

Review of Environmental Factors

Part 5 – EP&A Act, 1979

Sewage Treatment Plant & Sewage Reticulation Network
Catherine Hill Bay Scheme Stages 1 & 2
Lot 100, 101 & 106 DP1129872, Lot 1 DP1141989, Lot 1 DP1129299, Lot 103 DP1194707,
Lot 101 & 102 DP1194707, Lot 213 DP883941, Lot 1 Section I DP168, Lot 1 Section K
DP163, Flowers Drive Road Reserve, Montefiore Street Road Reserve & Lot 204
DP1164883

No. 85 & 95 Flowers Drive, 6 Keene Street & 12 Montefiore Street
Catherine Hill Bay



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Review and Amendments Schedule – PLANIT CONSULTING PTY LTD

		Date
Authors	LN	July 2014
Reviewer	AS	July 2014

Revision
Rev A – 22/01/14
Rev B – 02/07/14
Rev C – 15/10/14

The content of this report was prepared for the exclusive use of the proponent for the purposes of undertaking an activity (Sewage Treatment Plant and Sewage Reticulation Network) which does not require development consent but requires assessment under Part 5 of the Environmental Planning and Assessment Act 1979 and is not to be used for any other purpose or by any other person or corporation.

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July 2014

Executive Summary

The Proposal

Catherine Hill Bay Water Utility Pty Ltd proposed to undertake an activity being the construction and operation of a Sewage Treatment Plant (STP) and Sewage Reticulation Network (SRN) to be located on land identified as Lot 100, 101 & 106 DP1129872, Lot 1 DP1141989, Lot 1 DP1129299, Lot 103 DP1194707, Lot 101 & 102 DP1194707, Lot 213 DP883941, Lot 1 Section I DP168, Lot 1 Section K DP163, Flowers Drive Road Reserve, Montefiore Street Road Reserve & Lot 204 DP1164883, Catherine Hill Bay (CHB)

The STP and SRN would be located within the Lake Macquarie City Council (LMCC) Local Government Area (LGA). The site is boarded by the Munmorah State Conservation Area (MSCA) to the south and west and by the MSCA and Pacific Ocean to the east. To the north lies the existing village of CHB. The location and context of the site are further discussed under Section 2.

The activity is proposed in order to service a subdivision approved by the Planning Assessment Commission under Project Approval MP10_0204 on the 13 May 2011 which includes 550 residential lots, 1 retail lot, 9 reserves and 2 heritage lots. This existing approval has been subject to modification application identified as MP10_0204 MOD 2. This modification consolidated a number of approved residential allotments to provide a dedicated allotment for the STP. The STP location as it relates to the development approved under MP10_0204 MOD 2 are further discussed under Section 2.

The proposed STP would have the peak capacity to service 330kL per day and would be commissioned in three (3) stages. The subdivision the STP is to service will require approximately 556ET treatment capacity. Ultimately the STP would provide class A+ recycled water for domestic reuse on all allotments approved under MP10_0204 as modified. Domestic reuse would be facilitated via 'third pipe' (purple pipe) reticulated network.

Stage 1 would provide the full 556ET treatment capacity required by the CHB subdivision using a Membrane Bioreactor (MBR) and Ultraviolet Disinfection (UV), however only a maximum of 112ET would be connected at stage 1. Stage 1 would include onsite irrigation of treated wastewater. As an interim measure during stage 1 the recycled water network would be charged with potable water.

Stage 2 of the proposal would see the installation of an Advanced Water Treatment Plant (AWTP) for the supply of class A+ recycled water through the 'third pipe' recycled water network for domestic reuse. Stage 2 would include a Reject Reverse Osmosis (RRO) unit and would include three (3) Reverse Osmosis (RO) reject evaporation ponds; Stage 2 would be constructed once one hundred and twelve (112) lots within the subdivision are connected to the system and would service a maximum of 470ET. Stage 2 would include onsite irrigation of treated waste water.

Stage (3) represents an ultimate scenario to service the full 556ET required by the approved subdivision. Stage 3 of the proposal would require a form of offsite discharge. **Stage (3) of the proposal is not included or assessed as part of this REF and is mentioned for information purposes only. Stage 3 will be subject to separate approval.**

Need for the Proposal

The proposal is needed to facilitate urban services for the subdivision approved under Project Approval MP10_0204. The proposed STP and SRN is a direct response to the need presented by this approved development

Options Considered

Five options have been identified for the proposal, these are:

- 1 – Do Nothing;
- 2 – Centralised connection to the Hunter Water Network;
- 3 – Decentralised system with water recycling and irrigation of MBR & UV treated effluent on private land;
- 4 – Decentralised system with water recycling and irrigation of AWTP treated effluent on council parks and verges;

The preferred option is option 3 and is that assessed within this REF, this option has been arrived at after considerable investigation into appropriate and economically feasible services provision and alternative measures to deal with wastewater.

A decentralised system licensed under the WIC Act 2006 which maximises water recycling and irrigates MBR treated effluent is the preferred option for the site.

Statutory and Planning Framework

The proposal has been assessed as permissible without consent under the relevant environmental planning instruments. That position is established by reference to Clause 106 of the Infrastructure SEPP.

The proposal is within the definition of activity set by Section 110 of the EP&A Act and is being proposed by a person licensed under the Water Industry Competition Act 2006 (pending issue of license). Assessment under Part 5 of the EP&A Act is therefore required.

The matters prescribed by Clause 228 of the Environmental Planning and Assessment Regulation 2000, for consideration by assessments under Part 5, are reviewed at Appendix B.

No requirement for a referral under the EPBC Act has been identified.

Community and Stakeholder Consultation

Given the nature and scale of the proposal and that no private residences are directly affected, community involvement has been limited.

Consultation has been undertaken with Lake Macquarie City Council and IPART. Where required ongoing consultation would be held with relevant authorities during implementation of the proposal.

Environmental Impacts

Environmental Impact as discussed in detail under Section 7.

Justification and Conclusion

The proposed STP and SRN do not require development consent and is subject to assessment under Part 5 of the EP&A Act. The REF has examined and taken into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity. This has included consideration of critical habitat, impacts on threatened species, populations and ecological communities and their habitats and other protected fauna and native plants.

A number of potential environmental impacts from the proposal have been avoided or reduced during the concept design development and options assessment. The proposal as described in the REF best meets the project objectives. Mitigation measures as detailed in this REF would ameliorate or

minimise any expected impacts associated with the proposal. On balance the proposal is considered justified.

The environmental impacts of the proposal are not likely to be significant and therefore it is not necessary for an environmental impact statement to be prepared or approval to be sought for the proposal from the Minister for Planning under Part 5.1 of the EP&A Act. The proposal is unlikely to affect threatened species, populations or ecological communities or their habitats, within the meaning of the *Threatened Species Conservation Act 1995* or *Fisheries Management Act 1994* and therefore a Species Impact Statement is not required. The proposal is also unlikely to affect Commonwealth land or have an impact on any matters of national environmental significance.

The subject site is considered able to suitably accommodate the proposed STP & SRN

1 – Introduction

1.1 Brief & Purpose of the Report

This Review of Environmental Factors has been prepared by Planit Consulting Pty Ltd on behalf of Coastal Hamlets Pty Ltd. For the purposes of these works, Solo Water Pty Ltd (Catherine Hill Bay Water Utility Pty Ltd) is the proponent and the Minister administering the Independent Pricing and Regulatory Tribunal (IPART) is the determining authority under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The purpose of the REF is to describe the proposal, to document the likely impacts of the proposal on the environment, and to detail protective measures to be implemented.

The description of the proposed works and associated environmental impacts have been undertaken in context of Clause 228 of the *Environmental Planning and Assessment Regulation 2000*, the *Threatened Species Conservation Act 1995* (TSC Act), the *Fisheries Management Act 1994* (FM Act), and the Australian Government's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). In doing so, the REF helps to fulfill the requirements of Section 111 of the EP&A Act, that the determining authority examine and take into account to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the activity.

The findings of the REF would be considered when assessing:

- Whether the proposal is likely to have a significant impact on the environment and therefore the necessity for an environmental impact statement to be prepared and approval to be sought from the Minister for Planning and Infrastructure under Part 5.1 of the EP&A Act.
- The significance of any impact on threatened species as defined by the TSC Act and/or FM Act, in Section 5A of the EP&A Act and therefore the requirement for a Species Impact Statement.
- The potential for the proposal to significantly impact a matter of national environmental significance or Commonwealth land and the need to make a referral to the Australian Government Department of Sustainability, Environment, Water, Population and Communities for a decision by the Commonwealth Minister for the Environment on whether assessment and approval is required under the EPBC Act.

1.2 Proposal Identification

Catherine Hill Bay Water Utility Pty Ltd proposed to undertake an activity being the construction and operation of a Sewage Treatment Plant (STP) and Sewage Reticulation Network (SRN) to be located on land identified as Lot 100, 101 & 106 DP1129872, Lot 1 DP1141989, Lot 1 DP1129299, Lot 103 DP1194707, Lot 101 & 102 DP1194707, Lot 213 DP883941, Lot 1 Section I DP168, Lot 1 Section K DP163, Flowers Drive Road Reserve, Montefiore Street Road Reserve & Lot 204 DP1164883, Catherine Hill Bay (CHB)

The STP and SRN would be located within the Lake Macquarie City Council (LMCC) Local Government Area (LGA). The site is bordered by the Munmorah State Conservation Area (MSCA) to the south and west and by the MSCA and Pacific Ocean to the east. To the north lies the existing village of CHB. The location and context of the site are further discussed under Section 2.

The activity is proposed in order to service a subdivision approved by the Planning Assessment Commission under Project Approval MP10_0204 on the 13 May 2011 which includes 550 residential lots, 1 retail lot, 9 reserves and 2 heritage lots. This existing approval has been subject to modification application identified as MP10_0204 MOD 2, This modification consolidated a number of approved

residential allotments to provide a dedicated allotment for the STP. The STP location as it relates to the development approved under MP10_0204 MOD 2 are further discussed under Section 2.

The proposed STP would have the peak capacity to service 330kL per day and would be commissioned in three (3) stages. The subdivision the STP is to service will require approximately 556ET treatment capacity. Ultimately the STP would provide class A+ recycled water for domestic reuse on all allotments approved under MP10_0204 as modified. Domestic reuse would be facilitated via 'third pipe' (purple pipe) reticulated network.

Stage 1 would provide the full 556ET treatment capacity required by the CHB subdivision using a Membrane Bioreactor (MBR) and Ultraviolet Disinfection (UV), however only a maximum of 112ET would be connected at stage 1. Stage 1 would include onsite irrigation of treated wastewater. As an interim measure during stage 1 the recycled water network would be charged with potable water.

Stage 2 of the proposal would see the installation of an Advanced Water Treatment Plant (AWTP) for the supply of class A+ recycled water through the 'third pipe' recycled water network for domestic reuse. Stage 2 would include a Reject Reverse Osmosis (RRO) unit and would include three (3) Reverse Osmosis (RO) reject evaporation ponds; Stage 2 would be constructed once one hundred and twelve (112) lots within the subdivision are connected to the system and would service a maximum of 470ET. Stage 2 would include onsite irrigation of treated waste water.

Stage (3) represents an ultimate scenario to service the full 556ET required by the approved subdivision. Stage 3 of the proposal would require a form of offsite discharge. **Stage (3) of the proposal is not included or assessed as part of this REF and is mentioned for information purposes only. Stage 3 will be subject to separate approval.**

2 - Site & It's Surrounds

2.1 Property Description

The site of the proposal is made up of a number of existing allotments. The legal property description and corresponding property address are identified in table 1. The site is located within the LMCC LGA.

Table 1: Legal Description Summary

Lot & Plan No.	Property Address
Lot 100 DP1129872	95 Flowers Drive, Catherine Hill Bay
Lot 101 DP1129872	95 Flowers Drive, Catherine Hill Bay
Lot 106 DP1129872	95 Flowers Drive, Catherine Hill Bay
Lot 1 DP1141989	95 Flowers Drive, Catherine Hill Bay
Lot 1 DP1129299	95 Flowers Drive, Catherine Hill Bay
Lot 103 DP1194707	95 Flowers Drive, Catherine Hill Bay
Lot 101 DP1194707	95 Flowers Drive, Catherine Hill Bay
Lot 102 DP1194707	95 Flowers Drive, Catherine Hill Bay
Lot 213 DP883941	85 Flowers Drive, Catherine Hill Bay
Lot 1 Section I DP163	6 Keene Street, Catherine Hill Bay
Lot 1 Section K DP163	12 Montefiore Street, Catherine Hill Bay
Flowers Drive Road Reserve	N/A
Montefiore Street Road Reserve	N/A
Lot 204 DP1164883	Flowers Drive, Catherine Hill Bay

The site is boarded by the MSCA to the south and west and by the MSCA and Pacific Ocean to the east. The site is adjoined to the north by the existing village of CHB. The following further comment is provided on the location of the three key elements of the proposal:

2.1.1 STP allotment

The STP site would be located within and at the western extent of Lot 101 DP1129872. The works are proposed in order to service a subdivision approved by the NSW Planning Assessment Commission under Project Approval MP10_0204 on the 13 May 2011 which includes 550 residential lots, 1 retail lot, 9 reserves and 2 heritage lots.

This existing approval has been modified to consolidate a number of existing approved residential allotments to provide a dedicated lot for the STP. The STP would be located within this dedicated lot. This modification lodged with and approved by the NSW Department of Planning is identified as MP10_0204 MOD 2.

The location of the STP in relation to the amended subdivison layout under MP10_0204 MOD 2 is identified in Figure 2.

2.1.2 Irrigation Area & Location

A total of 8.5 ha of restricted access effluent irrigation area would be provided to service stage 1 and 2 of the proposal (maximum of 470ET). The irrigation area would be staged in line with the rate of production of surplus recycled water from the subdivision however a total of 4.5ha would be required for stage 1 and a further 4ha to stage 2. The irrigation system will be supplied from its own separate and independent irrigation network with its own irrigation pump.

The irrigation areas would be located on Lot 106 DP1129872 and Lot 100 DP1129872 and would occupy the land identified as subdivision stages 6 and 7 under MP10_0204. An aerial image of the proposed irrigation area location is provided in Figure 1. The Irrigation areas are also identified within the Land Capability Assessment for Effluent Irrigation under Appendix L.

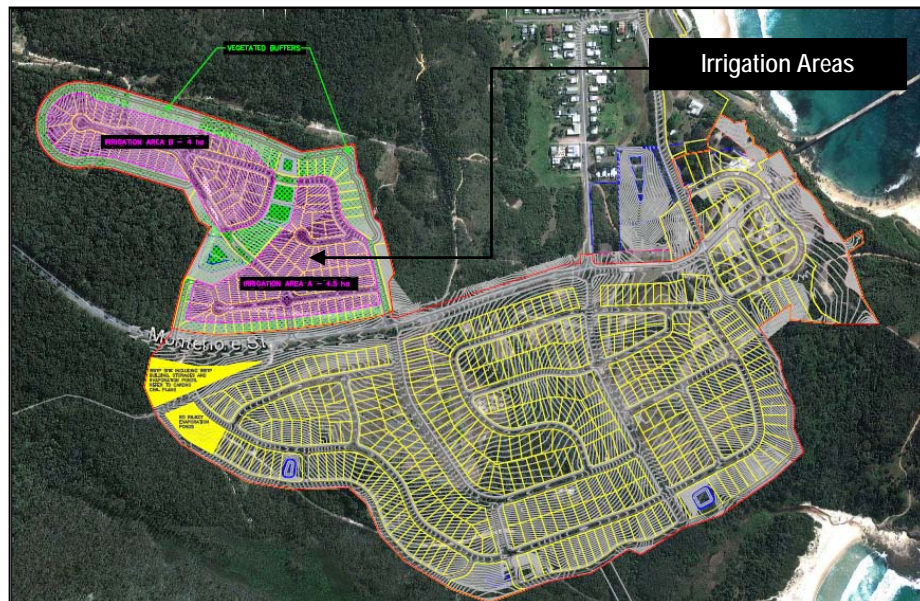


Figure 1 – Irrigation Area Location
Source: Solo Water Integrated Water Management Plan
Illustrative only. Not to scale

2.1.3 Reticulation Network

2.1.3.1 Pressure Sewer and Recycled Water Network

The reticulation network would be located within all allotments the subject of this application and is designed to reflect the amended subdivision layout approved by the NSW Department of Planning under MP10_0204 MOD 2.

2.1.3.2 Lot 204 DP1164883

Lot 204 DP1164883 for part of the MSCA. Lot 204 DP1164883 is part zoned E1 National Parks and Nature Reserves and R2 Low Density Residential. The proposal includes a small run of services across the R2 zoned portion of Lot 204 DP1164883 to access Lot 103 DP1194707. Appropriate easements will need to be negotiated within the Office of Environment and Heritage to allow these services to cross Lot 204 DP1164883. This requirement is included within the summary of project mitigation measures required.

Figure 2 – Amended Subdivision Layout Approved Under MP10_0204 MOD 2 & STP Location

2.2 Location / Context

The proposal would be located on land to the east of the Pacific Highway and the south and south west of the existing CHB village (which includes approximately 90 dwellings and urban facilities). The proposed development site lies to the north of the MSCA.

The CHB development site is located within the LMCC LGA and is situated approximately 100 kilometers north of Sydney and 26 Kilometers south of Newcastle. The site is identified in Figure 3.

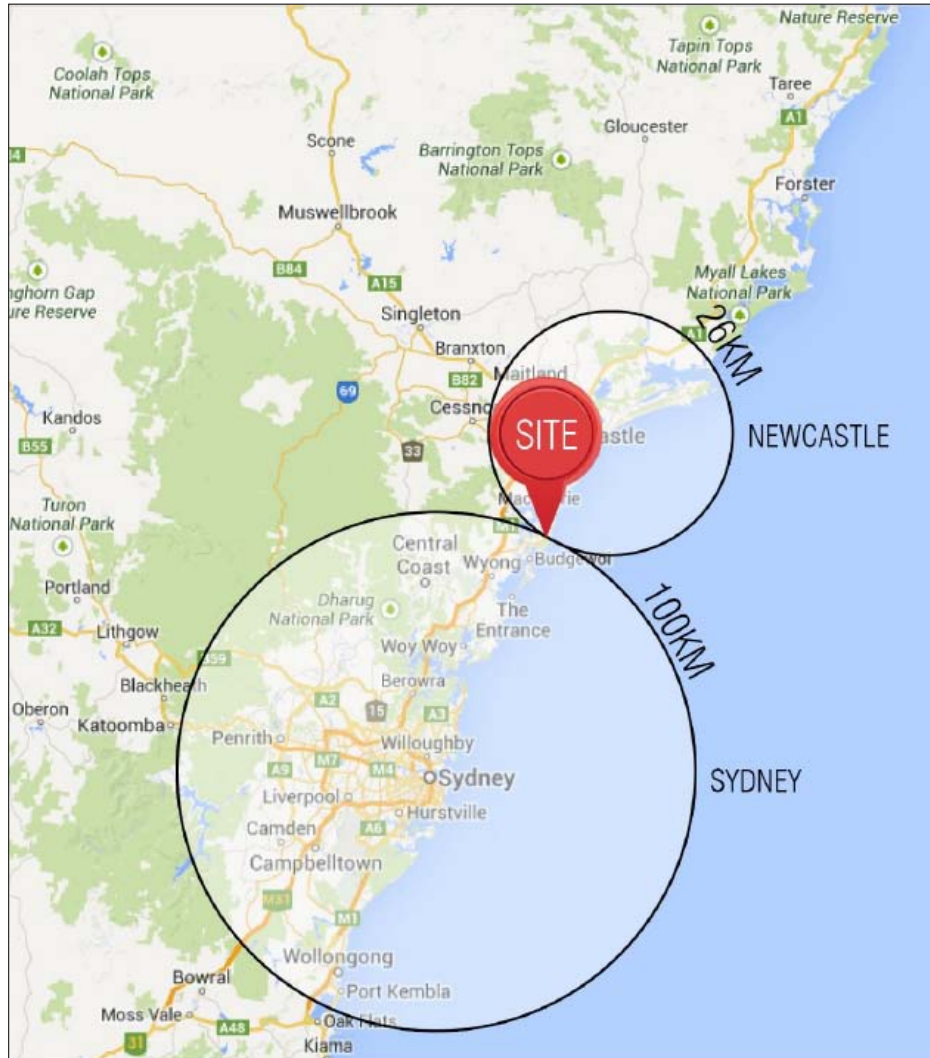


Figure 3 – Site Locality

Source: Landscape & Visual Impact Assessment
Illustrative only. Not to scale

An overview of the CHB subdivision development site and the approximate location of the CHB Water STP site are provided below in Figure 4.



Figure 4: Site Location
Source: Landscape & Visual Impact Assessment
Illustrative only. Not to scale

2.3 Existing Approvals

2.3.1 Project Approval MP10_0204

Previous development approval has been granted by the NSW Planning Assessment Commission under Project Approval MP10_0204 on the 13 May 2011 which includes 550 residential lots, 1 retail lot, 9 reserves and 2 heritage lots (as amended 27/05/2013). This existing approval has been subject to a modification application identified as MP10_0204 MOPD 2. MP10_0204 MOD 2 included the consolidation of a number of existing approved residential allotments to provide a dedicated lot for the STP. The STP would be located within this dedicated lot.

Importantly MP10_0204 was subject to a detailed assessment including but not limited to matters of ecological significance, aboriginal heritage, land contamination, access, etc. In light of this approval there are a significant number of synergies with regards to items that have already been assessed and approved and that which would potentially need to be assessed as part of this REF.

Subject to completion of the works approved by MP10_0204, the STP site would be provided as a cleared, remediated site with formed access. Importantly for this assessment where an overlap exists with the requirements of the existing approval it has been recommended that the requirements of the existing consent and other relevant approvals be completed prior to commencement of work on the STP or associated items.

For reference a copy of the MP10_0204 is included under Appendix H.

2.3.2 EPBC Act Approval

As part of the assessment of MP10_0204 an Environmental Protection and Biodiversity Conservation Act (EPBC) Act referral was required due to proposed vegetation clearing. EPBC Act referral 2012/6382 was approved on the 27 February 2009. Importantly MP10_0204 has assessed all issues relating to flora and fauna associated with the clearing required by the subdivision. The STP and SRN are located within the approved footprint under MP10_0204 and does not require or result in the need for clearing beyond that already approved.

For reference a copy of the EPBC Act Referral 2012/6382 approval is included under Appendix I.

2.3 Existing Improvements

Subject to completion of that required by MP10_0204, the STP site will be presented as a cleared, remediated site with access. As such for the purposes of this REF the site is considered to have no existing improvements.

2.4 Roads and Access

The site has road access from the Pacific Highway via Montefiore Street, approved road 28 and approved road 3, Refer Figure 2. Approved road 28 & 3 are to be constructed as per consent MP10_0204; while as per the requirements of the voluntary planning agreement applying to MP10_0204 the subdivision developer must enter into a road work agreement with the RTA (now RMS) for the upgrade of the Montefiore Street and Pacific Highway intersection prior to the release of subdivision certificate for the creation of the first urban lot.

For the purposes of the REF it has been assumed that access as required to service the subdivision would be constructed and would be available for the STP site.

2.5 Statutory Zoning

The site is subject to the provisions of the Lake Macquarie Local Environmental Plan 2004 (LMLEP) and is subject to a number of land use zonings; these zones are identified follows and are shown in Figure 5:

- SP2 Infrastructure
- R2 Low Density Residential
- E2 Environmental Conservation
- 2(1) Residential
- 7(1) Conservation (Primary); and
- 7(4) Environmental (Coastline)

The surrounding area includes a number of additional land uses and zonings. In the immediate vicinity the following land use zonings are present:

- E1 National Parks and Nature Reserves;
- E2 Environmental Conservation; and
- 8 National Park

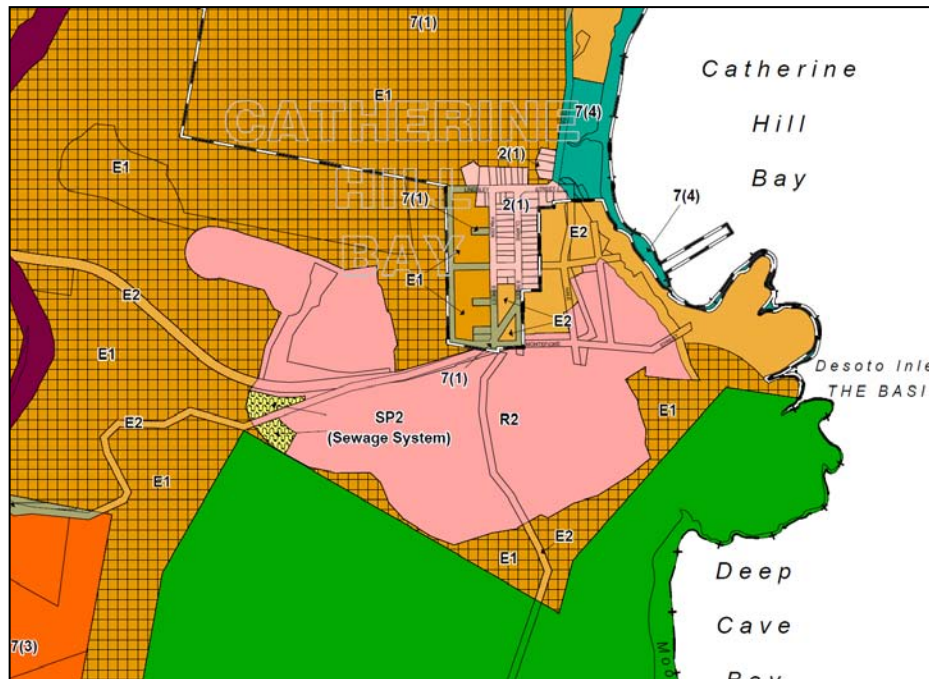


Figure 5: Statutory Zoning
Source: SEPP Major Developments 2005
Illustrative only. Not to scale

2.6 Environmental Considerations

2.6.1 Topography

The topography of the CHB development area which includes the site is significantly altered terrain. The change to the topography has resulted from the former land use of coal mining access, storage, processing/washery and handling of coal exported from the jetty of Catherine Hill Bay.

Geotechnical testing undertaken in support of the project approval MP10_0204 indicates that the current topography has significant areas of cut to fill with benching of up to 10-15 metres from the existing natural surfaces. This was for the creation of flat pads associated with the coal handling land use. The change to topography commenced in the 1870's.

The CHB subdivision will require bulk earth works to be undertaken as part of the development. Topography of the STP site would not be a constraint to development.

2.6.2 Bushfire Prone Land

The site is mapped as bushfire prone land.

2.6.3 Flooding

The site is not mapped as flood prone land.

2.6.4 Sensitive Receivers (Noise & Odour)

There is a small number of existing residence located approximately 800m radius from the STP site. Future residence with stage 5 and 6 of the amended subdivision as proposed under MP10_0204 MOD 2 would be located within 500m radius of the STP site. The location of the STP and

surrounding noise sensitive receivers is shown in Figure 6. It is noted that the residences with stage 6 would only be constructed pending separate approval of stage 3 of the STP and SRN.



Figure 6: Location of Noise Sensitive Receivers
Source: Noise Impact Assessment – Vipac
Illustrative only. Not to scale

2.6.5 Heritage Items

2.6.5.1 Aboriginal Heritage Items

An aboriginal cultural heritage management plan has been prepared in relation to project approval MP10_0204. This assessment identified a single isolated stone artefact within the bounds of the STP site, refer figure 7. No other archaeological sites or features were found within the subdivision development footprint approved under MP10_0204.

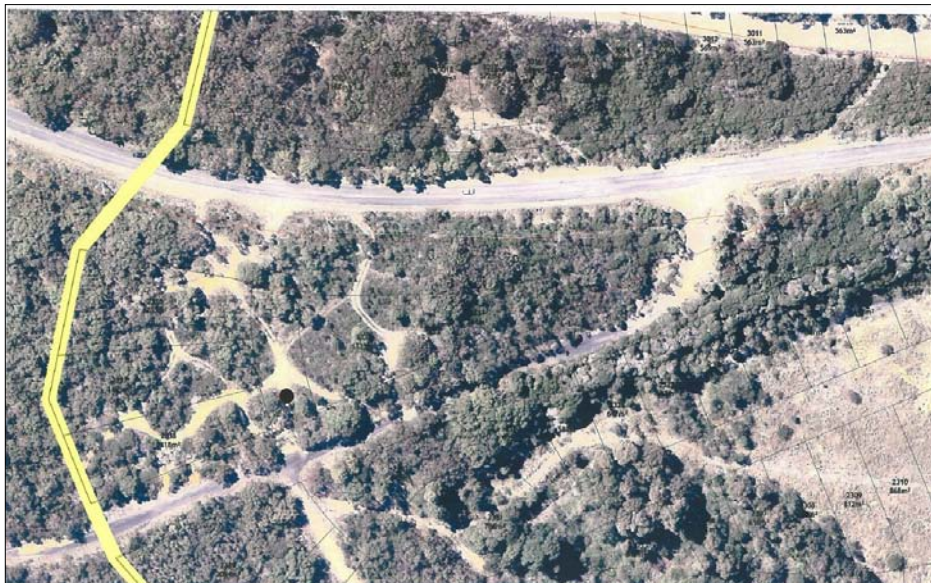


Figure 7: Location of Isolated Stone Artefact
Source: Aboriginal Cultural Heritage Management Plan for Project Approval, Catherine Hill Bay – Insite Heritage Pty Ltd
Illustrative only. Not to scale

2.6.5.2 Non Aboriginal Heritage Items

A number of the allotments which form part of the site fall within the Catherine Hill Bay Cultural Heritage Precinct. The Catherine Hill Bay Cultural Heritage Precinct is listed on the NSW State Heritage Register. The area of the site located within the CHB Cultural Heritage Precinct is identified in Figure 8.

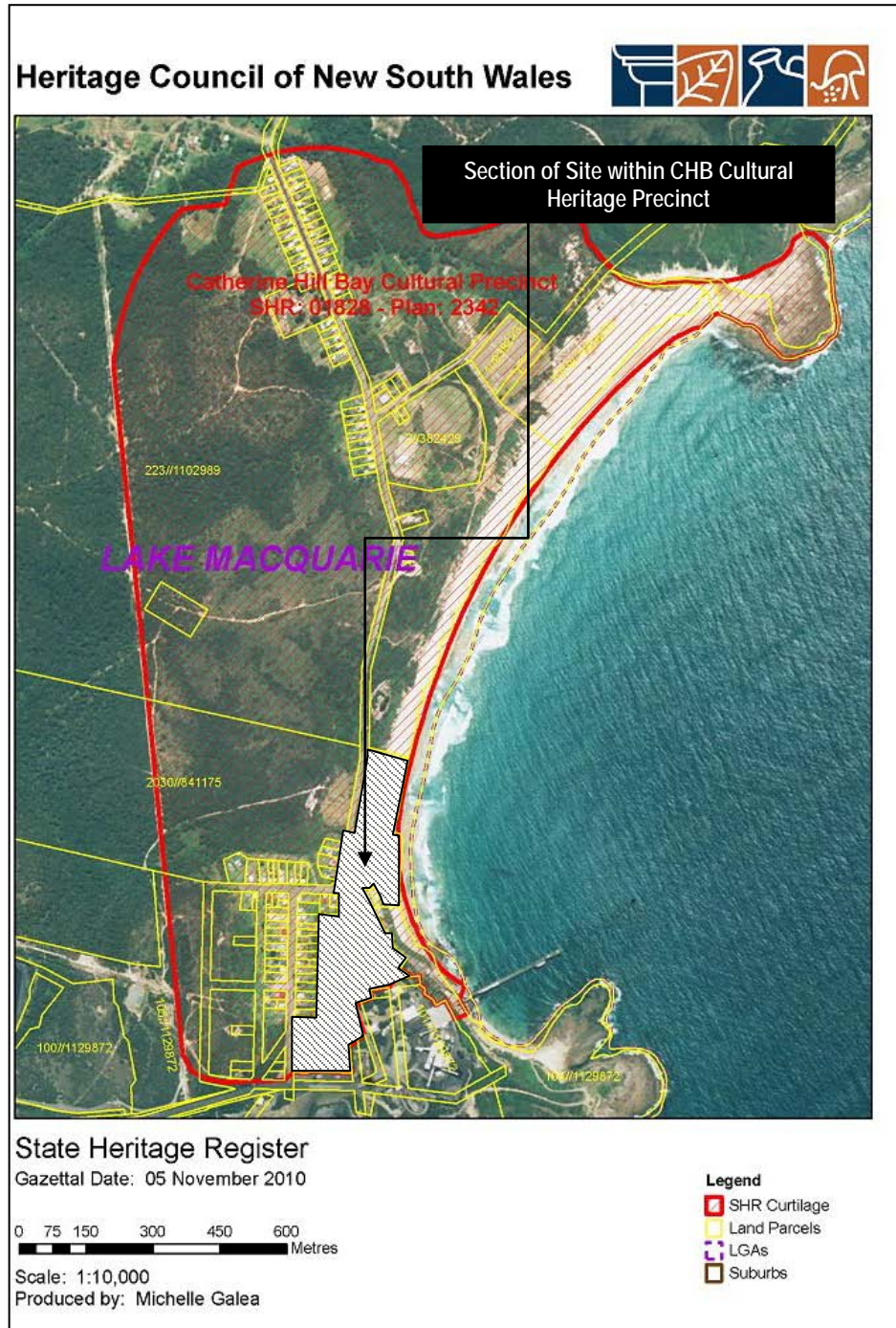


Figure 8: CHB Cultural Heritage Precinct Mapping
Source: NSW State Heritage Register
Illustrative only. Not to scale

The site also includes lots 101 and 102 DP1194707. Both are identified as heritage lots and are located within the Wallarah House Heritage Precinct under the Catherine Hill Bay (South) Development Control Plan 2012 adopted by the Department of Planning and Infrastructure on 18 July 2012.

Works within the Cultural heritage precinct and within Lots 101 & 102 DP1194707 do not relate to built structures upon these sites. Work would be limited to the installation of pressure sewer units and the reticulation network.

2.6.6 Biodiversity

A Terrestrial Flora and Fauna Assessment has been undertaken as part of this REF. Four (4) separate vegetation communities were identified, with the Narrabeen Doyalson Coastal Woodland being the dominate community. Site investigations did not identify any habitat/hollow bearing trees within the STP site.

The site of the STP is known to contain the vegetation community known as Narrabeen Doyalson Coastal Woodland including specific examples of *Tetralthea juncea* (Black-eye Susan) and *Cryptostylis hunteriana* (Leafless Tongue Orchid). Both flora species are listed as Vulnerable species under the EPBC Act.

It is pertinent to note that in June 2012, the Federal Department of Sustainability, Environment, Water, Populations and Communities (DSEWPC) approved an EPBC Act referral allowing the clearing of all vegetation within the subdivision footprint approved under MP10_0204. The proposed site of the STP is located within the footprint of the approved subdivision and is to be created in accord with the existing approvals (MP10_0204 as amended) and will be provided by Coastal Hamlets Pty Ltd to Catherine Hill Bay Water Utility Pty Ltd as a vacant clear site for construction of the STP. The proposal would not require any clearing beyond that already approved in association with MP10_0204.

The fauna survey conducted as part of the ecological assessment over 3 separate trapping investigation periods resulted in the recording of sixty eight (68) species of bird, thirteen (13) reptiles, seven (7) amphibians and thirty one (31) mammals (or evidence of their previous presence). Of these species five (5) (Little Bentwing Bat, Eastern Freetail Bat, Eastern Bentwing-bat Grey Headed Flying Fox, Squirrel Glider) are listed as vulnerable within the TSC Act.

Further detailed discussion is contained within the Terrestrial Flora and Fauna Assessment under Appendix E.

3 - Description of the Proposal

3.1 General Summary

The proposed STP would have the peak capacity to service 330kL per day and would be commissioned in three (3) stages. The subdivision the STP is to service will require approximately 556ET treatment capacity. Ultimately the STP would provide class A+ recycled water for domestic reuse on all allotments approved under MP10_0204 as modified. Domestic reuse would be facilitated via 'third pipe' (purple pipe) reticulated network.

Stage 1 would provide the full 556ET treatment capacity required by the CHB subdivision using a Membrane Bioreactor (MBR) and Ultraviolet Disinfection (UV), however only a maximum of 112ET would be connected at stage 1. Stage 1 would include onsite irrigation of treated wastewater. As an interim measure during stage 1 the recycled water network would be charged with potable water.

Stage 2 of the proposal would see the installation of an Advanced Water Treatment Plant (AWTP) for the supply of class A+ recycled water through the 'third pipe' recycled water network for domestic reuse. Stage 2 would include a Reject Reverse Osmosis (RRO) unit and would include three (3) Reverse Osmosis (RO) reject evaporation ponds; Stage 2 would be constructed once one hundred and twelve (112) lots within the subdivision are connected to the system and would service a maximum of 470ET. Stage 2 would include onsite irrigation of treated waste water.

Stage (3) represents an ultimate scenario to service the full 556ET required by the approved subdivision. Stage 3 of the proposal would require a form of offsite discharge. **Stage (3) of the proposal is not included or assessed as part of this REF and is mentioned for information purposes only. Stage 3 will be subject to separate approval.**

3.2 Plant Layout

The proposed layout of the plant is identified in Figure 9. This plan graphically depicts the ultimate layout of the STP. It is noted no physical changes occur between stage 2 and 3 of the scheme. This plan is also contained within Appendix A.

Figure 9 – Stage 2 Plant Layout

3.2.1 Construction

Construction of the STP is to be undertaken in two (2) stages. The following scope of works is identified for each stage of construction. The construction stages align with the two (2) commissioning stages assessed by this REF. Stage two of the proposal would commence upon connection of 112 lots to the STP.

Stage 1

- STP Building and Office
- Membrane Bioreactor & Associated Process Tanks;
- 1ML MBR permeate tank;
- 2 X 1 ML Wet Weather Storage Tanks;
- 1ML Recycled Water Tank
- 1.2ML Potable Water Storage tank;
- Permanent fence around perimeter with gate;
- All site hardstand including access and manoeuvring areas;
- Install all service ducting to accommodate final Stage 2 fitout;
- Install stage 1 services;
- Progressive installation of 4.5ha of irrigation area including vegetated buffers and perimeter fencing

Stage 2

- Install AWTP and associated process tanks; and
- 46 KL RO Reject Tank;
- Reject RO Unit;
- RO Reject Evaporation Ponds
- Install stage 2 services;
- Progressive installation of 4.0ha of irrigation area including vegetated buffers and perimeter fencing

The above two (2) stages are represented within the proposal plans under Appendix A.

3.3 Sewage Reticulation Network & 'Third Pipe' recycled water network layout.

The Sewage Reticulation Network and 'Third Pipe' recycled water network layout will match the subdivision layout approved under MP10_0204 as amended. The network would be built in seven (7) stages consistent with the staging approved under MP10_0204 as amended. The master plan of the network and the detailed design plans for stage 1 of the subdivision approved under MP10_0204 are contained under Appendix A.

It is noted stage 6 and 7 of the subdivision approved under MP10_0204 would not proceed until approval is sought and granted for stage 3 of the STP and SRN scheme.

3.4 Irrigation

Wastewater Irrigation would occur as part of stage 1 and 2 of the proposal. All waste water for irrigation would be MBR and UV treated.

A total of 8.5 ha of restricted access effluent irrigation area would be provided to service stage 1 and 2 of the proposal (maximum 470ET). The irrigation area would be staged in line with the rate of production of surplus recycled water from the subdivision however a total of 4.5ha would be required for stage 1 and a further 4ha for stage 2. The irrigation system will be supplied from its own separate and independent irrigation network with its own irrigation pump.

The irrigation areas would be located on Lot 106 DP1129872 and Lot 100 DP1129872 and would occupy the land identified as subdivision stages 6 and 7 under MP10_0204. An aerial image of the proposed irrigation area location is provided in Figure 1.

The onsite irrigation system including daily water and nutrient balance modelling is described within the Land Capability Assessment for Effluent Irrigation. This is included under Appendix L.

3.5 Operational Detail

3.5.1 Plant Operation & Equipment

To demonstrate how the plant will work an Integrated Water Management Plan and Land Capability Assessment for Effluent Irrigation has been prepared. These are included under Appendix C and Appendix L. Table 2 summarises the main components of the system:

Table 2: STP Component Summary

Scheme Component	General Description
Membrane bioreactor (MBR) + Ultraviolet disinfection (UV)	<p>All wastewater is treated using MBR + UV to produce high quality effluent. Typical MBR effluent quality:</p> <ul style="list-style-type: none"> - BOD < 10 mg/L - SS < 5 mg/L - TN < 10 mg/L - TP < 0.3 mg/L - Faecal Coliform < 10 cfu/100 mL - Turbidity < 1 NTU <p>The MBR + UV treatment plant has a peak design capacity of 330 kL/day and is sized to provide treatment of average wastewater flows plus a 10% contingency allowance.</p> <p>The full capacity of the MBR is constructed upfront during Stage 1.</p>
Advanced Water Treatment Plant (AWTP) – Constructed during Stage 2	<p>Following construction of the AWTP during Stage 2, MBR treated effluent undergoes further treatment in the AWTP to produce "Class A+" recycled water suitable for supply to customers in the third pipe non-potable water reticulation network.</p> <p>The AWTP uses a multiple barrier approach to achieve log reduction targets outlined in the Australian Guidelines for Water Recycling (2006) using Ultrafiltration membranes, Ultraviolet disinfection and Chlorine contact tank and residual chlorination. All treatment processes in the AWTP will be designed to appropriate USEPA standards using equipment accredited under USEPA guidelines.</p> <p>The AWTP is sized with a nominal capacity of 300 kL/day of recycled water. The AWTP will be operational once 112 lots are connected to the scheme.</p>
Third pipe recycled water network	<p>Compliant recycled water supplied through the urban non-potable water reticulation system is reused for the following uses:</p> <ul style="list-style-type: none"> - Toilet flushing - Laundry washing machine cold water (hard plumbed only) - Outdoor cleaning and washdown (including bin and car washing) - Unrestricted irrigation of private lots

	<p>The non-potable water reticulation system is supplied from a 1 ML recycled water storage tank using a variable speed drive booster pump set. Pressure in the non-potable water reticulation system is maintained below the pressure in the potable water network.</p> <p>An emergency potable water top-up (with air gap) is used to top-up the recycled water storage tank during consecutive peak day demands for recycled water.</p> <p>During Stage 1 only potable water is used to supply the non-potable water reticulation system until the AWTP is constructed in Stage 2.</p>
8.5ha land irrigation	<p>Surplus MBR treated effluent is managed by controlled irrigation of the temporary irrigation areas to be constructed on the developer's land inside the footprint of the approved subdivision. A total of 8.5ha of restricted access effluent irrigation area would be provided for the scheme servicing 470ET. Stage 1 will require 4.5ha and stage 2 a further 4ha.</p> <p>All irrigation water is stored in 2 ML wet weather storages prior to supply via a separate independent irrigation supply network. The system is designed to prevent irrigation during or shortly after rainfall through the use of weather station override on the main irrigation supply pump.</p> <p>Automated irrigation controllers are used to schedule effluent irrigation events on the restricted access open space areas in a controlled manner using spray drift controls and vegetated buffers to minimise environmental and public health risks.</p> <p>The effluent irrigation area would provide the following buffers:</p> <ul style="list-style-type: none"> • Minimum 30m to down gradient property boundary • Minimum 40m to down gradient property boundary in steeper north east corner of the irrigation area • 20m buffer to up gradient property boundary • No irrigation within the 40m wide future waterway corridor approved under MP10_0204 • 70m minimum buffer to nearest residential dwelling

3.5.2 Work Force & Operation Times

The proposed plant will operate 365 days a year, 24 hours a day. Once constructed, the plant will be run by two (2) full time employees. Specialist maintenance contractors would be bought into the site as required to provide maintenance.

3.5.3 Waste Management

The proposed sewerage treatment plant would provide four (4) waste streams. These are identified as follows:

MBR Screenings and Grit

All incoming wastewater passes through a fine screen before entering the MBR treatment process. The screen used is a rotating drum screen with automatic bypass and high level monitoring and is located inside the WWTP building.

The screen includes an automatic dewatering and bagging unit to minimize OH&S issues associated with handling screenings. As each bag is filled, at approximately monthly intervals, the waste material would be taken off site for disposal at an approved land fill facility.

The amount of screenings produced would be minimized through ongoing customer education designed to increase awareness of appropriate solid waste disposal practices.

MBR Waste Activated Sludge

The MBR is an activated sludge process that produces waste activated sludge at approximately 2% of the inflow rate. At ultimate development approximately 5 kL/day of waste activated sludge at solids content of approximately 10,000 mg/L will be generated from the MBR. Waste sludge will be stored in a sealed tank until it is removed from the site at approximately weekly intervals by a licensed liquid waste transport contractor and disposed of to the nearest approved municipal wastewater treatment plant.

Reverse Osmosis Reject

The STP includes reverse osmosis units for salinity control in the recycled water network. The production of waste concentrate is proportional to flow through the STP and feed water salinity. The RO process would produce an RO reject waste stream that requires management.

The RO system is estimated to produce an average of 6.4kL/day of RO reject with Total Dissolved Solids (TDS) concentration of approximately 5000 mg/L. The reject RO waste stream will be managed by:

- Three (3) HDPE lined evaporation ponds with total surface area of 4870m²

The above RO reject management system has been designed using daily water balance modeling. During prolong and extreme wet weather events when the evaporation ponds may fill, reject RO would be trucked offsite to ensure there are no uncontrolled overflows to the environment.

Discussion of the RO reject management system and water balance modeling is provided in Reverse Osmosis Reject Evaporation Pond Water Balance Report under Appendix J.

MBR Chemical Cleaning Wastewater

Chemical laden wastewater used in MBR cleaning would contain high concentrations of chlorine, acid/or caustic. The exact constituents would vary depending on the cleaning regime being undertaken. All membrane cleaning wastewater is temporarily stored in the Clean In Place (CIP) waste tank and neutralized prior to return to the inlet balance tank for treatment in the MBR.

Return of neutralized water is 'trickled' back to the inlet balance tank in a controlled manner over a period of several days or weeks to ensure no impact on the biological process of the system. If process impacts are observed during operation this waste stream will be removed from the site and taken to the nearest approved facility by licensed liquid waste transport contractor.

General Waste

The site will generate a small amount of general waste including general waste from staff, landscaping waste from maintenance and general cleaning waste. This waste would be serviced by the local waste contractor.

3.5.4 Air Quality

Odour

An Odour assessment has been undertaken for the facility. A copy of the odour impact assessment is provided under Appendix G. The odour assessment identified the STP and its operations would not result in odour concentrations exceeding the relevant criterion of 2 OU/m³. The odour modelling did not identify any specific mitigation measures as required.

Dust

All vehicle manoeuvring areas are to be fully sealed. Dust will not be generated onsite as part of operations. Refer proposal plans under Appendix A.

To ensure no dust impacts during construction, measures to control and mitigate dust from the site would be prepared and integrated into the proposed Construction Environmental Management Plan (CEMP)

3.5.5 Water Quality

Irrigation

The proposal would see 8.5ha of land irrigated during stage 2 of the STP and SRN scheme. The irrigation area would be staged in line with the rate of production of surplus recycled water from the subdivision however a total of 4.5ha would be required for stage 1 and a further 4ha to stage 4. The irrigation system will be supplied from its own separate and independent irrigation network with its own irrigation pump.

The irrigation areas would be located on Lot 106 DP1129872 and Lot 100 DP1129872 and would occupy the land identified as subdivision stages 6 and 7 under MP10_0204. An aerial image of the proposed irrigation area location is provided in Figure 1.

All wastewater to be irrigated would be treated by a membrane bioreactor (MBR) and UV disinfection to produce very high quality water that is low in BOD, nutrients and faecal coliforms. The expected quality of irrigation water is outlined below in Table 4.

Table 4: Typical irrigation water quality following MBR+UV treatment.

Parameter	Units	Minimum	Mean	95%ile	Maximum
Biochemical Oxygen Demand	mg/L	-	-	10	20
Suspended Solids	mg/L	-	-	5	10
Total Nitrogen	mg/L as N	-	10	-	20
Total Phosphorus	mg/L as P	-	0.3	-	2
pH	pH	6.5	-	-	8.5
Turbidity	NTU	-	-	1	2
Faecal Coliforms	cfu/100 mL	-	-	10	100
Total Dissolved Solids	mg/L	-	750	-	1000

Detail discussed of the modeling and water and nutrient balance results is included within the Land Capability Assessment for Effluent Irrigation. This is included under Appendix L.

Stormwater Management STP Site

Stormwater would be handled in accord with Councils requirement and relevant Australian Standards. A Stormwater Management Plan would be prepared for the STP site.

3.5.6 Noise and Vibrations

A Noise Impact Assessment (NIA) has been undertaken for the facility for both operation and construction. A copy of the noise impact assessment is provided under Appendix F and Construction Noise Management Plan (CNMP) under Appendix F. The NIA has identified no specific noise control measures during operation as being required.

The CNMP has identified standard best practice measures to proactively control construction noise. These requirements would be included within the proposal Construction Noise Environmental Plan (CEMP).

3.5.7 Traffic and Transport

The site will be accessed via internal roadway network from within the approved subdivision as amended. The proposal can facilitate onsite internal loading/unloading of Articulated Vehicles. As referenced on the currently approved subdivision plan for the CHB development, access to and from the Pacific Highway would occur via Montefiore Street, Road 28 and Road 3. Refer Figure 2 for amended subdivision layout as sought by MP10_0204 MOD 2 with STP overlay.

It is anticipated only two (2) truck movements per week would occur once the plant is constructed and operational. The proposal would not generate a significant increase in traffic during operation.

With regards to construction, a traffic management plan would be prepared and implemented as part of a CEMP for the proposal.

3.5.8 Chemicals Management

The following water treatment chemicals would be used in the CHB Water scheme:

- Aluminium Chlorohydrate for enhanced phosphorous removal;
- Acetic Acid as a supplementary carbon source for MLSS control and denitrification;
- Hydrochloric acid for pH correction and membrane cleaning;
- Sodium hydroxide for pH correction and membrane cleaning;
- Sodium hypochlorite for chlorine dosing and membrane cleaning;
- Sodium metabisulphite for dechlorination of RO feed water; and
- RO antiscalant chemicals to prevent fouling of the RO membranes.

All chemicals used in the scheme would be managed based on best practice strategy outlined below:

- Online monitoring and control of chemical dosing to minimise chemical consumption;
- All chemicals delivered to the site by licensed chemical transport company in 200 litre or 1000 litre plastic containers to minimise transport risk;
- A dedicated chemical storage area at the WWTP site that:
 - Is located inside the WWTP building to avoid exposure to direct sunlight, wind etc;
 - Is located in an appropriately lined and bunded area with adequate storage volume to contain all spills;
 - Provides separation of non-compatible chemicals;
 - Lifting gantry to allow safe unloading of chemical containers;
- Material Safety Data Sheets will be maintained onsite for all chemicals;
- Spill response kits will be maintained onsite for all chemicals;
- Procedures to control the acceptance of chemicals to the site to ensure only the correct chemicals are unloaded;
- Emergency response procedures for chemical spills;
- Staff training to ensure competency in chemical management processes and procedures.

3.6 Utilities

3.6.1 Water

No water is used in the treatment process. Water usage would be limited to staff amenities, cleaning and landscaping maintenance. Water usage associated with the proposal will be minimal.

It is noted that in conjunction with the private STP solution, Catherine Hill Bay Water Utility Pty Ltd will also be providing potable water services. The provision of the potable water service is not included within the scope of this REF. Emergency potable water backup would be provided for the recycled water reticulation system to ensure the continuity of supply.

3.6.2 Sewerage

Sewage generated by the development would be treated onsite. Sewerage generated onsite would be minimal and would only be associated with staff located on the site at any one time.

3.6.3 Electricity

Electricity supply would be available with appropriate capacity installed as part of works to facilitate the CHB subdivision.

3.7 Environmental Management Plans

Specific plans to manage the environmental impacts of construction and operation would be prepared as part of the proposed STP and SRN. The following plans would be prepared (among others):

- Construction Environmental Management Plan (CEMP);
- Operation Environmental Management Plan (OEMP)
- Emergency Response Plan (ERP)

The REF recommends that certain mitigation measures be implemented as part of the proposal. These mitigative measures are listed in Section 8 and discussed in Section 6 and would be incorporated into these plans as outlined below.

3.7.1 Construction EMP

A Construction Environmental Management Plan (CEMP) would be prepared for the construction and commissioning phase of the proposed STP and SRN. The proponent would be responsible for ensuring that the CEMP adequately addresses environmental issues and the conditions of approval. The CEMP would include the following information and control plans:

Project Objectives and Scope – Once approval of the proposal has been obtained, the project scope and objectives would be reassessed within the terms of any approval conditions.

Permits and Approvals – All permits and approvals required prior to and during the construction of the proposal would be identified in the CEMP. This would provide a checklist for construction contractors to ensure all permits and regulations are complied with and relevant approvals are obtained.

Consent Conditions – Consent conditions would be outlined within the CEMP with instructions on how to meet the conditions of approval. This would provide a checklist for construction contractors to ensure that consent conditions are met in the most effective manner.

Complaints Procedure – A procedure for managing complaints received during construction would be provided in the CEMP. The procedure would provide details on undertaking and monitoring actions following receipt of a complaint.

Construction Methods and Environmental Management Procedures – This section would provide an accurate description of the proposed construction activities. Location plans would be provided. Environmental considerations to be taken into account during all construction activities would be provided. Specific requirements relating noise, dust, traffic, etc would be outlined in other

sections of the CEMP and would include timing details and who is responsible for their implementation.

Soil and Water Management – An erosion and sediment control plan would be prepared as part of the CEMP. The plan would detail the methods of erosion and sediment control, maintenance requirements, location requisites for effective operation of erosion and sediment control measures and related monitoring and reporting requirements.

Waste Management – This section would outline waste management procedures, including waste recycling and reuse measures, waste disposal measures (when reuse is not feasible), and the identification of the closest waste disposal areas. The waste management plan would be developed to minimise the generation of waste during construction and maximise reuse, recovery and recycling of waste products.

The CEMP would be reviewed on a regular basis and would incorporate the result of any monitoring undertaken in the previous period.

3.7.2 Operating EMP

An Operation Environmental Management Plan (OEMP) would be prepared for the operational phase of the proposed STP and SRN. The proponent would be responsible for ensuring that the OEMP adequately addresses environmental issues and the conditions of any relevant approvals. The measures recommended to mitigate predicted environmental impacts during operation are discussed in Section 6.

Key environmental management issues that would be addressed include:

- Consent conditions;
- Requirements for emissions to air;
- Effluent quality requirements;
- Overflow prevention procedures;
- Requirements for chemical handling;
- Odour management;
- Noise management;
- Waste management; and
- Irrigation management and scheduling
- Weed management of irrigation areas

3.7.3 Emergency Response Plans

Emergency Response Plans will be developed for all critical risks identified through the risk assessment processes. Emergency response plans will be concise documents generally arranged in a flow chart type arrangement with relevant contact details etc. to ensure ease of use by operators.

All incidents and “near misses” that occur in the CHB Water scheme would be logged and reviewed to ensure continuous improvement. An incident reporting procedure would be developed that outlines the requirements of reporting of all incidents. Post incident reviews would be undertaken to identify appropriate preventative measures to be developed and implemented to prevent reoccurrence of similar events.

3.8 Environmental Monitoring, Reporting and Complaints Control

Environmental monitoring and reporting would be undertaken during construction and operation of the STP and SRN. Whilst a detailed monitoring and reporting program would be developed during the preparation of the CEMP and OEMP in accord with conditions of consent, an outline of proposed operational monitoring programs is provided.

3.8.1 Operational Phase Monitoring and Reporting

During the operational phase of the STP and Water Recycling Scheme, the following would be monitored:

- Effluent quality and quantity;
- Odour complaints and compliance with maintenance for carbon filter replacement;
- Noise emissions;
- Chemical storage and management;
- Waste generation and disposal;
- Soil, ground water and surface water conditions; and
- Overflow prevention actions.

Irrigation would be controlled by the automatic digital weather station located at the STP site to ensure irrigation only occurs at appropriate times.

The monitoring methods, locations, frequency, criteria, reporting and responsibilities would be determined during preparation of the OEMP and would be consistent with any relevant licence conditions.

3.8.2 External Communications

Operation

All Solo Water schemes, including the CHB Water scheme, use a centralised customer service call centre for receiving, logging and acting on customer questions, complaints, water outages and faults identified by the general public.

As required under the IPART retail license the CHB scheme will be supported by a customer call centre. In general the call centre will provide the following functions:

- Receive and log all customer complaints, queries and faults 24-hours a day, 7 days a week;
- Where appropriate call centre staff will escalate issues and provide work orders to CHB operations staff to attend to complaints and faults etc.;
- CHB operations staff are required to report back to the call centre when the fault has been acted upon and rectified, or to provide an update on progress. Open work orders are followed up by customer service call centre staff to ensure timely action;
- The customer service database records all complaints, issues, actions, response times etc. To enable extraction of Key Performance Indicators for reporting and continuous improvement;

Construction

A 24 hour contact number would be established and maintained for the duration of the construction period. The responsible person and entity will be identified in the CEMP for the proposal.

4 – Need and Options Considered

This section looks at other feasible alternatives to carrying out the development including the do nothing option. These are summarised below. It is concluded that the alternatives are not socially, economically or technically feasible or require further detailed assessment and that the proposal can occur with identified impacts being suitably mitigated and managed.

4.1 Strategic need for the Proposal

The proposal is needed to facilitate urban services for the subdivision approved under Project Approval MP10_0204. The proposed STP and SRN is a direct response to the need presented by this approved development

4.2 Objectives of the Proposal

The objectives of the proposal are:

- Provide financially feasible services to the approved CHB development;
- To provide best practice sewerage treatment and waste water minimisation for the locality;
- To ensure that activities have minimal environmental impacts upon the locality;
- To ensure noise, odour, visual and traffic impacts on surrounding land uses are at an acceptable level

4.3 Alternatives and Options Considered

4.3.1 Methodology for selection of preferred option

The preferred design option has been selected using a cost / benefit analysis. The preferred design option has been selected based upon the following criteria:

- Cost;
- Service provision;
- Constructability; and
- Potential Impacts

4.3.2 Identified Options

Five options have been identified for the proposal, these are:

- 1 – Do Nothing;
- 2 – Centralised connection to the Hunter Water Network;
- 3 – Decentralised system with water recycling and irrigation of MBR & UV treated effluent on private land;
- 4 – Decentralised system with water recycling and irrigation of AWTP treated effluent on council parks and verges;

The following assessment is provided for each, for options 2 through 4 the description and evaluation of this option is presented in Table 5.

Do nothing option

The 'do nothing' option is not an alternative if the CHB estate is to be developed. This options was discounted

Options 2 through 4

Table 5: Option 2 through 4 Analysis

Option	Description	Evaluation Summary
2 Centralised Business As Usual (BAU) connection to Hunter Water network	<p>The BAU connection to Hunter Water would involve construction and operation of:</p> <ul style="list-style-type: none"> • Gravity sewer networks, some of which would be at considerable depth and located below the water table; • A number of smaller sub-catchment scale sewage pump stations; • A number of large sewage transfer pump stations and approximately 10 km sewer rising mains with chemical injection for septicity control to connect to the existing network at Swansea; • Upgrades to the existing network at Swansea; • Treatment of all wastewater at Belmont WWTP to secondary treatment standards in a conventional activated sludge process; • Discharge of all treated effluent to the ocean with no wastewater recycling. 	<p>The BAU option is not the preferred option due to:</p> <ul style="list-style-type: none"> • No water recycling; • 100% of treated effluent discharged to the ocean; • Potential for wet weather overflows from the gravity sewer network and pump stations; • Environmental risk associated with failure of the 10 km sewer rising main; • Issues of septicity due to long detention times in the transfer system, particularly during earlier stages of development; • Belmont WWTP and broader catchment is already stressed during peak wet weather flow events; • This option is subject to Hunter Water capital works program and is dependent on contributions from other developers, which is unlikely in the medium term.
3 Onsite treatment with water recycling and irrigation of private land	<p>This option involves the construction and operation of:</p> <ul style="list-style-type: none"> • Pressure sewer network within continuous online monitoring and alarms; • Onsite Membrane Bioreactor to treat wastewater close to its source; • Advanced Water Treatment Plant (AWTP) sized to treat approximately 60% of wastewater flow for recycling at each house; • The 40% of surplus effluent managed by irrigation of private restricted access irrigation areas; • 8.5 ha irrigation area and 2 ML wet weather storage to manage all surplus water by irrigation with no discharges to waterways. 	<p>The original Solo Water proposal had the following advantages:</p> <ul style="list-style-type: none"> • 60% of all wastewater generated is recycled back to each house; • 40% surplus effluent managed by sustainable irrigation; • No discharges of surplus recycled water to waterways; • No wet weather overflows from the pressure sewer network; • Treat wastewater close to its source and avoid long sewage transfer systems; • Relatively low energy option. • Can deliver 470 ET capacity to allow initial stage of the subdivision approved under MP10_0204 to proceed <p>This is the preferred option for stages 1 and 2 of the STP and SRN scheme.</p>
4 Onsite treatment with water recycling and irrigation of public land	<p>The original Solo Water onsite wastewater proposal involved construction and operation of:</p> <ul style="list-style-type: none"> • Pressure sewer network within continuous online monitoring and alarms; • Onsite Membrane Bioreactor to treat wastewater close to its source; 	<p>The original Solo Water proposal had the following advantages:</p> <ul style="list-style-type: none"> • 60% of all wastewater generated is recycled back to each house; • 40% surplus effluent managed by sustainable irrigation; • No discharges of surplus recycled

Option	Description	Evaluation Summary
	<ul style="list-style-type: none"> Advanced Water Treatment Plant (AWTP) sized to treat approximately 60% of wastewater flow for recycling at each house; The 40% of surplus effluent managed by irrigation of public open space, parks and landscape buffers; 10 ha irrigation area and 10 ML wet weather storage to manage all surplus water by irrigation with no discharges to waterways. 	<p>water to waterways;</p> <ul style="list-style-type: none"> No wet weather overflows from the pressure sewer network; Treat wastewater close to its source and avoid long sewage transfer systems; Relatively low energy option. Can deliver 556 ET capacity to allow whole subdivision approved under MP10_0204 to proceed <p>This was the preferred option but is not feasible because Lake Macquarie City Council (LMCC) as the ultimate owner of the parks, landscape buffers and public open space will not permit irrigation using recycled water.</p>

Stage 3 of the scheme will require separate assessment of discharge options and will be subject to separate assessment and approval.

4.4 Preferred Option

The preferred option is option 3 and is that assessed within this REF, this option has been arrived at after considerable investigation into appropriate and economically feasible services provision and alternative measures to deal with wastewater.

A decentralised system licensed under the WIC Act 2006 which maximises water recycling and irrigates MBR and UV treated wastewater is the preferred option for stage 1 and 2 of the STP and SRN scheme.

5 - Statutory Framework

5.1 Commonwealth Legislation

5.1.1 Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act 1999)

Under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) a referral is required to the Australian Government for proposed 'actions that have the potential to significantly impact on matters of national environmental significance or the environment of Commonwealth land. These are considered in Appendix B and Chapter 7 of the REF.

The assessment of the proposal's impact on matters of national environmental significance and the environment of Commonwealth land found that there is unlikely to be a significant impact on relevant matters of national environmental significance. Accordingly, the proposal has not been referred to the Australian Government Department of Sustainability, Environment, Water, Population and Communities.

As part of the assessment of MP10_0204 an Environmental Protection and Biodiversity Conservation Act (EPBC) Act referral was required due to proposed vegetation clearing. EPBC Act referral 2012/6382 was approved on the 27 February 2009. Importantly MP10_0204 has assessed all issues relating to flora and fauna associated with the clearing required by the subdivision. The STP and SRN are located within the approved footprint under MP10_0204 and does not require or result in the need for clearing beyond that already approved.

For reference a copy of the EPBC Act Referral 2012/6382 approval is included under Appendix I.

5.2 State Legislation

5.2.1 Environmental Planning and Assessment Act 1979 (EP&A Act 1979)

As provided by Clause 76, an environmental planning instruments being SEPP (Infrastructure) 2007 outlines the proposal is permissible without development consent. The EP&A Act 1979 outlines the definition of an 'activity' as it relates to Part 5 of the EP&A Act 1979. The proposal is consistent with this definition and assessment is required in accord with the provisions of Part 5 of the EP&A Act 1979.

5.2.2 Environmental Planning & Assessment Regulation 2000 (EPAR 2000)

The matters prescribed by Clause 228 of the Environmental Planning and Assessment Regulation 2000, for consideration by assessments under Part 5, are reviewed at Appendix B.

5.2.3 Protection of the Environment Operations Act 1997

The POEO Act 1997, prohibits any person from causing pollution of waters or air, and provides penalties for pollution offences relating to water, air and noise. The POEO Act provides a regulatory framework for the licensing of all activities listed in Schedule 1 to the Act that have the potential to impact on the environment.

The proposal falls within the Schedule 1 definition of 'Sewerage Treatment'. Pursuant to Clause 48 of the POEO Act, an Environmental Protection License (EPL) is required for all scheduled activities and would be issued to a specific premises or activity. The proposal is not a scheduled activity as the

STP capacity does not exceed 2,500 equivalent persons or 750 kL/day. An EPL is not required by the development.

Section 120 of the *Protection of the Environment Operations Act 1997* (POEO Act) prohibits the pollution of waters. The proposal includes measures to address the risk of water pollution, see sections 7.

The proposal will include earthworks to form the proposed storage ponds, If VENM is to be taken off the site, a Section 143 Notice under the POEO Act will be required and if the site to receive the spoil requires a development application this will be in place as required by the Section 143 notice prior to the spoil being relocated.

5.2.4 Mines Subsidence Compensation Act 1961

In accord with Clause 15 of the Mines Subsidence Act 1961 the proposed site is located within the Swansea North Entrance Mine subsidence district. As per the requirements of Clause 15 (2A) an approval is required to alter or erect improvements within a mine subsidence district. This approval would have to be obtained prior to commencement of any works.

5.2.5 National Parks and Wildlife Act, 1974

The harming or desecrating of Aboriginal objects or places is an offence under section 86 of the *National Parks and Wildlife Act 1979*. Under section 90, an Aboriginal heritage impact permit may be issued in relation to a specified Aboriginal object, Aboriginal place, land, activity or person or specified types or classes of Aboriginal objects, Aboriginal places, land, activities or persons. Aboriginal objects or places are not likely to be affected by the proposal, refer Section 7.

All native birds, reptiles, amphibians and mammals, except the dingo, are protected in NSW under the NPW Act. The harming of protected fauna is prohibited under the NPW Act, but an exemption applies in relation to things that are essential to the carrying out of an activity to which Part 5 of the EP&A Act applies and where the determining authority has complied with the provisions of that part.

Potential impacts on flora and fauna are considered in Section 7. The proposal has been assessed as unlikely to impact upon flora or fauna.

5.2.6 Heritage Act, 1977

A number of the allotments which form part of the site fall within the Catherine Hill Bay Cultural Heritage Precinct. The Catherine Hill Bay Cultural Heritage Precinct is listed on the NSW State Heritage Register. Clause 57 Effect of Interim Heritage orders and listing on State Heritage Register of the Heritage Act 1977 requires that:

- (1) *When an interim heritage order or listing on the State Heritage Register applies to a place, building, work, relic, moveable object, precinct, or land, a person must not do any of the following things except in pursuance of an approval granted by the approval body under Subdivision 1 of Division 3:*
- (a) *demolish the building or work,*
 - (b) *damage or despoil the place, precinct or land, or any part of the place, precinct or land,*
 - (c) *move, damage or destroy the relic or moveable object,*
 - (d) *excavate any land for the purpose of exposing or moving the relic,*
 - (e) *carry out any development in relation to the land on which the building, work or relic is situated, the land that comprises the place, or land within the precinct,*
 - (f) *alter the building, work, relic or moveable object,*
 - (g) *display any notice or advertisement on the place, building, work, relic, moveable object or land, or in the precinct,*
 - (h) *damage or destroy any tree or other vegetation on or remove any tree or other vegetation from the place, precinct or land.*

As such the activity (proposal) would require an approval in respect of doing or carrying out of an act, matter of thing required to in Clause 57(1) of the Heritage Act 1977.

5.2.7 Roads Act, 1993

The *Roads Act, 1993* sets out rights of members of the public to pass along public roads, establishes procedures for opening and closing a public road, and provides for the classification of roads. It also provides for the requirement for an approval to be issued for any structure or work to be carried out on or over a public road. The proposed reticulation network and STP site access would include works within existing public road reserve. Approval under Section 138 of the Road act will be required for these items.

5.2.8 Threatened Species Conservation Act, 1995

The TSC Act is directed at conserving threatened species, populations and ecological communities of animals and plants. Certain species of animals or plants are identified as endangered species, populations or communities or vulnerable species under the Act. Areas of land comprising the habitats of listed endangered species may also be declared critical habitat under the Act.

By operation of associated EP&A Act provisions, activities that are likely to have a significant impact on listed threatened species, populations, endangered ecological communities or their habitats must be the subject of a species impact statement and require the concurrence of the Director-General of the Office of Environment & Heritage. Likely impacts on threatened species have been considered in Section 7. The assessment identifies the proposal is unlikely to threaten the viability of any local populations.

Section 91 of the TSC Act provides for the granting of licences for, amongst other things, to harm or pick threatened species, populations or ecological communities or damage habitat. The corresponding offence is outlined in section 118A of the NPW Act. Importantly, several defences are expressly recognised by the NPW Act including where the action taken was essential to the carrying out of an activity to which Part 5 of the EP&A Act applies and where the determining authority has complied with the provisions of that part. In this context it can be noted that that full compliance with Part 5 of the EP&A Act is being pursued.

The proposed STP and SRN do not require any vegetation removal beyond that approved under MP10_0204.

5.2.9 Water Management Act 2000

The Water Management Act 2000 provides for the sustainable and integrated management of the State's water for the benefit of both present and future generations. The Act controls the extraction and use of water, the construction of water bodies such as weirs and dams and any activity that is in or near water sources in NSW.

The definition of a 'water source' is a broad term used to describe any or whole parts of a river, lake, estuary, NSW coastal waters or a place where water occurs naturally on or below the surface of the ground. The definition of a 'controlled activity' is the carrying out of work or any other activity that affects the quality or flow of water in a water source. The definition of 'waterfront land' is defined as land within 40 metres of a lake, estuary, river or shoreline.

The proposal does not require a control activity approval for the operation of the STP and SRN as no water extraction would be required as part of the proposal. However any construction that is located within the 40m prescribed distance of a waterway will require a controlled activity approval. A controlled activity approval for any such construction would be required prior to commencement of works.

5.2.10 Noxious Weeds Act 1993

The Noxious Weeds Act 1993 (NW Act) establishes a system for the identification and control of noxious weeds in NSW. Responsibility for the control of noxious weeds lies with the owner and/or occupier of private land and Crown land, local councils and other public authorities on land they occupy. Under the NW Act, the Minister for Primary Industries may declare a plant to be a noxious

weed. Control notices can be issued by the Minister and local control authorities to ensure obligations are met. Weed management measures undertaken as part of the works would comply with the requirements of the Noxious Weeds Act 1993.

5.2.11 Rural Fires Act 1997

The Rural Fires Act 1997 includes the requirement for NSW Rural Fire Service approval of certain types of sensitive development, or special fire protection purpose under Section 100B of the Act. The proposal is not listed as a special fire protection purpose and approval under Section 100B of the Act is not required.

The proposed STP is classified as a Class 10a structure pursuant to the Building Code of Australia (BCA). The BCA does not provide for any bushfire specific performance requirements and as such AS-3959-2009 does not apply as a set of 'deemed to satisfy' provisions. The general fire safety construction provisions are taken as acceptable solutions, but the aims and objectives of Planning for Bushfire Protection 2006 apply in relation to other matters such as access, water and services, emergency planning and landscaping / vegetation management. A review of applicable requirements has been undertaken and is included within the Bushfire Management Plan under Appendix K.

5.3 State Environmental Planning Policies

The following State Environmental Planning Policies are applicable to the proposal:

- State Environmental Planning Policy No. 33 – Hazardous and Offensive Development;
- State Environmental Planning Policy No. 44 – Koala Habitat Protection;
- State Environmental Planning Policy No. 55 – Remediation of Land;
- State Environmental Planning Policy (Infrastructure) 2007;
- State Environmental Planning Policy (State & Regional Development) 2011

The following comment is provided against each:

5.3.1 State Environmental Planning Policy No. 33 – Hazardous and Offensive Development (SEPP 33)

SEPP 33 deals with the definition of and control of hazardous and offensive developments. SEPP 33 provides definitions for 'hazardous industry', 'hazardous storage establishment', 'offensive industry' and 'offensive storage establishment'. The definitions apply to all environmental planning instruments, existing and future.

The policy requires specified matters to be considered for proposals that are 'potentially hazardous' or 'potentially offensive' as defined in the policy. For example, any application to carry out a potentially hazardous or potentially offensive development is to be advertised for public comment, and applications to carry out potentially hazardous development must be supported by a preliminary hazard analysis (PHA).

The policy does not change the role of the determining authority, land zoning, or the designated development provisions of the EP&A Act where applicable. The operation of the STP will use minimal chemical storages and is not consistent with any of the definitions contained within SEPP 33. The proposal does not trigger the need for a preliminary hazard analysis.

5.3.2 State Environmental Planning Policy No. 44 – Koala Habitat Protection (SEPP 44)

A Terrestrial Flora and Fauna Assessment has been undertaken as part of the REF. A copy is included under Appendix E. As part of this assessment a review against SEPP 44 has been undertaken the following extract is provided:

This Policy 'aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline.'

In association with development applications and in areas where the policy applies a number of criteria are to be addressed to determine levels of assessment and to govern management considerations. The steps are as follows:

1. Does the Policy Apply?

Is the land greater than 1ha in size and located within one of the Local Government areas listed within Schedule 1 of SEPP 44?

Yes. The land is >1HA in area and located within the Lake Macquarie Local Government area, and the Wyong Local Government Area.

2. Is the land potential koala habitat?

The SEPP defines 'potential koala habitat' as 'areas of native vegetation where the trees of the types listed in Schedule 2 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component.' The trees within Schedule 2 are tabulated below:

Table 15 - Koala Feed Tree Species

Scientific Name	Common Name
<i>Eucalyptus tereticornis</i>	Forest red gum
<i>Eucalyptus microcorys</i>	Tallowwood
<i>Eucalyptus punctata</i>	Grey Gum
<i>Eucalyptus viminalis</i>	Ribbon or manna gum
<i>Eucalyptus camaldulensis</i>	River red gum
<i>Eucalyptus haemastoma</i>	Broad leaved scribbly gum
<i>Eucalyptus signata</i>	Scribbly gum
<i>Eucalyptus albens</i>	White box
<i>Eucalyptus populnea</i>	Bimble box or poplar box
<i>Eucalyptus robusta</i>	Swamp mahogany

*RPS HSO (2010) states that there is *Eucalyptus punctata*, *Eucalyptus haemastoma*, *Eucalyptus signata*, and *Eucalyptus robusta* located in vegetation communities within the site. These were observed as part of these investigations within the site and adjacent to it.*

3. Is the land core koala habitat?

The SEPP defines 'core koala habitat' means 'an area of land with a resident population of koalas, evidenced by attributes such as breeding females (that is, females with young) and recent sightings of and historical records of a population.'

According to RPS HSO (2010), no evidence of Koalas was observed within the CHB Development Lands during previous fauna surveys which included scat searches and spotlighting. There has however been Koalas recorded in the nearby offset areas identified above in Section 5 and (Atlas of NSW Wildlife Data). It is contended that the land is not core koala habitat as defined.

4. Is there a requirement to prepare a Plan of Management for land containing core koala habitat?

No. It is considered that the site does not contain core Koala habitat as described.

As the site does not contain core koala habitat a koala management plan is not required. Again it is noted that all clearing of the site and surrounding subdivision footprint has been approved

under MP10_0204 and EPBC Act referral 2012/6382. The proposal does not require further approval.

5.3.3 State Environmental Planning Policy No. 55 – Remediation of Land (SEPP 55)

SEPP 55 deals with the remediation of land, with the consent authority required to consider the items listed under Clause 7. As stated by Clause 7:

- (1) A consent authority must not consent to the carrying out of any development on land unless:
 - (a) It has considered whether the land is contaminated, and
 - (b) If the land is contaminated, it is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for the purpose for which the development is proposed to be carried out, and
 - (c) If the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied that the land will be remediated before the land is used for that purpose.
- (2) Before determining an application for consent to carry out development that would involve a change of use on any of the land specified in subclause (4), the consent authority must consider a report specifying the findings of a preliminary investigation of the land concerned carried out in accordance with the contaminated land planning guidelines.
- (3) The applicant for development consent must carry out the investigation required by subclause (2) and must provide a report on it to the consent authority. The consent authority may require the applicant to carry out, and provide a report on, a detailed investigation (as referred to in the contaminated land planning guidelines) if it considers that the findings of the preliminary investigation warrant such an investigation.
- (4) The land concerned is:
 - (a) Land that is within an investigation area,
 - (b) Land on which development for a purpose referred to in Table 1 to the contaminated land planning guidelines is being, or is known to have been, carried out,
 - (c) To the extent to which it is proposed to carry out development on it for residential, educational, recreational or child care purposes, or for the purposes of a hospital—land:
 - (i) in relation to which there is no knowledge (or incomplete knowledge) as to whether development for a purpose referred to in Table 1 to the contaminated land planning guidelines has been carried out, and
 - (ii) On which it would have been lawful to carry out such development during any period in respect of which there is no knowledge (or incomplete knowledge).

The STP and SRN will be located within the approved footprint of the CHB subdivision under MP10_0204. As part of the assessment of MP10_0204 the issue of site contamination was given significant consideration. As required by the conditions of approval for MP10_0204 a Remediation Action Plan (RAP) is to be prepared for the entire CHB development.

Approval MP10_0204 requires that an accredited EPA auditor certify that the RAP has been implemented and that the whole site is suitable for the proposed residential development prior to the issue of subdivision certificate. As the STP site is within the bounds of the approved CHB subdivision the site will be subject to the works required by the RAP for the subdivision and upon completion will be suitable for the construction of the STP.

5.3.4 State Environmental Planning Policy (Infrastructure) 2007

State Environmental Planning Policy (Infrastructure) 2007 (ISEPP) aims to facilitate the effective delivery of infrastructure across the State.

Clause 106(1) of ISEPP permits development for the purposes of sewage treatment plants to be carried out by or on behalf of a public authority or any person licensed under the *Water Industry Competition Act 2006* without consent on land in a prescribed zone; while Clause 106(3) permits development for the purposes of sewerage reticulation system by or on behalf of a public authority or any person licensed under the *Water Industry Competition Act 2006* without consent on any land.

As the proposal is for a sewerage treatment plant and sewerage reticulation system and is to be carried out by Solo Water Pty Ltd (Catherine Hill Bay Water Utility Pty Ltd) which will be licensed under the WIC Act 2006, it can be assessed under Part 5 of the *Environmental Planning and Assessment Act 1979*. Development consent under Part IV of the EP&A Act 1979 is not required.

It is noted the STP will be located on land zoned SP2 Infrastructure a prescribed zone for the purposes of Clause 106(1) of ISEPP.

The proposal is not located on land reserved under the *National Parks and Wildlife Act 1974* and does not affect land or development regulated by *State Environmental Planning Policy No. 14 - Coastal Wetlands*, *State Environmental Planning Policy No. 26 - Littoral Rainforests* or *State Environmental Planning Policy (Major Projects) 2005*.

Part 2 of the ISEPP contains provisions for public authorities to consult with local councils and other public authorities prior to the commencement of certain types of development. Consultation, including consultation as required by ISEPP (where applicable), is discussed in chapter 6 of this REF.

5.3.5 State Environmental Planning Policy (State & Regional Development) 2011

The provisions of SEPP (State & Regional Development) 2011 provide for the nomination of development that is state significant development pursuant to Section 89C of the EP&A Act 1979. Specifically clause 8 Declaration of State Significant development: section 89 states:

8 Declaration of State significant development: section 89C

- (1) *Development is declared to be State significant development for the purposes of the Act if:*
- (a) *the development on the land concerned is, by the operation of an environmental planning instrument, not permissible without development consent under Part 4 of the Act, and*
 - (b) *the development is specified in Schedule 1 or 2.*

As part of the site is located on land on the State Heritage Register the proposal is listed within Schedule of SEPP (State & Regional Development) 2011. However by virtue of Clause 106 of SEPP (Infrastructure) 2007 the proposal is permissible without development consent. Clause 106 of SEPP (Infrastructure) 2007 does not include any exclusion for land located on the State Heritage Register. As such the proposal does not meet the requirement of Clause 8(1)(a) and as such is not state significant development.

5.4 Lake Macquarie Local Environmental Plan 2004

Permissibility is established by SEPP (Infrastructure) 2007 and is discussed under Section 5.3.4. The Lake Macquarie Local Environmental Plan 2004 also applies to the site, specifically Part 11 South Wallarah Peninsula Site. The proposal does not compromise the provisions contained within the LMLEP. The following comment is provided against the relevant clauses:

Clause 144 – Height of Building

The site of the STP is identified with a statutory height limit of 9m. No structure associated with the STP will exceed 7.2m in height. The proposal is compliant with Clause 144. Refer Appendix A.

Clause 150 – Heritage Conservation

The proposal does not include any of the items listed as requiring consent in relation to a heritage item. The proposal will require an approval under Clause 57(1) of the Heritage Act 1977 prior to works commencing within the area of the site listed on the State Heritage Register.

5.5 Catherine Hill Bay (South) Development Control Plan

The STP site will be located within the South Montefiore Street precinct. The intent of the precinct is for structures to correspond to the surrounding bushland with structures to be constructed of natural materials and neutral colours. Structures are to be low in scale to allow surrounding bush to be dominate feature of the locality.

The proposed STP structures would meet this intent with heights a maximum of 7.2m, native screen planting to be provided and where possible colours will be natural. The STP building would be clad with a natural colorbond colour such as Pale Eucalypt or similar. Refer Landscape and Visual Impact Assessment under Appendix D for assessment of the STP visual impact upon the locality.

Stormwater management for the STP would be prepared and would be in accord with Lake Macquarie Councils DCP No.1 Volume 2 Engineering Guidelines. No drainage is to be directed to the adjacent conservation lands.

5.6 Confirmation of statutory position

The proposal has been assessed as permissible without consent under the relevant environmental planning instruments. That position is established by reference to Clause 106 of the Infrastructure SEPP.

The proposal is within the definition of activity set by Section 110 of the EP&A Act and is being proposed by a person licensed under the Water Industry Competition Act 2006 (pending issue of license). Assessment under Part 5 of the EP&A Act is therefore required.

The matters prescribed by Clause 228 of the Environmental Planning and Assessment Regulation 2000, for consideration by assessments under Part 5, are reviewed at Appendix B.

No requirement for a referral under the EPBC Act has been identified.

6 – Stakeholder and community consultation

6.1 Community involvement

Community involvement of consultation has been limited on the proposed STP and SRN. The proposal plant will not impact upon the existing CHB village. The proposal is such that it will not have undue adverse impact on the residential allotments it will adjoin within the approved subdivision.

6.2 Aboriginal community involvement

Further consultation with the local aboriginal community has not been undertaken as part of this REF. The proposed STP & SRN is located within the existing approved footprint of the CHB subdivision under MP10_0204. In accord with the requirements of MP10_0204 an Aboriginal Heritage Management Plan was prepared. This report included detail consultation with the Aboriginal Community and includes recommendation to address any Aboriginal heritage items onsite. The proposed STP & SRN does not alter or expand the approved subdivision footprint and further consultation is not required in this instance.

6.3 ISEPP consultation

Part 2 of the ISEPP contains provisions for public authorities to consult with local councils and other public authorities prior to the commencement of certain types of development.

The consultation requirements at clauses 13-16 of the Infrastructure SEPP have been reviewed and it is considered that formal consultation with Lake Macquarie Council is required. Specifically, it is noted that excavation of council managed roads (or parts thereof) may be such that the work cannot reasonably be characterized as minor or inconsequential (see clause 13 of the Infrastructure SEPP).

The consultation that has occurred with LMCC has taken the form of two (2) site meetings held with relevant Council officers on the 17/01/2013 and 07/03/2013. Given the proposal has minimal impact upon Council infrastructure it is considered to be sufficient for the purposes of the Infrastructure SEPP consultation requirements. The main feedback received centered around the location and use of irrigation.

As discussed within Section 4 options consideration it was ultimately determined that irrigation of private owned restricted access open space was the preferred option.

Ongoing consultation will be required with Lake Macquarie City Council and where required S138 approval will have to be issued by LMCC.

6.4 Government agency and stakeholder involvement

IPART

Consolation with IPART has been ongoing, with IPART currently in receipt of a Network Operator and Retail Suppliers License Application under the Water Industry Competition Act 2006 for the proposal. IPART will be familiar with discussion had to date with regards to the proposal.

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Lot 204 DP1164883 for part of the MSCA. Lot 204 DP1164883 is part zoned E1 National Parks and Nature Reserves and R2 Low Density Residential. The proposal includes a small run of services across the R2 zoned portion of Lot 204 DP1164883 to access Lot 103 DP1194707. Appropriate easements will need to be negotiated within the Office of Environment and Heritage to allow these

services to cross Lot 204 DP1164883. This requirement is included within the summary of project mitigation measures required.

7 – Environmental Considerations & Impacts

This section of the REF provides a detailed description of the potential environmental impacts associated with the construction and operation of the proposal. All aspects of the environment potentially impacted upon by the proposal are considered. This includes consideration of the factors specified in the guidelines *Is an EIS required?* (DUAP 1999) as required under clause 228(1)(b) of the *Environmental Planning and Assessment Regulation 2000*. The factors specified in clause 228(2) of the *Environmental Planning and Assessment Regulation 2000* are also considered in Appendix B. Site-specific safeguards are provided to ameliorate the identified potential impacts.

7.1 Soils

7.1.1 Existing Environment

Geotechnical investigation of the site undertaken by Geotech Solutions Pty Ltd (2010) indicates the natural soils across the site consist of:

- Clean Aeolian quartz sand overlying silty and clayey quartz sand
- A mixture of sand, gravel, clay and silt overlying extremely to highly weathered rock
- Higher plasticity clays at depth near the interface of bedrock
- Triassic and late Permian age bedrock

Given the sites former use as a coal mine, topsoil conditions vary across the site based on the specific mining activities that have previously occurred, e.g. stockpiles, tailings dams, earthworks etc. Post development soil conditions will vary from what is currently on site due to the remediation works being undertaken by the coal mine and the bulk earth works that will occur as part of the residential subdivision approved under MP10_0204.

As part of the assessment of MP10_0204 the issue of site contamination was given significant consideration. As required by the conditions of approval for MP10_0204 a Remediation Action Plan (RAP) is to be prepared for the entire CHB development.

Approval MP10_0204 requires that an accredited EPA auditor certify that the RAP has been implemented and that the whole site is suitable for the proposed residential development prior to the issue of subdivision certificate. As the STP site is within the bounds of the approved CHB subdivision the site will be subject to the works required by the RAP for the subdivision and upon completion will be suitable for the construction of the STP.

With regards to irrigation detailed evaluation of soil physical and chemical properties will be undertaken during each phase of the subdivision build out and reassessed following bulk earthworks. Appropriate management measures will be incorporated in to the Irrigation Management Plans.

Given the high sand content of the top soil layers where effluent will be applied, issues associated with poor drainage, Sodidity, soil pH and soil salinity are not expected to be a significant constraint to effluent irrigation.

During establishment of the restricted access open space areas, a minimum of 100 mm of high quality sandy loam topsoil sourced from the site and other areas will be used to develop suitable soil conditions for plant growth in the irrigation areas.

7.1.2 Potential Impacts

Importantly, to address the potential impacts associated with the sites previous use and the potential to expose contaminated materials any work identified by the remediation action plan required for the

CHB subdivision under MP10_0204 must be completed prior to commencement of works for the STP and SRN on the subject site.

Upon completion of any works required to facilitate the subdivision under MP10_0204. Impacts associated with the proposal would relate to construction activities and potential for increased erosion and sediment runoff.

The main soil constraints to irrigation management are top soil cover, soil pH and Sodidity. While unlikely, potential impacts associated with the proposed irrigation include if conducted in the absence of safe guards include:

- Increased salinity;
- Alteration of soil PH levels;
- Ground water contamination

7.1.3 Mitigation Measures

- The preparation of the Remediation Action Plan as required under MP10_0204 and any works required by this plan must be completed prior to works on the STP & SRN commencing.
- A Sediment and Erosion Control plan is to be prepared.
- Water quality, irrigation controls and measures and plant operations are to be in accord with that described within the Land Capability Assessment for Effluent Irrigation under Appendix L and are to be incorporated into an OEMP for plant operations.

7.2 Odour

7.2.1 Existing Environment

There is a small number of existing residence located approximately 800m radius from the STP site. Future residence with stage 5 and 6 of the amended subdivision as proposed under MP10_0204 MOD 2 would be located within 500m radius of the STP site. It is noted stage 6 of the approved subdivision would not proceed until such time as the separate approvals for stage 3 of the STP and SRN scheme are sought and received.

7.2.2 Assessment Criteria

The sense of smell is a subjective human response to the presence of a chemical compound or "odour" in air. The sensitivity to a particular odour can vary from one individual to another by up to two (2) orders of magnitude. Differences in sensitivity to an odour are due to a variety of factors, including age, health, prior exposure to the odour and natural variation within the population.

The factors that are commonly recognised as influencing whether an odour will result in a complaint or not depend on a number of factors referred to as the FIDOL factors.

- Frequency – how often the odour is detected,
- Intensity – how strong the odour is,
- Duration – how long the odour persists for,
- Offensiveness – how the odour smells, and
- Location – where the odour occurs

Dynamic olfactometry involves taking samples of air that contain an odourant and presenting the odour to a panel. The odour is diluted with "clean" air until 50% of the panel can detect the presence of the odour. This concentration is the threshold concentration and is deemed to be 1 odour unit (OU). The number of dilutions required to achieve this level determines the odour concentration of the original sample.

This science in conjunction with dispersion modelling has been shown to be the best available method of predicting odour nuisance on a community over long periods. It is the accepted approach in most developed countries.

The current New South Wales (NSW) odour policy presented in the *Approved Methods and Guidance – For the Modelling and Assessment of Air Pollutants in New South Wales, August 2001* is not a regulatory document. In this document a method is provided for determining an odour impact criterion based upon the number of people likely to be impacted by an operation, ranging from 2 OU/m³ to 7 OU/m³.

As per the *Approved Methods and Guidance – For the Modelling and Assessment of Air Pollutants in New South Wales, August 2005* the nose response time average (i.e. on a 1 second average) which is the 99th percentile should be 2 OU/m³ for a community with a population of 2000 or more people. This 1 second average criterion has been used within the Odour Assessment under Appendix G.

The maximum one second contour plots for the STP are identified within the Odour Assessment under Appendix G.

The results show that the criterion of 2OU/m³ will not be exceeded at any location and the highest concentration at the boundary of the proposed residential properties is significantly below the criterion, therefore odour nuisance from the STP is not expected.

7.2.3 Potential Impacts

Potential impacts associated with the proposal include loss of amenity for nearby sensitive receivers due to odour emissions.

7.2.4 Mitigation Measures

It is noted the Odour assessment under Appendix G did not include the modeling of any additional mitigation measures. The measures to ensure odour is not an impact are inherent in the design of the STP. However the proposal includes the following mitigations measures

- Ventilation stacks provided on all house connections to ensure gravity sewers are well ventilated;
- All gravity sewers designed to achieve self cleansing velocity to avoid accumulation and breakdown of solids in the network;
- Passively ventilated Mcberns activated carbon filters will be used on all air valves in the pressure sewer network;
- Actively ventilated Mcberns activated carbon filter on the STP inlet balance tank;
- All MBR biological tanks are fully enclosed and passively ventilated through McBerns activated carbon filters located on the roof of the STP building;
- The MBR room in the STP building has automatic indoor air quality monitoring for temperature, oxygen, hydrogen sulphide and methane, with automatic operation of an evaporative air conditioning unit to maintain ventilation and air quality;
- Deodorizing sprays are included in the design of the STP building to enable release of deodorizing sprays if required;
- CHB has a 24 hour customer service call centre for fielding all odour and other complaints. All complaints are recorded, reviewed and acted upon. Detail complaint handling procedures are to be incorporated into the OEMP.

7.3 Traffic

The proposal is to be located within a residential area and will be access from the Pacific Highway via Montefiore Street, approved road 28 and approved road 3. The existing road and to be constructed road network has sufficient capacity to cater for the traffic generated by the development. The proposal can facilitate internal unloading/loading and onsite manoeuvring of vehicles up to and including articulated vehicles.

It is anticipated only two (2) truck movements per week will occur once the plant is constructed and operational.

With regards to construction, a traffic management plan is to be prepared and implemented as part of the CEMP for the proposal.

7.4 Noise

The site is located within proximity to a number of sensitive receivers and the potential for disruption due to excessive noise exists.

7.4.1 Existing Environment

The projects acoustic consultants installed noise logging equipment in two locations to measure baseline environmental noise levels at a representative location in the vicinity of the proposed STP. The location of the monitoring points is identified in the Noise Impact Assessment under Appendix F. Table 6 identifies current ambient noise levels as measured onsite.

Table 6 – Onsite Ambient Noise Levels

Monitoring Location	Period	L _{Aeq}	L _{A90}	RBL
N1	Day	66	49	45
	Evening	65	43	41
	Night	60	40	38
N2	Day	63	49	47
	Evening	58	50	49
	Night	62	52	49

7.4.2 Assessment Criteria

Operational

The EPA (OEH) INP sets limits on the noise that may be generated by the STP during the operational stage. These limits are dependent upon the existing noise levels at the site and are designed to ensure changes to the existing noise environment are minimised and deal with the intrusiveness of the noise and amenity environment. The most stringent of the limits is taken as the limiting criterion for the noise source.

The intrusiveness noise criterion requires that the L_{Aeq, 15 minute} for the noise source, measured at the most sensitive receiver under the worst-case conditions, should not exceed the rated background level (RBL) by more than 5dB, represented as follows:

- $L_{Aeq, 15\text{minute}} < RBL + 5\text{dB}$.

The noise levels at nearby noise sensitive receptors associated with the operation phase of the STP should not exceed the noise levels identified in Table 7 below. The locations in Table 6 and 7 below are identified in the Noise Impact Assessment under Appendix F.

Table 7 – Project Specific Noise Levels at Noise Sensitive Receptors

Location	Period	L _{Aeq}	RBL	Recommended Acceptable L _{Aeq}	Intrusiveness Criteria Level	Project Specific Noise Level
F1 & F2	Day	63	47	55	52	52
	Evening	58	49	45	54	45
	Night	62	49	40	54	40
F3	Day	66	45	55	50	50
	Evening	65	41	45	46	45
	Night	60	38	40	43	40

Noise Prediction modelling has been carried out to assess the potential impact associated with the proposed STP on the noise environment at the nearest noise sensitive receptors located in proximity to the site. The predicted noise levels representative of the operational phase of each stage for the ultimate stage of the proposal for both neutral conditions and worst-case conditions during day and night time are presented in Tables 8 below

Table 8 – Proposed STP Operations (Stage 1) – Predicted Noise Impact

Location	Predicted Noise Levels dB(A)			
	Day time		Night time	
	Neutral	Worst	Neutral	Worst
F1	29	30	29	30
F2	38	39	38	39
F3	21	21	21	21

The predicted noise impact from the proposed sewage treatment plant on the noise sensitive receivers ranged between 21 to 39dB(A), falling below the applicable criteria during day, evening and night time.

Construction

The NSW interim Construction Noise Guideline was developed by the NSW – OEH and contains detailed procedures for the assessment and management of construction noise impacts. The proposed subdivision is to be constructed in stages with the houses in close proximity to the STP being constructed in stage 5 and 6. Construction Noise impacts are not expected to present a significant impact. A construction noise management plan is include within the NIA under Appendix F

7.4.3 Potential Impacts

Potential impacts associated with the proposal include loss of amenity for nearby sensitive receivers due to elevated noise levels.

7.4.4 Mitigation Measures

Operational

It is noted the Noise Impact Assessment under Appendix F did not include the modeling of any additional mitigation measures. The measures to ensure noise is not an impact are inherent in the design of the STP. However the proposal includes the following mitigations measures

- All sewage pumps in the pressure sewer networks are submersible pumps located below ground level in an enclosed chamber;
- The MBR and AWTP are fully enclosed within the STP building;
- Specific “noisy” equipment items like aeration blowers etc will be housed inside custom noise enclosures. Equipment specifications and design of custom noise enclosures will be undertaken to ensure compliance with the NSW Industrial Noise Policy (EPA: 2000) of background noise plus 5 dBA at nearest residential dwelling;
- All planned construction and routine maintenance works will be undertaken during standard permissible hours;
- All emergency works will be undertaken to minimise noise impacts on residents;
- CHB has a 24 hour customer service call centre for fielding all noise and other complaints. All complaints are recorded, reviewed and acted upon as outlined in the Onsite Wastewater Management Plan under Appendix F.

Construction

- The measures recommended within the construction noise management plan prepared by Vipac Engineers and Scientists are to be included within the Construction Environmental Management Plan to be prepared for the project.

7.5 Ground Water

7.5.1 Existing Environment

A preliminary site & soil evaluation has been undertaken to identify any significant constraints to irrigation, refer land capability assessment for effluent irrigation under appendix C. As identified in this report a Geotechnical investigation undertaken by Geotech Solutions Pty Ltd (2010) indicated minimal groundwater was encountered in the upper soil profile where effluent irrigation will occur.

Groundwater is expected to occur at depth in the rock strata that underlies the site. The potential for contamination groundwater from deep drainage of effluent at the proposed average irrigation rate of <0.9 mm/day is considered low, provided irrigation scheduling controls are implemented.

Some localised areas of the site were noted to be susceptible to water logging during extensive rain periods, particularly in areas of the site impacted by mining activities, e.g. where dams and ponds had been filled. No irrigation is proposed in low lying areas of the site in the drainage reserves.

The proposed irrigation scheme includes a 2 ML wet weather storage to enable effluent to be stored during and following periods of heavy rainfall when localised saturated soil conditions may occur.

Irrigation of restricted access privately owned open space will be with MBR & UV treated waste water. Given the high quality water, depth to groundwater and low irrigation rates, the risk of contamination of groundwater with pathogens as a result of recycled water irrigation is low.

MEDLI modelling undertaken as part of the Land Capability Assessment for Effluent Irrigation under Appendix L indicates all nutrients applied in irrigation are managed inside the boundary of the irrigation area by plant uptake and soil absorption, hence the potential for export of nutrients groundwater is considered low, provided irrigation scheduling controls are implemented.

7.5.2 Potential Impacts

Construction

Construction of the STP is not expected to have any significant impact on groundwater in the vicinity of the site. There is a minor risk of groundwater contamination from chemical and fuel spills if appropriate control measures are not in place. Hazardous substances will be stored in accordance with their material safety data sheet and appropriate environmental controls will be established.

Operation

Operation of the treatment plant and particularly the storage of water have the potential for the deep percolation of reject RO storage to groundwater. Irrigation required by the proposal has the potential for the deep percolation of irrigated wastewater to groundwater or the over irrigation of lands creating anaerobic soil conditions. The expected quality of irrigation wastewater is outlined below in Table 9.

Table 9: Typical irrigation water quality following MBR+UV treatment.

Parameter	Units	Minimum	Mean	95%ile	Maximum
Biochemical Oxygen Demand	mg/L	-	-	10	20
Suspended Solids	mg/L	-	-	5	10
Total Nitrogen	mg/L as N	-	10	-	20
Total Phosphorus	mg/L as P	-	0.3	-	2
pH	pH	6.5	-	-	8.5

Parameter	Units	Minimum	Mean	95%ile	Maximum
Turbidity	NTU	-	-	1	2
Faecal Coliforms	cfu/100 mL	-	-	10	100
Total Dissolved Solids	mg/L	-	750	-	1000

7.5.3 Mitigation Measures

Where perched water (evaporation ponds) is to be stored on the site HDPE or other suitable liners will be required to prevent loss of water into the underlying strata that could cause a watertable rise.

All site earthworks and construction is to be carried out in accord with a sediment and erosion control plan.

A Stormwater Management Plan for the STP site is to be prepared in accord with Lake Macquarie Councils DCP No.1 Volume 2 Engineering Guidelines. No drainage from the STP site is to be directed to the adjacent conservation lands.

7.6 Surface Water

7.6.1 Existing Environment

Surface water

The STP site has a southerly fall from Montefiore Street with a defined ephemeral drainage line bisecting the lower portion of the site. This drainage ultimately drains to Munmorah State Conservation Area and discharges at Moonee Beach, south of the existing Township. Ultimately drainage will be provided in accord with that approved under project approval MP10_0204.

The irrigation area is located in undulated terrain with levels varying from 20 to 45m AHD with average slopes across the irrigation area of approximately 10%.

7.6.2 Potential Impacts

General Operation

Potential impact as part of the proposal relate to increased sediment and erosion control and nutrient runoff into the stormwater catchments in and surrounding the site.

7.6.3 Mitigation Measures

The proposal is designed with the following mitigation measures to ensure surface water quality is maintained:

- A Stormwater Management Plan for the STP site is to be prepared in accord with Lake Macquarie Councils DCP No.1 Volume 2 Engineering Guidelines.
- No drainage from the STP site is to be directed to the adjacent conservation lands.
- A Sediment and Erosion Control plan is to be prepared.
- Wastewater reuse and recycling is maximised in the scheme through the supply of Class A+ recycled water to customers for toilet flushing, laundry and outdoor recycled water uses;
- Irrigation areas and irrigation implementation are to incorporate the following:
 - Diversion drains along uphill slope to divert upslope stormwater around the irrigation areas;
 - Catch drain/swale along the downhill boundary of irrigation areas;
 - Dense deep rooted grass vegetation will be established, e.g. kikuyu pasture;
 - Low application rate sprinklers are to be used;
 - No irrigation during rainfall when there is increased potential for run off;
 - Contour mounds to be constructed at intervals of approximately 30-50 metres;

- 30 metre down gradient buffer to the property boundary.
- Minimum 40m to down gradient property boundary in steeper north east corner of the irrigation area
- 20m buffer to up gradient property boundary
- No irrigation within the 40m wide future waterway corridor approved under MP10_0204
- 70m minimum buffer to nearest residential dwelling

These measures are to be incorporated in the OEMP for plant operation

7.7 Flora & Fauna

7.7.1 Existing Environment

A Terrestrial Flora and Fauna Assessment has been undertaken as part of the REF. Four (4) separate vegetation communities with the Narrabeen Doyalson Coastal Woodland being the dominate community were identified. Site investigations did not identify any habitat/hollow bearing trees within the STP site.

The site of the STP is known to contain the vegetation community known as Narrabeen Doyalson Coastal Woodland including specific examples of *Tetradlea juncea* (Black-eye Susan) and *Cryptostylis hunteriana* (Leafless Tongue Orchid). Both flora species are listed as Vulnerable species under the EPBC Act.

It is pertinent to note that in June 2012, the Federal Department of Sustainability, Environment, Water, Populations and Communities (DSEWPC) approved an EPBC Act referral allowing the clearing of all vegetation within the subdivision footprint approved under MP10_0204. The proposed site of the STP is to be created in accord with the existing approvals and will be provided as a vacant clear site for construction of the STP

The fauna survey conducted over 3 separate trapping investigation periods resulted in the recording of 68 species of bird, 13 reptiles, 7 amphibians and 31 mammals (or evidence of their previous presence). Of these species five (Little Bentwing Bat, Eastern Freetail Bat, Eastern Bentwing-bat Grey Headed Flying Fox, Squirrel Glider) are listed as vulnerable within the *Threatened Species Conservation Act 1995*.

Further detailed discussion is contained within the Terrestrial Flora and Fauna Assessment under Appendix E.

7.7.2 Potential Impacts

As all clearing works are approved and will be undertaken as part of the works associated with MP10_0204, The potential impacts to flora and fauna associated with the proposal relate to construction activities onsite and the STP and irrigation areas ongoing interaction with retained vegetation adjoining the site.

Potential exists for negative weed edge effects to occur on adjoining national parks land mitigation measures.

7.7.3 Mitigation Measures

- A Stormwater Management Plan for the STP site is to be prepared in accord with Lake Macquarie Councils DCP No.1 Volume 2 Engineering Guidelines.
- No drainage from the STP site is to be directed to the adjacent conservation lands.
- All site earthworks and construction is to be carried out in accord with a sediment and erosion control plan.
- All clearing works approved under MP10_0204 must be completed in accord with the relevant approvals prior to works associated with the STP commencing.

- The designated construction zone and boundary between the site and National Parks and Wildlife land is to be clearly marked via high visibility fencing, sediment fencing and/or signage identifying that no construction activities (including temporary storage, stockpiling, vehicle movement etc) are permitted beyond prior to commencement of any work.
- A Weed Management Plan is to be prepared for both the STP site and Irrigation areas and included within the operational environmental management plan to ensure negative edge effects do not occur to adjoining national park lands.
- A detailed landscaping plan of the proposed irrigation area vegetation buffers including appropriate species selection is to be prepared.

7.8 Aboriginal Heritage

7.8.1 Existing Environment

An aboriginal cultural heritage management plan has been prepared in relation to project approval MP10_0204. This assessment identified a single isolated stone artefact within the bounds of the STP site, refer section 2.6.2. No other archaeological sites or features were found within the subdivision development footprint approved under MP10_0204 as part of the Archaeological assessment of the site.

7.8.2 Potential Impacts

Although identified as clear of Aboriginal Heritage with exception of one (1) isolated item during investigations for the parent subdivision unexpected finds can occur.

7.8.3 Mitigation Measures

- Should any unexpected aboriginal heritage items be found during works all works would cease immediately and the National Parks & Wildlife Service and the relevant Local Aboriginal Land Council would be notified. Procedures to address this issue are to be included within the CEMP for the project.
- The procedures outlined within the Aboriginal Heritage Management Plan approved under MP10_0204 must be implemented to relocate the isolated artifact found onsite prior to commencement of any works.

7.9 Visual Amenity

7.9.1 Existing Environment

A Landscape and Visual Impact Statement has been prepared as part of this REF. The Visual Catchments for CHB are made up of two distinct primary regions, VCA1 Catherine Hill Bay VCA and VCA2 Moonee VCA. These regions are defined largely through topography with the main site ridgelines acting as the perimeters of these.

The general site topographic features reduce the potential visual impact of the STP to a single Visual Catchment Area referred to in this report as Visual Catchment Area 2. Visual Catchment Area 2 correlates to Stage 5 of the Catherine Hill Bay development approved under MP10_0204. Refer Landscape and Visual Impact Statement under Appendix D for detailed discussion of these Visual Catchments.

7.9.2 Potential Impacts

The subject site will be vacant cleared land and as such potential impacts are limited to the introduction of structures within the locality. The potential for significant impact is associated with the three main key vantage points identified within the Landscape and Visual Impact Statement.

7.9.3 Mitigation Measures

To mitigate the potential impact to visual amenity the following mitigations measures are proposed

- Buffer planting as outlined within Landscape and Visual Impact Statement under Appendix D is to be implemented as part of STP construction.
- The STP building is to be clad in natural colours such as colorbond Pale Eucalypt or similar.

7.10 Bushfire Hazard

The proposed STP is classified as a Class 10a structure pursuant to the Building Code of Australia (BCA). The BCA does not provide for any bushfire specific performance requirements and as such AS-3959-2009 does not apply as a set of 'deemed to satisfy' provisions. The general fire safety construction provisions are taken as acceptable solutions, but the aims and objectives of Planning for Bushfire Protection 2006 apply in relation to other matters such as access, water and services, emergency planning and landscaping / vegetation management.

Development such as the proposed requires on site car parking and loading space. As demonstrated on the Bushfire Management Plan under Appendix K, these areas have been located so as to allow for perimeter vehicle access over the site. This ensures that should emergency services require access during a bushfire event, all vehicles and personnel will be able to circumnavigate the STP buildings and structures.

The STP will have access to reticulated water supply and is also provided with sufficient storage tanks. A fire hydrant is to be located at site entrance into the STP to allow for connection to the reticulated water supply. It is considered that the large storage tanks on site provide for a secondary water supply for firefighting purposes.

A Bushfire Evacuation Plan is to be created and a copy of the plan is to be kept within the site office. Once the road network of the adjoining subdivision has been completed, the most efficient evacuation route away from the western bushfire threat is to be identified on a plan and erected near the exit of the site office.

7.11 Non Aboriginal Heritage

7.8.1 Existing Environment

A number of the allotments which form part of the site fall within the Catherine Hill Bay Cultural Heritage Precinct. The Catherine Hill Bay Cultural Heritage Precinct is listed on the NSW State Heritage Register. As such the activity (proposal) would require an approval in respect of doing or carrying out of an act, matter of thing under Clause 57(1) of the Heritage Act 1977

7.8.2 Potential Impacts

All works located within the Catherine Hill Bay Cultural Heritage Precinct would be limited to excavation and installation of predominately below ground services. As no works are proposed in direct relation to any built structures within the Cultural Heritage Precinct impacts upon the precinct are unlikely.

7.8.3 Mitigation Measures

- The relevant approval under the Heritage Act 1977 for the works within the Cultural Heritage Precinct is to be obtained prior to any work commencing within the Cultural Heritage Precinct. Works within the Cultural Heritage Precinct is to be undertaken in accord with any conditions of this approval.

7.12 Cumulative Impacts

Cumulative impacts have the potential to arise from the interaction of individual elements within the proposal and the additive effects of the proposal with other external projects. Clause 228 (2) of the Environmental Planning and Assessment Act 1979 requires that potential cumulative impacts as a result of the proposal be taken into account.

The STP will be located within the bounds of an approved residential subdivision and as such cumulative impact associated with vegetation removal does not result as part of the proposal. The proposed works may produce greenhouse gas. Due to the small scope of the project, these impacts do not have the potential to have a significant cumulative environmental effect on existing or likely future activities. The potential impacts on the environment would be minimised with the implementation of the safeguards given in this REF.

The proposed works would not significantly increase demands on resources, which are, or are likely to become, in short supply. Relatively small amounts of materials would be required for the proposed works. The safeguards listed in this REF would be implemented to minimise any impacts.

8 – Proposal Justification

This chapter provides a justification for the proposed STP & SRN within the following contexts:

- Biophysical effects
- Social / community effects
- Economic effects
- The principles of ecologically sustainable development (ESD).

The main beneficial effects are listed, together with the proposed development's main adverse effects.

8.1 Biophysical Context

8.1.1 Beneficial Effects

The proposed development is expected to have the following beneficial effects on the biophysical environment:

- No expected impacts on any threatened species, population or ecological community, or their habitat.
- The provision of essential infrastructure for the CHB development which will help facilitate a significant reduction in potable water demand.

8.1.2 Adverse Effects

The proposed development, if conducted in the **absence** of any mitigation measures, could be expected to have the following adverse effects on the biophysical environment:

- Potential for water pollution and subsequent downstream degradation from wastewater irrigation;
- Potential for noise;
- Potential for odour;

Of the above, it is considered that the potential for water quality impacts, noise and odour are the most significant potential risks upon the biophysical environment. Construction of the plant in accord with the supporting noise and odour assessment will negate the risk of adverse noise and odour. Operation of the plant in accord with the commitments contained within the Integrated Water Management Plan (and summarised in this report) and Land Capability Assessment for Effluent Irrigation (and summarised in this report) will negate any water quality impacts.

8.2 Social / Community Effects

8.2.1 Beneficial Effects

The proposed development is expected to have the following beneficial effects on the social environment:

- The proposed development would not impact upon existing community facilities or services
- There would be no significant visual impact from the proposed development
- The proposed plant will enable the ongoing development of CHB subdivision and will help facilitate the new community.

- The plant will provide employment during the construction and operational phase.

8.2.2 Adverse Effects

The proposed development, if conducted in the **absence** of any mitigation measures, could be expected to have the following adverse effects on the social / community environment:

- Potential for increase in ambient noise levels;
- Potential for odours spread;
- Potential water quality impacts

Construction of the plant in accord with the supporting noise and odour assessment will negate the risk of adverse noise and odour. Operation of the plant in accord with the commitments contained within the Integrated Water Management Plan (and summarised in this report) and Land Capability Assessment for Effluent Irrigation (and summarised in this report) will negate any water quality impacts.

8.3 Economic Context

8.3.1 Beneficial Effects

The proposed development is expected to have the following beneficial economic effects:

- Direct and indirect income benefits to the local and wider community
- Creation of employment opportunities.
- Provide essential infrastructure to facilitate the ongoing development of the adjoining residential estate.

8.3.2 Adverse Effects

The proposed development could have the following **adverse** effects on the economic environment if the site is not effectively managed.

- Additional expenses for Council and the general public should waste not be effectively managed on site with spin off environmental costs

8.4 Ecologically Sustainable Development

Ecologically Sustainable Development (ESD) is a concept firmly entrenched in NSW environmental legislation and government policy. The four guiding principles of ESD (as contained in the EPAR 2000) and their relation to the proposed development are outlined below:

- a) ***The precautionary principle** – namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.*

The nature of the proposed development is such that the potential for serious or irreversible environmental damage is extremely limited. The proposal is a modern, high tech sewerage treatment plant that provides whole system management and provides an alternative water source.

Scientific modelling and parameters are well established for the control of the main potential impacts (water quality, noise & odour) associated with the proposal.

Mitigation strategies have been developed as part of the proposal system design to prevent water quality issues and prevent downstream environmental degradation. These mitigation measures have been developed in accordance with current best management practices and with a view to achieving a sustainable long term sewerage treatment option.

- b) **Inter-generational equity** – *namely, that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.*

The proposed development responds in the positive to inter-generational equity providing a modern alternative to traditional sewerage treatment systems, an alternative source of water and does not require discharges of sewerage into the environment.

The potential impacts of the proposal are such that long term degradation is unlikely and the mitigation measures which form a fundamental part of the proposal ensure no serious or irreversible environmental effects.

- c) **Conservation of biological diversity and ecological integrity** – *namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration.*

The proposed development is able to be conducted without any significant impact on the biological diversity and ecological integrity of the locality. The proposed sewerage treatment plant would be located on a cleared site provided as part of the CHB subdivision. No Flora or Fauna is impacted as part of the proposal.

- d) **Improved valuation and pricing of environmental resources** – *namely, that environmental factors should be included in the valuation of assets and services, such as polluter pays, full life cycle costing, and utilising incentive structures / market mechanisms to meet environmental goals.*

Waste is a resource. The proposed STP provides an alternative water source for reuse in the adjoining residential development.

As demonstrated above, the proposal can be undertaken in a manner which accords with the principles of ESD. As demonstrated throughout this REF the proposed development is justifiable, as it would have minimal impact on the biophysical, social and economic environment.

9 – Mitigation Measures

9.1 Summary of Commitments and Mitigation Measures

The following sections summarise the commitments by the proponent regarding mitigations and control measures to be implemented for the proposal:

9.1.1 Soils

- The preparation of the Remediation Action Plan as required under MP10_0204 and any works required by this plan must be completed prior to works on the STP & SRN commencing.
- A Sediment and Erosion Control plan is to be prepared.
- Water quality, irrigation controls and measures and plant operations are to be in accord with that described within the Land Capability Assessment for Effluent Irrigation under Appendix L and are to be incorporated into an OEMP for plant operations.

9.1.2 Odour

- Ventilation stacks provided on all house connections to ensure gravity sewers are well ventilated;
- All gravity sewers designed to achieve self cleansing velocity to avoid accumulation and breakdown of solids in the network;
- Passively ventilated McBerns activated carbon filters will be used on all air valves in the pressure sewer network;
- Actively ventilated McBerns activated carbon filter on the STP inlet balance tank;
- All MBR biological tanks are fully enclosed and passively ventilated through McBerns activated carbon filters located on the roof of the STP building;
- The MBR room in the STP building has automatic indoor air quality monitoring for temperature, oxygen, hydrogen sulphide and methane, with automatic operation of an evaporative air conditioning unit to maintain ventilation and air quality;
- Deodorizing sprays are included in the design of the STP building to enable release of deodorizing sprays if required;
- CHB has a 24 hour customer service call centre for fielding all odour and other complaints. All complaints are recorded, reviewed and acted upon. Detail complaint handling procedures are to be incorporated into the OEMP.

9.1.3 Traffic

- A Construction traffic management plan is to be prepared and implemented as part of the CEMP for the proposal.

9.1.4 Noise

- All sewage pumps in the pressure sewer networks are submersible pumps located below ground level in an enclosed chamber;
- The MBR and AWTP are fully enclosed within the STP building;
- Specific “noisy” equipment items like aeration blowers etc will be housed inside custom noise enclosures. Equipment specifications and design of custom noise enclosures will be undertaken to ensure compliance with the NSW Industrial Noise Policy (EPA: 2000) of background noise plus 5 dBA at nearest residential dwelling;
- All planned construction and routine maintenance works will be undertaken during standard permissible hours;

- All emergency works will be undertaken to minimise noise impacts on residents;
- CHB is to have a 24 hour customer service call centre for fielding all odour and other complaints. All complaints are recorded, reviewed and acted upon. Detail complaint handling procedures are to be incorporated into the OEMP.
- The measures recommended within the construction noise management plan prepared by Vipac Engineers and Scientists are to be included within the Construction Environmental Management Plan to be prepared for the project.

9.1.5 Ground Water

- Where perched water (evaporation ponds) is to be stored on the site HDPE or other suitable liners are to be used
- All site earthworks and construction is to be carried out in accord with a sediment and erosion control plan.
- A Stormwater Management Plan for the STP site is to be prepared in accord with Lake Macquarie Councils DCP No.1 Volume 2 Engineering Guidelines.
- No drainage from the STP site is to be directed to the adjacent conservation lands.

9.1.6 Surface Water and Flora & Fauna

- A Stormwater Management Plan for the STP site is to be prepared in accord with Lake Macquarie Councils DCP No.1 Volume 2 Engineering Guidelines.
- No drainage from the STP site is to be directed to the adjacent conservation lands.
- All site earthworks and construction is to be carried out in accord with a sediment and erosion control plan.
- Wastewater reuse and recycling is maximised in the scheme through the supply of Class A+ recycled water to customers for toilet flushing, laundry and outdoor recycled water uses;
- Irrigation areas and irrigation implementation are to incorporate the following:
 - Diversion drains along uphill slope to divert upslope stormwater around the irrigation areas;
 - Catch drain/swale along the downhill boundary of irrigation areas;
 - Dense deep rooted grass vegetation will be established, e.g. kikuyu pasture;
 - Low application rate sprinklers are to be used;
 - No irrigation during rainfall when there is increased potential for run off;
 - Contour mounds to be constructed at intervals of approximately 30-50 metres;
 - 30 metre down gradient buffer to the property boundary.
 - Minimum 40m to down gradient property boundary in steeper north east corner of the irrigation area
 - 20m buffer to up gradient property boundary
 - No irrigation within the 40m wide future waterway corridor approved under MP10_0204
 - 70m minimum buffer to nearest residential dwelling

These measures are to be incorporated in the OEMP for plant operation

- All clearing works approved under MP10_0204 must be completed in accord with the relevant approvals prior to works associated with the STP commencing.
- The designated construction zone and boundary between the site and National Parks and Wildlife land is to be clearly marked via high visibility fencing, sediment fencing and/or signage identifying that no construction activities (including temporary storage, stockpiling, vehicle movement etc) are permitted beyond prior to commencement of any work.
- A Weed Management Plan is to be prepared for both the STP site and Irrigation areas and included within the operational environmental management plan to ensure negative edge effects do not occur to adjoining national park lands.
- A detailed landscaping plan of the proposed irrigation area vegetation buffers including appropriate species selection is to be prepared.

9.1.7 Aboriginal Heritage

- Should any unexpected aboriginal heritage items be found during works all works would cease immediately and the National Parks & Wildlife Service and the relevant Local Aboriginal Land Council would be notified. Procedures to address this issue are to be included within the CEMP for the project.
- The procedures outlined within the Aboriginal Heritage Management Plan approved under MP10_0204 must be implemented to relocate the isolated artifact found onsite prior to commencement of any works.

9.1.8 Visual Amenity

- Buffer planting as outlined within Landscape and Visual Impact Statement under Appendix D is to be implemented as part of STP construction.
- The STP building is to be clad in natural colours such as colorbond Pale Eucalypt or similar.

9.1.9 Waste

- A register will be maintained for all waste sampling and classification results for the life of the proposal in accordance with EPA's Classification Guidelines.
- Detailed procedures for waste handling including storage and disposal procedures is to be established and included within the OEMP.

9.1.10 Bushfire

- A fire hydrant is to be located at site entrance into the STP to allow for connection to the reticulated water supply.
- A Bushfire Evacuation Plan is to be created and a copy of the plan is to be kept within the site office. This plan is to identify the most efficient evacuation route away from the western bushfire threat. This evacuation route is to be identified on a plan and erected near the exit of the site office. The plan must include procedures to inform employees and visitors to the site of the bushfire evacuation plan and its content.

9.1.11 Non Aboriginal Heritage

- The relevant approval under the Heritage Act 1977 for the works within the Cultural Heritage Precinct is to be obtained prior to any work commencing within the Cultural Heritage Precinct. Works within the Cultural Heritage Precinct is to be undertaken in accord with any conditions of this approval.

9.1.12 Environmental Management Plans

- The following specific plans to manage the environmental impacts of construction and operation are to be prepared:
 - Construction Environmental Management Plan (CEMP);
 - Operation Environmental Management Plan (OEMP);
 - Emergency Response Plan (ERP)

9.1.13 Easements

- Easements for services across Lot 204 DP1164883 must be negotiated with the Office and Environment and Heritage and registered over any services with Lot 204 DP1164883

9.2 Environmental Monitoring and Reporting

- Operational and water quality will be monitored in accord with that outlined within the Integrated Water Management Plan under Appendix C.

9.3 Licensing and approvals

Table 10 Summary of licensing and approval required.

Requirement	Timing
Road Occupancy License	A minimum of 10 days prior to the commencement of works (only required if public road will be occupied during construction)
Section 143 Notice under the Protection of the Environment Operations Act 1997	Prior to relocation of site spoil if required by proposal earthworks
Approval to alter or erect improvements within a mine subsidence district under Clause 15(2) of the Mines Subsidence Act 1961	Prior to any works onsite
Construction Certificate (or equivalent)	Prior to any works onsite
S138 Approval for works located within an existing road reserve	Prior to any works within the road reserve
Approval under Clause 57(1) of the Heritage Act 1977	A number of the allotments which form part of the site fall within the Catherine Hill Bay Cultural Heritage Precinct. Prior to any works within this land
Controlled Activity Approval under Water Management Act 2000	Prior to any construction with 40m of a water way

10 – Conclusion

The proposed STP and SRN does not require development consent and is subject to assessment under Part 5 of the EP&A Act. The REF has examined and taken into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity. This has included consideration of critical habitat, impacts on threatened species, populations and ecological communities and their habitats and other protected fauna and native plants.

A number of potential environmental impacts from the proposal have been avoided or reduced during the concept design development and options assessment. The proposal as described in the REF best meets the project objectives. Mitigation measures as detailed in this REF would ameliorate or minimise any expected impacts associated with the proposal. On balance the proposal is considered justified.

The environmental impacts of the proposal are not likely to be significant and therefore it is not necessary for an environmental impact statement to be prepared or approval to be sought for the proposal from the Minister for Planning under Part 5.1 of the EP&A Act. The proposal is unlikely to affect threatened species, populations or ecological communities or their habitats, within the meaning of the *Threatened Species Conservation Act 1995* or *Fisheries Management Act 1994* and therefore a Species Impact Statement is not required. The proposal is also unlikely to affect Commonwealth land or have an impact on any matters of national environmental significance.

The subject site is considered able to suitably accommodate the proposed STP & SRN.

As such it is respectfully requested that the application be considered favourably and approved subject to reasonable and relevant conditions.

11 – Certification

This review of environmental factors provides a true and fair review of the proposal in relation to its potential effects on the environment. It addresses to the fullest extent possible all matters affecting or likely to affect the environment as a result of the proposal.

Lance Newley
Town Planner
Planit Consulting Pty Ltd
Date: 16/10/2014

I have examined this review of environmental factors and the certification by Lance Newley from Planit Consulting Pty Ltd and accept the review of environmental factors on behalf of Independent Pricing and Regulatory Tribunal.

Insert name
Position title, eg Project Manager
Date:

A – Development Plans

B – Consideration of Clause 228(2) factors and matters of national environmental significance

C – Integrated Water Management Plan

D – Landscape and Visual Impact Assessment

E – Terrestrial Flora and Fauna Assessment

F – Noise Impact Assessment

G – Odour Assessment

H – Project Approval MP10_0204

I – EPBC Act Referral Approval

J – Reverse Osmosis Water Balance Report

K – Bushfire Management Plan

L – Land Capability Assessment for Effluent Irrigation