, that will be impacted as part of the Project. The swift parrot is listed under the Commonwealth under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). NBES undertook an assessment of impacts under the EPBC Act Matters of National Environmental Significance Significant Impact Guidelines 1.1 and determined that the Project is not considered to be at any risk of resulting in a significant impact to the species (Appendix H). Nonetheless TW have elected to self-refer to the Commonwealth under the EPBC Act to provide certainty on that conclusion. In the unlikely event of a controlled action decision, the proponent will not elect to use the bilateral assessment option.

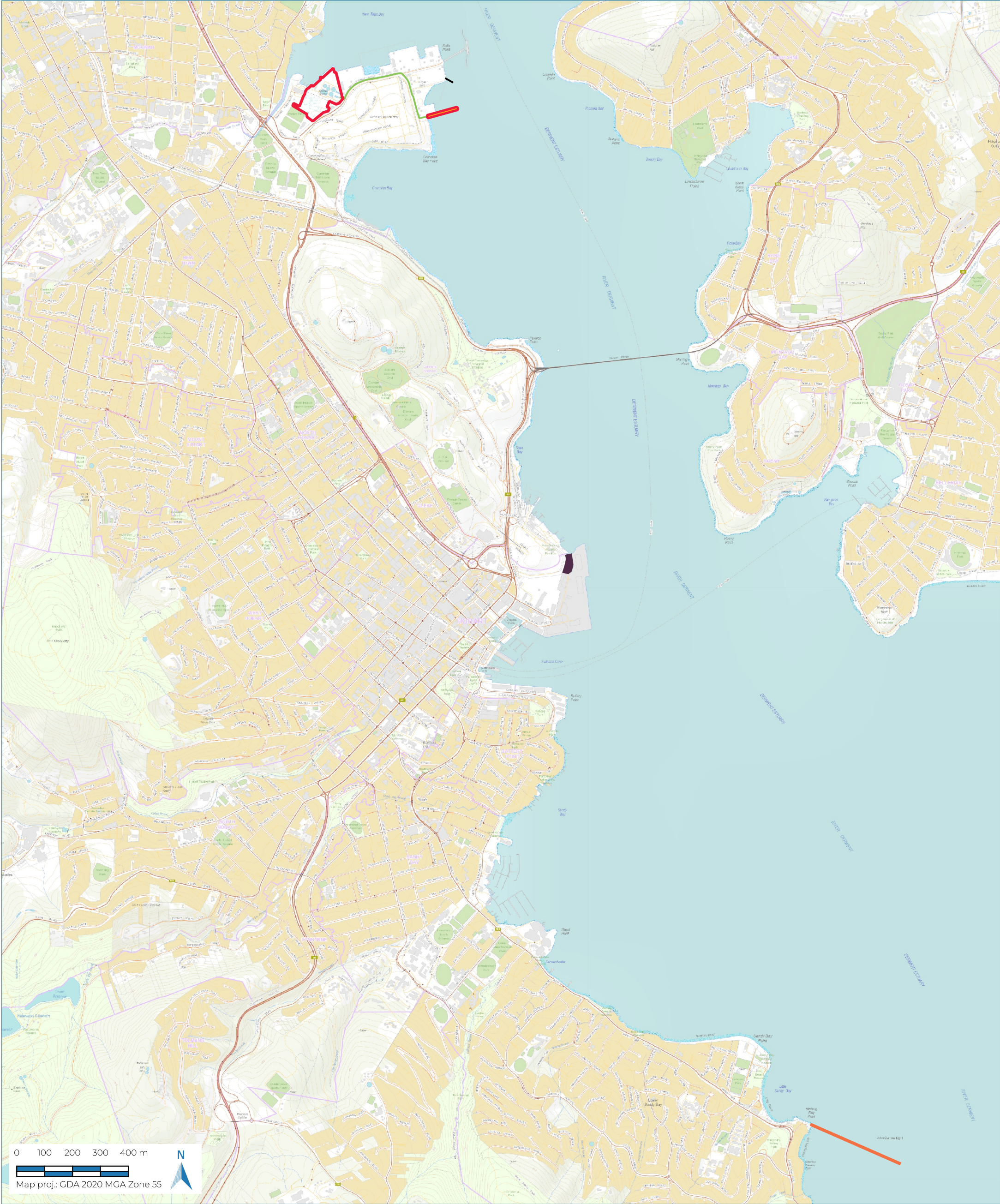
In addition to the above statutory approval processes, the proposed Project will also have to comply with a broad range of environmental and planning legislation, guidelines, standards and policies as described in the relevant sections of this EIS.

1.6 Proponent

The Project proponent is Tasmanian Water and Sewerage Corporation (TW), the authority responsible for the provision of water, wastewater and recycled water services throughout Tasmania. TW was formed on 1 July 2013 and manages over \$2 billion in assets. TW owns and operates 110 STPs and has significant experience and capacity to undertake the proposed Project.

Proponent and activity operator details are as follows.

Name of proponent	Tasmanian Water & Sewerage Corporation Pty Ltd, trading as TasWater (TW)
Registered address of proponent	163-169 Main Road Moonah TAS 7009
Postal address of proponent	GPO Box 1393 Hobart TAS 7001
ABN	47 162 220 653
ACN	162 220 653
Contact person	Chris Bren TasWater CDO Project Manager
Address	GPO Box 1393 Hobart TAS 7001
Phone	0400 448 337
Email	chris.bren@taswater.com.au
Activity operator	Kate Westgate Leader Environmental Performance
Address	GPO Box 1393 Hobart TAS 7001
Phone	0436 625 550
Email	kate.westgate@taswater.com.au

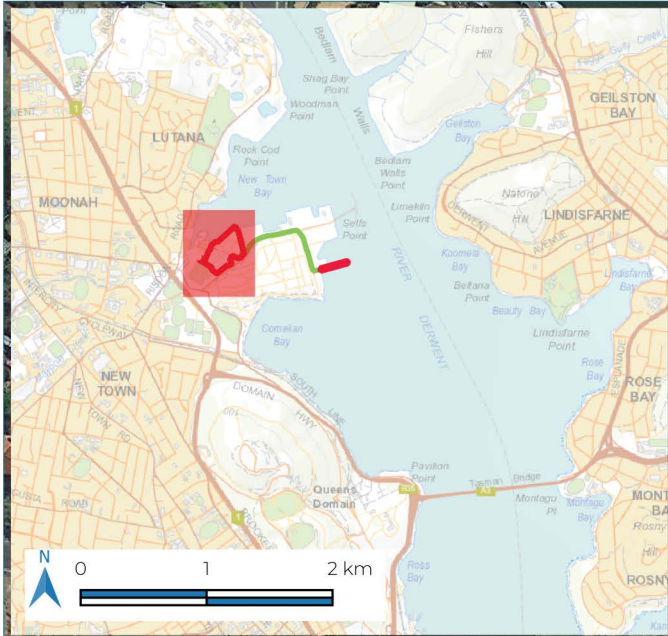


- ▬ Project site (the Land)
- ▬ Selfs Point Replacement Pipeline
- ▬ Selfs Point Existing Discharge
- ▬ Selfs Point Replacement Outfall Alignment
- ▬ Blinking Billy Existing Outfall
- ▬ Macquarie Point STP



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Selfs Point STP
Redevelopment
Figure 1-1
Site overview



- Project site (the Land)
- Selfs Point Replacement Pressure Pipeline
- Selfs Point Replacement Outfall Alignment

CADASTRAL PARCEL

- 163940/3 (PID: 3286956)
- 163940/3 (PID: 3189582)
- 163941/1 (PID: 3189590)
- 163940/2 (PID: 3286948)



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Selfs Point STP
Redevelopment
Figure 1-2
Site Location

2 Project description

2.1 Existing STP operation

The following provides a summary of the existing STP operation for context. Descriptions of the proposed changes are provided in the subsequent sections (Sections 2.2 and 2.3 and 2.4).

The Selfs Point STP in southern Tasmania is an existing level 2 activity, operated under EPN 8548/1, EPN 9797/1 and EPN 10344/1, and is permitted to treat an ADWF of 13 ML of sewage per day. The STP accepts influent from the gravity fed New Town catchment and from the Sandy Bay catchment, which is pumped to the STP via the Sandy Bay No. 2 SPS (as shown Appendix K). The existing activity achieves advanced secondary treatment of sewage with biological nutrient removal via the process outlined below, which is shown in Figure 2-1.

The existing inlet works consist of screening and grit removal from the influent, which is collected in bins for removal offsite. The influent is then pumped to the primary sedimentation tank(s). Following settling, 25% of the sludge is pumped to the anaerobic digesters and the remainder to a pre-fermenter, before being pumped to the anaerobic zone of the Biotenpho bioreactors.

From the sedimentation tanks, the liquid portion of the waste stream is pumped to either a trickling filter system (40-45% under normal flow) or to the anaerobic zone of the Biotenpho bioreactors. After treatment in the trickling filters, that portion of effluent is also pumped to the Biotenpho bioreactors, but downstream of the anaerobic zone.

Following treatment in the Biotenpho bioreactors, the effluent is then passed through to two secondary clarifiers for additional settlement. The effluent from this process is then disinfected with a UV system and chlorine gas and pumped to the primary effluent discharge location at Blinking Billy Point in Sandy Bay, several kilometres to the south. A small volume (~1%) of effluent from the STP is used as recycled water to irrigate the Friends School sportsground, although this will be ceasing due to the Department of Health's new requirement to accept only class A treated water at the site.

Under emergency conditions, there is an emergency storm bypass directly from the inlet works which receives a chlorine dose prior to direct discharge to the local Selfs Point effluent overflow outfall into the River Derwent. It is also possible to discharge from the storm flow tanks directly to the local Selfs Point effluent overflow outfall; the effluent at this point has been through primary treatment and receives a dose of chlorine prior to discharge. Emergency discharges to the local Selfs Point effluent outfall are permitted under the EPN, with 1-2 events per year on record between 2016 and 2020, ranging from 11 kL to a controlled 56.4 ML secondary treated storm bypass event over six days. During the 2020-21 annual environmental reporting period there were 20 bypass events ranging from 8 kL to 19.2 ML, all due to large rainfall events.

The grit and screenings from the various inlet process points are collected and stored in covered bins and regularly collected for disposal. Biosolid wastes are collected from the primary and secondary digesters, as well as the secondary sedimentation tanks and pre-fermenter. The sludge is then treated with a polymer prior to being reduced in weight to volume through a centrifuge or belt filter press. The sludge is then dosed with lime for stabilisation to comply with the EPA guidelines for disposal. The treated sludge is then taken offsite to licensed waste facilities or delivered for reuse as fertiliser under various arrangements.

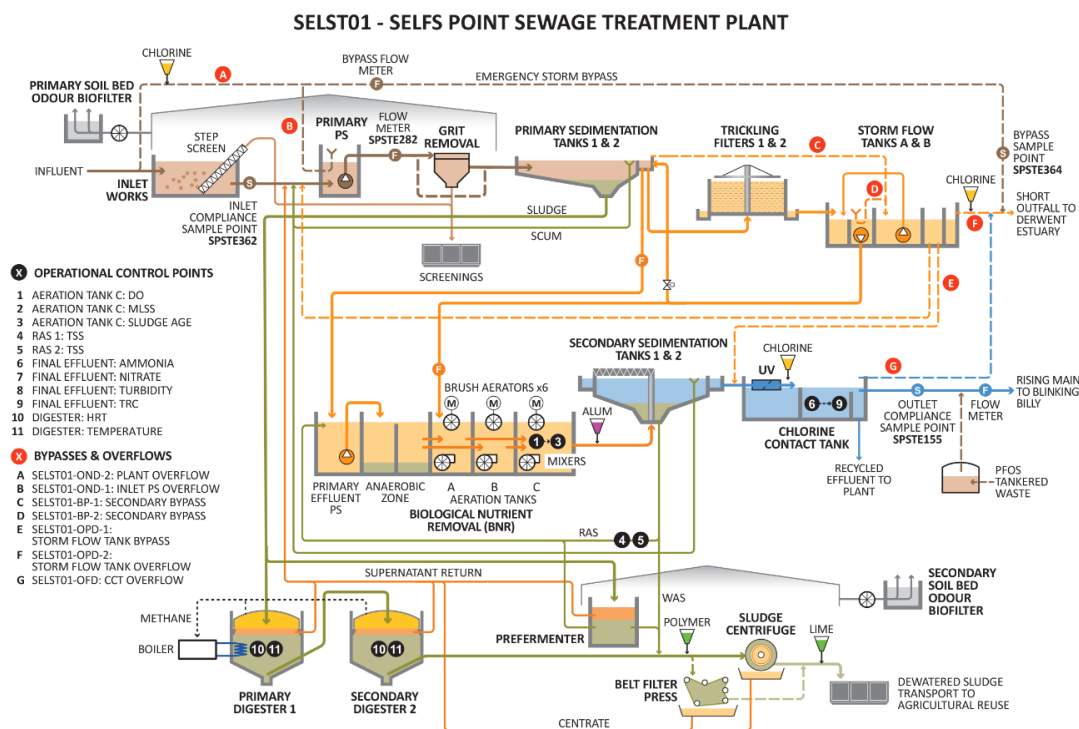


Figure 2-1 Existing Selfs Point STP process flow

2.2 Upgraded STP treatment requirements

The upgraded STP at Selfs Point will be designed to cater for increased flows (from both the redirected Macquarie Point STP flows and predicted catchment growth to the 2054 horizon) and altered influent quality (as a result of combined flows from Selfs Point and Macquarie Point STPs). The result will be an upgraded STP with capacity to cater for predicted STP flows and influent quality, without compromising the receiving environment at the point of discharge. The following subsections provide a summary of the upgrade requirements to achieve this objective.

2.2.1 Upgraded flow requirements

Catchment flows are estimated as approximately 8.0 ML/day ADWF at Selfs Point STP and 10.43 ML/day ADWF at Macquarie Point STP, as of 2020 data.

A report commissioned for the Project, *Review of flow and load growth rate for Hobart catchments* (Aurecon, 2020), concluded that the most appropriate growth rate to apply to annual base catchment inflows for Macquarie Point and Selfs Point was 0.9%. This considered permanent residential growth as well as increases in tourism and net inflow of workers. This growth rate has been applied to the Project design, with the resultant 2054 flows predicted for both catchments combined being 24.9 ML/day ADWF. This figure has been adopted for the basis of design.

In addition to the above catchment loads, the Project will also accept approximately 50 kL of tankered waste per day from various trade waste customers. This is included in the calculated total loads for the upgraded STP.

For the Macquarie Point STP catchment, the inflows to the Project will be restricted by the pump rate of the proposed Macquarie Point SPS (not part of this project), which has been sized at a maximum flow rate of 650 L/s. The new Macquarie Point SPS pumping capacity to the Selfs Point STP is limited by the rising main, and any flows beyond 650 L/s will be captured within the emergency storage at the Macquarie Point SPS. Additional technical details associated with the Macquarie Point SPS sizing is contained in the Inflow and Infiltration memo provided in Appendix J.

The 50% Detailed Design Report (refer Appendix K) outlines details on the use of historical rainfall data from 2010-16 to assess peak wet weather flow (PWWF) volumes for the Selfs Point STP to assist in planning for flow capacity requirements for the Project; details of how the PWWF figures were calculated are provided in the Inflow and Infiltration Assessment memo attached at Appendix J. Between 2010 and 2016, Selfs Point STP PWWF was 603 L/s; a safety factor of 87 L/s was applied to this figure, to bring the final figure to 690 L/s. The additional 87 L/s allows a significant safety factor for the Selfs Point STP catchment PWWF, which will also account for wet weather aspects of catchment growth post-2016 (refer Appendix K). This results in a total design PWWF capacity of 1,340 L/s for the Project.

During wet weather events, when the 8.5 ML effluent storage reaches capacity, discharge will occur via the Project's new local Selfs Point effluent outfall described in Section 2.4.15; this is predicted to occur on average seven times per year, with a predicted total discharge volume of 130 ML/y¹.

The Project has been sized to accept all the current Selfs Point catchment flows at a calculated PWWF flow rate (plus an additional safety factor) and the maximum pump rate from the Macquarie Point SPS. The Macquarie Point SPS controls maximum flows directed to Selfs Point STP, with any flows past the pump rate captured within the emergency storage at the SPS and discharged at the SPS emergency outfall if capacity is reached.

This results in the Project being able to accept the full Selfs Point catchment (including tankered waste and trade waste) plus the maximum volume that can be pumped from the Macquarie Point SPS, resulting in no preference being required for acceptance of any inflows. In an unlikely extreme event it is feasible to shut down the Macquarie Point SPS and Sandy Bay No. 2 SPS, and accept only the Selfs Point catchment flows (and tankered waste) and use the Macquarie Point SPS emergency discharge; this would involve a wet weather event more than twice the volume of the previously recorded PWWFs from the catchment and is considered highly unlikely to occur.

2.2.2 Predicted sewage quality

The Detailed Design Report (refer Appendix K) provides an analysis of the predicted sewage quality to be received at the upgraded STP. This analysis considered influent characterisations from the two existing STPs based on intensive sampling between November 2015 and February 2016, and follow-up sampling undertaken in 2021. Further detail on the data used is outlined in Section 2.1.3 of Appendix K, with the resultant median influent concentrations for each existing STP and the combined median to be used for the design of the Project outlined in Table 2-1.

Table 2-1 Median influent concentrations for existing STPs and proposed Project

Parameter	Selfs Point STP	Macquarie Point STP	Combined for Project
BOD (mg/L)	300	320	311
COD (mg/L)	684	724	706
TSS (mg/L)	280	354	322
TKN (mg/L)	57	56	56
Ammonia (mg/L)	33	40	37
Total phosphorus (mg/L)	9	9.5	9
Orthophosphate (mg/L)	5	5.2	5

¹In Appendix B the calculations were based on a 4 ML effluent storage capacity which equates to nine events with a total quantity of 133 ML, which is not considered significantly different to the 8.5 ML storage scenario in terms of impacts in the EIS.

Table notes: BOD=Biochemical oxygen demand, COD=Chemical oxygen demand, TSS=Total suspended solids, TKN=Total Kjeldahl nitrogen

Tankered waste is to be processed with the sludge streams from the plant and will be directed to the new anaerobic digestion facility. The tankered waste flow and load characteristics to be adopted are summarised in Table 2-2.

Table 2-2 Project input mass loads to 2054

Parameter	Selfs Point STP	Macquarie Point STP	Tankered waste
Flow (ML/day)	10.9	14.0	0.05
BOD (kg/day)	3,256	4,469	687
COD (kg/day)	7,428	10,111	1,780
TSS (kg/day)	3,039	4,944	714
TKN (kg/day)	615	782	49
Ammonia (kg/day)	362	559	1
Total phosphorus (kg/day)	93	133	32

2.2.2.1 Potential contaminants of concern

With respect to potential contaminants from trade waste customers and the general catchment network, influent screening to date has been limited to a standard suite of sewage contaminants (as documented in the above table). Hence in lieu of influent screening for toxicants (other than those above), available effluent screening has been used as a proxy where available to provide an indication of the presence of any additional contaminants of concern.

Effluent screening for the Macquarie Point catchment in 2016, as part of TW's Derwent Ambient Monitoring Report (Jacobs, 2016a), showed elevated levels of aluminium, copper, zinc and total residual chlorine with respect to ANZG (2018) default toxicant levels for 95% species protection in marine waters. No other significant toxicants were noted in the screening samples.

During sampling in the receiving environment for the Macquarie Point STP, aluminium (likely associated with flocculant added during the treatment process) was found to be below detection in dissolved form in all samples at all monitoring sites and was likely to be in bound form in the effluent and therefore not readily bioavailable. Similarly total copper was found to be below detection at most sites sampled during the 2016 ambient monitoring and was undetectable at all sites in dissolved form (Jacobs, 2016a). Zinc values in the environment ranged from 4 to 58 micrograms per litre (µg/L), with most surface samples exceeding the ANZG (2018) toxicant trigger value; however, no correlation with the effluent outfall was noted, reflecting the generally high zinc levels in the Derwent Estuary from other sources, including the zinc smelter upstream (Jacobs, 2016a).

Effluent screening was also undertaken for the Selfs Point catchment as part of the Derwent Ambient Monitoring Report (Jacobs, 2016a). The screening showed elevated copper and zinc in the effluent with respect to ANZG (2018) default toxicant levels for 95% species protection in marine waters. Ambient monitoring around the Blinking Billy effluent outfall showed copper to be undetectable (except one detection at the reference site) and zinc concentrations to vary from undetectable to 70 µg/L, but not correlated with the outfall, with the reference site often higher than impact sites.

2.2.3 Upgraded treatment quality requirements

Existing effluent quality discharge limits for the Selfs Point STP are outlined in EPN 9797/1, as shown in Table 2-3. The Project proposes some alterations to these existing limits owing to the proposed methods and technology to be used as part of the Project, and the capacity of the receiving environment to accept some flexibility in discharge concentration requirements given the overall mass load reduction that will result from the Project.

The proposed effluent quality limits are also shown in Table 2-3. These limits are in line with accepted modern technology (AMT) limits for STPs in Tasmania (DPIWE, 2001), with the exception of total phosphorus.

The proposed 50th percentile limit for total phosphorus is 2 mg/L (compared to the existing licence maximum of 3 mg/L and the AMT target of 1 mg/L). This is considered sustainable based on the assessment of impact undertaken for the marine/estuarine environment in Section 6.1, including consideration of overall net reductions in total phosphorus mass loads entering the Derwent Estuary; given the assessment that phosphorus is not likely to be the limiting nutrient in the Derwent Estuary under most circumstances (as documented in Appendix B), the relaxed total phosphorus limit is not anticipated to prejudice the receiving environment through increased eutrophication risk. The total phosphorus limit also minimises the broader environmental overhead associated with additional chemical usage that would be required to remove the additional phosphorus.

It should be noted that, even with this relaxed limit, the Project will still result in a 48% reduction in phosphorus mass loads discharged to the Derwent Estuary compared to the current performance of the Selfs Point and Macquarie Point STPs, as detailed in Section 2.2.4.

Water quality modelling has been undertaken (refer Section 6.1) to demonstrate how the proposed effluent quality targets can be applied without compromising the environmental values of the receiving environment.

Table 2-3 Proposed effluent quality limits

Parameter	Current EPN maximum	Proposed 50 th percentile	Proposed 90 th percentile	Proposed maximum	Comments
BOD (mg/L)	15	10	15	-	Equivalent to targets for AMT determined by EPA
TSS (mg/L)	20	10	20	-	Equivalent to AMT
E. coli (CFU/100 ml)	750	200	500	750	Equivalent to AMT
Oil & grease (mg/L)	5	2	5		Equivalent to AMT
Total nitrogen (mg/L)	10	7	10	-	Equivalent to AMT
Ammonia (mg/L)	2	1	2	5	Equivalent to AMT
Total phosphorus (mg/L)	3	2	5		Relaxed compared to AMT with justification based on environmental impact assessment
pH	6.5 - 8.5			6.5 - 8.5	Equivalent to AMT
Total residual chlorine (mg/L)	1			<0.1	Chlorine dosing is used to prevent biofouling in the Blinking Billy transfer main.

Parameter	Current EPN maximum	Proposed 50 th percentile	Proposed 90 th percentile	Proposed maximum	Comments
					Compliance point is at the discharge of the Blinking Billy outfall.

2.2.4 Mass loads

Effluent mass loads have been predicted for the Project by using the combined catchment flows from Section 2.2.1 and proposed median effluent quality limits from Table 2-3. The calculated mass loads are presented in Table 2-4; also included in the table is a comparison to existing mass loads using a data range from 2009-13, which was used in previous calculations for the previous iteration of the Project (Bonneville Consulting, 2023).

Table 2-4 Mass loads calculations

Parameter	Proposed 50 th percentile effluent limit (mg/L)	Predicted median mass load (tonnes/year)	Existing mass load 2009-13 (combined Macquarie Point and Selfs Point STPs) (tonnes/year)	Percentage reduction
Total nitrogen (mg/L)	7	63.6	153	58%
Ammonia (mg/L)	1	9.1	71.1	73%
Total phosphorus (mg/L)	2	18.2	31.2	42%
BOD (mg/L)	10	90.9	120	24%
TSS (mg/L)	10	90.9	92	1%

Table 2-4 shows the Project will result in significant reductions in all five parameters assessed for mass loads, most notably for nutrient-related parameters, with total nitrogen reduction at 58% and the total phosphorus reduction at 42%. The large 73% reduction in ammonia is also a significant reduction to potential toxicity and nutrient impacts to the estuarine receiving environment.

2.3 Project overview

The Project is the development of essentially a new STP (with some minor components retained) at the existing Selfs Point STP location at 12 Selfs Point Road and into the neighbouring land at 10 Selfs Point Road in New Town, southern Tasmania. The purpose of the Project is to provide treatment capacity to accommodate both the Selfs Point and Macquarie Point sewage catchments for a 2054 design horizon, with significantly improved effluent treatment. This will facilitate the decommissioning of the Macquarie Point STP allowing the redevelopment of the Macquarie Point Development site.

The Project will include the installation of a variety of new components and the reuse of some minor existing infrastructure. The key components of the Project include:

- A raw sewage pump station to lift flows from the Selfs Point gravity catchment to the inlet works
- A new network sewage pump station or utilisation of the existing STP's raw sewage wet well to transfer the local low-lying domestic sewage catchments into the new raw sewage lift pump station
- A tankered waste receival facility developed with several new roads
- Inlet receival chamber
- Inlet screening consisting of 6 mm primary screens and 2 mm secondary screens
- Screenings washing, compacting and collection system
- Emergency bypass 20 mm manual bar screen bypassing the primary screen stage
- Grit removal located after the screening stage
- Grit washing, dewatering and collection system
- Four primary sedimentation tanks with primary sludge and scum pumped to a primary sludge thickening system
- Two activated sludge bioreactors for biological nutrient removal (BNR)
- Membrane bioreactors (MBRs) - six trains discharging into a permeate tank
- Effluent balance tank
- New sludge storage, thickening, dewatering and biosolids outloading facilities
- Two new anaerobic digesters
- New biogas management and hot water supply facility
- Odour control system
- Chemical dosing and storage facility
- Electrical system upgrades
- A new local Selfs Point effluent outfall for effluent discharge in wet weather or other emergency event.

The only aspects of the existing STP arrangement that will be retained and repurposed are the Blinking Billy pumping station, chlorine building, and operator office and control room building. The remaining existing STP items will be decommissioned (under the existing EPN), including:

- Existing inlet works
- Raw sewage pumping station (possibly excluding the existing wet well structure)
- Primary sedimentation tanks
- Pre-fermenter
- Trickling filters
- Biotenipho bioreactor and secondary clarifiers
- Anaerobic digesters

- Biogas and hot water systems
- Alum storage tanks
- Odour control units
- Sludge dewatering system
- Existing local Selfs Point effluent outfall

Discharge of treated effluent dry weather flows from the Project will be via the existing Blinking Billy Point effluent outfall, which is currently the main Selfs Point STP effluent discharge location. The outfall has a multi-port diffuser and sits 550 m offshore at a depth of approximately 32 m. There are no proposed changes to the Blinking Billy outfall.

The existing local Selfs Point effluent outfall is used under storm or other emergency conditions to discharge effluent to the Derwent Estuary. This outfall has complex integrity issues and will be replaced by a new local outfall as part of this Project. The new outfall arrangement includes a new underground pipeline from the Selfs Point STP, which will travel along Selfs Point Road to the north-east and then on to Gas Road to the south to the commencement of a new outfall pipeline location, will extend out to a discharge diffuser into approximately 8 m of water.

A summary of how the Project is proposed to operate is shown graphically in the process diagram provided in Figure 2-2 and is outlined in the following points:

- The Project will have capacity to treat an ADWF of 24.9 ML of sewage per day. Sewage will be pumped from the various catchment areas to the new inlet works, where it will be screened and processed to remove debris and grit from the stream, which will be collected in covered bins for offsite disposal.
- The screened and de-gritted influent will then flow under gravity to the new primary sedimentation tanks, where settleable solids will be stored, thickened and sent to the new digesters.
- After digestion, the sludge will be dewatered to produce biosolids which will then be stored in covered bins for offsite disposal.
- The primary effluent will then be pumped to a new 4-stage activated sludge bioreactor to undertake BNR.
- After this treatment stage, the effluent will be pumped through a membrane bioreactor (MBR) system, which filters out suspended solids and removes bacteria from the effluent.
- The effluent from the MBR then gravitates to the Blinking Billy Pump Station which pumps fully treated effluent to the Blinking Billy outfall.
- Flows greater than the nominal Blinking Billy pump capacity of 290 L/s will be attenuated in an 8.5 ML effluent balance tank located onsite to mitigate discharging under dry weather to the local Selfs Point effluent outfall.
- During wet weather conditions, the effluent in the effluent balance tank may be discharged to the new local Selfs Point effluent outfall. This will only occur under prolonged wet weather events. The local Selfs Point effluent outfall will have a peak hydraulic capacity of 1,340 L/s to accommodate all wet weather flows pumped to the new STP.

The Project Site and a conceptual layout of the Project components are shown in Figure 2-3.

It should be noted that the Project is currently at the 50% complete detailed design phase, which is produced to inform the Issue of Construction design of the Project. Although minor aspects of the design may change in later design submissions, the substantive aspects of this design as discussed in this report are now fixed.

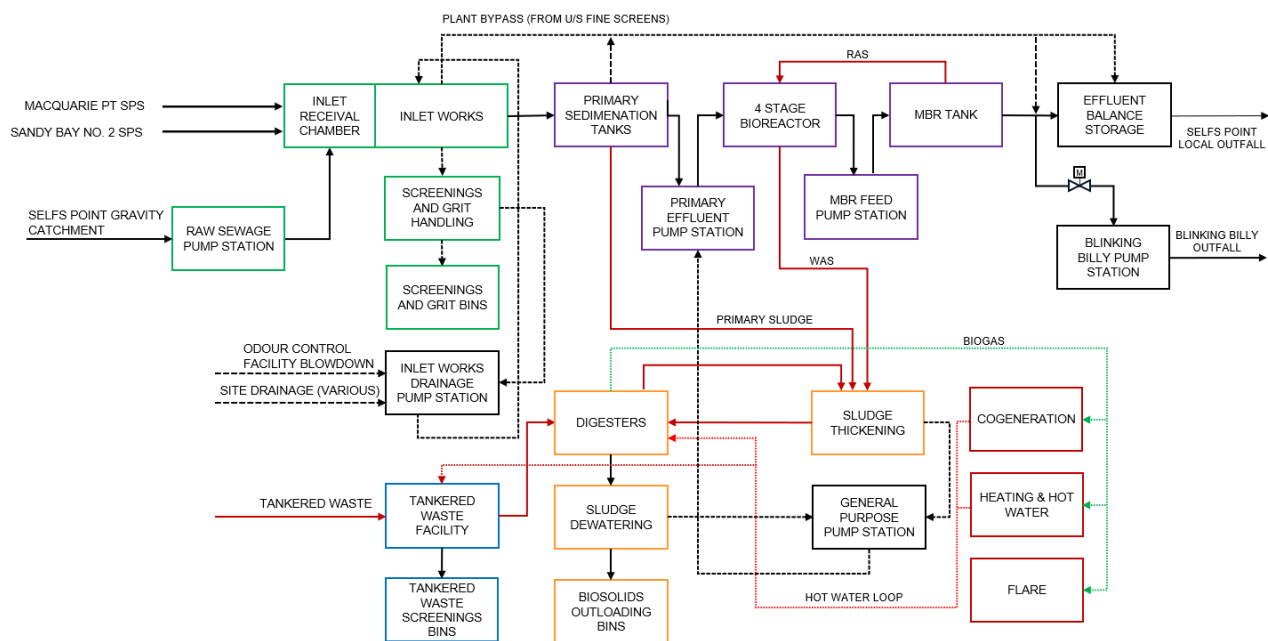


Figure 2-2 Process diagram for new configuration

2.4 Project components

A 50% Detailed Design Report has been developed for the Project and is provided in Appendix K. The following sections draw from that report and provide the salient details, with more technical details available in the appended report.

2.4.1 Inlet components

The construction of new inlet works is one of the key upgrade components for the Project, with the existing system being in poor condition. The new inlet works will be sized to cope with flows up to 1,340 L/s as well as internal plant return flows.

Owing to the poor condition of the existing inlet works, and the space constraints at that particular area of the STP, the new inlet works will be relocated to the southern end of the site and the old works decommissioned. The location of the new inlet works is shown in Figure 2-3.

Due to the relocation of the inlet works, a new raw sewage pump station will be needed to lift the gravity-fed New Town flows up to the new (higher) inlet works area. A small pumping station will also be required to separately pump the low-lying Selfs Point lower sewers across to this new lift pumping station. It is expected that both the Macquarie Point flows and the existing pumped flows from Sandy Bay No. 2 pump station will be linked into the new inlet works directly and will not require additional pumping at Selfs Point.

The new inlet works will include two 6 mm centre flow band screens (one duty and one standby) and a manually raked 20 mm bar screen on a screen bypass channel to be used in the event the primary band screens are blinded or fail.

The screened effluent is then required to pass through another set of fine 2 mm aperture screens to further reduce screenings down to an acceptable limit for the new membrane bioreactor. This will be achieved by passing the effluent through a second stage of centre flow band screens, with three screening channels provided in parallel in a duty/assist/standby arrangement. It is important for membrane integrity and longevity that flows do not bypass the secondary screens under any operational scenario. Therefore in case the secondary screens are blinded or fail, a bypass weir is installed prior to the secondary fine screen stage which bypasses inlet works, discharging directly into the effluent balance tank. Following the second screening stage a grit vortex chamber is used to remove grit and finer debris from the wastewater.

Quantities of screenings and grit recovered from these processes will be conveyed to four covered transportable ~10 m³ containers for collection and disposal offsite to a licensed waste facility. Estimates of screenings and grit volumes to be generated on a weekly basis are presented in Table 2-5; these figures have been based on existing Selfs Point and Macquarie Point STP data and design data for the Project.

Table 2-5 Screening and grit volume estimates

Waste	Selfs Point existing	Macquarie Point existing	New Selfs Point STP	Notes
Screenings (m ³ /week)	2.3	2.9	7.0	The new STP will generate more screenings due to the addition of the fine screens stage to the inlet works.
Grit (m ³ /week)	1.1	1.7	3.2	The new STP will capture more grit as the existing Selfs Point STP has an underperforming grit collection channel.

Sufficient storage will be made available onsite to collect seven days of material during 2054 average dry weather flows and one day of material under a 2054 discrete 'first flush' peak wet weather event. The transportable containers are not expected to result in an odour issue as they will remain sealed throughout each collection period. This is consistent with grit and screenings management at other TW STP sites.

All inlet screens, flow channels and grit removal equipment will be fully enclosed and vented to a new odour control system (refer Section 2.4.4).

Once grit removal and screening has occurred, the effluent will then be gravity fed to the new primary sedimentation tanks via a new flow splitter. Alum will then be dosed at this point via a rapid mixer for the purposes of chemical phosphorus removal.

2.4.2 Primary treatment system upgrade

The existing primary sedimentation tanks are in poor condition and are to be decommissioned as part of the Project and replaced with four new tanks, which will improve performance significantly and also increase the primary treatment capacity of the STP. The new tanks will be located adjacent to the new inlet works area, as shown in Figure 2-3.

The four new rectangular concrete tanks will sit side by side, providing a capacity of 690 m³ per tank. Flow into the four tanks from the inlet works will be via a new primary sediment tank distribution chamber, which will ensure an even flow split between the four tanks.

The tanks will target removal of 60% of the total suspended solids from the influent. Each tank will contain a chain and flight scraper mechanism which will push the settled sludge to one end of the tank, where it can then be pumped by primary sludge pumps to the sludge handling area for storage and mechanical thickening via rotary drum thickeners before being pumped to the anaerobic digester. The primary settled effluent will overflow via a weir in each tank to the primary effluent pump station wet well. A system will also skim primary scum from the surface of each primary sedimentation tank and pump it to the primary sludge storage tank (see Section 2.4.10).

Effluent will then be pumped from the primary effluent wet well via two separate pump stations (low flow and high flow pump sets) to the new 4-stage bioreactor for biological nutrient removal (BNR). There is a high level emergency overflow on this wet well which connects onto the inlet works emergency bypass line which terminates at the effluent balance tank.

Odour control covers will be installed above the tanks to draw the foul air away from the tanks and direct it to the new odour control system (see Section 2.4.4).

2.4.3 Bioreactors (BNR/MBR)

The new BNR bioreactor process will be installed to biologically remove biodegradable organic compounds as well as nitrogen from wastewater. Alum can also be dosed to the front of the bioreactor, instead of, or in addition to, alum dosing to the front of the primary sedimentation tanks to chemically remove phosphorus. Phosphorus when coagulated with alum combines with the activated sludge floc particles and is removed from the process via the waste activated sludge stream.

The new bioreactor system combines a 4-stage process and a membrane bioreactor (MBR) to achieve the required level of nutrient removal from the effluent.

The bioreactors proposed for the Project use a continuous, flow activated sludge process with two oxidation ditch bioreactors fed in parallel which then discharge to combined secondary anoxic and aerobic zones. As the wastewater passes through the bioreactor, nitrogen in the form of ammonia is oxidised in the aerobic zones of the bioreactor into nitrite, then to nitrate through nitrification. Nitrate in areas of the bioreactor where oxygen is not present is then reduced through denitrification to nitrogen gas, which leaves the system through off-gassing to the atmosphere.

The wastewater moves continuously between aerobic and anoxic zones before being fed to the MBR. The system also contains various pumps, valves and pipes that control sludge and wastewater return to the various bioreactor compartments to maintain the biological process; this includes returns from the MBR. A schematic of the bioreactor and the various compartments is provided in Figure 2-4.

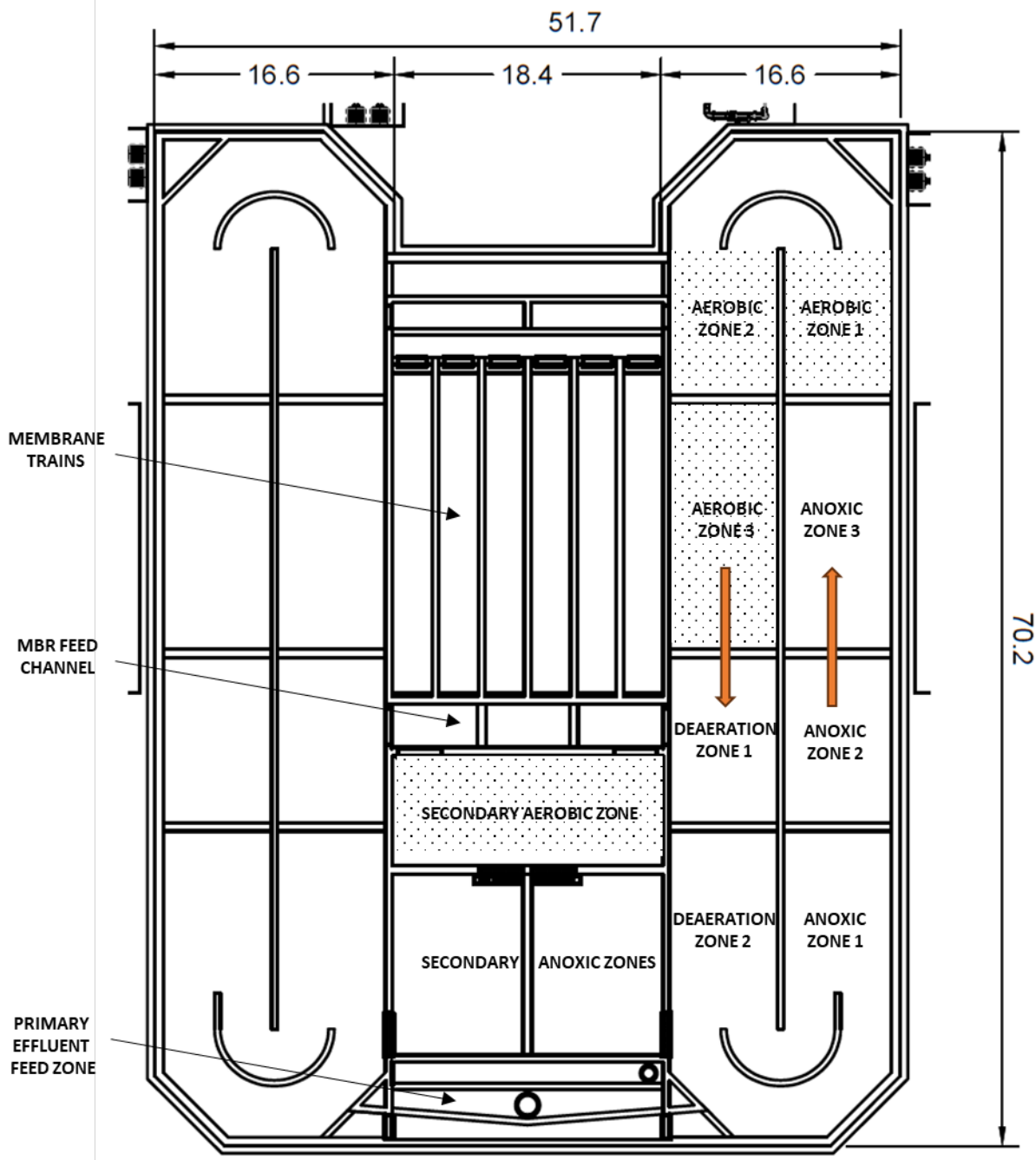


Figure 2-4 Concept schematic of the proposed bioreactor showing anoxic and aerated zones and pathways to the membrane bioreactor

To aerate the system within the aerobic zones, the bioreactor includes a fine bubble diffused aeration system with removable aeration grids (to allow servicing) connected to a blower system housed in a building adjacent to the bioreactor. To de-aerate the system but maintain mixing, a number of high-speed submersible impellers are used in the anoxic and swing zones. Dissolved oxygen probes are used to operate the aeration/de-aeration system.

Waste activated sludge (WAS) from the process will be pumped to two WAS thickeners (duty/standby) before being pumped to the new digesters.

The bioreactor feed chamber is covered by part of the odour control system. The rest of the bioreactor system is uncovered due to the need for regular inspections and maintenance of the aeration grids, pumps and mixers within the bioreactor; this has been balanced against the odour performance of the plant and cost considerations.

Once the effluent has been sufficiently treated in the bioreactor, it is pumped into the MBR. The membrane tank includes six trains of parallel membrane cassettes. Each cassette can be removed for maintenance or replacement by a mobile crane. Each train of cassettes will have a dedicated permeate pump to pull the effluent through the membranes, leaving the solids in the membrane tanks which are then returned to the bioreactor process; this is termed return activated sludge (RAS). The MBR will also contain backwash pumps to intermittently clear solids from the filter membranes to minimise filter clogging.

Detailed information on predicted process performance of the BNR/MBR is provided in Section 9 of the 50% Detailed Design Report in Appendix K.

2.4.4 Odour control system

Several of the components proposed as part of the Project will be significant sources of odour and would create nuisance concentrations of odour if left unmitigated. To control odour generation, a new odour control system will form part of the Project.

Covers with a ducted extraction system will be used over the main odour-producing infrastructure, which will draw foul air from the various processes into an odour control unit (OCU), which will treat the foul air.

The following odour-producing infrastructure will be covered as part of the Project:

- Raw sewage lift pumping station
- Inlet works (including fine screens) and outloading bins
- Primary flow splitter, primary settling tanks, and primary effluent wet well
- Bioreactor feed chamber
- Sludge-handling building and outloading bins
- Digester outlet chambers
- Tankered waste receival station
- All feed averaging tanks (primary sludge and digested sludge).

Each piece of infrastructure will be ventilated independently, with separate fresh air balance damper and foul air ducts for each structure. Foul air will be transferred by ductwork to the OCU.

The concept design for the odour control system is documented in Section 12 of Appendix K and summarised as follows, noting the current design is subject to contaminant characterisation and monitoring. Odour treatment will likely be via a new biotrickling filter with polishing activated carbon filters. The current design arrangement provides three biotrickling filters in parallel (duty/duty/duty), two activated carbon units (duty/duty), and two extraction fans (duty/standby). Downtime of a biotrickling filter or activated carbon unit can be tolerated by the system, only resulting in an increased stripping rate of carbon from one of the carbon units for the period of downtime.

Once treated, air will be pumped into an approximately 14-15 m stack with a 0.9 m diameter. The treatment system assumes a discharge flow of 30,000 m³/hr with an exit velocity of approximately 15 m/s of foul air at 500 odour units (OU) per cubic metre. The assumptions used to determine the rate of air extraction are explained in Section 12.4 of Appendix K.

The system will be designed to capture over 99% of fugitive emissions over the areas it covers. This generally requires a sustained negative pressure of 15 Pa. This is achieved through increases in ventilation rates in conjunction with sealing of gaps where odours can escape.

The treatment system will sit adjacent to the new primary treatment area, located as shown in Figure 2-3.

2.4.5 Treated effluent storage

The Project will contain effluent storage based on the pump capacity of the Blinking Billy effluent pumps. Dynamic pressure testing of the Blinking Billy rising main is currently being undertaken to determine the required storage capacity for the effluent balance, presumed to be not more than 8.5 ML of storage capacity. The 8.5 ML of balance storage will minimise the frequency and volume of treated effluent discharge to the local Selfs Point effluent outfall to an average of seven discrete discharge events per year at an average volume of 133 ML per year.

The 8.5 ML treated effluent storage will be an above-ground storage tank with a 40 m diameter and a height of 7.5 m, and will be located in the northern corner of the Project Site, as shown in Figure 2-3. The effluent balance tank will receive treated effluent from the new bioreactor/MBR flow pathway, with the flow balance assessment used to determine the size of the storage, as detailed in Appendix K.

2.4.6 Disinfection upgrade

The existing STP system uses both a UV and chlorine disinfection process prior to discharge. The new MBR process will remove pathogens to an acceptable level (through physical removal) without the need for further primary disinfection. To ensure the integrity of the membranes in the MBR process, turbidity sensors will monitor the effluent turbidity on each membrane train and trigger an alarm if a set threshold is reached. Once the offending membrane section has been located it will be replaced as required.

The existing chlorine disinfection system will be retained and dosed into the MBR effluent line, downstream of the effluent balance tanks but before the Blinking Billy effluent pump station. Chlorine dosing is retained to manage biofouling of the Blinking Billy effluent outfall line and to ensure effective operation of the heat exchangers that run from the effluent line (explained below).

Part of the downstream pipeline network includes a heat exchanger system used by the Hobart Aquatic Centre, Hobart City Council offices and the Hotel Grand Chancellor. A portion of the effluent is pumped through stainless steel heat exchange pipes to heat a carrier medium (fresh water). As the effluent moves through the steel pipework, heat is transferred to the carrier medium, prior to the effluent being returned to the main effluent discharge pipe. The heat exchange system is a sealed unit so at no time does the effluent come into contact with the carrier medium. The heated carrier medium is then pumped to the various locations for heating purposes. The stainless pipework functionality is susceptible to biofouling (which can reduce the thermal conductivity and create blockages in the pump and exchange pipework), which is solved with the use of chlorine as a disinfectant in the effluent.

TasWater proposes to dose chlorine at a nominal rate of 0.6 mg/L², with the aim of achieving a <0.1 mg/L residual chlorine concentration at the Blinking Billy discharge location following decay and consumption throughout the effluent pipeline network. This starting dosing rate will be optimised through commissioning based on testing at the Domain break of head tank. Chlorine will be monitored at the effluent outfall pump station to optimise the dosage required by measuring residual chlorine in the effluent after it has travelled through the transfer pipeline length; laboratory experiments will also be run using site-specific effluent to measure chlorine decay rates over longer periods. This information will allow TW to optimise the dosing rate to achieve the necessary controls at the heat exchangers, while minimising residual chlorine released to the environment.

No alternatives to chlorine (to achieve the required prevention of biofouling in the effluent pipeline) were assessed as viable. Chlorine is readily available, the benefits and impacts are widely understood, and it can be easily tested.

2.4.7 Chemical storage and dosing systems

Various chemicals are required to be dosed throughout the sewage treatment process to ensure process efficacy. The following chemical dosing and storage systems form part of the Project:

- Chlorine gas will be dosed in the final effluent pumped to Blinking Billy for secondary disinfection and to prevent biofouling of the transfer pipeline.

² Note that chlorine was modelled at a rate of 1 mg/L to address potential water quality impacts and mixing zone calculations in Section 6.1 as a conservative measure.

- Alum (aluminium sulphate) is a coagulant used in wastewater treatment to remove phosphorus and suspended solids. Alum will be dosed from two new 26 kL storage tanks via a new dosing system at the flow splitter (refer Section 2.4.1) to the primary sedimentation and bioreactor. Alum will also be separately dosed to the digested sludge storage tank to suppress mineral precipitation in the sludge and the consequent equipment fouling that mineral precipitate causes.
- Caustic soda for pH balancing will also be dosed at the flow splitter from a new 26 kL storage tank.
- Citric acid and sodium hypochlorite are used for membrane maintenance in the MBR system. These will be stored adjacent to the alum and caustic storage area in two separate 10 kL storage tanks and dosed to the MBR system as required.
- A new powdered polymer storage and dosing system will be installed to thicken sludge from various stages of the treatment process. The various polymers will be stored in separate tanks, and sizing will be determined from providers' specifications. These systems will also have the ability to dose liquid polymer if TW opts for this in the future.

An external carbon source (likely to be ethanol) may be required to be dosed if needed to aid in nitrogen removal. This will be established during the remaining detailed design phase; this would require additional storage tanks and a dosing system.

2.4.8 Tankered waste receipt

A new tankered waste receipt facility forms part of the Project to accept trade waste from various customers. Tankers will enter the dedicated area and unload via camlock connections where the waste will be pumped through an automated screen to remove any large solids. Screened waste will be pumped to two 26 kL covered holding/balancing tanks where it will then be mixed and heated with a heat exchanger to 40 °C; odour extraction will occur from the cover of the tank. Following heating and mixing, the waste stream will be pumped and split between the new digesters outlined in Section 2.4.10.

Tankered waste will include waste deemed acceptable by TW (trade waste, grease trap), with no industrial or septic waste planned to be accepted via tankered delivery.

The tankered waste facility location is shown on Figure 2-3. An access driveway will be provided, suitable to accommodate two tankers, one unloading and one in a waiting bay. Approximately 50 kL/day of tankered waste is anticipated, which would arrive in 5-10 tankers depending on size.

2.4.9 Thickening system

Thickening of sludge waste streams, including primary sludge and waste activated sludge (WAS), as well as recuperative thickening of digester sludge, is required in the new process to minimise the required size of the digesters proposed for the Project. Sludge from the various processes will be pumped to one of two feed averaging tanks, depending on sludge type. It will then be pumped to one of five specific rotary drum thickeners (RDTs), depending on sludge type. The thickened sludge will then be pumped to the digesters outlined in Section 2.4.10. The locations of the various thickening elements are shown in Figure 2-3.

2.4.10 Digesters

Two new anaerobic digesters are proposed for the Project to replace the existing digesters used at the site, as they are considered in poor condition and not cost-effective to retrofit.

The new digesters will receive thickened WAS from the new bioreactors, thickened primary sludge from the primary sedimentation tanks, and processed and pre-heated tankered waste from the tankered waste receipt facility.

The two new 2.3 ML digesters (sized to achieve a 15-day sludge retention time with one tank offline) will be located just to the north of the primary treatment area, rather than the existing digester location, to minimise the required pumping distance of sludge from the new primary treatment system.

The digesters will need to be heated to a working temperature of 35-40 °C. This will be achieved via the biogas heating system explained in Section 2.4.11.

Detailed design information on the digesters is provided in the Project Concept Design Report (Section 17 of Appendix K).

2.4.11 Biogas heating system

Significant volumes of methane are generated by the digestion process. This gas is proposed to be captured and used as a fuel source by the Project to heat water and generate electricity through a new biogas co-generation system. The biogas produced is anticipated to have a methane concentration of approximately 63%. The Project will result in peak day biogas production of 4,500 Nm³/day³ during peak load months.

The system will extract the gas from the floating roof cavities of the digesters, pass it through a filter, a hydrogen sulphide scrubber and then on to gas-powered hot water heaters and a co-generator for power production. The hot water generated in the system will be transferred to each digester via a heat exchanger to maintain the sludge at the required temperature to optimise the anaerobic process. A separate heat exchanger and hot water supply will be run to the tankered waste receival station to pre-heat the tankered waste before being pumped to the digesters. The hot water heaters will contain a dual biogas/natural gas burner assembly. The natural gas, which will be connected to the local gas mains, will be used as a backup only in the event insufficient biogas is available, will be connected to the local gas mains. The biogas co-generator system will be capable of producing up to 550 kW of energy for use onsite.

The biogas system will also contain an enclosed emergency gas flare to burn off any excess biogas, which has been sized to be capable of burning off the 2054 peak biogas volumes if required; this avoids the release of any methane to the environment. The use of the flare will be highly variable and dependent on seasonal requirements of biogas for heating and co-generation; however, its use is expected to be minimal considering the hot water heaters and co-generator have been sized to accept the vast majority of gas under summer and winter conditions to 2054.

The biogas system will result in the reduction of a significant volume of methane to the atmosphere, resulting in the release of CO₂ (and water) from the combustion process in its place, estimated at 3,330 tCO₂eq per annum (in 2040). This is considered significantly less harmful than methane as a greenhouse gas, which has an emission factor for National Greenhouse and Energy Reporting (NGER) 25 times greater than CO₂.

2.4.12 Dewatering and biosolids storage/outloading

Once sludge has been processed in the anaerobic digesters, it is required to be dewatered and collected for removal from site. Biosolids are generally used as agricultural fertiliser, but the destination of the biosolids varies with the availability of accepting locations.

Digested sludge from the new digesters will be fed to a new 60 m³ storage before it is pumped to one of two new centrifuges for dewatering. The centrifuges will be located on raised platforms to allow dewatered biosolids to be gravity fed to new horizontal screw conveyors that will convey the biosolids to one of four 20 m³ enclosed bins for collection by truck.

Predicted biosolids production from the Project, as well as production averages from the existing Selfs Point and Macquarie Point STPs, are provided in Table 2-6. The Project is expected to produce on average approximately 30 m³/day of dewatered biosolids (equivalent to approximately 31.5 tonnes) based on five days of operation a week; in a peak month these numbers are predicted to increase to 36 m³/day and 39 tonnes.

Table 2-6 Biosolids volume estimates

Waste	Selfs Point existing	Macquarie Point existing	New Selfs Point STP	Notes
Biosolids (m ³ /week)	105	80	150	Reduction in volumes are due to improvements in new digester process control and removal of sludge liming process at Selfs Point STP.

³ Nm³=normal cubic metre of gas @ temperature 0 °C, pressure 1.01325 barA (absolute pressure)

Biosolids produced by the Project are treated in the anaerobic digesters outlined in Section 2.4.10 and will be treated to meet the Grade B biosolids 'Stabilisation Grade' and 'Contamination Grade' requirements, as defined in the Tasmanian Biosolids Reuse Guidelines 2020.

Biosolids stabilisation grade refers to the degree of pathogen reduction, odour reduction and vector reduction (e.g. rodents, flies etc). The biosolids treatment process will comply with Option 1 (as defined in the Tasmanian Biosolids Reuse Guidelines 2020) of the approved processes for vector attraction reduction, that is the "Biosolids treatment process reduces volatile solids by >38%".

TW has developed a Sewage Sludge Management Plan, in accordance with the EPA's Sewage Sludge Management Plan Guidelines, to cover the management of all its level 2 STPs across the state, including the current Selfs Point STP; the document will be updated to reflect changes as a result of the Project. At all continuous sludge treatment plants (like the Project), to ensure Grade B is achieved, weekly biosolids sampling is undertaken by the TW Environmental Performance team, who investigate any exceedances and report this to the biosolids service delivery contractor to ensure an appropriate disposal route for the biosolids is found; this same process will apply for the Project.

Results of samples of biosolids collected in the 12 months prior to April 2022 at both the existing Macquarie Point and Selfs Point STPs show average concentrations of several metals result in a Grade B contaminant status, with the most pronounced metals being zinc and copper. As a combination of this sludge will be generated by the Project, this is expected to remain unchanged. However, in accordance with the precautionary principle, an additional risk assessment and screening of potential contaminants in biosolids will be undertaken as part of the commissioning process for the Project. This will involve the completion of an initial risk assessment of catchment areas containing commercial and industrial premises contributing influent to the Project, and then follow-up testing of biosolids in accordance with Section 7.1 of the Tasmanian Biosolids Reuse Guidelines 2020, including screening for any additional contaminants that have the potential to occur in the waste stream as identified in the risk assessment. Verification of the stabilisation process will be included as part of the sampling regime in accordance with Section 8.4.1 of the guidelines.

2.4.13 Electrical systems upgrade

The existing TasNetworks 11 kV supply and substation (located onsite) will be replaced with a new distribution system to meet the demands of the Project. This will include a new dual redundant high voltage supply arrangement from TasNetworks, which will feed a new outdoor high voltage (HV) switching station located within the project site. The HV switching station will distribute 11 kV around the site between ten 11/0.4 kV transformer kiosks rated no greater than 2 MVA that supply four low voltage (LV) switch rooms. The existing plant will then be resupplied from two new transformer kiosks, and the existing TasNetworks 11kV supply and substation will be abandoned.

Each LV switch room is supplied by two transformer kiosks to ensure a redundant supply is available at all times. Four LV switch rooms will be positioned at strategic positions around the new plant. Each switch room will contain main switch boards and motor control centres to supply power to equipment within the local area.

All electrical assets built under the Project will be designed to comply with the National Construction Code and TasWater Electrical and SCADA Technical Standards.

The new switch rooms will also house the communications and programmable logic controller equipment required to control each piece of infrastructure, which will incorporate various alarms to alert staff of infrastructure performance issues or process faults or failures.

2.4.14 Access roads

New access roads within the Project Site will be required to service the new infrastructure. The new road layout is shown in Figure 2-3. The new roads are required for the following activities:

- Chemical delivery
- Sludge removal
- Screenings and grit removal

- Maintenance access for 100 t crane.

All new and upgraded roads will be bituminised and have a minimum trafficable width of 5 m, with 7 m roads provided for crane access routes. Road grades will be a maximum of 6% and will have a 20-30 km/h speed limit.

2.4.15 Local Selfs Point effluent outfall

The existing local effluent pipeline and outfall at Selfs Point will be replaced as part of the Project. Both have been damaged by tree root infiltration and other processes over the years and would be unable to cater for the required flows that may result from the Project without significant rehabilitation works being undertaken. There is currently no plan to remove any of the existing outfall infrastructure during decommissioning.

The terrestrial portion of the replacement effluent pipeline will be buried underground along Selfs Point Road in the road reserve to the area of shoreline where the effluent outfall pipeline will commence from, as shown in Figure 2-5. As previously mentioned, this buried (underground) section of pipeline is considered prescribed works under the *Water and Sewerage Industry (General) Regulations 2019* and is therefore exempt from planning approval requirements and exempt from assessment as part of the Project. It is included in this document for context only and does not form part of the application. The marine portion of the pipeline from the high-water mark to the outfall/diffuser location, however, does form part of the assessment and has been included in the definition of the Land.

The local Selfs Point effluent outfall pipeline will extend approximately 200 m offshore along the alignment shown in Figure 2-5 to a water depth of approximately 8 m.

The outfall pipeline will be constructed of OD1400 PE100 pipe. Using a suitable vessel to lay the pipe, the pipe will be floated to the proposed discharge location and sunk into place with precast concrete collars spaced at 5-6 m intervals affixed to the pipeline. At the discharge location, a diffuser will be installed at the terminal end of the outfall pipeline above the seafloor to assist with dispersion efficiency. The diffuser will have 20-25 individual ports over a 100 m length, with alternating north and south facing ports. The ports will have a vertical angle to reduce scour on the seabed. The number and final sizing of each of the diffuser ports will be finalised as the design develops. The diffuser will be installed by divers from a vessel. A collar will also be provided at the terminal end of the outfall pipeline to allow future pipeline extensions if required.

The outfall will be used under extreme and prolonged storm events when the capacity of the available effluent balance storage and the Blinking Billy effluent outfall is exceeded, or during emergency events such as power failure. The effluent outfall will have a peak hydraulic capacity of 1,340 L/s. Results from modelled discharge frequency suggest that approximately 1.9% of total annual effluent volume from the Project over five years will be discharged at the local Selfs Point effluent outfall (GHD, 2022), with an average of seven discharges predicted to occur per year with an average discharge volume of 19 ML per event.

There are no proposed changes to the effluent outfall infrastructure at Blinking Billy Point.

2.4.16 Effluent reuse

As outlined in Section 3.3, an effluent reuse study was commissioned for the Project, which concluded that partial or full reuse at a commercial scale would not be viable for the Project without significant third-party funding in the region of \$75 million; whether full reuse or partial reuse, the startup costs for the infrastructure required to achieve any significant reuse remain similar, owing to the costs of installation of the pipelines, pumps and storage dam(s).

The existing arrangement for supply of treated class B effluent to Friends School for irrigation of its oval will cease as part of the Project due the Department of Health's new requirement for minimum class A recycled water at the site.

Current expected salinity in the Project effluent, as outlined in Section 2.4.17, is not expected to restrict future reuse opportunities, as outlined in the effluent reuse study in Appendix A.

2.4.17 Saltwater infiltration

Saltwater ingress is a known issue across numerous sewer catchments in the Hobart region. Relatively high levels of salinity are currently recorded from the Macquarie Point catchment. TW has developed a memo to

explain the saltwater ingress issues within the catchment; the full memo is provided in Appendix J and the salient points presented in the following paragraphs.

An inflow and infiltration assessment was undertaken for the catchment in 2016 by Mott MacDonald, provided in full in Appendix J. The assessment used flow and conductivity monitoring equipment in the sewer catchment at a number of locations, the results of which were analysed against local tidal and weather data. The results indicated that the sites with higher conductivity (a proxy for salinity) were associated with the lower lying areas within the catchment and were correlated with tidal flow, indicating seawater as the major source of salt infiltration to the catchment as opposed to any commercial source.

The study identified the three sub-catchments with the highest tidal saltwater ingress as low-lying areas adjacent to the waterfront:

- Around Hunter St and Franklin Wharf
- Through Salamanca Place
- Through Battery Point

Parts of the sewer network through this area date from the early 1900s and are of early concrete or vitreous clay construction with degraded spigot joints that allow high levels of ingress through low-lying areas adjacent to the waterfront. Areas where these high levels of ingress are occurring have been identified and the requirement for their prioritisation noted within the wider TW Inflow and Infiltration Program. As these renewals occur, peak volumes and conductivity levels will decrease. This means the design parameters adopted for the Project based on current day criteria are conservative over the long term. The concept design work undertaken to date allows for these elevated conductivity levels with no special infrastructure considerations required.

The volumes of seawater ingress experienced have been estimated based on available conductivity data, and details on the methodology are outlined in the memo in Appendix J. A high tide scenario was calculated as potentially inputting up to 10.3 L/s of the 120 L/s catchment flow or approximately 8.5% of flow. With the connection to the Project, this would be diluted by the Selfs Point catchment (which does not experience significant saltwater ingress) to a temporary (i.e. during high tide events) concentration of approximately 3,000 $\mu\text{S/cm}$; this would be further diluted in the Project's bioreactors.

The variation in salinity from the Macquarie Point effluent has been factored into the data used for the development of the Project and the effluent reuse study, which used an estimated mean salinity for combined flows from the Selfs Point and Macquarie Point catchments of 1,207 $\mu\text{S/cm}$, with a minimum of 644 $\mu\text{S/cm}$ and maximum 4,119 $\mu\text{S/cm}$.

From a process design perspective, the most critical component relating to conductivity levels is ensuring rapid changes in salinity will not cause osmotic shock in the treatment system. This has been factored into the design of the Project.

The median salinity for combined flows from the Project is unlikely to limit irrigation potential, as outlined in the memo (Appendix J) and the Effluent Reuse Feasibility Study (Appendix A).

2.4.18 Bypass scenario summary

The Project has been sized to accommodate PWWF. This means under normal operating conditions all effluent is treated through the plant via the bioreactor process. Section 3.2.4 of the 50% Detailed Design Report (Appendix K) provides additional information on wet weather flow management through the plant.

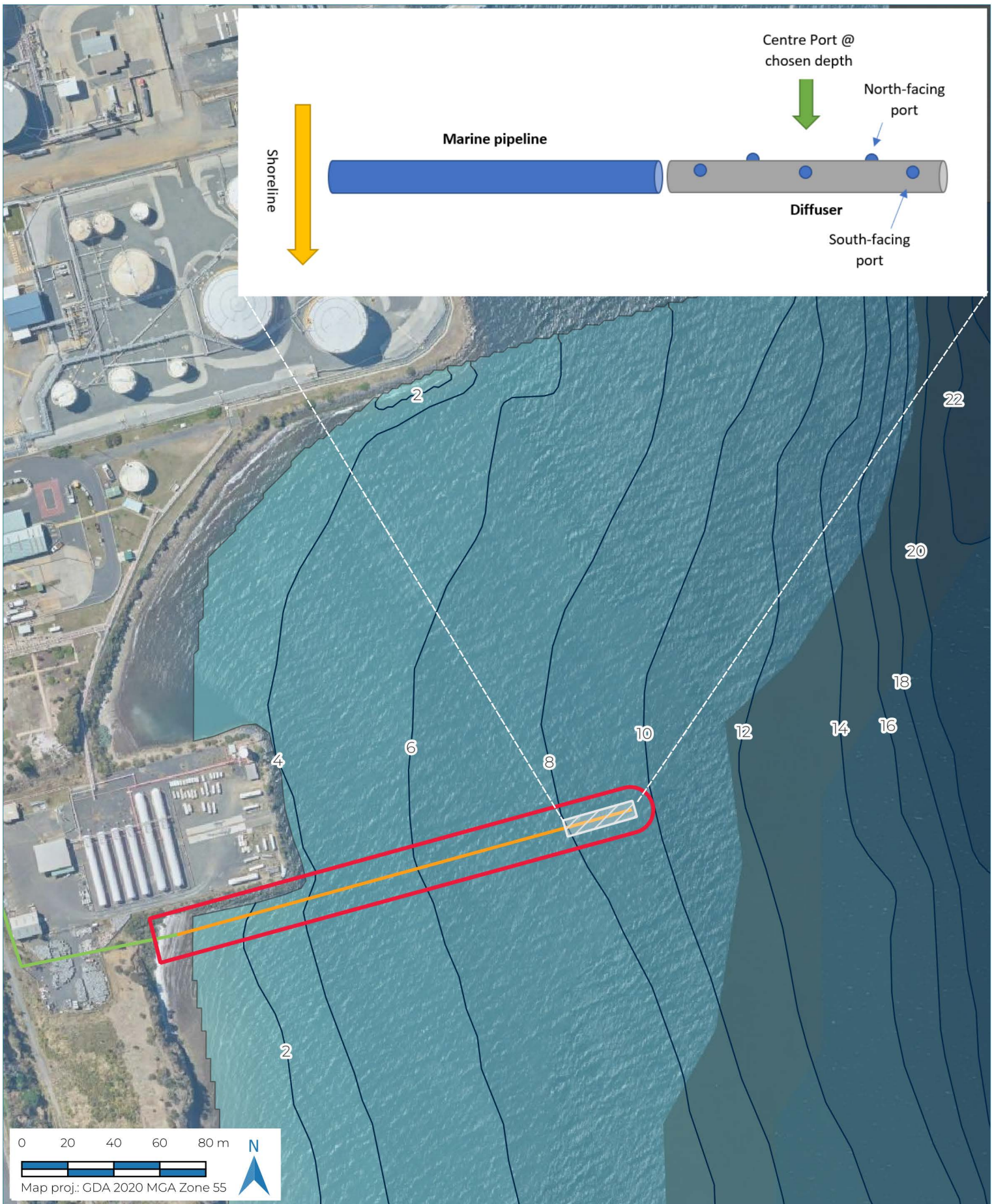
Bypass and overflow capability is included in the design to prevent uncontrolled upstream releases in emergency or breakdown scenarios. These are reportable events under the EPA Sewage Spill Notifications Guidelines and managed in accordance with TW's Sewage Spill Response Plan. A summary of the events that may lead to process bypass or overflow scenarios is provided in Table 2-7 below.

While bypass capability is incorporated in the design, particular consideration has been given to levels of redundancy for critical infrastructure in order to limit breakdown and emergency discharge occurrences. These levels of redundancy are discussed in further detail in Sections 2.2.4 of the Detailed Design Report (Appendix K). Key examples of redundancy include dual incoming power supplies from TasNetworks, and the extension of aerobic swing zones provided within the new BNR bioreactor stage, which will enable aerobic solids retention time to be increased should an oxidation ditch be taken offline in an emergency.

Table 2-7 STP bypass scenarios

Event	Discharge scenario
Blinking Billy effluent outfall unavailable	Effluent balance tank preferentially fills, then treated effluent overflows to local Sells Point effluent outfall.
Bioreactor system partial failure	The bioreactor stage has partial redundancy provisions in-built to the tank design which allows for an oxidation ditch stage and/or the combined secondary aerobic/anoxic stages to be completely isolated, drained and bypassed to still allow peak wet weather flows through the bioreactor. In the event an oxidation ditch is taken offline, a diffuser grid from the offline oxidation ditch can be relocated into the online ditch to maximise ammonia removal via nitrification.
Bioreactor system full failure	Bypass from primary effluent wet well is discharged to the effluent balance storage tank and outfalls.
Inlet works failure	The design will incorporate bypasses as detailed below. It must be noted that the secondary screens cannot be bypassed as this would void membrane warranties. • Primary 6 mm screening: 20 mm bar screen bypass into secondary fine screen channel. • Grit chamber: hydraulic bypass so operator can access the chamber for maintenance. • Secondary 2 mm screening: under a failure scenario, there would be bypass of this secondary screening state to the emergency overflow line which connects to the primary effluent wet well overflow line.
Primary treatment failure	In the event that a scraper system fails, the remaining primary sedimentation tank trains would be used and alum dose adjusted to maximise settlement from affected flows.
Effluent balance tank failure	Flows of 290 L/s preferentially discharged to Blinking Billy effluent outfall, and remainder (treated effluent) discharged to local Sells Point effluent outfall.
Blinking Billy pump station failure	Cannot feed Blinking Billy effluent outfall; discharge of treated effluent occurs via local Sells Point effluent outfall.
Failure of a single high voltage incomer to site, and/ or failure of a single high voltage switching station	Low power mode is automatically enabled until plant is reset by an operator (max 2 hrs duration until reset). In low power mode, power is supplied to inlet works and raw sewage pumps, alum dosing and primary sedimentation tanks. This provides chemically assisted sedimentation, screening and grit removal. Secondary treatment is bypassed until plant is reset. Effluent is partially treated and will overflow to the primary effluent wet well and to the effluent balance tank to maximise attenuation prior to discharge. Blinking Billy effluent outfall pump is the largest load drive onsite and cannot be relied upon under this scenario. All discharge of partially treated effluent will be to the local Sells Point effluent outfall.
Emergency overflow of the New Town gravity catchment raw sewage lift pump station. This pump station lifts the New Town gravity catchment into the new inlet works.	Due to the low level of this pump station, emergency discharge to the local Sells Point effluent outfall would require the outfall to not be in operation at that time. Consequently the feeder network SPS to the new STP will be interlocked to prioritise overflow from the raw sewage lift pump station.
Emergency overflow of the Blinking Billy outfall pump station due to power failure, and mechanical failure of	Due to the low level of this pump station, emergency discharge from the Blinking Billy outfall pump station at

Event	Discharge scenario
flow control valve (meaning flow cannot be diverted to the local Selfs Point effluent outfall).	Selfs Point cannot be directed to the new local Selfs Point effluent outfall and will redirect to storm water for operational safety in an emergency event. This is a low probability event that would require failure of the HV power supply, failure of the back-up power, and mechanical failure of the flow control valve that shuts off flow to the pump station (i.e. allowing flow to be diverted to the local Selfs Point effluent outfall). The HV power supply arrangement has a calculated reliability of 99.98% (single feed) and 99.999995% (dual feed) based on current TasNetworks statistics. At worst, due to an HV power failure at the wider plant, this would temporarily discharge partially treated effluent (screened and primary settled).



- Project site (the Land)
- Selfs Point Replacement Outfall Alignment
- Selfs Point Replacement Pressure Pipeline
- 2m marine contour lines
- Diffuser



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Selfs Point STP
 Redevelopment
 Figure 2-5
 Marine Outfall
 Layout

2.5 Construction

2.5.1 Construction overview

During the pre-construction phase between Project approval and the commencement of construction, a range of design elements will be finalised. This will include geotechnical assessment and surveys of the site to inform foundation design requirements, any required cut and fill design, and final siting of Project components.

Closer to the commencement of construction (i.e. still within the pre-construction period) early-works site preparation will begin. This will include clearing and levelling of land where required, establishment of a construction compound and laydown area, and development of access roads. Bulk earthworks have been minimised for the Project where possible to reduce the handling of contaminated material that exists throughout the Project Site, especially within the wetland area. As a result, the Project has been designed with most infrastructure occurring at surface level.

The construction compound and laydown areas will be established within the wetland area adjacent to the existing STP land boundary. Most machinery and vehicle parking will be contained within this area; however, discussion may be held with Council and adjacent landholders to agree to additional parking and storage areas on adjacent landholdings during peak construction periods. The construction compound will contain a site office, crib room, portable toilets, and parking for the construction personnel. The construction compound will also be used for equipment and materials laydown as required, in conjunction with other nominated laydown areas. This pre-construction stage is expected to take approximately 1-2 months to complete. The proposed layout of the construction facilities are illustrated in Figure 2-6.

The next phase of construction will be the development of foundations for the new infrastructure. Several of the larger treatment and storage tanks will require piling to secure a suitable foundation in the wetland area. This is a result of the wetland area being built on reclaimed/landfill land, which contains up to 20 m of various fill materials on top of underlying basalt rock. TW geotechnical assessments undertaken to date have shown significant variability in fill content throughout the reclamation profile, and therefore piled foundations will likely need to extend down to the base rock layer to achieve the required load bearing capacity. The final piling methodology will be determined post-approval.

Most other aspects of the Project will be constructed in situ, including already manufactured equipment and supporting infrastructure such as railings and stairs. All structures will require support piling.

Development of foundations and installation of equipment will likely occur in unison across the construction site, with several work fronts likely to be operating simultaneously. The majority of the new infrastructure for the Project will occur in the wetland area and therefore no major sequencing issues are expected for the Project's construction, in that the existing STP can be left to operate without interruption for the majority of the construction period. The main timing consideration for the Project will be completing the entirety of the new system, including commissioning, prior to accepting the Macquarie Point flows.

The construction of the Project is expected to take approximately 18-24 months, with an additional commissioning period.



- Project site (the Land)
- Compound area
- Laydown area



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Selfs Point STP
 Redevelopment
 Figure 2-6
 Construction Site
 Plan

2.5.2 Equipment

The major items of construction vehicles and equipment that will be required to construct the Project will include:

- Piling rigs for the development of foundations
- Several heavy tonnage cranes for locating STP components
- Several dump trucks, rollers, dozers and excavators for earth moving and road development
- Several concrete delivery trucks for foundation development and in-situ pouring of structures
- Light vehicles and maintenance trucks.

Construction vehicles (including machinery and equipment) will access the site via the Brooker Highway onto Selfs Point Road, which has sufficient capacity to accommodate likely traffic volumes.

2.5.3 Materials

Raw materials required for construction will mainly include road base aggregate, rebar for concrete foundations, and steel piles, with all concrete to be delivered to site rather than batched onsite. Materials will be sourced from local quarries and suppliers, and brought to site as required to avoid stockpiling where possible. Any soils extracted from the site will be reused where possible and, where this is not possible, will be disposed of offsite at a suitably licensed facility, depending on level of contamination.

2.5.4 Construction schedule and construction hours

Construction is expected to commence in FY24-25, with an approximate 24-month construction window prior to commissioning. Several aspects of the Project will be worked on concurrently to minimise construction timeframes.

The majority of the construction is proposed to be undertaken with construction hours limited to:

- Monday to Friday between 0700 hours and 1800 hours
- Saturday between 0800 hours and 1300 hours
- Sundays and public holidays – no work

There are, however, requirements for pre-drilling to facilitate piling activities to be on a 24-hour roster being:

- 24 hours during weekdays
- 24 hours during Saturdays, Sundays and Public Holidays.

The noise from this activity has been assessed, and details are in Section 6.2.

2.5.5 Construction staffing

The Project will be constructed by the TasWater CDO, with local or interstate subcontractors who will likely use a local workforce that will vary in size depending on the stage of construction. It is expected that no more than 100 workers would be onsite at any given time. Given the proximity to Hobart, no specific transport or accommodation issues are anticipated with the Project workforce.

2.5.6 Commissioning

The majority of the Project can be constructed in isolation of the currently operating STP. Commissioning of the new bioreactor will be completed with seed sludge from the existing Biotenipho process. Digester commissioning will require tankering in seed sludge from the anaerobic digestion processes at Macquarie Point STP or Prince of Wales Bay STP. During process commissioning, the digester will require external fuel heating via natural gas until stable biogas production is achieved.

During commissioning, poor quality effluent will be captured and fed into the existing Selfs Point STP infrastructure to avoid poor quality environmental discharges. Once the new STP is commissioned, the transfer of Macquarie Point sewage can be incrementally undertaken. The process commissioning period is

expected to last approximately six months before the upgrade plant enters a one-year process-proving period.

The existing Selfs Point STP will then be decommissioned, including the existing inlet works, primary sedimentation tanks, trickling filters, pre-fermenter, Biotenipho system, clarifiers, sludge handling equipment and outloading system, and digesters. Decommissioning and demolition of minor pieces of existing infrastructure (e.g. pipes, storage areas, some areas of road) will be undertaken in unison with construction of the new STP.

The new STP will be monitored closely during and following commissioning to ensure the new system is operating within design parameters. The receiving environment will be monitored in accordance with the Marine Monitoring Plan outlined in Section 6.1.

2.6 Project footprint summary

The Project will have a total footprint of 6.75 ha (including outfall area) once the new infrastructure is in place, compared to the current Selfs Point STP of 3.2 ha.

2.7 Operation and maintenance

Once commissioned, day-to-day operation of the Project will occur in a similar fashion to the existing STP, with 3-4 full-time equivalent staff operating the plant, as currently occurs on a 24 hour / 7 day basis. Tasks will include monitoring plant performance and making treatment adjustments as required, scheduling and undertaking regular maintenance, scheduling and monitoring trade waste deliveries, and operating the plant under upset conditions.

2.8 Offsite infrastructure

The key offsite infrastructure required for the Project to treat additional sewage is the new pipeline and associated SPS from the Macquarie Point STP to the Project's new inlet works. As previously mentioned, the delivery infrastructure from Macquarie Point will divert the entire Macquarie Point catchment to the Project.

The approvals for the new Macquarie Point SPS and alignment of the new pipeline to Selfs Point STP are underway at the time of writing and will be progressed as a separate piece of work to the Project, under a separate approval process. The existing Macquarie Point effluent outfall will be retained and used as the emergency discharge point for the new SPS emergency overflow.

The only other offsite infrastructure required for the Project is the upgraded power supply to the site, which will be undertaken by TasNetworks.

No public road upgrades are required.

2.9 Decommissioning

The nominal operational lifespan of the Project infrastructure is ~80 years. The operational lifespan for the various components is as follows: concrete structures 90 years, pipes 80 years, pumps/valves 25 years and switchboards 20 years. It is assumed those components with an operational lifespan <80 years will be replaced on an ongoing basis to match the lifespan of remaining infrastructure. At the end of the design life the assets will be assessed and, if required, decommissioned.

Decommissioning of the existing Selfs Point STP will occur according to an approved Decommissioning and Rehabilitation Plan as required by conditions DC1, DC2 and DC3 of Environmental Protection Notice 9797/1 issued 16 August 2018 and the EPA Guidelines – Decommissioning and Rehabilitation Plans for Level 2 Wastewater Treatment Plants in Tasmania, Nov 2010.

This process may require full removal of all components, removal of any contaminated materials not suitable to remain in situ, backfilling with clean fill, and reinstatement of natural ground. Decommissioning of any pipelines would involve pipeline removal or potentially capping, cleaning and retaining pipelines in situ.

Decommissioning of the new Selfs Point STP will be conducted according to any conditions required by the EPA Permit to Operate or Environmental Protection Notice issued for the new plant.

3 Project alternatives

3.1 Overview

The primary rationale for the Project is to allow the Macquarie Point STP to be decommissioned and demolished to facilitate the Macquarie Point redevelopment, with the secondary driver being the opportunity to greatly increase the treatment efficacy of effluent in the relevant catchments and to expand treatment capacity for future growth. It is proposed to achieve these aims through consolidation of inflows from the Selfs Point STP and Macquarie Point STP into a single new STP at the Selfs Point site (i.e. the Project).

A previous iteration of the Project was commenced in 2016, with a NOI submitted and PSGs provided to TW. This iteration was similar in nature to the current Project and a Development Proposal and Environmental Management Plan (DPEMP) was commenced but was abandoned prior to submission due to project funding issues.

The project was revisited in 2020, with new government funding acquired. The initial stages involved the completion of a strategic business case analysis that considered all development options for relocating the Macquarie Point flows to the Selfs Point STP site.

The strategic business case focused on an upgraded Selfs Point STP, because relocation to an existing STP site was seen as the most cost-effective method of dealing with the catchment flows. Several other options were investigated strategically, but Selfs Point STP was the closest option, and it also had suitable land available for the expansion, a well-performing outfall location at Blinking Billy Point, and existing pipeline easements between the Selfs Point and Macquarie Point sites that were available for use. Development of a new STP on a greenfield site was investigated, but not considered feasible, given the lack of available use-compatible land in the surrounding urban areas, the potential environmental and social costs of a new STP in a different location within the Hobart area, and the excessive costs associated with this sort of undertaking.

The initial version of the upgrade included a staged approach, where a combination of new and existing infrastructure would be utilised to meet an initial 2040 design horizon, termed “Stage 1”, which would then be followed by a second stage which would essentially replace all of the old treatment infrastructure, resulting in completely renovated plant to last up until 2054 (“Stage 2”).

The Stage 1 work scope included extending the use of the existing secondary treatment process (Biodenipho bioreactors) and building a separate (parallel) secondary treatment process (bioreactor tank and separate MBR tank) in the wetlands. The MBR tank would consist of six MBR trains. Post 2040 when the existing plant was scheduled for decommissioning, another duplicate bioreactor would be installed alongside the existing tank, and an extra MBR train (making a total of seven trains) would be installed for the MBR tank.

This staged approach was subsequently abandoned in 2023 due to the integration of the existing Biodenipho bioreactors not being cost effective. It was decided to complete Stage 1 and Stage 2 at the same time, resulting in essentially a completely new plant. Moving away from the staged approach allows a combined bioreactor/MBR configuration to be built, allowing efficiencies in construction mobilisation, groundworks and shared tank walls rather than building three separate water retaining structures, which would have been necessary for the staged approach. The move to the new design also means that dry and wet weather flows would be subject to membrane treatment for removal of microbes, eliminating the need for subsequent UV disinfection, which would be of been required for the Biodenipho process.

The chosen project meets TW's MOU commitments to the State Government for the Macquarie Point redevelopment. The Project also allows for expansion to meet the growing Hobart population and allows the incorporation of the latest sewage treatment technologies in the upgrade.

In terms of land availability around the Selfs Point STP, two areas were initially investigated: the Council wetland area currently incorporated into the Project and the adjacent Viva Energy site on the opposite side of the STP; however, the State Government renewed the Viva Energy lease in 2021, making this option obsolete.

3.2 Treatment options

Several treatment options and different arrangements were considered for the Project. Initially 11 secondary process options were screened through an option analysis. This eliminated process and treatment technology that did not have a proven track record or represented an unacceptable cost or risk profile. This eliminated technologies such as MABR (membrane aerated biofilm reactor), BioMag®, and 'nitrite shunt'; however, it was noted that these technologies may remain viable for future intensification pathways.

Seven treatment options were taken through to the second round of analysis. These were:

- Conventional ASP (activated sludge) (primary treatment)
- Conventional ASP (raw sewage)
- MBR (membrane bioreactor) (primary treatment)
- MBR (raw sewage)
- Aerobic granular sludge (raw sewage)
- SBR (sequencing batch reactor) (raw sewage)
- IFAS (integrated fixed-film activated sludge) (raw sewage).

For each treatment option, the following details were developed:

- Preliminary process unit sizing and site layout
- Process flow diagram identifying key cut-ins for construction staging
- An advantages and disadvantages assessment.

The treatment processes were scored against a range of decision criteria for the project. The MBR (primary treatment) option was selected as the preferred option on the following basis:

- Reduced capital cost due to the small footprint of the intensified process. This was particularly important due to the limited land area available and the requirement for ground improvement works to be undertaken due to poor geotechnical conditions.
- The small tankage improves the ability for this option to accommodate flows beyond 2054, improves constructability and minimises open tankage (and therefore odour potential) compared to other large footprint options.
- Provides good process robustness to achieve performance criteria and deal with variability in influent quality.

Alongside the MBR options, the 'Nereda' aerobic granular sludge process was also retained as an option through to the next stage of design. The main driver for this was the small footprint associated with this process.

A detailed optioneering study was subsequently completed looking at the viability of the Nereda treatment process at the Selfs Point site. The Nereda process was determined to be significantly larger than the MBR process, making it poorly suited to the Selfs Point site. The study concluded it was not beneficial to carry two treatment options through the design development pathway, and the final technology option was settled upon.

3.3 Effluent reuse

Effluent reuse was considered for the Project, and a full effluent reuse feasibility study was commissioned and completed in 2022, and the report is provided in Appendix A (Pinion Advisory, 2022). The effluent reuse study included a detailed review of previous feasibility studies and propositions for effluent reuse for Derwent-based STPs currently operating.

The study found that the effluent produced by the Project would meet a Class B standard and would generally be suitable for irrigation to land or for select industrial use under normal operating conditions. There were some reuse challenges identified with respect to occasional spikes in salinity that could make the effluent unsuitable for some uses for short periods, but this was considered manageable.

The study considered the following scenarios:

- Industrial reuse or irrigation of public spaces (sportsgrounds, parks etc) along the effluent pipeline route to Blinking Billy Point in Sandy Bay or within 5 km of the Project
- Contribution to an existing water recycling scheme on the eastern side of the River Derwent.

Several options were assessed for potential partial industrial reuse / public space irrigation, including a northern pipeline to the Tasracing facility and Nyrstar zinc smelter, a western pipeline into the Lenah Valley region, and use of the existing southern pipeline to the Blinking Billy effluent outfall. For a partial reuse system to be viable, at least 30% reuse of effluent is generally needed (without private investment).

The western and southern options were not considered viable, as they were only able to accept very small effluent allocations for sportsgrounds and public green spaces (0.7% and 2.4% reuse of the total effluent produced, respectively). The northern pipeline was considered the most viable of the options for a partial reuse system, at 16% usage of total effluent produced by the Project, driven by the large water demands of the Nyrstar smelter. However, this was still not considered a viable option at these volumes (without private investment). Additionally, Nyrstar indicated that the treated effluent would not be considered a high enough quality for reuse in its processes, as it would require additional treatment through a reverse osmosis system to remove excess salts and would therefore result in a significant cost. Given the low reuse volumes (in relation to the overall treated effluent volumes) and the significant additional investment required for reverse osmosis to generate water of a suitable quality for the Nyrstar process, this option was not considered viable.

Of the existing recycled water schemes, connection to the Brighton scheme and Clarence scheme was considered. The Penna scheme was considered too far away to be viable and is already over capacity with the STPs it currently services.

Connection to the Brighton recycled water irrigation scheme would involve a 15.7 km pipeline to the Green Point STP, with a 1.2 km crossing of the Derwent required. The existing scheme is at capacity, in terms of supply infrastructure, and would require duplication of many components and enlargement of storage to accept additional treated effluent, which would come at a significant cost. The irrigable area is also considered too small to take the additional reuse loads. This option was therefore considered unviable due to cost and capacity.

To connect to the Clarence recycled water irrigation scheme, the Project would require a Derwent crossing, potentially into the Rosny STP. From here the scheme would be significantly constrained in capacity, as per the Brighton scheme. Duplication of infrastructure and significant upgrades would be required for the scheme to accept the additional treated effluent volumes. To achieve 100% reuse from the Project via the Clarence scheme, a storage dam in the size range of 2,500 ML would be required. A dam of this size would require a significant portion of land and given land availability and prices in the area; this was considered likely to limit the viability of such a dam. Partial reuse would also require storage, albeit smaller than that required for full reuse, which would still require a significant dam and infrastructure upgrades. Additionally, Tas Irrigation's South East Irrigation Scheme already services a portion of the region, limiting the availability of irrigable land for an expanded Clarence scheme. While not impossible, a significant external investment would be required for the upgrade of the Clarence scheme to accept treated effluent from the Selfs Point STP, which is beyond the scope and financial capacity of the current Project but may become available in the future, noting that the current Project does not preclude this from happening.

In conclusion, the effluent reuse feasibility assessment found that a partial or full reuse scheme is not considered financially viable without significant external investment in the order of \$75 million (Pinion Advisory, 2022).

The existing arrangement for supply of treated effluent to Friends School for irrigation of the oval will cease due to the new Department of Health requirement to accept only class A recycled water at the site.

4 Consultation

TW has a dedicated Community and Stakeholder Engagement Team who will be managing the consultation component of the Project.

4.1 Engagement undertaken to date

To date TW's engagement for the Project has focused on the following key stakeholders:

- Hobart City Council
- Crown Land Services
- Government regulators (e.g. EPA)
- Viva Energy (lessee of Crown land adjacent to Selfs Point STP)
- Origin Energy (nearby operators)
- Derwent Estuary Program
- New Town Rivulet Catchment Care Group
- Adjacent rowing club.

These stakeholders have been engaged largely through one-on-one meetings during the early phases of the Project.

Additionally, TW has undertaken broader community engagement via online platforms in relation to the Macquarie Point STP relocation project during 2015 and 2016 as part of the previous iteration of the Project.

4.2 Engagement proposed to be undertaken

TW recognises that once the Project has been approved and transitions to the construction phase, there will likely be wider community interest. TW's engagement scope will then shift to focus more widely on surrounding land uses and community areas near Selfs Point including, but not limited to, the Council Depot, the Cornelian Bay cemetery, industrial land (including gas and petroleum businesses), and community recreational facilities.

TW has developed a Community and Stakeholder Management Plan for the Project, which was developed based on the principles of the IAP2 (International Association for Public Participation) Spectrum of Public Participation (IAP2, 2022). Engagement will be undertaken with stakeholders and the wider community, including adjacent and nearby landholders, to identify and address any specific concerns or feedback.

TW will use various channels and formats to provide information about the Project to different audiences, with the aim of building awareness about the Project, promoting project milestones, and responding to enquiries. Stakeholders and the community will have an opportunity through TW's community website to provide feedback on the Project (www.taswater.com.au/community/community/our-projects).

TW's stakeholder consultation will also be undertaken with, but not limited to, the following key agencies:

- Environment Protection Authority (approvals)
- City of Hobart (planning)
- State Growth (roads)
- Department of Natural Resources and Environment (heritage and environment)
- Tas Gas (easements)
- TasNetworks (easements)
- TasRail
- Crown Land Services
- Maritime and Safety Tasmania.

5 The existing environment

5.1 Planning aspects

5.1.1 Land use and tenure

The proposed Project is located at Selfs Point, New Town (as shown in Figure 1-1). As outlined in Section 1.3, this EIS relates only to upgrades of the Selfs Point STP and therefore the proposed Project relates to parcels of land as shown in Table 5-1. Certificate of titles and any associated schedule of easements are contained in the Planning Assessment Report, which will be submitted to the City of Hobart with this document.

Table 5-1 Title details

Property address	Title reference (CT and PID)	Easements and covenants	Approximate area (ha)	Land tenure	Land use
12 Selfs Point Rd, New Town	No CT ref PID 3286956	n/a	2.743 ha	TasWater	Existing STP site
12A Selfs Point Rd, New Town	163940/2 PID 3286948			Local Government City of Hobart	Passive recreation
10A Selfs Point Rd, New Town	CT 163940/3 PID 3189582	Land is limited in depth to 15m, excludes minerals and is subject to reservations relating to drains, sewers and waterways in favour of the Crown.	0.018 ha	TasWater	Existing STP site
10 Selfs Point Rd, New Town	CT 163941/1 PID 3189590	Land is limited in depth to 15m, excludes minerals and is subject to reservations relating to drains, sewers and waterways in favour of the Crown; and Burdening easement, 6m width, in favour of Aurora	13.55 ha	Local Government City of Hobart	Community, recreational and Council depot
Selfs Point Road reservation	n/a	n/a	n/a	Local Government City of Hobart	Road
Land adjacent to Gas Road	n/a	n/a	n/a	Department of Natural Resources and Environment Tasmania (Crown Land Services)	River Derwent

Most of the Project Site that is Council owned land (excluding the road corridor for the local Selfs Point effluent outfall pipeline) is used as a storage depot by the City of Hobart and does not have any recreational activities occurring on it. The remaining parts of that title area will continue to be used for the existing activities including the Ten Lives Cat Centre to the east, the New Town Bay Rowing Centre to the west and Rugby Park to the south.

The project does include earthworks on Council land at 10 Selfs Point Road and 12A Selfs Point Road. These earthworks are for batters. It is anticipated that, following construction, the recreational functions of that land will be improved. For Rugby Park, the embankments will provide an elevated viewing area, improving amenity for spectators of rugby matches. For 12A Selfs Point Road, public access along the foreshore will not be impeded due to the proposed works.

Surrounding the Project Site are recreation, community purpose, and port and marine land uses, including fuel storage facilities and Cornelian Bay cemetery and crematorium. The nearest residential land to the STP site is located approximately 100 m to the west.

Land use history relevant to the Project includes significant reclamation across essentially the entire Project Site and the historical use of a portion of 10 Selfs Point Road as a landfill facility following reclamation. The landfill was subsequently capped with clay and dredge spoil between 1998 and 2000 for use as an experimental wetland area fed from the Selfs Point STP effluent discharge. The wetland area was drained and is no longer used and remains in a dry state.

The land tenure affected by the proposed works are included in Figure 5-2, which shows the property boundaries in relation to the proposed works.

5.1.2 Planning permit requirement

Most of the Project (the STP upgrade works and the outfall) is considered use and development under the *Land Use Planning and Approvals Act 1993*. However, some elements of the Project are prescribed works under the *Water and Sewerage Industry (General) Regulations 2019*, and therefore will not be subject to the requirement for a planning permit.

Specifically, the pipeline from the STP site to the new local Selfs Point effluent outfall is prescribed works. As an underground pipeline, which is for the removal of sewage, it is not considered use and development under the *Land Use Planning and Approvals Act 1993*, pursuant to section 11(d) of the *Water and Sewerage Industry (General) Regulations 2019*, and therefore that pipeline does not require a planning permit.

5.1.3 Consideration under the Hobart Interim Planning Scheme 2015

The Project falls within the area covered by the Hobart Interim Planning Scheme 2015 (the scheme). The scheme primarily controls use and development on land through the application of zones. Each zone provides for a table of use and a suite of use and development standards. Development standards are divided into standards for 'building and works' and standards for 'subdivision'.

Additional to the zones, there are a suite of codes within the scheme. The codes set out provisions that may apply to more than one zone or cannot be described by zone boundaries. Some codes are applied by way of a spatial overlay and others by textual application (i.e. certain type of use and development). Where there is a conflict between a code and zone provision, the code provision prevails. Some codes require specific technical information to accompany the application to demonstrate compliance.

The scheme also provides for exemptions, general provisions (that apply across the entire municipal area) and site-specific provisions (in the form of particular purpose zones or specific area plans).

Under the scheme, use and development may be classified as:

- No permit required – a permit is not required to commence or carry out a use or development
- Permitted – a use or development must be granted a permit
- Discretionary – the planning authority has a discretion to refuse or permit a use or development
- Prohibited – a use or development permit must not be granted.

Any use and development standard includes an acceptable solution and a performance criteria. The acceptable solution is the permitted standard, and the performance criteria is the discretionary standard.

For each applicable standard, the Project must demonstrate compliance with the acceptable solution, or – where this cannot be met – demonstrate the performance criteria can be satisfied.

For this Project, a total of 38 separate standards apply. The Project relies on Council to exercise its discretion in relation to 15 of them.

5.1.3.1 Use classification

The Project falls within the Utilities use class, which is defined as:

Use of land for utilities and infrastructure including:

- (a) telecommunications;
- (b) electricity generation;
- (c) transmitting or distributing gas, oil, or power;
- (d) transport networks;
- (e) collecting, treating, transmitting, storing or distributing water; or
- (f) collecting, treating, or disposing of storm or floodwater, sewage, or sullage.

Examples include an electrical sub-station or powerline, gas, water or sewerage main, optic fibre main or distribution hub, pumping station, railway line, retarding basin, road, sewage treatment plant, storm or flood water drain, water storage dam and weir.

The scheme divides Utilities into Minor Utilities and other Utilities. Minor Utilities are defined as:

use of land for utilities for local distribution or reticulation of services and associated infrastructure such as a footpath, cycle path, stormwater channel, water pipes, retarding basin, telecommunication lines or electricity substation and power lines up to but not exceeding 110Kv.

The Project does not fall within the definition of Minor Utilities and therefore is treated as other Utilities. The status of the Utilities use class against the applicable zonings is considered below.

5.1.3.2 Zoning

The Project Site falls across two zones under the scheme: the Utilities Zone and the Recreation Zone as shown in Figure 5-1. Additionally, the outfall is located in the Environmental Management zone.

Recreation Zone

In the Recreation zone, Utilities is a discretionary use. There are use standards applicable to discretionary uses that address noise emissions and alignment with the recreational purpose of the land. The noise standard will not need to be specifically addressed, in this case, as noise emissions are being assessed by the EPA. The recreational purpose standard is considered achievable, as most of the land to be used by the Project is not currently used for recreational purposes. It is noted that some earthworks (batters) are proposed within the Council's land at 10 Selfs Point Road and 12A Selfs Point Road, which are currently used – and will continue to be used – for recreational purposes. For the works at 10 Selfs Point Road, it is anticipated that, once the project is constructed, the recreational functions of Rugby Park will be improved. This will be achieved by providing embankments that elevate the viewing height of spectators of rugby matches. For 12A Selfs Point Road, public access along the foreshore will not be impeded as a result of the works.

There are other applicable development standards in the Recreation Zone, relating to height, setback and landscaping, which are considered achievable either through the acceptable solution or performance criteria pathway.

Utilities Zone

Elements of the Project, including the additional effluent treatment tank and potentially any pipeline upgrades, are in the Utilities Zone. Utilities are a permitted use in the Utilities Zone.

None of the use standards in the Utilities Zone apply to the Project. The noise standard will not need to be specifically addressed as noise emissions are being assessed by the EPA.

There are other applicable development standards relating to height, siting, landscaping and fencing that are considered achievable either through the acceptable solution or performance criteria pathway. The development can meet the acceptable solutions for the required building height and front setback. Landscaping will be provided, with a landscape plan likely required through the secondary consent process. The Project will satisfy the performance criterion of the scheme (28.4.3 Landscaping, A1/P1) subject to conditioning of any permit.

Environmental Management Zone

In the Environmental Management Zone, Utilities is a permitted use if a reserve management plan applies. Alternatively, Utilities is considered discretionary.

A reserve management plan means a management plan prepared under the *National Parks and Reserves Management Act 2002*, the *Wellington Park Act 1993* or the *Living Marine Resources Act 1995*, or a plan of management prepared for an area reserved under the *Crown Lands Act 1976*.

A reserve management plan does not apply to this site; therefore, the use is considered discretionary and the use standard for discretionary uses will apply. This requires that it is demonstrated that the project does not have an unreasonable impact upon the amenity of the surrounding area through commercial vehicle movements, noise, lighting or other emissions that are unreasonable in their timing, duration or extent. This is considered achievable.

The other applicable standards under the zoning are development standards for the proposed works. The project will comply with all applicable development standards. The outfall is located below the water level, and any excavation will be limited to the amount needed for the construction of the outfall.

5.1.3.3 Applicable codes

Several overlays apply to the Project Site as shown in Figure 5-2. These will trigger assessment under codes of the planning scheme. Additionally, the Project is affected by other codes by way of textual application. The applicable codes, and a high-level assessment against the code requirements, is included in Table 5-2.

It should be noted that, while the Project is one that has potential to cause environmental harm, it is exempt from the Attenuation Code under the scheme due to Clause E9.4.1 as the Project requires assessment under the EMPC Act.

Table 5-2 Applicable codes

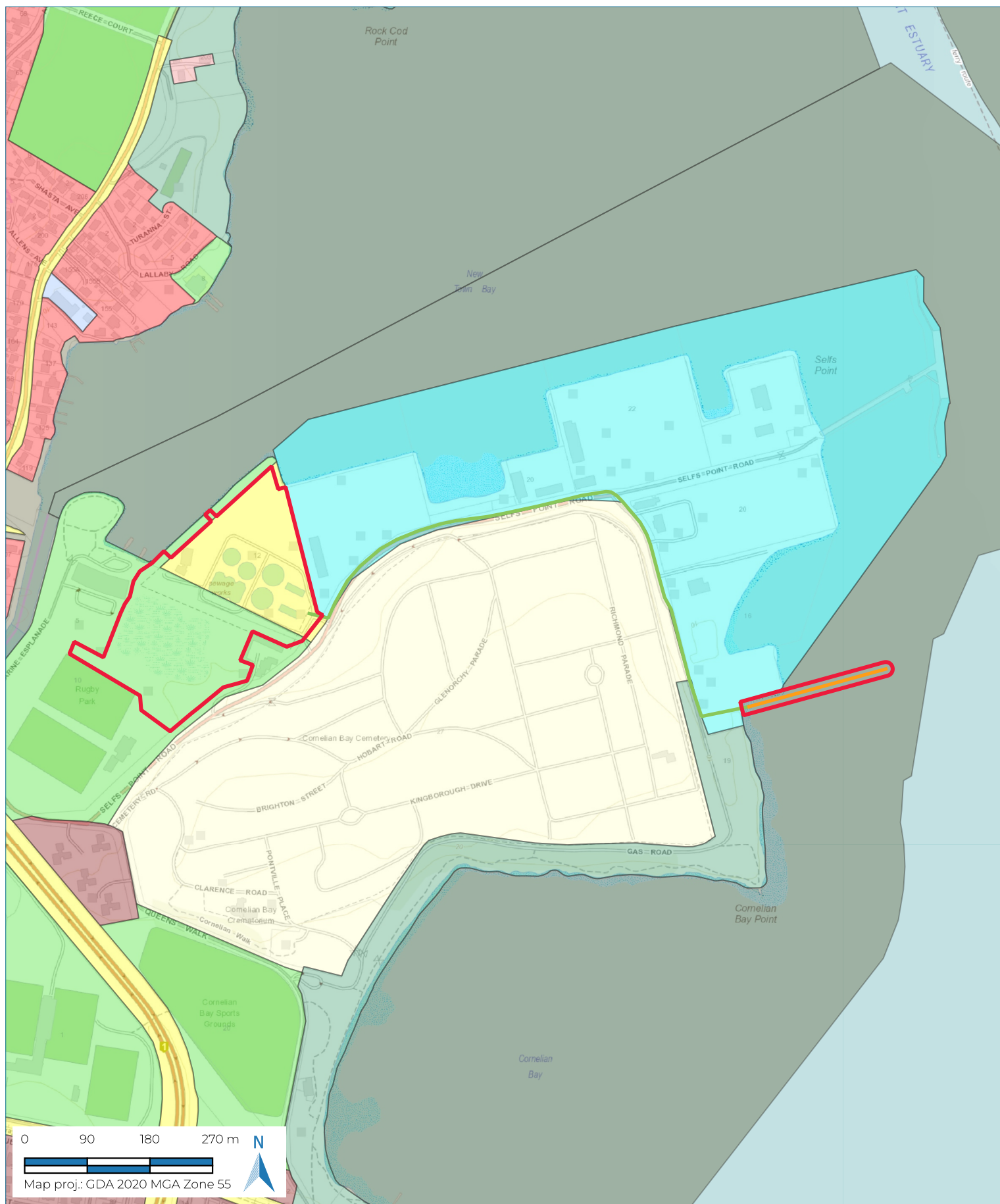
Code	Affected titles	Comments
Potentially Contaminated Land Code	All titles (applies to the Project by way of textual application)	While there is no specific exemption relevant within Clause E2.4 of the planning scheme, Section 25(2)(f) of the EMPCA directs the Planning Authority to not undertake an assessment. Notwithstanding, the provisions of the code will apply. Assessment of any applicable standards will be satisfied by the EPA's assessment.
Road and Railway Assets Code	All titles (applies to the Project by way of textual application)	Likely to satisfy the permitted use and development standards as there will be no significant intensification of vehicle movements in and out of the existing access to Sells Point Road.
Parking and Access Code	All titles (applies to the Project by way of textual application)	There are no minimum parking requirements for the Utilities use class. However, where provided, vehicle parking and loading areas must be able to service the likely workforce and attendance on the Project Site and designed to the relevant Australian Standard. Internal access roads must be designed and constructed to a standard suitable for their intended use. These requirements are considered achievable through detailed design.

Code	Affected titles	Comments
Stormwater Management Code	All titles (applies to the Project by way of textual application)	Stormwater generated from new impervious surfaces must be appropriately managed. This is achievable through detailed design.
Inundation Prone Areas Code	- PID 3286956 - PID 3286948, CT 163940/2 - PID 3189590, CT 163941/1	This code requires consideration as works are proposed in the low-risk inundation areas. The planning application is supported by a coastal inundation and erosion hazard management plan.
Coastal Erosion Hazard Code	- PID 3286956 - PID 3286948, CT 163940/2 - PID 3189590, CT 163941/1	Earthworks are proposed within the Coastal Erosion Hazard Area. The planning application is supported by a coastal inundation and erosion hazard management plan.

5.1.3.4 Consideration under the Tasmanian Planning Scheme

Tasmania is currently transitioning from individual Interim Planning Schemes to the Tasmanian Planning Scheme (TPS). The draft Hobart Local Provisions Schedule is still subject to further consideration by the City of Hobart, followed by assessment (including hearings) by the Tasmanian Planning Commission.

Planning applications are assessed under the planning scheme in effect the day a valid application is lodged with the planning authority.

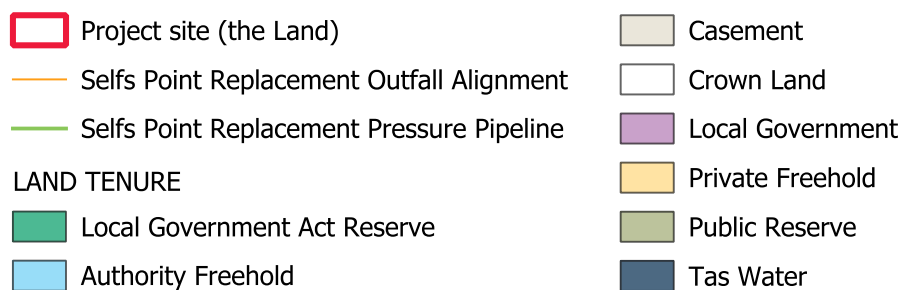
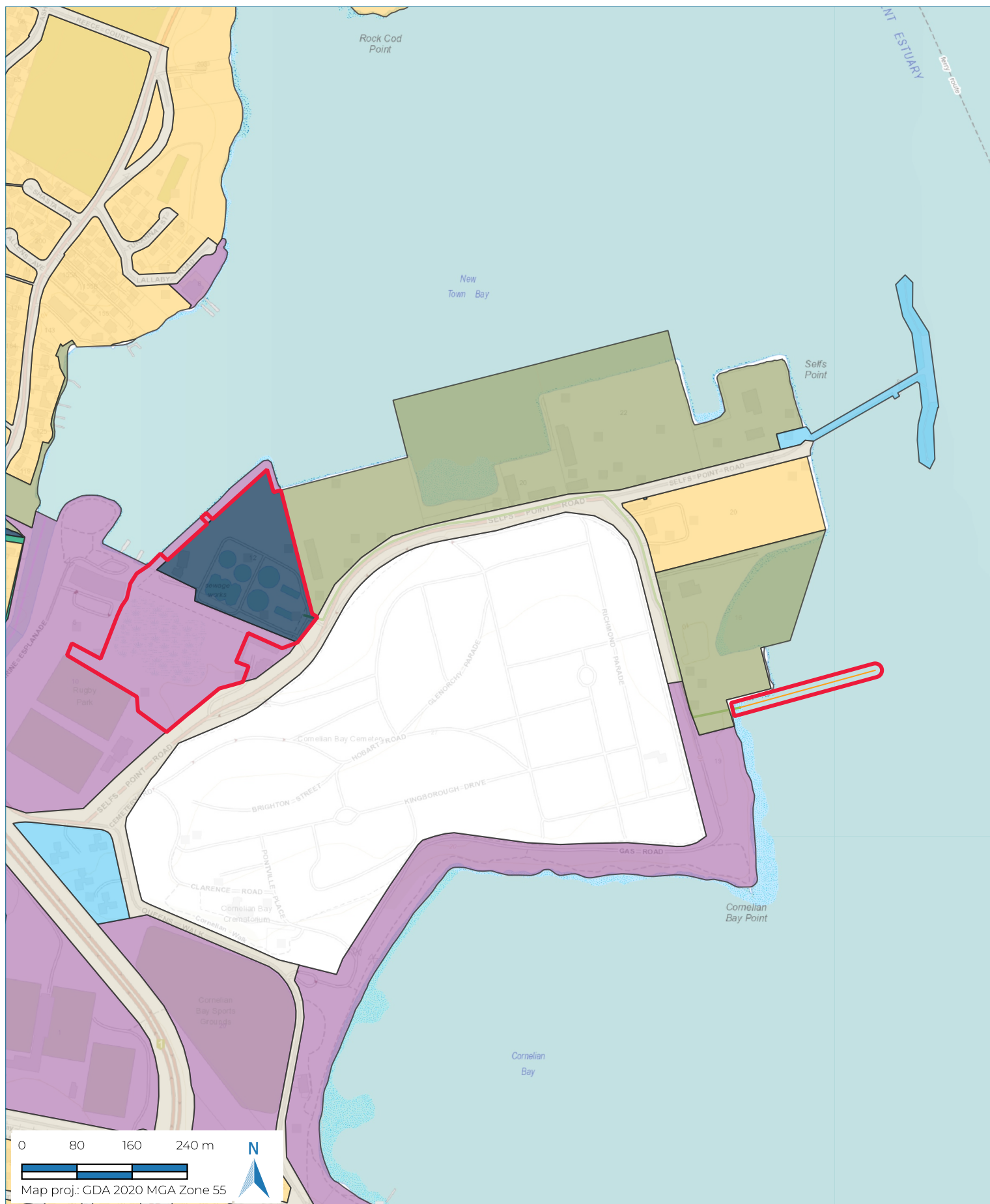


- | | |
|--|---|
| Project site (the Land) | 17 Community Purpose |
| Selfs Point Replacement Outfall Alignment | 29 Environmental Management |
| Selfs Point Replacement Pressure Pipeline | 20 Local Business |
| INTERIM PLANNING SCHEME ZONING | |
| 10 General Residential | 28 Utilities |
| 11 Inner Residential | 31 Port and Marine |
| 12 Low Density Residential | 19 Open Space |
| | 18 Recreation |



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Selfs Point STP
 Redevelopment
 Figure 5-1
 Land zoning



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Selfs Point STP
Redevelopment

Figure 5-2

Land tenure

5.2 Environmental aspects

The Project Site occurs over reclaimed land. Additionally, the expansion area to the west was a former landfill site that was at one stage converted into an artificial wetland, as explained in detail in Section 6.4.1. The geology of the site is described as transitional olivine basalt, which forms the bedrock under the significant anthropogenic fill that has been used on both the wetland site and existing STP site. Site soils are listed as comprising undifferentiated alluvial soils (LISTmap, 2023).

The topography of the area is generally flat; however, the wetland area is slightly elevated compared to surroundings. New Town Rivulet is the closest minor tributary of the River Derwent, which is now essentially an engineered canal. Groundwater movement in the direct vicinity of the Project slopes in a northerly direction from the wetlands through to the shoreline (Elgin, 2022b).

The closest geoconservation sites to the Project Site are the 'Bedlam Walls Scarp' (ID 2210) directly across the river, which is listed as a 'notable example of type', and approximately 1.2 km to the south is a site listed as 'Cenozoic Plant Macrofossils of Tasmania' (ID 3173). There are no geoconservation sites within or immediately adjacent to the Project Site. The Project does not occur in any formal reserves (LISTmap, 2023) and there is no high-quality wilderness mapped within or near the site. The closest reserve is several kilometres north on the opposite side of the river, as shown in Figure 5-3.

Acid sulfate soils (ASS) are mapped as having a low probability of occurrence throughout the terrestrial portion of the Project Site, noting that 'low probability' is considered as having 6-70% chance of occurrence in the mapping unit, as shown in Figure 5-4. The water portion of the Project Site is not mapped as having any subaqueous/intertidal ASS potential (LISTmap, 2023). Investigations by Elgin (2022b) did not find any evidence of ASS onsite, but this would need to be further assessed during excavation of soils.

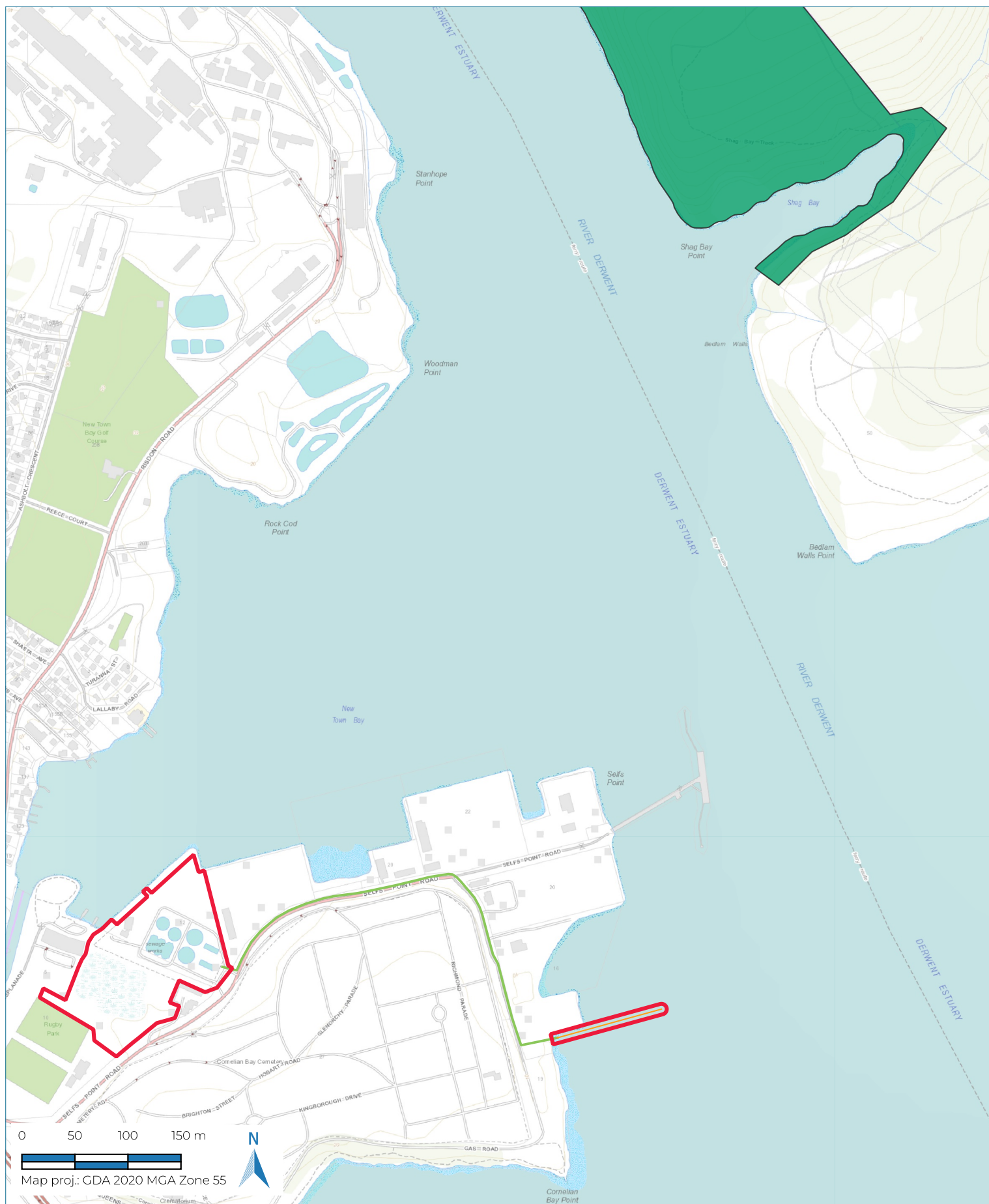
The projected 2050 and 2100 sea level rise layers from the LIST show encroachment on the boundaries of the Project Site but do not affect any proposed infrastructure (LISTmap, 2023). A mapping anomaly (a result of the LiDAR method used in the mapping model) occurs in the middle of the Project Site where inundation is predicted to occur, but as this is not linked to the sea, will not occur. Coastal Inundation Hazard Bands (LISTmap, 2023) show areas of low to medium risk within the existing STP site, with some proposed infrastructure to be located in areas mapped as low risk. Sea level rise, coastal inundation and flooding have all been considered in the engineering design of the Project.

The entirety of the terrestrial Project footprint lies on previously disturbed land, and the vegetation communities within the Project Site have been assessed under the TASVEG 4.0 code as being entirely comprised of 'Extra-urban miscellaneous (FUM)'. The only notable native vegetation recorded within the Project Site were (presumably) planted *Eucalyptus globulus* trees scattered around the edges of the site and between the wetland areas and existing STP site. Introduced flora species are ubiquitous across the Project Site, with environmental weeds widespread and abundant, including seven declared weed species (Appendix H). The *E.globulus* trees may present a food resource to the swift parrot; the site was not found to support any other significant fauna habitat, flora or vegetation communities (NBES, 2023).

The climate of the site is temperate, with an annual minimum average of 9.0°C and maximum average of 17.6°C. Rainfall is heavier through the winter and spring seasons, with monthly means ranging from 37-63 mm. Winds are generally stronger during the summer months, with predominant winds throughout the year being south-westerly (Bureau of Meteorology, 2022).

The environment around the proposed effluent outfall location is classified as the middle estuarine zone in accordance with the Derwent Estuary Program (DEP). The River Derwent commences some 200 km upstream at Lake St Clair and descends over 700 m to the Derwent Estuary at Hobart. The river is subject to numerous anthropogenic inputs from farming, aquaculture, industry, and wastewater.

Typical of the middle reaches of the Derwent Estuary, the substrate of the area is predominantly low productivity, silty sand habitat with occasional scattered rocks and debris. Typical species in the area include the introduced Northern Pacific seastar (*Asterias amurensis*), biscuit stars (*Pateriella regularis*), and the introduced New Zealand screw shells (*Maoriculpus rosaceus*). Several marine mammals have the potential to occur in the area, albeit in a transitory fashion, including the southern right whale and humpback whale, New Zealand fur seals, and bottlenose or common dolphins (DEP, 2020).



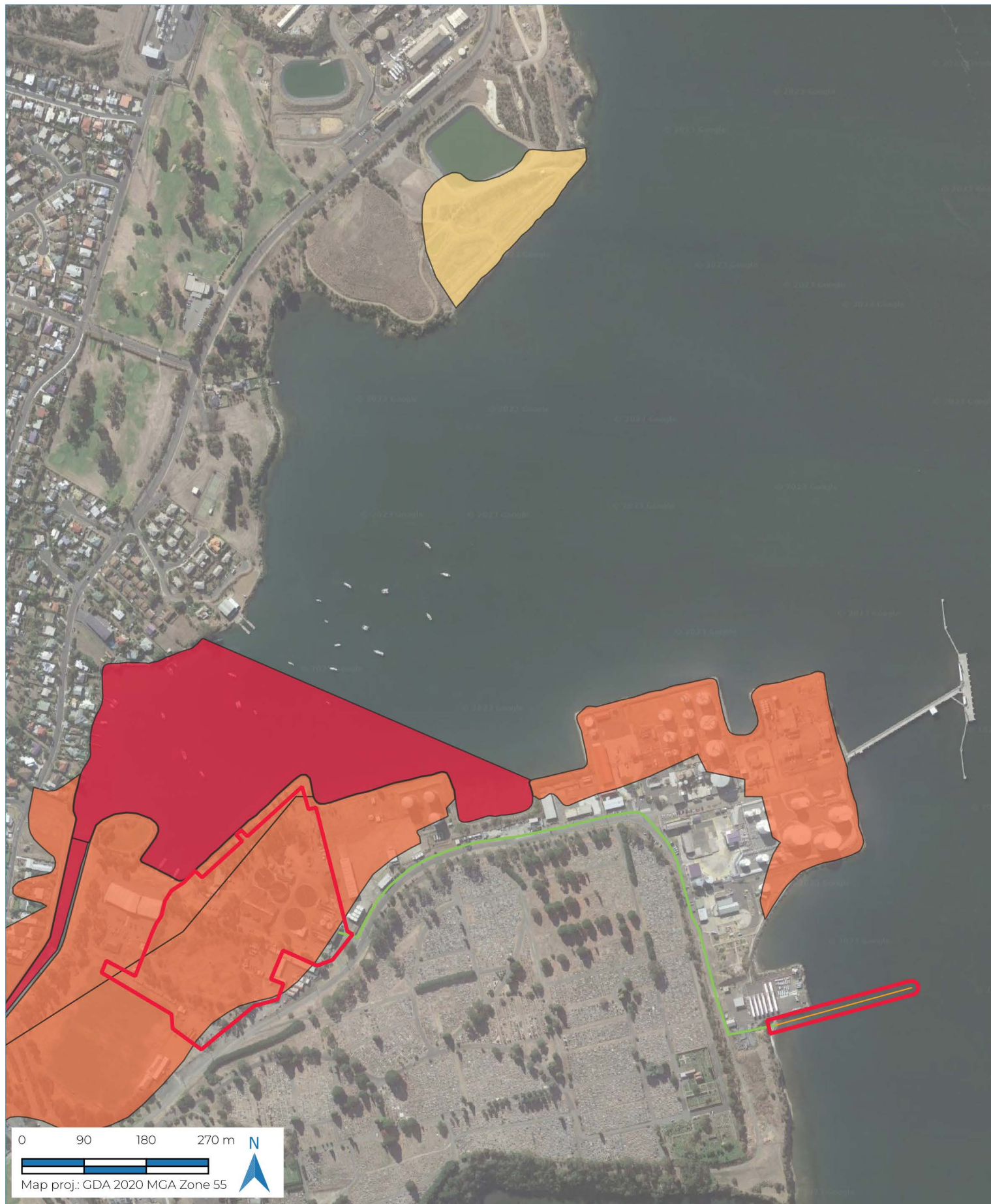
- Project site (the Land)
 - Selfs Point Replacement Outfall Alignment
 - Selfs Point Replacement Pressure Pipeline
- RESERVE CLASS**
- State Reserve



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Paper size A4

Selfs Point STP
 Redevelopment

 Figure 5-3
 Reserves



- Project site (the Land)
- Selfs Point Replacement Outfall Alignment
- Selfs Point Replacement Pressure Pipeline

ACID SULFATE SOILS PROBABILITY MAPPING

- High
- Low
- Extremely Low



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Selfs Point STP
Redevelopment

Figure 5-4
ASS mapping

5.3 Socio-economic aspects

The Project occurs in a mixed-use area of land to the north of Hobart, surrounded by the suburbs of New Town and Lutana. The Cornelian Bay cemetery is the largest feature in the Selfs Point area, with the remaining areas made up of the existing Selfs Point STP, several petroleum storage facilities (currently Bennett's Petroleum, United, Viva Energy, and Caltex), two recreational grounds, a bridge club, a rowing club, and a cattery. There are limited commercial operations in the area that would be affected by the Project.

The nearest residential housing lies to the west in Lutana, approximately 100 m from the Project Site boundary and separated from the site by the New Town Rivulet. An isolated block of apartments adjacent to the Brooker Highway lies approximately 175 m to the south-west of the Project Site. Lutana has a population of approximately 3,000 people, with the largest age group in the range of 30-34 years (from 2016 census data). There are no significant characteristics of the population that would make them more susceptible to any impacts from the Project.

The general economics of the region are heavily dependent on Hobart itself, and the Project is not expected to significantly impact on any existing commercial or industrial operations.

The most significant social and economic impacts associated with the Project will be positive effects from the upstream changes that will result from decommissioning the Macquarie Point STP and freeing up that land for future uses. The decommissioning of the STP from the Macquarie Point site will result in increases in land use options, land value, economic output and recreation options around the Macquarie Point development area.

6 Potential impacts and their management

The following sections (Sections 6.1 to 6.16) document the potential impacts and proposed management, mitigation, monitoring and reporting for the Project. Management and monitoring measures are documented separately in each section and collated into summary tables in Section 7 (monitoring and review) and Section 9 (management measures).

As well as the discipline-specific management and mitigation measures documented in the following sections, there are various measures that apply more broadly across all environmental disciplines. These measures are summarised in the following table and will be applied to the Project in its entirety.

Reference number	Management, mitigation or monitoring measure
Management and mitigation	
Various MM 1	A Final Design Report will be submitted to the EPA for approval prior to the commencement of construction. The Final Design Report will be informed by geotechnical assessment and engineering constraints.
Various MM 2	A Construction Environmental Management Plan (CEMP) capturing all relevant construction phase management measures set out in this EIS (and any resulting approval conditions) will be prepared and made available to the EPA prior to the commencement of construction. The approved CEMP will be implemented throughout construction.
Various MM 3	An Operational Environmental Management Plan (OEMP) capturing all relevant operational phase management measures as set out in the EIS (and any resulting approval conditions) will be prepared and made available to the EPA prior to the commencement of operation. The approved OEMP will be implemented throughout the operational period.
Various MM 4	An online complaints register and contact phone number for both construction and operational phases will be established to capture any dust, odour, noise, traffic or other complaints received from the public. Complaints will be actioned, the complainant notified and a record kept of the resolution.
Monitoring	
Various MON 1	Monitoring procedures for construction environmental controls will be documented in the CEMP and implemented during the construction phase, including as a minimum: • Daily visual monitoring of active construction areas for dust and other visible emissions (e.g. windblown waste and visible water quality issues including high sediment loads or surface sheen). • Fortnightly audits of the physical site construction controls (including sediment and erosion control measures, fencing, signage and waste management). Additional audits will be undertaken after extreme weather events. • Monthly audits of all management measures set out in the CEMP. • Any non-conformance identified during inspections and audits will be documented, investigated and resolved. • Audits will be made available to the EPA on request. • Any non-conformance or incident with the potential for serious or material environmental harm will be reported to the Director, EPA within 24 hours.
Various MON 2	During the operational phase of the Project, the results of relevant environmental monitoring stipulated in this EIS (and any resulting approval conditions) will be documented in annual environmental reports to be submitted to the EPA within 3 months of the conclusion of the reporting period.

6.1 Water quality

The following sections address the potential impact and mitigation associated with surface water impacts and, in particular, the discharge of treated effluent from the new STP into the aquatic environment. Consideration of effluent reuse is addressed separately in Section 3.3.

The aquatic ecological environment, and the potential impacts to sensitive receptors, is covered in detail in Section 6.6.

6.1.1 Existing environment

6.1.1.1 Water quality

The Derwent Estuary is in a significantly altered state from natural conditions and is considered a disturbed ecosystem. This is a result of decades of historical and continued anthropogenic influence through urbanisation, industry discharge, effluent discharge, urban and farmland run-off, introduction of marine pests, and changes to flow regimes (DEP, 2020).

The Derwent Estuary Program (DEP) manages a comprehensive water quality monitoring program for the estuary and provides regular detailed water quality updates to inform environmental management of the waterway. From the DEP and other monitoring, the EPA has developed a set of draft default guideline values (DGVs) for several functional zones of the estuary, which provide guideline values (based on 20th and 80th percentile values from a large dataset) for the maintenance of the known water quality conditions throughout various parts of the estuary. The Project is considered to occur across two functional zones, as two outfalls are being assessed as part of the STP. The Blinking Billy effluent outfall occurs within the zone described as the “lower estuary – south of the Tasman Bridge to a line between Tinderbox and the Iron Pot” and the local Selfs Point effluent outfall occurs within the zone described as “Mid-estuary channel – main channel of the estuary east of a line between Whitestone Point and Green Point to the Tasman Bridge”.

Water quality was also monitored as part of TW's Ambient Monitoring Plan (AMP) for several of the Derwent Estuary STP effluent outfalls, including Selfs Point and the Blinking Billy effluent outfalls, for a 12-month period between 2015 and 2016; this is reported in an Ambient Monitoring Report (AMR) (Jacobs, 2016a). The water quality overview reported herein has been sourced from the State of the Derwent estuary 2015, the State of the Derwent estuary 2020 update (DEP, 2020), the EPA's draft DGVs, and the results of the abovementioned ambient monitoring (Jacobs, 2016a).

Physicochemical properties:

- Salinity varies significantly with depth throughout the estuary, ranging from essentially fresh water at the upper margin of the estuary near New Norfolk, to marine in the Storm Bay region towards the mouth of the estuary. In the lower regions of the estuary (towards Storm Bay), median values throughout the water column tend around 30-34 PSU, with the higher salinity values at the greatest depths, as can be expected given the density differences between fresh and saline waters. At the Blinking Billy effluent outfall location, ambient monitoring found salinity values were between 32 PSU at the surface and 35 PSU on the bottom waters (Jacobs, 2016a). The mid-estuary channel near the local Selfs Point effluent outfall location has much more variable surface salinities, with median values around 21 PSU, but ranging between 15 and 24 PSU annually (Coughanowr, et al., 2015); the median surface value from the ambient monitoring was 25.7 PSU. The bottom waters around the site were steadily saline at around 34 PSU, as reported in the DEP and the AMR (Jacobs, 2016a) (Coughanowr, et al., 2015).
- Dissolved oxygen is generally above ANZG (2018) lower limits (6 mg/L) throughout the mid to lower estuary in surface waters at both sites of interest. Dissolved oxygen is notably lower and more seasonally variable in bottom waters throughout the estuary. Median values are occasionally reduced below ANZG limits in the middle estuary channel near the local Selfs Point effluent outfall location and occasionally at sites in the vicinity of the Blinking Billy effluent outfall, but much less frequently. The lower dissolved oxygen concentrations at depth throughout the estuary are generally related to low water movement and elevated temperatures during summer months. The DGVs developed for the estuary set annualised bottom water indicators for the mid-estuary of between 5.8 and 7.1 mg/L and for the lower estuary of between 6.2 and 7.6 mg/L.

- pH levels tend to increase downstream from the upper estuary with the increasingly saline water; there is little difference between top and bottom waters at both sites of interest and pH ranges are within the expected limits identified in ANZG (2018) (Jacobs, 2016a).
- Turbidity values are generally very low in the mid to lower estuary areas, with slightly higher values in bottom waters, but values generally range from 0-0.6 NTU, well within the ANZG (2018) stressor values.

Nutrient properties:

- Annualised total nitrogen draft DGVs for the middle estuary are 0.33 mg/L for surface waters and 0.37 mg/L for bottom waters (EPA Tasmania, 2019), which are above the ANZG (2018) default trigger value of 0.3 mg/L for physical and chemical stressors for estuaries in south-east Australia. The DGVs thus recognise the high ambient concentrations of total nitrogen in the Derwent Estuary system. Further downstream in the lower estuary, the surface water limit is 0.33 mg/L and bottom waters are 0.35 mg/L. There are significant anthropogenic sources of nitrogen that continue to enter the system from industry (including the Boyer paper mill), other STPs, upstream aquaculture hatchery facilities, and urban/agriculture/forestry run-off. Figure 6-1 shows the median total nitrogen concentrations in surface waters throughout the estuary from 2007-20, as reported by the DEP (2020). Site-specific results from the AMR show lower annualised combined depth median values of 0.25 mg/L at the Blinking Billy effluent outfall and 0.28 mg/L at the Selfs Point site (Jacobs, 2016a).
- Nitrate and nitrite (NO_x) median concentrations vary seasonally throughout the Derwent Estuary due to greater inputs from either end of the system during winter (Coughanowr, et al., 2015). The middle estuary channel median values are higher than the lower estuary median values, likely a result of greater nitrogenous inputs in the middle estuary from abovementioned sources of nitrogen, including STP effluent outfalls (DEP, 2020). DEP data (Coughanowr, et al., 2015) showed median values in the middle channel section of the estuary were over the default physical and chemical stressor ANZG (2018) value of 0.015 mg/L, and the draft DGVs reflect this with an annualised surface limit of 0.049 mg/L and bottom limit of 0.061 mg/L in the middle estuary. The majority of the 80th percentile range over the lower estuary median values were also above the ANZG (2018) and hence also have a similar annualised nitrate/nitrite limit at surface and bottom waters (EPA Tasmania, 2019). Figure 6-2 shows the median nitrite and nitrate (µg/L) in surface waters of the Derwent from the entire DEP data set. AMR results for the Blinking Billy effluent outfall location show annualised combined depth median values of nitrate of 0.007 mg/L, with nitrite levels below limits of reporting (LOR). For Selfs Point, the annualised AMR results were 0.012 mg/L for nitrate and 0.002 mg/L for nitrite (Jacobs, 2016a).
- Total ammonia/ammonium-N (TAN) concentrations are variable throughout the estuary and appear to be most concentrated in bays with existing effluent outfalls with low water movement, such as Prince of Wales Bay (Coughanowr, et al., 2015). Most of the TAN found throughout the estuary appears to be in the non-toxic ammonium-N form (Coughanowr, et al., 2015). Middle estuary sites have median values of TAN generally slightly above the ANZG (2018) physical and chemical stressor limits. TAN concentrations are found in significantly lower concentrations in the lower regions of the estuary. Annualised middle estuary draft DGV values are 0.010 mg/L for surface waters and 0.016 mg/L for bottom waters, whereas lower estuary draft DGV values are 0.007 mg/L for surface waters and 0.018 mg/L for bottom waters. Overall, TAN concentrations appear to be reducing in the middle estuary channel sites where total nitrogen is generally highest, as reported in DEP (2020). AMR annualised results for ammonia at Blinking Billy and Selfs Point show combined-depth median concentrations of 0.009 mg/L and 0.007 mg/L, respectively (Jacobs, 2016a).
- Historically, phosphorus and dissolved reactive phosphorus (DRP) concentrations have tended to be relatively low in surface waters of the upper estuary, increasing towards the middle estuary and then decreasing again towards the estuary mouth, as shown in Figure 6-3; this is somewhat similar to the patterns of some of the nitrogenous compounds (Coughanowr, et al., 2015) and correlates with the urbanisation and industry present throughout that section of the estuary. Throughout the estuary, phosphorus is generally found at higher concentrations in surface waters than at depth. High levels identified in Prince of Wales Bay from the DEP data are likely a result of STP effluent discharge (Coughanowr, et al., 2015). Median total phosphorus and DRP values from DEP data near the sites of interest had concentrations above the ANZG (2018) physical and chemical stressor values for surface

and bottom waters (Coughanowr, et al., 2015). Annualised total phosphorus middle estuary draft DGV values are 0.03 mg/L for surface waters and 0.046 mg/L for bottom waters, whereas lower estuary draft DGV values are similar at 0.034 mg/L for surface waters and 0.043 mg/L for bottom waters (EPA Tasmania, 2019). Annualised AMR results for phosphorus at Blinking Billy and Selfs Point show identical combined-depth median concentrations of 0.04 mg/L for total phosphorus and 0.010 mg/L for dissolved reactive phosphorus (DRP) (Jacobs, 2016a).

- Median values of chlorophyll- α from DEP data were all below the ANZG (2018) physical and chemical stressor value of 0.004 mg/L near the Selfs Point and Blinking Billy effluent outfall locations (Coughanowr, et al., 2015). Chlorophyll- α concentrations appear to repeat the trends of other nutrient parameters, with lower upper estuary concentrations and higher middle concentrations which start to reduce towards the mouth of the estuary (DEP, 2020). The AMR results show annualised combined-depth median concentrations of 0.004 mg/L for Selfs Point and 0.002 mg/L for Blinking Billy (Jacobs, 2016a). Draft DGVs have not been developed for the areas of interest but would still form a part of any monitoring program as a useful indicator of eutrophication. There are no ANZG (2018) default trigger values for chlorophyll- α as a physical and chemical stressor in marine or estuarine waters of Tasmania.

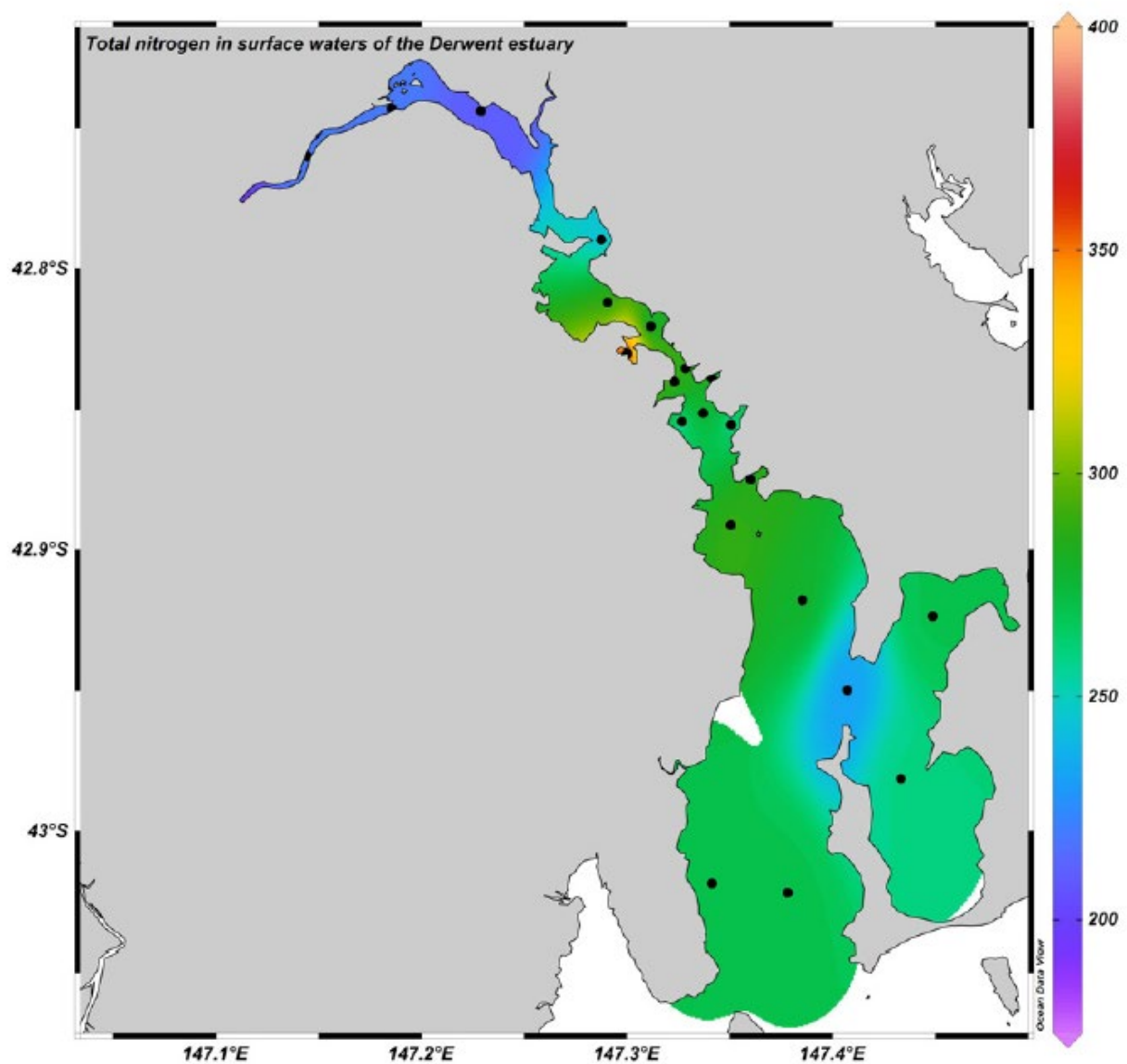


Figure 6-1 Median total nitrogen ($\mu\text{g/L}$) in surface waters of the Derwent from 2007-20 (DEP, 2020); note the black point locations are DEP monitoring sites.

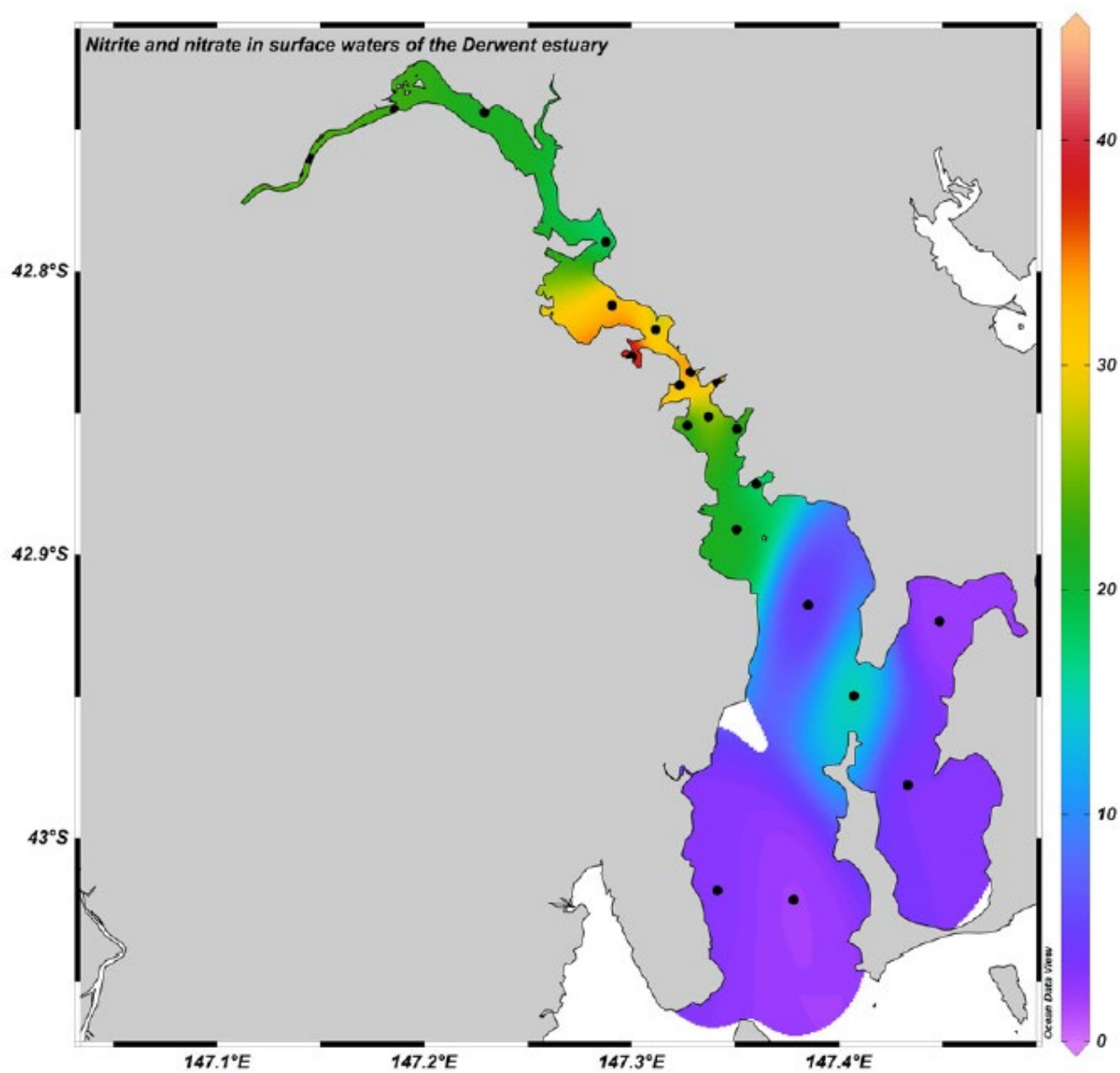


Figure 6-2 Median nitrite and nitrate ($\mu\text{g/L}$) in surface waters of the Derwent from 2007-2 (DEP, 2020); note the black point locations are DEP monitoring sites.

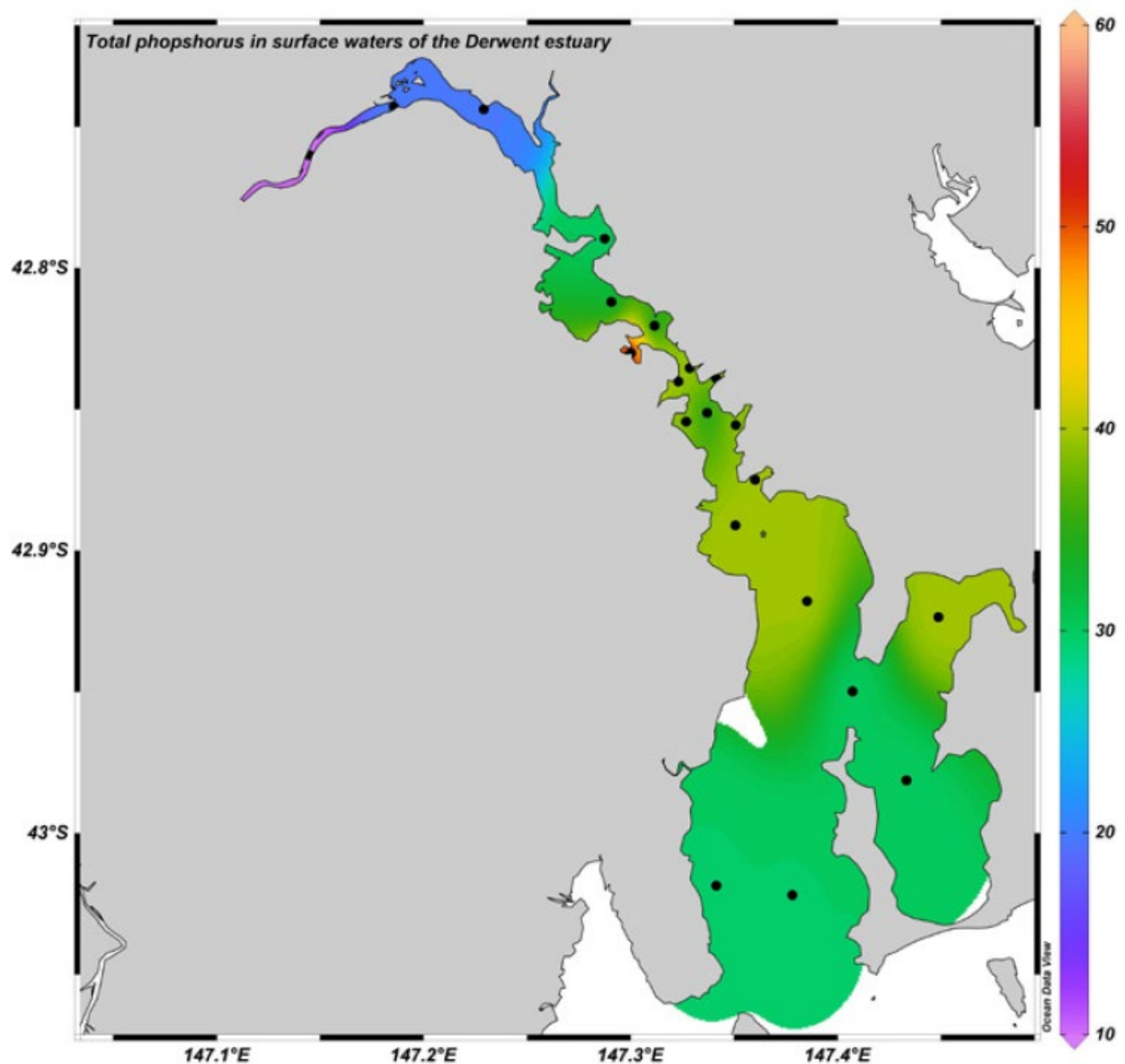


Figure 6-3 Median total phosphorus ($\mu\text{g/L}$) in surface waters of the Derwent from 2007-2 (DEP, 2020); note the black point locations are DEP monitoring sites.

Heavy metal occurrence:

- The Derwent Estuary has endured significant heavy metal contamination through decades (since 1917) of operation of the zinc smelter at Lutana and to a lesser extent the Boyer paper mill upstream of the River Derwent near New Norfolk (DEP, 2020); additional sources include run-off from urban areas, which can contain traces of heavy metals. Only zinc is monitored as part of the DEP, as it is found to be a suitable proxy for other related heavy metals.
- While a large proportion of heavy metals that have been historically released into the estuary are now bound in sediments and organic matter, there are still relatively high levels of dissolved metals found in the estuary's waters, most of which are found in the dissolved form (77-85% depending on depth) (Coughanowr, et al., 2015) and present near the zinc smelter site. Historical median concentrations of zinc near Selfs Point have been above the 95% species protection ANZG (2018) toxicant trigger in surface waters (but below the 80% trigger value) and below the 95% trigger value in bottom waters. For the DEP site closest to the Blinking Billy effluent outfall, surface and bottom waters were both

below the 95% species protection toxicant trigger limit, with bottom waters also below the 99% species protection limit (Coughanowr, et al., 2015).

- Overall, zinc concentrations were found to decline in 77% of water samples between January 2007 and December 2019; this is likely a result of collective industrial efforts to reduce zinc emissions to the environment (DEP, 2020).
- Ambient monitoring results for metals from the Selfs Point area include (Jacobs, 2016a):
 - Elevated total aluminium concentrations from 0.021 mg/L to 0.73 mg/L, but undetectable in dissolved form. ANZG (2018) has a low reliability toxicant trigger value for marine waters of 0.0005 mg/L; laboratory limits of reporting (LOR) for dissolved aluminium were above this guideline value though, so toxicity cannot be adequately assessed.
 - Total copper was only detected in one sample and all dissolved copper samples were below LOR.
 - Dissolved lead samples were all below LOR.
 - Dissolved zinc fractions ranged from 0.004 mg/L to 0.080 mg/L, the latter being above the ANZG (2018) 95% species protection limit trigger for toxicants. This is consistent with the findings of the DEP sampling.
 - Total arsenic, cadmium, cobalt and nickel results were all below LOR.
- Ambient monitoring results for metals from the Blinking Billy area include (Jacobs, 2016a):
 - Dissolved zinc fractions ranged from below LOR to 0.057 mg/L, the latter being above the ANZG (2018) 95% species protection limit trigger for toxicants (0.015 mg/L). This is consistent with the findings of the DEP sampling. Jacobs (2016) suggest zinc results may be correlated with the elevated levels in the effluent discharge at the time (2015/16), as the site closest to the diffuser was generally higher than surrounding sites.
 - Elevated total aluminium concentrations were up to 1.9 mg/L, but undetectable in dissolved form.
 - Total copper was detected in one sample and all dissolved copper samples were below LOR.
 - Dissolved lead, manganese, arsenic, cadmium, cobalt and nickel samples were all below LOR.

Pathogen properties:

- Throughout the Derwent Estuary there are several different events that can trigger high pathogen counts, which can accumulate to significant concentrations, especially in areas of low water movement. For example, large rainfall events can flush significant volumes of polluted stormwater into the system; discharges of poorly treated effluent can occur from time to time for a variety of reasons from any of the STPs that discharge into the estuary; and spills of materials or ruptured sewage pipelines can also result in elevated pathogen counts (Coughanowr, et al., 2015).
- Enterococci are sampled as the key faecal indicator bacteria in the DEP (DEP, 2020). Pathogen concentrations are regularly monitored throughout the estuary due to the human health risk factor, including most popular primary contact locations. This monitoring system uses the National Health and Medical Research Council Guidelines for managing risks in recreational water (NHMRC, 2008) guideline values. Jacobs (2016) sampled for enterococci at both locations, which showed enterococci levels generally below the EPA-recommended 40 cfu/100 ml trigger value at the Selfs Point and Blinking Billy sites.
- Thermotolerant coliforms and *E.coli* are also used as indicators of pathogens. For this EIS, *E.coli* are used as the primary impact indicator (as requested by the EPA), with default ANZG (2018) guideline values of 150 cfu/100 ml used for the estuary. The ambient monitoring events showed generally low levels at the Blinking Billy outfall area, with the exception of two events that marginally exceeded the guideline values (May and June 2014). At Selfs Point, similar results were seen, with spikes in May and July, suggesting potentially estuary-wide events in those months, with all other months below the guideline concentration (Jacobs, 2016a).

In summary, the Derwent Estuary is a complex system and has highly variable ambient water quality throughout. The combination of data from the DEP and from the ambient monitoring program is considered sufficient to describe the existing ambient water quality conditions.

6.1.1.2 Sediment quality

A sediment quality assessment was undertaken at both outfall locations as part of the AMP (Jacobs, 2016a). Sediment was collected and assessed on two occasions during the monitoring period. Sediment was assessed for particle size distribution, redox, nutrients, heavy metals, total organic carbon (TOC), and total petroleum hydrocarbons (TPH).

The following is a summary of the results of the assessment at sites sampled around the Blinking Billy effluent outfall location (Jacobs, 2016a):

- Particle size distribution ranged from gravel to mud, with most sites a combination of sand and mud, consistent with the lower portions of the Derwent Estuary (Coughanowr, et al., 2015).
- Sites downstream of the effluent outfall tended to have a higher proportion of mud, including at sites up to 500 m away, which is unlikely to be a result of the outfall, but more likely a result of the hydrodynamics or depth of the area, as discussed in Jacobs (2016).
- Redox sampling showed no noticeable difference with distance from the outfall.
- Nutrient concentration showed no correlation with distance from the outfall.
- TPH were detected in low concentrations, once at the outfall in the initial sampling round and then at several downstream sites and at the reference site in the subsequent sampling round.
- During both sampling events, concentrations of mercury, lead and zinc exceeded the National Assessment Guidelines for Dredging's (DEWHA, 2009) interim sediment quality guidelines (ISQGs) ISQG-High values and silver, cadmium, copper, nickel, and antimony exceeded ISQG-Low values. The highest levels of metals were found at the furthest upstream site, suggesting the outfall is unlikely to be significantly contributing to the results.
- Benthic infauna samples were taken at several intervals up and downstream of the outfall, with several differences in community abundance and richness noted between sites; in short, this seemed to be more associated with particle size rather than any effect from the outfall (Jacobs, 2016a).

The following is a summary of the results of the assessment at sites sampled around the local Selfs Point effluent outfall location (Jacobs, 2016a):

- Particle size distribution ranged from gravel to mud, with most sites a combination of sand and mud, all sites having a larger proportion of sand than mud. Gravel was only picked up at the outfall site and adjacent sites, potentially a result of scour of the smaller particles.
- Redox sampling showed no noticeable difference with distance from the outfall.
- Nutrient concentration showed no specific correlation with distance from the outfall.
- TPH were detected during one sampling event only (winter), with concentrations decreasing with distance from the outfall but also showing elevated levels at the reference site. Jacobs (2016) suggests that, as the outfall alignment occurs through and adjacent to an oil bunkering facility, rainfall run-off may be the source of the TPH rather than the outfall.
- During sampling events, concentrations of silver, arsenic (June), cadmium, copper, mercury, lead and zinc all exceeded the ISQG-High values; arsenic (January), nickel and antimony exceeded the ISQG-Low values. The highest levels of metals were found at the furthest upstream site, suggesting the outfall is unlikely to be significantly contributing to the results. One set of copper results suggest the outfall as a potential source of contamination, which may be a result of occasional industrial waste treatments at the STP; however, since this outfall is only very occasionally used, any contamination would be considered a rare occurrence.
- Benthic infauna samples were taken at several intervals up and downstream of the outfall. No consistent patterns were observed from multi-dimensional analysis across sites or between surveys,

and Jacobs concludes that there is no evidence that the outfall is having an impact on benthic infauna communities (Jacobs, 2016a).

6.1.1.3 Hydrodynamics

Acoustic Doppler current profilers (ADCPs) were deployed at the Blinking Billy and local Selfs Point effluent outfall locations as part of the AMP to measure current speed and direction across a depth range.

- The ADCP at Blinking Billy was deployed for an approximate one-month period in 2015 (17 March to 14 April) at a depth of approximately 32 m (Bonneville Consulting, 2023).
- Results of the ADCP deployment at Blinking Billy showed currents to be highly variable across tidal cycle and depth, with the highest current speeds recorded at depth. Bonneville Consulting (2023) notes the site may be in an eddy with complex tidal interactions. Overall, tidal movement was north to south-east.
- The ADCP at Selfs Point was deployed for an approximate one-month period in 2015 (29 January to 2 March) at a depth of approximately 5 m (Bonneville Consulting, 2023).
- Results of the ADCP deployment at Selfs Point showed surface currents move in a northerly and south-easterly direction with the tide but that bottom waters predominantly move in a northerly direction, a mixed result of river and tidal flow in the saltier layers at depth.

6.1.1.4 Marine users

Various beaches throughout the lower estuary are popular in summer months for swimming, waterskiing, and various other primary contact water sports. Long Beach and Nutgrove Beach at Sandy Bay are the most popular beaches closest to the Blinking Billy effluent outfall. Primary contact is less prominent during winter months but still occurs. Primary contact recreation in the middle estuary channel is not considered a common occurrence.

Popular secondary contact activities throughout the middle and lower estuary include fishing, sailing, kayaking, jet skiing and general boating. There are various moorings, boat ramps and jetties along this length of the estuary that are used as part of these activities also.

The estuary is also a busy shipping lane and is frequented by freighters, cruise liners and larger tourist boats. There are no aquaculture leases in the Derwent Estuary in the areas of interest.

6.1.2 Legal and other requirements

The project must be consistent with the objectives and requirements of the:

- *Environmental Management and Pollution Control Act 1994*
- *Water Management Act 1999*
- *State Policy on Water Quality Management 1997*
- *Tasmanian State Coastal Policy 1996*
- *Living Marine Resources Management Act 1995.*

The *State Policy on Water Quality Management 1997* sets out to “... ensure that diffuse source and point source pollution does not prejudice the achievement of water quality objectives and that pollutants discharged to waterways are reduced as far as is reasonable and practical by the use of best practice environmental management” (Part 2, 6.1b).

Under the policy, a range of environmental values are identified for any given aquatic area that are to be protected; these are referred to as Protected Environmental Values (PEVs). It must be demonstrated that the Project will not prejudice the achievement of any water quality objectives (WQOs) set for water bodies under the policy, which defines WQOs as the most stringent set of water quality guidelines that should be met to protect all of the PEVs nominated for that body of water.

The PEVs for the relevant function zones of the Derwent Estuary for each of the proposed outfall locations are drawn from Derwent Estuary Protected Environmental Values (EPA Tasmania, 2003), set under the *State Policy on Water Quality Management 1997*, and summarised as follows.

Middle Derwent Estuary – Tasman Bridge to Bridgewater Causeway

A: Protection of Aquatic Ecosystems:

- (ii) *Protection of modified (not pristine) ecosystems from which edible fish, but not shellfish or crustaceans, are harvested, and having particular regard to the ecological values identified in Derwent Estuary Protected Environmental Values (EPA Tasmania, 2003).*

B: Recreational Water Quality and Aesthetics:

- (i) *Primary contact water quality*
- (ii) *Secondary contact water quality*
- (iii) *Aesthetic water quality*

and having particular regard to the recreational uses identified in Derwent Estuary Protected Environmental Values (EPA Tasmania, 2003).

E. Industrial Water Supply:

(Nyrcstar Hobart Smelter)

Lower Derwent Estuary – Tasman Bridge to Tinderbox/South Arm

A: Protection of Aquatic Ecosystems:

- (ii) *Protection of modified (not pristine) ecosystems from which edible fish, crustaceans and abalone, but not other shellfish, are harvested, and having particular regard to the ecological values identified in Derwent Estuary Protected Environmental Values (EPA Tasmania, 2003).*

B: Recreational Water Quality and Aesthetics:

- (i) *Primary contact water quality*
- (ii) *Secondary contact water quality*
- (iii) *Aesthetic water quality*

and having particular regard to the recreational uses identified in Derwent Estuary Protected Environmental Values (EPA Tasmania, 2003).

That is, the Project must be designed and managed to ensure that any aquatic discharge does not prejudice the PEVs listed above.

The EPA has released the guidance document *Regulatory Framework for the Sustainable Discharge of Treated Wastewater from Level 2 WWTPs* (EPA Tasmania, 2020). This document sets out requirements for managing different types of treated effluent discharges including the definition of mixing zones, discharge limits, mass load calculations and ambient monitoring requirements. These requirements have been taken into account in the design of the Project and in this EIS.

Additionally, the following water quality guidelines have been used to assess potential impacts to the receiving environment in this EIS and to ensure PEVs are maintained:

- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018)
 - Default physical and chemical stressors (South-East Australia – Estuaries)
 - 95% Species Protection Toxicant Values
 - Recreational Water Quality (Primary/Secondary/Aesthetic)
- National Health and Medical Research Council Guidelines for managing risks in recreational water (NHMRC, 2008).
- EPA draft default guideline values (DGVs) for the waters of the Derwent Estuary (EPA Tasmania, 2019).

6.1.3 Potential impacts

6.1.3.1 Construction

Stormwater run-off from the construction area has the potential to enter the estuarine environment. Left unmanaged, stormwater can introduce entrained sediments and contaminants into the aquatic environment, which could potentially impact on aquatic biota through numerous pathways, including smothering and direct toxicity (e.g. hydrocarbons in run-off). Management of stormwater impacts is addressed in Section 6.1.4.

Potential impacts to surface waters from waste sources are covered in detail in Section 6.8.2.

Potential impacts to surface waters through groundwater impacted during construction are covered in detail in Section 6.8.2.

Potential impacts to surface waters from dangerous goods and other environmentally hazardous materials are covered in detail in Section 6.9.2.

6.1.3.2 Operation

Water quality impacts from the operational phase of the Project are related to the continuous discharge of treated effluent into the aquatic environment and include consideration of both near-field (at the outfall) and far-field (whole of estuary) context. Consideration is also made of other operational impacts to water quality including contaminated materials (Section 6.4), waste management (Section 6.8) and hazardous materials management (Section 6.9).

Near-field

In order to assess potential impacts of the Project on the aquatic environment of the Derwent Estuary and to allow the EPA to set statutory mixing zones for each of the Project's outfalls in accordance with the *State Policy on Water Quality Management 1997*, hydrodynamic modelling of the effluent discharges into the receiving environment were undertaken in the near-field; the modelling report is provided in Appendix B (Bonneville Consulting, 2023).

The 'near-field' in modelling terms relates to the area where the effluent, upon leaving the discharge point, remains under the influence of the momentum of the initial discharge jet at the end of pipe or diffuser port while it mixes with the ambient waters of the receiving environment. Modelling of effluent mixing in this region considers various physical aspects of the receiving environment, including depth, current, temperature and salinity. The boundaries of the near-field are generally defined as where the effluent plume reaches the surface or bottom of the aquatic receiving environment. After the initial near-field mixing is complete, secondary forces such as wind, current and tide become the key factors in determining the transport fate of the effluent particles; this region outside the near field is referred to as the 'far-field' and is significantly more complex to model. Generally, the main output of interest of the near-field model is an effluent dilution factor with distance from source (i.e. the outfall).

A mixing zone is defined by the EPA as "...a three-dimensional area of receiving waters surrounding a point of discharge of pollutants within which it is recognised that the WQOs for the receiving waters may not be achieved" (EPA Tasmania, 2020). A mixing zone is set by the regulator around a discharge point where it is not considered reasonable or practical to reduce the level of pollutants in a discharge to a concentration that meets the WQOs of the receiving environment at the exact point of discharge. Therefore, the mixing zone is a body of water around the discharge where pollutants are permitted to exceed WQOs while they mix with ambient waters to reach the desired WQOs at a certain distance from the discharge.

The requirements of a mixing zone are discussed in Section 20 of the *State Policy on Water Quality Management 1997*. Some key requirements are that the mixing zone be set based on toxicity (chronic or sub-lethal) to those organisms living in the receiving environment (or in some cases pathogens); the mixing zone should be as small as practical; and the mixing zone should not detract from the values and uses of the surrounding waters.

To complete the hydrodynamic modelling the following steps were completed for each outfall:

- Effluent discharge volumes established
- Effluent quality data assessed

- Receiving environment water quality data assessed and characteristics established
- WQOs established
- Dilution requirements determined
- Modelling inputs defined
- Modelling undertaken to determine dilution achieved in near-field.

These aspects are explained in detail in Appendix B, with the salient points outlined in the following sections.

Effluent discharge volume scenarios

The modelled discharge flow rates are based on the design parameters of the Project and its capacity. They have been calculated based on the design input volumes and the capacity of both the existing Blinking Billy and new local Selfs Point effluent outfall.

The capacity of the Blinking Billy effluent outfall is up to 345 L/s, which is equivalent to 29.8 ML/day, well above the projected 2054 ADWF requirements of the Project. To be conservative, and in the event that the full capacity of the outfall is required, 345 L/s has been adopted as the modelled flow rate for the near-field. The outfall will be discharging continuously, following diurnal patterns, and so has been modelled on a continuous maximum flow rate basis to be conservative.

For the replacement local Selfs Point effluent outfall, a design capacity of 1,340 L/s (equivalent to 115 ML/day) has been established, and therefore to be conservative this maximum volume has been used for the modelled flow rate for the near-field. This discharge will only occur under wet weather or emergency scenarios where the Blinking Billy 345 L/s capacity is not available and the effluent holding tank is full, which has been calculated as occurring on average seven times per year with a total discharge volume of 133 ML spread over those seven events (Bonneville Consulting, 2023). As the likely discharge durations will occur over multiple hours, the outfall has been modelled on a continuous flow basis rather than a batch discharge for the purposes of the near-field model, which will quickly reach equilibrium concentrations in this timeframe; batch discharge modelling in the near-field would produce the same results as continuous flow.

Effluent quality

The effluent quality design parameters for the Project have been provided in Table 2-3, and modelling used the 90th percentile values for the concentrations of the various constituents of the effluent.

For the purposes of modelling, an assumption has been made of chlorine dosing in the Blinking Billy effluent outfall at a concentration of 1 mg/L. This was the maximum dosing rate being considered by TW at the time of mixing zone modelling. Subsequently, TW has considered dosing rates further (with the aim of minimising dosing while still achieving the required treatment outcomes) and has determined that the actual rate will be approximately 0.6 mg/L, with an aim to achieve a <0.1 mg/L residual chlorine concentration at discharge. However, to ensure the assessment is conservative, the concentration of 1 mg/L originally used in the mixing assessment has been retained. Using a 1 mg/L dosing rate, a literature-based decay function has been applied to chlorine at the outfall location to predict levels at the point of outfall (see Appendix B for technical description). This decay curve applies at the point of exit from the outfall and does not allow for any decay of chlorine in the outfall pipeline itself (i.e. from the STP to the end of pipe). In reality a significant portion of the chlorine is likely to have either been oxidised through reactions with inorganic compounds (iron, ammonia, bromide etc) or gone through an addition/substitution reaction with organic matter in the effluent/pipeline wall by the time it reaches the outfall (von Gunten & Deborde, 2008). This is another layer of conservatism built into the modelling that must be considered when determining actual potential toxic effects at the outfall location.

Chlorine is excluded from the effluent quality parameters for the local Selfs Point effluent outfall, as the effluent that would be discharged through this outfall will have had no chlorine added (noting chlorine is only added to flows directed to Blinking Billy).

Receiving environment water quality

Water quality values from the Jacobs (2016) DEP data summary were used to define ambient background concentrations for the modelling for both outfalls, and these values are described in detail in Appendix B (Bonneville Consulting, 2023).

Water quality objectives

WQOs were developed based on several resources:

- The draft DGVs developed by the EPA for the Derwent Estuary (EPA Tasmania, 2019)
- Recommendation from the EPA on ambient trigger values for chlorine and relevant chlorine-related disinfection by-products (DBPs), as outlined in Bonneville Consulting (2023) (Appendix B)
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018):
 - Default physical and chemical stressors (South-East Australia – Estuaries)
 - 95% Species Protection Toxicant Values
 - Recreational Water Quality (Primary/Secondary/Aesthetic)
- National Health and Medical Research Council Guidelines for managing risks in recreational waters 2008.

For chlorine (as chlorine-produced oxidants or CPO), a revised 95% species protection value of 7.2 µg/L has been applied as the toxicant trigger value, as advised by the EPA (Bonneville Consulting, 2023). This value was derived by Batley & Simpson (2020) using short-term (acute) ecotoxicity test data rather than chronic effects data, which are thought to be the more appropriate ecotoxicology tests for deriving chlorine toxicity in marine waters due to its rapid decay rate (Batley & Simpson, 2020). It is acknowledged that the current ANZEC (2018) 95% species protection low reliability trigger value for marine waters is 3 µg/L; however, the 7.2 µg/L value has been used in this assessment, as advised by the EPA.

The WQOs applied for the Blinking Billy and local Selfs Point effluent outfalls are summarised in Table 4.1 and Table 5.1 of Appendix B, respectively.

Determination of dilution requirements

Using the abovementioned effluent and ambient water quality data and the WQOs set for each of the receiving environments, the dilutions required to reduce the most significant toxicants of concern (along with some other environmental effects constituents) to WQO limits were calculated in accordance with the methodology outlined in Appendix B and in accordance with EPA (2020).

Results for the Blinking Billy effluent outfall

A summary of the results for the Blinking Billy modelling follows.

- Chlorine (as CPO) was found to be the toxicant requiring the most dilution, with a **143-fold dilution** to bring the toxicant to below the trigger value of 7.2 µg/L.
- The next most significant toxicant was nitrate, with a **2-fold dilution** required.
- For ecosystem effects, total phosphorus was the parameter requiring the highest dilution, with a **708-fold dilution** required.
- For microbial indicators, faecal coliforms require a **2-fold dilution** and enterococci require a **12-fold dilution**.

Various modelling parameters were incorporated into the model for the effluent outfall (including the chlorine decay rate) and are summarised in Table 4.2 of Appendix B. In summary, effluent in the model is discharged in accordance with the existing Blinking Billy diffuser, which sits at 32 m, has 11 ports (five north facing and six south facing) spaced at 5 m intervals, and discharges continuously with a velocity of 1.5 m/s per nozzle. This was modelled with a flow of 345 L/s or 29.8 ML/d, which is the maximum flow the outfall can discharge.

The model was then run for two tidal scenarios, neap and spring, over three cycles for each tide (incoming, slack, outgoing). Current direction and strength at four depths for each cycle, as well as temperature and salinity differentials between top and bottom, were also integrated into the model.

The full modelling results for the Blinking Billy effluent outfall are presented in Section 4.4 of Appendix B, and are summarised here in Table 6-1.

Table 6-1 Blinking Billy outfall – mixing zone model results showing dilution with distance under several tidal scenarios at 29.8 ML/d flow

Tide	Dilutions (X:1) with distance from outfall (the range is from north to south ports respectively)			
	5 m	10 m	50 m	500 m
Neap Incoming	100-125	175-200	220-340	266-383
Neap Outgoing	110-150	200-260	380-425	415-440
Neap Slack	75	170-185	220-305	290-440
Spring Incoming	40-70	140-250	230-284	300-375
Spring Outgoing	40-70	220-350	220-350	360-600
Spring Slack	50-100	150-250	290-410	350-650

The modelling predicts chlorine (as CPO) concentrations to be diluted to below 5 µg/L in the initial near-field jet plume as it rises through the water column to the surface under all tidal conditions, reaching the surface at a distance ranging from 10-20 m from the outfall location.

The dilution requirement of 143:1 (to achieve the 7.2 µg/L target) is therefore met under all modelled tidal conditions within 20 m of the outfall.

Within the mixing zone, the potential toxicity of chlorine (as CPO) discharging into an estuarine/marine environment is significantly complex, due to variable environmental persistency and potential for the generation of disinfection by-products (DBPs). Chlorine (as CPO) is essentially a combination of various chlorine species, including hypochlorous acid (HOCl) and the hypochlorite ion (OCl⁻), among other forms of combined available chlorine (including various N-chlorinated compounds), which are available to react and interconvert (CCME, 1999; ANZG, 2018). In water, chlorine is highly reactive and there are a number of possible reaction pathways:

- Dissociation – resulting in chlorine (Cl₂), hypochlorous acid (HOCl) and the hypochlorite ion (OCl⁻).
- Volatilisation – resulting in chlorine off-gassing to the atmosphere.
- Chloramine formation – a reaction with ammonia to form chloramines and N-nitroso-dimethylamine (NDMA).
- Bromination – In marine waters, the behaviour of chlorine is strongly influenced by the bromide ion, which rapidly replaces chlorine in various species (e.g. hypochlorite to hypobromite), leaving free chloride ions. The reaction with bromide is fast, with the above example of hypochlorite to hypobromite reaching completion within 3 minutes under laboratory conditions in one study by Wong & Davidson (Wong & Davidson, 1977). Possible bromine chemical forms include hypobromite (OBr⁻), hypobromous acid (HOBr) and bromoform (CHBr₃). Residual chlorine and bromine have similar toxicities, so the same guideline values apply. Brominated compounds are produced naturally in the marine environment as part of the halogen cycle and therefore marine organisms can more readily regulate these compounds. This is not the case in fresh water where brominated compounds are considered toxic (Bonneville Consulting, 2023).
- Oxidation – a reaction with organic matter including fulvic, humic, and amino acids to produce a range of trihalomethanes (THMs), haloacetic acids (HAA) and chlorophenols, all DBPs.

The majority of DBPs formed in marine waters are present as trihalomethanes, 95% of which are bromoform from the bromination reaction mentioned above (Bonneville Consulting, 2023). The recommended EPA ambient trigger value for bromoform is 10 µg/L, and therefore with the dilution and dispersion behaviour of chlorine from the outfall mentioned above, bromoforms are not expected to exceed 10 µg/L outside the initial mixing zone of 20 m. DBPs are therefore considered to present a low risk to ecological values in the outfall area; more in-depth discussion on chlorine reactions in seawater is provided in Bonneville Consulting (2023) in Appendix B.

The next closest toxicant, nitrate, is modelled to be reduced to below its WQO limit within 5 m of the outfall. The mixing zone for faecal coliforms is also modelled to be less than 5 m from the outfall.

Ecosystem stressors, in this case total phosphorus, are not considered toxicants, and are only considered in the near-field modelling to assist in understanding whether their influence would extend beyond the mixing zone, and hence require consideration in the far-field and their potential effects on the environment. Total phosphorus was not predicted to sufficiently mix within the 500 m domain of the near-field model to achieve background concentrations, and its footprint may be elevated above its ecosystem stressor WQO for up to 1 km from the outfall location in several directions, potentially resulting in eutrophication or algal growth. Hence, phosphorus needs to be considered at a far-field level (refer below). In contrast, total nitrogen concentrations were predicted to be met within 10 m of the outfall.

The mixing zone assessment included an environmental risk assessment that interprets the mixing zone results in terms of potential impacts to the receiving environment (Bonneville Consulting, 2023). The assessment identified that at peak capacity of 29.8 ML/d the environmental risks of the outfall to the near-field receiving environment area are summarised as:

- All toxicants will be mixed within a 20 m zone around the diffuser.
- The closest sensitive receptor to the outfall is a known isolated population of the EPBC Act-listed spotted handfish (*Brachyonichthes hirsutus*) 850 m to the north-west of the diffuser; this is described in further detail in Section 6.6.3. There are limited other sessile sensitive receptors in the area. Although possible that individual spotted handfish could occur closer to the outfall, this is not considered a significant threat to the overall known populations key to the sustainability of the species. Also, considering the decay rates for chlorine expected in the effluent transfer pipeline, the threat of direct toxicity effects to the species within the mixing zone is considered negligible.
- The overall risk to the near-field environment from the Project in terms of protection of aquatic ecosystems and recreational water quality and aesthetics from the Blinking Billy effluent outfall is considered low for all relevant aspects (Bonneville Consulting, 2023).

Results for the local Selfs Point effluent outfall

A summary of the results for the Selfs Point modelling follows.

- Nitrate was found to be the toxicant requiring the most dilution, with a **2-fold dilution** to bring the toxicant to below the WQO limit. Effluent from this outfall is not chlorinated prior to discharge.
- For ecosystem effects, nitrate was also the parameter requiring the highest dilution, with a **254-fold dilution** required, followed by ammonia at 191-fold and total phosphorus at 166-fold.
- For microbial indicators, faecal coliforms require a **2-fold dilution**.

Various modelling parameters were incorporated into the model for the effluent outfall and are summarised in Table 5.2 of Appendix B. As the effluent discharge at Selfs Point will be a new arrangement, it has been modelled at four potential discharge depths (2, 6, 8 and 12 m) to assist in design optimisation. For diffuser design, a 25 port (150 mm diameter) arrangement with 4 m spacing between ports, directed interchangeably northerly and southerly, was used. These outfall/diffuser arrangements were modelled at the maximum flow rate of 1,340 L/s which is the maximum flow the outfall can discharge.

The model was then run for the same two tidal scenarios as the Blinking Billy effluent outfall – neap and spring – over three cycles for each tide (incoming, slack, outgoing). Current direction and strength at four depths for each cycle, as well as temperature and salinity differentials between top and bottom, were also integrated into the model.

The full modelling results for the local Selfs Point effluent outfall are presented in Section 5.4 of Appendix B, and are summarised here in Table 6-2.

Table 6-2 Local Selfs Point effluent outfall – mixing zone model results for four depths showing dilution at 10 m distance from diffuser under several tidal scenarios at 1,340 L/s flow.

Dilutions (X:1) at 10 m from outfall (the range is from north to south ports respectively)			
Depth	Neap Incoming	Neap Outgoing	Neap Slack
2 m	12	16-18	12
6 m	24-35	24-35	20
8 m	31-50	34-43	30
12 m	55-75	52-62	50
Depth	Spring Incoming	Spring Outgoing	Spring Slack
2 m	15	12-21	10-12
6 m	24-36	24-42	23-28
8 m	31-55	32-42	33-38
12 m	70	52-58	50-64

The modelling indicates that the dilution requirements for the toxicity indicator nitrate and the microbial indicator faecal coliforms will both be met within 10 m of the local Selfs Point effluent outfall at all depths.

For nutrients, the footprint of the discharge is expected to extend beyond 1 km from the outfall location in the direction of the prevailing current at the time.

The environmental risk assessment for the local Selfs Point effluent outfall identified that at peak capacity of 1,340 L/s the environmental risks of the outfall in the near-field to the receiving environment area are summarised as:

- There is no toxicant risk identified to flora and fauna outside a 10 m zone around the diffuser at any depth modelled.
- There is no microbial risk identified outside a 10 m zone around the diffuser at any modelled depth greater than 2 m, including for enterococci.
- The overall risk to the near-field environment from the Project in terms of protection of aquatic ecosystems and recreational water quality and aesthetics from the local Selfs Point effluent outfall is considered low, and for industrial water supply (Nyrstar Hobart) the risk is considered insignificant (Bonnevill Consulting, 2023).
- Potential threats to threatened marine species, including the spotted handfish, are considered negligible given the extremely small mixing zone for toxicants and the lack of species presence in or near the mixing zone.

In terms of optimal depth of outfall, the results suggest that, despite dilution and dispersion improving with depth, this mixing will have little effect on the size and extent of the footprint of the nutrient plume that will occur in the far-field environment. Therefore, any depth greater than the existing 6 m that effluent is

currently discharged at would be acceptable environmentally. Notionally 8 m has been selected as the outfall depth at this stage of design.

It is noted that Appendix B also assesses the Macquarie Point SPS emergency outfall, but the results are not discussed herein, as it will form part of a separate approval process.

Far-field considerations

The key risks to the receiving environment in the far-field from the Project are associated with nutrient enrichment leading to overproduction of phytoplankton growth in the estuary, potentially leading to algal blooms and epiphytic growth on algae, seagrass and inert objects.

The growth of marine phytoplankton is often discussed in relation to the Redfield ratio, which is a ratio of carbon to nitrogen to phosphorus availability in the aquatic environment equivalent to a molecular ratio of 106 C: 16 N: 1 P (or 50:7:1 by weight), any deviation from which implies a nutrient deficiency for the growth of phytoplankton (Bonneville Consulting, 2023).

Ratios of N:P in the Derwent Estuary were determined using data from the DEP water quality program (data from 2004-15) from sites closest to the outfall locations (Bonneville Consulting, 2023). The results indicate that nitrogen is the limiting nutrient in summer months and phosphorus is limiting in winter months. Further interrogation of data to understand the bioavailable components of total nitrogen and total phosphorus, i.e. the more available forms of nitrogen, namely dissolved inorganic nitrogen (constituting ammonia + nitrate + nitrite) and the phosphate ion (PO_4^{3-}) demonstrated that the bioavailable components of nitrogen are limiting all year round at all sites (Bonneville Consulting, 2023).

In addition to the Redfield ratio, other physicochemical properties also govern nuisance algal growth, including water temperature and availability of sunlight, resulting in lower eutrophication risks in winter (noting winter is also the period of the year when consideration of total nitrogen and total phosphorus shows total phosphorus as a potentially limiting factor).

Annual median chlorophyll- α concentrations from the DEP dataset, used as a proxy for water column algal presence, were found to be highest in the mid-estuary area year-round; this coincides with proximity to the highest density of STPs (Bonneville Consulting, 2023).

Appendix B contains a whole-of-estuary risk assessment that focuses on far-field impacts; it compares the current STP arrangements (Macquarie Point and Selfs Point STPs continuing current operations) versus the amalgamation proposed by the Project. The findings of the assessment are that, even with the 33% increase in effluent volume predicted to occur by 2054 due to population growth in the catchment, the Project will significantly reduce the total loads of nitrogen and phosphorus discharged to the estuary by the existing STPs by 58% and 42% respectively, as shown in Figure 6-4 and Figure 6-5 (Bonneville Consulting, 2023). This will be a direct result of the significant improvements in treatment technology proposed as part of the Project, and the shutdown of the underperforming Macquarie Point STP.

In addition to the nutrient load reduction, the Project will also relocate the effluent that is currently discharged at the existing Macquarie Point effluent outfall to the Blinking Billy effluent outfall, a far superior discharge location due to depth and location, resulting in greater dilution and dispersion rates.

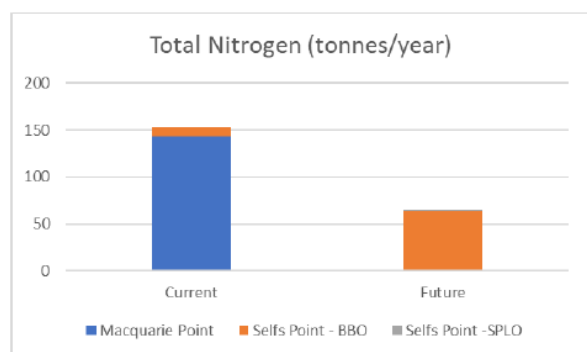


Figure 6-4 Effluent nutrient loads for total nitrogen

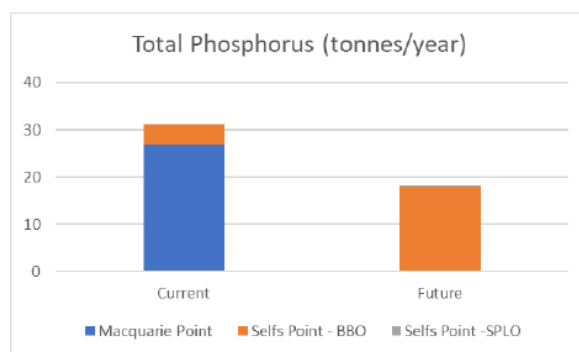


Figure 6-5 Effluent nutrient loads for total phosphorus

Specifically for the Blinking Billy effluent outfall, despite the relatively high concentrations and mass load outputs of phosphorus at the outfall, eutrophication risk to the Derwent Estuary is not expected to increase as a result of the Project in the far-field given the open-water moderate energy environment (resulting in short residence times in the area) and based on the premise that nitrogen is generally the limiting factor in eutrophication impacts in the marine environment (which is reducing as a result of the Project).

At the local Selfs Point effluent outfall, total nitrogen (including nitrate and ammonia) and total phosphorus have the potential to not mix effectively at distances over 1 km. However, the actual risk of this occurring is considered low. This is because the actual outfall volume predicted to be discharged is 1.9% of the total STP effluent volume over a year, in seven separate occurrences, totalling 133 ML/y. The intermittent nature and relatively low discharge volumes of effluent are unlikely to significantly contribute to whole-of-estuary eutrophication events given the daily flushing capacity of the estuary (Bonneville Consulting, 2023); cumulative impacts are considered negligible with the expected recurrence interval of discharge events at the outfall being so large.

It should also be noted that in comparison to nutrient discharge under the currently operating STP, the proposed Project will reduce the overall nutrient mass load discharged to the Selfs Point area. Whilst the overall volume would approximately double in comparison to recent AER data (to 130 ML/yr) the quality of effluent would increase approximately eight-fold due to secondary treatment and filtration of all local discharges, resulting in an overall reduction of local nutrient loading (by approximately four-fold on an annual basis) to the mid-estuary area.

6.1.4 Management, mitigation and monitoring

In addition to the applicable broader management, mitigation and monitoring measures outlined in Section 6, the following discipline-specific measures will also apply to the Project.

6.1.4.1 Construction

The following management and mitigation is proposed for the construction phase of the Project:

Reference number	Management, mitigation or monitoring measure
Management and mitigation	
Water Quality MM 1	Prior to construction commencing, a construction Sediment and Erosion Control Plan for the Project will be developed, identifying all major drainage lines and waterways and site-specific management and mitigation to be used, including controls such as sandbags, sediment fences, sediment traps and diffusion paths. The Sediment and Erosion Control Plan will form part of the CEMP for the Project.
Water Quality MM 2	No materials will be stockpiled on existing drainage lines; stockpile perimeter drains and sediment fencing will be used as required.
Monitoring	
No additional monitoring to that outlined in the applicable broader monitoring measures outlined in Section 6 is proposed.	

Additional management and mitigation for water quality during construction is contained in the following sections:

- Section 6.7.4 – Groundwater
- Section 6.8.3 – Waste Management
- Section 6.9.3 – Dangerous Goods and Environmentally Hazardous Materials.

6.1.4.2 Operation

The following management and mitigation is proposed for the operational phase of the Project:

Reference number	Management, mitigation or monitoring measure
Management and mitigation	
Water Quality MM 3	The STP and associated pipelines will be subject to regular maintenance and inspection.
Water Quality MM 4	The Project's SCADA systems will include monitoring systems and alarms to alert staff of any system or equipment failures. Procedures will be in place to ensure immediate response to any identified issues to ensure the functionality of the STP is maintained and treated effluent quality is not compromised.
Water Quality MM 5	Chlorine dosing rates will be optimised through the commissioning period based on testing at the Domain break of head tank and the Blinky Billy outfall pump station to optimise the dosage required by measuring residual chlorine in the effluent after it has travelled through the transfer pipeline length; laboratory experiments will also be run using Project-specific effluent to measure chlorine decay rates over longer periods. This information will be used to optimise the dosing rate to achieve the necessary controls at the heat exchangers, while minimising residual chlorine released to the environment.
Monitoring	
Water Quality MON 1	The marine ambient monitoring plan outlined in Section 6.1.4.3 will be implemented, which includes regular influent and effluent monitoring (including during upset storm conditions) to ensure STP performance is maintained. Any issues identified from the results will be investigated immediately and rectified as required.

6.1.4.3 Marine monitoring plan

The following marine ambient monitoring plan has been developed to detect any impact to the water quality or benthic habitat of the areas surrounding Blinky Billy effluent outfall in the operational phase (post-commissioning). The plan also includes sediment monitoring at the new local Selfs Point effluent outfall; regular water quality monitoring was not seen as necessary given the low frequency of discharge events expected to occur at the site and expected lack of detectability of any change to overall water quality in the area.

The plan has been based on the original plans developed for the Blinky Billy effluent outfall (Jacobs, 2016a); where suitable, sites have been retained to allow comparisons to be made to existing data. For Selfs Point, a new site will be selected due to the relocation of the local outfall.

Influent / effluent screening and monitoring

Following commissioning, influent and effluent screening will be undertaken for four weeks, with composite samples taken weekly over this period. The effluent screening will include a comprehensive analyte list including, but not limited to, the following:

- Total and dissolved metals (all available metals and metalloids)
- Nutrients (all available forms)
- General STP screening elements (BOD, TDS, TOC, chlorine, total residual chlorine etc)
- Total petroleum hydrocarbons (all available fractions)
- Benzene, ethylbenzene, toluene, xylene, naphthalene (BTEXN)
- Disinfection by-products (all available forms)
- PFAS/PFOS.

The results of the effluent screening will inform the final analyte list for the ambient water quality monitoring program.

Following screening, monthly influent and effluent samples will be collected during STP operation based on the screening analyte list. Influent and effluent samples will also be collected during discharge events at the local Selfs Point effluent outfall.

Plume study (Blinking Billy only)

Following commissioning and prior to the first water sampling event, a suitable plume study will be undertaken at the Blinking Billy effluent outfall only to determine the three-dimensional behaviour of the effluent plume to inform the finalisation of the water sampling site locations.

As part of this study, verification of the chlorine mixing zone will also be investigated to determine the fate of chlorine using a sonde capable of monitoring total and free residual chlorine. The sonde would be used to test total and free residual chlorine at various distances and depths from the outfall location to determine / verify the mixing zone.

Water quality (Blinking Billy only)

Water quality monitoring will be undertaken at the preliminary sites and frequencies specified in Table 6-3 for the parameters identified in Table 6-4, plus any additional contaminants of concern identified during the effluent screening events. The monitoring sites are shown graphically in Figure 6-6; they are based on the original sites used in the 2016 AMP (Jacobs, 2016a), but are considered preliminary until confirmed suitable by the aforementioned proposed plume study. Final water quality ambient monitoring locations and analytes will also be informed by any EPA permit conditions.

It is proposed that water quality monitoring is undertaken monthly for a 12-month monitoring period following plume verification to finalise monitoring sites. At the end of the 12 months of operational monitoring, results will be reviewed in consultation with the EPA and based on the outcome of the results, a decision made as to whether to continue for an additional period or to cease or reduce the frequency of monitoring.

Table 6-3 Water quality monitoring sites

Site name	Parameter groups	Depths	Frequency
Outfall	A, B, C, D	Surface, Mid, Bottom	Monthly (sampling on a mix of incoming and outgoing tides over the 12 months)
10 m, 50 m, 100 m, 500 m (upstream and downstream of outfall) Site locations are preliminary and are shown in Figure 6-6.	A, B, C, D	Surface, Mid, Bottom	
Reference	A, B, C, D	Surface, Mid, Bottom	

Table 6-4 Water quality parameters

Parameter
Group A: Physicochemical (in situ)
pH, Temperature, Salinity, Conductivity, Dissolved oxygen, Turbidity (Instrument sensitivity to suit ANZG [2018] physical and chemical stressor concentration values)
Group B: Nutrients (laboratory)
Total Nitrogen, Ammonia as N, Nitrate as N, Nitrite as N, Total Phosphorus as P, Reactive Phosphorus as P, Chlorophyll- α (Lab sensitivity to suit concentrations from ANZG [2018] physical and chemical stressor concentration values)
Group C: Metals (laboratory)
Total and Dissolved metals suite (to be informed by effluent screening but as a minimum As, Cd, Cr, Cu, Pb, Mn, Ni, Zn) (Lab sensitivity for dissolved metals to suit concentrations from ANZG [2018] 95% protection for toxicants)
Group D: Other (laboratory)
Chlorine and Total Residual Chlorine, Oil & Grease, Total Dissolved Solids, Total Suspended Solids, Enterococci, Disinfection By-products (all available forms), <i>E.coli</i> and any additional analytes informed by effluent screening.

Sediment quality monitoring

Sediment quality samples will be taken at the sites, parameters and frequencies specified in Table 6-5. Sample collection for sediment quality will be undertaken either by diver core or remotely using a Craib corer.

Benthic infauna samples will be collected by either diver core or by a van Veen grab and placed in 1 mm mesh bags and stored in a fixative/preservative. Infauna samples will then be sorted and identified in a laboratory to family level, where achievable.

Table 6-5 Sediment quality monitoring details

Location	Sites	Parameters	Frequency
Blinking Billy effluent outfall	Outfall 10 m, 50 m, 100 m, 500 m (upstream and downstream of outfall) Reference Site locations shown in Figure 6-6.	Sediment Quality Metals suite (to be informed by effluent screening but as a minimum As, Cd, Cr, Cu, Pb, Mn, Ni, Zn). Total Petroleum Hydrocarbon (TPH) Total Organic Carbon (TOC) Particle Size Distribution Redox (3 core depths) Nutrients (TN, TKN, Nitrate, Ammonia, TP) Any additional analytes informed by effluent screening. Benthic Infauna Samples to be collected in triplicate and identified to family level.	Once prior to commissioning and once at the completion of 12 months of operation.

Reporting

A draft Ambient Monitoring Plan will be submitted to the EPA incorporating the results of the effluent screening and plume study, and the subsequent final proposed analyte list and sample site locations for approval prior to monitoring commencing.

Once monitoring is underway, a marine monitoring report will be provided to the EPA within 3 months of the last sampling event containing:

- Results of the 12 months of ambient water quality monitoring
- Results of the sediment quality and benthic infauna monitoring events
- An assessment of the outcomes of the investigations and any recommended changes to the monitoring plan.

Name	Easting	Northing
Outfall	530090	5248377
10m downstream	530084	5248365
10m upstream	530082	5248390
50m downstream	530081	5248325
50m upstream	530087	5248429
100m downstream	530076	5248274
100m upstream	530073	5248476
500m downstream	530124	5247878
500m upstream	530046	5248873
Reference site	529943	5249220



- Monitoring locations
- BLINKING BILLY Effluent Outfall



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Revision V.5
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Paper size A3

Selfs Point STP
Redevelopment

Figure 6-6

Marine
monitoring plan

6.1.5 Residual impacts

With the implementation of the management and mitigation measures outlined above for the construction phase of the Project, residual impacts to surface waters as a result of construction are expected to be minimal.

The Project will result in an overall net environmental benefit to the water quality of the Derwent Estuary environment from the current situation. This is as a result of both the significant improvement to the level of treatment of the effluent and the relocation of the volume previously discharged from the Macquarie Point effluent outfall to the Blinking Billy effluent outfall, which has greater dilution and dispersion potential.

Despite the greater volumes proposed to be pumped out at the Blinking Billy effluent outfall, near-field impacts are expected to be limited to a mixing zone of 20 m. There are not expected to be any impacts to the closest sensitive receiver, which is considered to be the spotted handfish population at a distance of 850 m, providing a significant safety buffer.

The residual risk of impacts from the local Selfs Point effluent outfall will be greatly reduced from the current emergency discharge scenarios, as at full capacity the toxicity and microbial WQOs will be met within 10 m of the outfall diffuser, an improvement on current discharge effects at the existing local Selfs Point effluent outfall.

As the Project will result in an overall reduction in both nitrogen and phosphorus compounds to the whole of the estuary, a net environmental benefit will result in the far-field.

6.2 Noise

An environmental noise assessment was undertaken by Tarkarri Engineering for the Project, the results of which are summarised below and available in full in Appendix C (Tarkarri, 2024).

A noise assessment was previously undertaken by Jacobs, based on the 2016 design for the proposed expansion of the Selfs Point STP (Jacobs, 2016b). This report has been superseded; however, it provides useful data on background conditions.

6.2.1 Existing environment

Noise-sensitive land uses surrounding the Project Site include the residential areas of Lutana (to the north-west), with the closest residents being approximately 100 m from the boundary to the west; then Queens Walk apartments (site 1 in Figure 6-7) approximately 175 m from the boundary to the south-west. Other nearby non-residential locations sensitive to noise include the bridge club, sports oval and cattery.

Observed (i.e. with sampler present) environmental noise monitoring was undertaken in March 2022 at six locations (including sensitive receptors) surrounding the Selfs Point STP during the day, evening and night. Unobserved monitoring was also undertaken at one location at the boundary of the STP. The locations used for environmental noise monitoring are shown in Figure 6-7 and Figure 6-8. Observed environmental noise monitoring was also undertaken at locations 1, 4 and 5 in 2016 by Jacobs (Jacobs, 2016b).

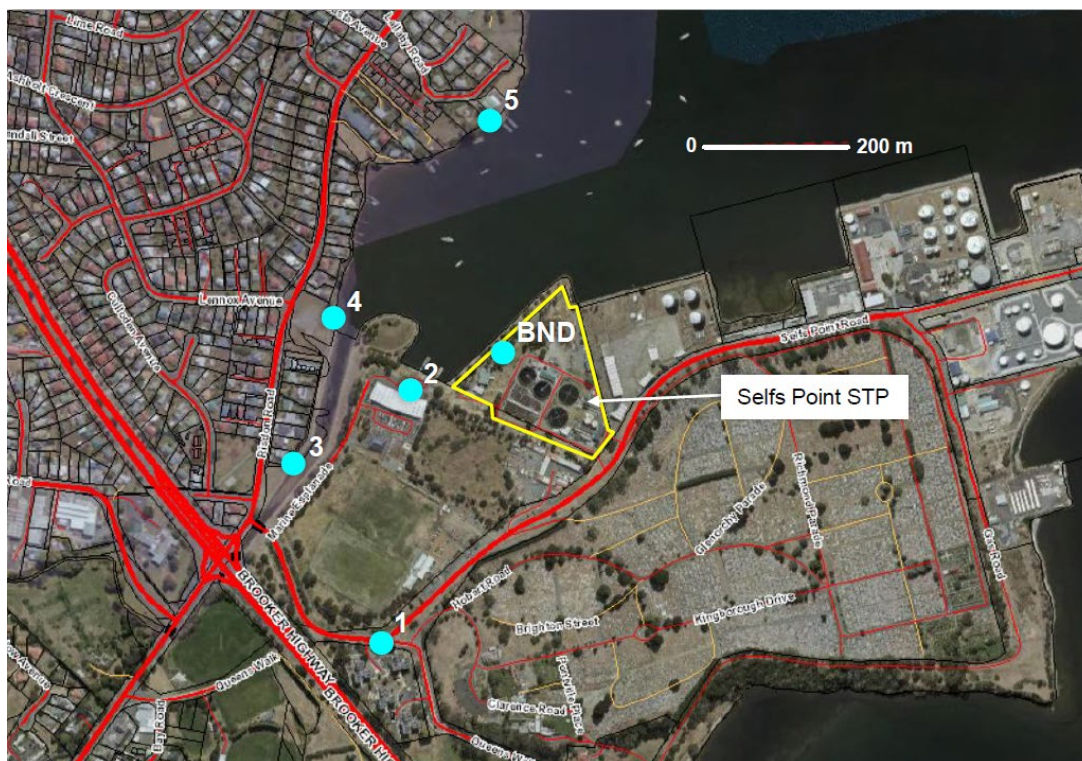


Figure 6-7 Environmental noise monitoring locations 1-5 (Tarkarri, 2024)



Figure 6-8 Environmental noise monitoring location 6 (control site) (Takarri, 2024)

A summary of the results of the environmental noise monitoring is provided in Table 6-6. The existing acoustic environment at the monitoring locations was generally controlled by traffic noise from the Brooker Highway and local roads (Takarri, 2024). During the night under lower traffic levels, industrial noise from Lutana was audible and controlled the background noise levels at most of the locations. The STP was not audible at any of the locations, except for the unobserved location at the Project Site boundary. Further details on the existing noise conditions and environmental noise monitoring data are provided in Appendix C.

Table 6-6 Summary of environmental noise monitoring

Number	Location	Ambient measurement (LAeq) (dB)		
		Day	Evening	Night
1	Queens Walk Apartments	67.2 63 ¹	67.1	57.3 53 ¹
2 ²	New Town Rowing Centre		59.1	
3	New Town Rivulet	60.3	53.6	46.4
4	119 Risdon Road	63 51 ¹	52.5	41.8 40 ¹
5	Friends Rowing Shed	52 47 ¹	42.1	39.6 38 ¹
6	2 Cook Street (control site)	51.4	43.5	42.8

Table notes:

1. Ambient measurement recorded by Jacobs in 2016.
2. Location 2 does not constitute a noise sensitive premises as defined by the EPN (i.e. residences and residential zones (whether occupied or not), schools, hospitals, caravan parks and similar land uses involving the presence of individual people for extended periods, except in the course of their employment or for recreation). This location has been included due to proximity to the STP.

6.2.2 Legal and other requirements

Key legislation and policy relevant to the management of noise for the Project include:

- *Environmental Management and Pollution Control Act 1994* (EMPC Act)
- *Environmental Management and Pollution Control (Noise) Regulations 2016*
- Noise Measurement Procedures Manual 2008
- *Environment Protection Policy (Noise) 2009* (Noise EPP)
- Hobart Interim Planning Scheme 2015
- NSW Construction Noise and Vibration Guideline 2016 (referenced in lieu of Tasmanian guidelines for construction vibration)
- NSW EPA Draft Construction Noise Guideline 2020.

The EMPC Act provides for the minimisation of environmental harm (which includes environmental nuisance). Section 53 of the EMPC Act outlines offences causing environmental nuisance, including the emission of noise.

The Regulations require that any measurement, calculation or estimate of noise is in accordance with the Noise Measurement Procedures Manual.

The Noise EPP provides principles and objectives to reduce health risks and other impacts associated with unreasonable noise emissions (Department of Environment, Parks, Heritage and the Arts, 2009).

The Hobart Interim Planning Scheme 2015 includes Use Standards to ensure that noise emissions do not cause environmental harm and have an unreasonable impact on residential amenity on land within a residential zone.

6.2.2.1 Operational noise

The STP operates under EPN 9797/1, issued under the EMPC Act. The existing Selfs Point STP EPN specifies the following noise emission limits at any noise-sensitive premises in other ownership, expressed as an equivalent continuous A-weighted sound pressure level:

- 50 dB(A) between 0800 hours and 1800 hours (Daytime)
- 40 dB(A) between 1800 hours and 2200 hours (Evening)
- 35 dB(A) between 2200 hours and 0800 hours (Night-time).

These noise limits have been adopted for the operational noise assessment of the Project as they are considered appropriate in terms of minimising impacts to local environmental values.

6.2.2.2 Construction noise

For the construction phase of the Project, a quantitative management approach is proposed to be implemented based on the NSW EPA Draft Construction Noise Guideline 2020 (in lieu of Tasmanian implementation measures). This method is deemed suitable where flexible noise management measures are preferred. The Guideline's objectives are in accordance with the principles of the Noise EPP, in that 'The key objective ... to ensure that noise impacts from construction and maintenance projects are kept to a minimum. This is achieved by ensuring all reasonable and feasible mitigation measures are identified, their selection is justified, and the community is engaged in a transparent and honest manner on the likely impacts and the mitigation to manage noise from the proposal.'

The recommended standard hours of construction in the Guideline are as follows:

- Monday to Friday between 0700 hours and 1800 hours
- Saturday between 0800 hours and 1300 hours
- Sundays and public holidays – no work

Noise management levels and management measures to be applied **during these standard hours** are defined by the Guideline as follows:

- **Noise affected** management levels for these hours are defined as the rated background noise level (RBL) + 10 dB – when exceeded the proponent shall apply all reasonable and feasible work practices to meet this level and all potentially impacted residents should be notified.
- **Highly noise affected** management levels for these hours are defined as 75 dB or greater – when exceeded the proponent shall apply all reasonable and feasible work practices as well as consent with the relevant authority or regulator to identify additional management measures. Where appropriate, engagement with the community is encouraged to determine the preferred mitigation approach (e.g. negotiated agreements, respite periods etc.).

Noise management levels and management measures to be applied for periods **outside the recommended standard hours** are defined by the Guideline as follows:

- Noise affected management levels for these hours are defined as the RBL + 5 dB – strong justification is required for work outside recommended hours. The proponent is to apply all reasonable and feasible work practices to meet this level; where the level cannot be met, residual impacts should be quantified and potentially impacted residents notified. Supplementary mitigation outlined in the Guideline must be considered.
- **Highly noise affected** management levels for these hours are defined as 75 dB or greater. At noise generation above this level, supplementary mitigation as defined in the Guideline must be considered and the proponent must justify the selection of the feasible and reasonable mitigation, including supplementary mitigation, with an emphasis on consultation with the community and consent of the relevant authority or regulator.

6.2.3 Potential impacts

Potential noise impacts during the construction and operation of the Project on sensitive receptors are outlined below, with more detail provided in Appendix C.

6.2.3.1 Construction

General civil construction activities have the potential to generate temporary, localised noise that could impact on nearby sensitive receptors, including those in nearby residential and recreational areas. Excessive noise also has the potential to impact on fauna species, particularly during the evening and night-time.

Significant noise generation in the aquatic environment can significantly impact on aquatic species, especially species of cetaceans. The proposed construction methodology of the new local Selfs Point effluent outfall is not expected to result in any significant noise generation, as it will involve laying the pipeline on the seafloor, which is not expected to cause measurable noise effects to marine fauna.

High-noise generating equipment likely to be used during the construction phase of the Project and typical noise levels are outlined in Table 6-7. As can be seen, the relevant construction activities with the highest noise generation potential are piling and the use of pneumatic tools (e.g. jackhammer). Piling will likely be required site-wide, given the generally unstable geotechnical conditions associated with reclaimed land and the area of wetlands/landfill at 10 Selfs Point Road. Piling has the potential to impact on the amenity of sensitive receivers in terms of noise disturbance, depending on the type of piling used. It can become an annoyance if used at a constant frequency for long periods of time, so this will need to be managed closely with sensitive receptors, including the cemetery and nearby residents, to ensure disturbance is minimised, in accordance with the NSW EPA Draft Construction Noise Guideline 2020, as outlined in Section 6.2.2.

Table 6-7 High-noise construction equipment – typical noise levels (Department for Infrastructure and Transport, 2021)

Equipment	Sound pressure level dB(A) Leq (15min) at 20 metres from noise source
Concrete truck	75
Crane	79
Delivery truck	74
Tracked excavator (5t)	68
Tracked excavator (45t)	74
Generator	69
Hand tools (electric)	68
Hand tools (pneumatic)	82
Piling rig	82

Noise modelling was not undertaken for general construction activities because most noise generation will be intermittent, temporary and kept to within the acceptable noise-generating timeframes, as outlined in Section 6.2.2. However, as noted in Section 2.5, pre-drilling to facilitate piling activities will need to be undertaken temporarily on a constant 24-hour / 7 day/week basis for a 9-month period to make construction timeframes practical for the Project. The potential impacts of this activity during construction were assessed by Tarkarri (2024).

The assessment modelled the pre-drilling for 'controlled modulus column pilling' using a 'continuous flight auger' drilling rig in all areas of the Project footprint, including the effluent balance tank area. The three main noise sources from the pre-drilling activity used were:

- Drill rig engine with a sound power level (SWL) of 104 dBA
- Drill rig hydraulic drive with an SWL of 90 dBA
- Excavator with an SWL of 90 dBA.

Tarkarri (2024) identified that:

- During standard hours of construction, the noise management level of 53 dBA LAeq, 10 min is applicable (RBL+ 10 dB).
- During non-standard hours of construction, the noise management level of 40 dBA LAeq, 10 min is applicable (RBL + 5 dB).

Using the modelling applied to the Project's operational phase, Tarkarri (2024) identified that the:

- Operation of the drill rig across the Project footprint predicted noise emission levels at sensitive receiver locations below the adopted standard hours noise management level.
- Operation of the drill rig during non-standard hours resulted in the relevant noise management levels being exceeded by up to 8 dB, with the dominant noise being the drill rig engine.

Tarkarri (2024) subsequently modelled the drilling with noise barriers in place approximately 0.8 m above the drill rig engine height on 2-3 sides of the rig. This reduced the predicted noise levels to below the

adopted non-standard working hours management level, indicating that the adopted noise management levels can be complied with assuming noise barriers are in place. Tarkarri (2024) notes that confirmation of the noise input data should be checked prior to construction commencing once the rig is chosen to confirm these results.

6.2.3.2 Operation

The Project will function on a 24-hour basis for the majority of in-situ plant, with most other activities, including truck deliveries/pick-ups, light vehicle movements and general site attendance occurring during normal business hours, with occasional weekend movements required. Tankered waste receiveal and sludge pick-up will generally be scheduled during normal working hours Monday to Friday, with occasional weekend deliveries/pick-ups required by exception.

Environmental noise modelling was undertaken for the sensitive receptors outlined in Table 6-6 (excluding the control site) to predict potential noise levels from the upgraded STP. SoundPLAN software was used to carry out detailed noise emission spectra and contour modelling, using the following input source data:

- Georeferenced elevation (topographic) 5 m interval contour data obtained from LISTdata and 1 m contour of LiDAR data for the area directly surrounding the STP
- Site layout and equipment locations for the Project, taken from the concept design
- Sound power levels from the Tarkarri Engineering data library.

For assessing atmospheric attenuation/amplification of noise, the ISO 9613 prediction algorithm was used for modelling 'neutral' weather conditions, and the CONCAWE calculation method was used for modelling worst-case weather conditions in SoundPLAN. Further technical information on modelling methodology used is provided in the noise assessment at Appendix C.

The noise sources modelled (which are those considered the highest noise-emitting equipment and infrastructure) are shown in Figure 6-9, noting these are considered a best estimate of final design of the Project. Predicted noise levels from these modelled sources are provided in the noise assessment at Appendix C and replicated in Table 6-8. The noise sources identified as the top contributors to the overall sound pressure level were pumps (when considered as an aggregated noise source), the blower building, and radiated noise from the odour control unit fan casings and ductwork (at locations where this source is not shielded by other structures). Other potential noise sources are detailed in Appendix C.

All sources were included in the modelling across a 24-hour period, despite some elements not being run on a continuous basis; the modelling results are therefore considered conservative on this basis.

Table 6-8 STP equipment sound power levels used in modelling

Equipment	Overall model input sound power levels (SWL) (dBA)
Generic pump	91
Inlet works	92
Blower building	104
Sludge dewatering building	90
Tanker waste screen building	85
Odour control unit (OCU) fan case	96
OCU fan inlet ductwork	100

Equipment	Overall model input sound power levels (SWL) (dBA)
Co-generator	91

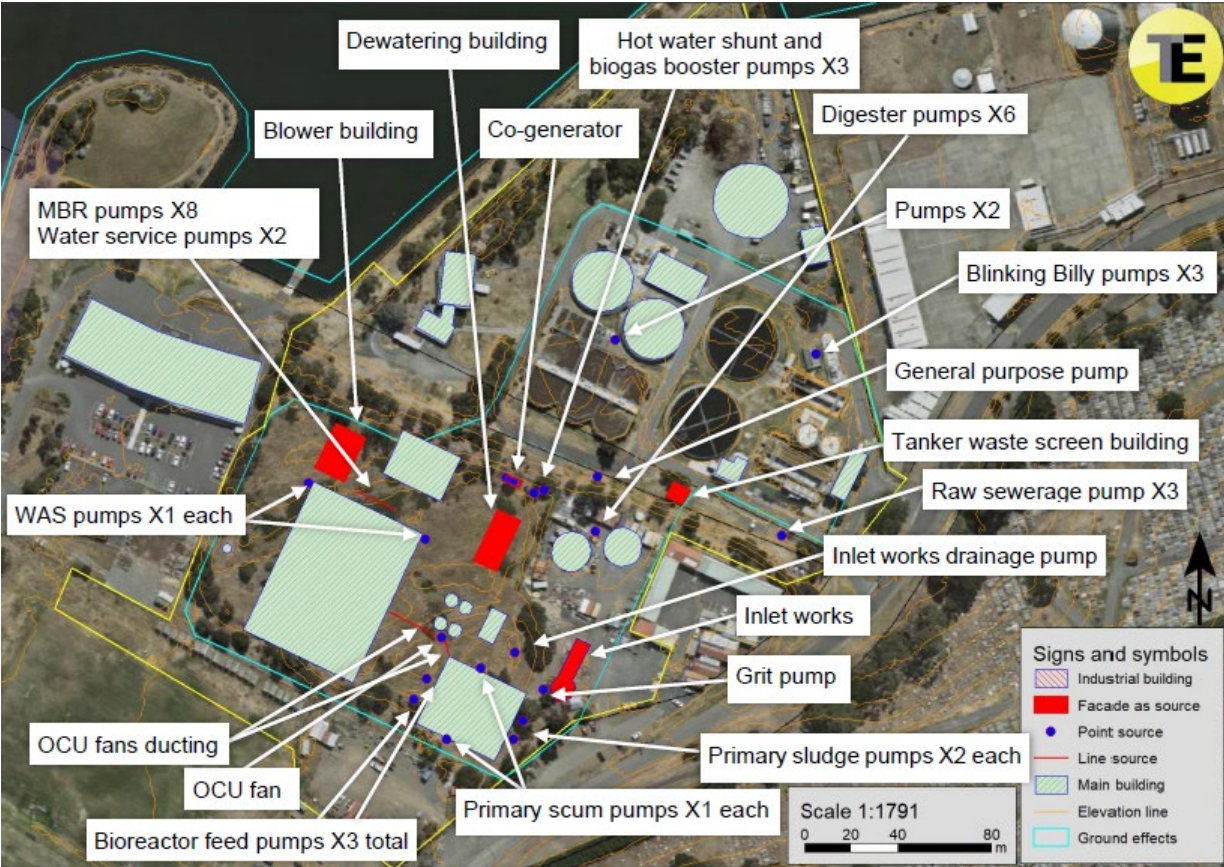


Figure 6-9 Modelled noise sources (Takarri, 2024)

The modelled sound pressure levels at the sensitive receptors during operation of the Project are presented in Table 6-10. The displayed results include sound pressure levels under both neutral (i.e. calm, no wind) and worst-case environmental conditions, which considers all receptors as downwind with weather promoting worst-case noise propagation. The predicted noise levels (without mitigation) at noise sensitive receptors are below the EPN limit during the day (50 dB(A)) for all sites except the rowing club; all sites exceed the limit for evening (40 dB(A)) and night (35 dB(A)) for both neutral and worst-case scenarios.

To address the exceedances, noise mitigation will need to be applied. The Tarkarri noise report, included as Appendix C, provides a comprehensive suite of mitigation that will be adopted in the final design of the Project. Proposed mitigation and the resulting predicted noise reduction is outlined in Table 6-9.

Table 6-9 Design noise mitigation

Equipment	Noise mitigation options	Predicted noise reduction (dB)
Generic pump	• ‘Quiet’ pump selection, i.e. pump specification for SWL no greater than 80 dBA. • Acoustic enclosures / barriers for pump sets.	10

Equipment	Noise mitigation options	Predicted noise reduction (dB)
Inlet works	• Provide local acoustic enclosures for equipment to reduce noise levels. • Enclose area to provide better containment.	10
Blower building	• Acoustic enclosures / barriers for equipment • Installation of acoustically absorbent material • Building designed to minimise sound transmission	15
Sludge dewatering building	• Acoustic enclosures / barriers for equipment • Installation of acoustically absorbent material • Building designed to minimise sound transmission	5
Odour control unit (OCU)	• 'Quiet' fan selection • Acoustic enclosure for fan casings • Inlet silencer to reduce duct radiated noise • Acoustic lagging of inlet ductwork	15

As shown in Table 6-10, with the application of the mitigation measures, sound pressure levels at noise-sensitive receptors reduce to below the EPN limit for evening and night under worst-case propagation conditions (the rowing club does not constitute a sensitive receptor).

The resulting modelled noise emission contours under worst-case conditions with mitigation measures in place are shown in Figure 6-10.

Table 6-10 Modelled sound pressure levels at sensitive receptors during operation

Receptor number	Night-time EPN limit	Predicted received sound pressure level (dBA)		
		Neutral (no mitigation)	Worst-case (no mitigation)	Worst-case (with mitigation)
1	35	44	46	34
2A ¹	35	52	54	41
2B ¹	35	58	60	45
3	35	45	48	34
4	35	45	48	35
5	35	43	46	33

Notes:

1. Location 2 is split into two receiver positions to the north (2A) and south (2B) of the New Town Rowing Centre. Locations 2A and 2B do not constitute sensitive receivers as defined by the EPN (i.e. residences and residential zones (whether occupied or not), schools, hospitals, caravan parks and similar land uses involving the presence of individual people for extended periods, except in the course of their employment or for recreation).
2. Only worst-case scenario conditions were modelled post-mitigation, as neutral conditions will naturally be lower noise levels.



Figure 6-10 Predicted noise contours (worst case – with mitigation)

6.2.4 Management, mitigation and monitoring

In addition to the applicable broader management, mitigation and monitoring measures outlined in Section 6, the following discipline-specific measures will also apply to the Project.

6.2.4.1 Design

The following management and mitigation measures will be applied for the Project design phase:

Reference number	Management, mitigation or monitoring measure
Management and mitigation	
Noise MM 1	The Project will include the following noise management and mitigation as a minimum, as included in the noise modelling undertaken on the concept design: • Selection of equipment with lower sound power level specifications (for pumps, blowers and fans). • Acoustic enclosures for select equipment, including pumps, internal equipment associated with the inlet works, blower building and sludge dewatering building, and fan casings in the OCU. • The use of acoustically absorbent internal lining in selected buildings to control reverberation. • The use of an inlet silencer and acoustic lagging of inlet ductwork for the OCU.
Noise MM 2	The final design will include the required mitigation to ensure the existing EPN limits during the day (50 dB(A)), evening (40 dB(A)) and night (35 dB(A)) are met at the closest sensitive receptor.

Reference number	Management, mitigation or monitoring measure
Noise MM 3	Additional noise modelling will be undertaken to ensure the final design meets the current EPN requirements prior to construction commencing; the report will be made available to the EPA. In the event noise modelling indicates EPN requirements are not met, additional management and mitigation will be applied to the design to bring the modelled results to within the acceptable range.

Monitoring

No additional monitoring to that outlined in the applicable broader monitoring measures outlined in Section 6 is proposed.

6.2.4.2 Construction

The following management and mitigation measures will be applied for the construction phase of the Project:

Reference number	Management, mitigation or monitoring measure
Management and mitigation	
Noise MM 4	Where possible operation of noise generating machinery and equipment during construction will be restricted to standard hours as defined by the NSW EPA Draft Construction Noise Guideline 2020 (the Guidelines), that is: - Monday to Friday between 0700 hours and 1800 hours - Saturday between 0800 hours and 1300 hours - Sundays and public holidays – no work Any works required to be undertaken outside these timeframes that require the use of noise generating machinery and equipment will be undertaken in accordance with the noise management measures outlined in the Guidelines.
Noise MM 5	Low-noise generating plant and equipment will be used where practicable.
Noise MM 6	Broadband reversing alarms will be used where practicable over traditional tonal alarms to minimise any nuisance noise generated.
Noise MM 7	The proponent will require the contractor to have regularly serviced and maintained equipment to minimise noise emissions.
Noise MM 8	Where practical, machinery will be operated at low speed or power and be switched off when not in use, rather than left idling for prolonged periods.
Noise MM 9	Delivery trucks will be advised to not use exhaust brakes in populated areas.
Noise MM 10	Regular community updates will be undertaken to inform construction timeframes.
Noise MM 11	A detailed Construction Noise Management Plan (CNMP) will be provided to the EPA prior to construction commencement to particularly address evening and night drilling noise impacts. Specific information from the appointed contractors drilling equipment to be used onsite will be measured and incorporated into the model to be provided with the CNMP. The CNMP will also include a proposal for trial monitoring at the start of the construction phase to verify the modelling predictions and detail what further mitigation could be adopted if the demonstrated noise levels are found to be problematic.
Noise MM 12	Where predrilling, using a continuous flight auger drilling rig, is required outside the standard hours as defined by the NSW EPA Draft Construction Noise Guidelines 2020 (the Guidelines) the rig will be enclosed on at least two sides by a suitable noise barrier at least 0.8 m above the rig engine to ensure noise emissions from construction remain below the adopted noise affected noise management levels for non-standard hours.

Monitoring

Reference number	Management, mitigation or monitoring measure
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No additional monitoring to that outlined in the applicable broader monitoring measures outlined in Section 6 is proposed.

Noise management and mitigation for the marine environment is covered in Section 6.6.4.

6.2.4.3 Operation

The following management and mitigation measures will be applied for the operational phase of the Project:

Reference number	Management, mitigation or monitoring measure
Management and mitigation	
Noise MM 13	Noise emitting equipment will be regularly inspected, maintained, and replaced as required.
Monitoring	
Noise MON 1	Directly post-commissioning, a noise survey will be undertaken at the sites used in Tarkarri (2024) (EIS Appendix C) to confirm the modelling results. The results of the survey will be provided to the EPA within 3 months of undertaking the survey. In the event the noise emissions are above the regulatory targets, additional noise mitigation or management will be applied in discussion with the Director, EPA. This may include the installation of additional or improved acoustic enclosures, quieter equipment, or additional acoustically absorbent internal linings in buildings.

6.2.5 Residual impacts

By incorporating mitigation measures into the Project design, restricting construction hours, implementing specialised noise management for the pre-drilling component outside the standard construction hours in a Construction Noise Management Plan, and implementing the noise management protocols during construction, the residual noise impacts to sensitive receptors are expected to be short term and limited to intermittent phases of the construction timeframe.

As general construction noise will be limited to daytime, the potential for impact (for example, sleep disturbance) is limited; the evening and night pre-drilling construction activity has been assessed as unlikely to result in any disturbance with the use of specialised noise barriers. During normal construction hours, some localised daytime amenity loss will be experienced in the immediate area. TW will manage this residual impact through an online complaints register and its existing community engagement framework.

Once operational, the upgraded STP is not expected to generate excessive noise beyond that already experienced and is expected to comply with existing noise limits in the site EPN, which will be confirmed by the post-commissioning noise survey. In the event the survey identifies exceedances, TW has committed to the application of additional noise mitigation until the noise levels are reduced to the acceptable limit.

6.3 Air quality

An air quality assessment was undertaken by Stantec for the Project, the results of which are summarised below and available in full in Appendix D (Stantec, 2023).

An Odour Assessment Report was previously prepared by Aurecon based on the 2016 design for the proposed expansion of the Selfs Point STP (Aurecon, 2016), using odour data collected by Environ Odour Australia Pty Ltd from February 2016. While this report does not consider the current design for the STP, the odour emission rates for the existing process units documented in the Aurecon report have been used as a sensitivity analysis for a number of modelling scenarios undertaken by Stantec.

6.3.1 Existing environment

The closest sensitive receptors surrounding the Project Site include the residential areas of Lutana (to the north-west), as shown in Figure 1-2; recreational and culturally sensitive areas including the New Town Bay Rowing Centre / Buckingham Rowing Club, Tasmanian Bridge Association and sports field to the west and south-west; and the adjacent Ten Lives Cat Centre and cemetery, as shown in Figure 6-12.

Apart from the odour sources within the existing Selfs Point STP, the only other known potential odour source in the area is associated with the fuel depot / storage facility to the east of the site, although emissions are expected to be limited to gas/fuel transfers, as all fuel tanks are covered. There are no other known significant odour sources in the area surrounding the Project Site.

Between 2017 and 2022, TasWater has not received any odour complaints in relation to the Selfs Point STP.

The local airshed is characterised by topographic features that affect airflow and local meteorology (DPIWE, 2004). The Project Site is located in the Derwent Valley, with a complex terrain of hills and mountain ranges (including kunanyi / Mt Wellington) located to the south-east. The prevailing wind direction at the nearest weather station to the Project Site (located in New Town, Hobart) is from the north-west. Wind direction is strongly influenced by the topography surrounding the Derwent Valley.

6.3.2 Legal and other requirements

Key legislation and policy relevant to the management of air quality for the Project include:

- *Environmental Management and Pollution Control Act 1994* (EMPC Act)
- *Tasmanian Environment Protection Policy (Air Quality) 2004* (Air Quality EPP)
- EPA Atmospheric Dispersion Modelling Guidelines
- EPA Board Statement 2022: an Update to Air Pollutant Design Criteria used in the Environmental Impact Assessment Process
- Technical framework: assessment and management of odour from stationary sources in NSW (referenced in lieu of Tasmanian guidelines).

The Air Quality EPP is made pursuant to the provisions of sections 96A-96O of the EMPC Act. The Air Quality EPP provides a framework for management and regulation of diffuse and point source air emissions in Tasmania. The policy sets out environmental values to be protected, including the life, health and wellbeing of humans and other forms of life, visual amenity and buildings, property and materials.

The Air Quality EPP specifies a two odour unit (OU) 99.5th percentile, 1-hour average design criteria for new projects at the boundary of the Project Site.

6.3.3 Potential impacts

Potential air quality impacts during the construction and operation of the Project are outlined below.

6.3.3.1 Construction

Construction activities, such as trenching, excavating, stockpiling of materials and movement of vehicles, have the potential to generate dust that may enter the airshed in the area surrounding the Project Site. Generation of dust can cause the following impacts:

- Dust can coat vegetation which can affect photosynthetic and transpiration processes of the plant.
- Both fauna and humans can inhale dust particles leading to respiratory stress.
- Dust clouds can result in a loss of visual amenity and can result in health and safety impacts from reduced visibility.

The potential severity of dust generation will depend on the soil type and climatic conditions. Given the environment of the Project Site, which is a combination of an old wetland and reclaimed land, dust generation is expected to be minimal overall, and readily controlled with standard construction management measures.

There is the potential for short-term, high odour emissions associated with the decommissioning of existing process units (including the trickling filters and digesters) during construction and the commissioning of new items of equipment. The potential impacts of this activity will depend on the prevailing weather and time taken to decommission the equipment but is expected to take days rather than weeks to complete.

Other potential air quality impacts during construction include exhaust emissions from construction vehicles and equipment. The additional volumes of exhaust emissions compared to those emitted under ambient conditions for the area surrounding the Project Site are anticipated to be negligible.

6.3.3.2 Operation

Once operational the key ongoing air impact expected from the Project is odour emissions from the STP, with minor emissions such as dust and vehicle emissions expected to be very low and largely unchanged from current conditions. These minor operational phase air emissions have not been addressed further, with the following analysis focused on odour impacts.

Atmospheric dispersion modelling was undertaken in accordance with the EPA Tasmania dispersion modelling guidelines to assess the potential air quality impacts of the Project once operational.

The CALPUFF dispersion modelling system was used by Stantec (2023) to predict odour emissions from the Project, using the CALMET meteorological model domain developed for the Project. The domain developed took into account a variety of meteorological variables, including fine-scale terrain (150 m resolution) and meteorological observation data (both surface and upper air data) from various weather stations (in this case Hobart Airport, New Town, and Eilerslie Road). Detailed information on the development of the model for the Project, including all inputs, is contained in the odour report attached as Appendix D.

Odour emission rates for new process infrastructure were taken from the Sydney Water odour emission database and Stantec's global emission and contaminant load database (Stantec, 2023). While none of the existing odour sources currently onsite are to be retained, odour emission rates from the Aurecon (2016) odour report for the aerobic and anoxic zones of the existing STP bioreactor have been used in the latest report for sensitivity analysis.

There are a number of new odour sources to be constructed as part of the Project. Of these new sources, the following will be captured and mitigated by the new odour control unit (OCU) proposed for the Project (with a 99% odour capture efficiency):

- Raw sewage pumping station
- General purpose pumping station
- Inlet works
- Inlet works drainage pumping station
- Primary settling tanks
- Primary effluent feed chamber
- Bioreactor flow splitter
- Sludge averaging feed tanks
- Digested sludge feed averaging tank
- Digester outlet chambers

- Tankered waste tanks.

New sources that won't be covered by the new odour control system (either for operational or maintenance purposes, or because they generate only insignificant odour) include:

- BMR oxidation ditches (aerobic, swing, anoxic and de-aeration zones)
- BMR secondary anoxic zone
- BMR secondary aerobic zone
- MBR (membrane bioreactor)
- Chlorine contact tank.

The locations of the odour emission sources are shown in Figure 6-11, and specific odour emission rates are detailed in Appendix D. The equipment with the highest odour emissions are associated with the OCU stack point source and the oxidation ditch bioreactor area source, particularly the anoxic zones (Stantec, 2023).

Additional to the key odour management measure, of implementing an odour control unit, the following additional design or operational measures will assist in odour reduction and safeguarding against odour release during upset conditions:

- Deliveries of tankered waste will be via camlock hose transfer into the OCU covered tankered waste screening building, with bunds to be inspected daily for spills, and washdown hoses present to remove any waste generating material that may have leaked or been spilt.
- The Project contains a dual power supply to prevent the chances of a power failure, and some key items of treatment equipment are able to be powered by a generator, further preventing the chances of a significant odour generating event due to power failure.
- The receipt of wastewater from all catchments will occur via the new covered inlet works to prevent emissions from this point in the process.
- Sludge collection will be via sealed 20 m³ bins to minimise the release of odour.

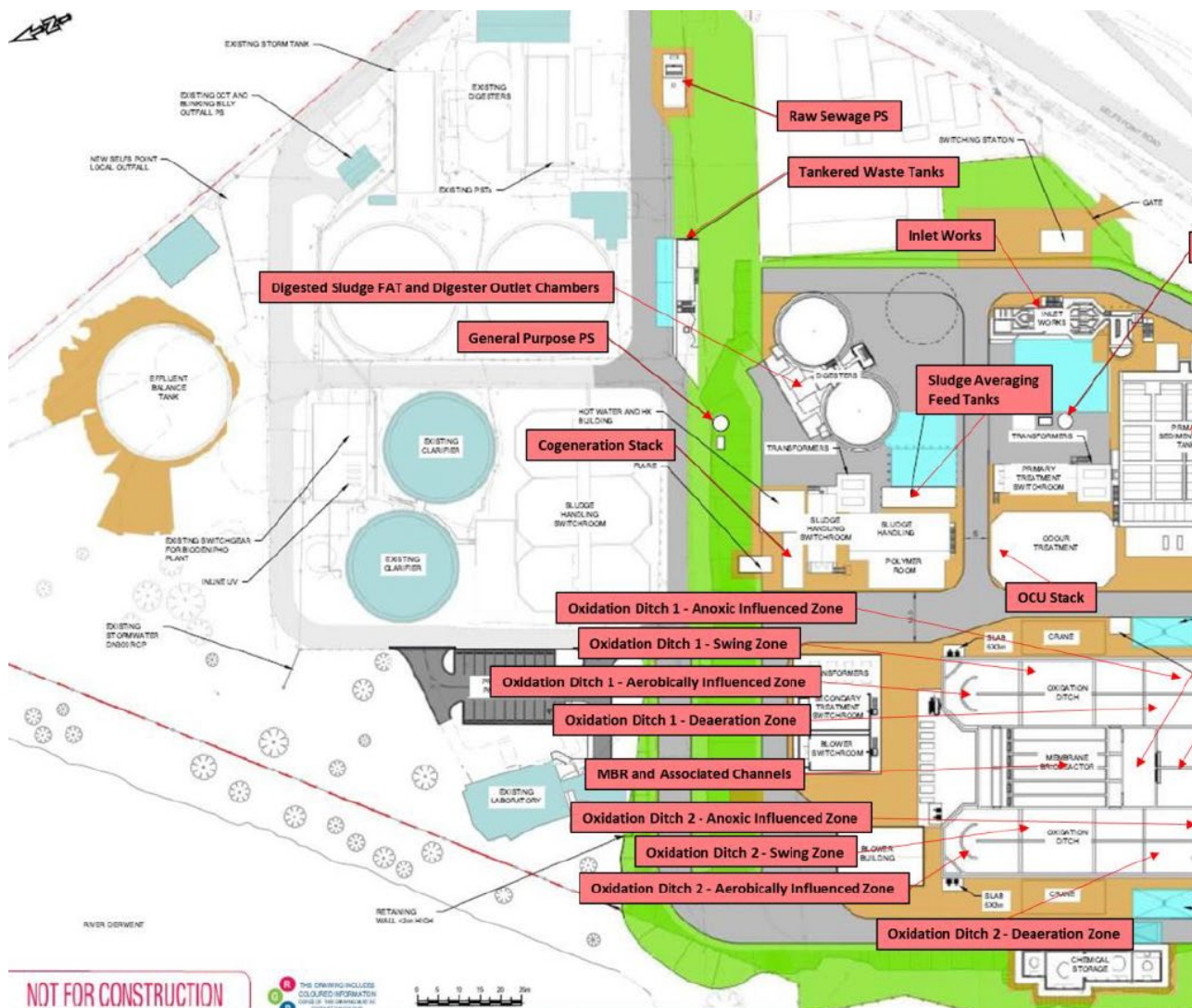


Figure 6-11 Modelled odour sources (Stantec, 2023)

Three odour modelling scenarios were assessed by Stantec (2023), namely:

- **Scenario 1:** The proposed Project scenario under normal operating conditions using Sydney Water database data with an OCU discharge concentration of 500 OU (which is the expected concentration).
- **Scenario 2:** A sensitivity assessment of Scenario 1 using the odour emission rates measured onsite from Aurecon (2016).
- **Scenario 3:** A sensitivity assessment of Scenario 1, with BNR bioreactor anoxic zones covered and extracted, using the odour emission rates measured onsite from Aurecon (2016).

Standard odour emission rates (SOERs) for Scenario 1 were derived from the Sydney Water odour emission database and Stantec's global emission and contaminant load database (Stantec, 2023). The Sydney Water odour emission database comprises more than 90 samples of anoxic and aerobic zones, with those emission rates representative of the process units proposed for the Project. For the purpose of sensitivity analysis, the single sample from the pre-fermenter-influenced aerobic and anoxic zones of the existing STP has been modelled within Scenario 2 and Scenario 3, with the BNR bioreactor anoxic zones uncovered and covered, respectively. Further detail is contained in the odour report attached as Appendix D.

The results of the modelling were assessed against the nearest residential areas as well as against a group of nearby sensitive 'cultural' receptors nominated by Stantec (2023), including the adjacent sports field, the rowing club, the Ten Lives Cat Centre, the bridge club and the rugby clubhouse, as shown in Figure 6-12.

The modelling results are presented visually in Figure 6-12, Figure 6-13, and Figure 6-14, with odour levels for the sensitive cultural receptors summarised in Table 6-11 (as no residential areas are modelled to be reached by the 2 OU isopleth).

Stantec (2023) describes 1 OU as the level at which an odour is detected but not recognised, and >2 OU as the level at which an odour can be recognised, with 2-5 OU unlikely to cause any significant nuisance, and >5 OU beginning to cause nuisance.

The modelling results for Scenario 1 (Figure 6-12), with the Project operating under normal conditions, indicate compliance within the regulatory boundary limit of 2 OU in all directions. All sensitive receptors received <1 OU in this scenario.

The results for Scenario 2 (see Figure 6-13) (based on the site-specific measurements) show that the boundary limit of 2 OU is exceeded in the southern, south-western and south-eastern site boundary. Some of the nearest residential sensitive receptors (to the west of the site) are between 1 and 2 OU isopleths. Of the cultural receptors, the rowing club site sits between the 1 and 2 OU isopleth area, the Ten Lives Cat Centre is partially covered by the 2 OU isopleth, along with the rugby club and bridge club; the 2 OU and 3 OU isopleths cross over Selfs Point Road into the cemetery area also. The highest predicted value at a cultural receptor is 2.6 OU at the sports field (Site 1).

A variation of Scenario 2, where the anoxic zones of the BNR bioreactor are covered, has been modelled in Scenario 3. Similar to Scenario 1, compliance with the 2 OU boundary criterion is achieved and all sensitive receptors are below 1 OU.

The extent of the modelled impact of odour on nearby receptors is sensitive to the specific odour emission rates used for the BNR anoxic zones. The anoxic zone SOER derived from the Sydney Water odour emission database of 0.5 (from a sample set of 28 available measurements) is considerably lower than the value measured from the existing Selfs Point site (2.27). The effect of the difference in assumptions can be seen in comparing the modelled odour impact isopleths of Scenario 1 and Scenario 2. While pre-fermented sludge (as is the case at the existing Selfs Point), is known to have an impact of three to six times on the SOERs of primary settling tanks, the impact it currently has on the SOER of the existing Selfs Point bioreactor cannot be definitively determined.

The Scenario 3 model indicates that covering, extracting and treating odour from the anoxic zones within the BNR bioreactor results in a compliant odour impact (meeting the 2 OU boundary criterion), even with adoption of the pre-fermenter-influenced SOERs. However, introducing these covers would have significant impacts on routine operation and maintenance of the equipment within this structure, thus is not proposed as part of the Project.

If, after commissioning and remeasuring odour emission rates, it is determined that the measurements are similar to those in 2016 (i.e. no change from the removal of the pre-fermenters and data from the Sydney Water odour emission database is not representative), it is proposed to remodel the odour impacts and use this data to determine if it is necessary to retrofit covers and extract and treat foul air from the anoxic zones to mitigate unacceptable impacts on sensitive receptors. Thus, although the Project does not propose to cover and extract foul air from the BNR bioreactor anoxic zones at the outset, should subsequent testing and modelling indicate it is warranted, then it can be achieved via retrofit.

Table 6-11 Predicted ground level concentrations (OU) under each modelling scenario at sensitive cultural receptors

Receptor	Scenario 1 (OU)	Scenario 2 (OU)	Scenario 3 (OU)
Sports field (site 1)	0.7	2.6	1.3
Rowing club (site 2)	0.5	1.5	0.8
Ten Lives Cat Centre (site 3)	0.5	1.9	1.0
Bridge club (site 4)	0.6	2.3	1.2
Rugby club house (site 5)	0.6	2.2	1.1

In addition to the modelled normal operating scenarios, seven theoretical upset scenarios were also modelled to predict potential impacts on the receiving environment. The scenarios modelled, which are explained in more detail in Appendix D, are as follows:

- **Upset Scenario 1:** Aeration goes offline
- **Upset Scenario 2:** OCU extraction stops
- **Upset Scenario 3:** Solids retention time drops from 20 days to 15 days
- **Upset Scenario 4:** Pressure relief valve on both digesters open
- **Upset Scenario 5:** Activated carbon filter changeover
- **Upset Scenario 6:** Digester system failure
- **Upset Scenario 7:** Higher emissions from tanker waste deliveries.

All of the upset scenarios have been modelled conservatively, including being modelled as if the upset condition was occurring for every hour of the entire year. This was done to ensure the worst meteorological conditions throughout the year were captured (Stantec, 2023). In reality, these upset conditions are likely to be infrequent and would occur for short durations of time. In addition, all the upset scenarios have been based off the higher SOERs modelled within Scenario 2.

The results presented in Table 6-12 suggest that the site is unlikely to generate an odour impact under most upset conditions modelled. However, if the pressure relief valves open on both digesters (after all other safeguards fail) there may be some odour affecting residences to the west of the site.

Table 6-12 Predicted ground level concentrations (OU) under the upset scenarios

Receptor	Upset Scenario 1 (OU)	Upset Scenario 2 (OU)	Upset Scenario 3 (OU)	Upset Scenario 4 (OU)	Upset Scenario 5 (OU)	Upset Scenario 6 (OU)	Upset Scenario 7 (OU)
Sports field (site 1)	2.7	3.6	3.4	4.2	2.6	2.6	2.6
Rowing club (site 2)	1.6	2.2	2.0	3.7	1.6	1.6	1.6
Ten Lives Cat Centre (site 3)	1.9	3.4	2.5	6.1	1.9	1.9	1.9
Bridge club (site 4)	2.3	3.1	2.9	4.3	2.3	2.3	2.3
Rugby club house (site 5)	2.3	3.2	2.9	3.0	2.2	2.2	2.2

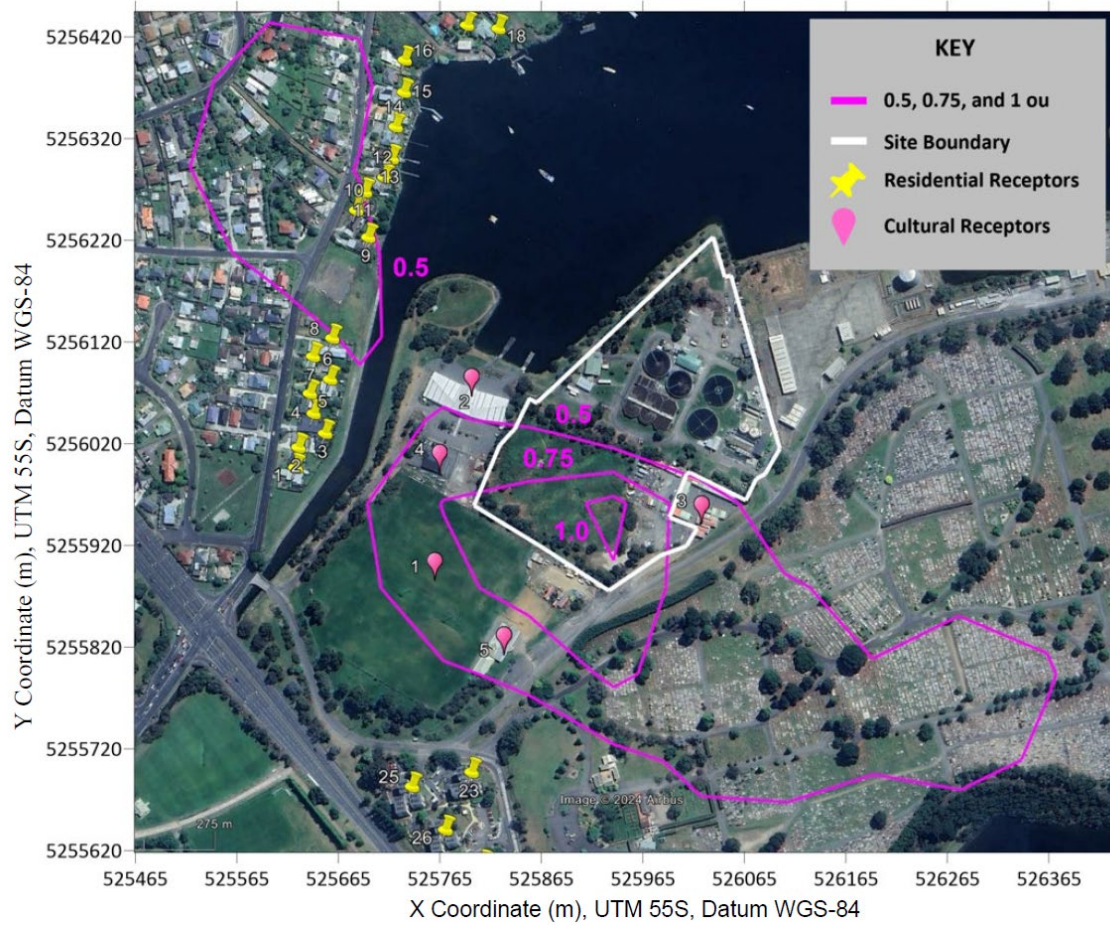


Figure 6-12 Predicted 99.5th percentile 1-hour average odour emission contours for Scenario 1; cultural receptors shown in pink and summarised in Table 6-11. Note site boundaries used are at the proposed fence line of the Project and do not include additional areas used in construction that form the Project Site.

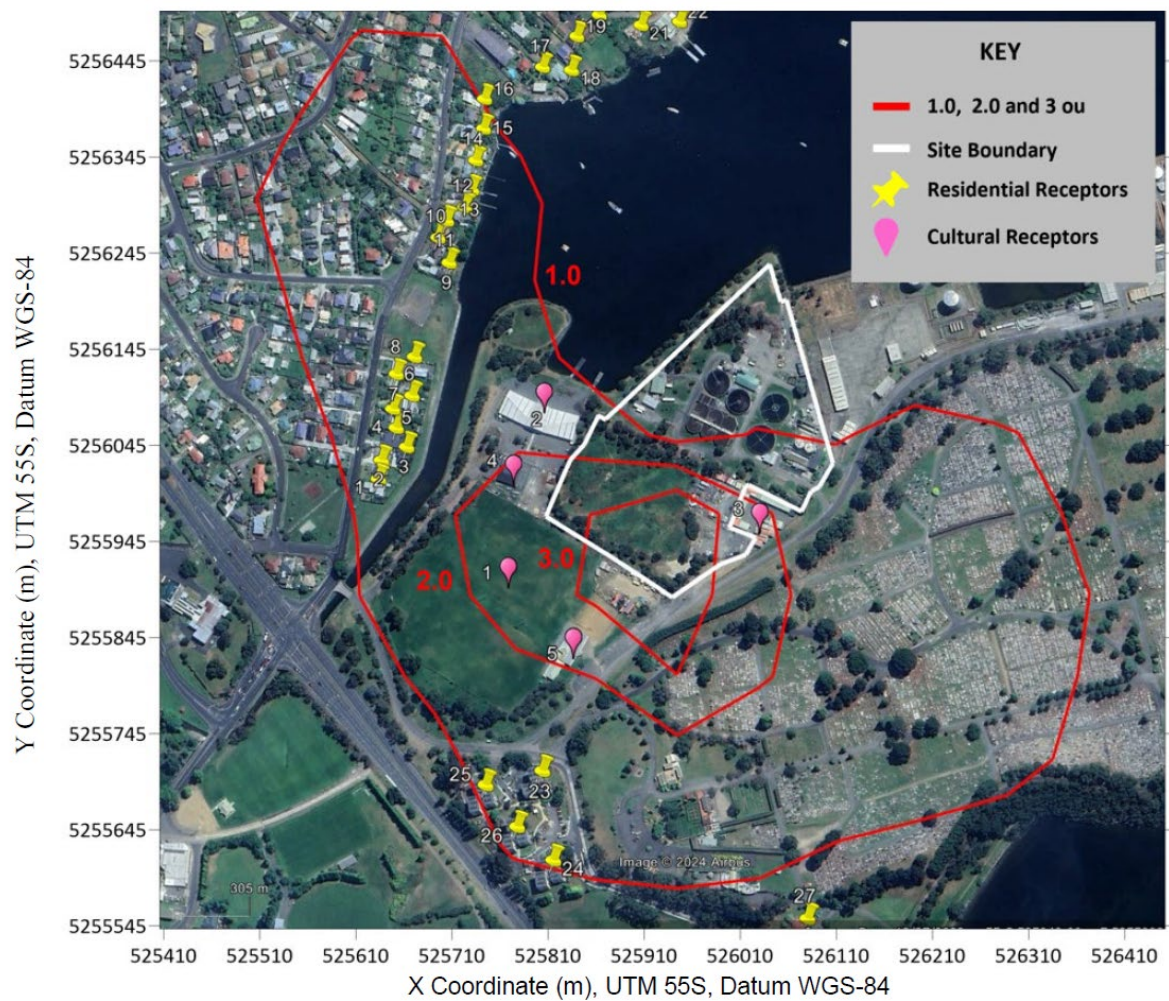


Figure 6-13 Predicted 99.5th percentile 1-hour average odour emission contours for Scenario 2. Note site boundaries used are at the proposed fence line of the Project and do not include additional areas used in construction that form the Project Site.

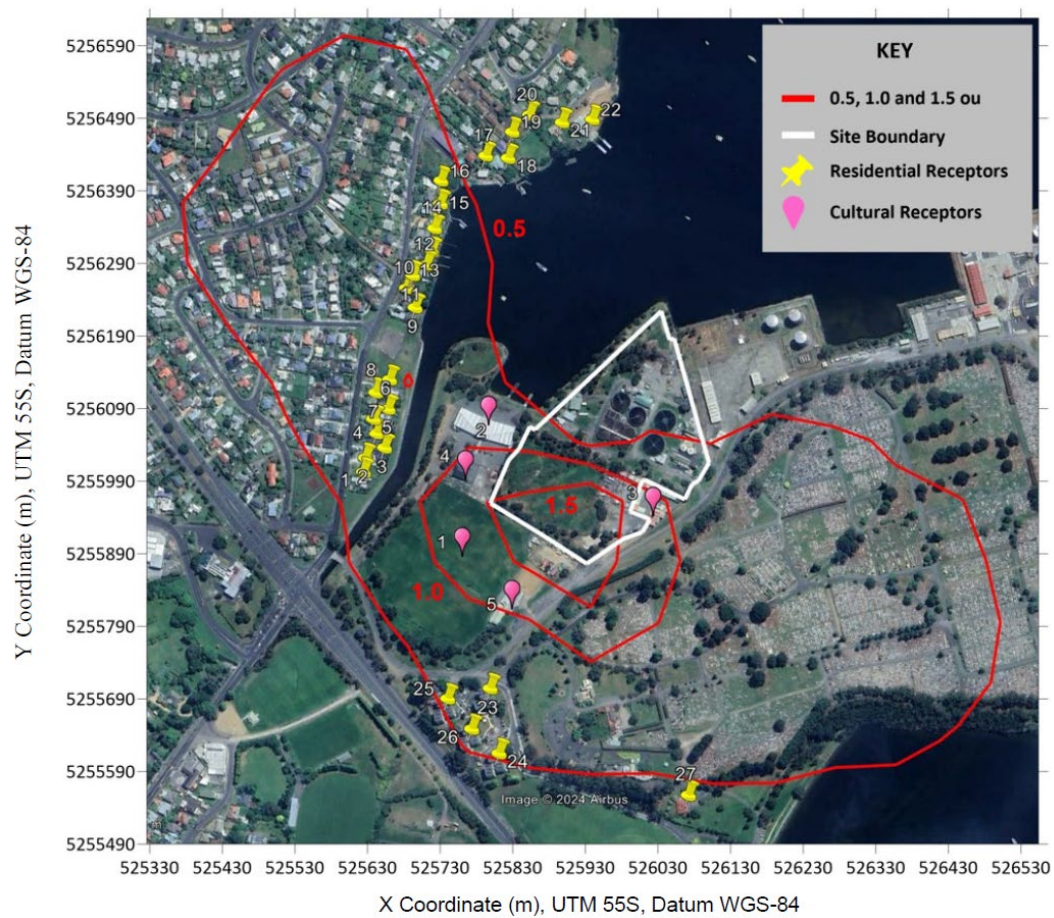


Figure 6-14 Predicted 99.5th percentile 1-hour average odour emission contours for Scenario 3. Note site boundaries used are at the proposed fence line of the Project and do not include additional areas used in construction that form the Project Site.

6.3.4 Management, mitigation and monitoring

In addition to the applicable broader management, mitigation and monitoring measures outlined in Section 6, the following discipline-specific measures will also apply to the Project.

6.3.4.1 Construction

The following management and mitigation is proposed for the construction phase of the Project:

Reference number	Management, mitigation or monitoring measure
Management and mitigation	
Air Quality MM 1	Onsite stockpiling of materials will be avoided where possible for management of dust emissions. If stockpiles are necessary, they will be sited away from the Project Site boundary and with consideration of the prevailing wind direction and the locations of sensitive receptors, watercourses, and surface water drains.
Air Quality MM 2	Potentially dust generating material stockpiles, unsealed roads and excavated areas will be sprayed during periods of dry weather with water or a suitable dust suppressant as required.
Air Quality MM 3	Speed restrictions will be applied to all roads within the Project Site, which will minimise dust generation.
Air Quality MM 4	Project information and construction schedules will be provided to local residents, advising them of potential dust and/or odour generation during construction and the mitigation measures to be applied.
Air Quality MM 5	Community consultation/notification will be undertaken as early as possible regarding potential odour spikes as a result of the decommissioning of existing process units.
Air Quality MM 6	During decommissioning of infrastructure containing odour generating materials (during construction phase), mitigation such as temporary infrastructure covers, bagging of waste, and vacuum trucks will be used to minimise odour generation. Decommissioning will also be staged to minimise total odour generation, and weather conditions will be taken into account when planning decommissioning activities to maximise odour dispersion and dilution. Details will be incorporated into the CEMP for the Project.
Monitoring	
No additional monitoring to that outlined in the applicable broader monitoring measures outlined in Section 6 is proposed.	

Additional management and mitigation for air quality during construction is contained in the following sections:

- Section 6.8.3 – Waste Management.

6.3.4.2 Operation

The following management and mitigation is proposed for the operational phase of the Project:

Reference number	Management, mitigation or monitoring measure
Management and mitigation	
Air Quality MM 7	Odour emitting equipment (including new and retained) and areas will be regularly inspected, maintained, and equipment replaced as required.
Monitoring	

Reference number	Management, mitigation or monitoring measure
Air Quality MON 1	Directly post-commissioning, odour concentrations will be investigated to confirm the assumptions used in the modelling, including testing odour emissions from the bioreactors to confirm their emission rates. Odour will be remodelled if the outcome of the investigations indicated a higher than expected odour emission rate from the various STP components. The results of the investigation will be provided to the EPA within 3 months of completion. In the event that odour emissions are deemed unacceptable by the Director, EPA, additional odour mitigation or management will be investigated, including potentially covering the BNR anoxic zones.

6.3.5 Residual impacts

With the odour control measures in place, the residual air impacts during construction are not expected to be significant. Even with controls in place, there is a chance there will be short periods of unavoidable elevated odour during the decommissioning and commissioning of various components of the existing STP infrastructure; however, the duration of these events will be short and local residents will be notified in advance of these works.

Operationally, the modelled odour generation from the Project shows compliance with the 2 OU regulated boundary when modelled using Sydney Water database figures. While the Project has been designed with significant upgrades to the control of odour, including a new OCU, covering the proposed BNR bioreactors and their inclusion as part of the odour control system is not preferred due to the need to regularly inspect and maintain functional items such as aeration grids, pumps and mixers within the reactors. Covering the reactors would lead to significant maintenance complexity for TW operators. While the baseline model (Scenario 1) indicates that covering the bioreactors is not required to achieve compliance, there is risk that the odour emission rates used in the modelling are not representative and the anoxic zones may need to be retrofitted in the future should impacts be greater than expected; this action has been committed to and will be addressed if required post-construction.

The upset scenarios modelled suggest minor odour nuisances would likely occur at nearby sensitive receptors, but generally would only occur for short periods (i.e. days), in the unlikely event that these scenarios actually occur.

The normal operation of the STP is not expected to pose a significant risk of environmental harm or nuisance to surrounding residential premises or the recreational and cultural receptors identified around the Project Site. The proponent has sought to lower the odour impact to as low as reasonably practicable based on the most appropriate emission data available. Hence, the requirements of the Air Quality EPP Section 11(1)(f) at this stage are considered to be met, and future upgrades have been committed to if deemed necessary.

6.4 Land contamination

6.4.1 Existing environment

As mentioned, the terrestrial part of the Project Site comprises the existing STP land at 12 Sells Point Road and the wetland area of the adjacent 10 Sells Point Road. Since 2013 several contaminated lands investigations have been undertaken relevant to the Project Site, including:

- A review of the New Town Bay 'wetlands' in 2013 (Koehnken, 2013)
- A Phase I Environmental Site Assessment (ESA) of the Sells Point STP site in 2013 (CH2M Hill, 2013a) and a subsequent Phase II ESA in 2016 (EM&C, 2016)
- An interim contamination site investigation report in 2021 (GHD, 2021).

Elgin Associates was engaged to complete a review of contaminated lands work undertaken to date across the Project Site to determine whether any additional investigations were likely to be required for the approval of the Project. The outcome of the review is presented in a gap analysis report with recommendations for further investigations pre- and post-approval (Elgin, 2022a); the gap analysis is provided in Appendix E. Elgin is suitably accredited to undertake this work under the Certified Environmental Practitioners (Site Contamination Specialist) scheme.

The gap analysis recommended that a Contaminated Site Assessment (CSA) be undertaken to investigate several potential contamination aspects identified across both the existing site and expansion area, including the investigation of groundwater quality, identification of any petroleum underground storage tanks (USTs), investigation of potential asbestos containing materials (ACM), investigation of landfill gas potential, and to develop a conceptual site model for the Project. The CSA is provided in full in Appendix F (Elgin, 2022b). The CSA is used herein, in conjunction with the abovementioned reports, to inform the impact assessment.

6.4.1.1 Background

A review of available information of the wetland area of 10 Sells Point Road confirmed that the site was originally used as a landfill, as evidenced in bore logs and test pits (Elgin, 2022a; Elgin, 2022b). In the mid-1990s the site was chosen to be used as a pilot site for the experimental disposal of dredge spoil from New Town Bay, with the idea that by saturating the spoil in an artificial wetland arrangement, with fresh water supplied by the Sells Point STP in a closed loop system, the dredged sediments would remain in a harmless state and a net environmental benefit would be realised by creating additional wetland habitat (Koehnken, 2013; Elgin, 2022a).

The wetlands were developed between mid-1998 and April 2000. The development of the wetlands involved the capping of the original landfill site with a layer of clay, followed by terraforming the area with the dredge spoil into a series of ponds and mounds and then covering with a 300 mm layer of organic wastes from the STP, along with some soil. The wetland was then kept saturated with effluent from the STP (Koehnken, 2013; Elgin, 2022a). Over a decade following the wetland's development, Koehnken (2013) found that it was not achieving its original management aims due to general poor performance and lack of any recreational value of the site, as it was not publicly accessible due to safety concerns. The wetland operations were subsequently ceased and the area left to dry out, with no subsequent works being undertaken at the site. The site is now in an unfunctional state as a wetland and is covered in generally non-native vegetation and weed infestations (ERA Planning and Environment, 2021).

Bore logs from the wetlands area show a ~2 m surface layer of silty/clay material, then around 6 m of landfill material in a matrix of clay and sand, followed by 12 m of weathered basalt/dolerite and then a basalt bedrock layer at 20 m below ground level (Elgin, 2022b). Test pits dug at the site during an investigation by Koehnken (2013) identified silty sandy surface layers followed by waste material including newspapers, bricks and plastics – confirmation of landfill in the area. The wetland slopes gently to the north-west and is elevated several metres compared to the existing STP area (Elgin, 2022b).

Assessment of the existing STP land at 12 Sells Point Road identified that the entire site was reclaimed between 1966 and 1972 using mixed fill material of unknown origins, suspected of including municipal landfill and rubble (CH2M Hill, 2013a; Elgin, 2022b). Previous drill holes have identified clay, cobbles, bricks, basalt and dolerite in the first 5 m of the site (i.e. fill material), followed by marine sediment layers including

silt, clay, sand, cobbles and weathered rock from approximately 6 m below ground level; continuous basalt was found from 11.5 to 21 m. The STP has operated on the site since 1972. Elgin (2022a, 2022b) notes that dried biosolids and incinerated rags and screenings have been historically disposed of onsite.

6.4.1.2 Contaminated soils

In terms of soil contamination in the wetland area, there have been several sampling events since the 2013 work was undertaken:

- Test pit soil samples to ~2 m by Koehnken (2013) showed elevated levels of sulphur and heavy metals (As, Cd, Cr, Mn, Pb and Zn).
- In 2016 EM&C (2016) undertook X-ray fluorescence (XRF) sampling of surface soils in the wetland area and also sent several duplicate samples to a NATA accredited laboratory for quality assurance. There was found to be a significant difference between duplicate lab samples and XRF samples, so only lab results were assessed here. Samples showed elevated heavy metals (Zn, Cu, Cd, Cr, Pb and Hg), Benzo(a)pyrene (BaP) and total petroleum hydrocarbons (C10 - C36) at various depths throughout the wetland, above Tasmanian EPA Information Bulletin No. 105 (IB105) Level 1 criteria.
- GHD (2021) undertook test pit sampling in 2021 and found elevated levels of heavy metals (Zn, Cd, Ni, Hg, Cr and As) in the surface soils across the wetland (0.9 - 1.7 m depth), all above IB105 Level 1 criteria. Two locations also showed elevated BaP above IB105 Level 2 criteria, and several locations above Level 1.

In terms of soil contamination in the STP area, several sampling events have been undertaken since 2016:

- As discussed for the wetland area, in 2016 EM&C undertook X-ray fluorescence (XRF) sampling of surface soils and also took laboratory samples, with only the laboratory results considered accurate. The northern portion of the STP site showed total PAH and BaP above IB105 Level 2 criteria from 2 m and below. Surface soils tested in the northern area showed exceedances above Level 1 criteria for heavy metals (Cd, Cr, Cu, Pb, Zn, Hg); chromium was detected above Level 2 criteria at one location. Asbestos samples were also taken in this area, with no detections (Elgin, 2022a).
- The samples taken from the test pits in the STP by GHD (2021) showed samples to be generally consistent with EM&C (2016), with elevated metals (predominantly zinc with some chromium) and BaP above IB105 Level 1 criteria, with one exceedance of BaP above Level 2 criteria (Elgin, 2022a).

ASS samples were also taken across both sites, with results suggesting significant acid neutralising material present in the soil of the area, with no samples exceeding action criteria from the Tasmanian Acid Sulfate Soils Management Guidelines (DPIPWE, 2015a; Elgin, 2022a).

Site visits by Elgin (2022a,b) found that the northern area of the STP site, where the new balance tank infrastructure is proposed to be located, contains numerous stockpiles of soil, building waste and rubble; stockpiles of mulch were also present. The wetland area that fronts Selfs Point Road contains various stockpiles of waste and building materials, including potentially a piece of asbestos containing material (ACM) (requiring lab confirmation). As the proponent proposes to undertake soil sampling during the construction phase, no further soil analysis was undertaken to inform approvals. The proponent assumes that most soil will be contaminated and therefore will require management during construction.

6.4.1.3 Groundwater

There were eight groundwater wells drilled as part of the EM&C (2016) study, covering both the existing STP and wetland area; the well locations are shown in Figure 6-15.

After the wells were established in 2016, water was found at 0.68 and 1.75 mAHD in the northern portion of the STP site and 0.72 and 1.03 mAHD in the southern wetlands area.

Sampling of the wells in 2016 by EM&C showed groundwater quality in the northern portion of the STP to have dissolved metals and ammonia in some wells above the ANZG (2018) 95% trigger values for marine waters. Within the wetland area, concentrations of nickel and zinc were elevated in some samples above ANZG (2018) 95% trigger values for marine waters. Also found was elevated naphthalene, total recoverable hydrocarbons (TRH), BaP, and total PAH, especially in bore MW5s and MW5d. The potential for the

groundwater to be impacted by a light non-aqueous phase liquid (LNAPL) layer (i.e. hydrocarbon layer on top of water column) was also noted by EM&C (2016).

Follow-up sampling completed by Elgin as part of the 2022 CSA and from seven existing bores across the STP and wetland site identified the following:

- Groundwater was relatively shallow across both sites, ranging from 0.21 - 1.25 mAHD at the existing STP grounds to between 1.24 - 1.56 mAHD at the wetlands site, with an inferred northerly groundwater gradient from the wetland area towards the coastline.
- Results of groundwater sampling show that the majority of contaminants were below adopted human health criteria (NHMRC, 2008) at all sites sampled with the exception of benzo(a)pyrene at well MW5s in the wetland area (refer Figure 6-15).
- Contaminants found to be above ANZG (2018) default marine ecosystem protection values were nickel, zinc, PAH and PFOS.
- No light non-aqueous phase liquid (LNAPL) contaminant layer was noted in the groundwater.
- Dissolved methane and total carbon dioxide was identified in groundwater in all seven bores sampled, suggesting the potential presence of landfill gas.

Overall groundwater at the site was described as brackish (due to links with the estuary), with a near neutral acidity and with high turbidity.

6.4.1.4 Landfill gas

Owing to the historical use of 10 Sells Point Road as a landfill, and due to the presence of methane in groundwater samples, landfill gas screening was undertaken opportunistically around both the existing STP and wetlands site.

The initial screening exercise identified high levels of methane gas in the existing groundwater bores within the wetland area, with bore MW5s reading volume concentrations of 53.9 % v/v methane and MW6 showing 46.9 % v/v methane; these bores also had carbon dioxide readings of 23.6 % v/v and 27.5 % v/v respectively, consistent with landfill gas (Elgin, 2022b).

Sweeps of areas within and adjacent to the wetland area were undertaken, including within the STP site. Bores within the existing STP site had methane concentrations either below the action levels mentioned or at undetectable concentrations. Several utility ditches and drains around the adjacent western land parcel, including the rowing club, showed levels of methane ranging from 0.01 - 9.9% v/v, identifying potential human health risks in the area.

The landfill gas results prompted the need for the landowner (at the time Hobart City Council) to report the findings to the EPA in accordance with Section 74B of the EMPC Act, which requires the owner or occupier of land to promptly inform the Director of the EPA when they become aware that it constitutes a contaminated site. This notification procedure has been completed.

The landfill gas screening exercise resulted in the requirement to undertake additional works to define the extent of the landfill gas risk presented by the site in the context of design, construction and operation of the Project. This was proposed to be undertaken in two stages: an initial rapid screening risk assessment (RSRA), and a subsequent full landfill gas risk assessment (LGRA)⁽⁴⁾. These assessments will be specific to the implications for the Project Site. The initial RSRA has been completed and is provided in Appendix G (Elgin, 2023); the outcomes of the investigation are summarised in the following paragraphs.

The landfill gas assessment criteria relevant to the Project are outlined in the RSRA in Appendix G; this includes actionable criteria for methane of >1.25 % v/v CH₄ and for carbon dioxide of >1.5 % v/v CO₂ (DPIWE, 2004; EPA Victoria, 2015). The Tasmanian Landfill Sustainability Guide 2004 (DPIWE, 2004) notes methane's explosive range as 5-15 % v/v. Carbon dioxide is considered an asphyxiant risk, with toxic effects noticeable above 2% v/v CO₂ and severe above 5% v/v CO₂ (Elgin, 2023).

⁴ As the landfill gas risks identified extend beyond the Project Site (as it relates to broader management of historical landfill gas generation), separate to the current Project the landowner (HCC) has commissioned a separate LGRA. That HCC LGRA is outside the scope of this Project and not considered further herein.

The RSRA was limited to 12 Sells Point Road (the existing STP) and part of 10 Sells Point Road, including the wetland area proposed to be constructed on. The RSRA included the installation of six new landfill gas monitoring bores around the perimeter of the wetland area, as shown in Figure 6-15, to assist in the delineation of the landfill gas and to aid in future management, mitigation and monitoring; bore logs are presented as an attachment to Appendix G. Aside from surface materials of clay, sand and silt, waste layers were intercepted during drilling, containing brick, waste steel, wire, glass and wood. The waste depth was found to be greatest on the southern side of the wetland, with Elgin (2023) noting strong hydrocarbon odours during drilling.

Three landfill gas sampling events were undertaken by Elgin (2023) between August and September 2022, including measurements of the landfill gas bores, existing groundwater bores, and the new groundwater monitoring wells installed onsite. Additionally, surface sweeps of the area were undertaken and measurements made at available offsite utility pits, agricultural pipe outlets and stormwater pits (Elgin, 2023). Figures 1–3 in Appendix G provide a detailed overview of the sampling sites, surface sweep passes, and individual location results.

Results of the RSRA generally confirmed previous opportunistic investigations, indicating elevated concentrations of methane and carbon dioxide above actionable criteria in most of the landfill gas and groundwater bores sampled, with the exception of the two new landfill gas bores along the north-eastern boundary of the wetland area where only elevated carbon dioxide was detected. The highest methane recordings were towards the centre of the wetland at bores MW5 (51.7-56.7 % v/v CH₄) and MW6 (49.7-52.7 % v/v CH₄). Elevated results were also noted along the westernmost boundary of the wetland that adjoins the Council depot, with methane levels of between 7.8 - 23.2 % v/v CH₄ at the two bores located in this area. Landfill gas concentrations were found to reduce directly north and south of the wetland area, but still above actionable criteria in the south, with gas bore LFG06 recording methane levels in the explosive range of 5.6-9.2 % v/v CH₄.

Elgin (2023) assessed the site in accordance with the adopted British Standard 8485:2015+ A1:2019, which uses methane and carbon dioxide concentrations with gas flow rates (collectively gas screening value or GSV) to provide a characteristic gas situation (CS) hazard potential rating between CS1 (very low) and CS6 (very high). The site as a whole is considered by Elgin (2023) to be CS4 – Moderate to High Risk based on, but not limited to:

- Very low gas flow rates
- Very high concentrations of methane and carbon dioxide
- Very high concentrations of methane measured offsite in subsurface services and ground surfaces
- An ongoing source of landfill gas generation.

Elgin (2023) notes that this rating should be recalculated as more data becomes available in any future monitoring. In response to the findings of the RSRA, a full LGRA was recommended to be undertaken pre-construction to inform a Landfill Gas Management Plan for the Project. The management measures outlined in Section 6.4.4 provide commitments to undertake these actions.

6.4.1.5 Underground storage tank (UST)

A 4,500 L petroleum underground storage tank (UST) was listed in WorkSafe Tasmania records as present within the Project Site and was reportedly decommissioned in 1973 (Elgin, 2022b). The UST was identified by Elgin during a site visit, adjacent to the existing digesters, and found to still contain approximately 2,700 L of diesel. No further information was available regarding the state of the UST (e.g. leaks), and it was suggested by site staff that it may have been left in situ as it was close to existing operations and difficult to remove. The UST will, however, be decommissioned and removed as part of the Project construction phase, in coordination with a contaminated lands specialist.



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Selfs Point STP
Redevelopment

Figure 6-15

Contaminated
lands

6.4.2 Legal and other requirements

The key legislation and policy relevant to land contamination for the Project includes:

- *Environmental Management and Pollution Control Act 1994*
- *Environmental Management and Pollution Control (Waste Management) Regulations 2020 (Tas)*
- *Environmental Management and Pollution Control (Underground Petroleum Storage Systems) Regulations 2020*
- National Environment Protection (Assessment of Site Contamination) Measure
- National Environment Protection (Movement of Controlled Waste between States and Territories) Measure 2004 (the 'Controlled Waste NEPM') (Cth).

The following EPA documents may also be relevant for the Project:

- Information Bulletin No. 105 Classification and Management of Contaminated Soil for Disposal
- Information Bulletin No. 101 Notification of a Contaminated Site
- Information Bulletin No. 114 Guide to Engaging an Environmental Site Assessment Consultant.

Public and environmental health issues are addressed by the Department of Health, and workplace safety issues are covered by WorkSafe Tasmania.

6.4.3 Potential impacts

A conceptual site model (CSM) was completed as part of the CSA (Elgin, 2022b) to define the source, pathway, and risk to receptors from the identified contaminant issues associated with the Project Site. The CSM is used to inform the potential impacts associated with contamination as a result of the construction and operation of the Project; the full CSM is provided in the CSA report in Appendix F.

6.4.3.1 Construction

There are several areas of known and potential contamination within the Project Site including soil, groundwater and air which have the potential to impact on ecological and human receptors.

The soils around the Project Site have known levels of contamination that have resulted from historical reclamation and dumping of various materials, including putrescibles from the old landfill site under the wetlands, unknown site fill under and around the existing STP site, and dredge spoil used in the wetland construction. Without sufficient management and mitigation, the disturbance of these soils for construction could lead to both human health and ecological impacts through direct contact, release of volatiles, and mobilisation of contaminants following exposure to air and water.

There is also a risk of contact with asbestos-containing material, which could occur in stockpiled soils that have been identified onsite. Asbestos presents a significant risk through inhalation of fibres by human receptors.

Excavations, piling and drilling of bores/wells during construction that reach the water table will expose groundwater to contaminants throughout the soil profile and could potentially lead to changes in groundwater chemistry across the Project Site, create new preferential pathways for groundwater movement and potentially impact on transmissivity. Increases in contaminants in the groundwater could have downstream effects in the aquatic environment as the groundwater migrates to the estuary. Given the size, currents and tidal movement of the receiving environment, contaminants that reach the estuary from groundwater are likely to rapidly dilute and disperse and would therefore likely pose a minimal threat to sensitive receptors. Contaminant concentrations would nevertheless have to be regularly monitored to ensure this was the case.

Direct contact with groundwater by workers during the construction phase also presents a risk to human health through the known elevated levels of some contaminants in the groundwater. Management and mitigation of groundwater during any abstraction, disposal or potential contact will be required to ensure any impacts are minimised.

Landfill gas in the wetland area has been identified as a potential threat to human and ecological health and building integrity and is also explosive when found with methane concentrations between 5 and 15 % v/v. This will be managed carefully during the Project design and construction phases to minimise any impacts to the environment or human receptors including site workers and the broader community.

Development on or adjacent to the UST onsite presents a safety and environmental risk to workers and the environment. In the event the UST is struck and leaks during construction, there is the chance that up to 2,700 L of diesel fuel could enter the soil/groundwater matrix and leach into the surrounding environment. This will need to be managed by removal of the UST prior to construction (refer Section 6.4.4).

6.4.3.2 Operation

It is expected that post-construction, contaminated land issues associated with the Project Site will be stabilised and will not present an ongoing risk to human health and the environment; this will, however, require ongoing monitoring to ensure this remains the case.

Ongoing day-to-day operational risks will include spills, leaks or unsuitable storage of potentially contaminating materials, including biosolids, hydrocarbons and chemicals.

Leaks from STP infrastructure could potentially contaminate any groundwater present in the immediate vicinity and potentially migrate to the aquatic environment. The key measure to prevent such an occurrence is appropriate design and construction of all infrastructure in accordance with all relevant standards to ensure suitability and longevity of the asset, as well as regular maintenance and leak checks of infrastructure, especially pipe works.

Other potential impacts from spill and leaks are covered separately in:

- Section 6.8 – Waste Management
- Section 6.9 – Dangerous Goods and Environmentally Hazardous Materials.

Landfill gas may present an ongoing environmental and structural risk that will need to be managed throughout the detailed design and operational phase of the Project; this will be informed by the findings of a more detailed LGRA to be undertaken post-approval.

6.4.4 Management, mitigation and monitoring

In addition to the applicable broader management, mitigation and monitoring measures outlined in Section 6, the following discipline-specific measures will also apply to the Project.

6.4.4.1 Design

The following management and mitigation is proposed for the design phase of the Project:

Reference number	Management, mitigation or monitoring measure
Management and mitigation	
Land Contamination MM 1	A comprehensive Landfill Gas Risk Assessment (LGRA) will be undertaken for the Project Site and surrounds prior to construction commencing to collect additional data to delineate the extent of landfill gas risk, and further assess the landfill gas management, mitigation and monitoring required for the construction and operational phases of the Project.
Land Contamination MM 2	The results of the LGRA will be used to inform the design process and ensure that the final design provides suitable mitigation measures to ensure landfill gas risk is adequately managed for the duration of the Project.
Monitoring	
No additional monitoring to that outlined in the applicable broader monitoring measures outlined in Section 6 is proposed.	

6.4.4.2 Construction

The following management and mitigation is proposed for the construction phase of the Project:

Reference number	Management, mitigation or monitoring measure
Management and mitigation	
Land Contamination MM 3	A construction Site Contamination Management Plan will be developed prior to construction commencing based on relevant EPA Information Bulletins, guidelines and NEPMs and as a minimum contain: • Maps showing areas of potential contamination within the Project Site • Appropriate personal protective equipment procedures • Procedures for temporary stockpiling of contaminated material during construction, including any cover and drainage aspects • Testing, monitoring, and classification procedures in accordance with relevant guidelines for areas of contamination, including soils and groundwater • Procedures for reuse of any contaminated soils • EPA processes for sign-off of material considered Level 2 contaminated and greater • Location arrangements for disposal of contaminated material or water (e.g. Copping Landfill) • Procedures for classifying and disposing of clean fill type 1 & 2 in accordance with the EPA Approved Management Method • Procedures for dealing with unanticipated contaminated material • Decontamination procedures for vehicles and workforce • Appended specialised plans and procedures where required. The Site Contamination Management Plan will form part of the CEMP for the Project.
Land Contamination MM 4	All existing stockpiled soil within the Project Site and soil excavated as part of the Project will be treated as contaminated waste and stored appropriately until classified in accordance with Tasmanian EPA Information Bulletin No. 105, after which it will be disposed of accordingly depending on contamination classification.
Land Contamination MM 5	ASS risk and management will be addressed through the development of a construction ASS Management Plan in accordance with the DPIPW document Tasmanian Acid Sulfate Soil Management Guidelines 2015 prior to construction commencing. The ASS Management Plan will form part of the CEMP for the Project.
Land Contamination MM 6	A construction Landfill Gas Management Plan will be developed prior to the commencement of construction based on the results and recommendations of the LGRA to ensure safety of construction workers, the broader community and the environment during the construction phase. The Landfill Gas Management Plan will form part of the CEMP for the Project.
Land Contamination MM 7	The existing underground storage tank within the Project Site will be removed under the supervision of a suitably qualified environmental consultant prior to construction commencing, in accordance with the <i>Environmental Management and Pollution Control (Underground Petroleum Storage Systems) Regulations 2020</i> and EPA requirements.
Land Contamination MM 8	STP infrastructure will be leak tested during the commissioning phase of the Project.
Monitoring	
Land Contamination MON 1	All monitoring for site contamination during construction will be included in the Site Contamination Management Plan for the Project.
Land Contamination MON 2	The construction Landfill Gas Management Plan will include construction monitoring requirements for landfill gas, to be developed from the RSRA and LGRA prior to construction commencing.

Additional measures to prevent contamination to the environment during construction are provided in the following sections:

- Section 6.8 – Waste Management
- Section 6.9 – Dangerous Goods and Environmentally Hazardous Materials.

6.4.4.3 Operation

The following management and mitigation is proposed for the operational phase of the Project:

Reference number	Management, mitigation or monitoring measure
Management and mitigation	
Land Contamination MM 9	An operational Landfill Gas Management Plan will be developed for the operational phase of the Project, including suitable management, mitigation and monitoring measures in accordance with the recommendations from the RSRA, LGRA, and any ongoing monitoring to ensure any safety or operational risks are adequately managed throughout the operational period of the Project. The Landfill Gas Management Plan will form part of the OEMP for the Project.
Monitoring	
Land Contamination MON 3	The operational Landfill Gas Management Plan will include operational monitoring requirements for landfill gas, to be developed from the RSRA and LGRA prior to operation commencing.
Land Contamination MON 4	A Groundwater Monitoring Plan will be developed for the operational phase of the Project to monitor groundwater contamination, the results of which will be used primarily to detect any leaks in Project infrastructure and to monitor contaminant levels reaching the receiving environment (Derwent Estuary). The plan will be based on the outcomes of ongoing pre-construction and construction groundwater monitoring and will include a suite of management and mitigation options for consideration in the event groundwater contamination becomes a significant risk to the receiving environment. The Groundwater Monitoring Plan will form part of the OEMP for the Project.

Management and monitoring of waste (including biosolids) and use of dangerous goods and environmentally hazardous materials during operation is covered in sections:

- Section 6.8 – Waste Management
- Section 6.9 – Dangerous Goods and Environmentally Hazardous Materials.

6.4.5 Residual impacts

The majority of potential contamination issues identified for the construction phase of the Project are associated with the wetland area of 10 Selfs Point Road, where the majority of new infrastructure will be located.

If contaminated soils are managed in strict accordance with the site contamination management plan to be developed for the Project, then residual impacts are expected to be negligible, as all contaminated soil will be segregated, sampled, and removed from site or appropriately reused in situ.

Once construction is complete, groundwater is unlikely to be further impacted by the Project as no additional ground disturbance will be required. However, as mentioned, any new preferential pathways created from the construction process may result in the mobilisation of contaminants from historical activities, which may then migrate to the receiving environment. The proposed Groundwater Monitoring Plan will be in place to ensure any potential environmental issues related to groundwater are identified, which will then trigger the requirement for investigation into management and mitigation options. Overall, the residual risk of a significant environmental impact occurring as a result of contaminated groundwater migration to the aquatic environment is considered low, given the large dilution and dispersion available in the receiving environment.

As with any STP site, there will remain a risk of accidental spills of chemicals or sewage that could reach the groundwater table. This risk remains largely unchanged (or in fact improved through replacement of old assets) as a result of the Project.

Regarding landfill gas, there is an established existing risk at the site because of historical land use practices. With suitable design, design mitigation measures and construction controls in place (as proposed) the potential for the Project to impact upon this risk is considered manageable. There remains a risk of residual landfill gas in the broader area as a result of historical land uses, which will be the subject of the separate body of work undertaken by the HCC, which is considered beyond the scope of this Project.

6.5 Biodiversity and natural values

This section addresses terrestrial biodiversity and natural values only. Marine biodiversity values associated with the marine outfall installation and operation are addressed separately in Section 6.6.

6.5.1 Existing environment

6.5.1.1 Terrestrial ecology

Several ecological surveys of the Project Site and surrounds have been undertaken recently for various iterations of the Project, including a 2016 report by Norther Barker Ecosystem Services (NBES) (NBES, 2016) and a 2021 survey by ERA (ERA Planning and Environment, 2021). The latest survey, which has been used for this assessment, was undertaken by NBES in December 2023; the report is provided in full in Appendix H (NBES, 2023). The ecological survey focused on the proposed STP site (existing and expansion area) and also includes a portion of the new local Selfs Point effluent outfall pipeline route, which is prescribed works in the terrestrial portion and therefore excluded from assessment in this chapter.

The Project Site was found to be heavily modified, with the entire project footprint mapped by NBES as Extra-urban miscellaneous (FUM), a TasVeg 4.0 non-native unit generally used to describe anthropogenically disturbed areas.

The majority of flora identified onsite were introduced species. Of the native flora species recorded, the (presumably) planted *Eucalyptus globulus* trees around the borders of the wetland and STP area were the most prominent, with 55 individual trees mapped within or just beyond the boundary of the Project Site. No threatened flora or vegetation communities were identified within or adjacent to the Project Site during the survey, and the potential for threatened flora to have been overlooked was considered low (NBES, 2023).

Introduced flora were ubiquitous across the Project Site, with a total of seven species of declared weeds mapped during the survey, namely blackberry, boneseed, fennel, white weed, African boxthorn, English broom, and Montpellier broom. Some relatively large patches were observed, especially within the wetland area of the Project Site; these patches are identified in Figure 6-16.

NBES identified three threatened terrestrial fauna species previously recorded within 500m of the Project Site on the Natural Values Atlas, namely Tasmanian wedge-tailed eagle (*Aquila audax* subsp. *fleayi*), white-bellied sea eagle (*Haliaeetus leucogaster*) and swift parrot (*Lathamus discolor*). Of these, the swift parrot is the only species considered likely to occur within the Project Site (NBES, 2023). The swift parrot is listed as endangered under the *Threatened Species Protection Act 1995* (TSP Act) and Critically Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Swift parrots may feed on the nectar of the *E.globulus* trees present during their spring migration to breeding areas. No suitable nesting habitat was observed during the 2023 assessment.

Desktop searches also identified a range of fauna species with the potential to occur in the area based on range boundaries, such as the green and gold frog (*Litoria raniformis*), eastern barred bandicoot (*Perameles gunnii*), and Tasmanian devil (*Sarcophilus harrisii*). Despite the Project Site containing some potential foraging, roosting and nesting habitat for some fauna, the area was assessed as not containing any habitat critical to the survival of these species, mainly due to its highly modified condition and urban location (NBES, 2023). There were no raptor nests identified within 2 km of the study area, with the closest nest approximately 2.4 km to the north-east.



 Project site (the Land)

TASVEG 4.0 CODE

 (FUR) Urban areas

X (FWU) Weed infestation

NATIVE VEGETATION

▲ Eucalyptus globulus

WEEDS

● Blackberry (*Rubus fruticosus*)

● Boneseed (*Chrysanthemoides monilifera*)

▲ Fennel (*Foeniculum vulgare*)

■ Hoary cress (*Lepidium draba*)

■ African boxthorn (*Lycium ferocissimum*)

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PLANNING
& ENVIRONMENT

Job Number 2122_029

Revision V.5

Date 19 December 2023

Paper size A4

Selfs Point STP
Redevelopment

Figure 6-16

Vegetation
mapping

6.5.1.2 Rivers and creeks

Aside from the River Derwent, the only nearby waterway is the New Town Rivulet, which in its lower reaches is a highly modified canal with little to no ecological value.

Note that marine ecology associated with the outfall sites is addressed separately in Section 6.6.

6.5.1.3 Geoconservation

As identified in Section 5.2, there are two geoconservation sites near the Project Site: one is the 'Bedlam Walls Scarp' (ID 2210), which is a length of cliffs on the eastern side of the River Derwent, and the other is a 'Cenozoic Plant Macrofossils of Tasmania' (ID 3173) site, which is an assemblage of fossils along the coastline approximately 1 km south of the Project Site.

6.5.1.4 Reserves

There are no formal reserves mapped within the Project Site or adjacent. The closest reserve is approximately 1.4 km across the River Derwent to the north-east (East Risdon State Reserve).

6.5.2 Legal and other requirements

The key legislation and policy relevant to protecting biodiversity values of relevance to this Project include:

- *Environment Protection and Biodiversity Conservation Act 1999*
- *Tasmanian Threatened Species Protection Act 1995*
- *Forest Practices Act 1985* and associated regulations
- *Nature Conservation Act 2002*
- *Weed Management Act 1999*
- *State Policy on Water Quality Management 1997*
- *Tasmanian State Coastal Policy 1996*.

The key performance requirement is to minimise impacts to identified biological values and seek necessary permits for any unavoidable impacts (not anticipated to be required).

6.5.3 Potential impacts

6.5.3.1 Terrestrial ecology

The proposed works have the potential to impact on terrestrial biodiversity through direct impact (clearance of vegetation during construction) as well as indirect impact (through the spread or introduction of weeds, pests or pathogens and changes in roadkill risk during construction).

The proposed Project footprint will occur both within the existing STP site and within the adjacent wetland area to the west of the site. The majority of the land is essentially cleared, with only small remnant patches of native species required to be cleared.

As outlined in Section 6.5.1.1 the Project Site is heavily modified from its natural state and the Project is not expected to impact any native vegetation community or threatened flora species. No threatened fauna are expected to be directly impacted, however the removal of some *Eucalyptus globulus* trees has the potential to affect available foraging habitat for the threatened swift parrot.

A total of 55 *E.globulus* trees were mapped within and immediately adjacent to the Project Site. Of these, 30 trees were recommended for avoidance during Project design by NBES (2023), with these being the trees deemed to have the highest foraging potential for the swift parrot. These trees are predominantly located on the margin of the estuary and away from the construction area; they offer an unobstructed flight path to the Meehan Range, a known habitat area. These 30 trees have been avoided by the proposed Project footprint, and thus will be retained.

This resulted in a total of 25 trees expected to be impacted because they are in the Project footprint or have their tree protection zone overlapping the Project Footprint (and thus also at risk).

An additional risk identified by NBES for swift parrots was the potential for collision risk with windows, wires, fences along potential flight paths associated with the remaining *E.globulus* trees; NBES (2023) note that swift parrots tend to suffer elevated mortality rates in areas built-up within foraging habitat. An assessment of the Project design for potential collision risk by NBES (2023) found that the site presented a very low collision risk, essentially due to the variation in heights between infrastructure and habitat.

Assessment by NBES (2023) against the Commonwealth's Significant Impact Guidelines 1.1 determined that the Project does not present a risk of significant impact to swift parrots, thus approval under the EPBC Act is not expected to be required. It is noted that TW will refer the Project to the Commonwealth under the EPBC Act for transparency and to seek confirmation of this self-assessment. This will be addressed as a separate piece of work to the state approval.

The Project has the potential to spread weeds, pests or pathogens within and possibly into or out of the area. The Project Site is known to contain a high proportion of weeds, including seven species of declared weeds, which if disturbed during construction could be spread to other sites and/or result in increases in local infestation due to ground disturbance. Although weed infestations already occur within the Project Site, the Project must avoid exacerbating or further spreading these infestations. These matters will be addressed by strict weed and hygiene controls as outlined below in Section 6.5.4.

During construction there is some potential for roadkill of native fauna, as a result of construction vehicles or changes to road conditions. Overall this risk is considered to be very low, given the urban nature of the Project Site and the generally low levels of traffic expected for the Project.

6.5.3.2 Rivers and creeks

No impacts to the nearby New Town Rivulet are expected as a result of the Project. Impacts to the River Derwent through treated effluent discharge are addressed in Sections 6.1 and 6.6.

6.5.3.3 Geoconservation

No impacts to the geoconservation sites are expected as a result of the Project.

6.5.3.4 Reserves

No impacts to reserves are expected as a result of the Project.

6.5.4 Management, mitigation and monitoring

In addition to the applicable broader management, mitigation and monitoring measures outlined in Section 6, the following discipline-specific measures will also apply to the Project.

6.5.4.1 Design

The following management and mitigation is proposed for the design phase of the Project:

Reference number	Management, mitigation or monitoring measure
Management and mitigation	
Biodiversity and Natural Values MM 1	The key management measure for the protection of biodiversity in the area is the protection of the planted <i>E.globulus</i> trees along the Project Site fringes, which may be used for foraging by the listed swift parrot on occasion. The Project footprint has been designed to avoid disturbance to <i>E.globulus</i> trees as a priority, and the remaining trees will be avoided by any future modifications.
Monitoring	
No additional monitoring to that outlined in the applicable broader monitoring measures outlined in Section 6 is proposed.	

6.5.4.2 Construction

The following management and mitigation is proposed for the construction phase of the Project:

Reference number	Management, mitigation or monitoring measure
Management and mitigation	
Biodiversity and Natural Values MM 2	All identified swift parrot foraging habitat trees to be retained within 30 m of the boundary of the proposed Project footprint area will be clearly marked and exclusion zones established around them to avoid unnecessary impact during the construction phase of the Project Site.
Biodiversity and Natural Values MM 3	A construction Weed, Disease and Hygiene Management Plan will be prepared prior to construction. This plan will be prepared in general accordance with the Weed, Disease Planning and Hygiene Guidelines (DPIPWE, 2015b) and include provisions for: • Pre-construction weed control for areas of existing weed infestation in the Project Site. • Hygiene protocols, including vehicle washdown prior to site entry/exit to avoid the spread of weeds and pathogens in general accordance with the Tasmanian Washdown Guidelines for Weed and Disease Control and Keep It Clean – A Tasmanian field hygiene manual to prevent the spread of freshwater pests and pathogens. • Control measures for material brought onto the site for construction to ensure it is free from weed seeds or disease. The Weed, Disease and Hygiene Management Plan will form part of the CEMP for the Project.
Biodiversity and Natural Values MM 4	At the completion of construction, topsoil will be reinstated to disturbed areas, including seeding with a suitable (non-invasive) species to establish a stable site and reduce the potential for weed spread post-construction.
Monitoring	
No additional monitoring to that outlined in the applicable broader monitoring measures outlined in Section 6 is proposed.	

Construction management of marine biodiversity is addressed separately in Section 6.6.

6.5.4.3 Operation

The following management and mitigation is proposed for the operational phase of the Project:

Reference number	Management, mitigation or monitoring measure
Management and mitigation	
Biodiversity and Natural Values MM 5	The Project Site will be kept free of declared weeds throughout the operational phase, with site inspections and declared weed control measures to be stipulated in the OEMP for the Project.
Biodiversity and Natural Values MM 6	Any swift parrot collision fatalities that are found onsite will be reported to the EPA on an annual basis and if deemed necessary collision mitigation measures will be installed at the Project Site in consultation with NRE Tasmania and the EPA.
Monitoring	
No additional monitoring to that outlined in the applicable broader monitoring measures outlined in Section 6 is proposed.	

Operational management of marine biodiversity is addressed separately in Section 6.6.

6.5.5 Residual impacts

With the above stated design, management and mitigation measures in place, the residual risk to terrestrial biodiversity values is considered low.

Effort has been made to reduce impact to potential foraging habitat of the swift parrot, including the avoidance of 30 *E.globulus* trees in the design of the Project. NBES (2023) have assessed the potential

impacts of the Project against the significance of impact criteria under the EPBC Act and found the Project is unlikely to result in a significant impact to the swift parrot.

6.6 Marine and coastal

This section addresses potential impacts of the Project on the marine and coastal environment and draws upon information from Section 6.1, which addresses potential impacts on water quality within the Derwent Estuary.

6.6.1 Existing environment

The Project has the potential to affect the marine environment in the middle reaches of the Derwent Estuary, at the existing local Selfs Point effluent outfall, and in the lower reaches of the estuary at the existing Blinking Billy outfall (several kilometres to the south), as well as up and downstream of these areas, depending on the hydrodynamics of the discharged effluent from the outfall locations.

Various assessments were undertaken at the existing Blinking Billy effluent outfall and the existing local Selfs Point effluent outfall as part of the Derwent Ambient Monitoring program completed by TW (Jacobs, 2016a). At Blinking Billy, water quality, sediment quality and benthic infauna were assessed. For the existing local Selfs Point effluent outfall, water quality, underwater video transects, and seagrass surveys were included in the AMP (Jacobs, 2016a). This information was used to inform descriptions of the receiving environments of the Project, where relevant. Information specific to water quality of the estuary is addressed separately in Section 6.1.

As the Project will result in the relocation of the existing local Selfs Point effluent outfall further to the south, as described in Section 2.4.15, an aquatic environmental survey was commissioned for the Project to assess the intertidal and subtidal areas that may be affected by the installation of the new local Selfs Point effluent outfall pipeline and diffuser (Elgin, 2022c). The full report is provided in Appendix I and summarised herein to describe the aquatic environment around Selfs Point and identify any potential impacts that may occur as a result of the Project. The area surveyed is shown in Figure 1 of Appendix I.

The Derwent Estuary Program (DEP) coordinates a range of environmental programs within the estuary and provides five-yearly summaries on the health and wellbeing of the estuary, information on habitats, sediment and water quality, as well as industry impacts and other vital information within its State of the Derwent Estuary report series, the latest being the 2020 Update (DEP, 2020). The 2020 update has been used in conjunction with the previous iterations of the report to help describe the receiving environments of the Project, along with the abovementioned targeted assessments.

The marine and coastal environment of the Derwent Estuary is in a highly modified state and has been significantly impacted by anthropogenic activity over the last century. The shoreline is highly modified in many areas, including large areas of reclaimed land, which has led to alterations in natural flow in the waterway and changes to natural sedimentation regimes. Inputs from industrial processes, maritime activities, agricultural run-off and municipal waste inputs have all contributed to significant degradation of the sediment and water quality of the estuarine environment.

The estuary is subject to freshwater inputs moving seaward from the Derwent River over the denser salt waters moving upstream from tidal action, which under low river flows can reach as far up as New Norfolk in the north (DEP, 2020).

The western coastline in the area between Selfs Point and Blinking Billy Point is a combination of rocky shorelines, reclaimed land with riprap or concrete seawalls and port infrastructure, and low energy sandy/silty beaches.

The majority of Selfs Point itself is reclaimed land with riprap seawall as the predominant coastal feature. This area supports several gas and petroleum depots and a berthing facility for vessels. This area then transitions to Cornelian Bay through to Ross Bay to the south, which is dominated by a generally rocky coastline with stretches of soft sediments. Further south there are the Macquarie Point and Salamanca foreshore areas, which contain essentially no natural coastline and are dominated by a combination of wharfs, concrete seawalls and areas of riprap. South from the rocky shorelines of Battery Point the coastline transitions back to a generally rocky/soft sediment coastline before the higher energy sandy beach areas of Nutgrove Beach and Long Beach are reached. The rocky Blinking Billy Point is just to the south of Long Beach and supports the existing Selfs Point SPS with an effluent outfall pipeline that extends out from this point into approximately 32 m of water.

The habitat surrounding Sells Point is mapped as subtidal silt in the State of the Derwent Estuary 2015 report (Coughanowr, et al., 2015), with areas of rocky reef fringing the coastline and an area of *Heterozostera* seagrass within Cornelian Bay to the south. The silty sediments that dominate this portion of the estuary provide habitat for benthic infauna, microscopic algae, macroalgae, and seagrasses and macrophytes in shallower areas. The soft sediments play an important role in the denitrification of the system, helping to maintain the ecological function of the estuary (Coughanowr, et al., 2015). The silty sediments are generally barren in the deeper areas and have been impacted to varying degrees by heavy metals from industry and introduced marine species, include the northern Pacific seastar (*Asterias amurensis*).

The proposed replacement local Sells Point effluent outfall pipeline extends out to a depth of approximately 8 m from the shoreline adjacent to the Origin Energy gas storage facility, as shown in Figure 2-5. The survey of the pipeline route across the intertidal area was undertaken primarily to search for the threatened Derwent seastar (*Marginaster littoralis*) (it should be noted that the species is also referred to as *Patiriella littoralis* in the literature) and live-bearing seastar (*Pateriella vivipara*). The Derwent seastar, listed as endangered under the TSP Act and Critically Endangered under the EPBC Act, has previously been identified from intertidal rocky habitats up to 1.5 m in depth in the mid-estuary (including the nearby Cornelian Bay Point (DCCEEW, 2024), but has not been observed for several decades and is suspected of having been outcompeted by other seastar species; the literature suggests the species may even now be extinct⁵ (DCCEEW, 2024; O'Hara, Mah, Hispey, Bribiesca-Contreras, & Barrett, 2019), however it remains listed as Critically Endangered under the EPBC Act. The live-bearing seastar, listed as vulnerable under the TSP Act, is found in select rocky intertidal areas around the estuary to depths of around 1.2 m (Threatened Species Section, 2022). Extensive searches of the intertidal area, including snorkel searches, did not identify either of the species in or adjacent to the proposed pipeline route (Elgin, 2022c).

The habitat assessment undertaken by Elgin (2022c) in the region of the replacement effluent outfall location at Sells Point describes a rocky intertidal zone adjacent to a small gravelly section of beach, as shown in Figure 6-17. There were 17 intertidal fauna species observed, including bivalves, crabs and gastropods, with the dominant species being the Pacific oyster (*Magallana gigas*). Five species of algae were observed, including common species such as *Codium spp.* and sea lettuce (*Ulva spp.*). Several bird species were observed along the shoreline, including the silver gull, kelp gull and pied oyster catcher; no threatened marine bird species were observed.

Subtidal habitat consisted of soft sediments and mixed hard substrata including boulders and cobble, with a section of rock armouring around the gas depot area. Fauna observed during video transects included the northern Pacific seastar (*Asterias amurensis*), regular seastar (*Patiriella regularis*) and flathead, along with observations of various invertebrate burrows and polychaete tubes. Several species of algae were present on the rock armouring. No seahorses or other syngnathids were observed. No threatened marine species were observed.

Overall the survey undertaken by Elgin (2022c) did not identify any species of conservation significance throughout the area surveyed.

⁵ Whilst reference to the Derwent seastar as possibly being extinct is made in Appendix H and Appendix I, the species has not been declared extinct by the Australian Government under the EPBC Act.



Figure 6-17 Local Selfs Point effluent outfall intertidal zone (Elgin, 2022c)

The area around the Blinking Billy effluent outfall pipeline, shown in Figure 6-6, is significantly closer to the mouth of the estuary and supports a sandy habitat around the shoreline before transitioning to the siltier soft sediments towards the deeper waters of the middle estuary (Coughanowr, et al., 2015). The soft sediment habitat of this area would likely support a slightly different array of flora and fauna, with a similar diversity to the Selfs Point area.

Common demersal fish species in the estuary, which could occur in the vicinity of both outfalls, include sand flathead, sea mullet, flounder, skates and school whiting. Common pelagic species that frequent the estuary are Australian salmon, silver trevally, jack mackerel, gummy sharks and school sharks. Species more common around fringing rocky reefs include blue-throat wrasse (*Notolabrus tetricus*), bastard trumpeter (*Latridopsis forsteri*) and toothbrush leatherjacket (*Acanthaluteres vittiger*). There are also migratory species that transit the estuary, including various whitebait species, trout and short-finned eel (Coughanowr, et al., 2015); yellow-tailed kingfish are also starting to appear on a seasonal basis in the estuary.

The area around Long Beach and around Blinking Billy Point, along with several other sites on either side of the estuary, are known habitat areas of the spotted handfish (*Brachionichthys hirsutus*), listed as Critically Endangered under the EPBC Act and endangered under the TSP Act. This species is susceptible to changes in habitat and water quality and are in constant threat from continued anthropogenic stressors in the local environment (Coughanowr, et al., 2015).

The species population in the Derwent Estuary is considered highly fragmented, with nine known separate populations downstream of the Tasman Bridge, with a total occupancy area estimated at 1.8 km²; no populations are known north of the Tasman Bridge (Department of the Environment, 2014). Although found between depths of 1-60 m, the species appears to be most common in the 5-10 m depth range (DSEWPac, 2012). The species was historically common in the lower reaches of the estuary up until the mid-1980s, after which a notable decline in species numbers and populations began. Previous known population locations are now considered extinct of the species, including Frederick Henry Bay, where original population numbers were estimated at up to 250 individuals, with a combination of anthropogenic threats to the species the most likely reason for the decline (Threatened Species Scientific Committee, 2012). Significant survey work across the lower reaches of the estuary has failed to identify any additional populations outside of the nine known locations (DCCEEW, 2023).

Threats to the species are primarily related to a decline in habitat quality, especially suitable breeding substrate, including the stalked ascidian species *Sycozoa spp.* which the species lay their eggs around.

Habitat destruction can result from a number of pathways, including direct dredging, sedimentation, pollution, and introduced marine pests such as the northern Pacific seastar (*Asterias amurensis*) which prey on sessile invertebrates, including stalked ascidians (DCCEEW, 2023).

There is a known isolated population of spotted handfish approximately 850 m to the north-west of the Blinking Billy effluent outfall location (Jacobs, 2016a). There is always potential for the species to occur closer to the outfall, although this has not been shown in any surveys to date (DCCEEW, 2023). The species is not considered to inhabit the area surrounding the proposed new local Selfs Point effluent outfall location, with the closest known population to the south-east of the site around the Bellerive Bluff area (Department of the Environment, 2014).

Other protected fish species that occur in the estuary include the Australian grayling (*Prototroctes maraena*), a diadromous species known to migrate annually in the estuary (albeit not commonly encountered), and the white shark (*Carcharodon carcharias*) which is also listed as potentially occurring in the area.

The Derwent Estuary is also frequented in a transitory fashion by several marine mammal species (albeit rarely by most), including the southern right whale (*Eubalaena australis*) and humpback whale (*Megaptera novaeangliae*), New Zealand fur seal (*Arctocephalus forsteri*), Australian fur seal (*Arctocephalus pusillus*) and subantarctic fur seal (*Arctocephalus tropicalis*), as well as bottlenose dolphins (*Tursiops truncatus*) and common dolphins (*Delphinus delphis*) (DEP, 2020).

The Derwent Estuary contains many introduced species, which have been brought to the estuary through various vectors such as ballast water, deliberate introduction, and vessel biofouling (DEP, 2022). This has resulted in significant ecological impacts to the area's natural state. The key species of concern are the northern Pacific seastar (*Asterias amurensis*), European green crab (*Carcinus maenas*), Pacific oyster (*Crassostrea gigas*), New Zealand seastar (*Patiriella regularis*), and the New Zealand screw shell (*Maoricolpus roseus*) (Coughanowr, et al., 2015). These species have significantly outcompeted several of the native inhabitants of the estuary, with the northern Pacific seastar causing extensive ecological damage (Coughanowr, et al., 2015).

6.6.2 Legal and other requirements

The key legislation and policy relevant to protecting marine and coastal values of relevance to this Project include:

- *Water Management Act 1999*
- *State Policy on Water Quality Management 1997*
- *Environment Protection and Biodiversity Conservation Act 1999*
- *Tasmanian Threatened Species Protection Act 1995*
- *Living Marine Resources Management Act 1996*
- *Tasmanian State Coastal Policy 1996*.

The objectives of these acts and policies must be met, including the preservation of the Protected Environmental Values attributable to the Derwent Estuary area, as set out in Section 6.1.

6.6.3 Potential impacts

6.6.3.1 Construction

The construction of the new local Selfs Point effluent outfall pipeline has the potential to directly impact the coastal environment through disturbance of the area of shoreline where the marine component of the effluent outfall pipeline will commence. It also has the potential to impact on intertidal and subtidal habitats when the pipeline is weighted along the seafloor.

In the intertidal environment, there is potential to impact on resident species and their habitat; however, the disturbance footprint would be very minor in comparison to the available similar habitat in the area and would be unlikely to have a measurable environmental impact on the intertidal ecology of the area.

In the subtidal environment, potential impacts from the weighted pipeline are limited to direct impacts to the benthic community under the effluent discharge outfall pipeline and concrete collars that would be required to weight the pipeline. As mentioned, the benthic habitat around the proposed effluent outfall pipeline is predominantly silty sediment, a well-represented habitat in the region. The loss of <1 ha of this habitat would be unlikely to have a measurable impact on the overall benthic ecology of this section of the Derwent Estuary.

There are unlikely to be any threatened marine species that reside within the subtidal portion of the outfall alignment, noting no threatened marine species were identified in site surveys. There are no known spotted handfish populations north of the Tasman Bridge (as detailed in Section 6.6.1) and the subtidal area is also not considered suitable habitat for any of the listed seastars, given they are intertidal species. Some threatened species may transit the area, such as the Australian grayling, but measurable impacts from the construction phase on these species are not anticipated.

Potential impacts to cetacean and pinniped species through noise disturbance are considered unlikely, as no pile driving, dredging or underwater explosives are proposed for pipeline installation.

There could be a risk of marine mammal collision or entanglement through the use of barges during the installation of the pipeline (depending on the selected construction technique), albeit unlikely.

From a geomorphology standpoint, the coastal area around Selfs Point is highly modified and the Project will therefore have no detrimental impact to any natural coastal feature.

Other potential construction impacts to marine and coastal sensitive receptors are related to spills of environmentally hazardous materials (covered in Section 6.9) and incorrect disposal of wastes (covered in Section 6.8).

6.6.3.2 Operation

The aspect with the greatest potential to impact on the marine and coastal biodiversity of the Derwent Estuary is the operational release of treated effluent from the Blinking Billy effluent outfall and the local Selfs Point effluent outfall. The potential impacts of the effluent on water quality are covered separately in Section 6.1 and discussed here in relation to the potential implications for marine and coastal ecology.

It should be noted that, as a direct result of the Project, the existing Macquarie Point effluent outfall will be made essentially obsolete, which will subsequently remove an environmental stressor from that section of the estuary. The only exception to this is that it will be used as an emergency overflow for the proposed SPS from the Macquarie Point STP location and therefore would have impacts under overflow scenarios, which are not discussed as part of the EIS as they will be assessed as part of separate approval associated with the Macquarie Point SPS.

Blinking Billy effluent outfall

The Project will result in an increased total flow of treated effluent from the existing Blinking Billy effluent outfall, but at the same time will improve overall effluent quality discharged from the STP. As outlined in Section 6.1, discharge modelling indicates a mixing zone of approximately 20 m within which water quality is expected to be impacted. The closest sensitive receptor to the outfall is the spotted handfish population some 850 m from the diffuser location, which is unlikely to experience any measurable impact from the discharge. There are no other sensitive receptors in the immediate vicinity of the effluent outfall that would likely be impacted by the discharge. Effluent constituents will be reduced compared to the historical effluent quality records to date as a result of significant process improvements from the Project, and hence the potential for any impacts are also reduced from these elements compared to the current discharge scenario.

Given the width of the estuary in the area surrounding the outfall and the overall high quality of the effluent, restrictions to marine fauna passage (i.e. fish and cetaceans) are highly unlikely to occur.

In terms of far-field impacts, as the Project will significantly reduce nutrient loads from the outfall, as outlined in Section 6.1, no negative impacts are expected to marine flora and fauna as a result of the Project.

Replacement local Selfs Point effluent outfall

In the area directly surrounding the replacement local Selfs Point effluent outfall, some localised alterations to benthic community composition (including infauna) may occur as a result of the organically enriched

effluent, which is a known impact of effluent outfalls in aquatic environments (Pearson & Rosenberg, 1978). However, given the intermittent nature of the discharges, the low diversity of species and lack of any listed species, significant impacts to the marine ecosystem are not expected to occur in the area.

As outlined in Section 6.6.1, there are no sessile threatened marine species likely to occur within the local Selfs Point effluent outfall footprint or within the predicted mixing zone (refer Section 6.1). As such, any potential for impact to threatened marine species is limited to transient effects to mobile species (e.g. cetaceans, fish etc) moving through the area.

The potential impacts of relocating the effluent outfall into the new location within the Derwent Estuary is not expected to affect the movements of cetaceans, given the expected changes to water quality are for such short periods of time and toxicity impacts are likely to be restricted to directly adjacent to the outfall area (see Section 6.1); it is expected that there is more than sufficient time for these species to pass through this portion of the estuary unaffected. Similarly, the water quality conditions are not expected to significantly alter the movements of pelagic fish populations around the Derwent Estuary area for the same reasons.

A net environmental benefit is expected for the general area, as the movement of the outfall from the existing discharge location will allow that area to recover from any historical impacts and the predicted effluent quality to be discharged from the new local Selfs Point effluent outfall will be significantly improved compared to the current discharge arrangements.

6.6.4 Management, mitigation and monitoring

In addition to the applicable broader management, mitigation and monitoring measures outlined in Section 6, the following discipline-specific measures will also apply to the Project.

6.6.4.1 Construction

The following management and mitigation is proposed for the construction phase of the Project:

Reference number	Management, mitigation or monitoring measure
Management and mitigation	
Marine and Coastal MM 1	Floating and submersible plant and equipment to be used for the Project will be disinfected and cleaned prior to use in the marine environment.
Marine and Coastal MM 2	Any marine vessels and equipment used will have all required Introduced Marine Pest (IMP) inspections completed and documentation in place.
Marine and Coastal MM 3	Silt curtains will be used in the marine environment around activities that present a risk of sediment disturbance or sedimentation.
Marine and Coastal MM 4	Aquatic spill kits will be present during any construction activities that occur near or within the marine environment.
Marine and Coastal MM 5	Refuelling will not occur within 30 m of the marine environment.
Marine and Coastal MM 6	Marine mammal observers will be present during the installation of the local Selfs Point effluent outfall, who will be responsible for implementing the following protocol during construction: • Each day the immediate area will be scanned for the presence of cetaceans or pinnipeds. • Construction activities will not occur, or must cease, if any cetacean or pinniped species is known to be present within 500 m of construction activities. • The Marine Conservation Program within NRE Tas will be consulted immediately prior to construction activities commencing to determine whether there have been any recent marine mammal sightings in the proposed work area (24 hr Whale Hotline on 0427 WHALES or 0427 942 537). • Occurrences of listed cetaceans or pinnipeds will be reported to NRE Tasmania within 90 days. Reference data will include species name, location-GPS (grid reference GDA94), observer name, date, number of individuals and area occupied. • Works will be undertaken in accordance with the National Guidelines for Whale and Dolphin Watching: Whale and Dolphin Viewing Guidelines (available at www.nre.tas.gov.au).

Reference number	Management, mitigation or monitoring measure
Monitoring	
No additional monitoring to that outlined in the applicable various monitoring measures is proposed.	

Additional construction management, mitigation and monitoring relevant to the marine and coastal environment is contained within the following sections:

- Section 6.1 – Water Quality
- Section 6.7 – Groundwater
- Section 6.8 – Waste Management
- Section 6.9 – Dangerous Goods and Environmentally Hazardous Materials.

6.6.4.2 Operation

No additional marine or coastal environmental management, mitigation or monitoring beyond the measures outlined in the following sections are proposed:

- Section 6.1 – Water Quality
- Section 6.7 – Groundwater
- Section 6.8 – Waste Management
- Section 6.9 – Dangerous Goods and Environmentally Hazardous Materials.

6.6.5 Residual impacts

The Project will result in the removal of the current Macquarie Point effluent discharge from the Derwent Estuary and result in a significant reduction in nitrogen and phosphorus loads to the Derwent Estuary. The Macquarie Point STP was generally underperforming, and therefore removing this waste stream from the Derwent Estuary is a positive environmental outcome to the marine and coastal environment. From a whole of estuary perspective, the health of the waterway is expected to improve as a result of the Project.

The marine environment directly around the Blinking Billy effluent outfall is not expected to change in any significant manner as a result of the Project. Despite the increase in concentrations of several effluent constituents (namely nitrogen and phosphorus), the high energy environment is expected to rapidly disperse and dilute these elements into the far-field environment of the estuary.

The coastal environment around the local Selfs Point effluent outfall is not expected to be significantly impacted, as the coastal location where the outfall commences is not considered an important coastal feature in terms of coastal morphology and lacks any significant environmental values.

The marine environment is not considered at significant risk of direct impacts from the new outfall location, given the mixing zone area is well represented habitat in the area and was not found to contain any listed marine flora or fauna (Elgin, 2022c); also, the emergency discharge effluent will be well treated in comparison to the existing case.

Construction in the marine environment is not expected to result in any measurable impacts if the management and mitigation committed to throughout this document are adhered to.

6.7 Groundwater

This section addresses general groundwater conditions at the Project Site, with groundwater contamination and its management addressed separately in Section 6.4.

6.7.1 Existing environment

There are several existing groundwater bores throughout the Project Site, as shown in Figure 6-15. Groundwater level measurements were taken as part of the Contaminated Site Assessment (CSA) completed for the Project, attached as Appendix F. Groundwater was found to be relatively shallow, ranging from 0.21 - 1.25 mAHD at the existing STP grounds to 1.24 - 1.56 mAHD at the wetlands site, implying the groundwater gradient travels in a northerly direction, which is to be expected given the location and topography of the site; this was confirmed by additional investigations at the Project Site undertaken by GHD (GHD, 2022).

There are no known users of the groundwater in the area and no known proposed uses. The Protected Environmental Values (PEVs) for the groundwater are the default guideline values (DGVs) for aquatic ecosystems of groundwater, as set by the EPA.

Groundwater physicochemical characteristics vary around the Project Site with bore depth and location. The two bores on the existing STP site closest to the coastline (MW1 and MW2 in Figure 6-15) had similar water depths and showed slightly brackish conditions in water samples, ranging in conductivity (a proxy for salinity) from 2,363 $\mu\text{S}/\text{cm}$ for MW2 to 4,006 $\mu\text{S}/\text{cm}$ for MW1. Site MW4 on the STP site further inland showed fresher groundwater of 1,867 $\mu\text{S}/\text{cm}$ at similar screening depths, indicating less influence from the estuary.

The wetland sites have significantly deeper bores available, which show increasing salinity with depth, as can be expected given the proximity of the site to the estuary. Site MW5 (deep) shows a conductivity of 18,230 $\mu\text{S}/\text{cm}$, well into the brackish region of salinity; the shallow bore at the same location has a conductivity of 8,849 $\mu\text{S}/\text{cm}$. Overall the groundwater conductivity measurements suggest a freshwater lens is present above the more estuarine water below.

Groundwater turbidity is variable across the site and with depth. At bore MW5 (shallow) the turbidity was found to be 2.8 NTU (effectively clear) and at MW5 (deep) the turbidity was 169 NTU (cloudy in appearance). The remaining bores showed turbidity ranges from 13 to 66 NTU.

The pH of the groundwater ranged from 6.5 (within the wetlands area) to 7.2 (within the STP area). These results are indicative of non-aggressive to mildly corrosive groundwater for piling purposes (Elgin, 2022b).

Groundwater quality in terms of contaminants is discussed further in Section 6.4.1.3.

6.7.2 Legal and other requirements

Protection of groundwater resources in Tasmania is generally governed by the:

- *Water Management Act 1999*
- *State Policy on Water Quality Management 1997* (Water Quality Policy).

Under the policy, interim PEVs for groundwater have been adopted and DGVs for aquatic ecosystems of groundwater have been set by the EPA (EPA Tasmania, August 2020), to protect the identified PEVs. The Project must not compromise the PEVs set for groundwater in Tasmania.

6.7.3 Potential impacts

6.7.3.1 Construction

Given depth to groundwater is relatively shallow around the Project Site, it is likely it will be encountered during excavation and installation of some Project components. The majority of the Project has been designed using above-ground infrastructure on concrete pads with piled foundations due to the unstable underlying geology of clays, marine sediments, organic material and fill material which sit atop a basalt bedrock layer at a depth of between 11.5 and 21 metres below ground level (mbgl) across the two land areas (10 & 12 Selfs Point Road) (Elgin, 2022b). The majority of piled foundations will be required to be drilled to the underlying basalt bedrock to ensure adequate support. There will be some components that will not be

piled and will require some deeper excavations to install, including various wet wells that will be required to sit below ground level.

Given the generally shallow construction methods to be used across the Project Site, the exposure to groundwater from excavations will be limited to shallower depths of 1-2 mbgl, with piling the main construction method that will interact with groundwater. There is the potential for new preferential pathways to be created as a result of foundation pile installation (and investigative drilling). This has the potential to expose groundwater to new contaminant sources throughout the geological strata of the Project Site and also may affect transmissivity. The potential for groundwater contamination is discussed separately in Section 6.4.

The main environmental groundwater hazards that may be encountered during construction are associated with the management of groundwater through any required dewatering processes. If done incorrectly, these processes can lead to ecological impacts following discharge, depending on the groundwater quality, characteristics and discharge location. Information on groundwater quality is provided in Section 6.4.

The areas where groundwater is most likely to be encountered for the Project are in the topographically lower areas in the existing STP grounds, where some excavations are required. This groundwater is expected to be relatively fresh in the first few metres given the results described above. No groundwater bore production data has been sourced to date, so extraction volumes cannot be estimated; bores will be required to be flow tested prior to construction commencing to gauge the volumes of dewatering that may be required for the construction process. Groundwater levels are not expected to be significantly affected by the Project long term, as they will likely be recharged rapidly given the geology of the site (marine sediments, fill etc).

6.7.3.2 Operation

Once constructed, the Project is unlikely to result in any additional changes to groundwater transmissivity. However, there will remain risks to groundwater quality from contamination risks from spills and leaks, as covered separately in Section 6.4.

6.7.4 Management, mitigation and monitoring

In addition to the applicable broader management, mitigation and monitoring measures outlined in Section 6, the following discipline-specific measures will also apply to the Project.

6.7.4.1 Construction

The following management and mitigation is proposed for the construction phase of the Project:

Reference number	Management, mitigation or monitoring measure
Management and mitigation	
Groundwater MM 1	Dewatering will be managed in accordance with a construction Dewatering Procedure, which as a minimum will contain methods for suitable collection, treatment and discharge of dewatered groundwater. The Dewatering Procedure will form part of the CEMP for the Project.
Groundwater MM 2	Groundwater flow testing will be undertaken prior to construction commencing to inform the Dewatering Procedure.
Monitoring	
No additional monitoring to that outlined in the applicable broader monitoring measures outlined in Section 6 is proposed.	

Additional construction management, mitigation and monitoring relevant to groundwater is contained within the following section:

- Section 6.4 – Land Contamination.

6.7.4.2 Operation

No additional operational groundwater management, mitigation or monitoring beyond the measures outlined in the following section are proposed:

- Section 6.4 – Land Contamination.

6.7.5 Residual impacts

With the implementation of the management and mitigation measures outlined above, the Project is unlikely to have a residual impact to groundwater (specifics on residual contamination risk are covered in Section 6.4) during construction or operational periods of the Project.

6.8 Waste management

6.8.1 Legal and other requirements

Waste management in Tasmania is largely governed through the:

- *Environmental Management and Pollution Control Act 1994*
- *Environmental Management and Pollution Control (Waste Management) Regulations 2010*.

Tasmania is also signatory to the following NEPMs, both of which automatically become state policies in Tasmania in accordance with the *State Policies and Projects Act 1993*:

- National Environment Protection Measure (Used Packaging Materials)
- National Environment Protection Measure (Movement of Controlled Waste between States and Territories).

In addition to compliance with the above, the Project must also manage all wastes in accordance with the waste hierarchy, namely avoidance, reuse, recycling/reclamation, treatment to reduce potentially adverse impacts, and disposal.

6.8.2 Potential impacts

6.8.2.1 Construction

During the construction period, a variety of wastes will be generated. This is likely to include:

- Waste construction materials such as concrete, plastic and steel (tens of tonnes)
- General waste including general recyclables (several tonnes)
- Small quantities of controlled wastes including solvents and paints (<5,000 L)
- Waste oil or hydraulic fluid (<5,000 L)
- Possible contaminated soils (variable quantities) (addressed in Section 6.4)
- Waste from transportable toilets (to be removed from site by a licensed operator)
- Waste from demolition of any minor infrastructure including concrete, pipes or road surface (tens of tonnes)
- Waste diesel from the UST removal (~2,700 L).

Left unmanaged, these waste streams have the potential to harm the environment from both an ecological and aesthetic perspective. Wastes containing environmentally hazardous material have the potential to impact the environment through numerous pathways, as outlined in Section 6.9.

These waste streams can be readily managed with appropriate sorting, storage and removal from site as outlined below in Section 6.8.3.

As discussed in Section 5.2, the majority of the Project Site is mapped as 'low probability inland ASS', which has a 6-70% chance of ASS occurrence in the mapping unit, not affording an accurate indication of the presence of the material. Left unmanaged, ASS run-off has the potential to impact the marine and terrestrial environment through direct impacts from acid and secondary impacts via mobilisation of heavy metals in the surrounding soils to the marine environment. ASS management and mitigation will be required during the construction period to minimise the risk of any acidic run-off into the marine environment.

6.8.2.2 Operation

During the operational phase, solid waste streams will include:

- General wastes – Waste generated during the operational phase of the Project will be limited to smaller quantities of paints, oils and lubricants used for maintenance, and general waste from the facility.

- Screenings and grit from the inlet works – These will be collected in sealed 10 m³ storage bins for regular (monthly) collection.
- Biosolids – Biosolids are a by-product of the sewage treatment process that will continually be produced throughout the life of the Project. The biosolid dewatering and outloading process for the Project is described in detail in Section 2.4.12.

Left unmanaged, these waste streams have the potential to result in environmental impacts from both an ecological and aesthetic perspective, including the generation of nuisance odours.

The liquid waste stream associated with discharge of treated effluent is addressed separately in Section 6.1.

6.8.3 Management, mitigation and monitoring

In addition to the applicable broader management, mitigation and monitoring measures outlined in Section 6, the following discipline-specific measures will also apply to the Project.

6.8.3.1 Construction

The following management and mitigation is proposed for the construction phase of the Project:

Reference number	Management, mitigation or monitoring measure
Management and mitigation	
Waste MM 1	Wastes from onsite toilets will be stored within the portable toilet system and removed from site by a suitably licensed operator and disposed of at a licensed wastewater facility. This may be able to be disposed of at the existing Selfs Point STP for a portion of the construction period.
Waste MM 2	A waste management area will be delineated within the construction compound(s), with all wastes to be segregated (into recyclables and non-recycles) and all putrescible and/or potentially windblown waste to be stored in sealed bins.
Waste MM 3	All wastes classed as environmentally hazardous materials will be stored in appropriately bunded containers.
Waste MM 4	Wastes will be removed from site on a regular basis by a suitably qualified operator and disposed of at a suitably licensed facility.
Waste MM 5	Any asbestos encountered during construction (including demolition) will be removed by a licensed specialist contractor and disposed of at a suitably licensed waste facility.
Waste MM 6	Diesel remaining in the UST will be pumped out by a licensed operator as part of the UST removal process and taken to a licensed facility for disposal.
Monitoring	
Waste MON 1	The construction contractor will maintain records of waste volumes generated and disposal locations, including disposal facility receipts.
Waste MON 2	The construction contractor will undertake weekly site audits to ensure the waste management system is effective, clean up any windblown or otherwise escaped waste, and modify storage arrangements if necessary.

Additional construction management, mitigation and monitoring relevant to waste management is contained within the following section:

- Section 6.4 – Land Contamination
- Section 6.9 – Dangerous Goods and Environmentally Hazardous Materials.

6.8.3.2 Operation

The following management and mitigation is proposed for the operational phase of the Project:

Reference number	Management, mitigation or monitoring measure
Management and mitigation	
Waste MM 7	During operation a waste management area will be delineated, with all wastes to be segregated (into recyclables and non-recycles) and all putrescible and/or potentially windblown waste to be stored in sealed bins. Wastes will be removed from site on a regular basis by a suitably qualified operator and disposed of at a suitably licensed facility.
Waste MM 8	Grit and screenings generated during operation will be stored in sealed bins and removed from site by a suitably qualified operator to be disposed of at a suitably licensed facility, on a monthly basis.
Waste MM 9	Detailed site-specific information about biosolids monitoring, handling and management will be incorporated into the existing TW Sewage Sludge Management Plan. The existing plan was developed based on the requirements of the EPA's Tasmanian Biosolids Reuse Guidelines and Approved Management Method for Biosolids Reuse. The updated plan will include, but not be limited to, the following details: • Provide an overview of biosolids treatment and handling at the STP, including transportation details. • Set satisfactory controls to ensure sludge contaminant quality will be consistently maintained. • Identify arrangements and alternative pathways for any biosolids that do not meet the criteria for reuse (including transport to a licensed landfill facility if required). • Define a biosolids monitoring program that fully complies with the requirements of the EPA's Tasmanian Biosolids Reuse Guidelines. • Outline the requirements for process verification for stabilisation of biosolids produced in accordance with the EPA's Tasmanian Biosolids Reuse Guidelines, including all monitoring requirements and evidence to be provided to the EPA.
Monitoring	
Waste MON 3	Biosolids will be subject to regular testing to ensure they meet permit requirements prior to being collected and transported offsite to existing agricultural reuse sites. This will be included in the Biosolids Management Plan.

Additional operational management, mitigation and monitoring relevant to waste management is contained within the following section:

- Section 6.9 – Dangerous Goods and Environmentally Hazardous Materials.

6.8.3.3 Residual impacts

With the implementation of the management and mitigation measures outlined above, wastes, including ASS and biosolids, can and will be suitably managed and pose no measurable risk to environmental values at the Project Site. No measurable impacts to the current or future land use are anticipated.

6.9 Dangerous goods and environmentally hazardous materials

6.9.1 Legal and other requirements

The Project must comply with the following legislation and policy in relation to dangerous goods and environmentally hazardous materials:

- *Australian Code for the Transport of Dangerous Goods by Road and Rail (Edition 7.7 2020)*
- *Dangerous Substances (Safe Handling) Act 2005* and associated regulations
- *Dangerous Goods (Road and Rail Transport) Act 2010* and associated regulations
- *Work Health and Safety Regulations 2012*
- *Australian Standard AS 1940:2017 The Storage and Handling of Flammable and Combustible Liquids.*

6.9.2 Potential impacts

6.9.2.1 Construction

Several dangerous goods and environmentally hazardous materials may be used throughout the construction (and commissioning) period, including:

- Fuel for machinery and vehicles (several hundred thousand litres)
- Hydraulic oil and various lubricants for machinery (several thousand litres)
- Paints and solvents (several thousand litres)
- Cement (~100,000 m³)
- Disinfectants and/or weed control chemicals (several hundred litres)
- Sludge material for commissioning of the system (several thousand litres)
- LPG for commissioning of digesters (several thousand litres).

Refuelling and maintenance of equipment will likely occur onsite within the construction compounds (refer Figure 2-6). This will require bulk storage of fuels, oils and chemicals onsite.

Dangerous goods and environmentally hazardous materials present a risk to the environment and human health if used, stored or disposed of incorrectly. Spills of these materials to waterways, drainage lines and wetlands can present significant risks to inhabitants ranging from direct toxicity impacts to smothering effects and inhalation impacts. Spills of these materials to ground can present similar risks if the spilt materials reach the water table or are washed into drainage lines during rains. The key tools for managing these risks are suitable storage, bunding, handling and disposal as outlined in Section 6.9.3 below.

6.9.2.2 Operation

Several dangerous goods and environmentally hazardous materials are required for the sewage treatment process during the operational period of the Project, including:

- Methanol
- Chlorine (gas or sodium hypochlorite)
- Flocculant (alum)
- Caustic soda (sodium hydroxide)
- Citric acid
- Polymers

The accidental release of any of these materials could result in terrestrial or aquatic ecological impacts. As identified in Section 2.4.7, these chemicals will be stored in dedicated tanks throughout the Project Site, with bunding and suitable foundation material in accordance with relevant Australian Standards.

6.9.3 Management, mitigation and monitoring

In addition to the applicable broader management, mitigation and monitoring measures outlined in Section 6, the following discipline-specific measures will also apply to the Project.

6.9.3.1 Construction

The following management and mitigation is proposed for the construction phase of the Project:

Reference number	Management, mitigation or monitoring measure
Management and mitigation	
Dangerous goods and environmentally hazardous materials MM 1	All dangerous goods or environmentally hazardous materials will be stored in appropriately bunded containers within the construction compound(s), in accordance with relevant Australian Standards and state regulations.
Dangerous goods and environmentally hazardous materials MM 2	A refuelling truck will be used throughout the construction phase, which will make regular deliveries to the Project Site. The truck will have on board spill kits and use temporary bunding equipment.
Dangerous goods and environmentally hazardous materials MM 3	A register of dangerous goods and environmentally hazardous materials used onsite will be maintained throughout the construction period. The register will be accompanied by the appropriate safety, storage, segregation and handling information (including Safety Data Sheets).
Dangerous goods and environmentally hazardous materials MM 4	Hydrocarbon and chemical spill kits will be stored within the construction compound(s) and wherever dangerous goods and environmentally hazardous materials are used throughout the Project Site. Kits will also be stored on select site vehicles.
Dangerous goods and environmentally hazardous materials MM 5	All disposal of dangerous goods and environmentally hazardous materials will be undertaken in accordance with relevant Australian Standards and state regulations.
Dangerous goods and environmentally hazardous materials MM 6	Clean-up measures, reporting and notification procedures for equipment breakdowns and accidental releases will be incorporated in an Emergency Response Plan for the Project. This will include clean-up procedures in aquatic environments as well as incident response in the event of fire, chemical release or an explosion. The Emergency Response Plan will form part of the CEMP for the Project.
Dangerous goods and environmentally hazardous materials MM 7	All spills of dangerous goods or environmentally hazardous materials will be reported to the site supervisor, with spills >100 L or any spills >5 L direct to the aquatic environment to be reported to the EPA within 24 hours of the incident occurring.
Dangerous goods and environmentally hazardous materials MM 8	The site induction for all staff will include training in use and disposal of all dangerous goods and environmentally hazardous materials to be used onsite as well as protocols to follow in the event of an incident involving these materials.
Monitoring	
Dangerous goods and environmentally	Records of volumes of all dangerous goods or environmentally hazardous materials used for the Project will be maintained by the construction contractor and be made available to EPA upon request.

hazardous materials MON 1	
Dangerous goods and environmentally hazardous materials MON 2	Monthly audits of all aspects of dangerous goods and environmentally hazardous materials management, mitigation and monitoring will be undertaken and made available to the Director, EPA, upon request.

6.9.3.2 Operation

The following management and mitigation is proposed for the operational phase of the Project:

Reference number	Management, mitigation or monitoring measure
Management and mitigation	
Dangerous goods and environmentally hazardous materials MM 9	The operational storage requirements of chemicals for the treatment process and maintenance requirements will strictly follow required Australian Standards, which will be quality controlled through operational sign-off on the Project by the lead engineering company and a third-party assessor.
Dangerous goods and environmentally hazardous materials MM 10	The use and storage of dangerous goods and environmentally hazardous materials will be governed and documented by TW through internal HSEQ procedures.
Monitoring	
No additional monitoring to that outlined in the applicable broader monitoring measures outlined in Section 6 is proposed.	

6.9.3.3 Residual impacts

With the implementation of the management, mitigation and monitoring measures outlined above, the risk from dangerous goods and environmentally hazardous materials can be well managed and residual risks are very low. No measurable impacts to the current or future land use are anticipated.

6.10 Socio-economic issues

The objective of the Project is to transfer the sewage flows from the Macquarie Point STP to the Selfs Point STP to allow the Macquarie Point STP to be decommissioned and demolished to enable the Macquarie Point redevelopment to proceed. The Macquarie Point redevelopment will result in direct positive benefits to the socio-economic conditions of Hobart by allowing new commercial and residential growth in the Hobart waterfront area. The Project will also result in improved treatment of sewage compared to the existing case, resulting in a net environmental benefit to the receiving environment. Investment in Tasmania's sewage treatment infrastructure services the existing community and facilitates opportunities for growth in the Hobart region by ensuring continuity of wastewater management into the future.

The Project total construction cost is expected to be in excess of \$100 million. The construction phase will employ local construction firms where possible, with input from mainland providers where technical requirements dictate the need. Once operational, the Project does not change operational staffing requirements used for the existing STP.

Potential negative socio-economic impacts relate largely to short-term amenity impacts of the construction phase, including possible short-term traffic disruption and possible localised noise and dust amenity impacts. Once operational, the Project poses no significant amenity or social impacts to the region and contributes positively to long-term economic security through the provision of wastewater treatment and disposal in an improved fashion.

6.11 Hazard analysis and risk assessment

6.11.1 Construction

Potential for major hazards during construction is very low, and the mitigation measures set out in the relevant chapters of this EIS address the routine environmental risks associated with construction (use of hazardous materials and dangerous goods, construction impacts to ecological values etc). Further assessment of construction phase risks will be addressed in the CEMP prior to the commencement of construction.

6.11.2 Operation

Potential hazard events, once operational, could include uncontrolled discharge of treated, partially treated or untreated effluent from the STP to the local Selfs Point effluent outfall. The Blinking Billy effluent outfall is unlikely to be used as an emergency outfall but could be used under extreme conditions or if the local Selfs Point effluent outfall became damaged.

TW has an online Contingency Management Plan for the existing Selfs Point STP, which will be updated as a result of the Project. This management plan identifies:

- Site-specific details outlining potential unplanned event risks and procedures and plans to follow
- Threshold limits for environmental incidents
- Statewide emergency contacts
- Selfs Point STP contacts.

The management plan outlines the following procedures to be followed, which are available to the EPA upon request:

- Sewage Incident & Response Procedure (TW doc number IEM-PRO25)
- Shellfish Zone Sewage Spill Notification Procedure (TW doc number TENPRO01)
- Cyanobacteria (Blue-green Algae) Management Plan (TENMNP05).

Specifically for the Selfs Point STP, the risk of shellfish and blue-green algae impacts are considered negligible in the Contingency Management Plan, with the main risks associated with sewage spill incidents coming from fire, flood, power failure, loss of disinfection, operational malfunction or pipe rupture.

Management of sewage spills is covered in the Sewage Incident & Response Procedure, which outlines the response process in the event of an incident; it also covers financial arrangements for a response and recovery responsibility. The procedure was written to be consistent with the notification procedures from the EPA Sewage Spill Notification Guide and to integrate with notification processes for various industry bodies (e.g. ShellMAP for shellfish fisheries).

Although the Project replaces the processing arrangements and adjusts the quantities processed at the existing Selfs Point STP, it does not inherently increase the risk of hazard events from the site, and overall improves reliability. Nonetheless, the existing Contingency Management Plan for the Selfs Point STP will be updated to reflect the Project.

The following management and mitigation is proposed for the operational phase of the Project:

Reference number	Management, mitigation or monitoring measure
Management and mitigation	
Hazard analysis and risk assessment MM 1	The existing Contingency Management Plan for the Selfs Point STP will be updated to reflect the Project.
Monitoring	
No additional monitoring to that outlined in the applicable broader monitoring measures outlined in Section 6 is proposed.	

6.12 Fire risk

The overall risk of fire associated with the Project is considered low, given the urban location of the work (i.e. not within forested or other fire prone vegetation types), the location is close to emergency services, and the construction process does not have an elevated fire risk above standard construction risk.

The risk to the proposed infrastructure from fire originating from outside the site (i.e. wildfire) is also very low given the urban location of the Project.

6.12.1 Construction

Fire risks during the construction phase are generally limited to standard construction-associated risks including use of machinery in areas containing dry vegetation, use of flammable goods, smoking, and hot works.

The following construction phase management and mitigation is proposed for fire risk.

Reference number	Management, mitigation or monitoring measure
Management and mitigation	
Fire Risk MM 1	An Emergency Response Plan will be developed for the Project which will include fire response protocols. These will indicate muster points, evacuation plans, and emergency service contact and reporting protocols. The Emergency Response Plan will form part of the CEMP for the Project.
Fire Risk MM 2	Designated smoking areas will be included onsite.
Fire Risk MM 3	All hot works will be internally permitted by the construction contractor to ensure adequate controls are in place.
Fire Risk MM 4	All flammable goods will be handled and stored in accordance with Australian Standards and Safety Data Sheets.
Fire Risk MM 5	Project infrastructure will comply with all fire-related building codes.

Reference number	Management, mitigation or monitoring measure
Monitoring	
No additional monitoring to that outlined in the applicable broader monitoring measures outlined in Section 6 is proposed.	

6.12.2 Operation

During operation, there will be standard fire risks associated with electrical faults, smoking, or mishandling or incorrect storage of chemicals. The Project does not present any major change to the existing overall fire risk at the site.

The following operational phase management and mitigation is proposed for fire risk.

Reference number	Management, mitigation or monitoring measure
Management and mitigation	
Fire Risk MM 6	Any additional operational fire risks as a result of the Project will be addressed in the existing operational and emergency plans for the existing STP operation.
Monitoring	
No additional monitoring to that outlined in the applicable broader monitoring measures outlined in Section 6 is proposed.	

6.13 Infrastructure and offsite ancillary facilities

During construction the Project will require the use of the public road network (largely the Brooker Highway) for workforce access and the delivery of materials and equipment. The existing road network has sufficient capacity to accommodate the expected road usage. A portion of the Project Site adjacent to the existing STP site will be used as the construction compound during the construction period. The workforce will not require local accommodation as the Project is within commuting distance to Hobart.

Works ancillary to the Project (but excluded from this application) will include the development of the SPS at the Macquarie Point STP, the installation of the sewage transfer pipeline from the Macquarie Point SPS to the Selfs Point STP, and capacity upgrades to the Blinking Billy effluent outfall pipeline.

The development and completion of these components will be required in order for the Project to enter the commissioning and operational phases and have therefore been taken into consideration during construction planning for the Project. With the exception of the SPS at the Macquarie Point STP, these aspects are considered Prescribed Works under the *Water and Sewerage Industry (General) Regulations 2019*, their construction is likely to commence well prior to construction of the Project commencing, which must go through the permitting and approval process first. Therefore the construction schedule of the Project is unlikely to be affected by these works.

Sewage flows will continue to be accepted and treated at the Macquarie Point STP until construction of the Project, the new Macquarie Point SPS and the pipeline between them are all completed. When commissioning is due to commence at the Project, a valve installed at the new Macquarie Point SPS will divert all or partial flows via a 'T' section in the pipeline towards the Project until commissioning is completed; following this, the valve will be permanently opened and the pipeline leading to the Macquarie Point STP will be permanently sealed off and decommissioned. This process will allow for the management of the effluent volume and quality during the construction and commissioning period.

Additionally, but unlikely to affect the Project, will be the decommissioning and demolition of the Macquarie Point STP, which will occur post-commissioning of the Project.

6.14 Environmental management systems

TW operates under a suite of internal policies, including an Environmental Policy and Community Engagement Policy, which dictate the principles by which the organisation addresses environmental management and community engagement respectively. The policies are endorsed by the TW Board, apply to all staff, and the CEO is responsible for ensuring overall compliance with the policies.

The Environmental Policy includes a commitment to achieving rapid uplift in compliance and reducing key environmental risks from operations. This Project, which seeks to improve the environmental impact of both the existing Selfs Point STP and the Macquarie Point STP through flow amalgamation and significant treatment technology upgrades, is a step towards achieving these goals.

The Environmental Policy is one component of TW's overall Environmental Management System, designed to manage overall environmental performance of the organisation.

As identified in Section 6, a CEMP will be prepared prior to commencement of construction to address environmental management and capture all relevant mitigation measures and commitments from this EIS and any associated permits (refer Various MM 2).

The CEMP will address all potential environmental impacts from construction, including but not limited to those set out in this EIS, and will contain:

- A description of the activities to be undertaken during construction, including proposed timing and sequence of the major construction activities
- Construction site plans showing exclusion zones, proposed construction parking, onsite storage and stockpile areas, screening of the site and vehicular access points during work
- Locations and procedures for washing down vehicles
- The proposed management measures to be implemented to avoid or minimise environmental impacts during the construction phase
- Proposed monitoring and compliance reporting program to show compliance with the CEMP
- An inspection program detailing the activities to be inspected, frequency of inspections and recording of inspections
- A protocol for managing and reporting any incidents and non-compliances
- Procedures for rectifying any non-compliances
- A description of the roles and environmental responsibilities for relevant employees
- Training and induction program for employees including contractors and subcontractors
- Community and stakeholder engagement plan for any works with potential for public disturbance.

The construction contractor will be responsible for implementing the CEMP, including training and induction for all staff, and TW will be responsible for auditing the contractor's compliance against the CEMP.

Once operational, the environmental management of the Project will be captured in the Selfs Point STP OEMP. Environmental risks and controls identified in this EIS will be incorporated into the OEMP, to ensure ongoing management of these matters as part of the overall site management (refer Various MM 3).

6.15 Cumulative and interactive impacts

The Project will result in the amalgamation of sewage flows from Hobart (via Macquarie Pt STP), New Town, Lenah Valley, Sandy Bay and Taroona (via the Selfs Point STP) into a single new treatment plant (i.e. the Project). This will enable the Macquarie Point STP to be decommissioned and cease regular effluent discharge from the Macquarie Point effluent outfall. The Project will also result in the decommissioning of all aged infrastructure at the existing Selfs Point STP site. This essentially covers the strategy for the Hobart region and surrounding suburbs mentioned until 2054.

Reuse options were investigated as part of the Project and are summarised in Section 3.3, with the full effluent reuse feasibility study provided in Appendix A (Pinion Advisory, 2022). At this stage, effluent reuse is not considered financially viable, with an estimated \$75 million in infrastructure upgrades required to plug

in to the existing Clarence recycled water irrigation scheme, including crossing of the river and duplication of infrastructure to take the additional flows. As previously noted, nothing in the Project precludes the viability of such an investment in the future should funding become available.

Environmentally, the Project will result in a net environmental benefit to the water quality of the Derwent Estuary, with significant reductions in total nitrogen and total phosphorus loads entering the estuary in comparison to the existing effluent discharged from the Selfs Point and Macquarie Point STPs; this is discussed further in Section 6.1.

The Project will effectively reduce the amount of treatment infrastructure while improving the quality of the end product, which is a cumulative positive impact for Hobart.

6.16 Traffic

The Project will generate a small number of vehicle movements to and from the site during construction, including:

- Construction equipment that will be delivered at the commencement of works, stored at the construction compound in the Project Site during construction, and then removed from the site at completion
- Several truck deliveries on a daily basis bringing raw materials (e.g. gravel, concrete trucks etc), precast concrete sections, prefabricated treatment equipment, and any other materials required during construction
- Daily light vehicle access for construction workers.

Vehicles accessing the site will use the Brooker Highway and the Selfs Point Road for all aspects of the Project. It is expected the majority of the workforce will be from the local region (e.g. Hobart, Kingston, Glenorchy etc).

Traffic movements along the Brooker Highway will be minor in the context of existing road use and no significant amenity impacts are expected for surrounding users.

Roadkill is not considered to be a significant issue given the urban environment of the Project.

A small number of vessels may be required for the construction of the effluent outfall, and these will be launched at nearby suitable boat launching facilities and generate only a handful of traffic movements.

There will be no permanent change in traffic movements to and from the site once construction and commissioning are complete and no ongoing traffic implications of the Project.

7 Monitoring and review

The proposed monitoring regime for the Project comprises:

- Construction phase monitoring to ensure compliance with the controls set out in this EIS
- Operational phase monitoring of noise and odour to confirm model predictions
- Marine monitoring in the operational phase to assess the impacts at the effluent discharge

7.1 Construction phase monitoring

The proposed construction phase monitoring commitments have been documented in the relevant sections of this EIS and are summarised in Table 7-1.

Table 7-1 Construction phase monitoring commitments

Reference number	Aspect / EIS section	Monitoring commitment
Various MON 1	All (Section 6)	Monitoring procedures for construction environmental controls will be documented in the CEMP and implemented during the construction phase, including as a minimum: • Daily visual monitoring of active construction areas for dust and other visible emissions (e.g. windblown waste and visible water quality issues including high sediment loads or surface sheen). • Fortnightly audits of the physical site construction controls (including sediment and erosion control measures, fencing, signage and waste management). Additional audits will be undertaken after extreme weather events. • Monthly audits of all management measures set out in the CEMP. • Any non-conformance identified during inspections and audits will be documented, investigated and resolved. • Audits will be made available to the EPA on request. Any non-conformance or incident with the potential for serious or material environmental harm will be reported to the Director, EPA, within 24 hours.
Land Contamination MON 1	Land Contamination (Section 6.4.4)	All monitoring for site contamination during construction will be included in the Site Contamination Management Plan for the Project.
Land Contamination MON 2	Land Contamination (Section 6.4.4)	The construction Landfill Gas Management Plan will include construction monitoring requirements for landfill gas, to be developed from the RSRA and LGRA prior to construction commencing.
Waste MON 1	Waste (Section 6.8.3)	The construction contractor will maintain records of waste volumes generated and disposal locations, including disposal facility receipts.
Waste MON 2	Waste (Section 6.8.3)	The construction contractor will undertake weekly site audits to ensure the waste management system is effective, clean up any windblown or otherwise escaped waste, and modify storage arrangements if necessary.
Dangerous goods and environmentally hazardous materials MON 1	Dangerous goods and environmentally hazardous materials (Section 6.9.3)	Records of volumes of all dangerous goods or environmentally hazardous materials used for the Project will be maintained by the construction contractor and be made available to EPA upon request.
Dangerous goods and environmentally	Dangerous goods and environmentally	Monthly audits of all aspects of dangerous goods and environmentally hazardous materials management, mitigation and monitoring will be undertaken and made available to the Director, EPA, upon request.

Reference number	Aspect / EIS section	Monitoring commitment
hazardous materials MON 2	hazardous materials (Section 6.9.3)	

7.2 Operational phase monitoring

The proposed operational phase monitoring commitments have been documented in the relevant sections of this EIS and are summarised in Table 7-2.

Table 7-2 Operational phase monitoring commitments

Reference number	Aspect / EIS section	Monitoring commitment
Various MON 2	All (Section 6)	During the operational phase of the Project, the results of relevant environmental monitoring stipulated in this EIS (and any resulting approval conditions) will be documented in annual environmental reports to be submitted to the EPA within 3 months of the conclusion of the reporting period.
Water Quality MON 1	Water (Section 6.1.4)	The marine ambient monitoring plan outlined in Section 6.1.4.3 will be implemented, which includes regular influent and effluent monitoring (including during upset storm conditions) to ensure STP performance is maintained. Any issues identified from the results will be investigated immediately and rectified as required.
Noise MON 1	Noise (Section 6.2.4)	Directly post-commissioning a noise survey will be undertaken at the sites utilised in Tarkarri (2024) (EIS Appendix C) to confirm the modelling results. The results of the survey will be provided to the EPA within 3 months of undertaking the survey. In the event the noise emissions are above the regulatory targets, additional noise mitigation or management will be applied in discussion with the Director, EPA. This may include the installation of additional or improved acoustic enclosures, quieter equipment, or additional acoustically absorbent internal linings in buildings.
Air Quality MON 1	Air quality (6.3.4)	Directly post-commissioning, odour concentrations will be investigated to confirm the assumptions used in the modelling, including testing odour emissions from the bioreactors to confirm their emission rates. Odour will be remodelled if the outcome of the investigations indicated a higher than expected odour emission rate from the various STP components. The results of the investigation will be provided to the EPA within 3 months of completion. In the event that odour emissions are deemed unacceptable by the Director, EPA, additional odour mitigation or management will be investigated, including potentially covering the BNR anoxic zones.
Land Contamination MON 3	Land Contamination (Section 6.4.4)	The operational Landfill Gas Management Plan will include operational monitoring requirements for landfill gas, to be developed from the RSRA and LGRA prior to operation commencing.
Land Contamination MON 4	Land Contamination (Section 6.4.4)	A Groundwater Monitoring Plan will be developed for the operational phase of the Project to monitor groundwater contamination, the results of which will be used primarily to detect any leaks in Project infrastructure and to monitor contaminant levels reaching the receiving environment (Derwent Estuary). The plan will be based on the outcomes of ongoing pre-construction and construction groundwater monitoring and will include a suite of management and mitigation options for consideration in the event groundwater contamination becomes a significant risk to the receiving environment. The Groundwater Monitoring Plan will form part of the OEMP for the Project.
Waste MON 3	Waste (Section 6.8.3)	Biosolids will be subject to regular testing to ensure they meet permit requirements prior to being collected and transported offsite to existing

Reference number	Aspect / EIS section	Monitoring commitment
		agricultural reuse sites. This will be included in the Biosolids Management Plan.

7.2.1 Marine monitoring

The preliminary marine monitoring plan outlined in Section 6.1.4.3 is summarised below in Table 7-3.

Table 7-3 Summary of preliminary marine ambient monitoring plan

Monitoring	Sites	Parameter	Frequency
Effluent Screening	At STP	Total and dissolved metals (all available metals and metalloids) Nutrients (all available forms) General STP screening elements (BOD, TDS, TOC, chlorine, total residual chlorine etc) Total petroleum hydrocarbons (all available fractions) Benzene, ethylbenzene, toluene, xylene, naphthalene (BTEXN) Disinfection by-products (all available forms) PFAS/PFOS	Following commissioning, effluent screening will be undertaken for four weeks, with composite samples taken weekly over this period. Influent and effluent samples will be taken during each discharge event at the local Selfs Point effluent outfall for the parameters identified during the screening assessment.
Water Quality (Blinking Billy Only)	Outfall (surface, mid, bottom) 10 m, 50 m, 100 m, 500 m (upstream and downstream of outfall) (surface, mid, bottom) Reference (surface, mid, bottom)	Physicochemical (pH, Temperature, Salinity, Conductivity, Dissolved Oxygen, Turbidity) Nutrients (Total Nitrogen, Ammonia as N, Nitrate as N, Nitrite as N, Total Phosphorus as P, Reactive Phosphorus as P, Chlorophyll- α) Total and dissolved metals suite (to be informed by effluent screening but as a minimum As, Cd, Cr, Cu, Pb, Mn, Ni, Zn) Other (Chlorine, Total Residual Chlorine, Oil and Grease, Total Dissolved Solids, Total Suspended Solids, <i>E.coli</i> , Enterococci, and any additional analytes informed by effluent screening) Disinfection By-products (all available forms)	Once prior to commissioning Monthly for 12 months
Sediment Quality (Blinking Billy only)	Outfall 10 m, 50 m, 100 m, 500 m (upstream and downstream of outfall) Reference	Metals suite (minimum As, Cd, Cr, Cu, Pb, Mn, Ni, Zn) Total Petroleum Hydrocarbon (TPH) Total Organic Carbon (TOC) Particle Size Distribution Redox (3 core depths) Nutrients (TN, TKN, Nitrate, Ammonia, TP) Any additional analytes informed by effluent screening Benthic infauna triplicate samples	Once prior to commissioning and once at the completion of 12 months of operation

Monitoring	Sites	Parameter	Frequency
Plume Study (Blinking Billy Only)	Around outfall	Rhodamine or similar tracer study	Once within 12 months of commencing operation
Reporting Draft Marine Ambient Monitoring Plan	N/A	Results of the effluent screening Results of the plume study Final proposed monitoring analytes and sites.	Prior to commencement of monitoring
Reporting Marine Ambient Monitoring Report	All	Results of the 12 months of ambient water quality monitoring Results of the initial sediment quality monitoring event An assessment of the outcomes of the investigations and any recommended changes to the marine monitoring plan	Initial 12-month annual report

8 Decommissioning and rehabilitation

The Project will be entirely constructed on disturbed areas, including the existing STP site, the manmade wetland area, and the roadside verge for the local Selfs Point effluent outfall pipeline. It is expected that only minimal rehabilitation will be required for the Project. This will include reinstatement and stabilisation of any excavated areas that remain exposed post-construction.

Excavated sections will be reinstated with engineered rock and subsoil, and, where appropriate, topsoil will be brought into site, given that the existing topsoil is likely to be contaminated to some degree. These areas will then be stabilised and reseeded with appropriate non-invasive species if appropriate. A rehabilitation plan will be included in the CEMP to document the rehabilitation procedure, including post-construction weed control and monitoring.

Once construction is complete, all aspects of the Project will be TW assets and subject to ongoing maintenance and end of life decommissioning. These components will be included in any future decommissioning plan for the Selfs Point STP site under the existing EPN.

9 Management measures

Management and mitigation measures proposed for each environmental aspect are documented throughout this EIS and summarised in Table 9-1. These measures will be captured in an overall construction environmental management plan (CEMP) and operational environmental management plan (OEMP) as depicted in Various MM2 and Various MM3 in the table.

Table 9-1 Summary of management and mitigation measures

Management and mitigation number	Management or mitigation measure	Phase	EIS Section
Various MM 1	A Final Design Report will be submitted to the EPA for approval prior to the commencement of construction. The Final Design Report will be informed by geotechnical assessment and engineering constraints	Design	Section 6
Various MM 2	A Construction Environmental Management Plan (CEMP) capturing all relevant construction phase management measures set out in this EIS (and any resulting approval conditions) will be prepared and made available to the EPA prior to the commencement of construction. The approved CEMP will be implemented throughout construction.	Construction	Section 6
Various MM 3	An Operational Environmental Management Plan (OEMP) capturing all relevant operational phase management measures as set out in the EIS (and any resulting approval conditions) will be prepared and made available to the EPA prior to the commencement of operation. The approved OEMP will be implemented throughout the operational period.	Operation	Section 6
Various MM 4	An online complaints register and contact phone number for both construction and operational phases will be established to capture any dust, odour, noise, traffic or other complaints received from the public. Complaints will be actioned, the complainant notified and a record kept of the resolution.	Construction and operation	Section 6
Water Quality MM 1	Prior to construction commencing, a construction Sediment and Erosion Control Plan for the Project will be developed, identifying all major drainage lines and waterways and site-specific management and mitigation to be used, including controls such as sandbags, sediment fences, sediment traps and diffusion paths. The Sediment and Erosion Control Plan will form part of the CEMP for the Project.	Construction	Section 6.1.4
Water Quality MM 2	No materials will be stockpiled on existing drainage lines; stockpile perimeter drains and sediment fencing will be used as required.	Construction	Section 6.1.4
Water Quality MM 3	The STP and associated pipelines will be subject to regular maintenance and inspection.	Operation	Section 6.1.4
Water Quality MM 4	The Project's SCADA systems will include monitoring systems and alarms to alert staff of any system or equipment failures. Procedures will be in place to ensure immediate response to any identified issues to ensure the functionality of the STP is maintained and treated effluent quality is not compromised.	Operation	Section 6.1.4
Water Quality MM 5	Chlorine dosing rates will be optimised through the commissioning period based on testing at the Domain break of head tank and the Blinky Billy outfall pump station to optimise the dosage required by measuring residual chlorine in the effluent after it has travelled through the transfer pipeline length; laboratory experiments will also be run using Project-specific effluent to measure chlorine decay rates over longer periods. This information will be used to optimise the dosing rate to achieve the necessary controls at the heat exchangers, while minimising residual chlorine released to the environment.	Operation (Commissioning)	Section 6.1.4

Management and mitigation number	Management or mitigation measure	Phase	EIS Section
Noise MM 1	The Project will include the following noise management and mitigation as a minimum, as included in the noise modelling undertaken on the concept design: • Selection of equipment with lower sound power level specifications (for pumps, blowers and fans). • Acoustic enclosures for select equipment, including pumps, internal equipment associated with the inlet works, blower building and sludge dewatering building, and fan casings in the OCU. • The use of acoustically absorbent internal lining in selected buildings to control reverberation. • The use of an inlet silencer and acoustic lagging of inlet ductwork for the OCU.	Design	Section 6.2.4
Noise MM 2	The final design will include the required mitigation to ensure the existing EPN limits during the day (50 dB(A)), evening (40 dB(A)) and night (35 dB(A)) are met at the closest sensitive receptor.	Design	Section 6.2.4
Noise MM 3	Additional noise modelling will be undertaken to ensure the final design meets the current EPN requirements prior to construction commencing.	Design	Section 6.2.4
Noise MM 4	Where possible operation of noise generating machinery and equipment during construction will be restricted to standard hours as defined by the NSW EPA Draft Construction Noise Guideline 2020 (the Guidelines), that is: • Monday to Friday between 0700 hours and 1800 hours • Saturday between 0800 hours and 1300 hours • Sundays and public holidays – no work Any works required to be undertaken outside these timeframes that require the use of noise generating machinery and equipment will be undertaken in accordance with the noise management measures outlined in the Guidelines.	Construction	Section 6.2.4
Noise MM 5	Low-noise generating plant and equipment will be used where practicable.	Construction	Section 6.2.4
Noise MM 6	Broadband reversing alarms will be used where practicable over traditional tonal alarms to minimise any nuisance noise generated.	Construction	Section 6.2.4
Noise MM 7	The proponent will require the contractor to have regularly serviced and maintained equipment to minimise noise emissions.	Construction	Section 6.2.4
Noise MM 8	Where practical, machinery will be operated at low speed or power and be switched off when not in use, rather than left idling for prolonged periods.	Construction	Section 6.2.4
Noise MM 9	Delivery trucks will be advised to not use exhaust brakes in populated areas.	Construction	Section 6.2.4
Noise MM 10	Regular community updates will be undertaken to inform construction timeframes.	Construction	Section 6.2.4
Noise MM 11	A detailed Construction Noise Management Plan (CNMP) will be provided to the EPA prior to construction commencement to particularly address evening and night drilling noise impacts. Specific information from the appointed contractors drilling equipment to be used onsite will be measured and incorporated into the model to be provided with the CNMP. The CNMP will also include a proposal for trial monitoring at the start of the construction phase to verify the modelling predictions and detail what further mitigation could be adopted if the demonstrated noise levels are found to be problematic.	Construction (pre-construction)	Section 6.2.4

Management and mitigation number	Management or mitigation measure	Phase	EIS Section
Noise MM 12	Where predrilling, using a continuous flight auger drilling rig, is required outside the standard hours as defined by the NSW EPA Draft Construction Noise Guidelines 2020 (the Guidelines) the rig will be enclosed on at least two sides by a suitable noise barrier at least 0.8 m above the rig engine to ensure noise emissions from construction remain below the adopted noise affected noise management levels for non-standard hours.	Construction	Section 6.2.4
Noise MM 13	Noise emitting equipment will be regularly inspected, maintained, and replaced as required.	Operation	Section 6.2.4
Air Quality MM 1	Onsite stockpiling of materials will be avoided where possible for management of dust emissions. If stockpiles are necessary, they will be sited away from the Project Site boundary and with consideration of the prevailing wind direction and the locations of sensitive receptors, watercourses, and surface water drains.	Construction	Section 6.3.4
Air Quality MM 2	Potentially dust generating material stockpiles, unsealed roads and excavated areas will be sprayed during periods of dry weather with water or a suitable dust suppressant as required.	Construction	Section 6.3.4
Air Quality MM 3	Speed restrictions will be applied to all roads within the Project Site, which will minimise dust generation.	Construction	Section 6.3.4
Air Quality MM 4	Project information and construction schedules will be provided to local residents, advising them of potential dust and/or odour generation during construction and the mitigation measures to be applied.	Construction	Section 6.3.4
Air Quality MM 5	Community consultation/notification will be undertaken as early as possible regarding potential odour spikes as a result of the decommissioning of existing process units.	Construction	Section 6.3.4
Air Quality MM 6	During decommissioning of infrastructure containing odour generating materials (during construction phase), mitigation such as temporary infrastructure covers, bagging of waste, and vacuum trucks will be used to minimise odour generation. Decommissioning will also be staged to minimise total odour generation, and weather conditions will be taken into account when planning decommissioning activities to maximise odour dispersion and dilution. Details will be incorporated into the CEMP for the Project.	Construction	Section 6.3.4
Air Quality MM 7	Odour emitting equipment (including new and retained) and areas will be regularly inspected, maintained, and equipment replaced as required.	Operation	Section 6.3.4
Land Contamination MM 1	A comprehensive Landfill Gas Risk Assessment (LGRA) will be undertaken for the Project Site and surrounds prior to construction commencing to collect additional data to delineate the extent of landfill gas risk, and further assess the landfill gas management, mitigation and monitoring required for the construction and operational phases of the Project.	Design	Section 6.4.4
Land Contamination MM 2	The results of the LGRA will be used to inform the design process and ensure that the final design provides suitable mitigation measures to ensure landfill gas risk is adequately managed for the duration of the Project.	Design	Section 6.4.4
Land Contamination MM 3	A construction Site Contamination Management Plan will be developed prior to construction commencing based on relevant EPA Information Bulletins, guidelines and NEPMs and as a minimum contain: • Maps showing areas of potential contamination within the Project Site	Construction	Section 6.4.4

Management and mitigation number	Management or mitigation measure	Phase	EIS Section
	• Appropriate personal protective equipment procedures • Procedures for temporary stockpiling of contaminated material during construction, including any cover and drainage aspects • Testing, monitoring, and classification procedures in accordance with relevant guidelines for areas of contamination, including soils and groundwater • Procedures for reuse of any contaminated soils • EPA processes for sign-off of material considered Level 2 contaminated and greater • Location arrangements for disposal of contaminated material or water (e.g. Copping Landfill) • Procedures for classifying and disposing of clean fill type 1 & 2 in accordance with the EPA Approved Management Method • Procedures for dealing with unanticipated contaminated material • Decontamination procedures for vehicles and workforce • Appended specialised plans and procedures where required. The Site Contamination Management Plan will form part of the CEMP for the Project.		
Land Contamination MM 4	All existing stockpiled soil within the Project Site and soil excavated as part of the Project will be treated as contaminated waste and stored appropriately until classified in accordance with Tasmanian EPA Information Bulletin No. 105, after which it will be disposed of accordingly depending on contamination classification.	Construction	Section 6.4.4
Land Contamination MM 5	ASS risk and management will be addressed through the development of a construction ASS Management Plan in accordance with the DPIPWE document Tasmanian Acid Sulfate Soil Management Guidelines 2015 prior to construction commencing. The ASS Management Plan will form part of the CEMP for the Project.	Construction	Section 6.4.4
Land Contamination MM 6	A construction Landfill Gas Management Plan will be developed prior to the commencement of construction based on the results and recommendations of the LGRA to ensure safety of construction workers, the broader community and the environment during the construction phase. The Landfill Gas Management Plan will form part of the CEMP for the Project.	Construction	Section 6.4.4
Land Contamination MM 7	The existing underground storage tank within the Project Site will be removed under the supervision of a suitably qualified environmental consultant prior to construction commencing, in accordance with the <i>Environmental Management and Pollution Control (Underground Petroleum Storage Systems) Regulations 2020</i> and EPA requirements.	Construction	Section 6.4.4
Land Contamination MM 8	STP infrastructure will be leak tested during the commissioning phase of the Project.	Construction	Section 6.4.4
Land Contamination MM 9	An operational Landfill Gas Management Plan will be developed for the operational phase of the Project, including suitable management, mitigation and monitoring measures in accordance with the recommendations from the RSRA, LGRA, and any ongoing monitoring to ensure any safety or operational risks are adequately managed throughout the operational period of the Project. The Landfill Gas Management Plan will form part of the OEMP for the Project.	Operation	Section 6.4.4
Biodiversity and Natural Values MM 1	The key management measure for the protection of biodiversity in the area is the protection of the planted <i>E.globulus</i> trees along the Project Site fringes, which may be used for foraging by the listed	Design	Section 6.5.4

Management and mitigation number	Management or mitigation measure	Phase	EIS Section
	swift parrot on occasion. The Project footprint has been designed to avoid disturbance to <i>E.globulus</i> trees as a priority, and the remaining trees will be avoided by any future modifications.		
Biodiversity and Natural Values MM 2	All identified swift parrot foraging habitat trees to be retained within 30 m of the boundary of the proposed Project footprint area will be clearly marked and exclusion zones established around them to avoid unnecessary impact during the construction phase of the Project Site.	Construction	Section 6.5.4
Biodiversity and Natural Values MM 3	A construction Weed, Disease and Hygiene Management Plan will be prepared prior to construction. This plan will be prepared in general accordance with the Weed, Disease Planning and Hygiene Guidelines (DPIPWE, 2015b) and include provisions for: • Pre-construction weed control for areas of existing weed infestation in the Project Site. • Hygiene protocols, including vehicle washdown prior to site entry/exit to avoid the spread of weeds and pathogens in general accordance with the Tasmanian Washdown Guidelines for Weed and Disease Control and Keep It Clean – A Tasmanian field hygiene manual to prevent the spread of freshwater pests and pathogens. • Control measures for material brought onto the site for construction to ensure it is free from weed seeds or disease. The Weed, Disease and Hygiene Management Plan will form part of the CEMP for the Project.	Construction	Section 6.5.4
Biodiversity and Natural Values MM 4	At the completion of construction, topsoil will be reinstated to disturbed areas, including seeding with a suitable (non-invasive) species to establish a stable site and reduce the potential for weed spread post-construction.	Construction	Section 6.5.4
Biodiversity and Natural Values MM 5	The Project Site will be kept free of declared weeds throughout the operational phase, with site inspections and declared weed control measures to be stipulated in the OEMP for the Project.	Operation	Section 6.5.4
Biodiversity and Natural Values MM 6	Any swift parrot collision fatalities that are found onsite will be reported to the EPA on an annual basis and if deemed necessary collision mitigation measures will be installed at the Project Site in consultation with NRE Tasmania and the EPA.	Operation	Section 6.5.4
Marine and Coastal MM 1	Floating and submersible plant and equipment to be used for the Project will be disinfected and cleaned prior to use in the marine environment.	Construction	Section 6.6.4
Marine and Coastal MM 2	Any marine vessels and equipment used will have all required Introduced Marine Pest (IMP) inspections completed and documentation in place.	Construction	Section 6.6.4
Marine and Coastal MM 3	Silt curtains will be used in the marine environment around activities that present a risk of sediment disturbance or sedimentation.	Construction	Section 6.6.4
Marine and Coastal MM 4	Aquatic spill kits will be present during any construction activities that occur near or within the marine environment.	Construction	Section 6.6.4
Marine and Coastal MM 5	Refuelling will not occur within 30 m of the marine environment.	Construction	Section 6.6.4
Marine and Coastal MM 6	Marine mammal observers will be present during the installation of the local Selfs Point effluent outfall, who will be responsible for implementing the following protocol during construction: • Each day the immediate area will be scanned for the presence of cetaceans or pinnipeds.	Construction	Section 6.6.4

Management and mitigation number	Management or mitigation measure	Phase	EIS Section
	- Construction activities will not occur, or must cease, if any cetacean or pinniped species is known to be present within 500 m of construction activities. - The Marine Conservation Program within NRE Tas will be consulted immediately prior to construction activities commencing to determine whether there have been any recent marine mammal sightings in the proposed work area (24 hr Whale Hotline on 0427 WHALES or 0427 942 537). - Occurrences of listed cetaceans or pinnipeds will be reported to NRE Tasmania within 90 days. Reference data will include species name, location-GPS (grid reference GDA94), observer name, date, number of individuals and area occupied. - Works will be undertaken in accordance with the National Guidelines for Whale and Dolphin Watching: Whale and Dolphin Viewing Guidelines (available at www.nre.tas.gov.au).		
Groundwater MM 1	Dewatering will be managed in accordance with a construction Dewatering Procedure, which as a minimum will contain methods for suitable collection, treatment and discharge of dewatered groundwater. The Dewatering Procedure will form part of the CEMP for the Project.	Construction	Section 6.7.4
Groundwater MM 2	Groundwater flow testing will be undertaken prior to construction commencing to inform the Dewatering Procedure.	Construction	Section 6.7.4
Waste MM 1	Wastes from onsite toilets will be stored within the portable toilet system and removed from site by a suitably licensed operator and disposed of at a licensed wastewater facility. This may be able to be disposed of at the existing Selfs Point STP for a portion of the construction period.	Construction	Section 6.8.3
Waste MM 2	A waste management area will be delineated within the construction compound(s), with all wastes to be segregated (into recyclables and non-recycles) and all putrescible and/or potentially windblown waste to be stored in sealed bins.	Construction	Section 6.8.3
Waste MM 3	All wastes classed as environmentally hazardous materials will be stored in appropriately banded containers.	Construction	Section 6.8.3
Waste MM 4	Wastes will be removed from site on a regular basis by a suitably qualified operator and disposed of at a suitably licensed facility.	Construction	Section 6.8.3
Waste MM 5	Any asbestos encountered during construction (including demolition) will be removed by a licensed specialist contractor and disposed of at a suitably licensed waste facility.	Construction	Section 6.8.3
Waste MM 6	Diesel remaining in the UST will be pumped out by a licensed operator as part of the UST removal process and taken to a licensed facility for disposal.	Construction	Section 6.8.3
Waste MM 7	During operation a waste management area will be delineated, with all wastes to be segregated (into recyclables and non-recycles) and all putrescible and/or potentially windblown waste to be stored in sealed bins. Wastes will be removed from site on a regular basis by a suitably qualified operator and disposed of at a suitably licensed facility.	Operation	Section 6.8.3
Waste MM 8	Grit and screenings generated during operation will be stored in sealed bins and removed from site by a suitably qualified operator to be disposed of at a suitably licensed facility, on a monthly basis.	Operation	Section 6.8.3
Waste MM 9	Detailed site-specific information about biosolids monitoring, handling and management will be incorporated into the existing	Operation	Section 6.8.3

Management and mitigation number	Management or mitigation measure	Phase	EIS Section
	TW Sewage Sludge Management Plan. The existing plan was developed based on the requirements of the EPA's Tasmanian Biosolids Reuse Guidelines and Approved Management Method for Biosolids Reuse. The updated plan will include, but not be limited to, the following details: • Provide an overview of biosolids treatment and handling at the STP, including transportation details. • Set satisfactory controls to ensure sludge contaminant quality will be consistently maintained. • Identify arrangements and alternative pathways for any biosolids that do not meet the criteria for reuse (including transport to a licensed landfill facility if required). • Define a biosolids monitoring program that fully complies with the requirements of the EPA's Tasmanian Biosolids Reuse Guidelines. • Outline the requirements for process verification for stabilisation of biosolids produced in accordance with the EPA's Tasmanian Biosolids Reuse Guidelines, including all monitoring requirements and evidence to be provided to the EPA.		
Dangerous goods and environmentally hazardous materials MM 1	All dangerous goods or environmentally hazardous materials will be stored in appropriately bundled containers within the construction compound(s), in accordance with relevant Australian Standards and state regulations.	Construction	Section 6.9.3
Dangerous goods and environmentally hazardous materials MM 2	A refuelling truck will be used throughout the construction phase, which will make regular deliveries to the Project Site. The truck will have on board spill kits and use temporary bunding equipment.	Construction	Section 6.9.3
Dangerous goods and environmentally hazardous materials MM 3	A register of dangerous goods and environmentally hazardous materials used onsite will be maintained throughout the construction period. The register will be accompanied by the appropriate safety, storage, segregation and handling information (including Safety Data Sheets).	Construction	Section 6.9.3
Dangerous goods and environmentally hazardous materials MM 4	Hydrocarbon and chemical spill kits will be stored within the construction compound(s) and wherever dangerous goods and environmentally hazardous materials are used throughout the Project Site. Kits will also be stored on select site vehicles.	Construction	Section 6.9.3
Dangerous goods and environmentally hazardous materials MM 5	All disposal of dangerous goods and environmentally hazardous materials will be undertaken in accordance with relevant Australian Standards and state regulations.	Construction	Section 6.9.3
Dangerous goods and environmentally hazardous materials MM 6	Clean-up measures, reporting and notification procedures for equipment breakdowns and accidental releases will be incorporated in an Emergency Response Plan for the Project. This will include clean-up procedures in aquatic environments as well as incident response in the event of fire, chemical release, or an explosion. The Emergency Response Plan will form part of the CEMP for the Project.	Construction	Section 6.9.3
Dangerous goods and environmentally hazardous materials MM 7	All spills of dangerous goods or environmentally hazardous materials will be reported to the site supervisor, with spills >100 L or any spills >5 L direct to the aquatic environment to be reported to the EPA within 24 hours of the incident occurring.	Construction	Section 6.9.3

Management and mitigation number	Management or mitigation measure	Phase	EIS Section
hazardous materials MM 7			
Dangerous goods and environmentally hazardous materials MM 8	The site induction for all staff will include training in use and disposal of all dangerous goods and environmentally hazardous materials to be used onsite as well as protocols to follow in the event of an incident involving these materials.	Construction	Section 6.9.3
Dangerous goods and environmentally hazardous materials MM 9	The operational storage requirements of chemicals for the treatment process and maintenance requirements will strictly follow required Australian Standards, which will be quality controlled through operational sign-off on the Project by the lead engineering company and a third-party assessor.	Operation	Section 6.9.3
Dangerous goods and environmentally hazardous materials MM 10	The use and storage of dangerous goods and environmentally hazardous materials will be governed and documented by TW through internal HSEQ procedures.	Operation	Section 6.9.3
Hazard analysis and risk assessment MM 1	The existing Contingency Management Plan for the Selfs Point STP will be updated to reflect the Project.	Operation	Section 6.11
Fire Risk MM 1	An Emergency Response Plan will be developed for the Project which will include fire response protocols. These will indicate muster points, evacuation plans, and emergency service contact and reporting protocols. The Emergency Response Plan will form part of the CEMP for the Project.	Construction	Section 6.12
Fire Risk MM 2	Designated smoking areas will be included onsite.	Construction	Section 6.12
Fire Risk MM 3	All hot works will be internally permitted by the construction contractor to ensure adequate controls are in place.	Construction	Section 6.12
Fire Risk MM 4	All flammable goods will be handled and stored in accordance with Australian Standards and Safety Data Sheets.	Construction	Section 6.12
Fire Risk MM 5	Project infrastructure will comply with all fire-related building codes.	Construction	Section 6.12
Fire Risk MM 6	Any additional operational fire risks as a result of the Project will be addressed in the existing operational and emergency plans for the existing STP operation.	Operation	Section 6.12

10 Conclusion

The Project will enable the amalgamation of flows from two STPs into one updated treatment facility incorporating the existing Selfs Point STP site and additional adjacent land. The Project includes the establishment of a completely new treatment process at the site, only retaining some minor existing infrastructure components, to treat the catchment flows currently treated at the existing Selfs Point and Macquarie Point STPs. The Project will enable treatment from the catchments to 2054, catering for expected growth.

The primary driver for the amalgamation of the flows is to enable the decommissioning of the Macquarie Point STP as part of the Macquarie Point redevelopment, which will see the whole of Macquarie Point transition from an industrial area to a mixed-use area, making it available for commercial and residential developments.

In addition to this, the Project will also result in significant environmental improvements through increases in treatment efficiency and efficacy, through the use of modern treatment equipment sized to meet the flow rates of the 2054 design horizon. The new treatment systems will result in the reduction of 58% of the total nitrogen and 42% of the total phosphorus that is currently discharged from the existing Selfs Point and Macquarie Point STPs into the Derwent Estuary.

The Project will also result in ceasing regular effluent discharge at the Macquarie Point outfall, with the Project discharging all regular effluent flows to the existing Blinking Billy effluent outfall location which has superior dispersion and dilution rates and is further south of the confinements of the estuary.

The Project will be constructed over an 18 - 24-month timeframe with an additional commissioning period. The construction process flow will allow the existing STP to operate unhindered while the upgrades and new facilities are installed. The majority of the construction force is expected to be sourced locally and is expected to bring an economic benefit to the area during construction.

While effluent reuse opportunities were extensively investigated, no financially viable solutions were identified in the current market, noting that this does not preclude future reuse opportunities with outside investment.

From the standpoint of water quality and the health of the Derwent Estuary overall, the Project is expected to result in a substantial net environmental benefit and is not anticipated to result in measurable negative impacts on the environment. There will potentially be increased chlorine loads at the Blinking Billy effluent outfall as a result of the increased flow, which is modelled as requiring a 20 m mixing zone. However, significant chlorine decay is also expected to occur within the 10 km pipeline stretch to the outfall and in the marine waters surrounding the outfall. TW is aiming to achieve a <0.1 mg/L chlorine concentration at the end of pipeline through dosing optimisation, which will further negate its potential for toxic effects on the environment in the 20 m mixing zone. Additionally it should be noted the Project is simultaneously removing the chlorine discharge from the Macquarie Point effluent outfall.

With mitigation measures in place, noise levels are expected to remain essentially unchanged from the current STP operation. Specialised sound barriers are proposed to be used for temporary night pre-drilling activities during the construction phase, which are expected to reduce impacts to within an acceptable level. To ensure this is the case, the proposed Construction Noise Management Plan (CNMP) will include updated noise modelling and a trial phase of the night drilling activity to ensure the noise mitigation is meeting the required performance standards.

Modelled odour generation shows no exceedance of the allowable 2 OU boundary limit when modelled using inputs from Sydney Water's database for similar systems. Using previous measurements from the existing STP in the modelling predicts higher odour emissions, with the 2 OU isopleth extending beyond the Project boundary to the south into the sports field. The actual odour levels will be confirmed with odour monitoring post-commissioning, and a commitment has been made to investigate covering the anoxic zone of the bioreactors if necessary to reduce odour to an acceptable level.

Land contamination is identified as a key issue for the Project, requiring the greatest scrutiny and management. This is due to the nature of the Project Site, which includes a combination of reclaimed land, an old municipal tip site and an area of dredge spoil, which formed part of a material reuse experiment in

the form of an artificial wetland adjacent to the existing STP. Most soil within the Project Site is considered likely to be contaminated to some extent, which will be managed carefully during construction.

As a result of the landfill area and the circumstances surrounding the development of the artificial wetland, including capping of the landfilled area, a landfill gas risk remains at the Project Site that will require specific design considerations during the detailed design phase and management and mitigation during the construction phase. This may include installing trenches and drains to allow off-gassing in a safe manner. This aspect will be further investigated post-approval by undertaking a full landfill gas risk assessment and subsequently developing a Landfill Gas Management Plan to inform the design and construction of the Project. An operational Landfill Gas Management Plan will then be developed to ensure ongoing management of landfill gas at the Project Site to ensure the integrity of the Project as it relates to health, safety and the environment.

Given the highly urbanised location of the Project Site and its already disturbed nature, biodiversity values on site are limited, and natural value management proposed for the Project is limited to the preservation of planted *E.globulus* trees, which could be used opportunistically by the listed swift parrot as a food source. As a result of iterative project planning, 30 of 55 identified *E.globulus* trees with the highest swift parrot feeding habitat potential will be avoided by the Project Footprint. NBES (2023) have considered the Project against the EPBC Act significant impact criteria, and determined that expected impacts to swift parrot are not likely to result in a significant impact to the species. Nevertheless, TW have elected to refer the Project under the EPBC Act to seek confirmation on the matter.

The marine and coastal environments are not expected to be substantially impacted by the Project, with generally net improvements expected across the estuary as a result of the implementation of modern treatment technology and improved dispersion and dilution of effluent generated.

Existing groundwater is somewhat impacted around the Project Site, likely a result of the material used to develop the land around the area, much of which is of unknown origin and likely to comprise pollutant-containing materials. Groundwater contaminant testing will form part of the construction Site Contamination Management Plan, and flow testing will be undertaken prior to the commencement of construction to inform groundwater management for the construction phase. An operational Groundwater Monitoring Plan will be developed for the Project post-construction to monitor for any sewage treatment leaks or contamination migration as a result of the Project, and the plan will include a suite of potential management measures to be implemented in the event leaks or migrations are detected.

The overall impacts to the environment from the Project are expected to be minimal if the management, mitigation and monitoring outlined throughout this document and summarised in Section 9 and Section 7 are adhered to.

The Project will result in a net environmental benefit to the Derwent Estuary, enable the decommissioning of the poorly performing Macquarie Point STP, secure effluent treatment capability for Hobart and surrounding suburbs until 2054, and enable development to progress at Macquarie Point.

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Appendix A Effluent Reuse Feasibility Study

Appendix B Mixing Zone Modelling

Appendix C Noise

Appendix D Odour

Appendix E Contaminated Land Gap Analysis

Appendix F Contaminated Site Assessment

Appendix G Landfill Gas Rapid Screening Risk Assessment

Appendix H Natural Values Survey

Appendix I Selfs Point Aquatic Assessment

Appendix J Inflow and Infiltration Assessments

Appendix K Project Concept Design Report



Contact us

ERA Planning & Environment
Level 1, 125A Elizabeth St Hobart 7000

☎ (03) 6165 0443

✉ enquiries@eraplanning.com.au

eraplanning.com.au