GOVERNMENT OF WESTERN AUSTRALIA

Environmental Protection Authority

EPA Referral Form

Form for the referral of a proposal to the Environmental Protection Authority under Section 38 of the *Environmental Protection Act 1986*

Referrer information			
Who is referring this proposal?	☐ Proponent ☐ Decision-making authority ✓ Community member/third party		
Name (print) Bethwyn Carlessi	**Signature**		
Position	Spokesperson	Organisation	Preserve Gnarabup
Email	bethwyncarlessi@gmail.com		
Address	7	Price Street	
	Rapids Landing, Margaret River	WA	6285
Date			
Does the referrer request that the EPA treat any part of the proposal information in the referral as confidential? *Provide confidential information in a separate attachment.*	☐ Yes	✓ No	

Referral declaration for organisations, proponents and decision-making authorities:

I, BETHWYN MARIE CARLESSI *(full name)* declare that I am authorised to refer this proposal on behalf of Preserve Gnarabup and further declare that the information contained in this form is true and not misleading.

Part A: Proponent and proposal description

Proponent information	
Name of the proponent/s (including Trading Name if relevant)	According to published information the Proponents are Saracen Properties. Saracen Properties is leading outward facing engagement with Local Government, State Development Assessment Unit and media and community.
Australian Company Number(s) ☐ **OR** Australian Business Number(s) ☐	

Contact for the proposal (if different from the referrer) *Please include: name, physical address, phone, and email.*	✓ Yes ☐ No Joel Saraceni, Project Director Saracen Properties Pty Ltd, Ground Floor, 342 Murray Street (Cnr King Street), Perth WA 6000 08 9426 8100, Direct 08 9426 8110, mobile 0408 934 081 joel@saracenproperties.com.au www.saracenproperties.com.au
Does the proponent have the legal access required for the implementation of all aspects of the proposal? ***If yes,** provide details of legal access authorisations / agreements / tenure.* ***If no,** what authorisations / agreements / tenure is required and from whom?*	☐ Yes ☐ No To be provided by proponent
Proposal type	
What type of proposal is being referred? For a change to an approved proposal please state the Ministerial Statement number/s (MS No./s) of the approved proposal For a derived proposal please state the Ministerial Statement number (MS No.) of the associated strategic proposal	✓ significant – new proposal ☐ significant – change to approved proposal (MS No./s: _____) ☐ proposal under an assessed planning scheme ☐ strategic ☐ derived (Strategic MS No.: _____)
For a significant proposal: • Why do you consider the proposal may have a significant effect on the environment and warrant referral to the EPA?	Please refer to the attached Supporting Document. Preserve Gnarabup considers the Proposal is likely to have a significant impact on the sensitive environment at the location and wide-ranging social impacts for local community members and visitors to the region. Given the high-level of public interest in the Proposal, Preserve Gnarabup is also concerned that the Proponent will not refer the Proposal and provide the local community, and public more broadly, an opportunity to be consulted on the likely effect of the Proposal and any proposed mitigation measures. There are nine preliminary environmental factors that are relevant to the Proposal: • 1. Flora and Vegetation – the development will require clearing of approximately 7 hectares of remnant coastal heath. Additional clearing may be required to provide fire breaks around the hotel resort and housing development. There is potential for listed and priority flora to occur within the proposed development area.

	2. Terrestrial Environmental Quality – the Proposal is expected to send additional waste to the nearby Gnarabup Wastewater Treatment Plant. The Plant is non-compliant with its DWER environmental licensing conditions and elevated levels of nitrogen have been sampled in the ground and nearby ocean. Sending further waste to this non-compliant plant has the potential to impact soil quality in close proximity to the ocean due to addition of excess nutrients 3. Terrestrial Fauna - Clearing of fauna habitat for the critically endangered Western Ringtail Possum and foraging habitat for threatened Black Cockatoo species. 4. Marine Environmental Quality – the development site is located on a Karst Limestone Ridge which is highly porous. Rainfall events are followed by runoff directly into the Gnarabup Beach cove, Back Beach and Gas Bay. Any form of development on the limestone ridge, underlying the development, will directly impact the quality of water in the adjacent marine environment. The existing nearby Gnarabup Wastewater Treatment plant is non-compliant to DWER license conditions and is leaching nutrients into ground and ocean. Proponents plan to send additional waste to this facility. 5. Coastal Processes - the Proposal is located in an area that is already subject to high levels of coastal erosion. Preserve Gnarabup believes developing this land will add to coastal erosion and modify natural processes. 6. Social Surroundings - Gnarabup Beach is the only protected local swimming beach, is highly used by the community and tourists and is vital community asset. There is also a registered Aboriginal cultural heritage site within the development area. 7. Human Health - there are potential impacts to human health associated with additional waste generated from the development at the Gnarabup Wastewater Treatment Plant and

	discharge into the environment, in particular the ocean which is a high use local area. 8. *Landforms* - the land which is subject to this Proposal sits atop fragile limestone karst cliffs and a headland. The raised nature of the area means it is a prominent landmark on the coastal landscape and is visible from throughout the Gnarabup and Prevelly areas. 9. Subterranean Fauna – there are potentially threatened and rare fauna in the development area associated with specific karst type geology. The potential occurrence of subterranean fauna in the development area has not been previously assessed. Each preliminary environmental factor is described in the attached Supporting Document. • . •
For a proposal under an assessed planning scheme, provide the following details: • Scheme name and number For the Responsible Authority: • What new environmental issues are raised by the proposal that were not assessed during the assessment of the planning scheme? • How does the proposal not comply with the assessed scheme and/or the environmental conditions in the assessed planning scheme?	Local Planning Scheme 1, Shire of Augusta-Margaret River is not an assessed Scheme. The Shire has recently referred an Amendment to the Scheme to rezone four of the five lots covered by the Proposal (Lots 501-504) from 'Future Development' to 'Tourism' to the EPA as required under the Planning and Development Act 2005 and Environmental Protection Act 1986.
Proposal description	
Title of the proposal	Development of a 120-room resort hotel and beach-front residential and short-stay housing on Lots 501, 502, 504 Reef Drive, Lot 503 Seagrass Place and Lot 783 Mitchell Drive at Gnarabup Beach, WA. While the Development Application hasn't been submitted by the Developer, we understand the Development Application will be for the Westin Margaret River Resort and Spa and Gnarabup Beach Houses. Source: http://www.saracenproperties.com.au/current-projects-1

	http://www.saracenproperties.com.au/gnarabup-beach
Name of the Local Government Authority in which the proposal is located.	Shire of Augusta-Margaret River
Location: a) street address, lot number, suburb, and nearest road intersection; or b) if remote the nearest town and distance and direction from that town to the proposal site.	Lot 783 Mitchell Drive Gnarabup and Lots 501, 502 and 504 Reef Drive Gnarabup and Lot 503 Seagrass Place Gnarabup
Proposal description – including the key characteristics of the proposal *Provide as an attachment to the form*	Attached
Have you provided electronic spatial data, maps and figure in the appropriate format? *Refer to instructions at the front of the form*	☐ Yes ✓ No
What is the current land use on the property, and the extent (area in hectares) of the property?	Native vegetation of almost 7 hectares across five lots
Have you had pre-referral discussions with the EPA at DWER Services? If so, quote the reference number and/or the DWER contact.	Preserve Gnarabup has had engagement with: Gerard O'Brien A/Manager EIA Environmental Planning Branch, EPA Services Teresa Bryant A/Manager, EIA Planning Anthony Sutton Executive Director, EPA Services Division

Part B: Environmental impacts

Environmental factors	
What are the likely significant environmental factors for this proposal?	☐ Benthic Communities and Habitat ✓ Coastal Processes ✓ Marine Environmental Quality ☐ Marine Fauna ✓ Flora and Vegetation ✓ Landforms ✓ Subterranean Fauna ✓ Terrestrial Environmental Quality ✓ Terrestrial Fauna ☐ Inland Waters ☐ Air Quality ☐ Greenhouse Gas Emissions

		✓ Social Surroundings ✓ Human Health
*For **each** of the environmental factors identified above, complete the following table, or provide the information in a supplementary report*		
Potential environmental impacts		
1	***EPA Factor***	See attached Supporting Document
2	***EPA policy and guidance*** - What have you considered and how have you applied them in relation to this factor?	See attached Supporting Document
3	***Consultation*** – Outline the outcomes of consultation in relation to the potential environmental impacts	See attached Supporting Document
4	***Receiving environment*** – Describe the current condition of the receiving environment in relation to this factor.	See attached Supporting Document
5	***Proposal activities*** – Describe the proposal activities that have the potential to impact the environment	See attached Supporting Document
6	***Mitigation*** – Describe the measures proposed to manage and mitigate the potential environmental impacts.	See attached Supporting Document
7	***Impacts*** – Assess the impacts of the proposal and review the residual impacts against the EPA objective.	See attached Supporting Document
8	***Assumptions*** - Describe any assumptions critical to your assessment e.g. particular mitigation measures or regulatory conditions.	See attached Supporting Document

Part C: Other approvals and regulation

State and Local Government approvals

Is rezoning of any land required before the proposal can be implemented? If yes, please provide details.	☐ Yes ✓ No We understand that the Proponents are not seeking rezoning however the Shire of Augusta-Margaret River is currently progressing an amendment to the Scheme to bring the Scheme in line/make consistent with the Local Planning Strategy for the site. The Shire has recently referred this amendment to the Scheme to rezone four of the five lots covered by the Proposal (Lots 501-504) from 'Future Development' to 'Tourism' to the EPA as required under the Planning and Development Act 2005 and Environmental Protection Act 1986.
If this proposal has been referred by a decision-making authority, what approval(s) are required from you?	Decision making Authority for the Development Application will be the WA Planning Commission.

Please identify other approvals required for the proposal:

Proposal activities e.g. clearing, dewatering, mining, processing, dredging	**Land tenure/access** e.g. Crown land, Mining lease, specify legislation for access if relevant	**Type of approval** e.g. Native Vegetation Clearing Permit, licence, mining proposal,	**Legislation regulating the activity** e.g. *EP Act 1986* – Part V, *RiWI Act 1914*, *Mining Act 1979*
Wastewater discharge	Freehold	Licence	EP Act 1986

Commonwealth Government approvals

Does the proposal involve an action that may be or is a controlled action under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)?	✓ Yes ☐ No
Has the proposed action been referred? If yes, when was it referred and what is the reference number (EPBC No.)?	Yes ✓ No As a third party, Preserve Gnarabup cannot refer to the Commonwealth, however we will be writing to DAWE to raise concern about potential impact to matters of national environmental significance under the EPBC Act 1999. We wrote to DAWE in the second half of 2020 to raise these concerns and will write again attaching our referral to the EPA. At the time a DAWE officer contacted us to advise they would remind the Proponent of their responsibility to

Part C: Other approvals and regulation	
State and Local Government approvals	
	refer if the Proposal would impact on matters of national environmental significance. Date: _____ EPBC No.: _____
If referred, has a decision been made on whether the proposed action is a controlled action? If 'yes', check the appropriate box and provide the decision in an attachment.	☐ Yes ✓ No ☐ Decision – controlled action ☐ Decision – not a controlled action
If the proposal is determined to be a controlled action, do you request that this proposal be assessed under the bilateral agreement or as an accredited assessment?	☐ Yes - Bilateral ✓ No ☐ Yes – Accredited
Is approval required from other Commonwealth Government/s for any part of the proposal? *If yes, describe.*	☐ Yes ✓ No Approval:

Proposed Gnarabup Headland Development

EPA Referral Supporting Document

Prepared by Preserve Gnarabup

April 2021

Table of contents

List of tables

List of figures

1. Introduction

1.1 Purpose and scope

Community organisation Preserve Gnarabup is formally referring the Westin Margaret River Resort and Spa and the Gnarabup Beach Houses development projects (the Proposal) proposed by Saracen Properties Ltd (the Proponent) under Section 38 of the *Environmental Protection Act 1986* (WA).

The Proposal is located on beachfront land at Gnarabup in the south-west region of Western Australia, 10 km from the township of Margaret River and consists of the development of:

- a 120-room resort hotel at Lot 783 Mitchell Drive, Gnarabup
- residential and short-stay housing on Lots 501, 502 and 504 Reef Drive Gnarabup and Lot 503 Seagrass Place Gnarabup.

Preserve Gnarabup understands that the Proposal is to clear remnant native vegetation across the almost 7 hectare site. In addition, the Proposal includes connection of the resort and residential development to the adjacent Gnarabup Wastewater Treatment Plant.

It is understood that the resort hotel development is to be operated by the Marriot Hotel Group as a Westin branded hotel and the other lots will be on-sold to multiple landholders.

Figure 1 presents the location and layout of the lots subject to the Proposal.

Preserve Gnarabup considers the Proposal is likely to have a significant impact on the sensitive environment at the location and wide-ranging social impacts for local community members and visitors to the region. Given the high-level of public interest in the Proposal, Preserve Gnarabup is also concerned that the Proponent will not refer the Proposal and provide the local community, and public more broadly, an opportunity to be consulted on the likely effect of the Proposal and any proposed mitigation measures.

1.2 Proponent

Table 1 provides the details of the Proponent.

Table 1: Proponent and key contact details

Proponent 1	Contact details
Name	Saracen Properties
ABN	Unknown – there are various companies with a similar name.
Postal address	Saracen Properties Pty Ltd, Ground Floor, 342 Murray Street, Perth WA 6000
Proponent contact	Joel Saraceni, Project Director Saracen Properties Pty Ltd 08 9426 8100, Direct 08 9426 8110, mobile 0408 934 081 *joel@saracenproperties.com.au* www.saracenproperties.com.au

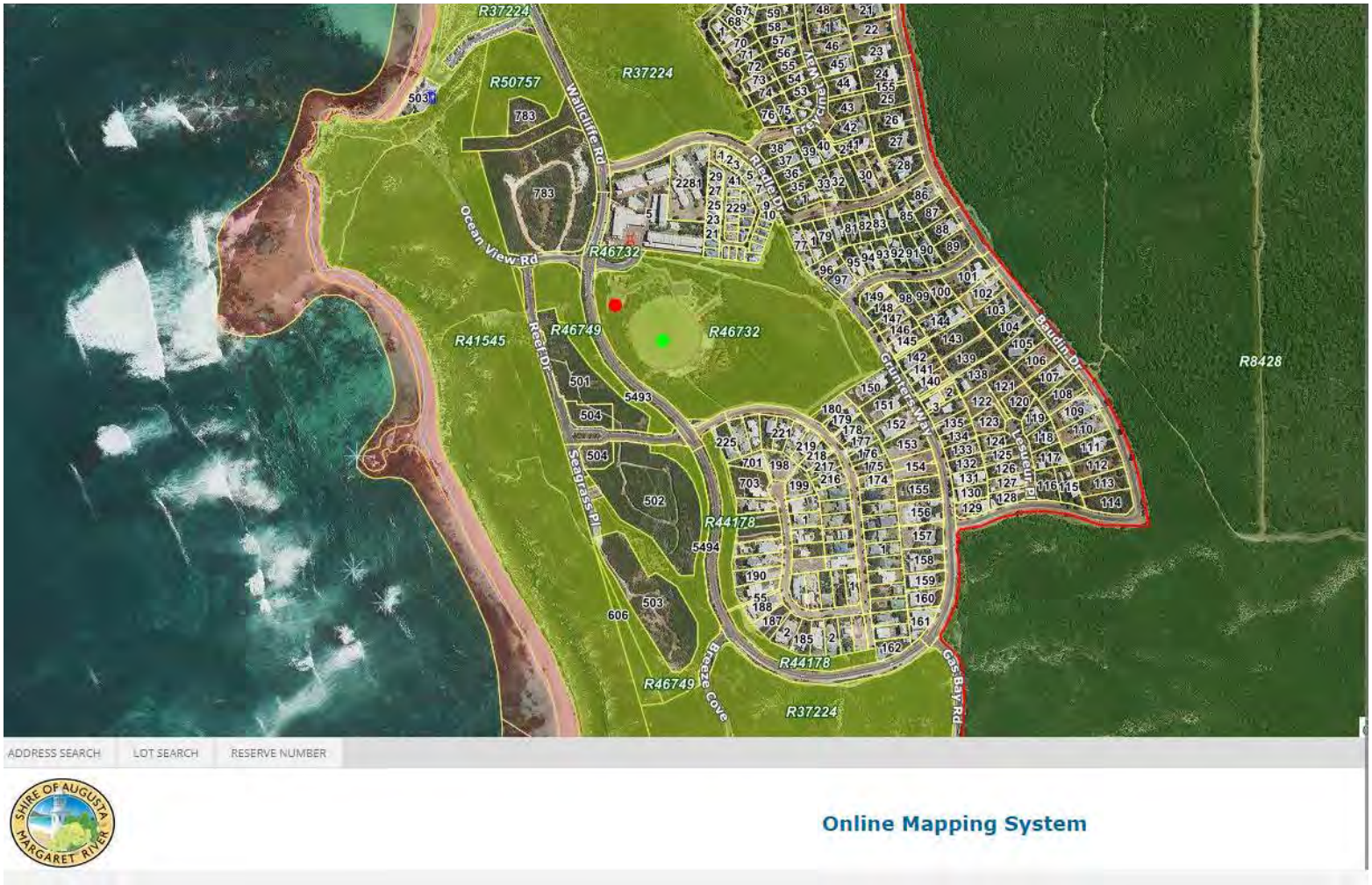
1.3 Other approvals and regulation

Preserve Gnarabup understands that the Proponent will require a licence and/or a permit from the Department of Water and Environment Regulation to connect to and discharge the significant volume of waste produced from the development to the Gnarabup Wastewater Treatment Plant.

Preserve Gnarabup understands the Proponent has developed a Development Application for the project with the State Development Assessment Unit. This Development Application will ultimately be subject to a decision by the WA Planning Commission.

Figure 1: Proposal locality and layout – showing lots 501, 502, 503, 504 and 783

Key: Yellow areas = Shire Vested Reserves, Dusty Pink areas = Unallocated Crown Land, Dark Green areas = Leeuwin Naturaliste National Park



2. Proposal

2.1 Background and justification

In this document Preserve Gnarabup sets out the likely impacts of Proposal which are potentially significant and therefore require formal assessment under Part IV of the *Environmental Protection Act 1986.*

The Environmental Protection Authority (EPA) has never formally or informally assessed any development in the Proposal area. Until recently, the Proposal land area had not been previously referred to the EPA for consideration however the Shire of Augusta-Margaret River has recently referred an amendment to its Local Planning Scheme 1 that relates to four of the fives lots (lots 501-504 and not lot 783). The Shire's current Local Planning Scheme 1 has not been assessed by the EPA and as such is an 'unassessed scheme".

In 1992 the EPA had decided to informally assess the Gnarabup Beach Estate Structure Plan on the basis that it was consistent with the Prevelly Park Development Guidelines and Town Planning Scheme 18 hich was based on the Guidelines. The Prevelly Park Development Guidelines had been prepared based on the detailed and extensive work of Bowman and Hesp, Geomorphologicial Study of the Leeuwin-Naturaliste Coastline - Assessment of Stability and Potential Development Sites (1982), and the Leeuwin-Naturalist Region Plan Stage 2 (SPC 1988).

As the land parcel subject to this current Proposal was not identified as suitable for development by Bowman and Hesp or the Leeuwin-Naturaliste Region Plan Stage 2, it was not included within the boundaries of the Prevelly Park Development Guidelines and Town Planning Scheme 18.

The first version of the Gnarabup Beach Estate Structure Plan, presented to the EPA in 1992 did not include the land subject to this Proposal and the subsequent decision to informally assess the land applies only to land located east of Wallcliffe Road and not the land subject to this Proposal, which is west of Wallcliffe Road.

Following this informal assessment of the Gnarabup Beach Estate Structure Plan by the EPA, the developer modified the Structure Plan to include what it called "Tourist Development Scheme A" and "Tourist Development Scheme B". The parcels of land that fall into these Scheme areas now comprise the area of land subject to the current development Proposal.

In its June 1993 advice to the Department of Planning and Urban Development (DPUD) on the now modified proposed Gnarabup Beach Estate Structure Plan, the EPA advised that its decision to informally assess the proposed 1992 Structure Plan had been on the basis that it was consistent with the Prevelly Park Guidelines (and therefore did not include the land west of Wallcliffe Road now subject to the current Proposal). Of the modified Structure Plan, the letter concludes that:

"Because the proposal is not consistent with Guidelines it cannot be viewed as being the same proposal which the Environmental Protection Authority agreed to assess at an informal level because it conformed with the Guidelines. If the proposal cannot be made consistent with the Guidelines, then the Authority may consider the proposal requires formal assessment."

Please see full letter at Appendix 1.

A further letter from the EPA to the Shire of Augusta-Margaret River Shire's Planner on 14 February 1993 on the Gnarabup Estate Structure Plan indicated the EPA was concerned about "exposed areas", "and is particularly concerned about the proposed chalet area" (now known as Lots 501-504 and site of the current Proposal for short-stay and permanent housing and commercial). The EPA also expressed concern about management of visual impacts of developing the sites of "the proposed location of the Chalets, Tourist Development and Commercial Centre". This parcel of land is the same land subject to the current Proposal. The EPA goes on to comment on concerns about bush fire management; rare flora and fauna; provision of water and sewerage services; and dune blowout and erosion.

The letter states:

"Clause 9.1.3. the Development Guidelines recommends that exposed ridges, knolls, and slopes within the development area are to be subject to a detailed assessment should development of these features be contemplated. The Authority has not seen a detailed assessment of any of these areas, and is particularly concerned about the proposed chalet area……"

Please see letter at Appendix 2.

The informal assessment in 1992 by the EPA of the land in the adjacent Gnarabup Beach Estate Structure Plan (east of Wallcliffe Road) occurred without the knowledge available now on climate change, rising sea levels and the listing of this region as global biodiversity hotspot. It also occurred before the listing of the Western Ringtail Possum as 'Endangered 'and then 'Critically Endangered' (2017).

The community of Margaret River, Prevelly and Gnarabup recognises the environmental and social importance and sensitivity of the land that is subject of the Proposal and has opposed development of this land for more than thirty years.

2.2 Description of Proposal

2.2.1 Key Proposal Characteristics

Table 2 presents the Key Proposal characteristics.

Table 2: Proposal summary table

Proposal title	
Proponent name	Saracen Properties Pty Ltd
Short description	Development of a 120-room resort hotel and beach-front residential and short-stay housing on Lots 501, 502, 504 Reef Drive, Lot 503 Seagrass Place and Lot 783 Mitchell Drive at Gnarabup Beach, WA.

Physical and operational elements

Element	Location	Proposed extent
Physical elements		
Development of all listed Lots – 501, 502, 503, 504 and 783, Gnarabup Connection to the Gnarabup Wastewater Treatment Plant.	See Figure 1	• Clearing of approximately 7 ha of native vegetation on the lots. Previous Development Applications for the site have also included clearing fire breaks into the surrounding Crown Land. It is unclear yet whether the current Proposal will seek approval to clear fire breaks into Crown Land.

3. Stakeholder engagement

Preserve Gnarabup is not aware of any engagement and consultation by the Proponent with the local community or other key stakeholders about the Proposal to date. The following key stakeholders have been identified in relation to the Proposal:

- Wadandi people
- Undalup Association
- South West Aboriginal Land and Sea Council
- Local residents
- Preserve Gnarabup
- Surfrider Foundation Australia – Margaret River Branch
- Margaret River Coastal Residents Association
- Nature Conservation Margaret River Region
- Southwest Catchment Council
- Margaret River Recreational Surfers Association
- Shire of Augusta-Margaret River
- Surf Lifesaving WA
- Vac Swim
- Local swimming groups
- local businesses
- Recreational fishers and boat users
- Margaret River, Prevelly and Gnarabup community
- Department of Biodiversity, Conservation and Attractions (DBCA)
- Commonwealth Department of Agriculture, Water and Environment (DAWE)

Given the importance of the environmental and social values of the Proposal location, and high level of public interest in any proposed development at Gnarabup Beach and Headland, there should be thorough community consultation on the likely environmental and social effects of the Proposal. Preserve Gnarabup believes this is best achieved through a formal environmental assessment, and associated public consultation and appeal processes, with additional stakeholder engagement by the Proponent through several methods including:

- advertising in local and state-wide media publications
- display at public facility – community centre, supermarket, library, etc
- local community meetings
- stakeholder briefings, and
- public information sessions.

Preserve Gnarabup was contacted by Saracen Properties in December 2020 to set up a briefing for a limited number of representatives (4-5 only) on the Development Application prior to submission however the timeframe for this briefing keeps getting postponed by the Proponent. We understand Saracen Properties also plans to brief the Shire Councillors on the Proposal however this is not confirmed.

3.1 Environmental Factors

Preserve Gnarabup believes that there are nine preliminary environmental factors that are relevant to the Proposal:

1. Flora and Vegetation
2. Terrestrial Environmental Quality
3. Terrestrial Fauna
4. Marine Environmental Quality
5. Coastal Processes
6. Social Surroundings
7. Human Health
8. Landforms
9. Subterranean Fauna

Each preliminary environmental factor is described in Section 3.1.1 to Section 3.1.9. Matters of National Environmental Significance (MNES) are identified where relevant under each factor.

3.1.1 Flora and Vegetation

EPA objective

The EPA's Statement of Environmental Principles, Factors and Objectives (EPA 2018a) identifies the following objective for flora and vegetation:

- To protect flora and vegetation so that biological diversity and ecological integrity are maintained.

Potential impacts

Preserve Gnarabup understands the Proposal requires clearing of approximately 7ha of remnant native vegetation. We believe the Proponent may also propose clearing additional native vegetation in surrounding Crown land for bushfire breaks. The vegetation communities in the proposed development area predominantly comprise of coastal heathland that are relatively undisturbed and considered to generally be in good condition. Parts of the land was burnt in the 2011 bushfire that passed through Gnarabup. There has been significant regrowth over the past decade and the vegetation on the land includes significant numbers of new Peppermint tree growth alongside more mature remnant Peppermint trees and well-established Melaleuca.

Construction activities also have potential to impact on adjacent native vegetation through erosion, uncontrolled access, dust deposition, and through the spread of weeds and dieback.

A search of the Commonwealth Government's Protected Matters Search Tool (PMST) has identified the following four plant species, that are listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999,* as potentially occurring in the development area:

- *Caladenia excelsa* (Lodge's Spider-orchid) - Critically Endangered Species
- *Caladenia lodgeana* (Blue Tinsel Lily) - Critically Endangered Species
- *Calectasia cyanea* (Dwarf Hammer-orchid) - Vulnerable Species
- *Drakaea micrantha* (Butterfly-leaved Gastrolobium) - Endangered Species

See full PMST report for Gnarabup/Leeuwin Naturaliste National Park area at Appendix 6.

We are unaware of any vegetation and flora surveys being conducted in the development area. As there is potential for rare and priority flora, such as listed *Caladenia spp* and habitat for critically endangered fana, to occur within the development area Preserve Gnarabup believes these warrant detailed surveys and assessment prior to any development occurring.

3.1.2 Terrestrial Environmental Quality

EPA objectives

The EPA's Statement of Environmental Principles, Factors and Objectives (EPA 2018b) identifies the following objective for terrestrial environmental quality:

- To maintain the quality of land and soils so that environmental values are protected.

Potential impacts

The Proposal is expected to send additional waste to the nearby Gnarabup Wastewater Treatment Plant. The Plant is non-compliant with its DWER environmental licensing conditions and elevated levels of nitrogen have been sampled in the ground and nearby ocean. Sending further waste to this non-compliant plant has the potential to impact soil quality in close proximity to the ocean due to addition of excess nutrients

3.1.3 Terrestrial Fauna

EPA objectives

The EPA's Statement of Environmental Principles, Factors and Objectives (EPA 2018b) identifies the following objective for terrestrial fauna:

- To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.

Potential impacts

The Proposal will result in clearing of approximately 7 ha of fauna habitat (and possibly more habitat in surrounding Crown Land for fire breaks), comprising predominantly coastal heathland.

The site adjoins the Leeuwin Naturaliste National Park and the Ngari Capes Marine Park. The critically endangered Western Ringtail Possum (*Pseudocheirus occidentalis*), all three species (two endangered) of black cockatoo (*Calyptorhynchus banksii naso*, *Calyptorhynchus baudinii* and *Calyptorhynchus latirostris*), Hooded Plover (*Thinornis rubricollis*), and Osprey (*Pandion haliaetus*) have been sighted on or near the development area.

Other significant fauna species that may also occur within the development area or adjacent habitat are:

- Southern Brush-tailed Phascogale (*Phascogale tapoatafa subsp. tapoatafa* - P3 (WA)
- Southern Brown Bandicoot, Quenda (*Isoodon obesulus subsp. fusciventer* - P5 (WA)
- Quokka (*Setonix brachyurus*) – Vulnerable (Cwth).
- Brush-tailed bettong, Woylie (*Bettongia penicillata ogilbyi*) – Endangered (Cwth)

Three community member sightings of Western Ringtail Possum within or adjacent to the lots, were reported to the Department of Biodiversity, Conservation and Attractions over a three-month period to November 2020.

The first sighting was of a deceased specimen on Wallcliffe Road near the Gnarabup Beach carpark, and the second sighting was of a healthy mother and young in Peppermint tree scrub on one of the proposed development lots. See photo at figure 2 below taken of these possums. The third sighting was a solo possum, again on one of the development lots.

Figure 2: Photo of a healthy mother and daughter Western Ringtail Possums in peppermint tree scrub on one of the development lots, viewed from outside the lot taken in 2020

In 2017, the threat category for the Western Ringtail Possum was increased from 'Endangered' to 'Critically Endangered'.

A report commissioned by the Shire of Augusta-Margaret River, by D Bradshaw, "Ensuring the long-term survival of the Endangered Western ringtail possum (*Pseudocheirus occidentalis*) in the Shire of Augusta-Margaret River: The impact of recent fires and the threat of future fires" December 2016, states:

> *"The major factors thought to be contributing to the decline of the ringtail include habitat loss and/or modification, predation by introduced predators, and changing fire regimes."*
>
> *"Clearing of coastal Peppermint in the Bunbury-Augusta and Albany areas is contributing to habitat fragmentation while prescribed burning of these areas needs to be managed to maximize population survival and enhancement. Housing developments have led to substantial clearing of peppermints, forcing the possums to come to the ground at night where they are vulnerable to predation by cats and dogs."*

The Commonwealth Conservation Advice for *Pseudocheirus occidentalis* (Western Ringtail Possum) by the Threatened Species Scientific Committee 2013 sets out the following actions for decision makers and land owners to implement to protect the species:

> *"Investigate formal conservation arrangements, management agreements and covenants on private land, and for crown and private land investigate and/or secure inclusion in reserve tenure if possible.*
>
> *Minimise the incidence of land clearing for urban development, especially in the Busselton area (DEWR, 2007).*
>
> *Conserve existing populations within public lands managed by the Western Australian Department of Environment and Conservation (DEC, 2012) and private conservation reserves.*
>
> *Retain and conserve vegetation in the Quindalup Dune Vegetation Complex, which has high conservation value for the species (DEC, 2012).*

Retain and plant peppermint (Agonis flexuosa) trees (DEC, 2012).

Minimise adverse impacts from land use at known sites. Minimise the impact of land developments through in-situ conservation (DEC, 2012).

Protect populations of the listed species through the development of conservation agreements and/or covenants.

Conserve remnant bushland for the western ringtail possum by placing a covenant or voluntary management agreement on properties, and by fencing, controlling feral species and removing weeds (DEWR, 2007).

Proponent representative Mr Luke Saraceni has made comments to the local media saying that the lots no longer have habitat for Western Ringtail Possum following the 2011 fires. We know this is not correct. There has been significant regrowth of habitat, including significant numbers of Peppermint trees alongside more mature remnant Peppermint trees and well-established Melaleuca. See Appendix 3 with photos of Peppermint trees on the lots taken on 8 September 2020.

The Proposal site sits directly above the well-known karst formation of the Leeuwin-Naturaliste National Park and we understand that no surveys have been undertaken to assess karst biodiversity such as stygofauna.

Conserve Gnarabup is of the view that detailed fauna surveys need to be conducted across the proposed development site to determine the significance of the area as habitat for conservation significant fauna species. These surveys should be conducted prior to any development in the area and as part of a formal environmental assessment of the Proposal.

3.1.4 Marine Environmental Quality

EPA objectives

The EPA's Statement of Environmental Principles, Factors and Objectives (EPA 2018b) identifies the following objective for marine environmental quality:

- To maintain the quality of water, sediment and biota so that environmental values are protected.

Potential impacts

Gnarabup Bay is the Margaret River town beach, a rare safe swimming beach on this coast, backed by undeveloped coastal heath and limestone karst cliff system. To the south, just metres from the Wastewater Treatment Plant, are Gas Bay and the Sewers surf break which were named after the plant was built. The flora, fauna and limestone karst system on this section of coast are intrinsically linked to the surrounding Leeuwin Naturaliste National Park and the Ngari Capes Marine Park.

The DWER licensing conditions of the Gnarabup Wastewater Treatment Plant require the production of an annual environmental report. The 2019/20 Gnarabup Waste Water Treatment Plant Annual Environmental Report shows the plant has not complied with its licensing conditions since the earliest recorded year 2015/16. The reporting on the level of groundwater contamination is non-compliant due to the lack of information from available operating monitoring bores since 2015/16. The reporting also does not include historical records or trends prior to 2015/16 and therefore may have been non-compliant for much longer. The plant has been in operation since 1996.

The 2019/20 Annual Environmental Report for the plant at Appendix 4 shows high levels of nitrate recorded in the ground and ocean downstream of the Plant. Liquid waste from the plant is discharged into the ground and eventually flows to the nearby ocean. The concentrations of nitrate in ocean samples is concerning and appears to be increasing over time. There is also an increase in chlorophyll, suggesting the nitrate is fuelling phytoplankton growth.

In late 2020, operator Water Corporation drilled a new set of monitoring bores at the treatment plant due to the failure of existing bores. Preserve Gnarabup is of the view that the new bores are still not sufficient in number or correctly located to adequately assess the impact of the Gnarabup Wastewater Treatment Plant on the environment. For example, there is no control bore up stream or to the east of the Plant and downstream bores are limited and not widely spread. It will take at least 18 months and likely several years

before reliable monitoring data is available from the new bores. Therefore, increasing the load at the plant would not be environmentally responsible.

Please see following an analysis of the Annual Environmental Report, Gnarabup Wastewater Treatment Plant 2019-2020 which raises serious concerns. This analysis was prepared by a scientist who works in the field of water management:

- The variability in the effluent and the spikes in a number of key parameters (*E .coli*, oxygen demand, nitrate) are concerning – especially if there are plans to increase the load on the plant. The plant appears to suffer from periods when it is discharging poor quality effluent (spikes in effluent data e.g., Nov 2019). The plant is operating at about one third of capacity (based on volumes treated), so these spikes in poor quality effluent are a concern.
- Despite the fact that Gas Bay is well flushed and any effluent leaching to the ocean would be expected to be rapidly diluted there is some evidence that the WWTP may be detrimentally impacting Gas Bay. Of particular note is the detection of *E.coli* bacteria at Ocean Survey point 4 in February 2019. *E. coli i*s indicative of recent faecal contamination and suggests that poorly treated effluent is reaching the Bay at some times.
- The concentrations of nitrate (reported as nitrite plus nitrate as N) found recently in the ocean sampling is also concerning and looks like it may be increasing over time at many of the ocean survey points. There is also an increase in chlorophyll, possibly suggesting that the increasing nitrate is fuelling phytoplankton growth. In general nitrate levels in summer would be expected to be very low as there should be a lot of primary producers (like seagrass, phytoplankton) consuming the nitrate, so because there is measurable nitrate it may suggest there is a nitrate source.
- The report is lacking as the location of the ocean sampling is not provided so it is hard to establish if the elevated nitrate is definitely coming from the plant but the *E.coli* and nitrate levels warrant further investigation into if the plant is impacting on the coastal ocean.
- The report reveals that the Water Corporation doesn't really know how the effluent is moving in the groundwater (as evident by contamination in the upstream bore).
- The report lacks of historical information (only goes back as far as 2015)
- There is a lack of monitoring sites – there are effectively only two monitoring bores that are valid which is not enough to define the extent of the contamination plume. The control bore has been corrupted with contamination. While Water Corporation have now added monitoring bores to the west there are no bores to the east. At least 12 to 18 months of data is required before these monitoring bores can be evaluated.
- The report lacks environmental ranges – the information should be reported with relevant ranges. The results should be listed with the accepted ranges for the elements.

While the Annual Report appears to have been audited, see Appendix 5, and the Plant is found to be non-compliant with the Licensing conditions, the failings in the Annual Report are not noted and have not been corrected.

The Gnarabup Wastewater Treatment Plant, and its potential to pollute the groundwater and nearby ocean, has been a concern of the community since it was built in the early 1990s. The original developer of Gnarabup Estate constructed the Gnarabup Wastewater Treatment Plant in the 1990s. There have been many issues related to this plant and it would be unlikely to be approved in a modern real estate development. The liquid waste from the plant goes into the surrounding limestone and sand and then leaches into the ocean. Some changes have been made to the plant over the years, including a Stage 2 expansion in 2000/2001 but it continues to be problematic and is not appropriate to support the existing Gnarabup population, let alone an expanded population.

The plant was the subject of a petition to the Legislative Council in 2001 which resulted in a Parliamentary Inquiry. Please see below the *Conclusions of the Report of the Standing Committee on the Environment and Public Affairs in relation to a Petition opposing the Gnarabup Wastewater Treatment Plant, WA Parliament, October 2002*. While all the conclusions are worrying, in particular we point you to fact that:

- the Report found that the Wastewater Treatment Plant may be illegal,
- the EPA's advice that the development area may require assessment was ignored by regulators assessing approval of the plant; and also
- that the plant was built 375 metres from the ocean when a 500 metre buffer was the then Water Authority (now the Water Corporation) guideline for such developments.

By way of explanation, SWRPC in the below extract from the Report stands for the South West Regional Planning Committee of the State Planning Committee, now the WA Planning Commission.

"13 CONCLUSIONS

13.1 The Committee concludes that the Treatment Plant is inappropriately located and that insufficient consideration was given to its siting.

13.2 The Committee appreciates that the Water Corporation was not the proponent of the Treatment Plant but that it inherited the Treatment Plant from the developer through the land planning and development process. However, the Water Corporation is now responsible for the operation, management and maintenance of the facility.

13.3 The Committee has observed a failure to find solutions for the Margaret River coastal communities of Gnarabup and Prevelly with regard to wastewater treatment and in particular integrating a solution with the outdated system at Prevelly which requires infill sewerage and can not be connected to the Treatment Plant at neighbouring Gnarabup.

13.4 The Committee finds that the decision made by the SWRPC at its meeting on July 22 and 23 1993 to approve the 1993 Structure Plan, despite the letter of advice from the EPA signed on behalf of Mr Sippe and hand-dated June 15 1993, was an inappropriate decision, albeit a legal one under the Environmental Protection Act 1986. The Committee is concerned that the 1993 Structure Plan was approved despite the advice from the EPA in the letter of June 15 1993 that it:

- *was inconsistent with the Shire Council's Visual Resource Assessment;*
- *was inconsistent with a number of elements of the then Department of Planning and Urban Development's coastal development policy;*
- *did not conform with the Shire of Augusta-Margaret River Town Planning Scheme No 18;*
- *did not conform with the Prevelly Park Development Guidelines;*
- *could not be viewed as being the same proposal which the EPA agreed to assess at an informal level and that if the proposal could not be made consistent with the Prevelly Park Development Guidelines the EPA might consider that the proposal required formal assessment; and*
- *did not meet Water Authority buffer requirements.*

13.5 The Committee concludes that if the SWRPC had properly taken into account the advice in the EPA letter, the outcome of the decision might have been different and the 1993 Structure Plan might not have been approved.

13.6 The Committee concludes that if the SWRPC had not approved the 1993 Structure Plan at its meeting on July 22 and 23 1993 the subsequent problems with the Gnarabup Waste Water Treatment Plant might have been avoided. In particular, the failure to provide an adequate buffer zone around the Treatment Plant may have exacerbated the subsequent pollution events.

13.7 The Committee is aware that the development at Gnarabup approved at that meeting has caused significant grievance and expense for the Shire of Augusta-Margaret River, and its community, to this day.

13.8 The Committee also concludes that the decision by the SWRPC to approve the 1993 Structure Plan did not integrate with other planning and development decisions in the Gnarabup/Prevelly area. The Committee concludes that planning and development approvals within Western Australia should take account of and be integrated with other developments, schemes and projects in the local and, if appropriate, wider area.

13.9 The Committee concludes that during the approval process for the Treatment Plant there was confusion and misunderstanding between the various government agencies and departments and the Shire Council regarding the interpretation of section 32 of the Town Planning and Development Act 1928 with regard to approvals for public works. There was also confusion regarding the identity of the proponent for the Treatment Plant which contributed to a lack of accountability in the process.

13.10 The Committee notes that no formal development application for the Treatment Plant was assessed by the Shire of Augusta-Margaret River. The legality of the Treatment Plant may therefore be uncertain.

13.11 The Committee finds that the subsequent approvals by the Shire of Augusta-Margaret River, the EPA and the WAWA were constrained by the pre-determined decision of the SWRPC in July 1993.

13.12 The Committee finds that the siting of the Treatment Plant is detrimental to the values of a world class tourist destination.

13.13 The Committee concludes that there needs to be a long-term, integrated and comprehensive solution to the problems arising as a result of the approval for and the development, construction and operation of the Treatment Plant."[1]

The Report made recommendations that all parties – the Developer of the land, the Shire and Government Departments should invest in changing the treatment plant into a pumping station and installing a pipe to transfer treated liquid wastewater to the Margaret River Golf course for use on the greens rather than release into the ground at Gas Bay. This project has never been fully funded and has therefore not proceeded. The Inquiry also looked at the cost of rebuilding the waste treatment Plant in a more suitable location away from the ocean and another option to build a pipeline and pumping system to send the waste to the Margaret River wastewater treatment plant.

The original structure plan approved for the Gnarabup Beach real estate development in 1993, limited the size of the estate to approximately the same size as the adjoining Prevelly township at the time and limited the number of tourist rooms. These limits were exceeded many years ago.

Preserve Gnarabup notes that the Report of the Standing Committee into the Gnarabup Wastewater Treatment Plant records evidence given in 2001 by Water Corporation executive Chris Elliot, that identified Nitrogen as the main nutrient that Water Corporation is careful to manage at the Waste Water Treatment Plant:

"4.5 Mr Elliott also advised the Committee that the main nutrient of concern for the coastal receiving environment is nitrogen. He informed the Committee that the Treatment Plant reduces nitrogen by over 90 per cent, a level of reduction not possible in septic tank systems."

Separately, we note that the Risk Analysis and Risk Identification Workshop that forms part of the Shire of Augusta-Margaret River's Coastal Hazard Risk Management Plan 2015 (CHRMP) states the following risk in relation to the Gnarabup Wastewater Treatment Plant: "Potential environmental disaster should this be impacted upon through coastal erosion."

The Proposal may also directly impact on marine environmental quality through construction phase impacts including erosion, sediment and accidental spills.

3.1.5 Coastal Processes

EPA objectives

The EPA's Statement of Environmental Principles, Factors and Objectives (EPA 2018b) identifies the following objective for marine environmental quality:

- To maintain the geophysical processes that shape coastal morphology so that the environmental values of the coast are protected.

Potential impacts

Potential impacts of the Proposal to coastal processes include:

[1] Conclusions of the Report of the Standing Committee on the Environment and Public Affairs in relation to a Petition opposing the Gnarabup Waste Water Treatment Plant, WA Parliament, October 2002. https://parliament.wa.gov.au/Parliament/commit.nsf/WCurrentNameNew/64E7DA74AB6092FB48257831003D342F#Report

- Creating hard infrastructure (buildings) extremely close to a very active and rapidly changing coastline.
- Reducing the opportunity to create wider coastal foreshore reserve and a barrier between coastal ingress and established developed areas.
- Additional waste sent to Gnarabup Waste Water Treatment Plant where the buffer of foreshore between the plant and ocean has reduced by almost 200 metres since it was built in the early 1990s. The Risk Analysis and Risk Identification Workshop that forms part of the Shire of Augusta-Margaret River's Coastal Hazard Risk Management Plan 2015 (CHRMP) states the following risk in relation to the Gnarabup Waste Water Treatment Plant: "Potential environmental disaster should this be impacted upon through coastal erosion."

The Proposal is located in an area that is already subject to high levels of coastal erosion. An example of this is seen by considering the ingress of the coastline to the west of the Gnarabup Wastewater Treatment Plant. The 2002 Parliamentary Report into the Gnarabup Sewerage and Wastewater Treatment Plant (located directly to the south of the proposed development) recorded that when it was built in the 1990s, the plant was 375m from the ocean. In the 2019/20 Water Corporation Annual Environmental Report for the plant, it was recorded as being approximately 200m from the ocean. The plant is in fact currently less than 200 metres from the coast. There has been significant movement inland of the shoreline on this section of coast over the past 27 years.

Figure 3: Photo of Gnarabup Wastewater Treatment Plant, located on Gas Bay, immediately south of Proposal site

Under the guidance of the Western Australian Planning Commission (WAPC), coastal local governments throughout WA have worked with over the past eight years to examine the impact of climate change and rising sea levels on their coastal area, likely impact on infrastructure and impact zones. The local governments have each prepared a Coastal Hazard Risk Management and Adaptation Planning, based on guidelines developed by the Department of Planning, Lands and Heritage (DPLH)and State Planning Policy 2.6.

The Shire of Augusta-Margaret River's Coastal Hazard Risk Management and Adaptation Plan 2015 (CHRMA2P) states:

> *"The Coastal Hazard Risk Management and Adaptation Planning (CHRMAP) process is recommended by Western Australia Planning Commission (WAPC, 2013a) (WAPC, 2014). This coastal planning process aims to provide strategic guidance on coordinated, integrated and sustainable management and adaptation for land use and development in the coastal zone likely to be affected by coastal hazards. It establishes the basis for present and future risk management and adaptation. The coastal settlement areas or areas of significant tourism amenity (Coastal Management Areas) identified by the Augusta Margaret River Shire (AMRSC) for further consideration include Gracetown, Prevelly, Gnarabup, Hamelin Bay, Molloy Island, Augusta North (Blackwood River) and Augusta South (Flinders Bay)."*

It is noted that CHRMAP was developed using coastal erosion data to 2013. This is now widely considered out of date as actual erosion rates throughout Western Australia have outstripped the predicted rates. In December 2020, a statuary Climate Health WA Inquiry report by the State's former Chief Health Officer, Professor Tarun Weeramanthri was tabled in WA Parliament. That report says of Western Australia:

> *"However, it is vulnerable to climate change, with a steady decline in rainfall in the south-west, drying interior, lengthening fire season, exposure to cyclones and extreme weather events, and a rate of sea-level rise almost three times the global average."* (Climate Health WA Inquiry Final Report, December 2020)

The Shire of Augusta Margaret River's CHRMAP shows that the current coastline, Gnarabup Beach and Headland, Back Beach, the limestone cliffs and parts of the land subject to the Proposal fall within the 100-year allowance for coastal processes zone (all other parts of the land subject to the Proposal are very close). Gnarabup and Back Beach and all public access areas fall within the 10 and 20-year allowance zones (Figure 2 – which is page 107, map of coastal process zones, Hazard Risk Management and Adaptation Plan (CHRMAP), 2015, Shire of Augusta Margaret River).

Rising sea levels are already impacting the beach at Gnarabup and Back Beach which are directly to the west of the Proposal. This coastal erosion has seen the Shire Council invest significant funds in reducing the risk of cliff fall, reducing access to environmentally sensitive areas and rebuilding public access infrastructure. Coastal protection and public access infrastructure maintenance is become an increasingly costly expense for the local government A dedicated group of volunteers works to re-plant and protect dune systems.

In past years, the decking outside the small café at Gnarabup Beach has had to be repaired or replaced after high swells wash its footings loose much like the carpark that has been washed away at Port Beach in North Fremantle over recent winters. The beach has become narrower and steeper in recent years.

Figure 1.2 Coastal Erosion and Damage to Infrastructure in Gnarabup During September 2013 (Cristina Da Silva, DoT 2013)

Figure 4: Photo of damage to retaining wall and decking at White Elephant Café at Gnarabup Beach washed away after winter storm in 2013 - (from page 10 of Hazard Risk Management and Adaptation Plan (CHRMAP), 2015, Shire of Augusta Margaret River).

Another example of erosion can be seen in the impact of rising sea levels can be seen in the Gnarabup – Prevelly Coastal Walkway which was first built in 2002. At the time, the path was nestled behind a wide beach and dunes.

Just 12 years later, parts of the path were washed out in winter 2015. Since then, the wash out of sections of the path has become an annual occurrence, despite the best efforts of the tireless volunteers who toil to plant, cover and protect the dunes. In 2020 the Shire of Augusta-Margaret River committed a further $300,000 to rebuild the pathway further inland - away from the encroaching ocean. This was funded by reallocating the last funds paid by the developer of Gnarabup Beach Estate in the 1990s for infrastructure at then newly accessible beaches near the estate (Gnarabup, Back Beach, Grunters and Gas Bay) (the same beaches adjacent to the Proposal) and instead use the funds to move the Walkway between Gnarabup to the older settlement at Prevelly. This raises the question of what funds will be used to protect the coastal environment and provide public access to the coast adjacent to the Proposal which is also badly impacted by erosion.

This factor is directly relevant to the Proposal. Preserve Gnarabup believes developing this land will add to coastal erosion and modify natural processes.

Figure 5: Photos of erosion of Gnarabup -Prevelly Coastal Walkway winter damage

Figure 6: Photo of erosion of Gnarabup -Prevelly Coastal Walkway winter damage

Figure 7: Map of modelled coastal process zones, Hazard Risk Management and Adaptation Plan (CHRMAP), 2015, Shire of Augusta Margaret River Page 107

3.2 Social Surroundings

3.2.1 EPA objectives

The EPA's Statement of Environmental Principles, Factors and Objectives (EPA 2018b) identifies the following objective for social surroundings:

- To protect social surroundings from significant harm.

3.2.2 Potential impacts

Potential impacts to social surroundings include:

- disturbance to recorded and un-recorded Aboriginal heritage places through clearing and earthworks
- visual impact of the development on the Gnarabup landscape
- loss of access and enjoyment of a coastal environment which is of significance to local people and tourists
- construction phase impacts on aesthetic, economic and social values due to:
    - dust emissions and deposition
    - noise and vibration from machinery during construction
    - construction waste such as litter and debris
    - construction vehicle traffic including heavy vehicles supplying materials.

The Proposal will result in the loss of amenity and access to this valuable and highly used community and tourism asset.

The impact of the Proposal on the environment will result in the loss of a valuable nature-based tourism attraction and experience which supports the local tourism industry.

Margaret River is famous for is big swells which attract surfers from around WA, Australia and the world. This means that there are very few protected and safe beaches for swimming. Gnarabup is the main public swimming and recreation beach for Margaret River. Many generations of local people have learnt to swim in its protected bay – reaching back to the local Indigenous people, the pioneering Bussell family, through the Depression-era hard-working returned soldier group settlement communities, the dairy farmers and more recent communities. As the only protected bay on the coastal strip between Gracetown and Hamelin Bay, Gnarabup beach:

- is the only safe beach for children,
- is home to numerous swim clubs,
- accommodates Royal Lifesaving WA swimming lessons/ VacSwim,
- is used by WA Surf lifesaving for training for surf lifesavers from around the State, and
- Is home to the only boat ramp between Gracetown and Hamelin Bay.

Despite common opinion that Margaret River is a wealthy community, in fact, the permanent community has a particularly low average household income. Public assets like the protected Gnarabup Beach that are free to use are incredibly important to this community. The area is a vital community asset that is precious to and loved by locals and tourists from throughout Western Australia, Australia and the world and is therefore very important to local tourism business operators. This high visitation occurs in a relatively small envelope of Gnarabup beach, the public carpark, café, the boat ramp and a walk trail from Gnarabup to the beaches to the north. The fragile limestone headland is protected from significant impact from people but is enjoyed and admired for its wild beauty.

Tourists to the region, comment on the amazing wildness of this stretch of coast and their ability to swim and enjoy a coffee, with the wild and spectacular limestone headland surrounding the beach and café. Natural values and natural environments are becoming increasingly important in nature-based tourism and it is questionable whether the Proposal will add to this. Gnarabup Headland (and therefore the Lots proposed for development) are also on the Cape to Cape trail which is supported by the State and Local Government and promoted as an internationally significant opportunity for nature-based tourism. The trail is acknowledged as one of the great wilderness trails globally. The Cape to Cape trail features heavily in the State Government's current "Take a Hike" advertising campaign. The Government's 10-year WA Hiking Strategy aims to encourage Western Australian and tourists to see the beautiful natural environments of our State in a sustainable way. A large international resort and residential development a few short metres from the Cape to Cape trail, at the half way point of the trail, will ruin another Western Australian, Australian and international tourist attraction and forfeit the resulting economic opportunity for local tourist businesses and all they employ.

Development of the site has long been opposed by the Traditional Owners. The Proposal site includes a significant Aboriginal heritage place (lodged with the Department of Planning Lands and Heritage's Aboriginal Heritage Register) on one of the lots. This lodged site is a Gnamma Hole, a naturally occurring rock formation in the hard cap rock of the limestone which was used as a freshwater collection point.

In 2001, Traditional Owner William (Bill) Webb, Cultural Manager, Wardan Centre, made the following comments at a hearing for the Inquiry of the Standing Committee on the Environment and Public Affairs in relation to a Petition opposing the Gnarabup Wastewater Treatment Plant, WA Parliament. The comments are significant as they detail the significance of the Gnarabup Valley to local people and the Gnamma Hole which falls within the Proposal area.

"Mr Webb: *……We have maintained all along that it is just too close to somewhere that is of international importance, which is the whole cape-to-cape region. We would like to see some preservation of some of our sacred areas.*

The CHAIRMAN: *Are there any actual Aboriginal heritage sites very close to the waste water treatment location?*

Mr Webb*: The whole Gnarabup valley, and the other one as well, is of significance, because it is a water point. I know from my father that all along the waterway there were massive camping grounds. There is a sacred cave there as well - the Rainbow Cave - and over the back of that there are huge cave shelters that run fairly extensively around in an arc facing east. It is an ideal place for protection from the weather coming in from the west.*

The CHAIRMAN: *How close is the Gnarabup valley to the waste water treatment site?*

Mr Webb: *The treatment site is only just over the rise, just down from the first houses, where the first run-off would run down through the valley.*

The CHAIRMAN: *Are you inferring to the committee that the study in which you participated in 1995 did not adequately reflect your views?*

Mr Webb: *The 1992 study was only the personal outcome of his research. In 1995, we put forward that there should never be anything of that nature so close to that recreational area, the ocean, and the people living in the area. We wanted to transfer it back to the other treatment plants.*

Hon J.A. SCOTT: *My understanding is that in 1995 you were consulted about that site. Were you told about the development as a whole, or just that area?*

Mr Webb: *We tried to encompass as much as possible, because we only had the archaeologists for a certain time. To paint a picture of what the whole area was, as well as that specific area, we encompassed the whole story of Aboriginal occupation in that area.*

Hon LOUISE PRATT: *Are the Aboriginal sites in the area registered?*

Mr Webb: *There are a couple of registered sites that are close by, which includes the Rainbow Cave. They may have been registered in the report about the gnamma holes and the midden mounds, which are piles of shellfish that have been eaten in the one area. I know from my ancestry that Gnarabup beach itself was a site for spearing salmon, when the season was on, and a multitude of fish came into those shallow waters.*

Hon LOUISE PRATT: *In your view, are there other places? Obviously the whole region is of significance, but there may be specific sites other than those already registered.*

Mr Webb: *What we have studied and understood, within the whole cape-to-cape region, on rivers, waterways and the natural springs, is that there is evidence of occupation up to 40 000 years ago in many of these areas."*

Figure 8: Photo of boys of long term local families swim at Gnarabup Beach in 1960s

Figure 9: Photo of locals visiting Gnarabup Beach in 1950s

Figure 10: Photo of people camping at Gnarabup Beach in early 1900s

3.3 Human Health

EPA objectives

The EPA's Statement of Environmental Principles, Factors and Objectives (EPA 2018b) identifies the following objective for human health:

- To protect human health from significant harm.

Potential impacts

The Proposal development site is located on Karst Limestone Ridge which is highly porous. Rainfall events are followed by flushing of the fresh water directly into the Gnarabup Beach cove, Back Beach and Gas Bay. Any form of development on the limestone ridge underlying the development with associated surface runoff will directly impact the quality of water in Gnarabup Bay. Any development on this Karst limestone ridge is highly problematic for Human Health for recreation users of Gnarabup Beach, Back Beach, and Gas Bay.

There are also potential impacts to human health associated with additional waste generated from the development at the Gnarabup Wastewater Treatment Plant and discharged into the environment, in particular the ocean which is a high use local area. This could include:

- microbiological illness (bacterial and potentially amoebic meningitis).
- skin irritation and disease caused by certain types of algae in high concentrations.

- chemical impacts (depending upon current/historical peripheral land use with potential for down-stream/end-point contamination).

In addition, the Proposal will result in increased risk from bushfire for a greater number of people. The principal soil type running from Cape Naturaliste to Cape Leeuwin is predominantly gravelly, sandy/laterite loam that has formed directly from the underlying granite and gneissic rock and is highly permeable when moist but any moisture is quickly shed from sloping sites, leaving the land very dry.

A total of 292 landscape fires were recorded in the Leeuwin-Naturaliste area between July 2010 – February 2016.

Gnarabup, Prevelly and the surrounding national park are listed as 'Extreme' bush fire risk zones in the of the Augusta Margaret River Shire, including Gnarabup, as being 'bushfire prone' in accordance with the Shire's Local Planning Scheme 1. Further, in 2018 the Fire and Emergency Commissioner declared parts Fire and Emergency Services Act. We believe that Proposal is in contravention of State Planning Policy 3.7 Planning in Bushire Prone Areas.

In 2011 a controlled burn by Department of Biodiversity, Conservation and Attractions escaped containment and ripped through the Leeuwin Naturalist Ridge. Fire fighters fought desperately to stop fire reaching the communities based at townships of Prevelly and Gnarabup, but the fire leapt the Margaret River, destroying the historic Wallclife House and rushing on to Prevelly and Gnarabup. In total, 3,400 ha, 32 houses, five sheds, nine chalets and one shop were destroyed by the fire in Prevelly, Gnarabup and Redgate.

With only one road in and out of the isolated settlements of Gnarabup and Prevelly, some residents left the area, escorted by police. They drove out on the single road through the fire. Other people stayed to protect their homes, eventually many also sought safety under the boat ramp at Gnarabup Beach.

After the fire, the State Government said it would build a second road out of Gnarabup and Prevelly to give residents a second way out during a fire, however this project has not been funded or developed in the intervening decade. The Proposal will bring more people to stay and live in the area and put more cars on roads in a high fire risk area. With the region's often dangerous ocean conditions, evacuation via the ocean is not possible at all times.

Inhabitants of the Proposal will be exposed to extreme fire risk. Any risk management plan to mitigate this danger would require wide clearing on the land. The developer is expected to apply to have fire breaks extend into the surrounding Crown land (including the coastal reserve) to maximise building envelopes. Preserve Gnarabup does not support the developer being given approval to clear Crown Land in an area known for its rich plant biodiversity and identification as a world biodiversity hotspot.

Figure 11: Photo of 2011 fire at Gnarabup in Leeuwin-Naturaliste National Park

Figure 12: Photo of houses and coastal health at Gnarabup burnt by 2011 fire in Leeuwin-Naturaliste National Park

Figure 13: Photo of houses and coastal health at Gnarabup burnt by 2011 fire in Leeuwin-Naturaliste National Park

Figure 14: Photo taken from upper Gnarabup Beach car park of 2011 fire in Leeuwin-Naturaliste National Park as it moved to the south towards the Proposal site

Further the development will increasingly become a barrier to public access to Gnarabup Beach and the coast due to rapidly changing coastal processes and rising sea levels due to the impact of climate change. It is well understood that WA is and will be particularly impacted by climate change. In December 2020, a statuary Climate Health WA Inquiry report by the State's former Chief Health Officer, Professor Tarun Weeramanthri was tabled in WA Parliament. The scope of the study was to investigate the implications of climate change, including more frequent and intense weather events, on health.

> *"Western Australia (WA) is geographically Australia's largest state with significant mineral reserves, renewable energy sources and rich biodiversity. However, it is vulnerable to climate change, with a steady decline in rainfall in the south-west, drying interior, lengthening fire season, exposure to cyclones and extreme weather events, and a rate of sea-level rise almost three times the global average."*
>
> (Climate Health WA Inquiry Final Report, December 2020)

The Shire of Augusta Margaret River's CHRMAP shows that the current coastline, Gnarabup Beach and Headland, Back Beach, the limestone cliffs and parts of the land subject to the Proposal fall within the 100-year allowance for coastal processes zone (all other parts of the land subject to the Proposal are very close). Gnarabup and Back Beach and all public access areas fall within the 10 and 20-year allowance zones. Should this development go ahead it will create a further barrier to the coast and public access to these beaches will be impacted within a few short decades.

3.4 Landforms

EPA objectives

The EPA's Statement of Environmental Principles, Factors and Objectives (EPA 2018b) identifies the following objective for human health:

- To maintain the variety and integrity of significant physical landforms so that environmental values are protected.

Potential impacts

The land which is subject to this Proposal sits atop fragile limestone karst cliffs and a headland. The raised nature of the area means it is a prominent landmark on the coastal landscape and is visible from throughout the Gnarabup and Prevelly areas, and from the seaward side.

There has been limited environmental studies on the development site and the surrounding area. Several studies need to be completed on the impact on the karst system including hydrology and hydrogeological modelling and geotechnical studies. Without this work being done, we have major concerns for the design, planning, construction and operation of the Proposal and the impact on the landform.

The limestone headland is fragile, riddled with caves in the limestone karst and impacted by the ocean, drying climate and erosion. The limestone headland is like the area in which a cave collapsed at Gracetown in the winter of 1996, killing nine local people. We note that erosion continues at Gracetown and Gnarbup and significant collapses have occurred this winter. The Shire and Department of Biodiversity, Conservation and Attractions have a continuous program of works to defend the coastline and coastal infrastructure assets.

The site of this Proposal, has long been identified by State and Local Government environmental and planning documents as of high visual impact and significance. State Planning Policy 6.1 The Leeuwin Naturaliste Ridge Statement of Planning Policy states of the ridge (including Gnarabup Headland):

> *"This is an extraordinary landscape which is part of the nation's heritage. Its unique values will be conserved by land use strategies and development assessment processes, having particular regard for—*
>
> *• protection of the natural character of the Leeuwin-Naturaliste Ridge, including the coastal and marine interfaces and areas of remnant vegetation;"*

Gnarabup has met and exceeded the development limit identified in State Planning Policy 6.1 The Leeuwin Naturaliste Ridge Statement of Planning Policy and many other environmental and planning documents. This Proposal is not supported by numerous State Government environmental and planning policy and strategic expert documents including:

- Bowman and Hesp, Geomorphologicial Study of the Leeuwin-Naturaliste Coastline - Assessment of Stability and Potential Development Sites (1982),
- Leeuwin-Naturaliste Region Plan Stage 2 (1988),
- the Leeuwin Naturaliste Ridge Statement of Planning Policy (1997), Statement of Planning Policy No. 2.6 - State Coastal Planning Policy (2003, 2006 and 2013 amendments).

3.5 Subterranean fauna

EPA objectives

The EPA's Statement of Environmental Principles, Factors and Objectives (EPA 2018b) identifies the following objective for Subterranean Fauna:

- To protect subterranean fauna so that biological diversity and ecological integrity are maintained.

Potential impacts

Preserve Gnarabup is concerned for the potential threatened and rare fauna that may exist in this area due to the specific karst type geology. We do not believe the Proponent has commissioned any studies of the subterranean karst biodiversity. We note that the potential occurrence of subterranean fauna in the development area has not been previously assessed.

4. Environmental principles

4.1 Principles

The EP Act identifies a series of principles for environmental management. The environmental principles are the highest-level goals that a proposal must meet in order to be found environmentally acceptable by the EPA. Preserve Gnarabup has considered these principles in relation to the development and have serious concerns that they will not be able to be met if implementation of the Proposal occurs. **Error! R eference source not found.** outlines how the principles relate to the Proposal.

Table 3: EP Act principles

Principle	Consideration
Precautionary principle Where there are threats of serious irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, decisions should be guided by: 1. Careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and 2. An assessment of the risk-weighted consequences of various options.	There has been limited environmental studies on the development site and the surrounding area. Several studies need to be completed in the following scientific disciplines: • Flora and fauna surveys • Hydrology and hydrogeological modelling • Geotechnical study • Aboriginal heritage study These studies need to be completed by an independent body before a development proposal can be considered. Without this work being done, we have major concerns for the design, planning, construction and operation of the Proposal and the impact on the environment. The development site is located on a remnant highly porous limestone ridge that is directly connected to Gnarabup Beach and GasBay which are significant recreational area and the Ngari Capes Marine Park.
Intergenerational equity 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 Proposal is inconsistent with Intergenerational Equity. Future generations will not have the ability to enjoy the diversity of this area. The Gnarabup Headland and Beach area has long been an important community asset.
Conservation of biological diversity and ecological integrity Conservation of biological diversity and ecological integration should be a fundamental consideration.	There has been limited environmental impact studies in this area and no studies that we are aware of on the land subject to the Proposal. A comprehensive environmental impact assessment needs to be completed for the land subject to the Proposal before approval to develop is considered.
Improved valuation, pricing and incentive mechanisms 1. Environmental factors should be included in the valuation of assets and services. 3. The polluter pays principle – those who generate pollution and waste should bear the cost of containment, avoidance or abatement. 4. The users of goods and services should pay prices based on the full life cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste. Environmental goals, having been established, should be pursued in the most cost-effective way, by establishing incentive structures, including market mechanisms, which benefit and/or	The Proponent must be responsible for funding the cost of environmental management. This could include aspects such as waste management, coastal foreshore protection and retention, retention of habitat for threatened and endangered species known to live and forage on the land.

Principle	Consideration
minimise costs to develop their own solutions and responses to environmental problems.	
Waste minimisation All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.	The Proposal plans to send additional waste to the already failing and problematic Gnarabup Wastewater Treatment Plant. The 2029/20 Annual Environmental Report of the Gnartbup Wastewater Treatment Plant shows that it is non-compliant with its licensing conditions and has not been compliant for all years recorded in the report – as far back as 2015/16. Recent Annual Environmental reports from the Gnarabup Wastewater Treatment Plant show elevated levels of nitrogen in soil and at the ocean discharge. The groundwater monitoring network has been found to provide insufficient information to make a valid judgement on the impact of the present facility. The monitoring network has been upgraded in 2020 with additional bores however still does not include bores upstream to the east of the wastewater treatment plant. Sufficient results and trends from these new bores and monitoring will be available in 2023. Sending increased waste to this facility is possibly not sustainable and may cause environmental harm and potential human health concerns. The results from the additional bores built in 2020 will become available in 2023 at which time an assessment could be made. The Risk Analysis and Risk Identification Workshop that forms part of the Shire of Augusta-Margaret River's Coastal Hazard Risk Management Plan 2015 (CHRMP) states the following risk in relation to the Gnarabup Wastewater Treatment Plant and its location within 175/185 metres of the coast: "Potential environmental disaster should this be impacted upon through coastal erosion."

5. Conclusion

Preserve Gnarabup believes that there is sufficient evidence of the significant environmental and social impact that development of the Proposal will cause to warrant assessment of the Proposal by the EPA at the level of Public Environmental Review.

It is important that the environment of this site is fully understood before any development is considered. Beyond the immediate environmental impacts in this globally important biodiversity region, the significance of the social and cultural aspects of the site must also be considered.

6. References

Public Submissions, Hearings and Transcripts and Report of the Inquiry by the Standing Committee on Environment and Public Affairs in Relation to a Petition Opposing the Gnarabup Waste Water Treatment Plant, October 2002
https://parliament.wa.gov.au/Parliament/commit.nsf/WCurrentNameNew/64E7DA74AB6092FB48257831003D342F?OpenDocument#Details

Shire of Augusta-Margaret River Online Mapping System

Bradshaw, D "Ensuring the long-term survival of the Endangered Western ringtail possum (Pseudocheirus occidentalis) in the Shire of Augusta-Margaret River: The impact of recent fires and the threat of future fires" December 2016
https://www.amrshire.wa.gov.au/library/file/1Council/Meetings/Committees/SAC/Attachment%201%20-%20Ringtail%20possums%20and%20fire%20(003).pdf

Conservation Advice for Pseudocheirus occidentalis (Western Ringtail Possum) by the Threatened Species Scientific Committee 2013,
http://www.environment.gov.au/biodiversity/threatened/species/pubs/25911-conservation-advice.pdf

Shire of Augusta-Margaret River's Coastal Hazard Risk Management Plan 2015
https://www.amrshire.wa.gov.au/library/file/0Publications/Documents%20SD/Coastal%20Hazard%20Risk%20Management%20and%20Adaptation%20Plan%20with%20attachments%20compressed.pdf

Climate Health WA Inquiry Final Report, December 2020, https://ww2.health.wa.gov.au/climate-health-wa-final-report

Bowman and Hesp, Geomorphologicial Study of the Leeuwin-Naturaliste Coastline - Assessment of Stability and Potential Development Sites (1982),

Leeuwin-Naturaliste Region Plan Stage 2 (1988),

The findings of the Government Officers Technical Advisory Group (GOTAG) (chaired by Larry Guise, then Executive Director of the then Department of Planning and Urban Development) which comprised representatives of nine State Government agencies and the Shire tasked with considering the proposed Gnarabup development (1992-95),

The Leeuwin Naturaliste Ridge Statement of Planning Policy (1997), Statement of Planning Policy No. 2.6 - State Coastal Planning Policy (2003, 2006 and 2013 amendments),

State Planning Policy 3.7 Planning in Bushire Prone Areas

Appendix 1

- Letter of advice on the Gnarabup Beach Estate Structure Plan from Environmental Protection Authority to the Department of Planning and Urban Development (DPUD) June 1993

Copy for you to keep.

125/90/4

(40)

EPA

AN ENVIRONMENT WORTH PROTECTION

THE EXECUTIVE DIRECTOR
DEPARTMENT OF PLANNING
AND URBAN DEVELOPMENT

ATTENTION LARRY GUISE

Your ref:
Our ref:
Enquiries:

Our Ref 125/90

Dear Sir

GNARABUP BEACH STRUCTURE PLAN

The Leeuwin-Naturaliste Region Plan Stage 2.(SPC 1988) recommended that Prevelly Park be a site for further coastal settlement but only on an environmentally sustainable basis. The Plan Stage further states that it is important to conserve the natural and cultural attributes and special features of the area (5.2.2). The strategies and objectives contained in the Leeuwin-Naturaliste Plan have been further reinforced by Council in its overall Shire policies described in the Rural Strategy, the Prevelly Park Development Guidelines, and TPS 18.

The proposed structure plan is inconsistent with the Council's Visual Resource Assessment carried out for the Rural Strategy, and a number of elements of the DPUD coastal development policy, viz any development should not reduce the visual amenity of the foreshore, disturbance to vegetation should be minimised, and roads and carparks should blend with their setting by following natural contours.

The proposed structure plan also does not conform with the the Shire of Augusta-Margaret River TPS No. 18 nor with the Prevelly Park Development Guidelines on which the TPS is based, particularly with respect to development boundaries, the visual impacts of some parts of the proposal on the landscape, and possible impacts from erosion, water extraction and the disposal of effluent on the integrity of the coastal environment.

Development Boundaries

The Guidelines adopted a position of allowing development on land identified by Bowman and Hesp as being the most stable. Other factors considered and incorporated in the Guidelines are the values held by the immediate community for the area, which are the findings of lengthy public participation exercises during the Leeuwin Naturaliste study. The Guidelines determined an area **within** which a development proposal will be considered on its merits, once a scheme has been prepared. The Guidelines apply not only to the original proposal, but to any subsequent proposal to develop that land. The current proposal does not conform with the develoment boundaries contained in the Guidelines in the following respects:

1. Tourist development Scheme A falls outside the development bounda

2. Tourist development Scheme B on Lot 227 falls outside the development boundary.

Landscape Protection

Another intent of the Guidelines is to identify the key landscape features that exist within the site and classify these as constraints to development. The guidelines clearly accept that development will be seen on the site from the key view points and many other places, and do not make a judgement that development will mar the landscape. However the Guidlines made clear that the most significant natural landscape features should be protected (6.2.11). Skylines, focal points and connecting ridge lines should be precluded from disturbance by development. Particular emphasis must be given to the impact that building height will have on these features. The proposed tourist development on Lot 227 would clearly impinge on the skyline.

The proposal for Lot 227 impinges on the TPS Landscape and Landform Protection Zone. A visual analysis was required to demonstrate the impact of the proposed development on visually prominent features within the landscape and landform protection zone, and whether these impacts would be manageable. This has been done for proposed tourist development , but has not been carried out to an appropriate standard. It is not possible to interpret the computer analysis, as a map showing viewing points, viewing heights and distance has not been provided, and there is no colour code. The accompanying written analysis is not always appropriate nor accurate. For example the analysis states that the tourist lodge will complement the landscape in the way the Greek Chapel does. The Greek Chapel does not complement the landscape, it is in high conrast to it.

Steep Slopes

The Guidelines state that slopes exceeding 10% within the development area require special consideration in terms of infrastructure and building construction in order to minimise environmental and topographic impacts, and should be the subject of specific design criteria and guidelines. A slope analysis showing which lots are on slopes exceeding 10% has not been supplied by the developer. The intent of this requirement was to see that building design on these slopes minimised cut and fill, and maximised vegetation retention. The use of retaining walls on these steep lots does not meet this objective.

In view of the Bush Fire Board's requirements that houses be located to the front of lots and for fairly extensive clearing around houses, an analysis of the visual impact of these requirements for the lots high on the ridge, particularly in Stage 5, is required.

Infrastructure

The road design for Stages 1, 2 , 4 and 5 does not meet the guidelines' objectives for minimisation of erosion, vegetation retention and rehabilitation. It is better to minimise erosion by designing roads that follow rather than cross the contours. Examples of the erosion problems caused by roads running across contours are available at Yallingup. The developer has made a commitment to retain and rehabilitate vegetation in the road verges. Rolling tritter into road verges to prevent erosion will probably result in soil compaction, significantly reducing the chances of successful re-establishment of vegetation.

The TPS also states that no services shall affect the National Park either physically or visually. Whilst the physical impacts of the proposed location of the water tank may be managed, it has not been satisfactorily demonstrated that visual impacts are manageable. The drawing of several cross sections to the tank does not satisfy that objective. There may be other viewing points from which the water tank is visible.

The TPS states that a suitable site is to be identified in accordance with Water Authority requirements for a waste water treatment plant. Insufficient work has been carried out to demonstrate to the EPA's satisfaction that the proposed site is suitable for the treatment of effluent. The proposed sewerage plant does not meet WAWA requirements for a 500 metre buffer between the plant and residential development. Any proposal to reduce the buffer would require airmodelling to demonstrate that odours would not impinge on residential development. In addition it is necessary to demonstrate quantitatively that effluent from the treatment plant will not impact on the environment for example that effluent seepage will not impact on the foreshore reserve vegetation. The proposal to use effluent to irrigate dune rehabilitation may not be appropriate because the plant species suitable for the dune blowout may not be tolerant of effluent with high nutrient levels.

If scheme water is not supplied to the subdivision, a geotechnical study is required to demonstrate that groundwater extraction is feasible, and that it will have no significant impacts on existing vegetation.

Conclusion

Because the proposal is not consistent with the Guidelines, it cannot be viewed as being the same proposal which the Environmental Protection Authority agreed to assess at an informal level because it conformed with the Guidelines. If the proposal cannot be made consistent with the Guidelines, then the Authority may consider that the proposal requires formal assessment.

Yours faithfully

[redacted]

R.A.D. Sippe
DIRECTOR
EVALUATION DIVISION

Prevelly Structure GCO

15/6/93

Appendix 2

- Letter on the Gnarabup Estate Structure Plan from the EPA to the Augusta-Margaret River Shire's Shire Planner, 14 February 1993

125/90/3

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14-02-93

EPA

AN ENVIRONMENT WORTH PROTECTION

Mr Peter Gleed
Shire Planner
Shire of Augusta-Margaret River
Town View Terrace
MARGARET RIVER. 6285

Your ref:
Our ref:
Enquiries: Ms G Corbett

Dear Mr Gleed

GNARABUP BEACH ESTATE, PREVELLY PARK

The Environmental Protection Authority is providing the following comments on the proposed structure plan, the draft foreshore management plan, the draft bush fire management plan and the draft engineering construction plan to assist Council in its deliberations. The Authority recognises that the documents are preliminary in nature, and intends to carry out further consultation with the proponent's consultants and the Department of Planning and Urban Development about the issues raised in this letter.

1 Structure Plan

The Environmental Protection Authority suggests that the current Structure Plan be modified because it is does not comply with the Prevelly Park Development Guidelines in the following respects:

1.1 Boundaries

The Structure Plan should conform with the boundaries of the Development Guidelines, which were drawn to mitigate predicted ecological and visual impacts arising from development.

1.2 Road Design

Further study of the road alignments proposed in the Structure Plan and the possible access road to beaches south of Marmaduke Point should be carried out to determine their possible environmental impacts on the National Park and the Holocene dunes, and noise and visual impacts.

1.3 Special Rural Lots

The provision of special rural lots was not allowed for in the Development Guidelines. This issue requires further consideration.

G. Klem DPUD Bunbury.
Copy to Alan Tingay 17/2/93
GMC.

1.4. Exposed Areas

Clause 9.1.3. of the Development Guidelines recommends that exposed ridges, knolls and slopes within the development area are to be subject of a detailed assessment should development of these feature be contemplated. The Authority has not seen a detailed assessment for any of these areas, and is particularly concerned about the proposed chalet area, and the residential development adjacent to Point Marmaduke.

1.5 Lot Size

The Authority is aware that the community considers that larger lots are more desirable, but would like to point out that small lots clustered in nodes have the advantage of confining visual and ecological impacts arising from land clearing to smaller areas of the site, would maximise the retention of vegetation to act as faunal corridors, allow for a better fire management plan, and reduce the visual impacts arising from the proposed suburban style subdivision.

2 Provision of Services

The provision of water and sewerage and the impacts arising from their use has been inadequately addressed at this stage. Details on the package sewerage treatment plant and disposal of effluent are insufficient to assess its environmental acceptability, and there may be impacts arising from the proposed on site disposal of effluent. It is possible that on-site septic tanks would have less impact than a point source disposal area, depending on lot density.

The proposed interim water supply do not address the potential environmental impacts arising from the proposed abstraction rate, such as the effects of drawdown on indigenous vegetation.

The impacts of the additional rubbish disposal on the existing tip site have not been considered.

The issue of storm water drainage disposal on site has not been adequately discussed.

3 Rare flora and fauna

Given the potential for rare flora to occur in the area, a survey for rare flora or fauna should be carried out prior to finalisation of the design of the Structure Plan, as it may require amending as a result of the surveys.

4 Management of Visual Impacts

The Environmental Protection Authority considers that the visual impacts of the proposed location of the Chalets, the Tourist Development and the Commercial Centre have not been sufficiently evaluated. Additional information on Building Development Controls such as proposed Height Restrictions and Placement of Building Envelopes would assist with the assessment. The Stage 2 subdivision should also be subject to more detailed assessment before approval. A study of the visual impacts of the proposed water tank and firebreaks should also be included.

5 Bush Fire Management Plan

The proposed bush fire management plan is inconsistent with the Structure Plan's proposed Land Systems Management which recognises the landscape and recreational values of the extensive tracts of coastal vegetation, and which proposes that the clearing of vegetation for any purpose other than that essential for development should be discouraged (Structure Plan p.42).

Coastal heath has a dense, closed canopy and very little floor litter. It would be difficult to achieve fuel reduction in it without almost total destruction of the vegetation, leaving this exposed areas open to wind erosion and causing visual impacts, and consequential and substantial management costs. Alternative methods of managing the bush fire risk should be considered such as re-designing the structure plan so that roads are placed between residences and the National Park to act as fire breaks, smaller lots are concentrated in nodes and greater overall clearing within lots is permitted, and greater emphasis placed on the reduction of fire risk through public education, fireproof building design and individual lot management. The requirement for the use of fire tolerant plant species and the management of the subsequent visual impacts arising from the use of non-indigenous vegetation needs further examination.

6 Construction Management Plan

6.1 Vegetation Retention

The draft Construction Management Plan would benefit from modification to make it suitable for this site. To minimise the damage to vegetation, stockpiling of excavated material or vegetation should only be permitted on areas to be cleared within each stage, such as areas requiring bulk earthworks, not on future road reserves, car parks or service corridors. All road reserves should be cleared to the edge of earthworks only, not to the edge of verges, surplus excavated material should not be distributed along the road reserves, and road reserves should not be graded to the edge of the reserve. The question of penalties for damaging vegetation in areas which are not to be cleared should be addressed.

6.2. Construction of firebreaks

The construction of firebreaks requires further consideration. The proposed clearing and grubbing of firebreaks and their stabilization with compacted limestone may not be the most appropriate approach in this area.

6.3. Dieback Management

An adequate dieback management plan has not yet been supplied.

7 Foreshore Management Plan

Comments on the draft foreshore management plan are preliminary in nature as the draft management plan is incomplete.

7.1 Boat Ramp

There is the potential for conflict between swimming, fishing and boat usage in this area because this area is one of the few to provide low swell conditions and shelter from prevailing winds on a high energy coastline. This possibility may increase with increased beach usage arising from the proposed residential and tourist development. Similar conflict could arise in other suitable areas close by for the same reasons. It would be preferable not to upgrade the boat ramp but to relocate it to the other side of the River mouth during development of the site

7.2 Boundaries of Foreshore Reserve

The boundaries of the reserve should be more closely aligned with the contours and with ecological boundaries rather than be determined by a set distance from the shore. The inclusion of Point Marmaduke in the foreshore reserve needs further consideration.

7.3 Dune Blowout

The management plan proposes fencing to restrict access into the dune blowout, which would allow vegetation to re-establish. This assumes that restricting access is sufficient for restabilization. This is acceptable as a preliminary measure, but monitoring of progress is required, and if it is unsuccessful then more active measures such as seeding and planting of vegetation would be appropriate.

7.4 Management Responsibilities

Ongoing management should include rehabilitation, monitoring of use, auditing conditions of approval, and additional facilities as required. A timetable for staging and completion of work and should be required. The Structure Plan states that the Applicant will enter into an agreement with Council that management will be carried out by the applicant, but this matter and responsibility for costs has not yet been addressed in the Foreshore Management Plan.

The land which is the subject of this development application is in a prime location in a rapidly expanding area for quality tourism based in part on environmental values. The Authority's non-binding advice is designed to assist Council to make sound decisions in protecting these environmental values whilst still meeting the proponent's plans for the land, albeit in a modified form consistent with environmental protection principles. Council should be aware of the Environmental Protection Authority's policy to make available to the public upon request.its advice on informal assessments

Yours sincerely

RAD Sippe
DIRECTOR
EVALUATION DIVISION

14th February 1993

GnarabupStructureGCO

Appendix 3
- Photos of Peppermint trees on the lots taken on 8 September 2020

Photos taken of Western Ringtail Possum Habitat on Lots 783,501, 503, 502,504 Gnarabup

8 September, 2020

There are significant stands of mature and regrowth Peppermint (Agonis flexuosa) trees growing on the lots. This regrowth follows the 2011 fires which impacted some sections of the lots. The following photos of Peppermint trees on the lots taken on 8 September 2020.

Preserve Gnarabup's position is that the reservation of the development lots to Parks and Recreation is entirely consistent with State and Federal Government policy for the protection of the critically endangered Western Ringtail Possum.








Appendix 4
- The 2019/20 Annual Environmental Report for the Gnarabup Waste Water Treatment Plant

Annual Environmental Report

Gnarabup Wastewater Treatment Plant
1 July 2019 to 30 June 2020

Nexus 83264458

Contents

Document Management

Prepared for
Department of Water and Environmental Regulation

Prepared by
Water Corporation
Level 1, 629 Newcastle Street, PO Box 100, Leederville 6902, Western Australia

Rev No.	Version description	Prepared by	Reviewed by	Date
	First Draft	R Munro		21/07/2020
	Technical Review		D Puzey	07/08/2020
	Environmental Section Review		B Scott	17/08/2020
	Asset Investment Planner Review - Final		A Brown	20/08/2020

Executive Summary

Annual Environmental Reports are required in accordance with Water Corporation operating licences issued under Part V of the *Environmental Protection Act 1986*. This Annual Environmental Report provides a summary of the Gnarabup Wastewater Treatment Plant's (WWTP) performance for the period 1 July 2019 to 30 June 2020.

Compliance Issues Summary

Sampling of groundwater monitoring at bores 1/99 and 2/99 continues to be missed due to insufficient water to sample. The Water Corporation was issued field notice #3159, 25 February 2016 by the Department of Water and Environmental Regulation (DWER) to provide steps to ensure compliance with conditions W3, W4(a), Table 2 and W4(b) of the superseded licence. Water Corporation has now replaced the long-term dry bores (1/99 and 2/99) with a new set of bores i.e. 4/17 (Upgradient), 2/17 (Midstream) and 3/17 (Downgradient). Sampling results indicate that the upgradient bore (4/17) may be too close to the WWTP to represent accurate background concentrations. As a result, a replacement upstream bore is planned to be installed during Q1 FY 2020-21. Once the new bore is installed, a licence amendment is expected to be submitted to DWER to ensure all monitoring points in the licence reflects operations on site.

Background

Gnarabup WWTP was established in 1991 and is located on Gas Bay Rd approximately 500m south of Gnarabup.

Gnarabup WWTP treats wastewater to a secondary standard and consists of an Intermittently Decanted Extended Aeration (IDEA) plant. Treated wastewater (TWW) is infiltrated into three onsite infiltration ponds. Waste activated sludge is collected and dried in sludge drying beds prior to disposal. Supernatant from the sludge drying beds is returned to the plant for processing.

Environmental Context Descriptor	Details
Disposal Method / Discharges to the Environment	TWW is infiltrated into three onsite infiltration ponds.
Soil Type	This consists of steep dunes (sheltered from prevailing winds) on Aeolian sands over granite. The soil in this region is calcareous deep sands (with topsoils stained dark by organic matter)
Depth to Groundwater	10-15m
Distance to Nearest Sensitive Receptor(s) (km)	The nearby residential area of Gnarabup is located approximately 300m north of the WWTP. The Indian Ocean is located approximately 200m to the west of the WWTP.
Surrounding Land Use(s)	The Gnarabup WWTP is surrounded by natural bushland

Abbreviations

FRP - Filterable reactive phosphorus

CD – Cadmium

CU - Copper

CR – Chromium

HG - Mercury

PB - Lead

ZN - Zinc

AS - Arsenic

NI - Nickel

SE – Selenium

NH4 - Ammonium as nitrogen

TN - Total nitrogen

NH3 - Ammonia as nitrogen

TKN - Total kjeldahl nitrogen

TP - Total phosphorus

NO32 - Nitrite plus nitrate as N

ECOLI - Escherichia coli

HELM - Strongyloides and Hookworm (Larvae&Ova)

ENTEROCOC – Enterococci

SS - Suspended Solids

BOD - Biochemical Oxygen Demand Carb

BOD_FILT - Biochemical Oxygen Demand Filtered Carb

PH_LAB - pH measured in laboratory

COND - Conductivity Laboratory at 25 C
OIL_GREASE - Oil and Grease

Wastewater Treatment Plant Details

WWTP Name	Licence #	DWER File #	Expiry date
Gnarabup WWTP	L6640/1994/11	SWB1993-05	31/10/33

1. Contact Details

Name	Digby Short	Email	environment@watercorporation.com.au
Position	Manager Environment	Postal / Street Address	PO Box 100, Leederville WA 6902
Phone	(08) 9420 2038		

Annual Report

1.1 Methodology (Sampling and Contaminant Load Calculations)

All water samples as far as practicable were collected, handled and preserved in accordance with the relevant parts of Australian Standard AS/NZS 5667:1.

Holding time guidance for pH (6 hours) was not routinely achieved at Gnarabup WWTP. Water Corporation internal studies (provided to DWER in correspondence dated 4 June 2019) demonstrate that holding times of up to 48 hours do not have a significant impact on the accuracy of pH analysis where samples are preserved and transported in accordance with Water Corporation Standards (S100 and S210). Section 1.1 of AS/NZS 5667:1;1998 affords the use of alternate sampling procedures, where it is demonstrated that procedures are at least as reliable as the prescribed standard. DWER has acknowledged that sampling according to Water Corporation standards is as an acceptable alternative. Analysis is therefore in accordance with AS/NZS 5667:1;1998. Should a significant statistical variation in data be observed, the impact of holding times will be investigated as a possible cause.

All water samples sent externally were analysed by either SGS Australia Laboratory, Analytical Reference Laboratories or PathWest. All laboratories are NATA accredited commercial laboratories.

All water samples analysed internally by the Water Corporation were in accordance with the Water Corporation's Manual of Analytical Procedures as approved by the Director. These procedures are based on the current "Standard Methods for Examination of Water and Wastewater – APHA-AWWA-WEF".

Results for *E. coli* analysis have been reported as Colony Forming Units (CFU/100mL), however have been obtained using the substrate technology method 'Colilert' (Most Probable Number (MPN/100mL)) (as detailed in AS/NZS 4276.21:2007). Results obtained by the MPN method provide comparable and reproducible results against the 'membrane filtration' method (CFU) (AS/NZS 4276.07:2007) and both methods are NATA accredited.

Contaminant loads are calculated as per the following equations:
***Equation 1**:*

$$\text{Average daily emission rate (sampling period (\textbf{SP})) (kg/day)} = \frac{\text{Cumulative flow rate (sampling period) } (m^3) \text{ x Parameter concentration (sampling period) (mg/L)}}{\text{1000 x no. days in sampling period}}$$

***Equation 2**:*

$$\text{Average daily emission rate (Annual) (kg/day)} = (\textbf{SP}1 + \textbf{SP}2 + \textbf{SP}3 + \ldots + \textbf{SP}n) / n$$

(Where: n equals the number of completed sampling events; and SP equals the 'Average daily emission rate' for the particular sample period, determined in ***Equation 1***; parameter concentration included in Appendix 1.)

1.2 Monitoring of Inputs and Outputs

Table 1 provides monthly, cumulative and average daily flow data in cubic metres (m_3) for the following processes at the WWTP:

- Sewage – inlet flow.

The Gnarabup WWTP has been operated within the premises production or design capacity of 356m^3/day during the 2019-20 reporting period, with an annual average daily inflow of 113m^3/day (Table 1). This represents a 1% increase compared to the 2018-19 reporting period.

Table 1: Summary of Inputs and Outputs

	Gnarabup WWTP 2 Inflow Meter		
	Monthly Flow	Cumulative Flow	Average Daily Flow
	m3	m3	m3
Jul 2019	2984	2984	96
Aug 2019	2864	5848	92
Sep 2019	3052	8900	102
Oct 2019	3857	12757	124
Nov 2019	3279	16036	109
Dec 2019	4161	20197	134
Jan 2020	4638	24836	150
Feb 2020	3412	28248	118
Mar 2020	3456	31704	111
Apr 2020	2800	34504	93
May 2020	3258	37762	105
Jun 2020	3479	41241	116
Average			**113**

Notes: New licence issued 2 June 2016 states inflow measurement is considered an adequate indicator of outflow.

1.3 Wastewater Monitoring Data

1.3.1 Exceptions & Exceedances

Sampling of groundwater monitoring at bores 1/99 and 2/99 continues to be missed due to insufficient water to sample. The Water Corporation has now replaced the long-term dry bores (1/99 and 2/99) with a new set of bores i.e.: 4/17 (Upgradient), 2/17 (Midstream) and 3/17 (Downgradient). A licence amendment is planned to be submitted to DWER during Q2 of the 2020-21 reporting year to ensure all monitoring points in the licence reflects operations on site.

All monitoring data is provided in Appendix 2 with trend graphs presented in Appendix 3. Standing water levels are provided in Appendix 4.

1.3.2 Trends

Parameter	Trend	Corrective Actions Proposed / Taken
Bore 2/17 & 4/17 TN and TP	Decreasing concentrations between midstream bore (2/17) and downgradient bore (3/17).	Suggest natural attenuation of nitrogen and phosphorus levels in the groundwater

1.3.3 Contaminant Load

Condition 4.2.1 of the licence specifies monthly and annual average loads of the contaminants shall be reported in the Annual Environmental Report in kilograms per day, Table 2 presents this data. The loads are based on the TWW discharge rates and the concentrations as measured in accordance with conditions 2.2.1 and 2.3.1.

Table 2: Contaminant Load

	Ammonium as Nitrogen kg/day	Biochemical Oxygen Demand Carb kg/day	Nitrite plus nitrate as N kg/day	Total Suspended Solids kg/day	Total Dissolved Solids by evaporation kg/day	Total nitrogen kg/day	Total phosphorus kg/day	Cadmium kg/day	Copper kg/day	Lead kg/day	Mercury kg/day	Zinc kg/day
Jul 2019	0.10	0.24	0.22	0.24	34.77	0.50	0.72	0.001	0.002	0.001	0.000	0.015
Aug 2019	0.04	0.23	0.51	0.23	37.14	0.68	0.64	0.001	0.001	0.001	0.000	0.015
Sep 2019	0.07	0.26	0.22	0.26	40.26	0.44	0.78	0.001	0.002	0.001	0.000	0.017
Oct 2019	0.46	0.32	0.05	0.32	51.97	0.71	0.18	0.001	0.001	0.001	0.000	0.015
Nov 2019	0.70	1.07	0.07	2.68	48.19	1.07	1.39	0.001	0.001	0.001	0.000	0.013
Dec 2019	0.09	0.34	0.06	0.68	58.62	0.30	0.75	0.001	0.001	0.001	0.000	0.016
Jan 2020	0.63	0.37	0.04	0.37	69.07	0.81	1.76	0.001	0.000	0.001	0.000	0.012
Feb 2020	0.01	0.29	0.18	0.59	54.21	0.42	0.99	0.001	0.000	0.001	0.000	0.009
Mar 2020	0.22	0.28	0.07	0.28	45.27	0.44	0.77	0.001	0.000	0.001	0.000	0.009
Apr 2020	0.19	0.23	0.06	0.23	57.92	0.37	0.65	0.001	0.001	0.001	0.000	0.004
May 2020	0.02	0.26	1.04	0.26	51.92	1.17	0.85	0.001	0.001	0.001	0.000	0.004
Jun 2020	0.02	0.29	0.27	0.29	45.34	0.43	0.33	0.001	0.001	0.001	0.000	0.005

Notes:

- Flow measurements are taken from Gnarabup WWTP Inflow Meter

1.3.4 Explanation of Monitoring Data

Discharge from the Treatment Plant to the Infiltration Area (Final Effluent)
All final effluent monitoring data remained consistent with previous reporting periods with no discernible adverse trends. *E.coli* levels within WWTP treated effluent discharged to the infiltration ponds remain high as the treatment plant is not equipped with disinfection unit process technology.

Shore Sample Points 1, 2, 3 and 4 (Gnarabup Ocean Survey Points 1, 2, 3 and 4)
Water Corporation carries out biannual ocean surface sampling at four locations along Gas Bay (Ocean Points Pts1-4). The monitoring continues to be in line with historical ranges and remain relatively stable. Results are summarised below;

- *E.coli* detection continues to remain very low with results during 2019-20 remaining less than the laboratory limit of reporting (<10cfu/1000ml).
- NO32 concentration showed temporal variation at all ocean water monitoring sites with a peak of 0.21mg/L recorded at Pt1 during December 2019. The average NO32 concentration across all sites during 2019-20 was 0.11mg/L.
- Filterable reactive phosphorus continues to be recorded below the LOR which is consistent with historical monitoring data.
- Chlorophyll *a* results at all Ocean Sampling Points range from <0.02µg/L to 0.8µg/L with Pt 1 typically recording marginally higher results than the other 3 sites.

Groundwater Monitoring Bores 4 /17 (Upgradient), 2/17 (Midstream) and 3/17 (Downgradient)
The direction and flow of groundwater is generally expected to flow in a westerly direction towards the coast (Gas Bay). A partial comparison of midstream to downgradient groundwater quality is now possible as monitoring of downgradient bore (3/17) commenced in October 2018. The 2019-20 monitoring data showed that average TN and TP concentrations decreased between the WWTP midstream bore (TN 8.2mg/L & TP 3.4mg/L) and the downgradient bore (TN 3.6mg/L & TP 0.03mg/L). This trend was also reported last year and suggests that nitrogen and phosphorus levels are progressively attenuating in the groundwater downgradient from the WWTP. The midstream groundwater monitoring bore is located directly adjacent to the infiltration pond and therefore elevated nutrient concentrations are not unexpected.

Sampling results suggest that 4/17 is too close to the WWTP and may not represent background conditions. Water Corporation is undertaking further investigation to assess background groundwater conditions in the area including installation of an additional upstream bore during Q1 FY 2020-21.

1.4 Complaints

There were no complaints received during the 2019-20 reporting period.

1.5 Incidents

There were no incidents reported during the 2019-20 reporting period.

1.6 Inspections

2. Date of Inspection	Details of Issue	Corrective Actions undertaken
DWER Compliance Inspection 18 Feb 2020]	Noted that long-term bores have been replaced with new bores, however these were not yet added to licence.	A licence amendment is expected to be submitted to DWER during Q2 of the 2020-21 reporting year to ensure all monitoring points in the licence

		reflect operations on site.

Monthly inspections of licence compliance are also undertaken by staff independent to the day to day processing at the Gnarabup WWTP.

2.1 Changes to Wastewater Treatment Plant / Planning Activities

2.1.1 Recent Changes

No significant changes

2.1.2 Planning Activities

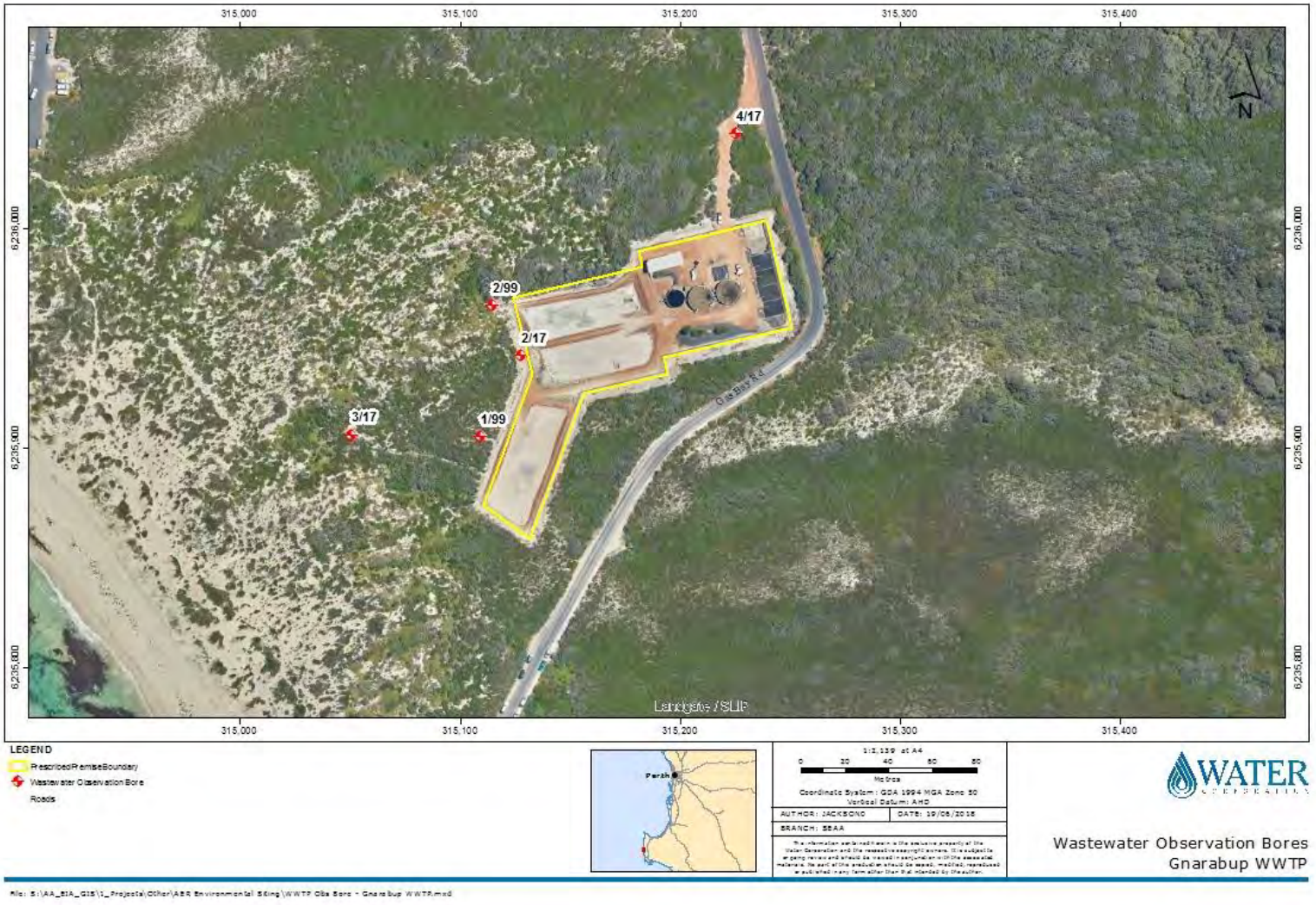
A refurbishment project (CS03176) is to be delivered 2020/21 which includes replacing corroded steel elements at the WWTP; replacing the existing intermittent aeration tank mechanical aerators with a single floating mechanical aerator; installing a new RAS pump; and installing a bioselector.

Long-term planning is scheduled to commence in 2020/21 to cater for revised growth projections for the area.

2.2 Sludge/Solid Waste Management

During the 2019-20 reporting period a total of 26.5 tonnes of sludge was removed from the drying beds at the WWTP and sent to Cleanaway Dardanup for landfill.

Appendix 1: Location of Groundwater Monitoring Bores – Gnarabup WWTP



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Appendix 2: Monitoring Data (Tables)

SP Gnarabup Final Effluent

(Discharge from the Treatment Plant to the Infiltration Area)

	Ammonium as nitrogen	Biochemical Oxygen Demand Carb	Escherichia coli	Nitrite plus nitrate as N	pH measured in laboratory	Suspended Solids	Total dissolved solids by evaporation	Total nitrogen	Total phosphorus
	mg/L	mg/L	/100 mL	mg/L	NOUNIT	mg/L	mg/L	mg/L	mg/L
July 2019	1.0	<5	1200	2.3	7.25	<5	360	5.2	7.5
August 2019	0.40	<5	3900	5.5	7.25	<5	400	7.3	6.9
September 2019	0.68	<5	7700	2.1	7.39	<5	390	4.3	7.6
October 2019	3.6	<5	760	0.40	7.45	<5	410	5.6	1.4
November 2019	6.5	10	>24000	0.70	7.28	25	450	10	13
December 2019	0.68	<5	110	0.42	7.42	5	430	2.2	5.5
January 2020	4.3	<5	1700	0.29	7.43	<5	470	5.5	12
February 2020	0.095	<5	490	1.5	7.70	5	460	3.6	8.4
March 2020	2.0	<5	660	0.60	7.47	<5	410	4.0	7.0
April 2020	0.28	<5	2700	4.6	7.27	<5	620	6.1	7.6
May 2020	0.18	<5	2400	9.8	7.52	<5	490	11	8.0
June 2020	0.18	<5	2000	2.3	7.64	<5	390	3.7	2.8

SP Gnarabup Final Effluent

(Discharge from the Treatment Plant to the Infiltration Area – Metals)

	Cadmium	Copper	Lead	Mercury	Zinc
	mg/L	mg/L	mg/L	mg/L	mg/L
July 2019	<0.02	0.016	<0.02	<0.0005	0.16
October 2019	<0.02	0.005	<0.02	<0.0005	0.12
January 2020	<0.02	0.003	<0.02	<0.0005	0.08
April 2020	<0.02	0.012	<0.02	<0.0005	0.04

SP Gnarabup WWTP Ocean Survey Pt 1

Shore Sample Point 1

	Ammonium as nitrogen	Cadmium	Chlorophyll a	Copper	Escherichia coli	Filterable reactive phosphorus	Lead	Mercury	Nitrite plus nitrate as N	Total nitrogen	Zinc
	mg/L	mg/L	ug/L	mg/L	/100 mL	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
December 2019	<0.05	<0.1	0.09	<0.01	<10	<0.03	<0.5	<0.0005	0.21	0.3	<0.1
February 2020	0.050	<0.2	0.80	<0.02	<10	<0.03	<1.0	<0.0005	<0.05	0.2	<0.2

SP Gnarabup WWTP Ocean Survey Pt 2

Shore Sample Point 2

	Ammonium as nitrogen	Cadmium	Chlorophyll a	Copper	Escherichia coli	Filterable reactive phosphorus	Lead	Mercury	Nitrite plus nitrate as N	Total nitrogen	Zinc
	mg/L	mg/L	ug/L	mg/L	/100 mL	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
December 2019	<0.05	<0.1	<0.02	<0.01	<10	<0.03	<0.5	<0.0005	0.18	0.3	<0.1
February 2020	<0.05	<0.2	0.66	<0.02	<10	<0.03	<1.0	<0.0005	<0.05	0.1	<0.2

SP Gnarabup WWTP Ocean Survey Pt 3

Shore Sample Point 3

	Ammonium as nitrogen	Cadmium	Chlorophyll a	Copper	Escherichia coli	Filterable reactive phosphorus	Lead	Mercury	Nitrite plus nitrate as N	Total nitrogen	Zinc
	mg/L	mg/L	ug/L	mg/L	/100 mL	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
December 2019	<0.05	<0.1	0.18	<0.01	<10	<0.03	<0.5	<0.0005	0.20	0.3	<0.1
February 2020	<0.05	<0.2	0.40	<0.02	<10	<0.03	<1.0	<0.0005	<0.05	<0.1	<0.2

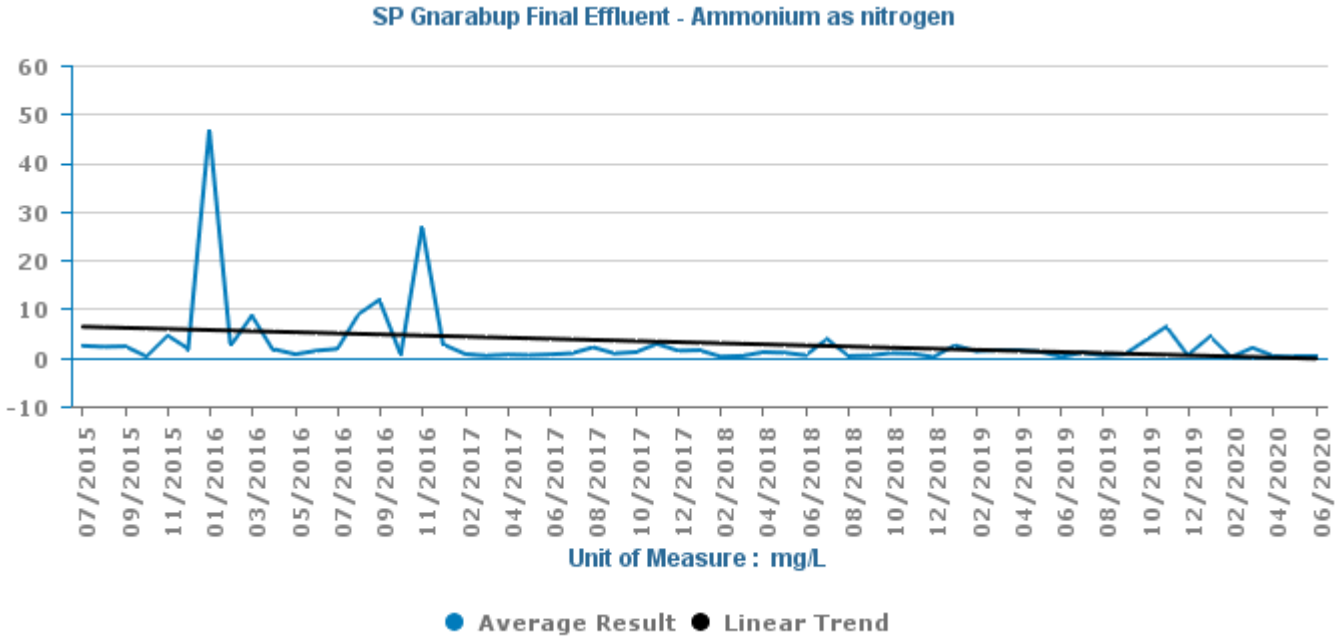
SP Gnarabup WWTP Ocean Survey Pt 4

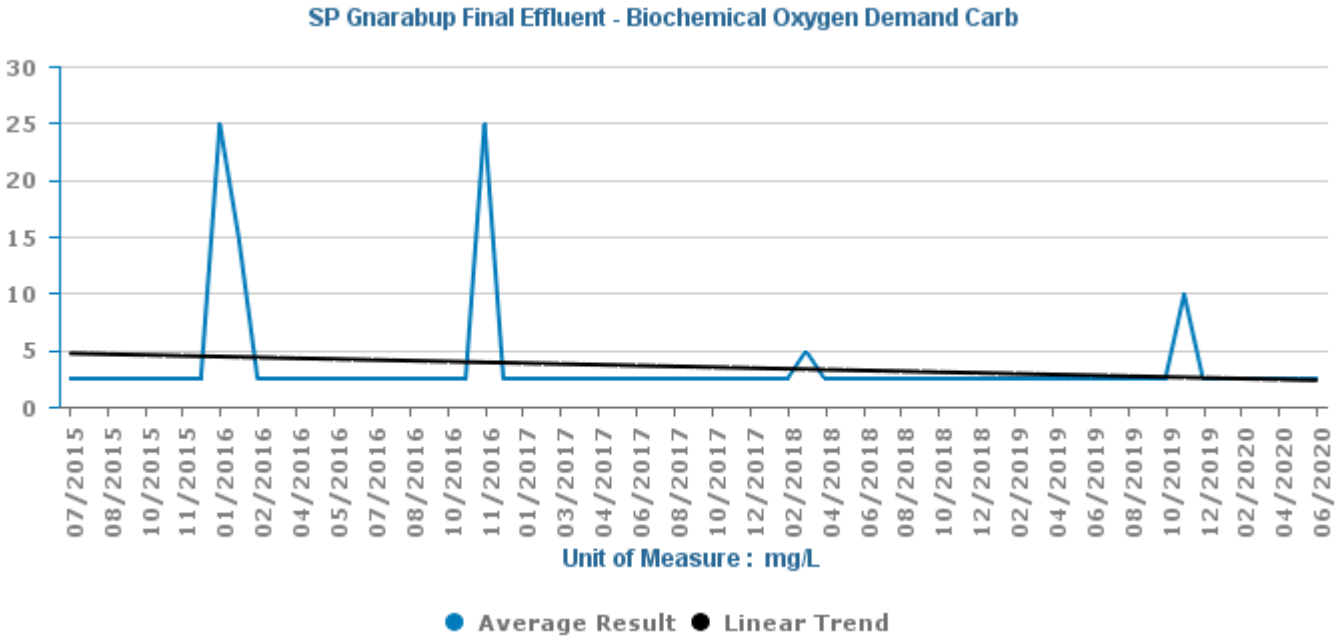
Shore Sample Point 4

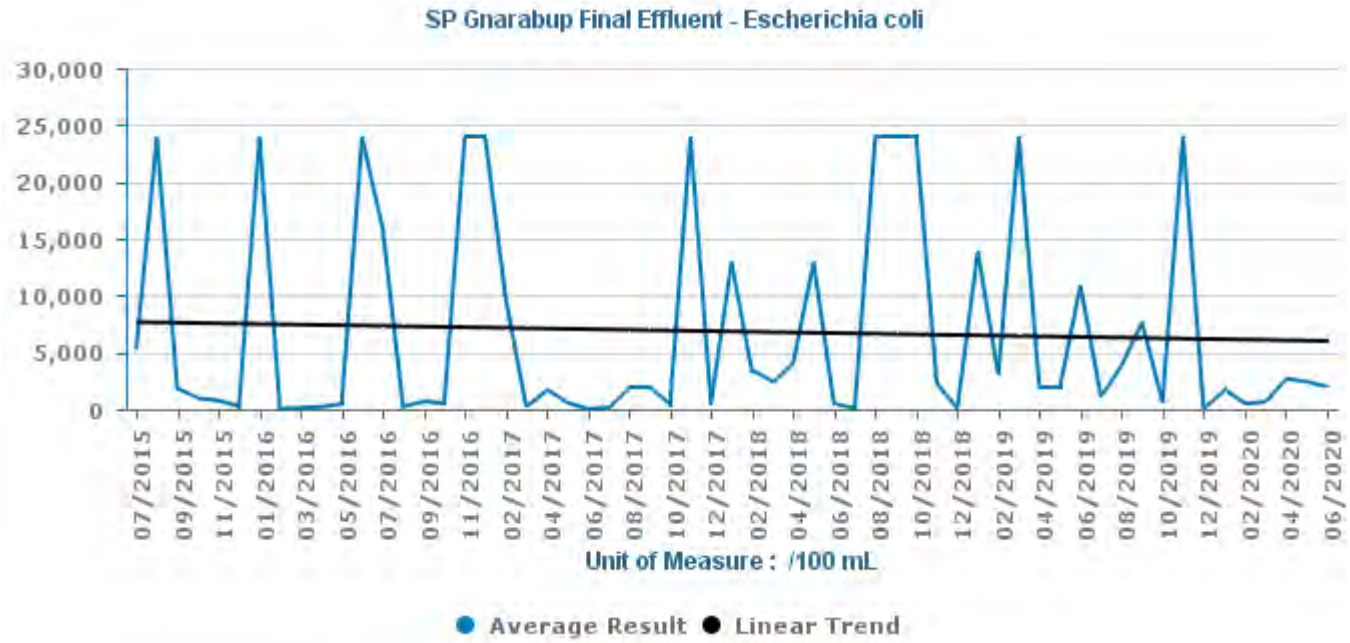
	Ammonium as nitrogen	Cadmium	Chlorophyll a	Copper	Escherichia coli	Filterable reactive phosphorus	Lead	Mercury	Nitrite plus nitrate as N	Total nitrogen	Zinc
	mg/L	mg/L	ug/L	mg/L	/100 mL	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
December 2019	<0.05	<0.1	<0.02	<0.01	<10	<0.03	<0.5	<0.0005	0.19	0.3	<0.1
February 2020	<0.05	<0.2	0.14	<0.02	<10	<0.03	<1.0	<0.0005	<0.05	0.1	<0.2

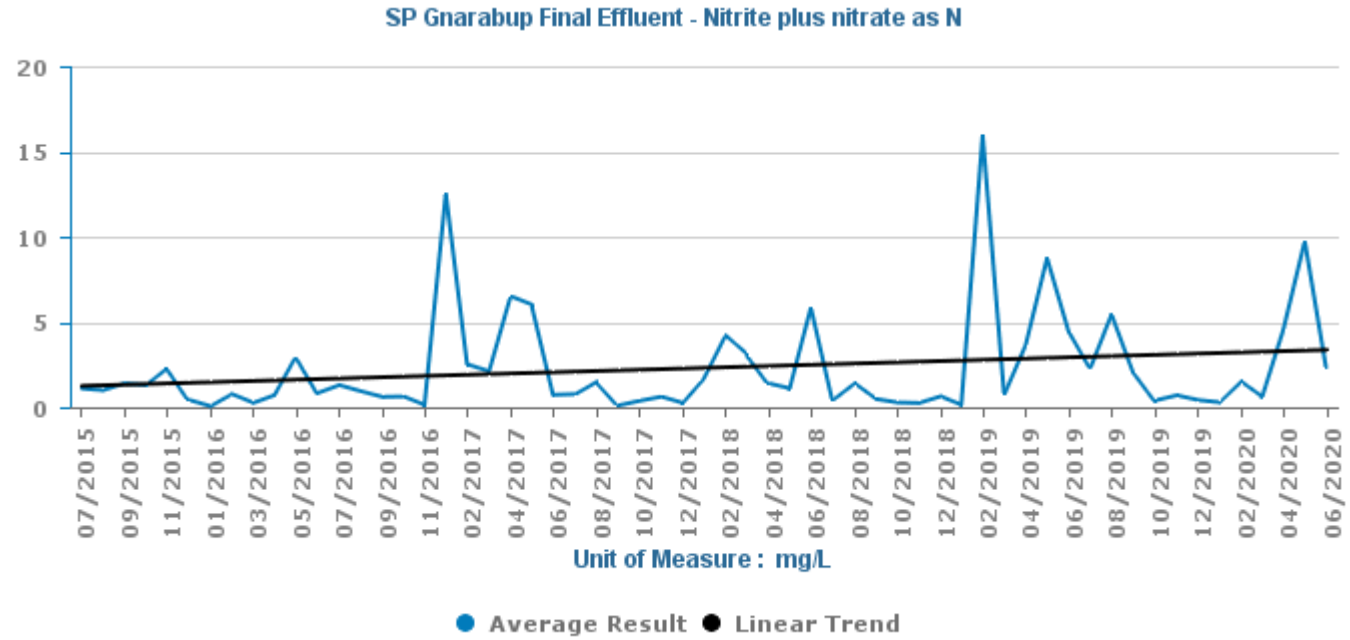
Appendix 3: Monitoring Data (Trend Graphs)

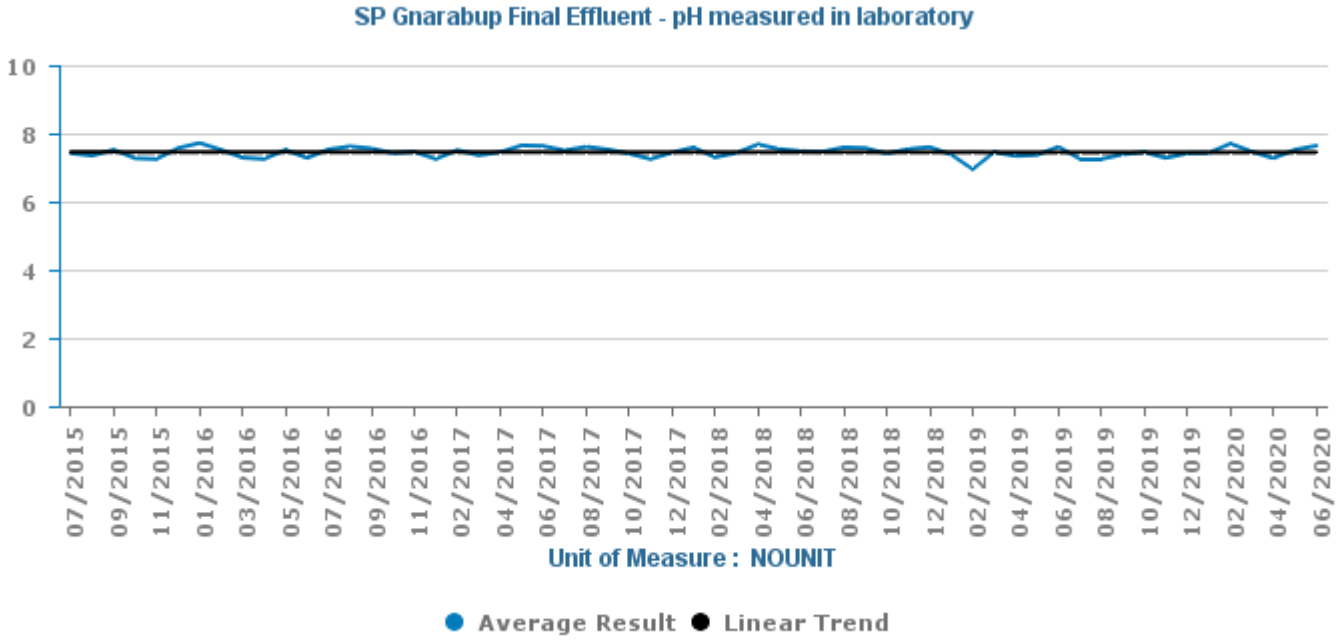
SP Gnarabup Final Effluent

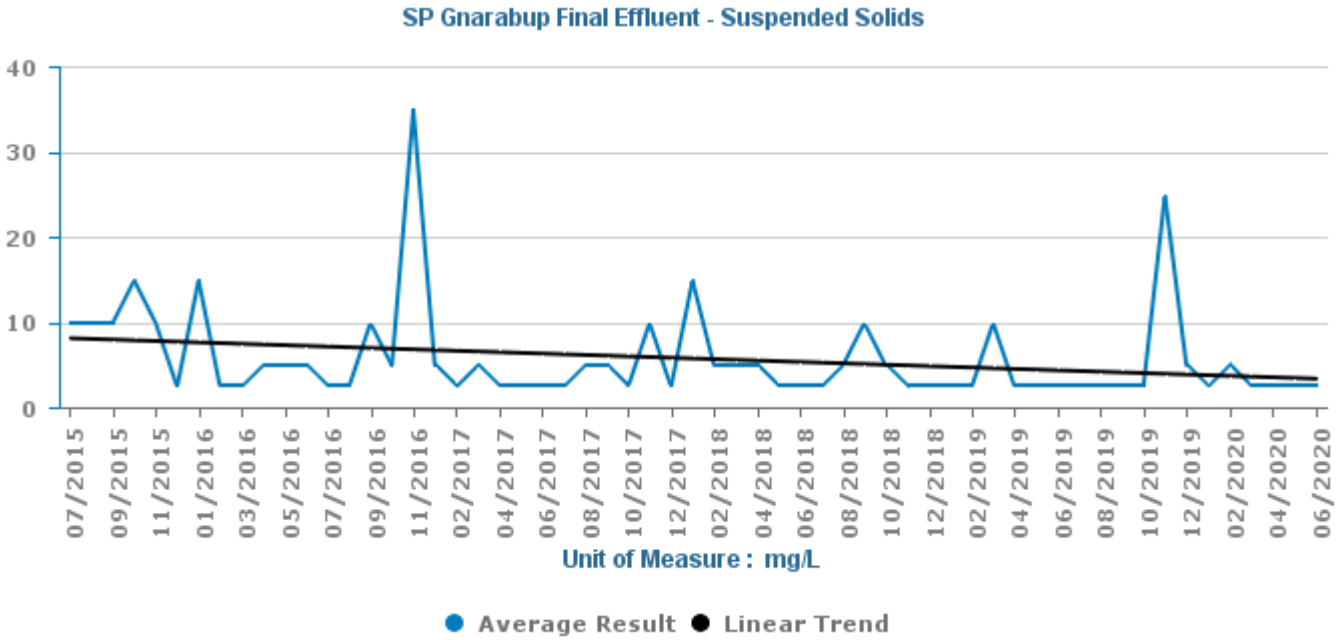


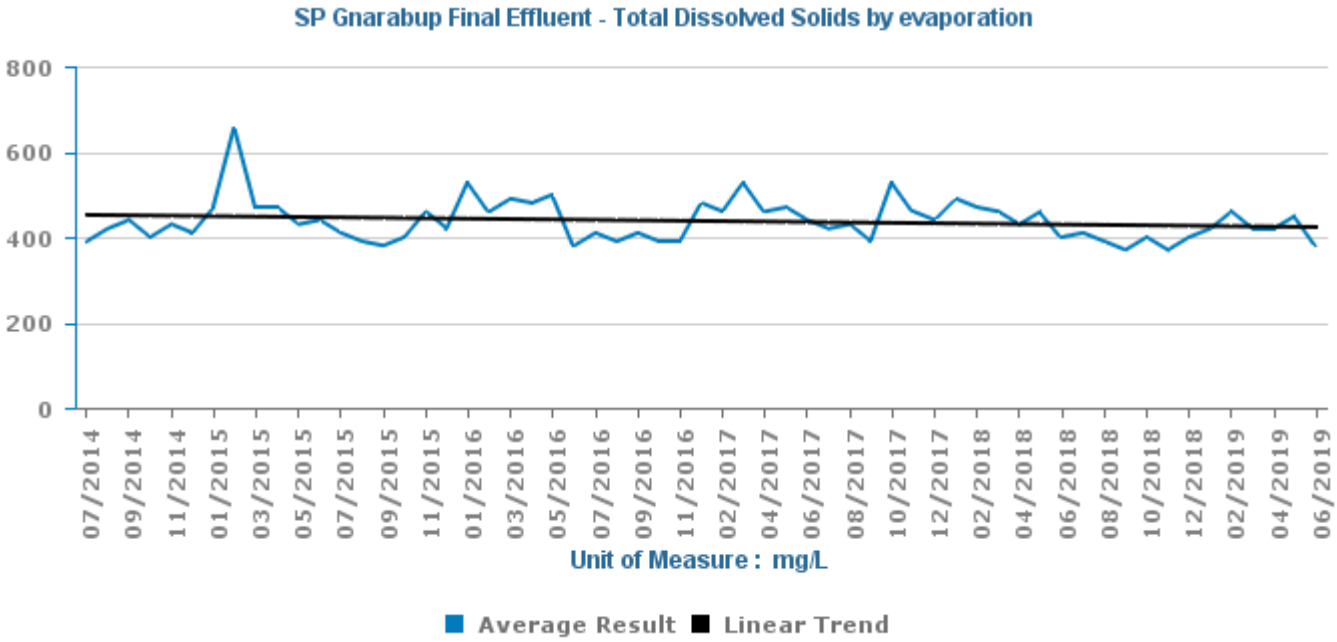


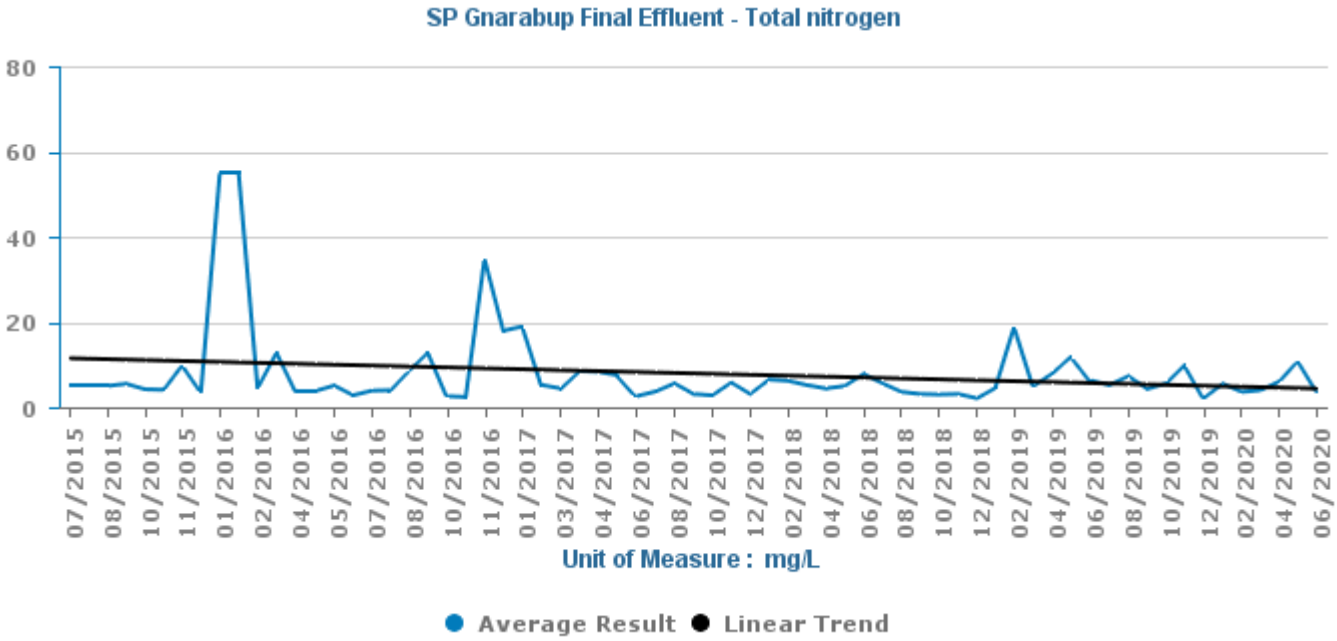

SP Gnarabup Final Effluent - Escherichia coli
30,000
25,000
20,000
15,000
10,000
5,000
0
07/2015
09/2015
11/2015
01/2016
03/2016
05/2016
07/2016
09/2016
11/2016
02/2017
04/2017
06/2017
08/2017
10/2017
12/2017
02/2018
04/2018
06/2018
08/2018
10/2018
12/2018
02/2019
04/2019
06/2019
08/2019
10/2019
12/2019
02/2020
04/2020
06/2020
Unit of Measure : /100 mL
Average Result
Linear Trend

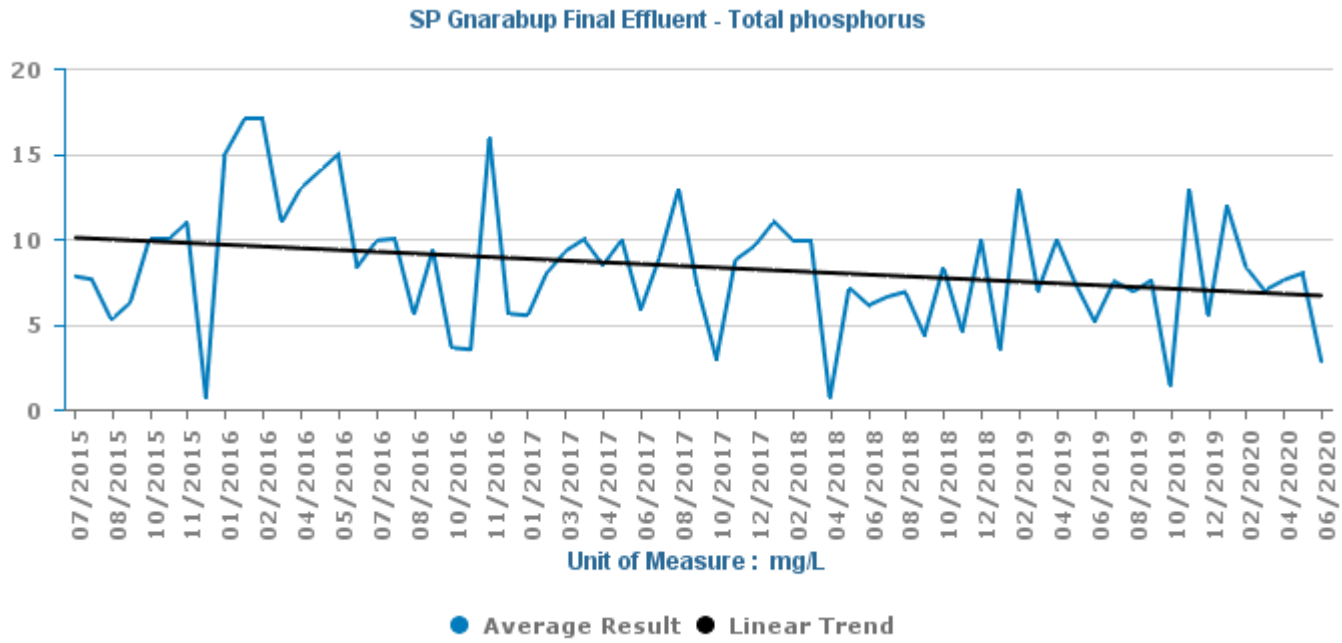

SP Gnarabup Final Effluent - Nitrite plus nitrate as N
20
15
10
5
0
07/2015
09/2015
11/2015
01/2016
03/2016
05/2016
07/2016
09/2016
11/2016
02/2017
04/2017
06/2017
08/2017
10/2017
12/2017
02/2018
04/2018
06/2018
08/2018
10/2018
12/2018
02/2019
04/2019
06/2019
08/2019
10/2019
12/2019
02/2020
04/2020
06/2020
Unit of Measure : mg/L
Average Result
Linear Trend


SP Gnarabup Final Effluent - pH measured in laboratory
10
8
6
4
2
0
07/2015
09/2015
11/2015
01/2016
03/2016
05/2016
07/2016
09/2016
11/2016
02/2017
04/2017
06/2017
08/2017
10/2017
12/2017
02/2018
04/2018
06/2018
08/2018
10/2018
12/2018
02/2019
04/2019
06/2019
08/2019
10/2019
12/2019
02/2020
04/2020
06/2020
Unit of Measure : NOUNIT
Average Result
Linear Trend

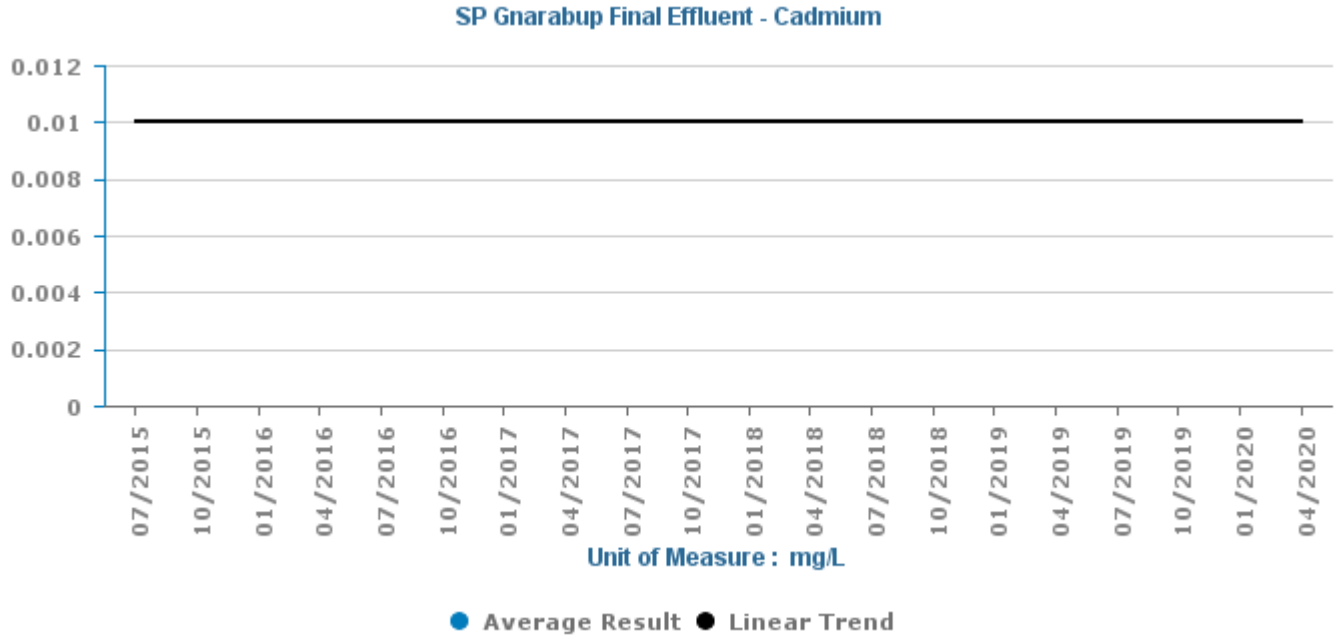

SP Gnarabup Final Effluent - Suspended Solids
40
30
20
10
0
07/2015
09/2015
11/2015
01/2016
03/2016
05/2016
07/2016
09/2016
11/2016
02/2017
04/2017
06/2017
08/2017
10/2017
12/2017
02/2018
04/2018
06/2018
08/2018
10/2018
12/2018
02/2019
04/2019
06/2019
08/2019
10/2019
12/2019
02/2020
04/2020
06/2020
Unit of Measure : mg/L
Average Result
Linear Trend

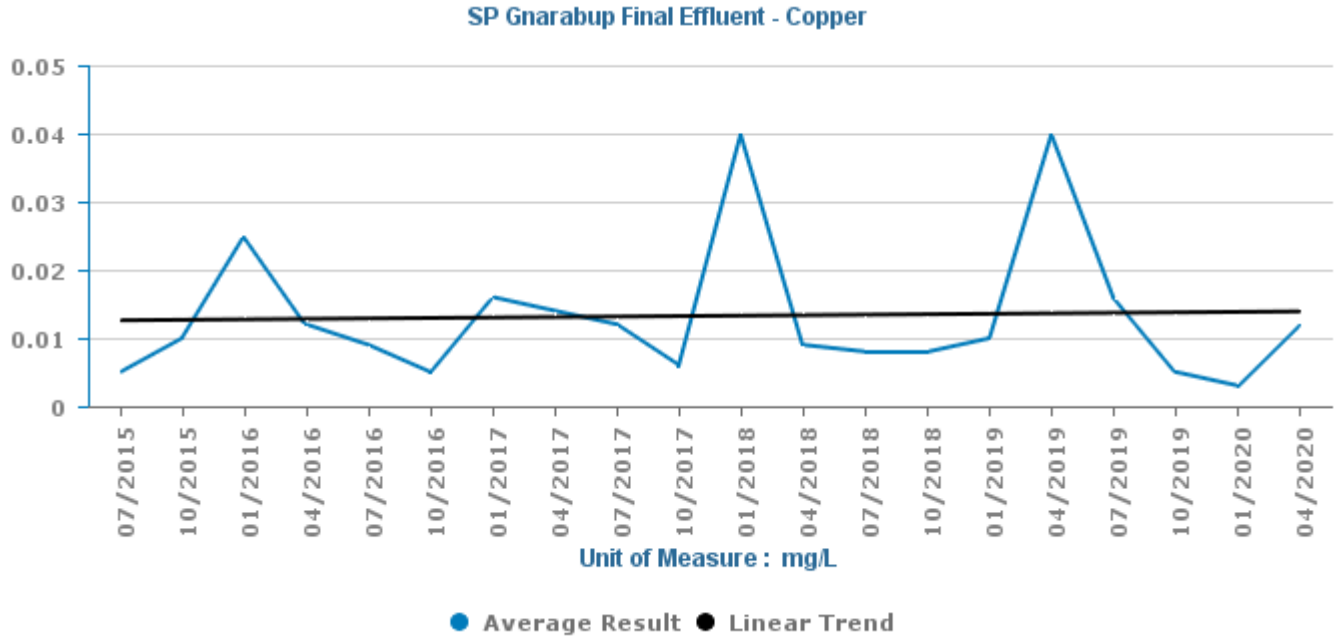

SP Gnarabup Final Effluent - Total Dissolved Solids by evaporation
800
600
400
200
0
07/2014
09/2014
11/2014
01/2015
03/2015
05/2015
07/2015
09/2015
11/2015
01/2016
03/2016
05/2016
07/2016
09/2016
11/2016
02/2017
04/2017
06/2017
08/2017
10/2017
12/2017
02/2018
04/2018
06/2018
08/2018
10/2018
12/2018
02/2019
04/2019
06/2019
Unit of Measure : mg/L
Average Result
Linear Trend

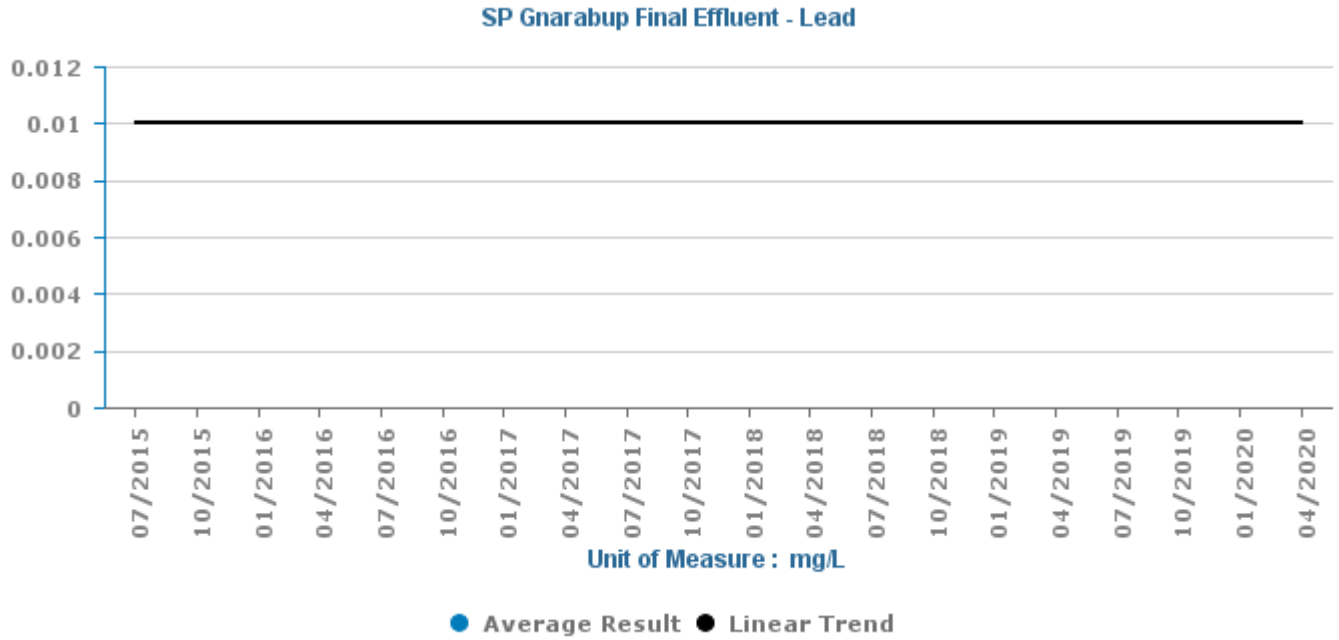

SP Gnarabup Final Effluent - Total nitrogen
80
60
40
20
0
07/2015
08/2015
10/2015
11/2015
01/2016
02/2016
04/2016
05/2016
07/2016
08/2016
10/2016
11/2016
01/2017
03/2017
04/2017
06/2017
08/2017
10/2017
12/2017
02/2018
04/2018
06/2018
08/2018
10/2018
12/2018
02/2019
04/2019
06/2019
08/2019
10/2019
12/2019
02/2020
04/2020
06/2020
Unit of Measure : mg/L
Average Result
Linear Trend

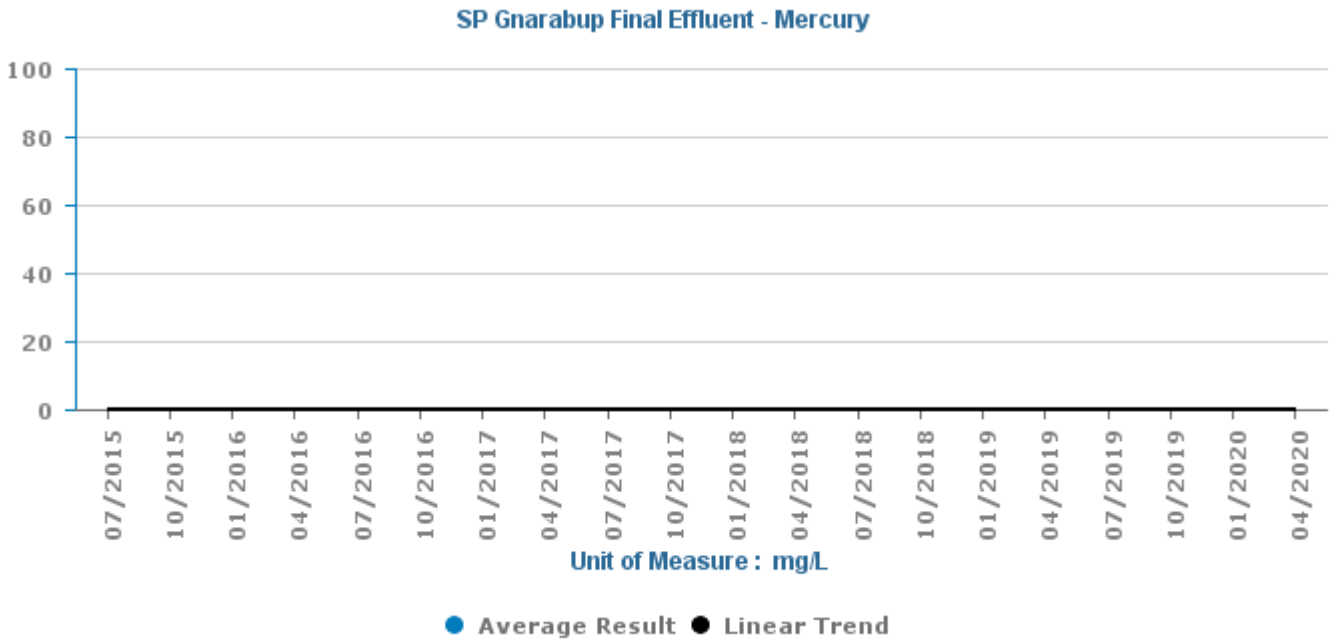


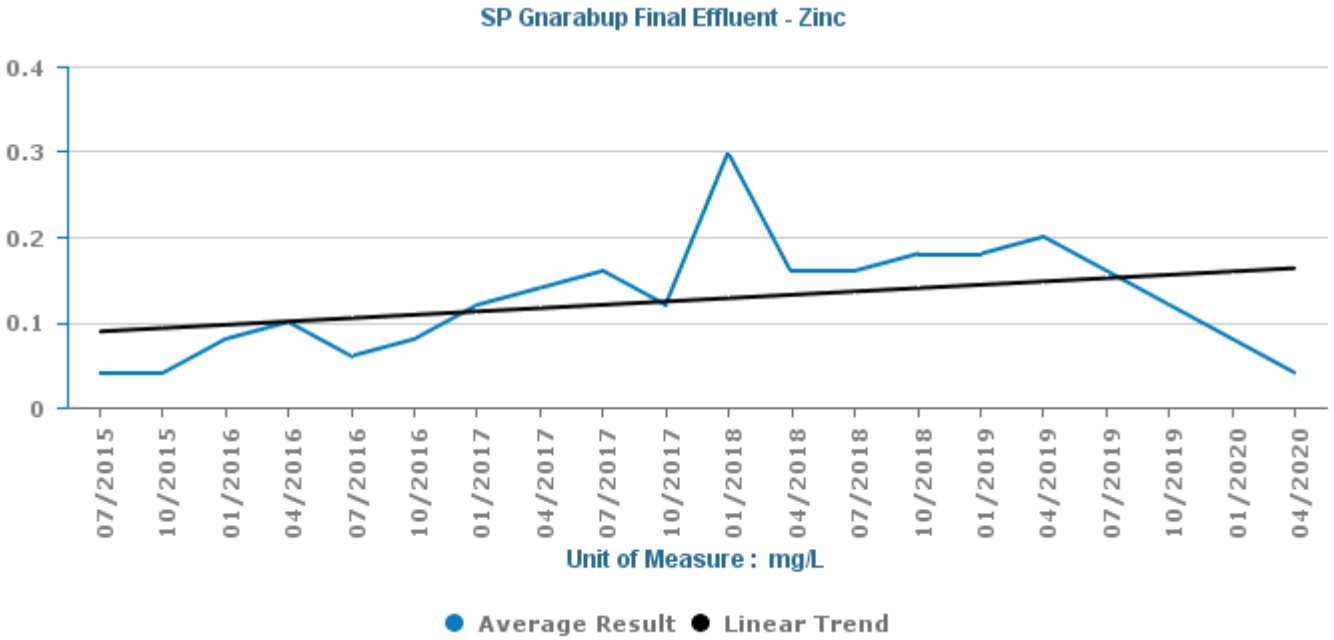
SP Gnarabup Final Effluent



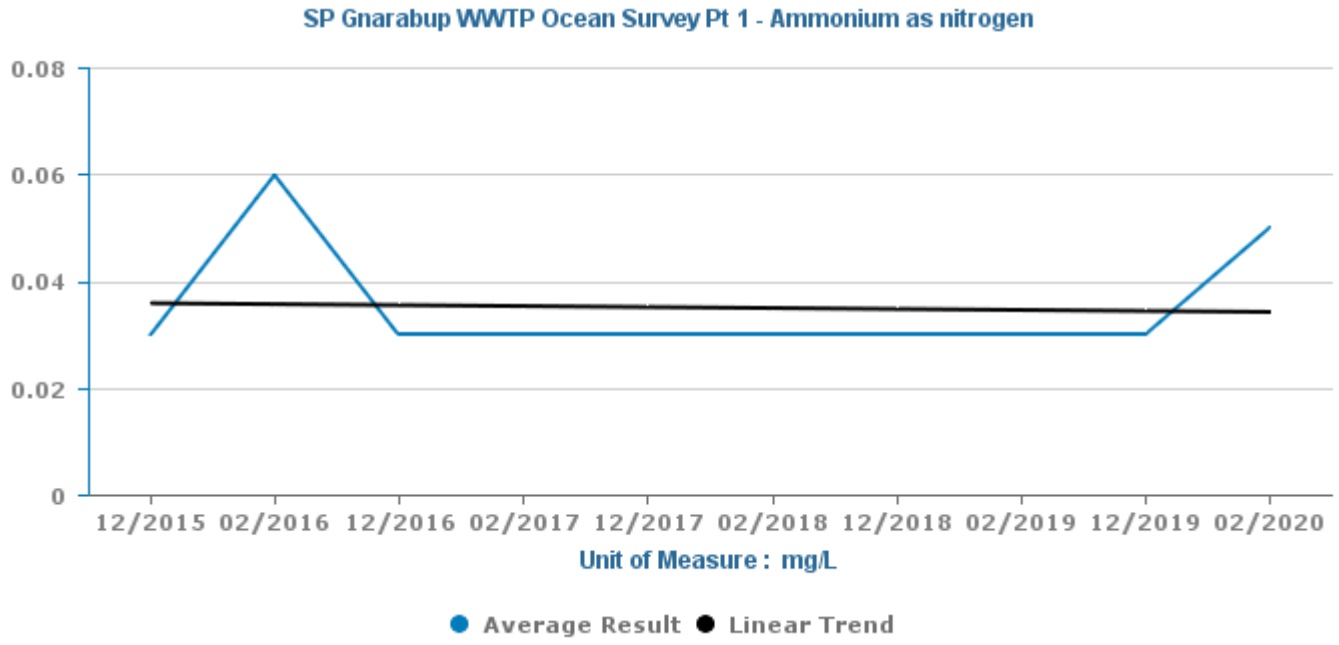

SP Gnarabup Final Effluent - Copper
0.05
0.04
0.03
0.02
0.01
0
07/2015
10/2015
01/2016
04/2016
07/2016
10/2016
01/2017
04/2017
07/2017
10/2017
01/2018
04/2018
07/2018
10/2018
01/2019
04/2019
07/2019
10/2019
01/2020
04/2020
Unit of Measure : mg/L
Average Result
Linear Trend

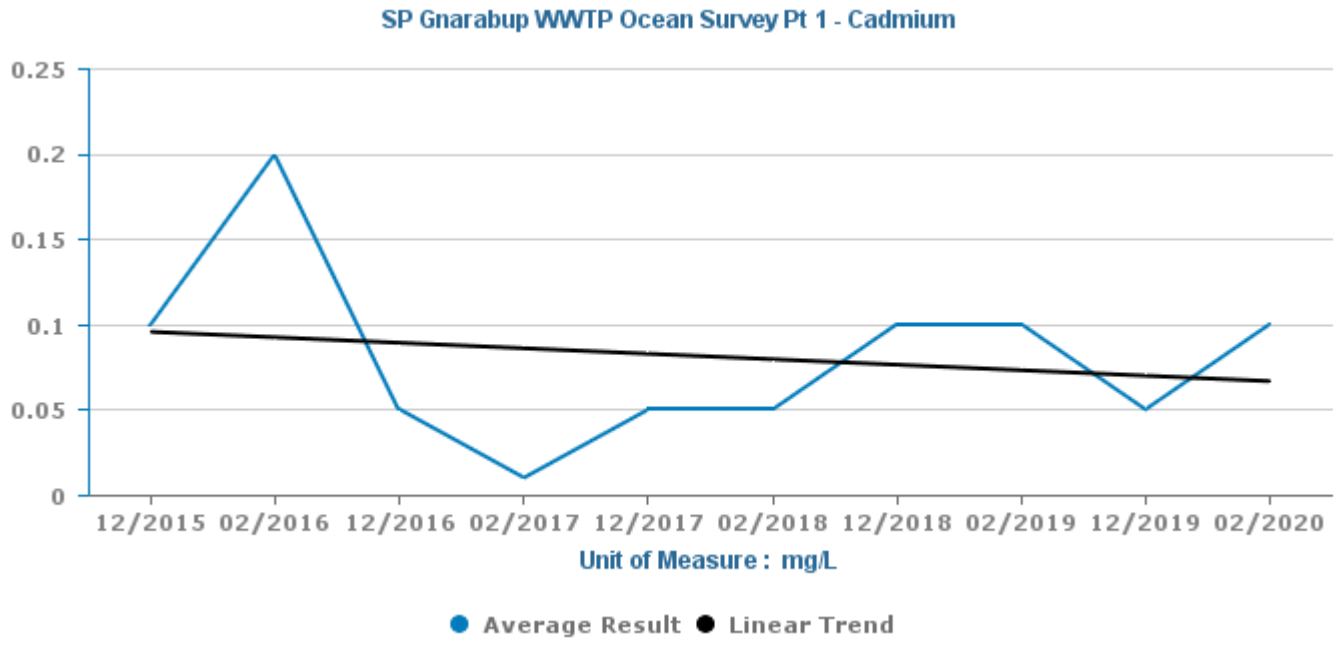

SP Gnarabup Final Effluent - Lead
0.012
0.01
0.008
0.006
0.004
0.002
0
07/2015
10/2015
01/2016
04/2016
07/2016
10/2016
01/2017
04/2017
07/2017
10/2017
01/2018
04/2018
07/2018
10/2018
01/2019
04/2019
07/2019
10/2019
01/2020
04/2020
Unit of Measure : mg/L
Average Result
Linear Trend

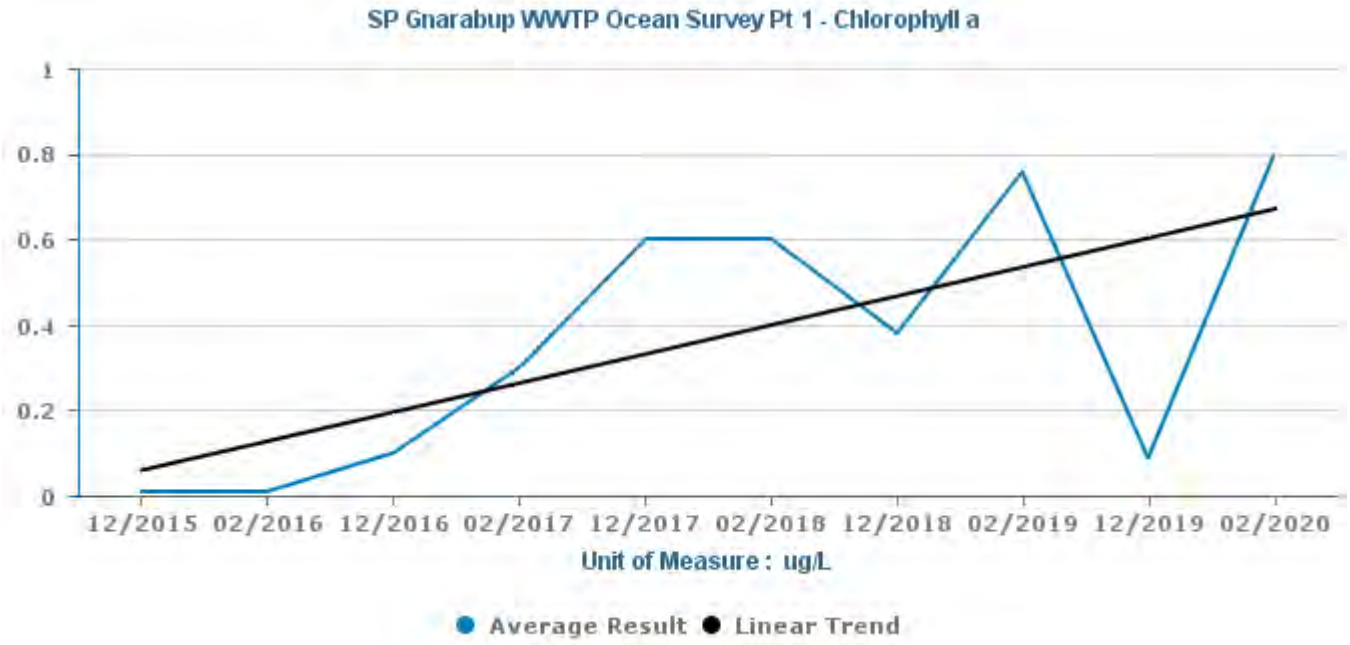

SP Gnarabup Final Effluent - Mercury
100
80
60
40
20
0
07/2015
10/2015
01/2016
04/2016
07/2016
10/2016
01/2017
04/2017
07/2017
10/2017
01/2018
04/2018
07/2018
10/2018
01/2019
04/2019
07/2019
10/2019
01/2020
04/2020
Unit of Measure : mg/L
Average Result
Linear Trend

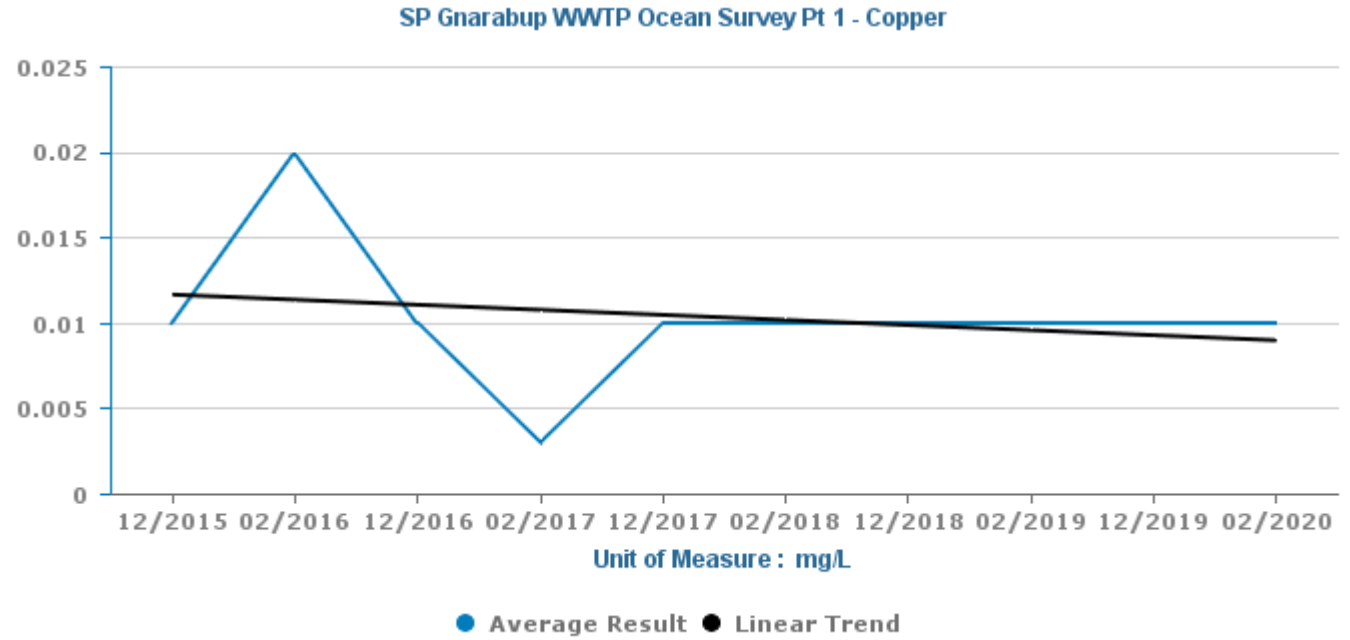

SP Gnarabup Final Effluent - Zinc
0.4
0.3
0.2
0.1
0
07/2015
10/2015
01/2016
04/2016
07/2016
10/2016
01/2017
04/2017
07/2017
10/2017
01/2018
04/2018
07/2018
10/2018
01/2019
04/2019
07/2019
10/2019
01/2020
04/2020
Unit of Measure : mg/L
Average Result
Linear Trend

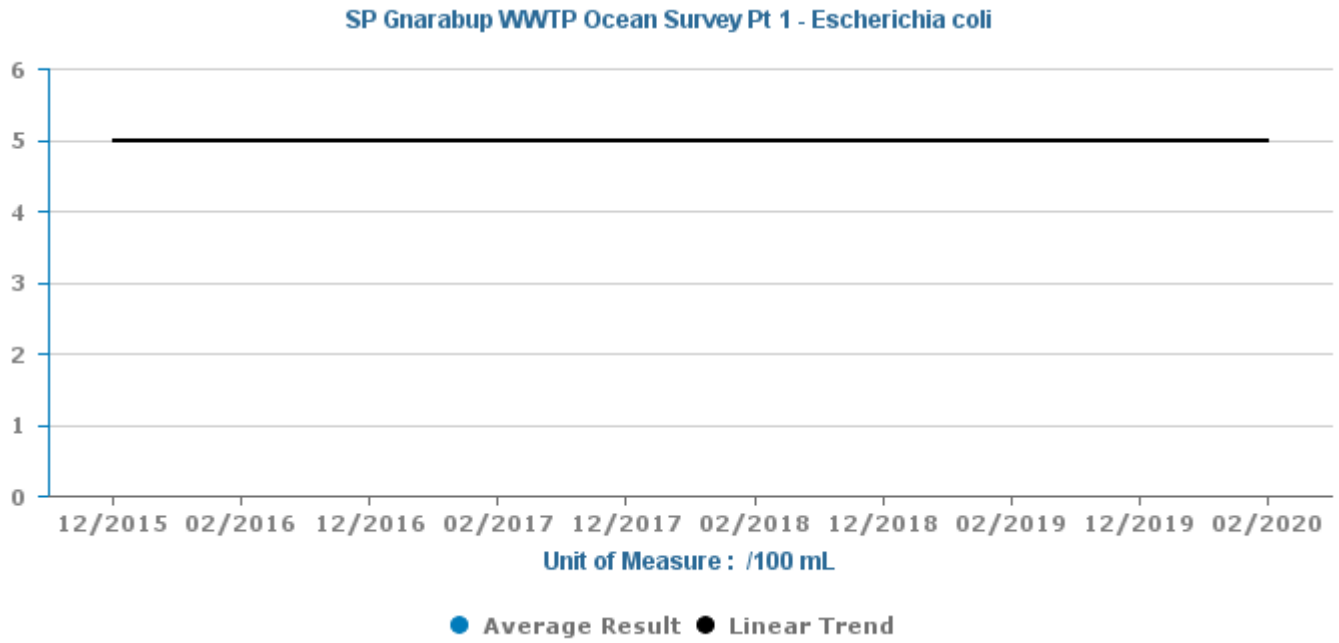
SP Gnarabup WWTP Ocean Survey Pt 1

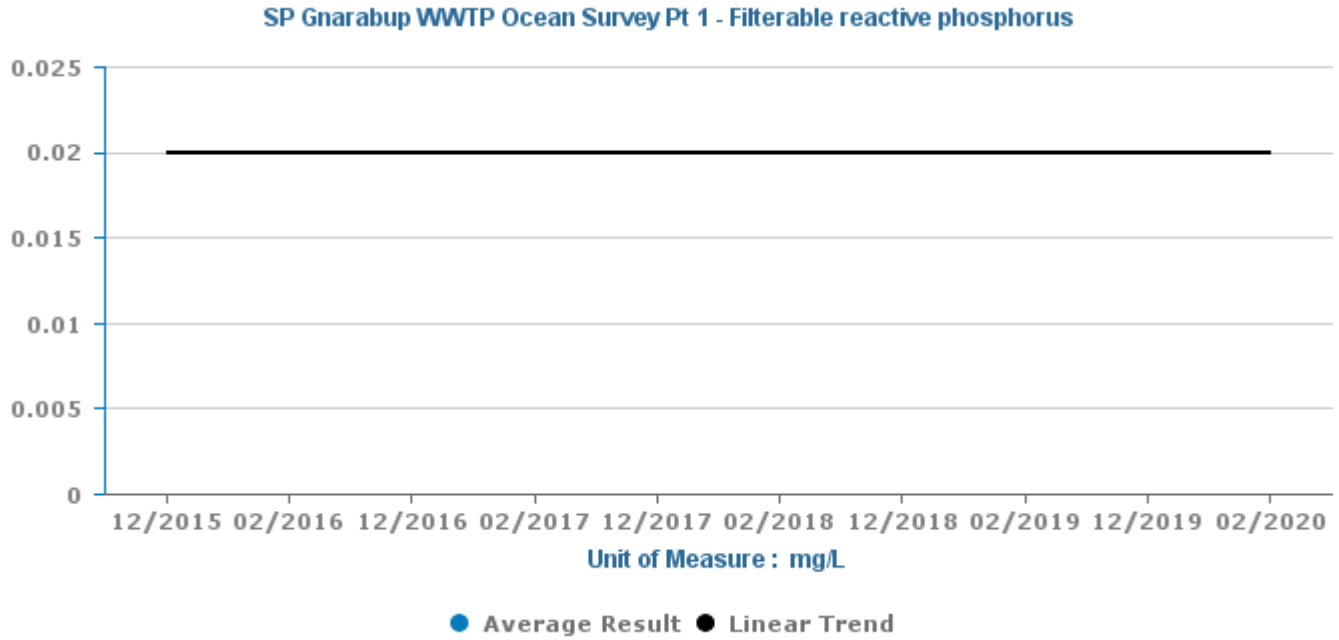


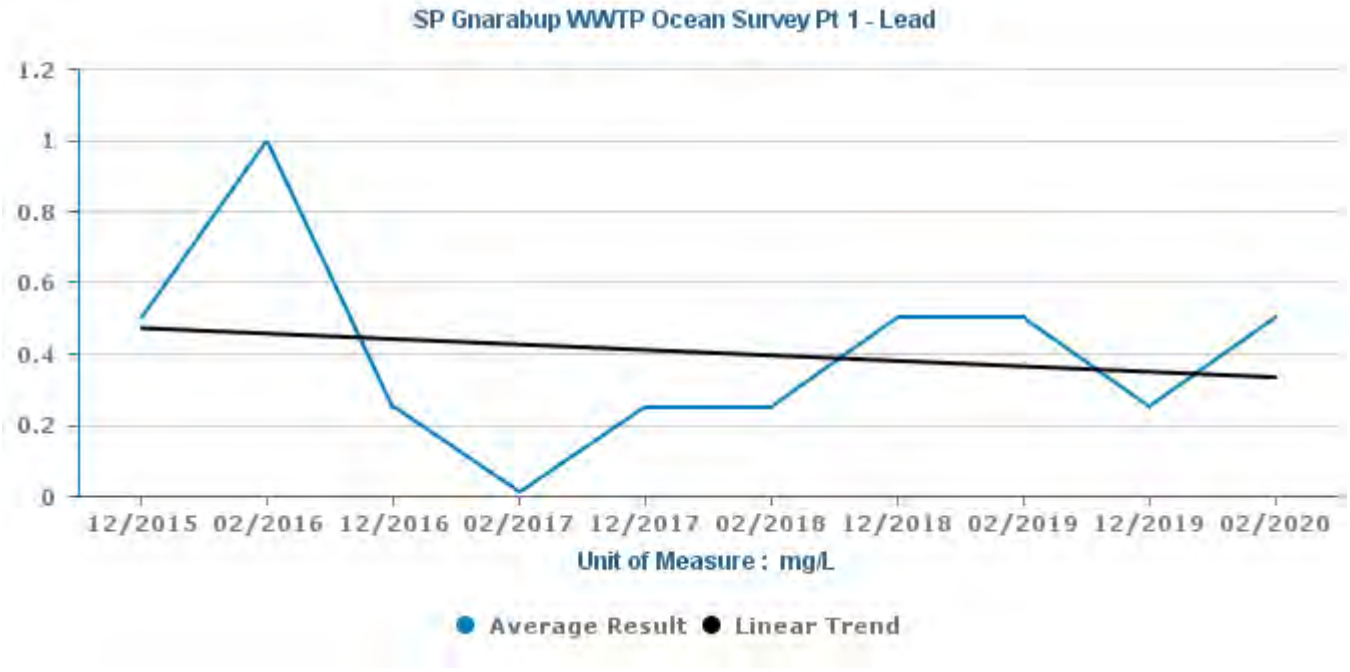


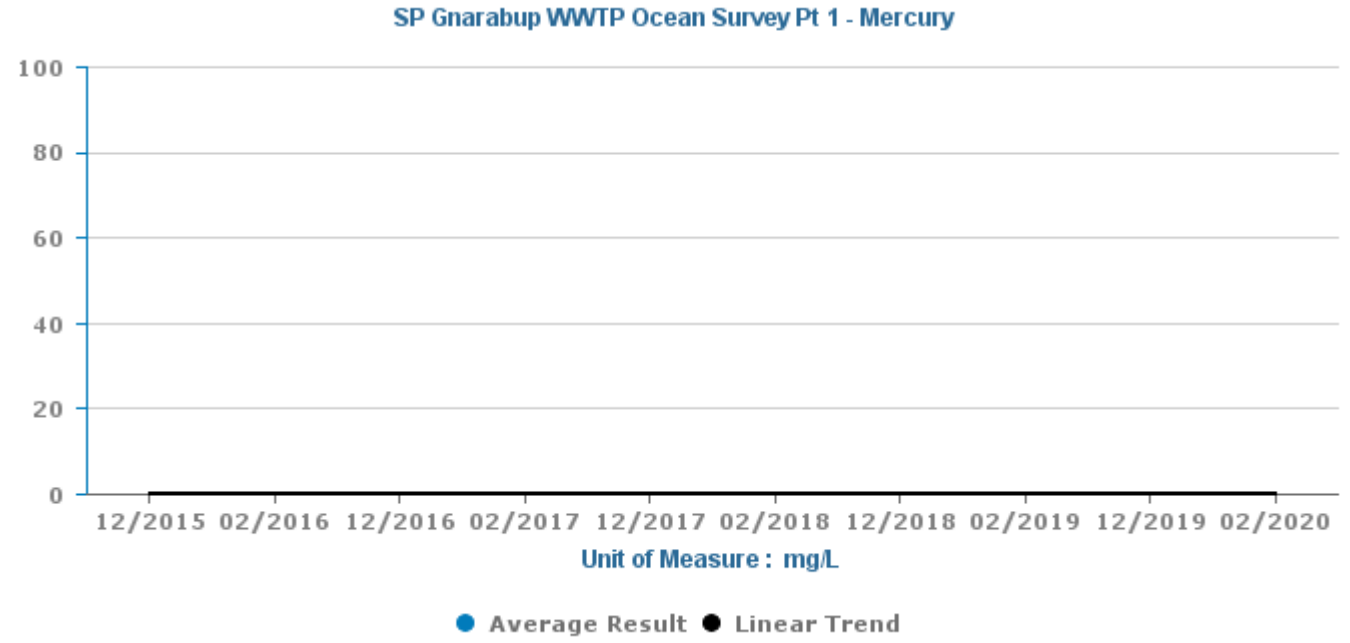

SP Gnarabup WWTP Ocean Survey Pt 1 - Chlorophyll a
1
0.8
0.6
0.4
0.2
0
12/2015 02/2016 12/2016 02/2017 12/2017 02/2018 12/2018 02/2019 12/2019 02/2020
Unit of Measure : ug/L
Average Result
Linear Trend

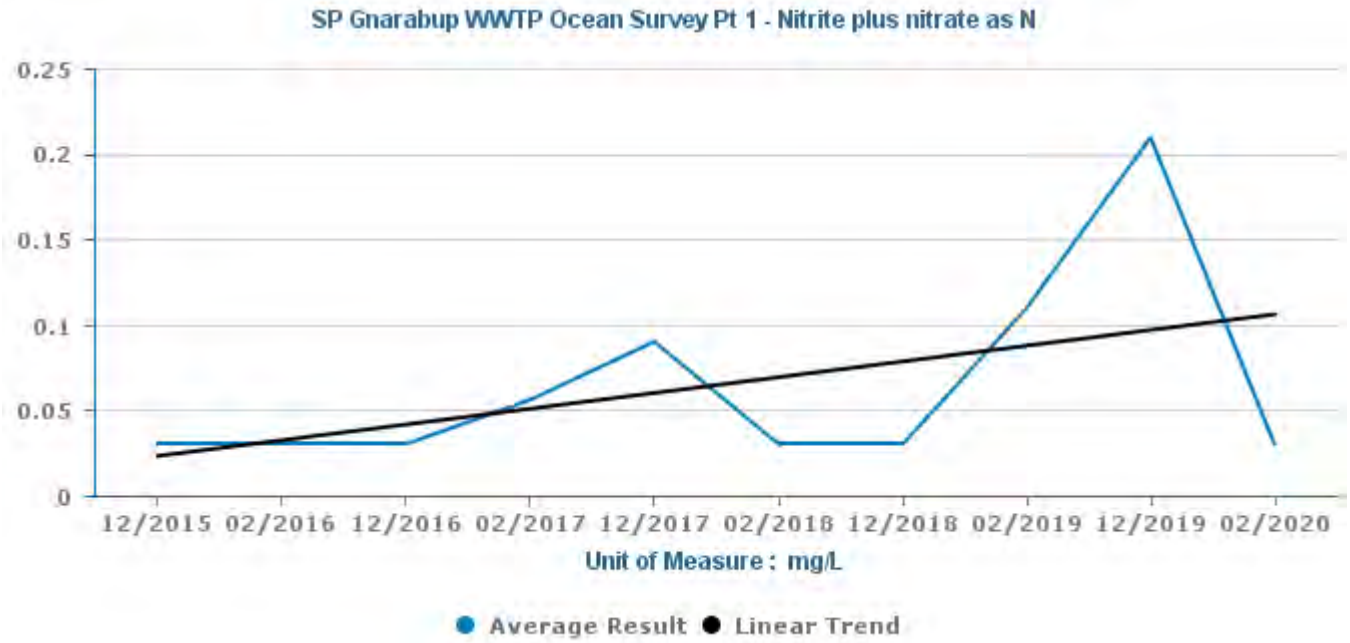

SP Gnarabup WWTP Ocean Survey Pt 1 - Copper
0.025
0.02
0.015
0.01
0.005
0
12/2015 02/2016 12/2016 02/2017 12/2017 02/2018 12/2018 02/2019 12/2019 02/2020
Unit of Measure : mg/L
Average Result
Linear Trend

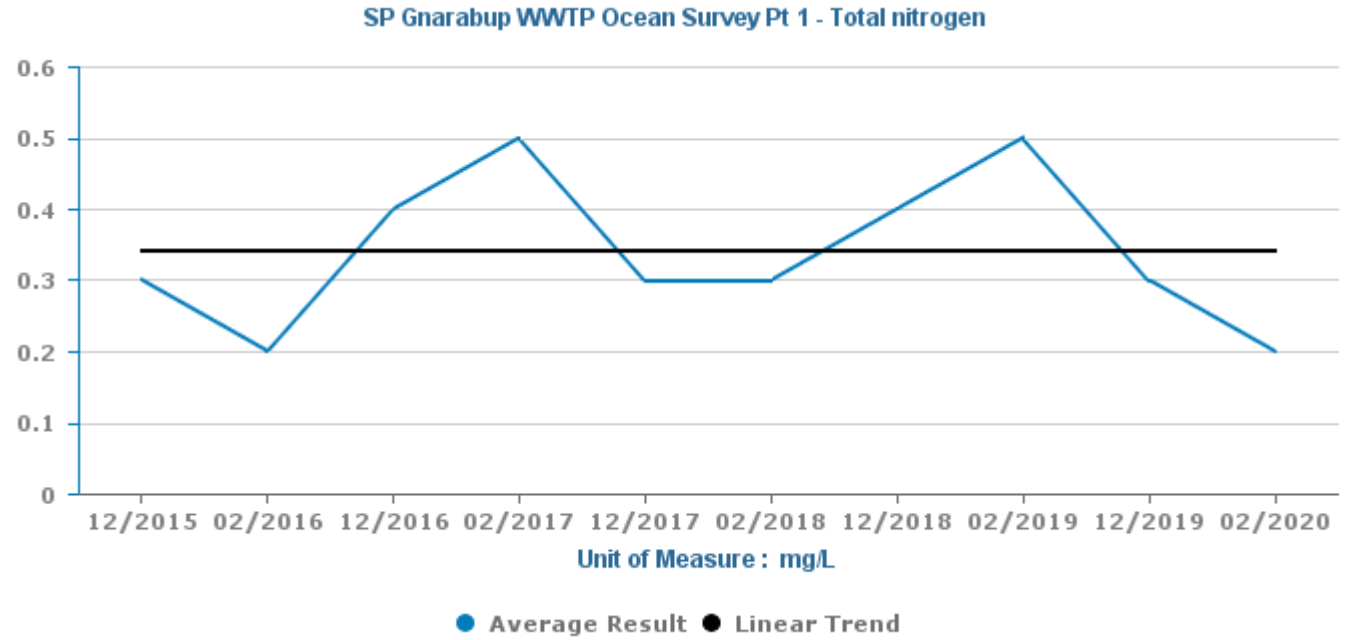

SP Gnarabup WWTP Ocean Survey Pt 1 - Escherichia coli
6
5
4
3
2
1
0
12/2015 02/2016 12/2016 02/2017 12/2017 02/2018 12/2018 02/2019 12/2019 02/2020
Unit of Measure : /100 mL
Average Result
Linear Trend

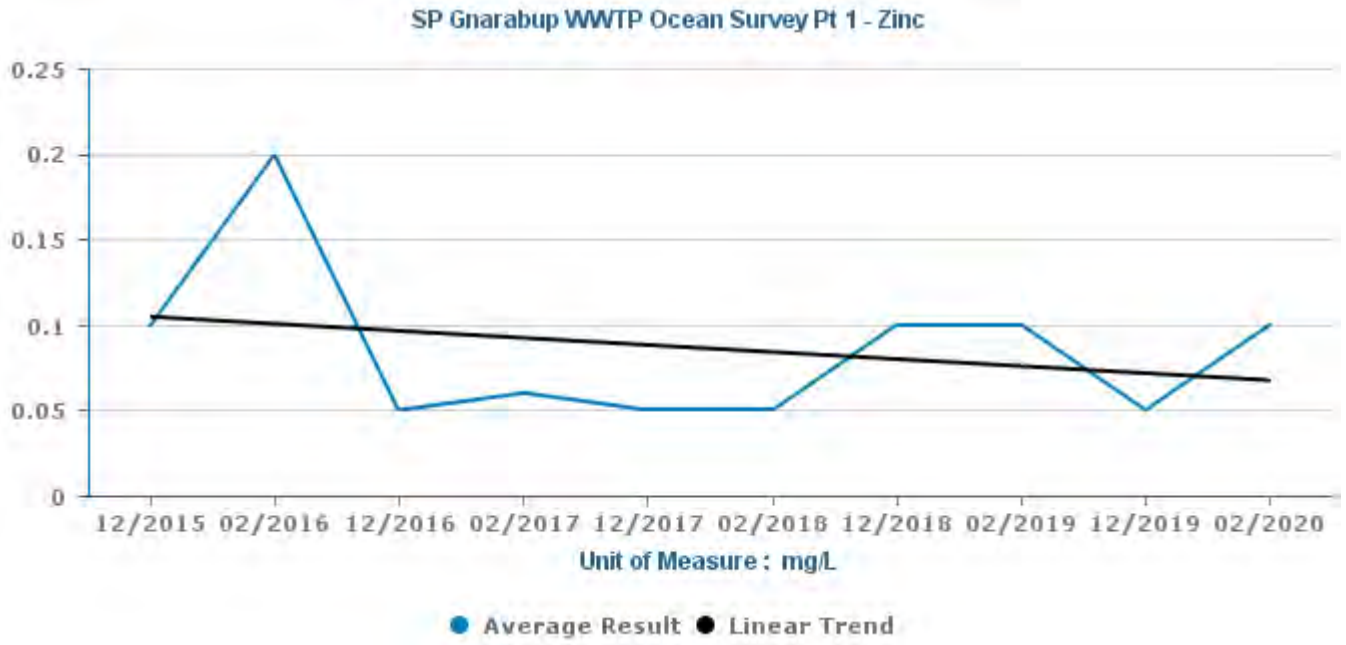

SP Gnarabup WWTP Ocean Survey Pt 1 - Filterable reactive phosphorus
0.025
0.02
0.015
0.01
0.005
0
12/2015 02/2016 12/2016 02/2017 12/2017 02/2018 12/2018 02/2019 12/2019 02/2020
Unit of Measure : mg/L
Average Result
Linear Trend


SP Gnarabup WWTP Ocean Survey Pt 1 - Lead
1.2
1
0.8
0.6
0.4
0.2
0
12/2015 02/2016 12/2016 02/2017 12/2017 02/2018 12/2018 02/2019 12/2019 02/2020
Unit of Measure : mg/L
Average Result
Linear Trend

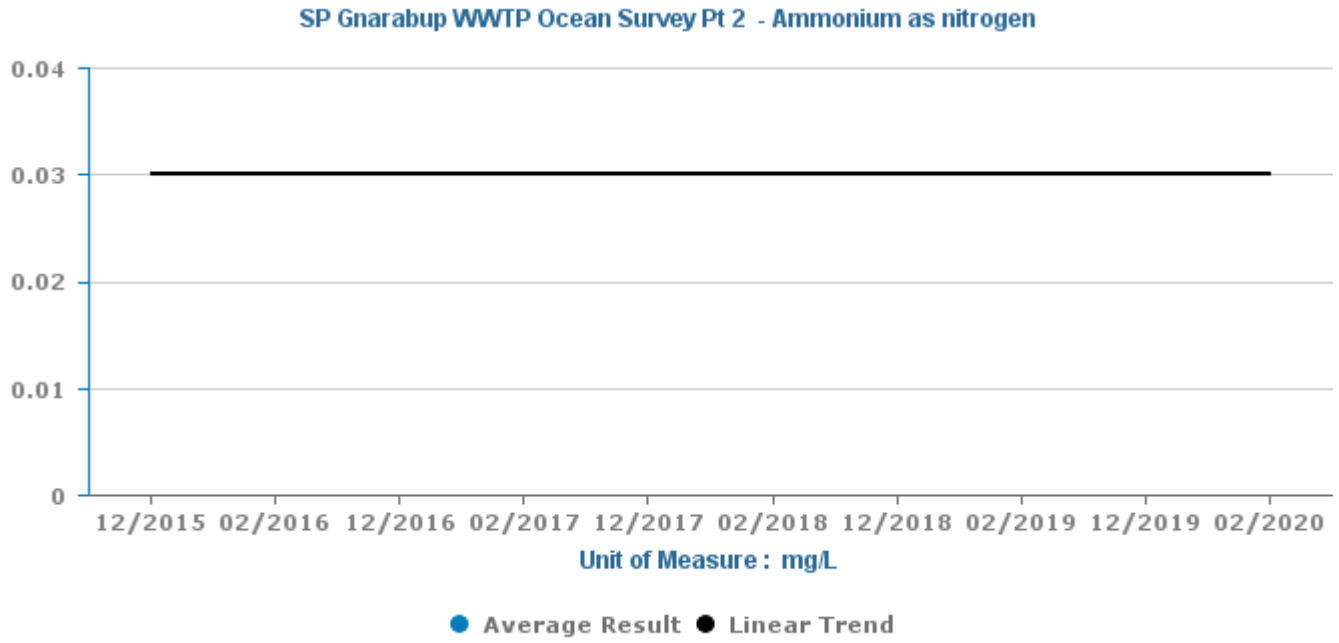

SP Gnarabup WWTP Ocean Survey Pt 1 - Mercury
100
80
60
40
20
0
12/2015 02/2016 12/2016 02/2017 12/2017 02/2018 12/2018 02/2019 12/2019 02/2020
Unit of Measure : mg/L
Average Result
Linear Trend

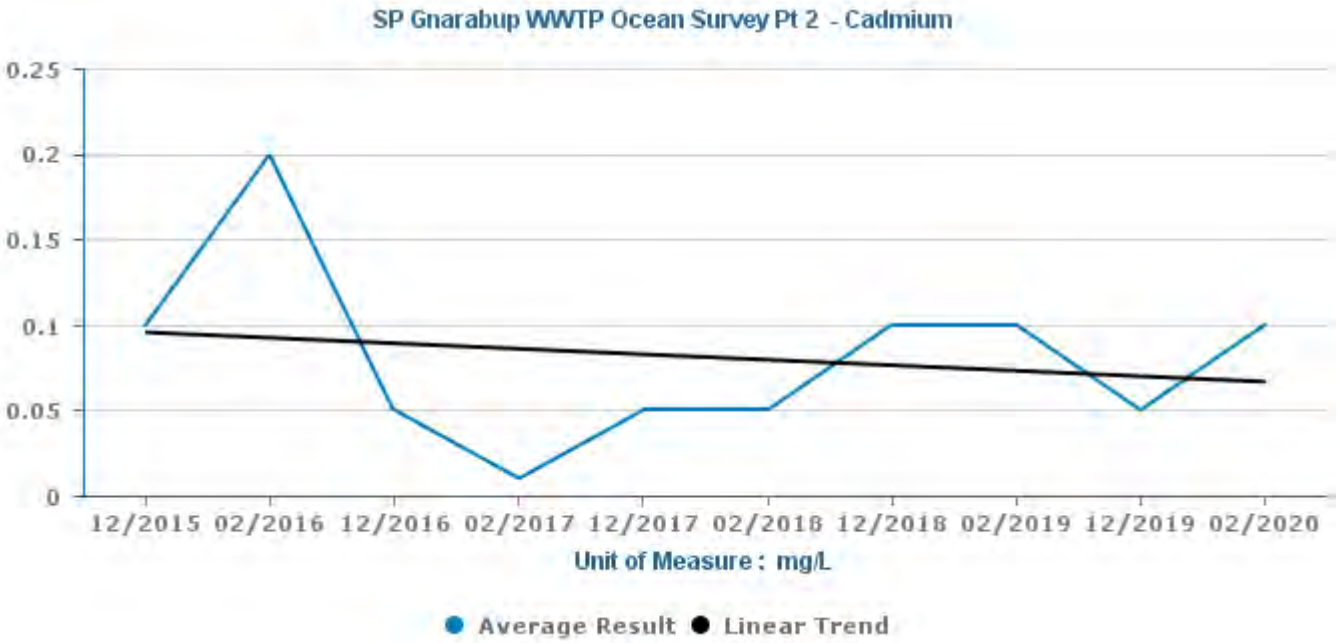

SP Gnarabup WWTP Ocean Survey Pt 1 - Nitrite plus nitrate as N
0.25
0.2
0.15
0.1
0.05
0
12/2015 02/2016 12/2016 02/2017 12/2017 02/2018 12/2018 02/2019 12/2019 02/2020
Unit of Measure : mg/L
Average Result
Linear Trend

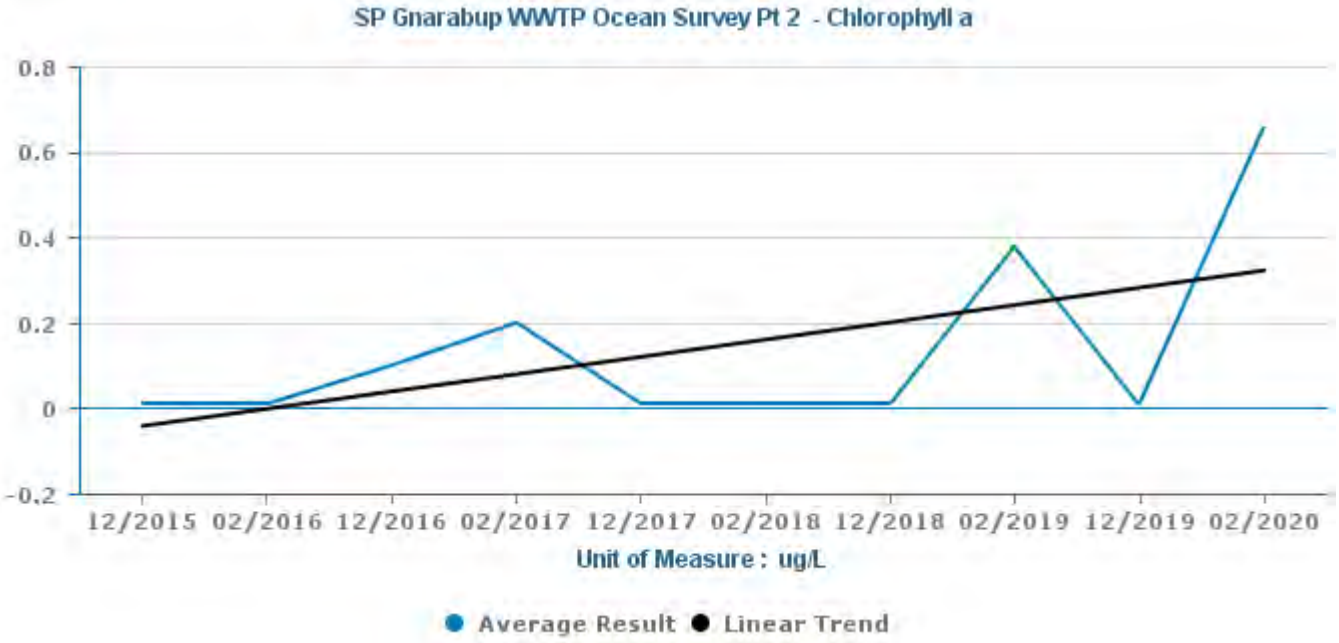

SP Gnarabup WWTP Ocean Survey Pt 1 - Total nitrogen
0.6
0.5
0.4
0.3
0.2
0.1
0
12/2015 02/2016 12/2016 02/2017 12/2017 02/2018 12/2018 02/2019 12/2019 02/2020
Unit of Measure : mg/L
Average Result
Linear Trend

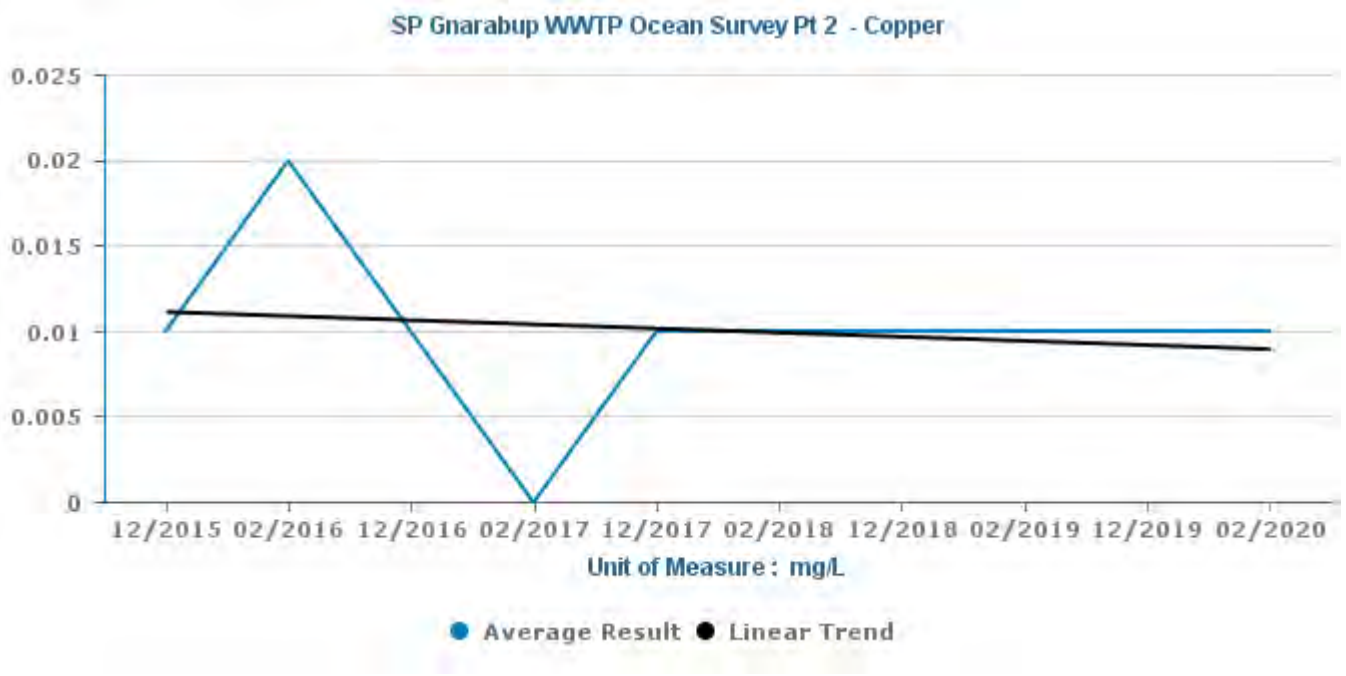


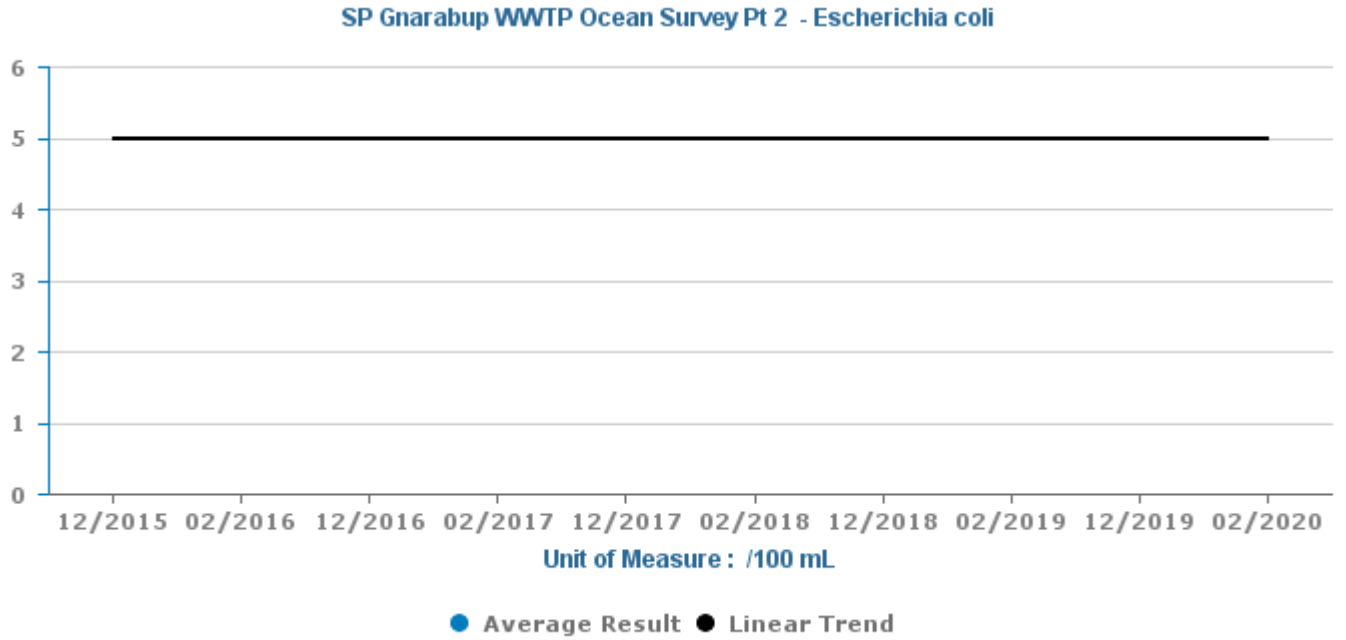
SP Gnarabup WWTP Ocean Survey Pt 2

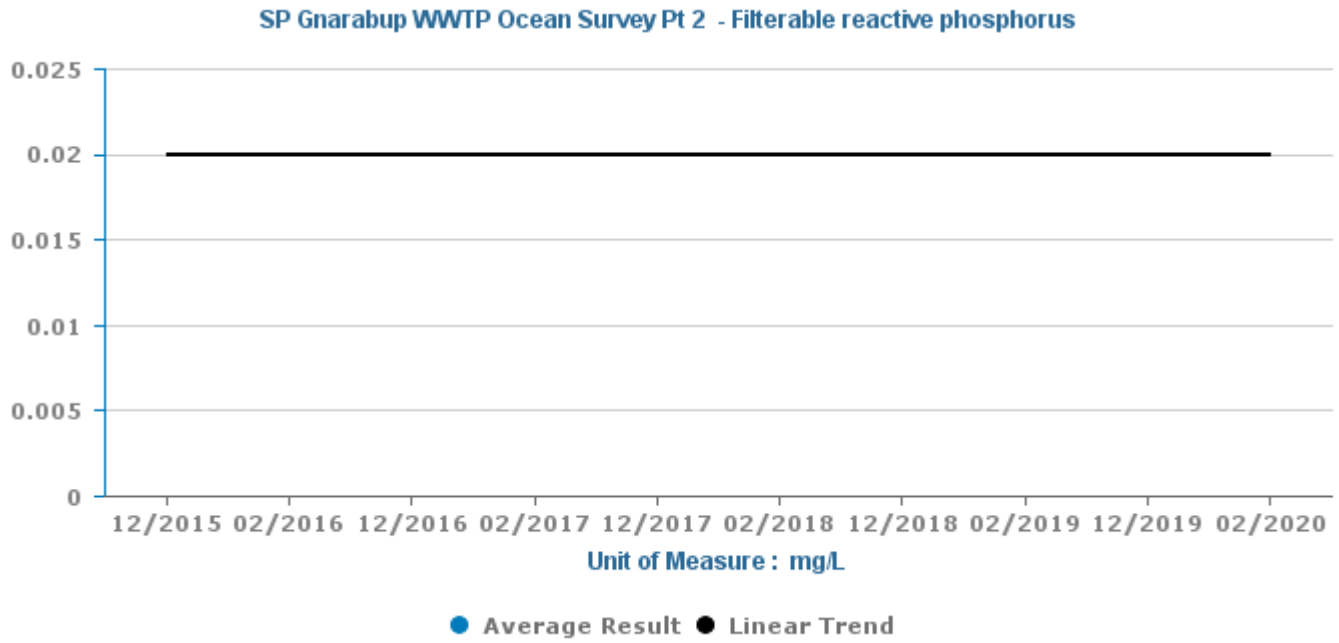


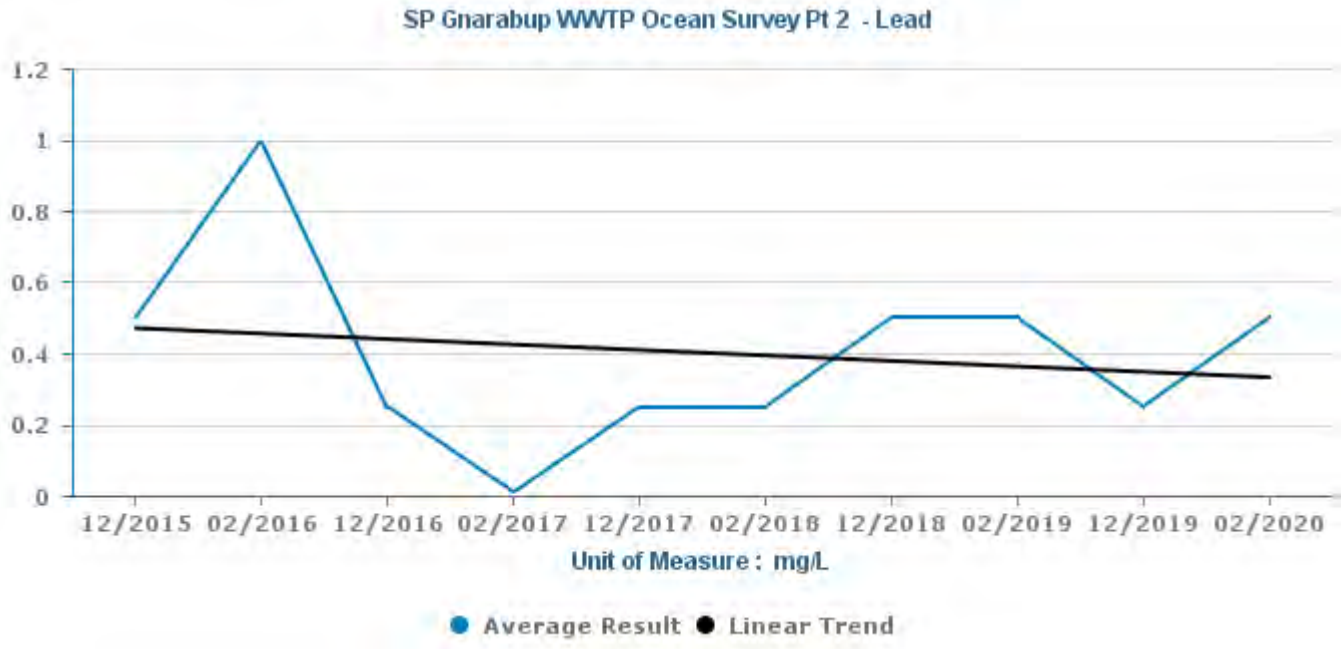

SP Gnarabup WWTP Ocean Survey Pt 2 - Cadmium
0.25
0.2
0.15
0.1
0.05
0
12/2015 02/2016 12/2016 02/2017 12/2017 02/2018 12/2018 02/2019 12/2019 02/2020
Unit of Measure : mg/L
Average Result
Linear Trend

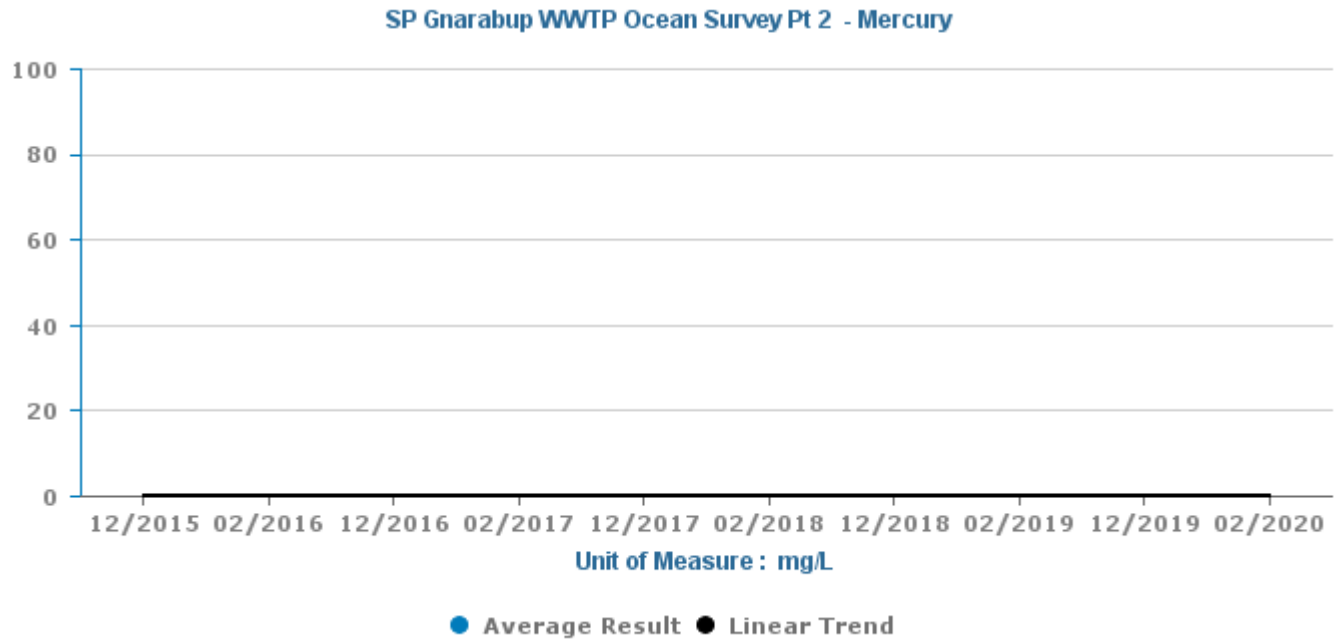

SP Gnarabup WWTP Ocean Survey Pt 2 - Chlorophyll a
0.8
0.6
0.4
0.2
0
-0.2
12/2015 02/2016 12/2016 02/2017 12/2017 02/2018 12/2018 02/2019 12/2019 02/2020
Unit of Measure : ug/L
Average Result
Linear Trend

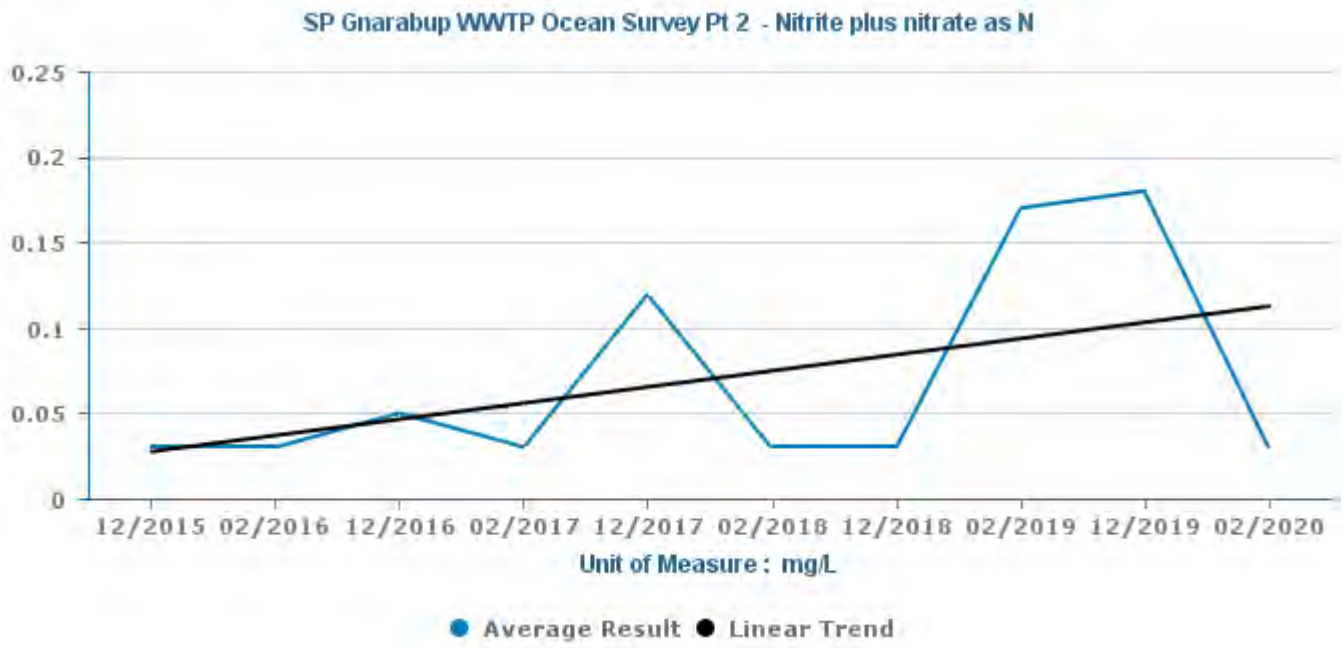

SP Gnarabup WWTP Ocean Survey Pt 2 - Copper
0.025
0.02
0.015
0.01
0.005
0
12/2015 02/2016 12/2016 02/2017 12/2017 02/2018 12/2018 02/2019 12/2019 02/2020
Unit of Measure : mg/L
Average Result
Linear Trend

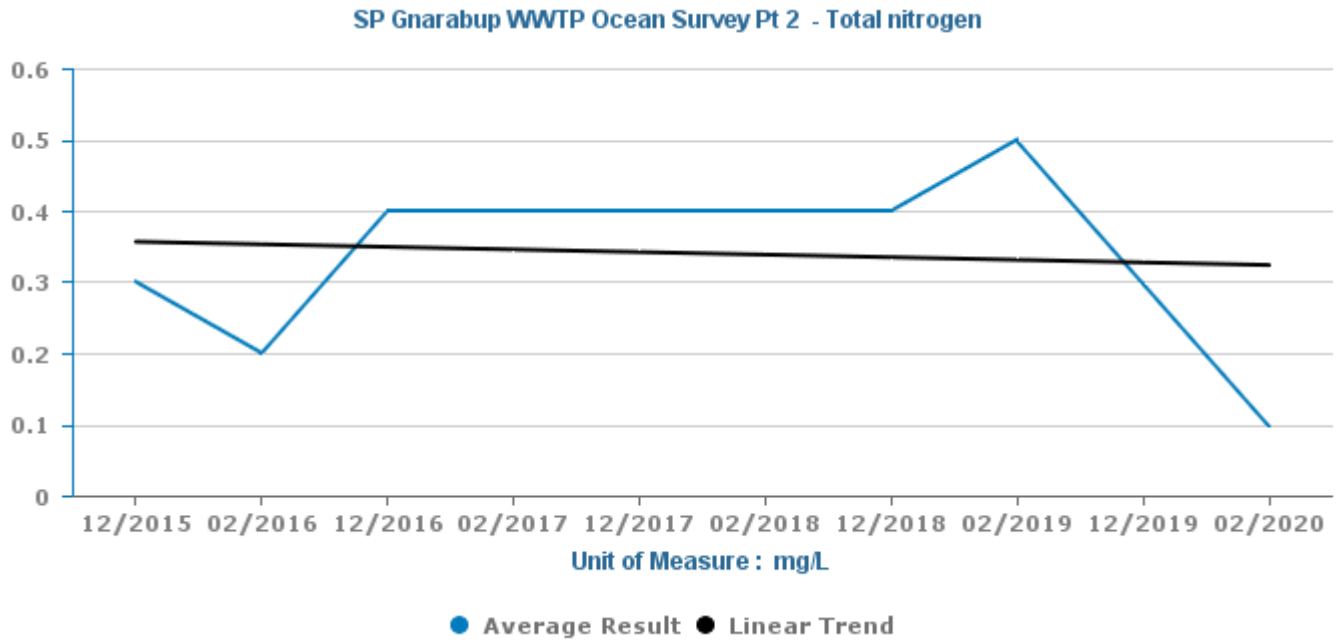

SP Gnarabup WWTP Ocean Survey Pt 2 - Escherichia coli
6
5
4
3
2
1
0
12/2015 02/2016 12/2016 02/2017 12/2017 02/2018 12/2018 02/2019 12/2019 02/2020
Unit of Measure : /100 mL
Average Result
Linear Trend

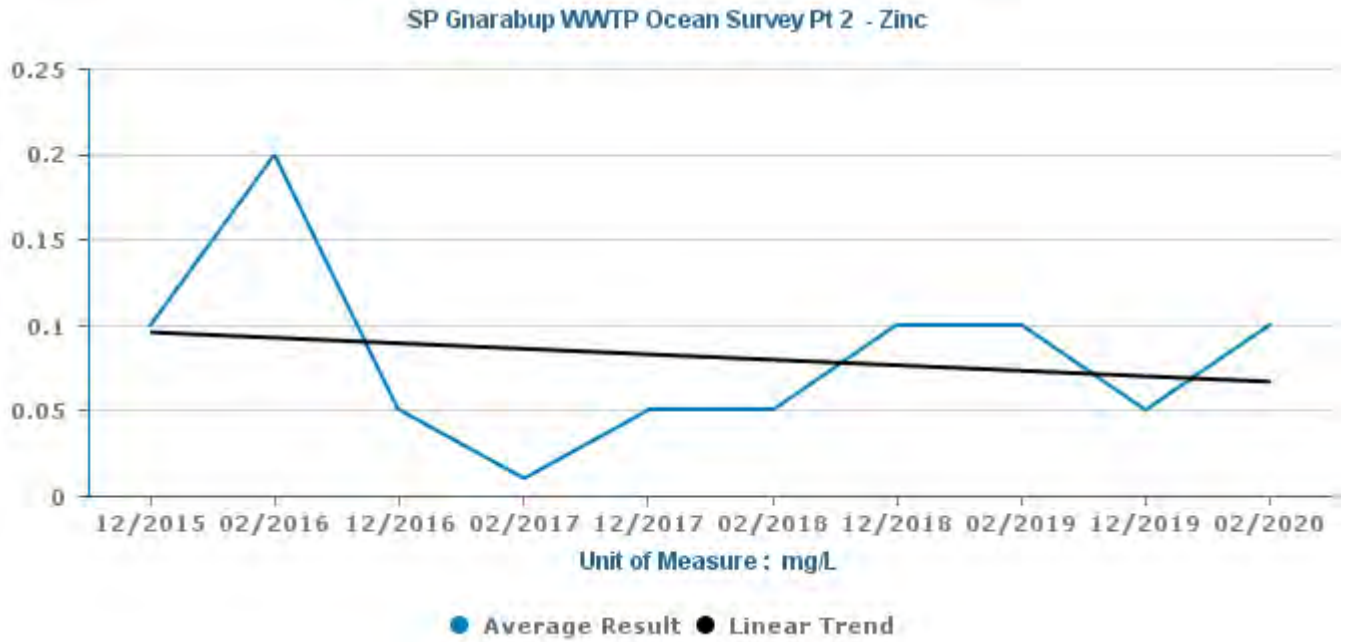

SP Gnarabup WWTP Ocean Survey Pt 2 - Filterable reactive phosphorus
0.025
0.02
0.015
0.01
0.005
0
12/2015 02/2016 12/2016 02/2017 12/2017 02/2018 12/2018 02/2019 12/2019 02/2020
Unit of Measure : mg/L
Average Result
Linear Trend


SP Gnarabup WWTP Ocean Survey Pt 2 - Lead
1.2
1
0.8
0.6
0.4
0.2
0
12/2015 02/2016 12/2016 02/2017 12/2017 02/2018 12/2018 02/2019 12/2019 02/2020
Unit of Measure : mg/L
Average Result
Linear Trend

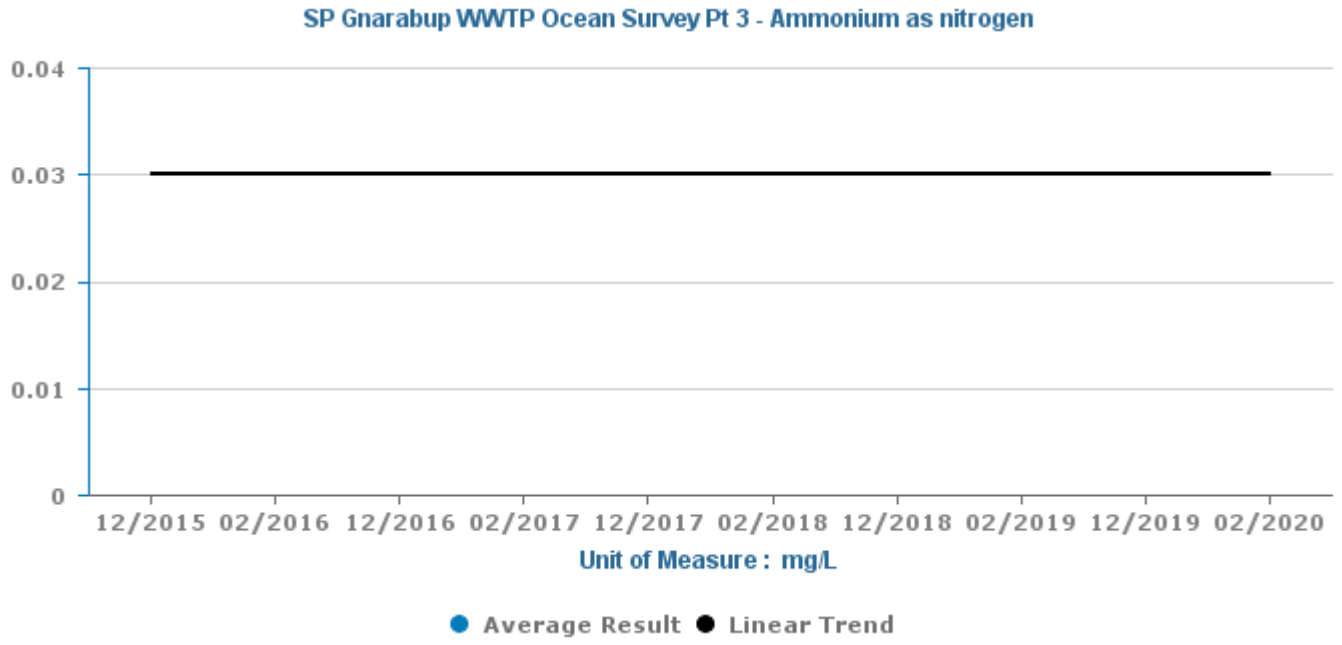

SP Gnarabup WWTP Ocean Survey Pt 2 - Mercury
100
80
60
40
20
0
12/2015 02/2016 12/2016 02/2017 12/2017 02/2018 12/2018 02/2019 12/2019 02/2020
Unit of Measure : mg/L
Average Result
Linear Trend

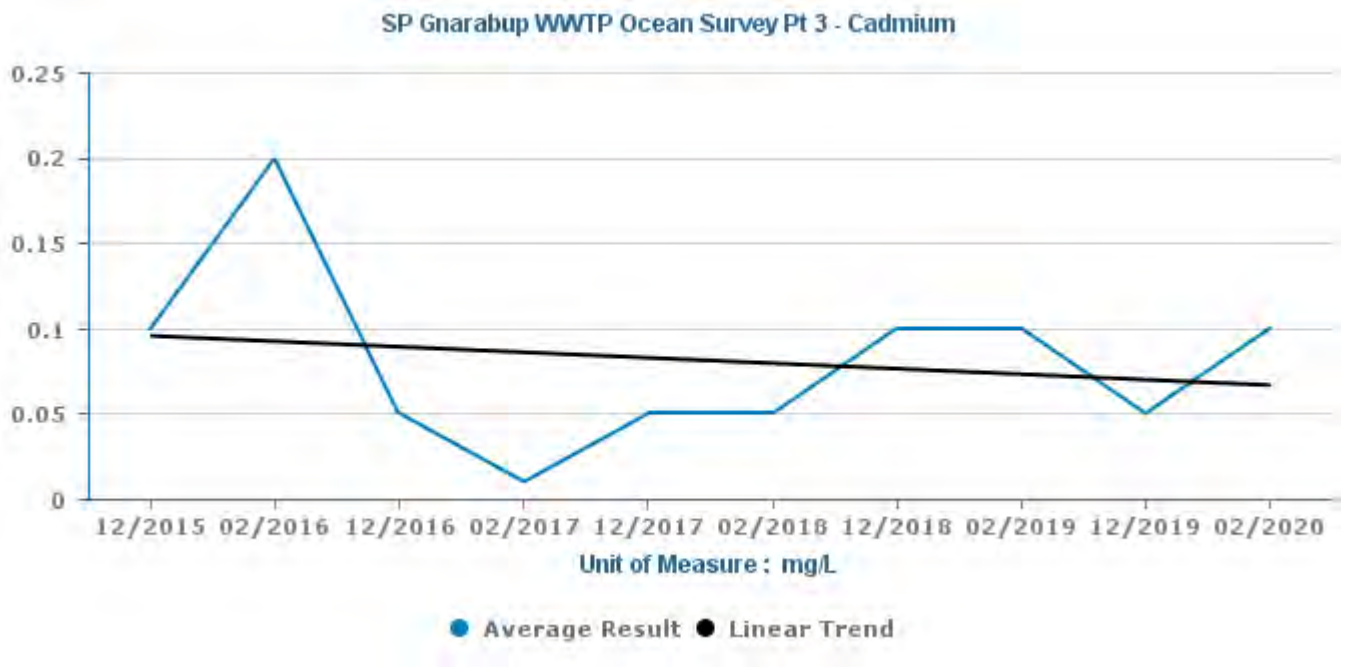

SP Gnarabup WWTP Ocean Survey Pt 2 - Nitrite plus nitrate as N
0.25
0.2
0.15
0.1
0.05
0
12/2015 02/2016 12/2016 02/2017 12/2017 02/2018 12/2018 02/2019 12/2019 02/2020
Unit of Measure : mg/L
Average Result
Linear Trend

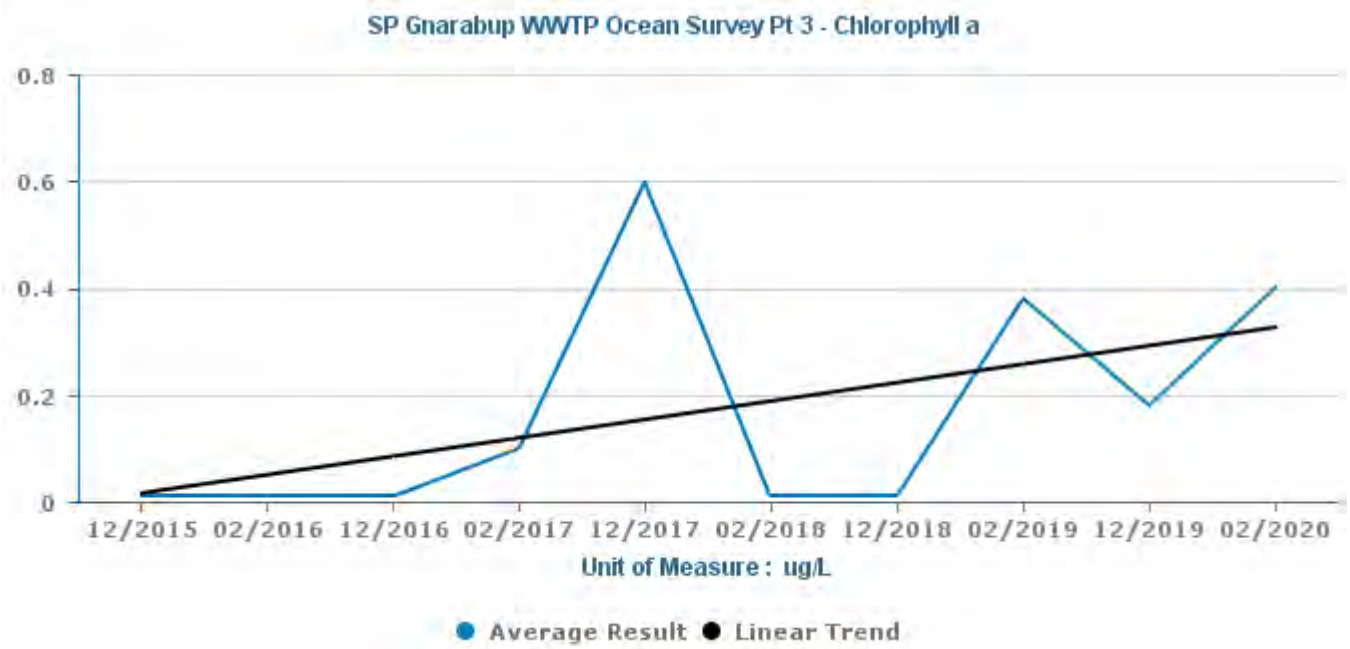

SP Gnarabup WWTP Ocean Survey Pt 2 - Total nitrogen
0.6
0.5
0.4
0.3
0.2
0.1
0
12/2015 02/2016 12/2016 02/2017 12/2017 02/2018 12/2018 02/2019 12/2019 02/2020
Unit of Measure : mg/L
Average Result
Linear Trend

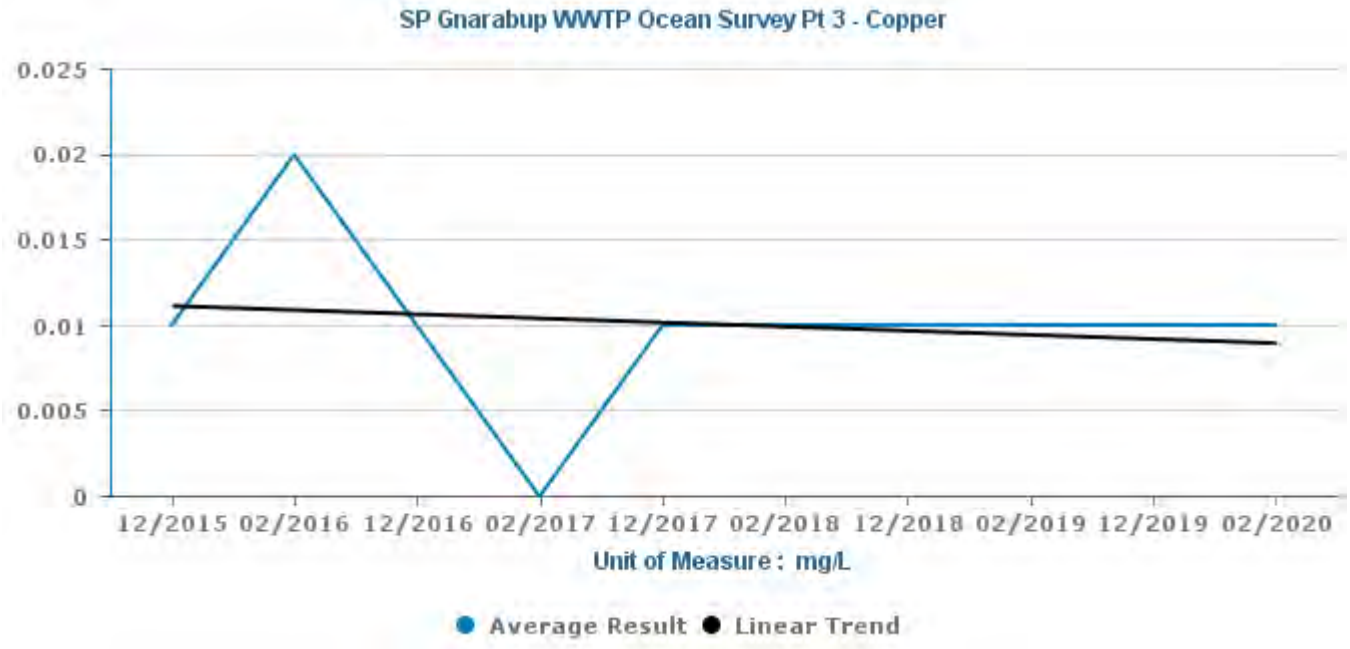

SP Gnarabup WWTP Ocean Survey Pt 2 - Zinc
0.25
0.2
0.15
0.1
0.05
0
12/2015 02/2016 12/2016 02/2017 12/2017 02/2018 12/2018 02/2019 12/2019 02/2020
Unit of Measure : mg/L
Average Result
Linear Trend

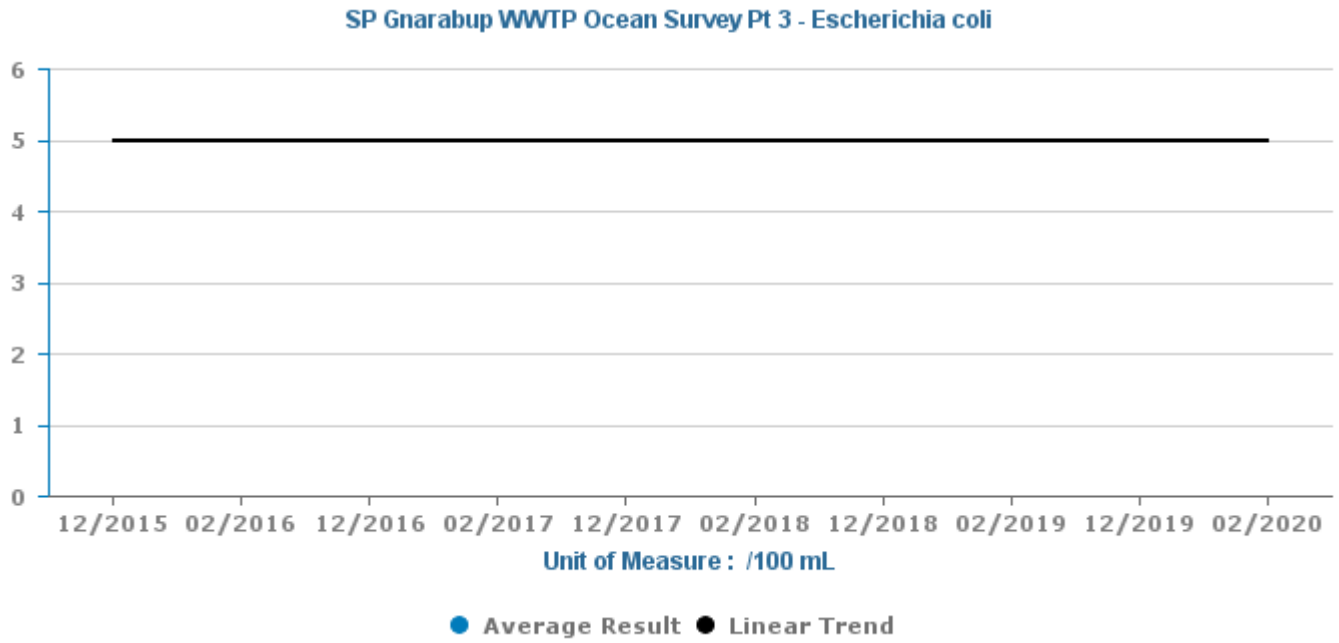
SP Gnarabup WWTP Ocean Survey Pt 3

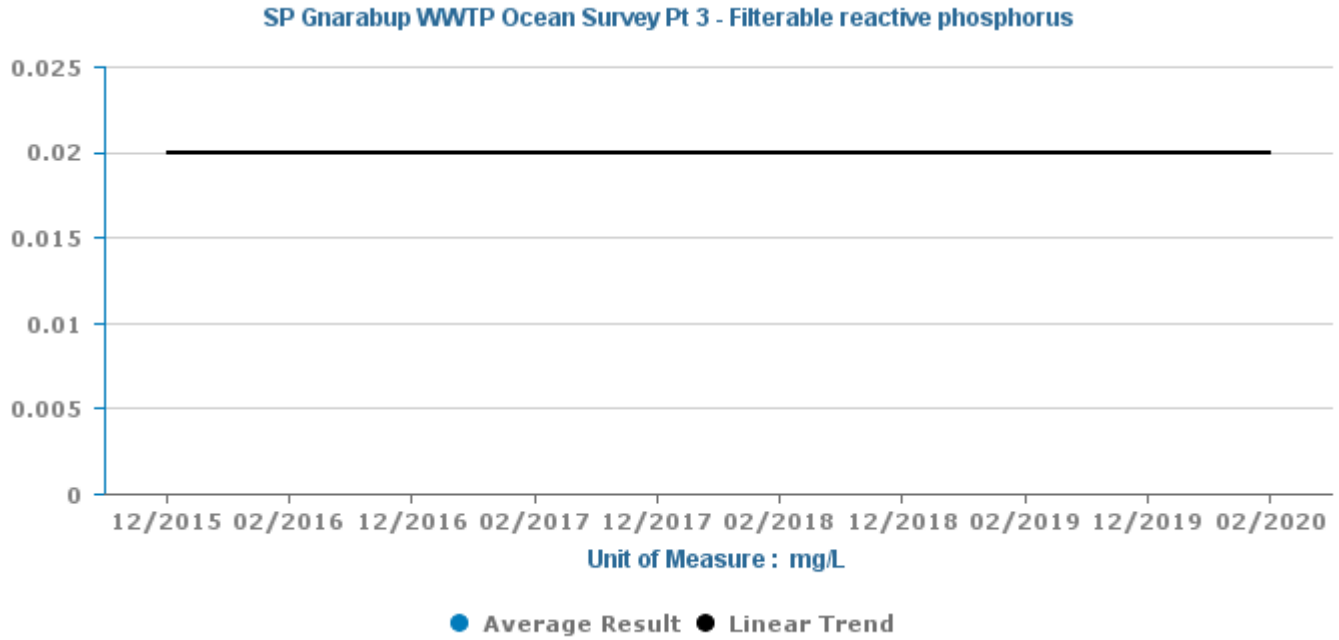


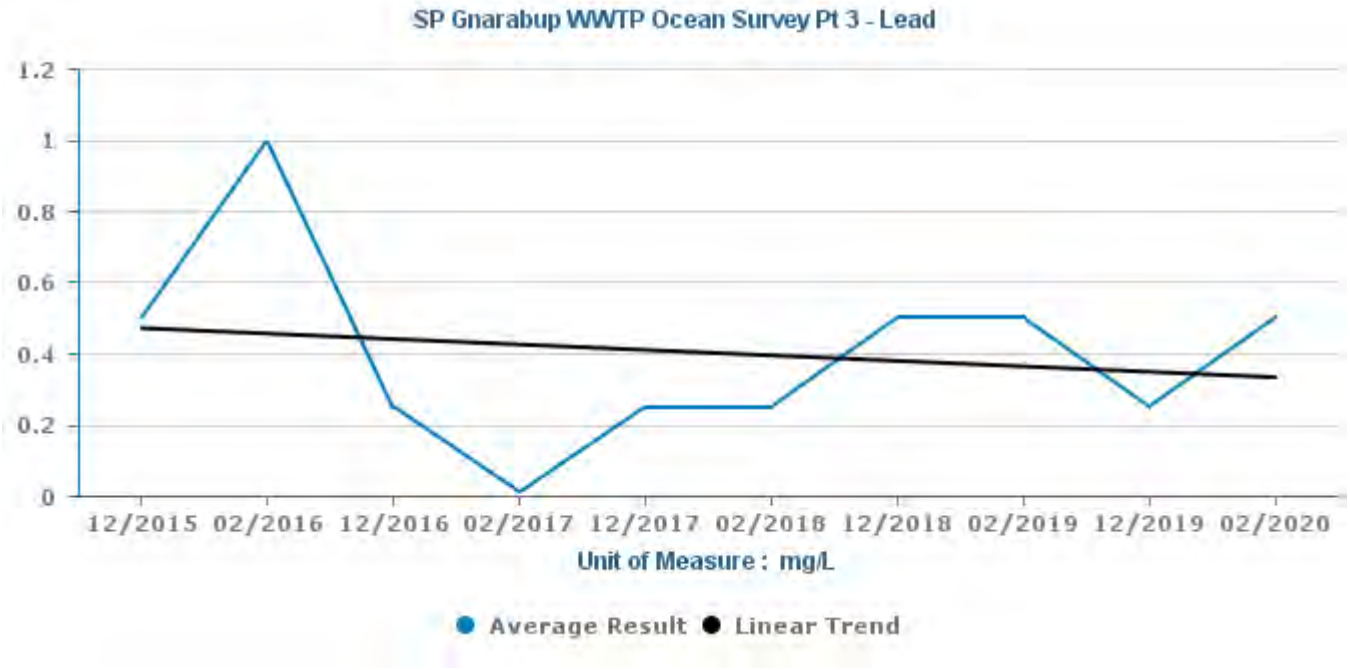


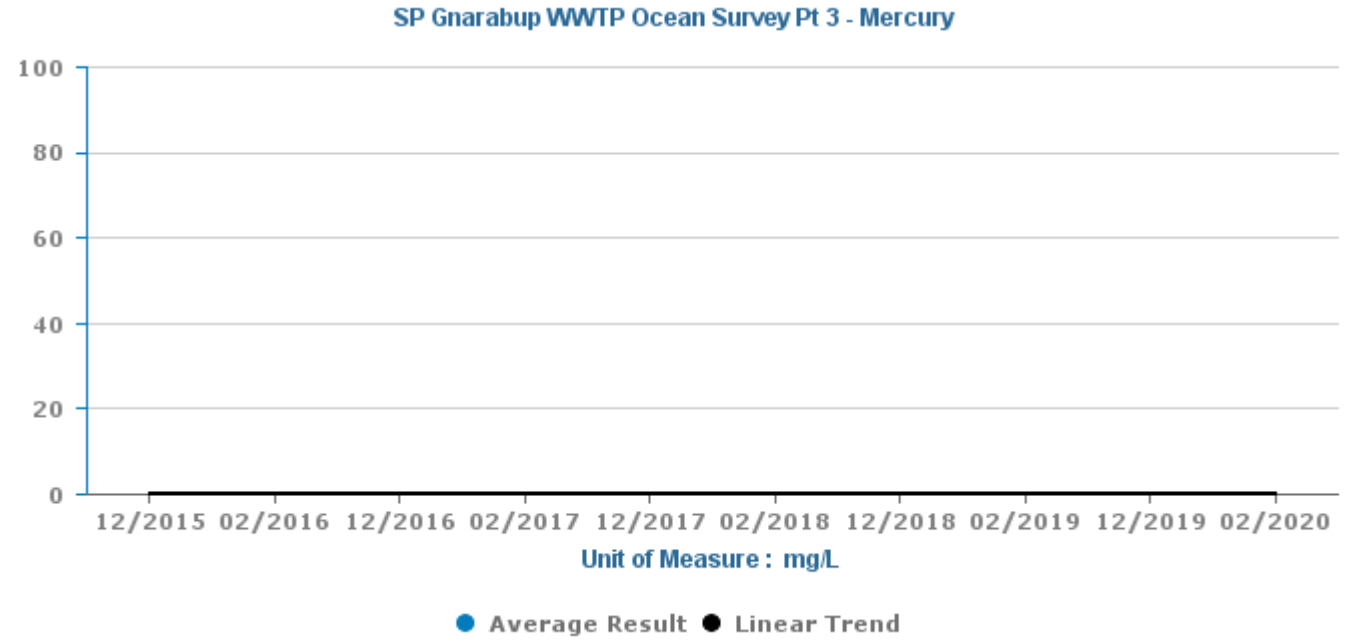

SP Gnarabup WWTP Ocean Survey Pt 3 - Chlorophyll a
0.8
0.6
0.4
0.2
0
12/2015 02/2016 12/2016 02/2017 12/2017 02/2018 12/2018 02/2019 12/2019 02/2020
Unit of Measure : ug/L
Average Result
Linear Trend

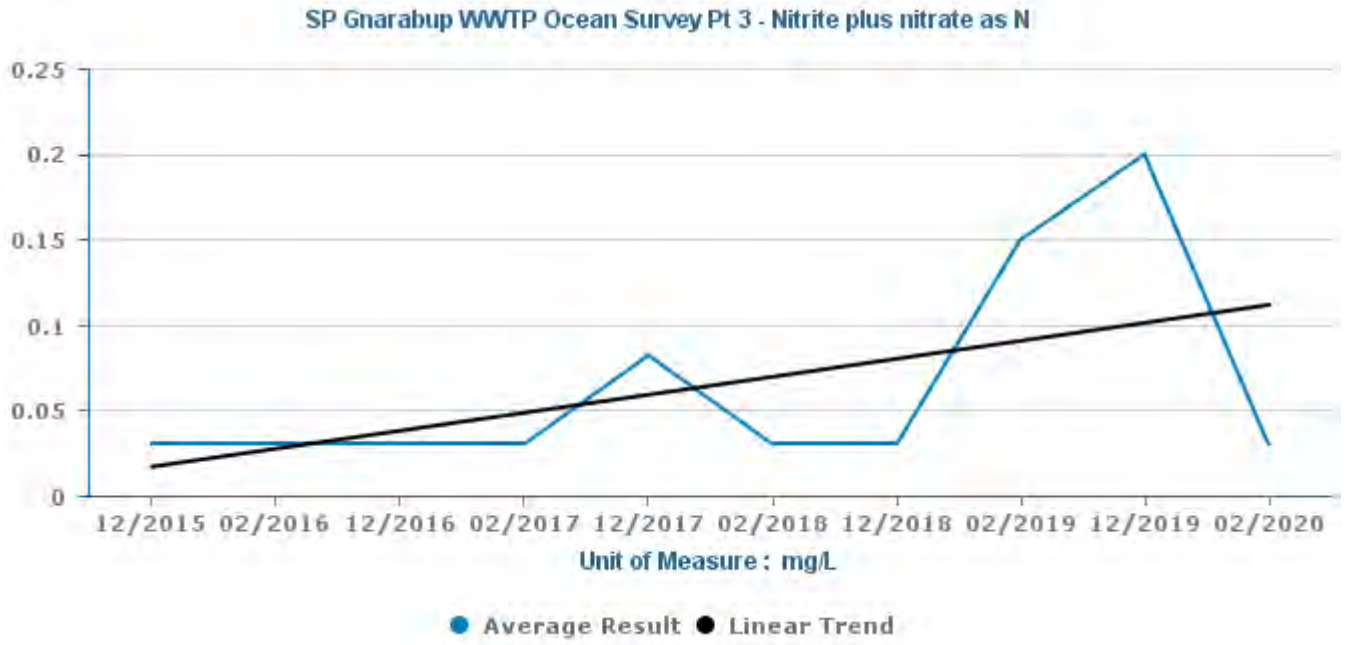

SP Gnarabup WWTP Ocean Survey Pt 3 - Copper
0.025
0.02
0.015
0.01
0.005
0
12/2015 02/2016 12/2016 02/2017 12/2017 02/2018 12/2018 02/2019 12/2019 02/2020
Unit of Measure : mg/L
Average Result
Linear Trend

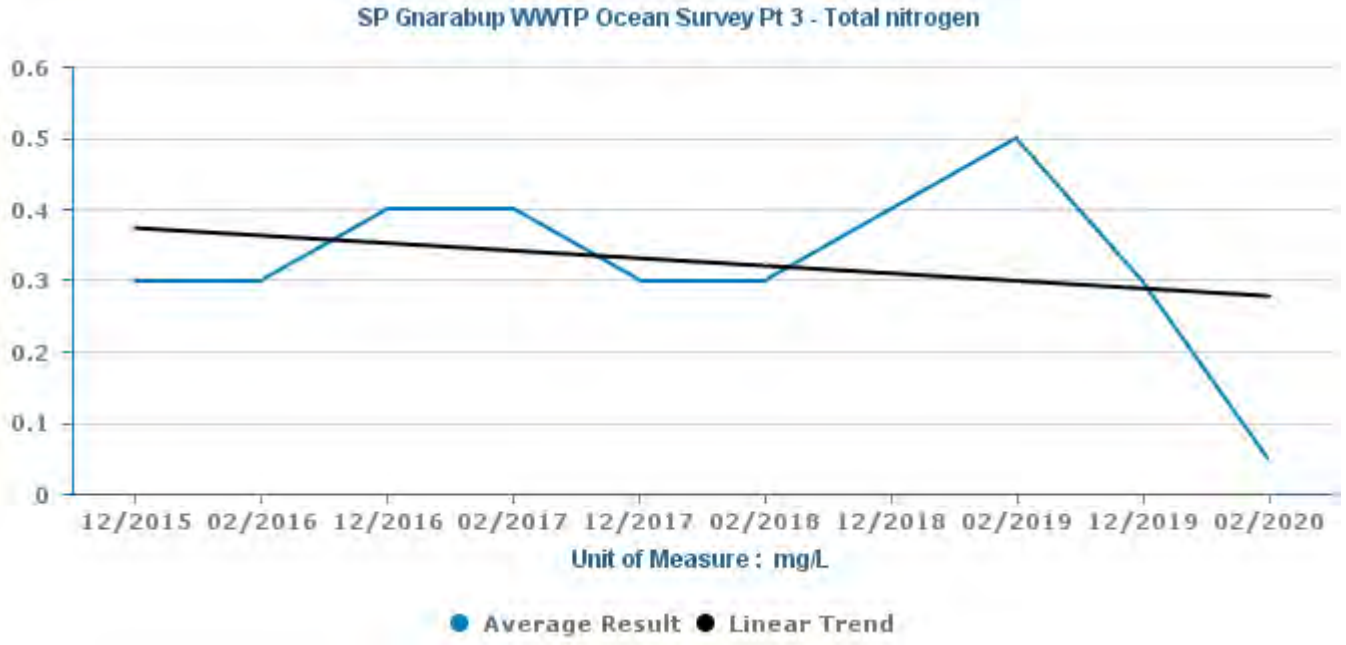

SP Gnarabup WWTP Ocean Survey Pt 3 - Escherichia coli
6
5
4
3
2
1
0
12/2015 02/2016 12/2016 02/2017 12/2017 02/2018 12/2018 02/2019 12/2019 02/2020
Unit of Measure : /100 mL
Average Result
Linear Trend

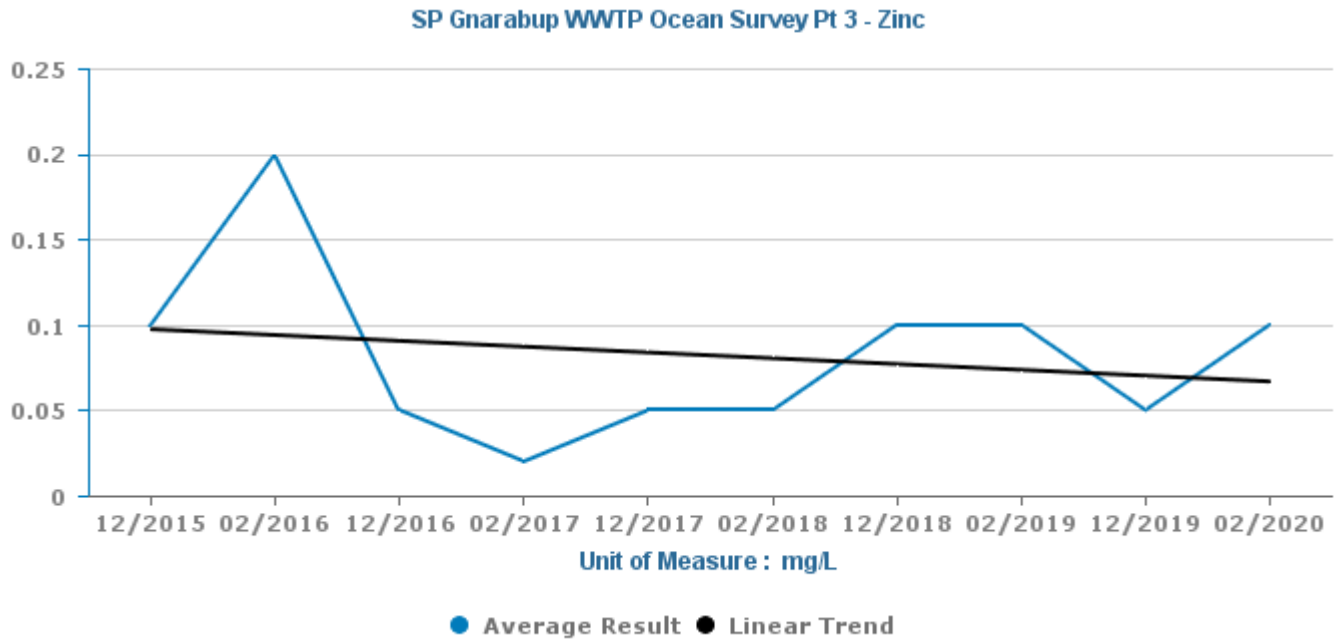

SP Gnarabup WWTP Ocean Survey Pt 3 - Filterable reactive phosphorus
0.025
0.02
0.015
0.01
0.005
0
12/2015 02/2016 12/2016 02/2017 12/2017 02/2018 12/2018 02/2019 12/2019 02/2020
Unit of Measure : mg/L
Average Result
Linear Trend


SP Gnarabup WWTP Ocean Survey Pt 3 - Lead
1.2
1
0.8
0.6
0.4
0.2
0
12/2015 02/2016 12/2016 02/2017 12/2017 02/2018 12/2018 02/2019 12/2019 02/2020
Unit of Measure : mg/L
Average Result
Linear Trend

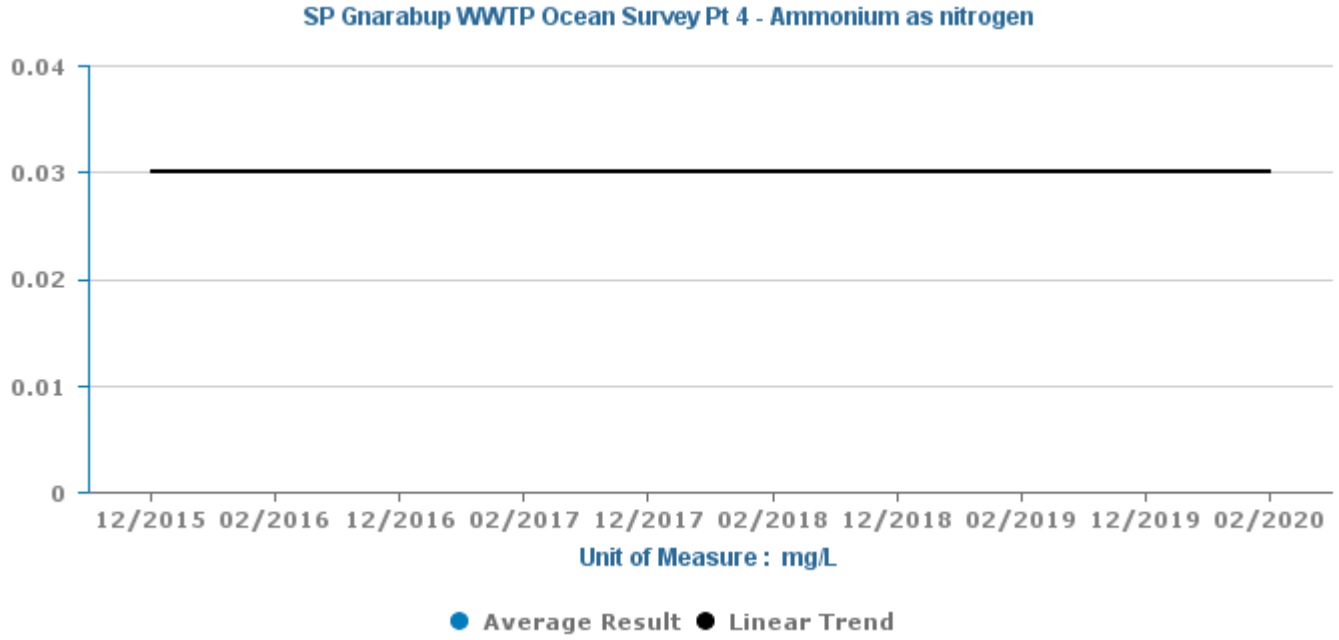

SP Gnarabup WWTP Ocean Survey Pt 3 - Mercury
100
80
60
40
20
0
12/2015 02/2016 12/2016 02/2017 12/2017 02/2018 12/2018 02/2019 12/2019 02/2020
Unit of Measure : mg/L
Average Result
Linear Trend

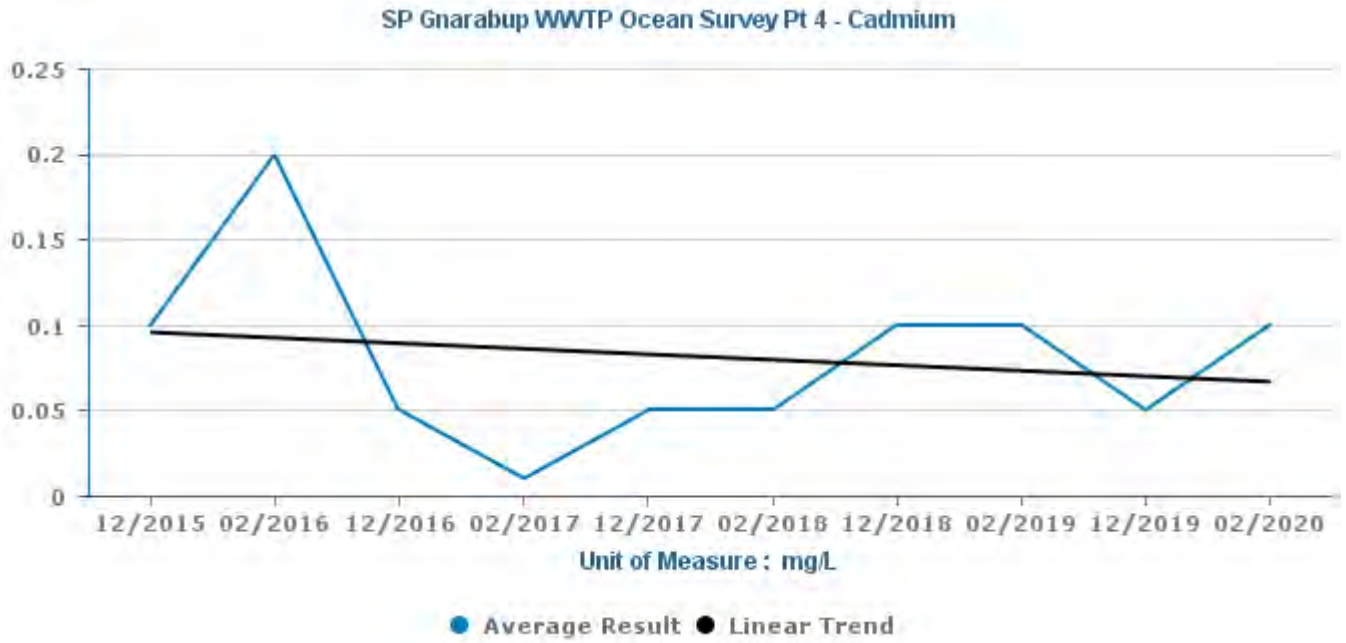

SP Gnarabup WWTP Ocean Survey Pt 3 - Nitrite plus nitrate as N
0.25
0.2
0.15
0.1
0.05
0
12/2015 02/2016 12/2016 02/2017 12/2017 02/2018 12/2018 02/2019 12/2019 02/2020
Unit of Measure : mg/L
Average Result
Linear Trend

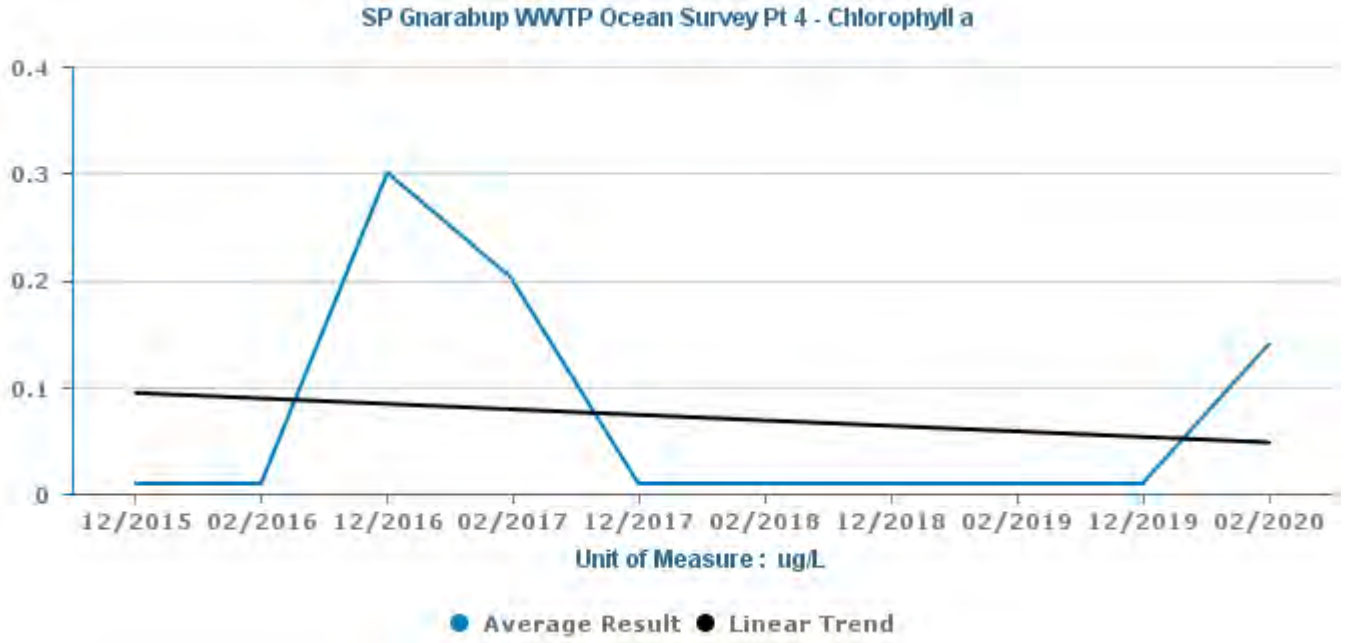

SP Gnarabup WWTP Ocean Survey Pt 3 - Total nitrogen
0.6
0.5
0.4
0.3
0.2
0.1
0
12/2015 02/2016 12/2016 02/2017 12/2017 02/2018 12/2018 02/2019 12/2019 02/2020
Unit of Measure : mg/L
Average Result
Linear Trend

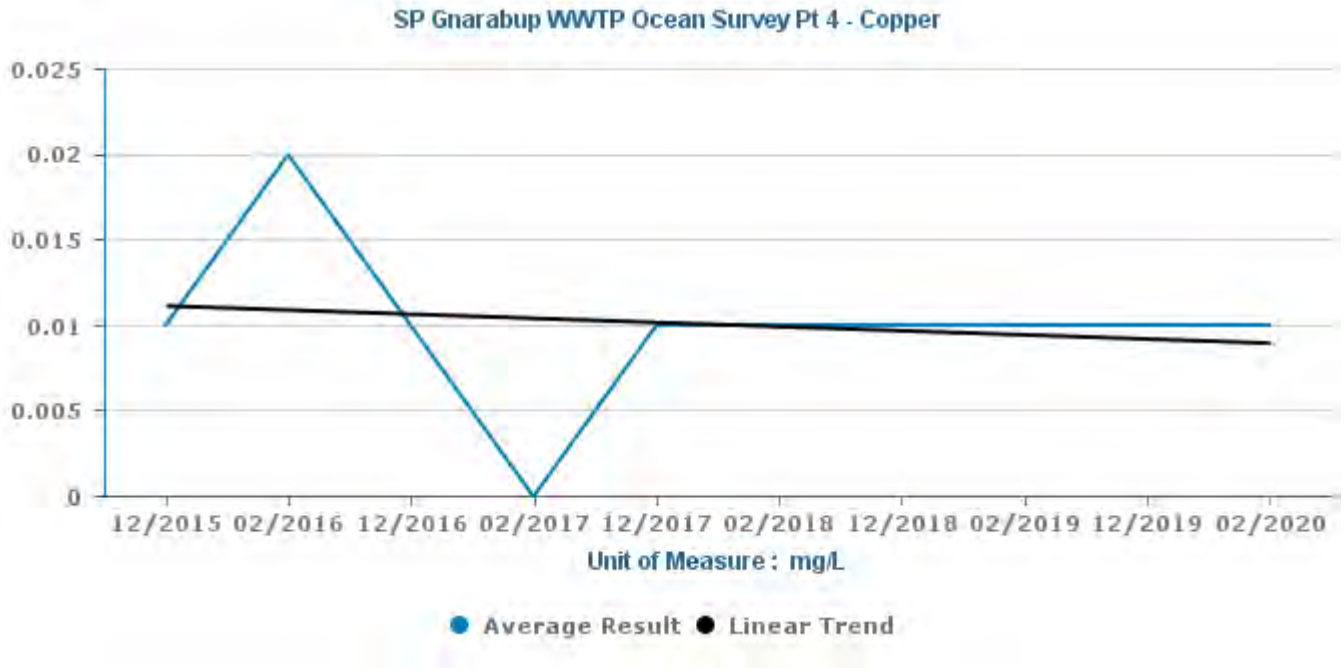


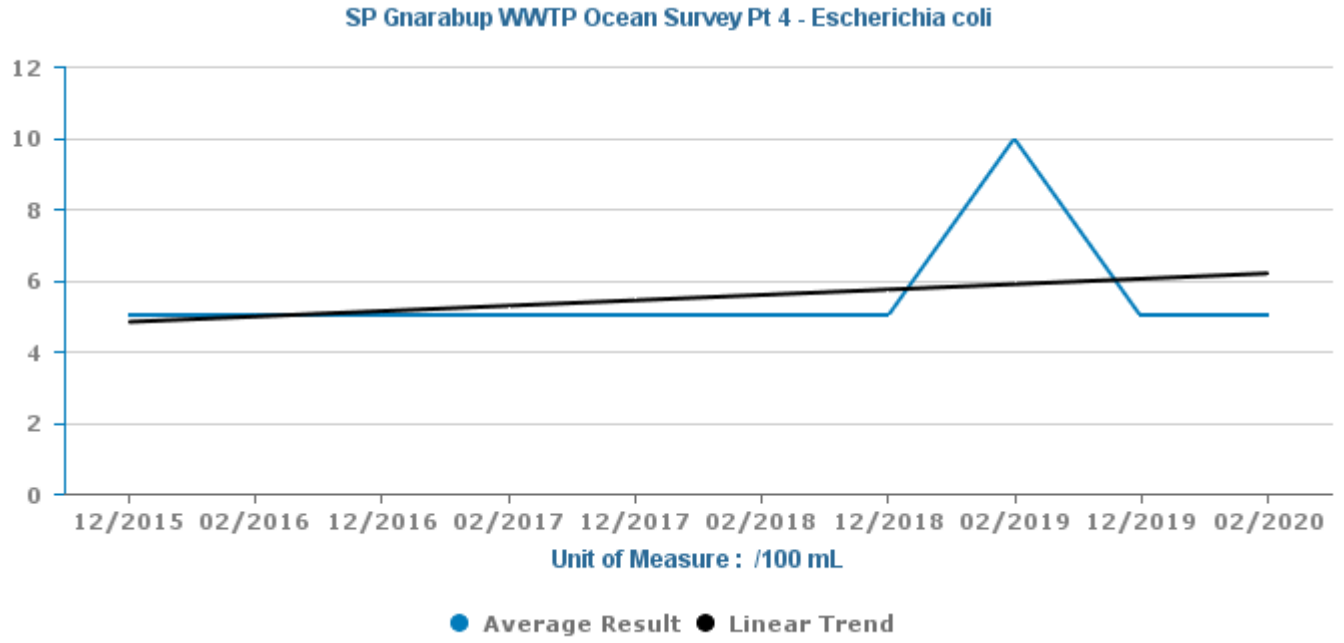
SP Gnarabup WWTP Ocean Survey Pt 4

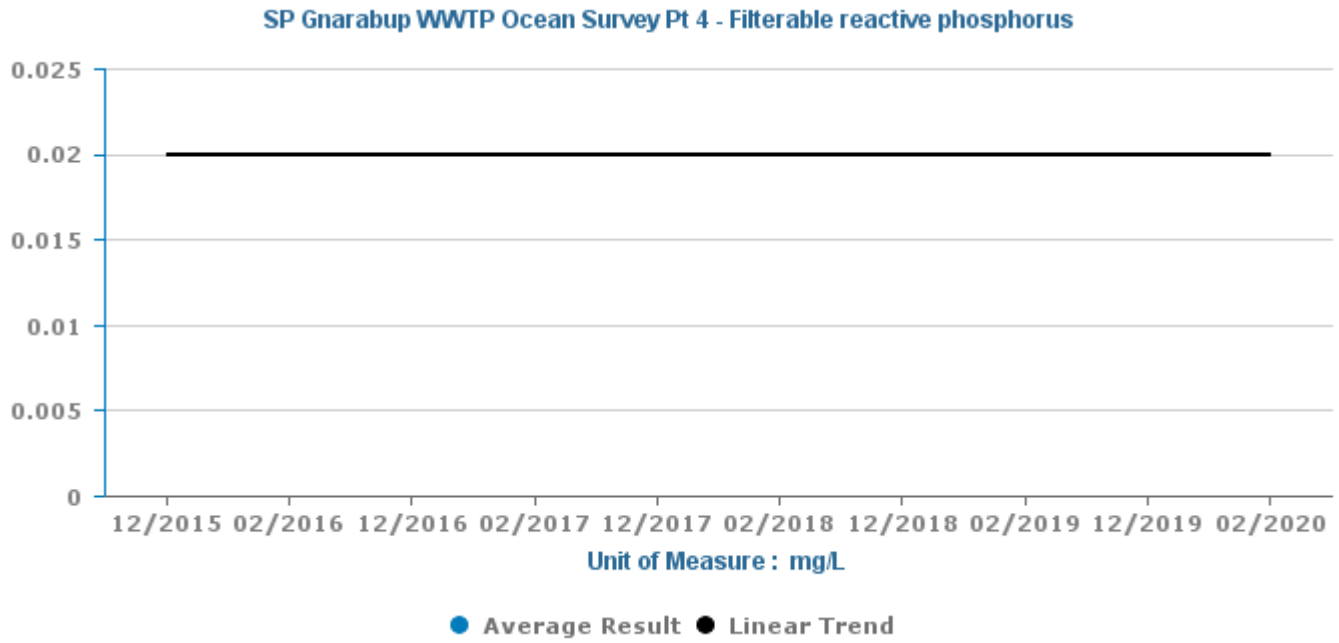


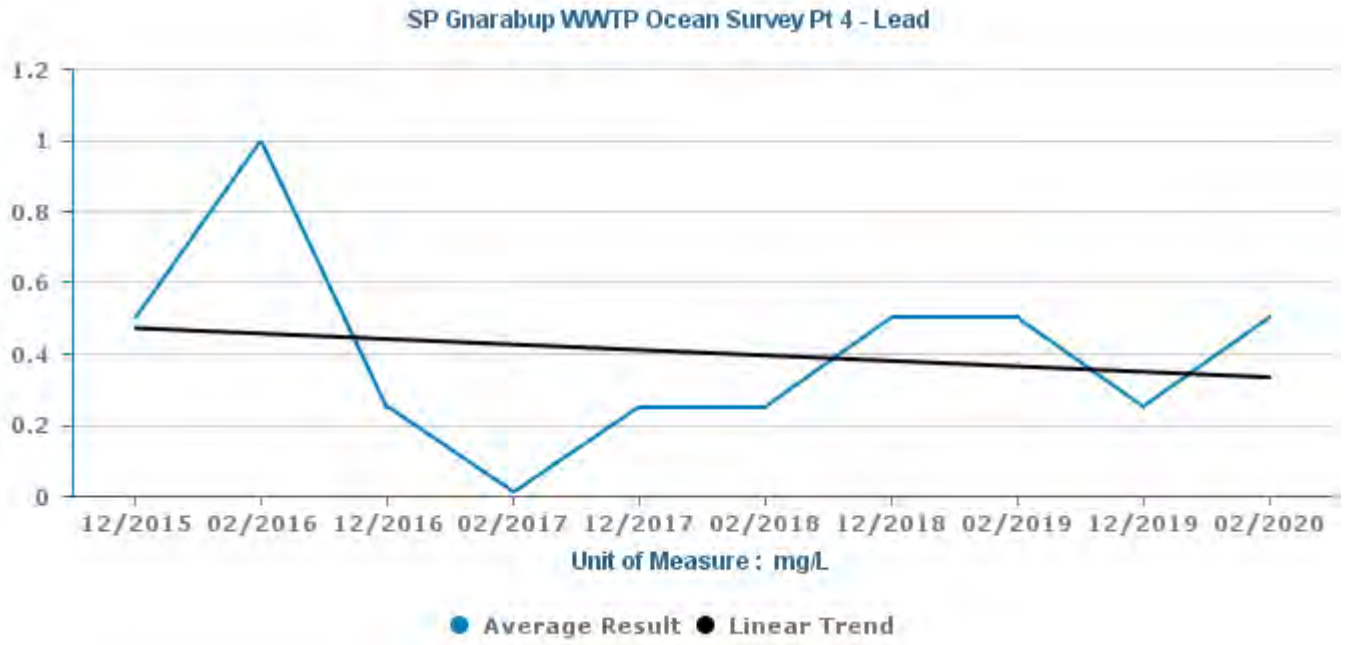

SP Gnarabup WWTP Ocean Survey Pt 4 - Cadmium
0.25
0.2
0.15
0.1
0.05
0
12/2015 02/2016 12/2016 02/2017 12/2017 02/2018 12/2018 02/2019 12/2019 02/2020
Unit of Measure : mg/L
Average Result
Linear Trend

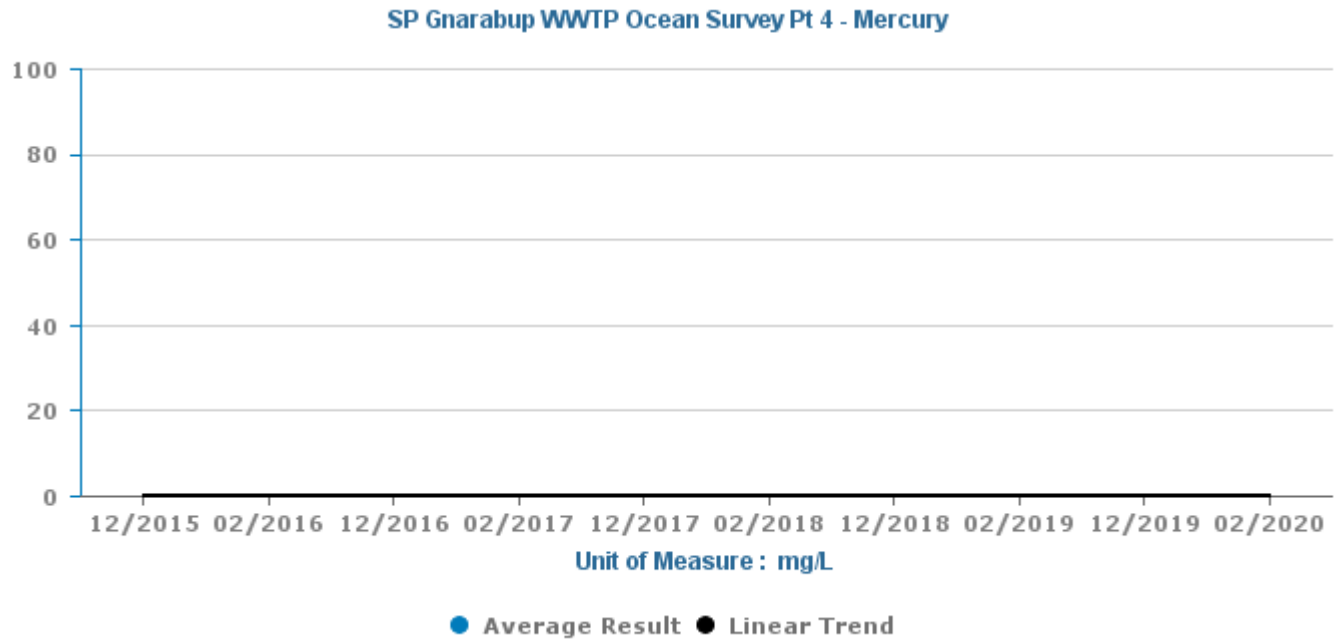

SP Gnarabup WWTP Ocean Survey Pt 4 - Chlorophyll a
0.4
0.3
0.2
0.1
0
12/2015 02/2016 12/2016 02/2017 12/2017 02/2018 12/2018 02/2019 12/2019 02/2020
Unit of Measure : ug/L
Average Result
Linear Trend

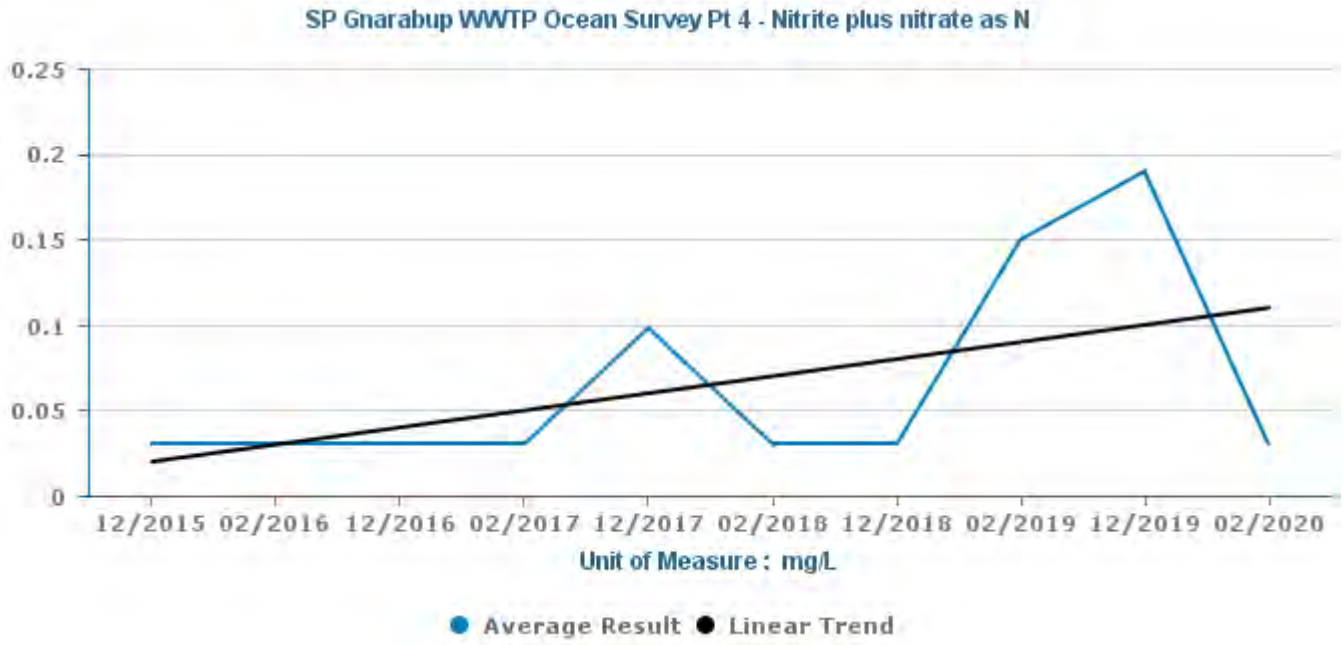

SP Gnarabup WWTP Ocean Survey Pt 4 - Copper
0.025
0.02
0.015
0.01
0.005
0
12/2015 02/2016 12/2016 02/2017 12/2017 02/2018 12/2018 02/2019 12/2019 02/2020
Unit of Measure : mg/L
Average Result
Linear Trend

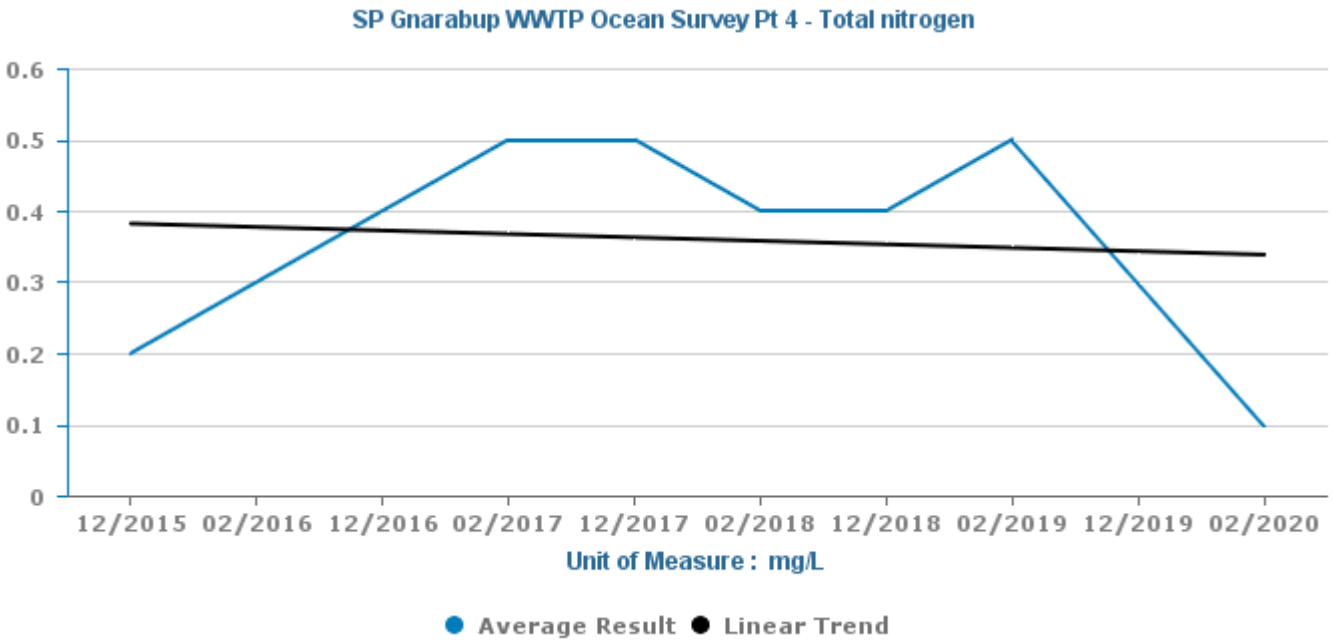

SP Gnarabup WWTP Ocean Survey Pt 4 - Escherichia coli
12
10
8
6
4
2
0
12/2015 02/2016 12/2016 02/2017 12/2017 02/2018 12/2018 02/2019 12/2019 02/2020
Unit of Measure : /100 mL
Average Result
Linear Trend

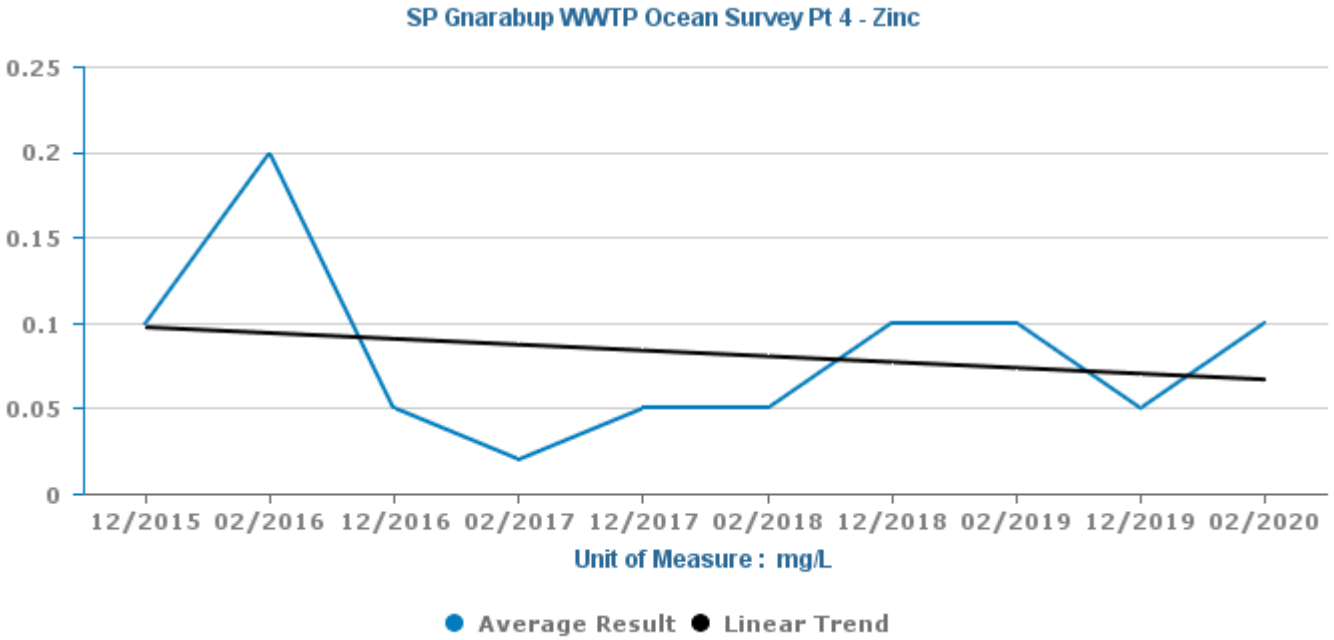

SP Gnarabup WWTP Ocean Survey Pt 4 - Filterable reactive phosphorus
0.025
0.02
0.015
0.01
0.005
0
12/2015 02/2016 12/2016 02/2017 12/2017 02/2018 12/2018 02/2019 12/2019 02/2020
Unit of Measure : mg/L
Average Result
Linear Trend


SP Gnarabup WWTP Ocean Survey Pt 4 - Lead
1.2
1
0.8
0.6
0.4
0.2
0
12/2015 02/2016 12/2016 02/2017 12/2017 02/2018 12/2018 02/2019 12/2019 02/2020
Unit of Measure : mg/L
Average Result
Linear Trend


SP Gnarabup WWTP Ocean Survey Pt 4 - Mercury
100
80
60
40
20
0
12/2015 02/2016 12/2016 02/2017 12/2017 02/2018 12/2018 02/2019 12/2019 02/2020
Unit of Measure : mg/L
Average Result
Linear Trend


SP Gnarabup WWTP Ocean Survey Pt 4 - Nitrite plus nitrate as N
0.25
0.2
0.15
0.1
0.05
0
12/2015 02/2016 12/2016 02/2017 12/2017 02/2018 12/2018 02/2019 12/2019 02/2020
Unit of Measure : mg/L
Average Result
Linear Trend


SP Gnarabup WWTP Ocean Survey Pt 4 - Total nitrogen
0.6
0.5
0.4
0.3
0.2
0.1
0
12/2015 02/2016 12/2016 02/2017 12/2017 02/2018 12/2018 02/2019 12/2019 02/2020
Unit of Measure : mg/L
Average Result
Linear Trend


SP Gnarabup WWTP Ocean Survey Pt 4 - Zinc
0.25
0.2
0.15
0.1
0.05
0
12/2015 02/2016 12/2016 02/2017 12/2017 02/2018 12/2018 02/2019 12/2019 02/2020
Unit of Measure : mg/L
Average Result
Linear Trend

Appendix 4: Groundwater Monitoring Data (Tables)

SP Gnarabup WWTP Bore 2/17

	Ammonium as nitrogen mg/L	Escherichia coli /100 mL	Nitrite plus nitrate as N mg/L	pH measured in laboratory NOUNIT	Total dissolved solids by evaporation mg/L	Total nitrogen mg/L	Total phosphorus mg/L
July 2019	<0.05	<10	6.0	8.11	480	6.5	3.6
October 2019	2.8	<10	8.1	8.10	530	11	2.6
January 2020	0.075	<10	5.4	8.11	560	6.2	3.6
April 2020	<0.05	<10	8.2	7.95	710	9.1	3.7

Notes: WWTP Bore 2/17, 3/17 and 4/17 have replaced long-term dry bores 1/99 and 2/99

SP Gnarabup WWTP Bore 3/17

	Ammonium as nitrogen mg/L	Escherichia coli /100 mL	Nitrite plus nitrate as N mg/L	pH measured in laboratory NOUNIT	Total dissolved solids by evaporation mg/L	Total nitrogen mg/L	Total phosphorus mg/L
July 2019	<0.05	<10	0.85	7.82	31740	1.0	0.063
October 2019	0.060	<10	4.4	7.85	22230	4.5	<0.05
January 2020	0.055	<10	6.1	7.88	16740	6.2	<0.05
April 2020	<0.05	10	2.3	7.77	28860	2.5	<0.05

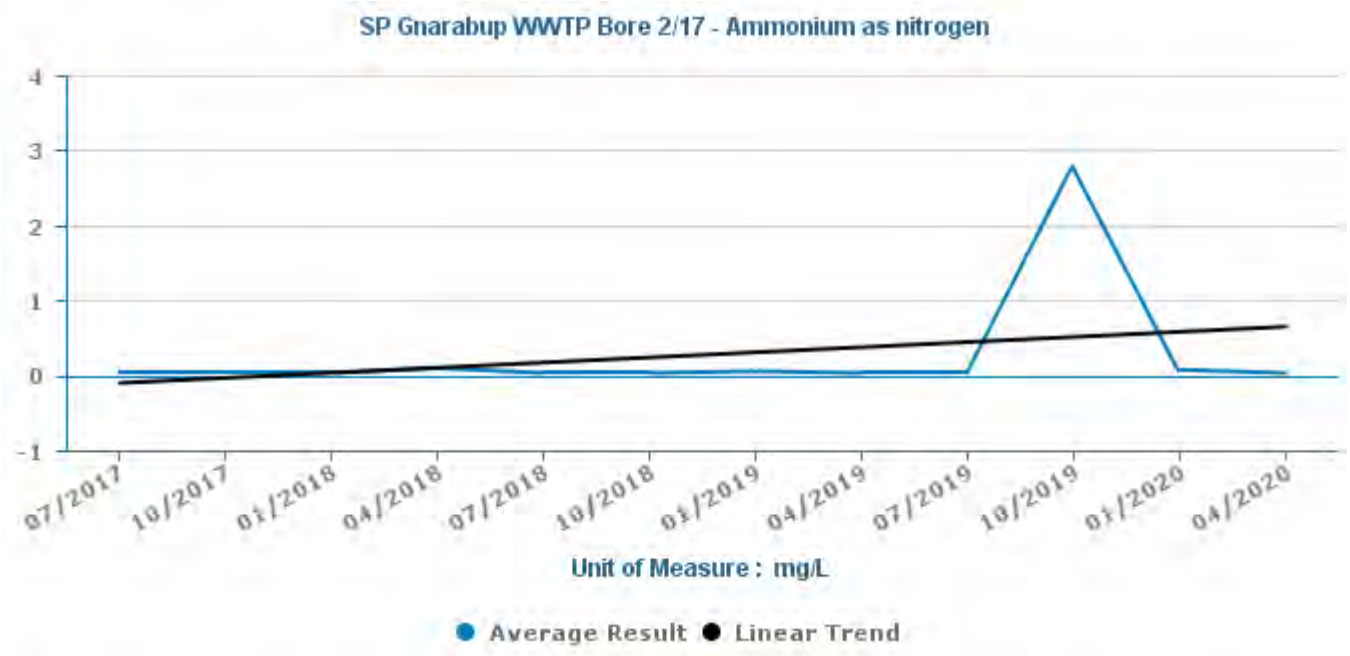
Gnarabup WWTP Bore 4/17

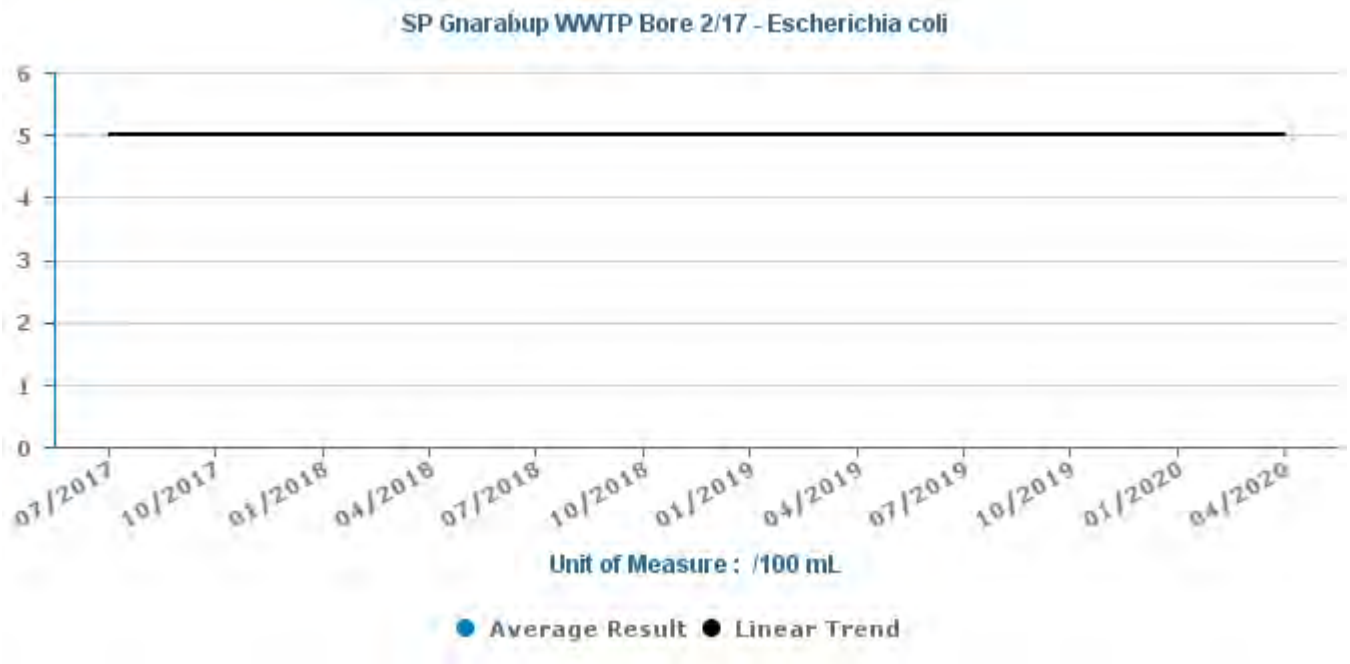
	Ammonium as nitrogen	Escherichia coli	Nitrite plus nitrate as N	pH measured in laboratory	Total dissolved solids by evaporation	Total nitrogen	Total phosphorus
	mg/L	/100 mL	mg/L	NOUNIT	mg/L	mg/L	mg/L
July 2019	0.065	<10	2.9	7.93	1140	4.0	1.8
October 2019	0.060	<10	2.9	8.03	1170	3.1	0.25
January 2020	<0.05	<10	3.2	8.01	1270	4.0	0.12
April 2020	<0.05	<10	3.2	7.94	1160	3.5	0.58

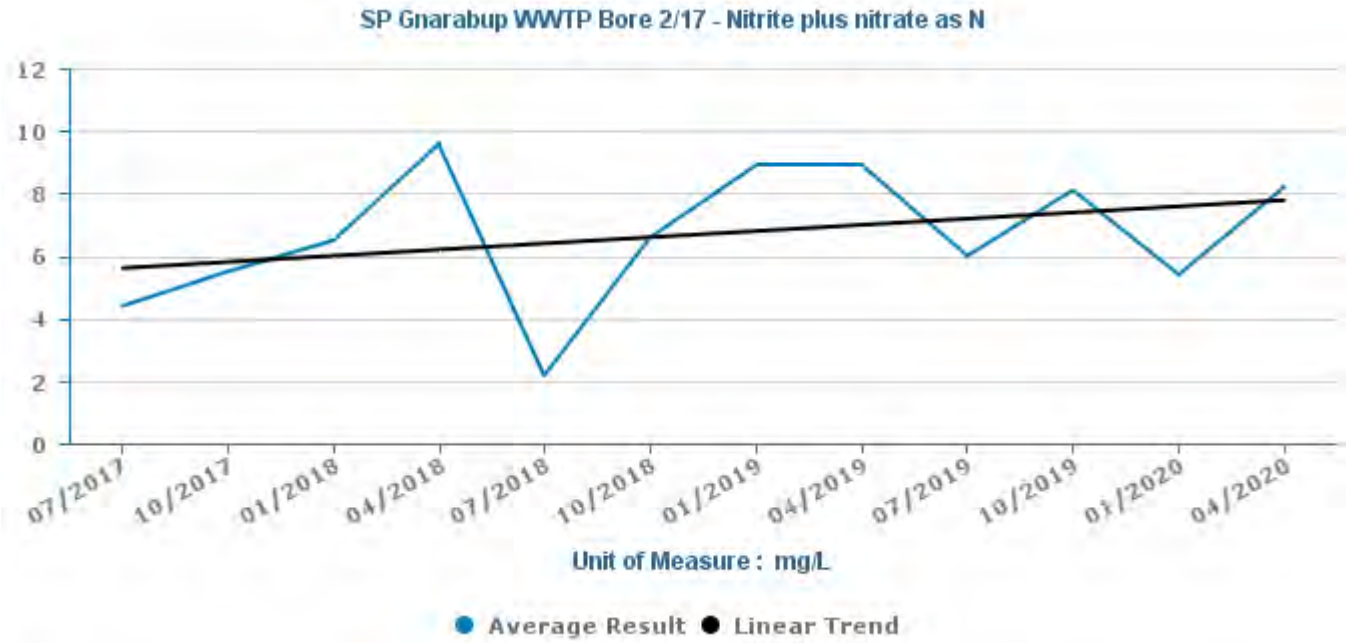
Notes: WWTP Bore 2/17, 3/17 and 4/17 have replaced long-term dry bores 1/99 and 2/99

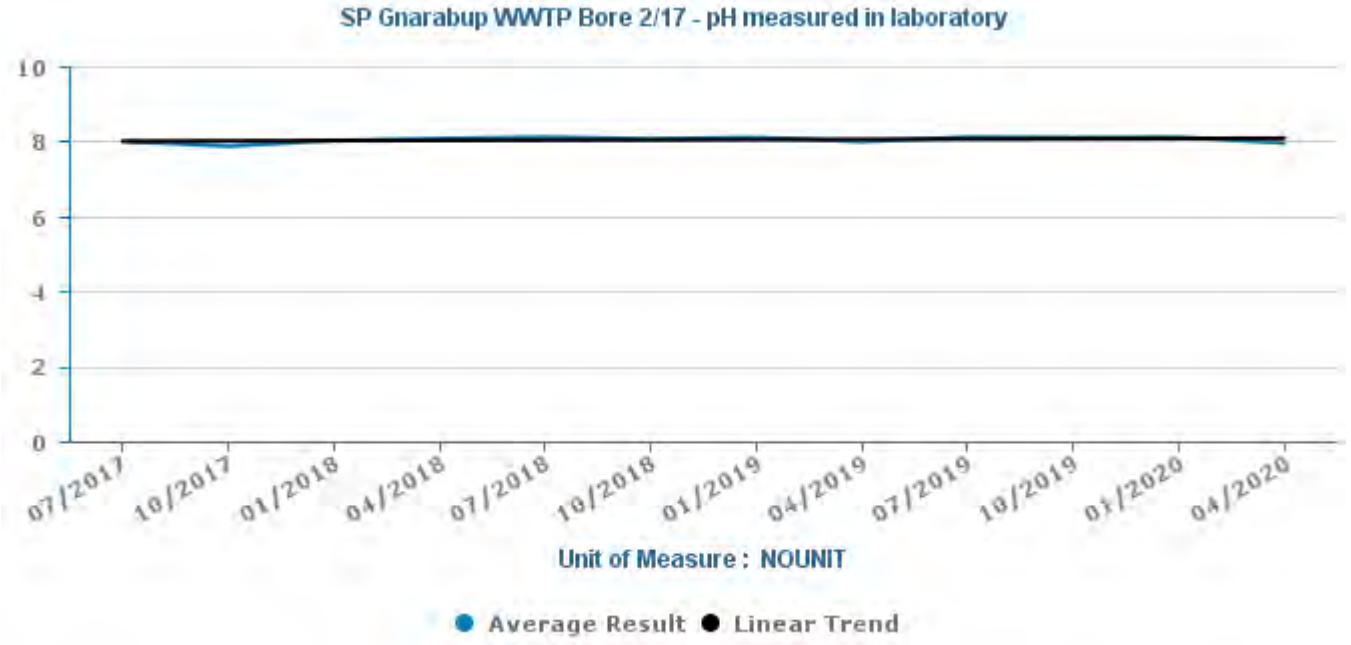
Appendix 5: Groundwater Monitoring Data (Trend Graphs)

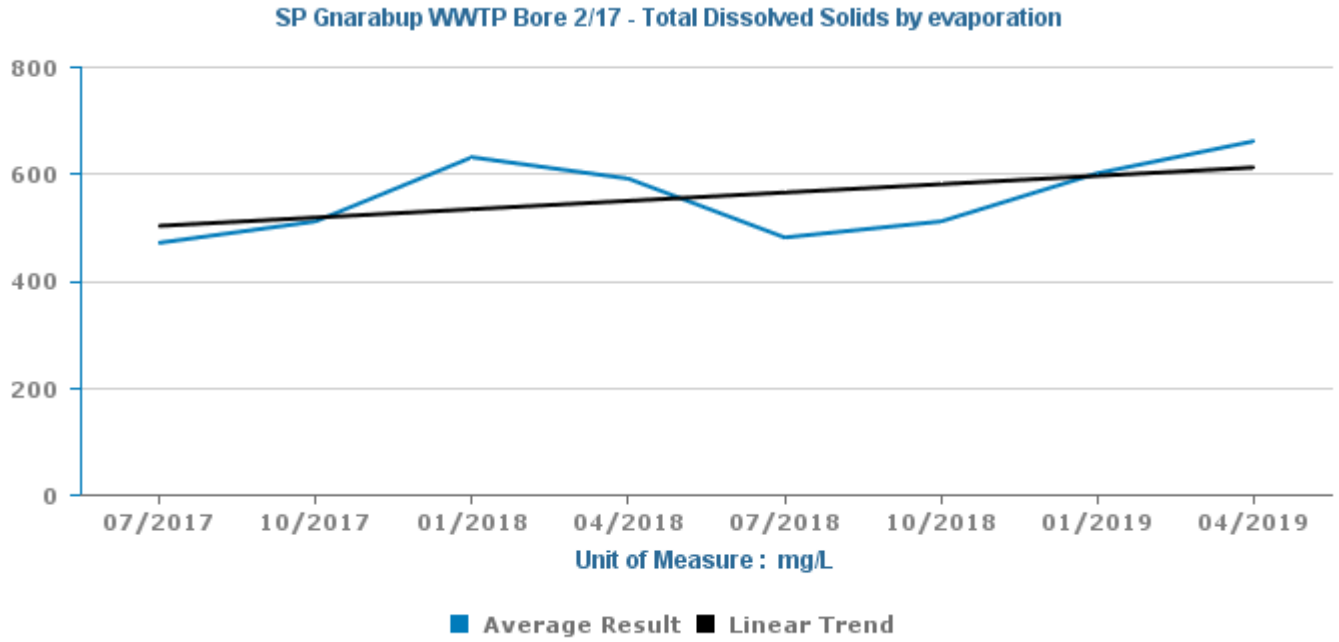
SP Gnarabup WWTP Bore 2/17

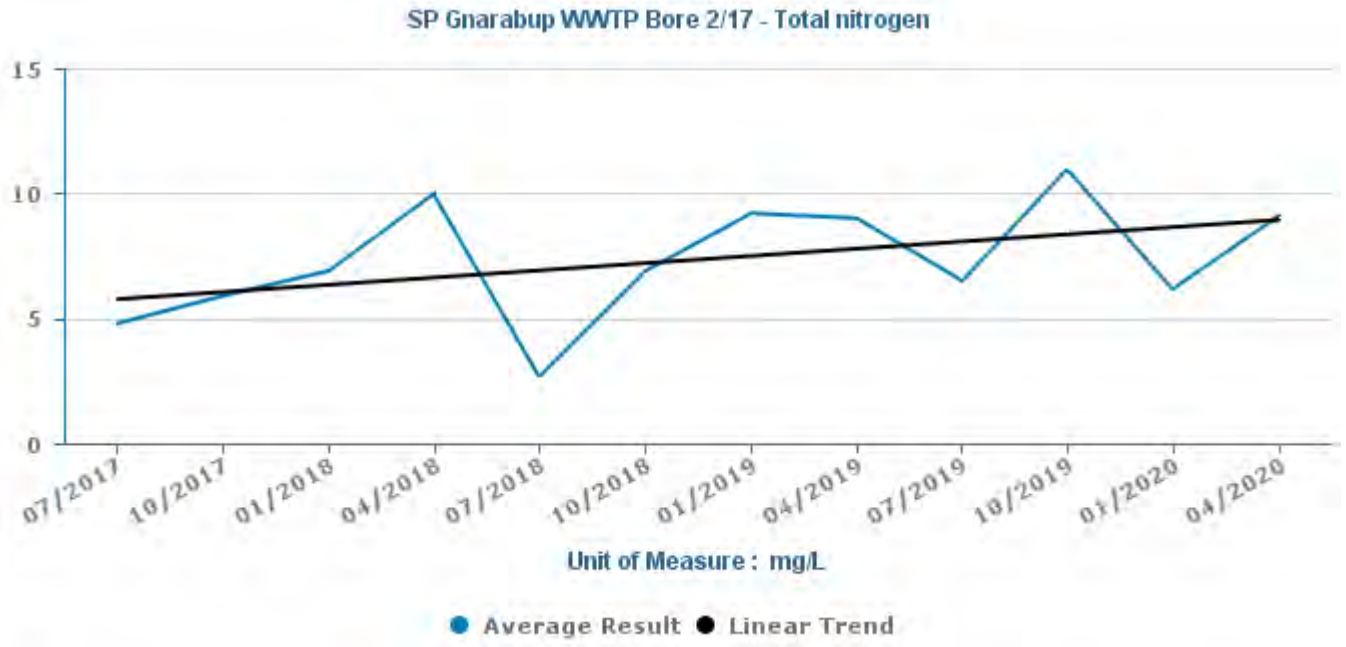


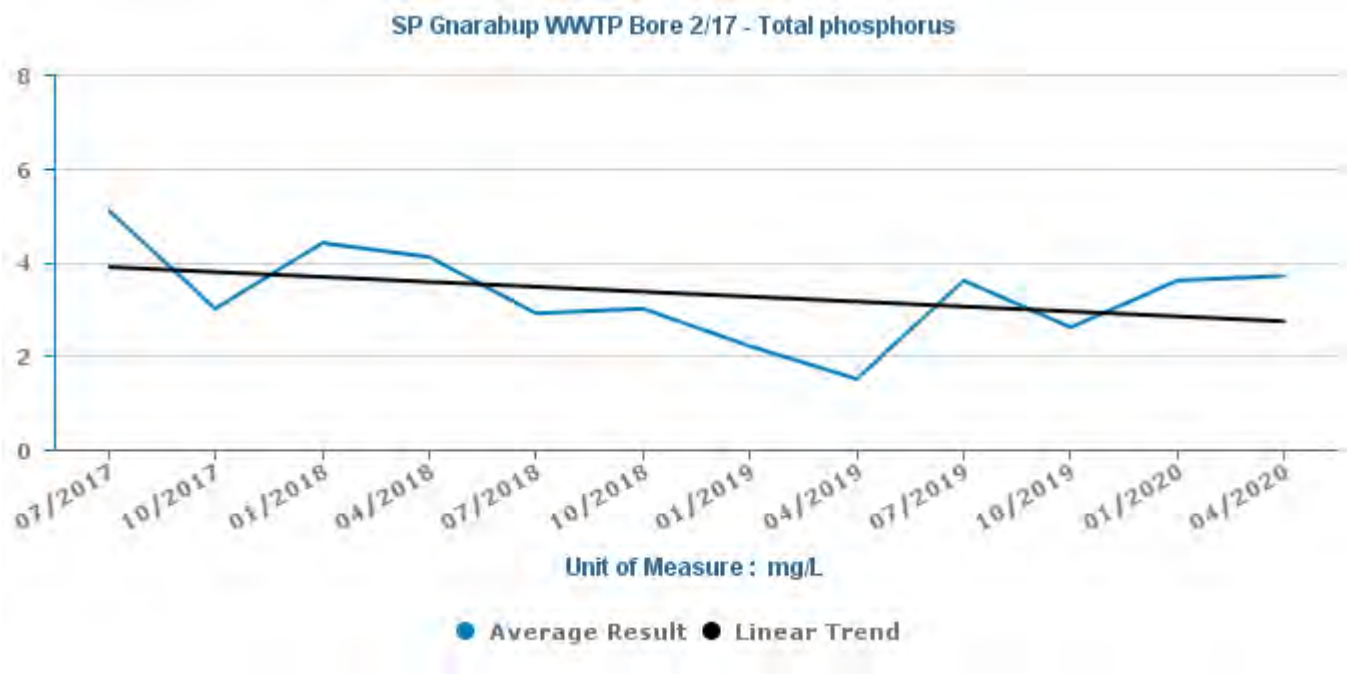



SP Gnarabup WWTP Bore 2/17 - Nitrite plus nitrate as N
12
10
8
6
4
2
0
07/2017
10/2017
01/2018
04/2018
07/2018
10/2018
01/2019
04/2019
07/2019
10/2019
01/2020
04/2020
Unit of Measure : mg/L
Average Result
Linear Trend

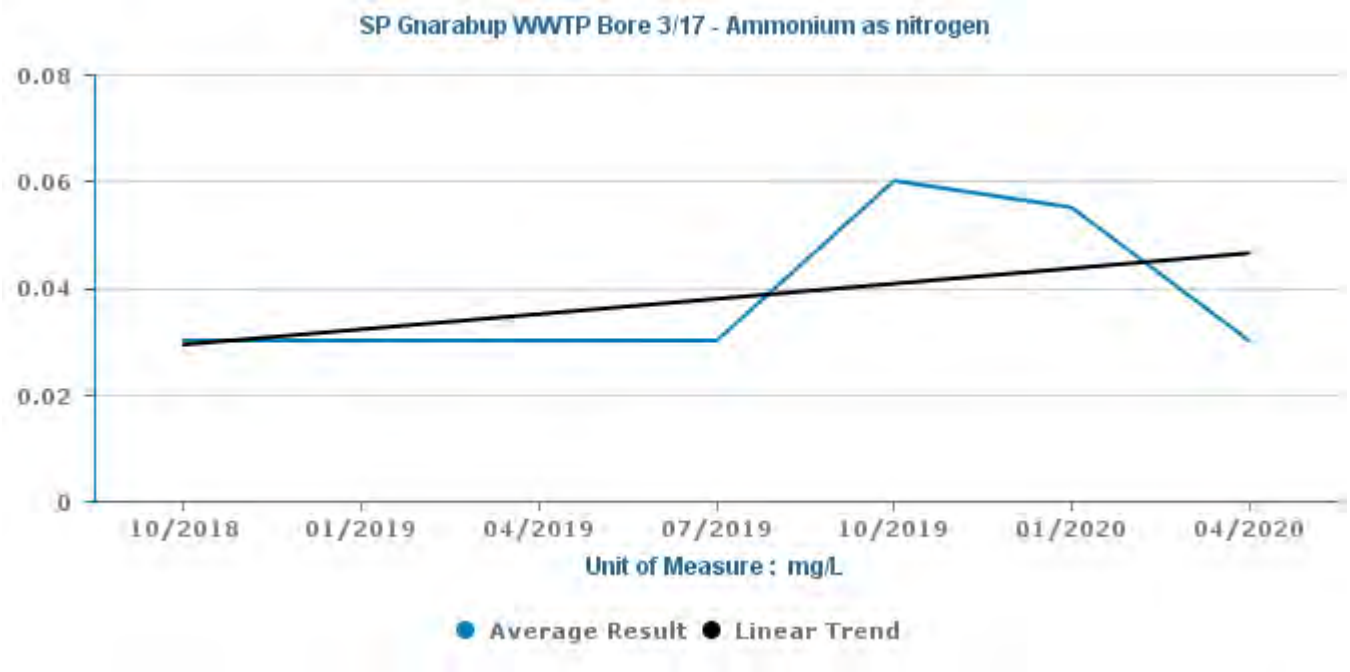

SP Gnarabup WWTP Bore 2/17 - pH measured in laboratory
10
8
6
4
2
0
07/2017
10/2017
01/2018
04/2018
07/2018
10/2018
01/2019
04/2019
07/2019
10/2019
01/2020
04/2020
Unit of Measure : NOUNIT
Average Result
Linear Trend

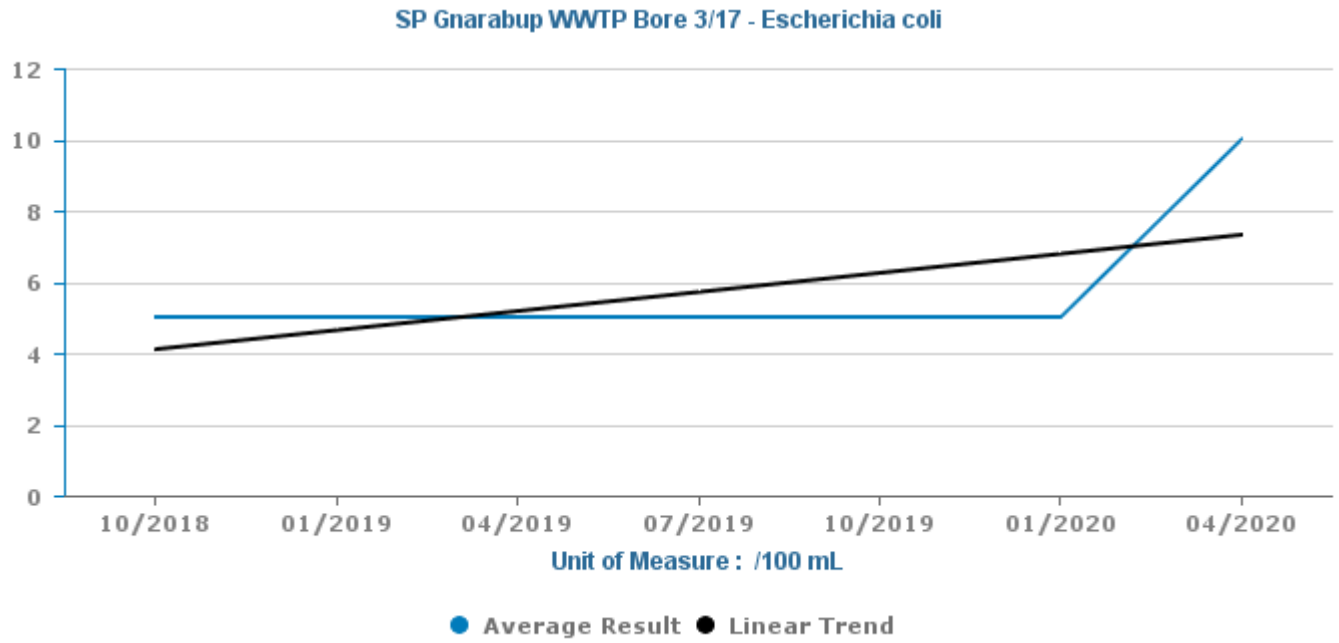

SP Gnarabup WWTP Bore 2/17 - Total Dissolved Solids by evaporation
800
600
400
200
0
07/2017
10/2017
01/2018
04/2018
07/2018
10/2018
01/2019
04/2019
Unit of Measure : mg/L
Average Result
Linear Trend

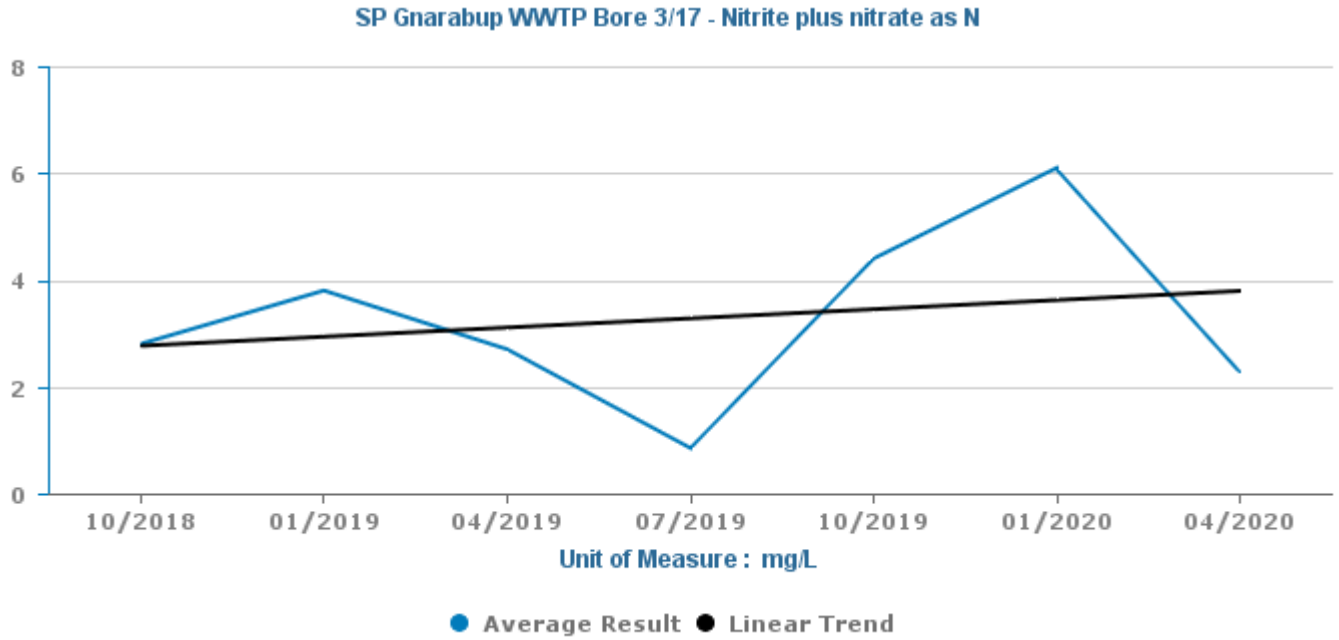

SP Gnarabup WWTP Bore 2/17 - Total nitrogen
15
10
5
0
07/2017
10/2017
01/2018
04/2018
07/2018
10/2018
01/2019
04/2019
07/2019
10/2019
01/2020
04/2020
Unit of Measure : mg/L
Average Result
Linear Trend

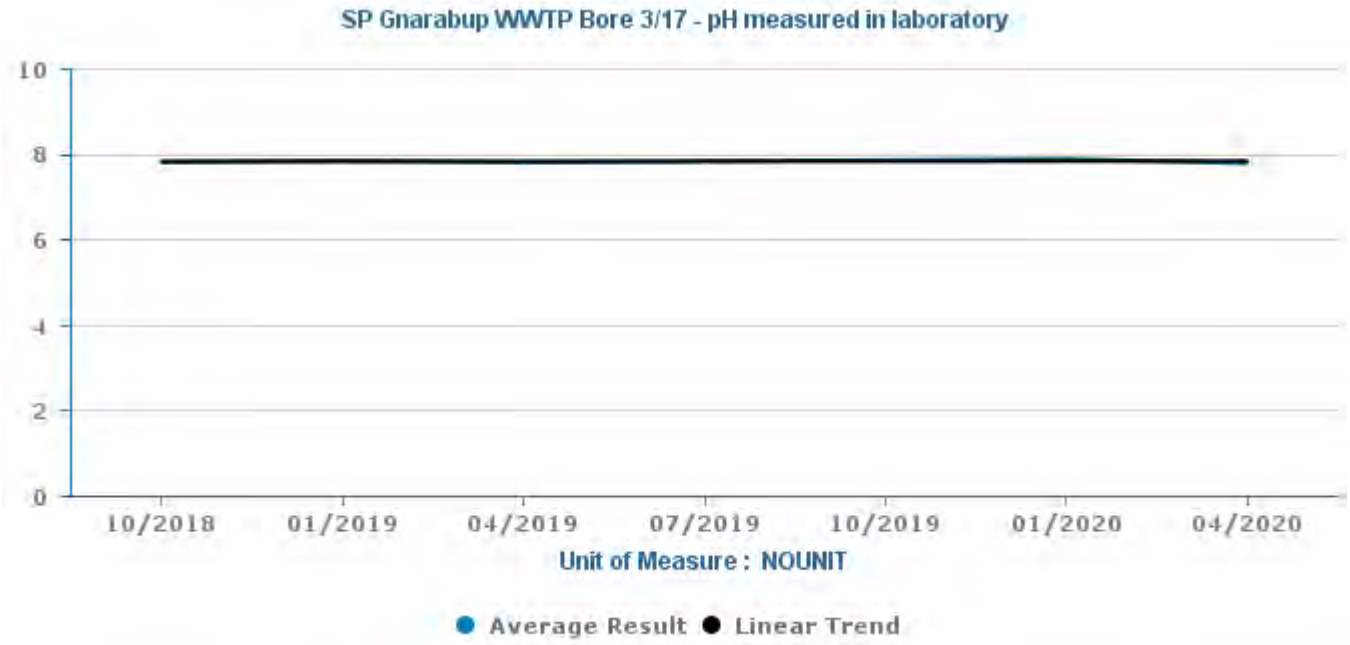


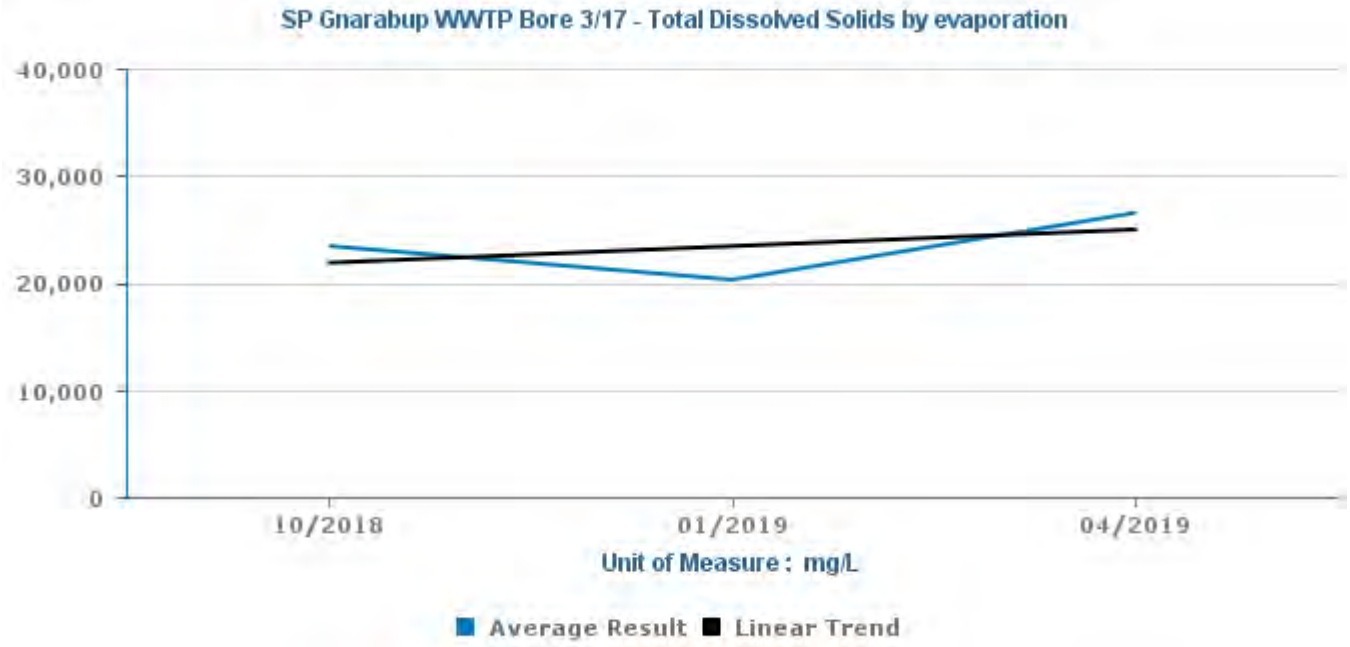
SP Gnarabup WWTP Bore 3/17

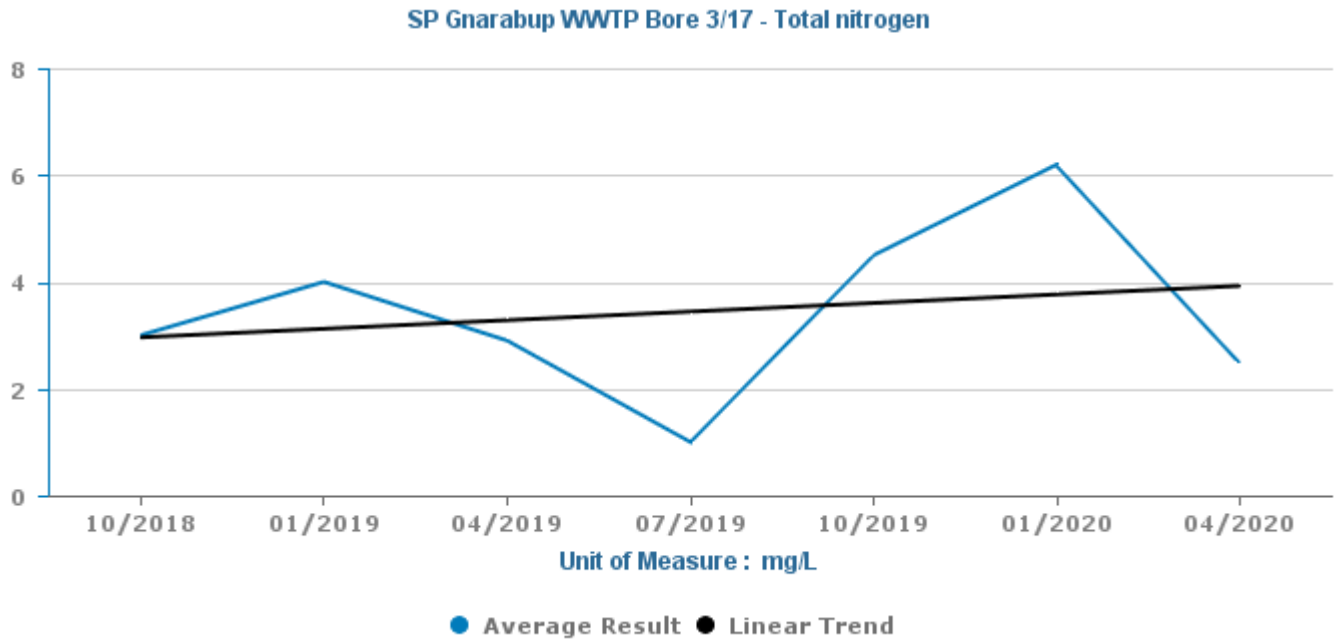


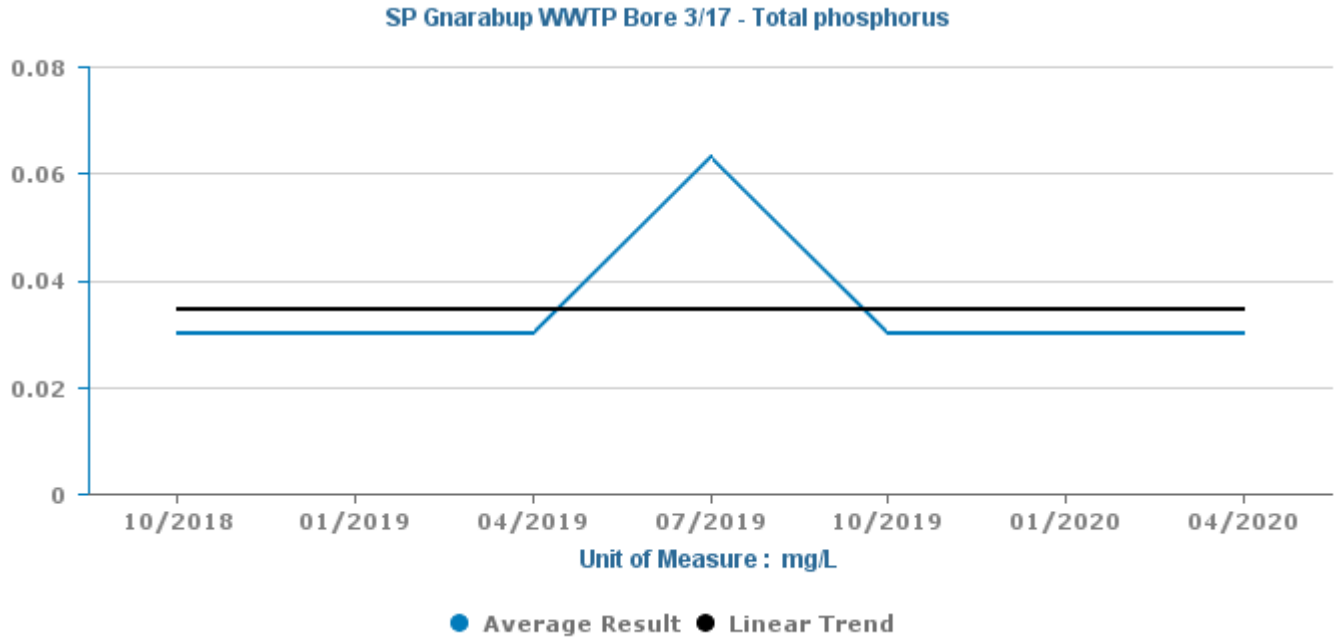

SP Gnarabup WWTP Bore 3/17 - Escherichia coli
12
10
8
6
4
2
0
10/2018
01/2019
04/2019
07/2019
10/2019
01/2020
04/2020
Unit of Measure : /100 mL
Average Result
Linear Trend


SP Gnarabup WWTP Bore 3/17 - Nitrite plus nitrate as N
8
6
4
2
0
10/2018
01/2019
04/2019
07/2019
10/2019
01/2020
04/2020
Unit of Measure : mg/L
Average Result
Linear Trend

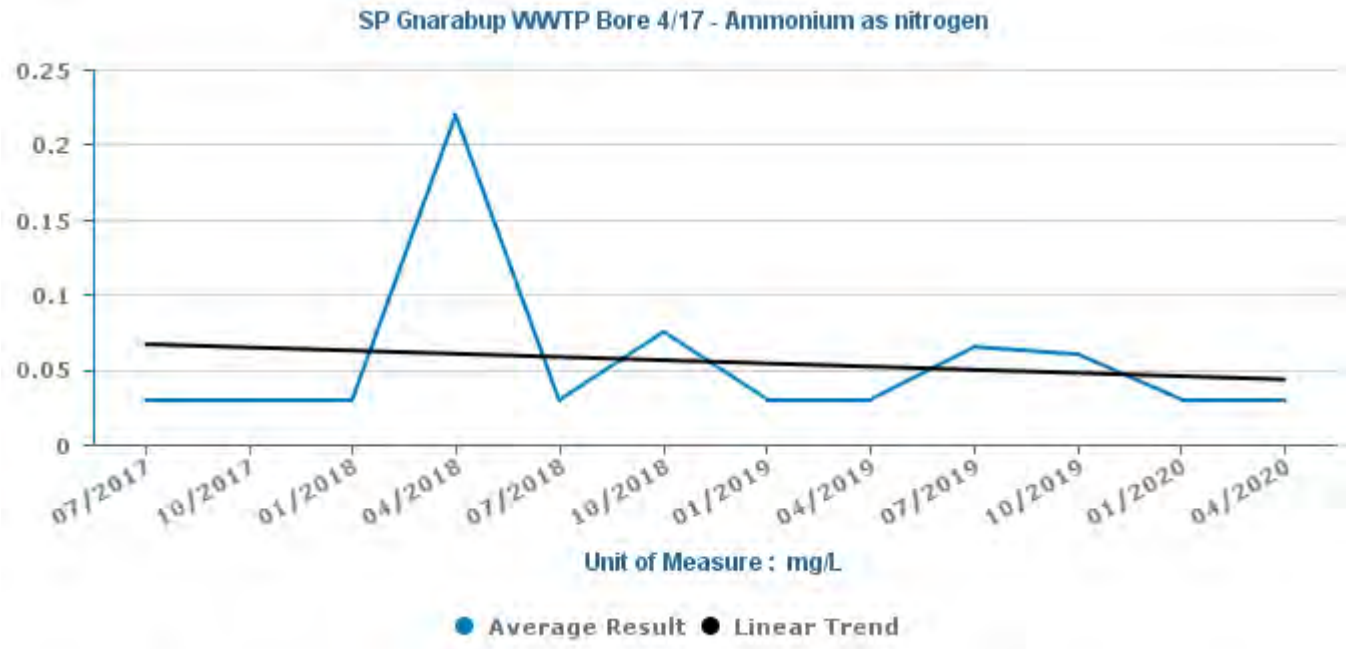

SP Gnarabup WWTP Bore 3/17 - pH measured in laboratory
10
8
6
4
2
0
10/2018
01/2019
04/2019
07/2019
10/2019
01/2020
04/2020
Unit of Measure : NOUNIT
Average Result
Linear Trend

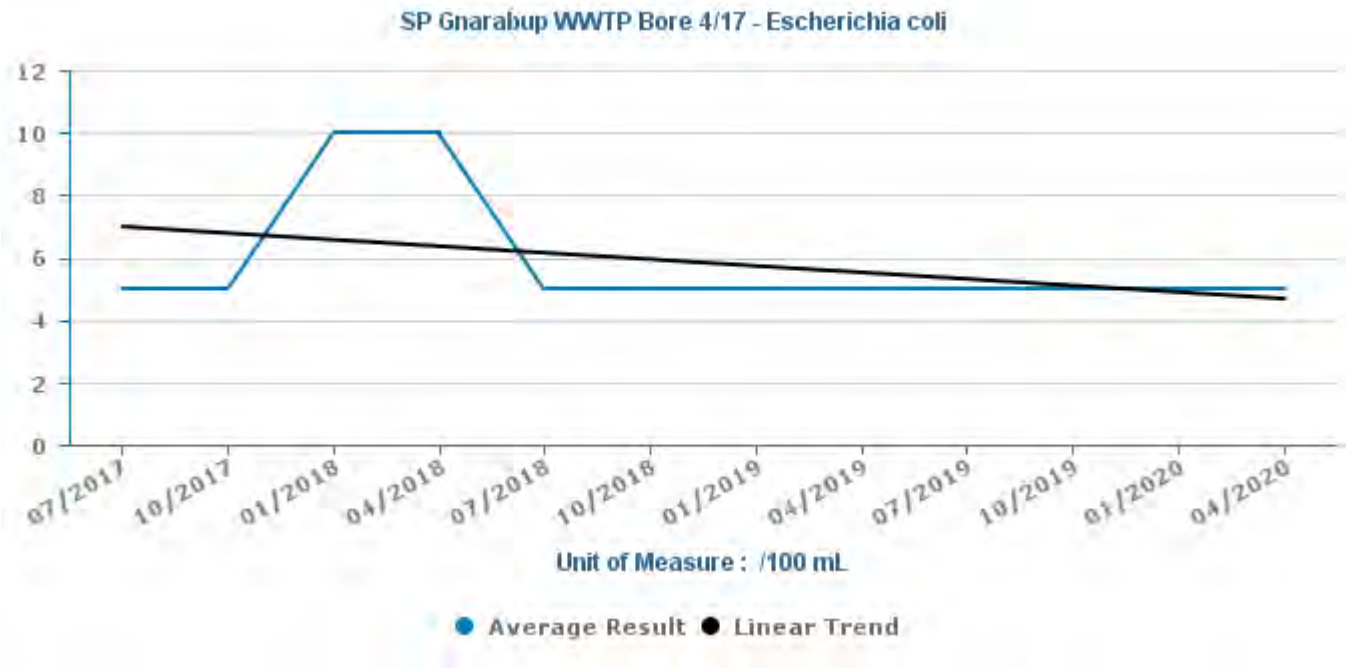

SP Gnarabup WWTP Bore 3/17 - Total Dissolved Solids by evaporation
40,000
30,000
20,000
10,000
0
10/2018
01/2019
04/2019
Unit of Measure : mg/L
Average Result
Linear Trend

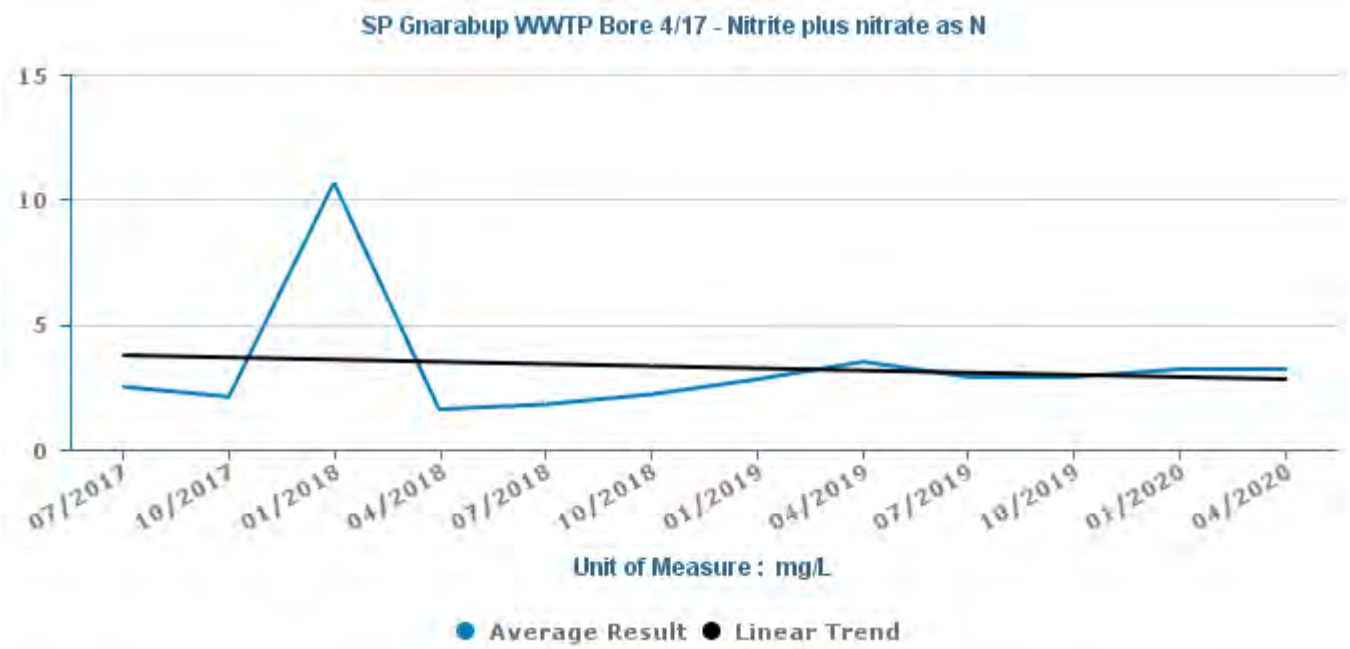

SP Gnarabup WWTP Bore 3/17 - Total nitrogen
8
6
4
2
0
10/2018
01/2019
04/2019
07/2019
10/2019
01/2020
04/2020
Unit of Measure : mg/L
Average Result
Linear Trend

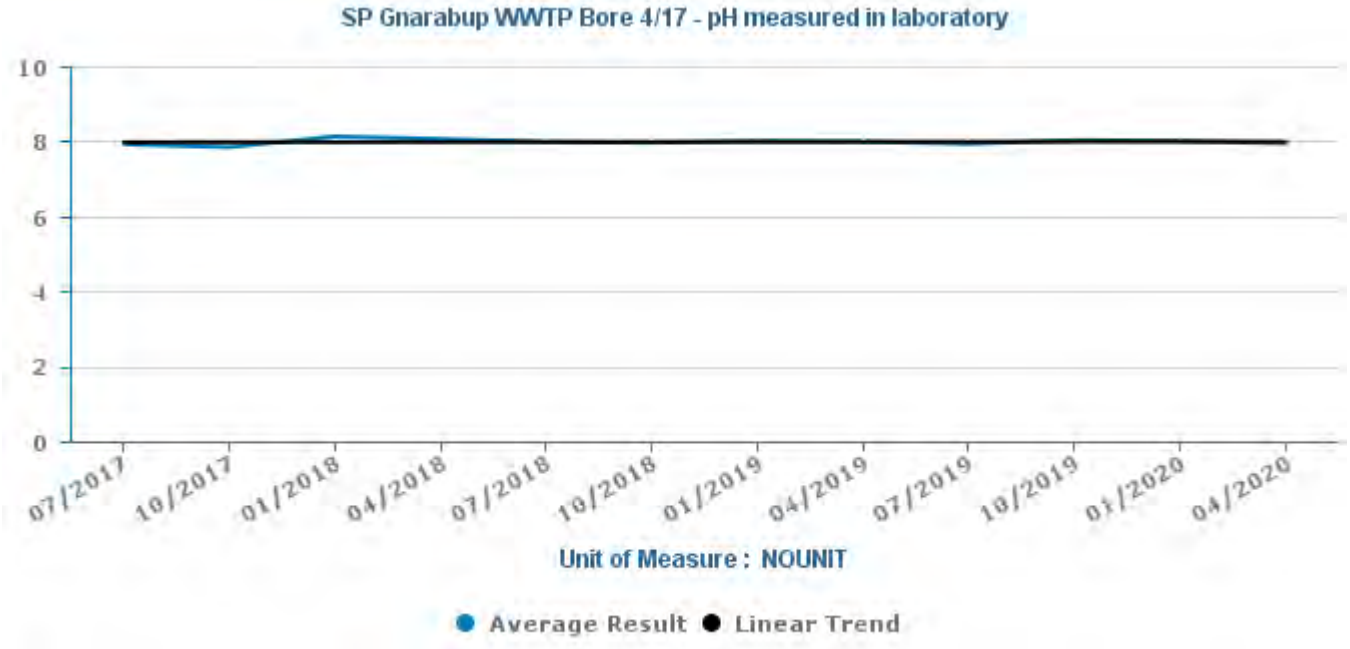

SP Gnarabup WWTP Bore 3/17 - Total phosphorus
0.08
0.06
0.04
0.02
0
10/2018
01/2019
04/2019
07/2019
10/2019
01/2020
04/2020
Unit of Measure : mg/L
Average Result
Linear Trend

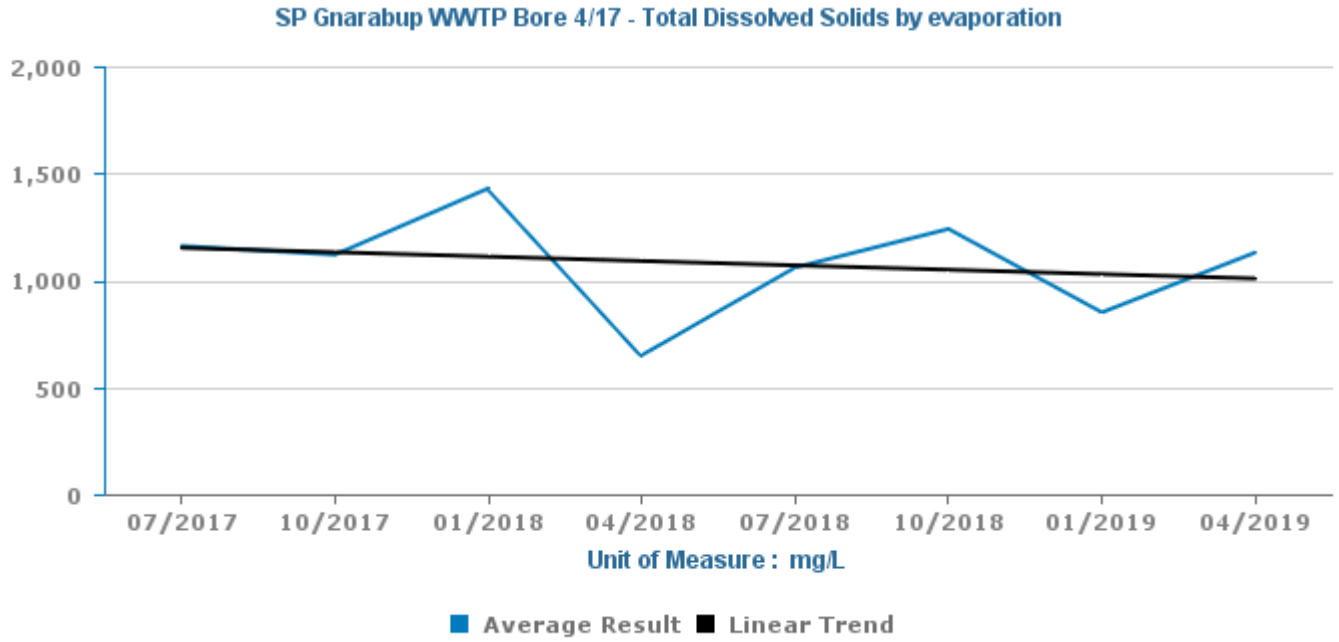
SP Gnarabup WWTP Bore 4/17

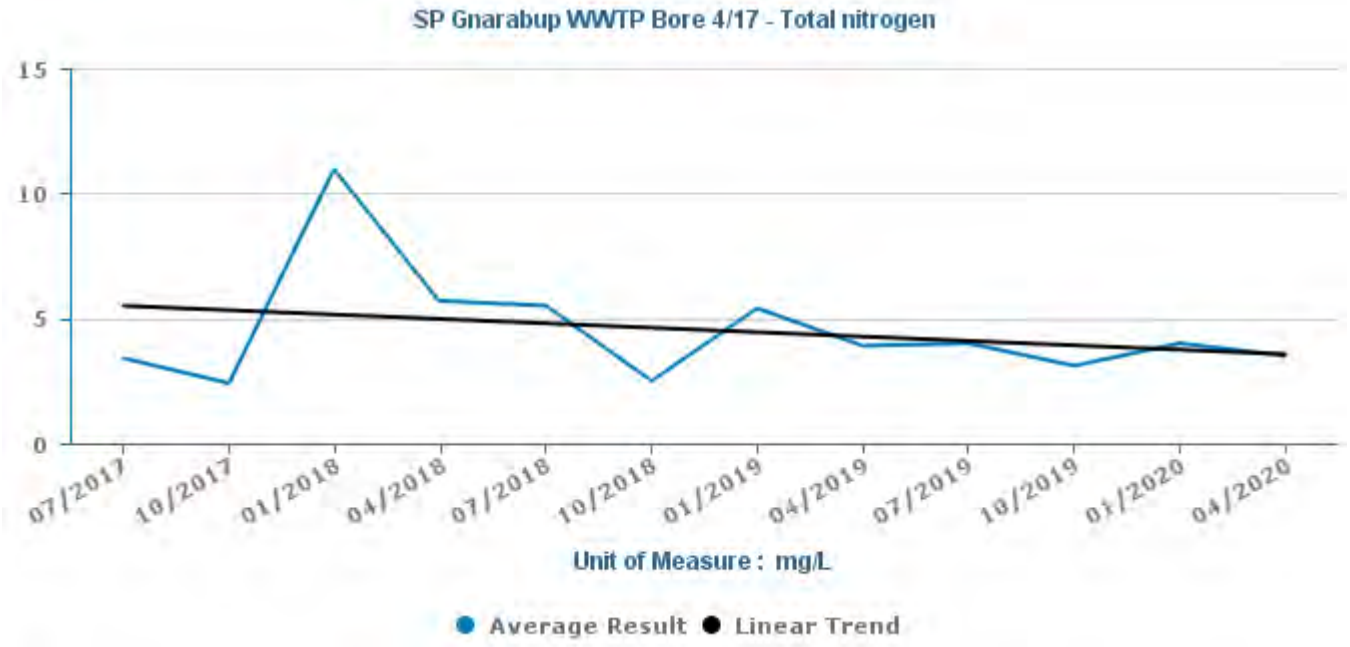


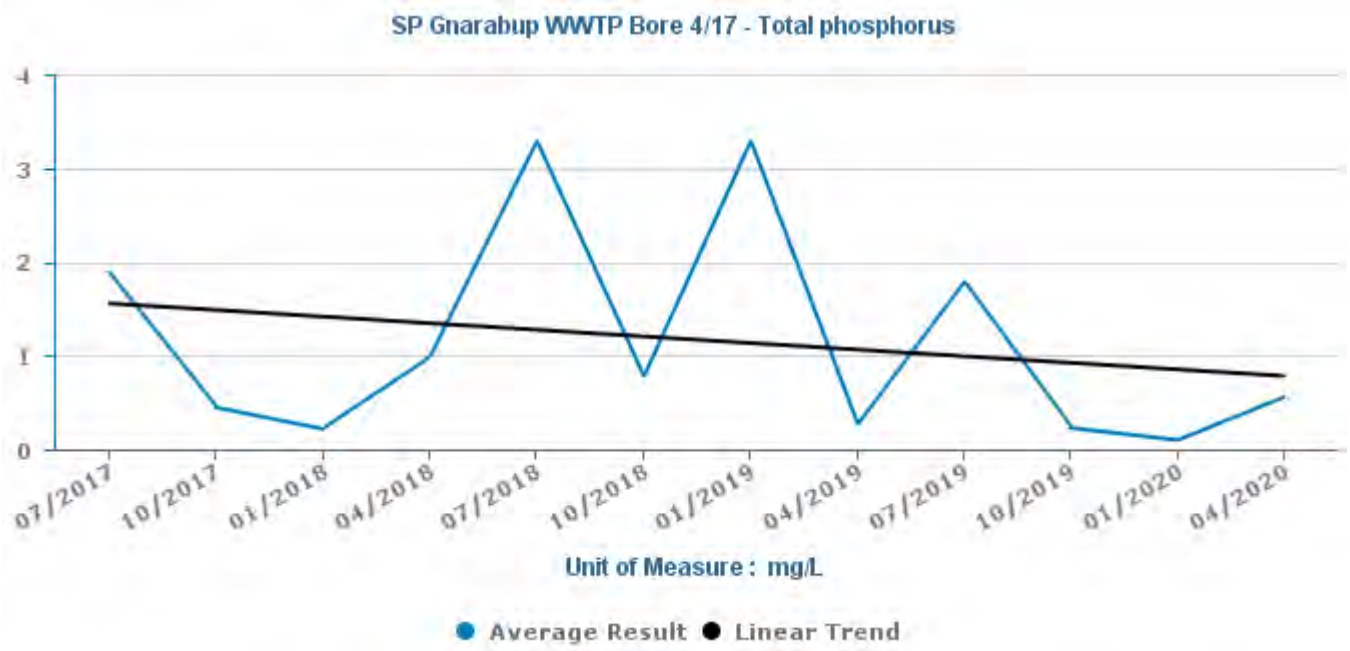



SP Gnarabup WWTP Bore 4/17 - Nitrite plus nitrate as N
15
10
5
0
07/2017
10/2017
01/2018
04/2018
07/2018
10/2018
01/2019
04/2019
07/2019
10/2019
01/2020
04/2020
Unit of Measure : mg/L
Average Result
Linear Trend


SP Gnarabup WWTP Bore 4/17 - pH measured in laboratory
10
8
6
4
2
0
07/2017
10/2017
01/2018
04/2018
07/2018
10/2018
01/2019
04/2019
07/2019
10/2019
01/2020
04/2020
Unit of Measure : NOUNIT
Average Result
Linear Trend


SP Gnarabup WWTP Bore 4/17 - Total Dissolved Solids by evaporation
2,000
1,500
1,000
500
0
07/2017
10/2017
01/2018
04/2018
07/2018
10/2018
01/2019
04/2019
Unit of Measure : mg/L
Average Result
Linear Trend


SP Gnarabup WWTP Bore 4/17 - Total nitrogen
15
10
5
0
07/2017
10/2017
01/2018
04/2018
07/2018
10/2018
01/2019
04/2019
07/2019
10/2019
01/2020
04/2020
Unit of Measure : mg/L
Average Result
Linear Trend


SP Gnarabup WWTP Bore 4/17 - Total phosphorus
4
3
2
1
0
07/2017
10/2017
01/2018
04/2018
07/2018
10/2018
01/2019
04/2019
07/2019
10/2019
01/2020
04/2020
Unit of Measure : mg/L
Average Result
Linear Trend

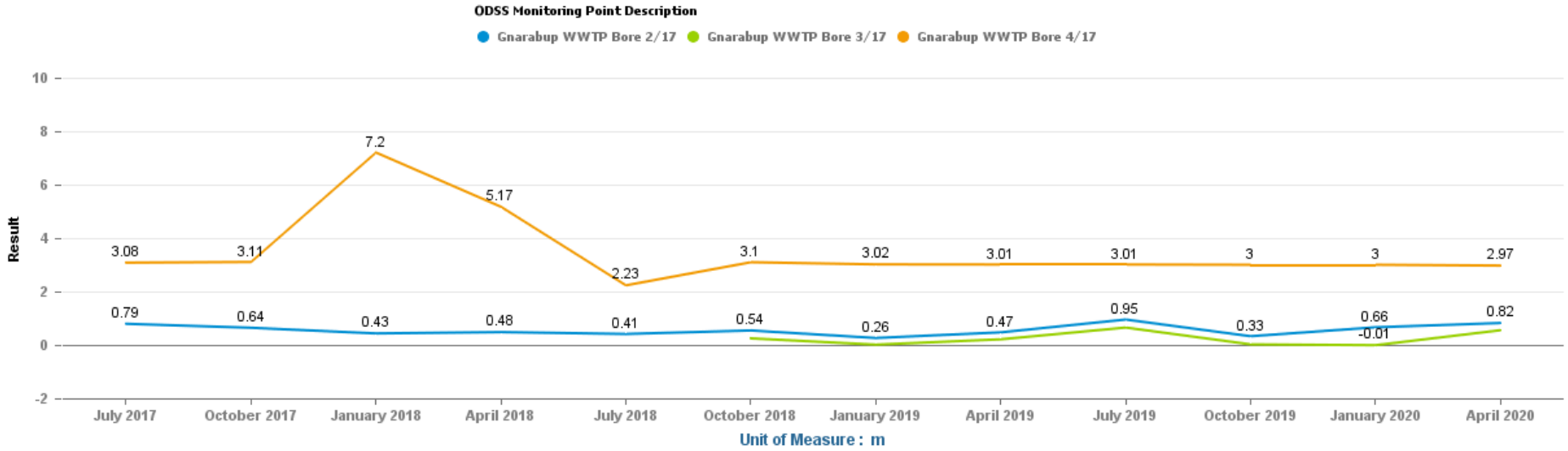
Appendix 6: Groundwater Bores: Standing Water Levels

Calculated Groundwater Level (AHD)

	Bore 2/17	Bore 3/17	Bore 4/17
	Calculated Groundwater Level (AHD)	Calculated Groundwater Level (AHD)	Calculated Groundwater Level (AHD)
	m	m	m
July 2019	0.95	0.65	3.01
October 2019	0.33	0.02	3
January 2020	0.66	-0.01	3
April 2020	0.82	0.55	2.97

Note: WWTP Bore 2/17, 3/17 and 4/17 have replaced long-term dry bores 1/99 and 2/99. Sampling of bore 3/17 commenced in Oct 2018

Calculated Groundwater Level (AHD)



Nexus 83264458

Appendix 5
- Annual Audit Compliance Report Gnarabup Waste Water Treatment Plant L6640-1994-11_01JUL19-30JUN20

Government of **Western Australia**
Department of **Environment Regulation**

Annual Audit Compliance Report Form

Environmental Protection Act 1986, Part V

Section A – Licence Details			
Licence number:	L6640/1994/11	Licence file number:	SWB 1993-05
Licence holder:	Water Corporation		
Trading as:	Gnarabup Wastewater Treatment Plant		
ABN:	28 003 434 917		
Registered address:	629 Newcastle Street, LEEDERVILLE, WA 6007		
Reporting period:	01 / 07 / 2019 **to** 30 / 06 / 2020		

Section B – Statement of Compliance with Licence Conditions

Did you comply with all of your licence conditions during the reporting period?
(please tick the appropriate box)

☐Yes – please complete:

- section C;
- section D if required; and
- sign the declaration in Section F.

☒No – please complete:

- section C;
- section D if required;
- section E; and
- sign the declaration at Section F.

Section C – Statement of Actual Production

Provide the actual production quantity for this reporting period. Supporting documentation is to be attached.

Prescribed Premises Category	**Actual Production Quantity**
54	113 m^3/day (details provided in Annual Report)

Section D – Statement of Actual Part 2 Waste Discharge Quantity

Provide the actual Part 2 waste discharge quantity for this reporting period. Supporting documentation is to be attached.

Prescribed Premises Category	**Actual Part 2 Waste Discharge Quantity**
Not applicable	

Section E1 – Details of Non-Compliance with Licence Condition			
Please use a separate page for each condition with which the licence holder was non-compliant at a time during the reporting period.			
Condition no:	W3 and W4(a)	Date(s) of non-compliance:	1 July 2019 – 30 June 20120
Details of non-compliance:			
Monitoring bores 1/99 and 2/99 are not being maintained to allow representative water samples to be collected, as the bores are dry. DWER issued a field notice (number 3159), dated 25 February 2016, as part of a site audit.			
What was the actual (or suspected) environmental impact of the non-compliance? **NOTE** – please attach maps or diagrams to provide insight into the precise location of where the non-compliance took place.			
No environmental impact.			
Cause (or suspected cause) of non-compliance:			
Monitoring program – dry bores.			
Action taken to mitigate any adverse effects of non-compliance and prevent recurrence of the non-compliance:			
These bores have been replaced by new bores 4/14 (Upstream), 2/17 (Midstream) and 3/17 (Downstream). The upstream bore is considered too close to the WWTP to provide a true representative background sample. Water Corporation has postponed adding these bores to the licence until a new upstream bore is drilled (planned for August 2020). It is expected a licence amendment, to ensure that monitoring points listed on the licence reflect operations on site, will be submitted to DWER during Q2 of the 2020-21 reporting year.			
Was this non-compliance previously reported to DER?			
☒ Yes, and			
☐ Reported to DER verbally		Date: / /	
☒ Reported to DER in writing		Date: 01 / 09 / 2016	

Section F – Declaration

I/We declare that the information in this Annual Audit Compliance Report is true and correct and is not false or misleading in a material particular[1]. I/We consent to the Annual Audit Compliance Report being published on the Department of Environment Regulation's (DER) website.			
Signature[2]:	[redacted]	Signature:	
Name: (printed)		Name: (printed)	
Position:	General Manager Operations	Position:	
Date:	07/08/2020	Date:	
Seal (if signing under seal):			

[1] It is an offence under section 112 of the *Environmental Protection Act 1986* for a person to give information on this form that to their knowledge is false or misleading in a material particular.

[2] AACRs can only be signed by the licence holder or an authorised person with the legal authority to sign on behalf of the licence holder.

Appendix 6
- EPBC Act Protected Matters Report for Gnarabup/ Leeuwin Naturaliste National Park area, 26 April 2021

Australian Government

Department of Agriculture, Water and the Environment

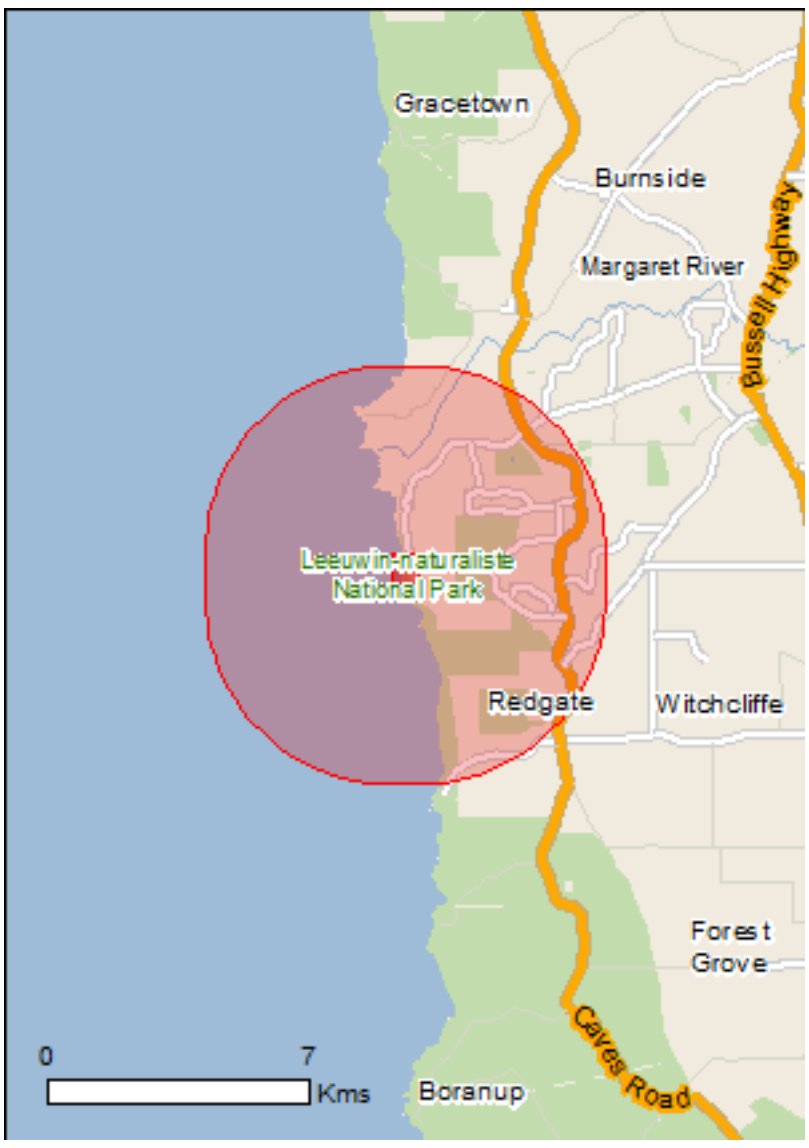
EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

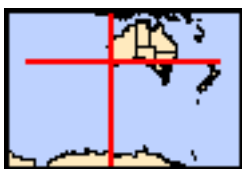
Report created: 26/04/21 22:07:47



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2015

Coordinates

Buffer: 5.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	48
Listed Migratory Species:	42

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	64
Whales and Other Cetaceans:	13
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	1
Regional Forest Agreements:	1
Invasive Species:	24
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat likely to occur within area
Calyptorhynchus baudinii Baudin's Cockatoo, Long-billed Black-Cockatoo [769]	Endangered	Breeding known to occur within area
Calyptorhynchus latirostris Carnaby's Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Species or species habitat known to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat may occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within

Name	Status	Type of Presence
		area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Russkoye Bar-tailed Godwit [86432]	Critically Endangered	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Species or species habitat known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Crustaceans		
Cherax tenuimanus Hairy Marron, Margaret River Hairy Marron, Margaret River Marron [78931]	Critically Endangered	Species or species habitat may occur within area
Mammals		
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Bettongia penicillata ogilbyi Woylie [66844]	Endangered	Species or species habitat likely to occur within area
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur

Name	Status	Type of Presence
		within area
Megaptera novaeangliae		
Humpback Whale [38]	Vulnerable	Congregation or aggregation known to occur within area
Neophoca cinerea		
Australian Sea-lion, Australian Sea Lion [22]	Endangered	Species or species habitat may occur within area
Pseudocheirus occidentalis		
Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Critically Endangered	Species or species habitat known to occur within area
Setonix brachyurus		
Quokka [229]	Vulnerable	Species or species habitat likely to occur within area
Other		
Westralunio carteri		
Carter's Freshwater Mussel, Freshwater Mussel [86266]	Vulnerable	Species or species habitat known to occur within area
Plants		
Caladenia excelsa		
Giant Spider-orchid [56717]	Endangered	Species or species habitat likely to occur within area
Caladenia lodgeana		
Lodge's Spider-orchid [68664]	Critically Endangered	Species or species habitat likely to occur within area
Calectasia cyanea		
Blue Tinsel Lily [7669]	Critically Endangered	Species or species habitat may occur within area
Drakaea micrantha		
Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat may occur within area
Gastrolobium papilio		
Butterfly-leaved Gastrolobium [78415]	Endangered	Species or species habitat may occur within area
Reptiles		
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
Sharks		
Carcharias taurus (west coast population)		
Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat known to occur within area
Carcharodon carcharias		
White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat may occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Hydroprogne caspia Caspian Tern [808]		Foraging, feeding or related behaviour known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Onychoprion anaethetus Bridled Tern [82845]		Foraging, feeding or related behaviour likely to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		

Name	Threatened	Type of Presence
Balaena glacialis australis Southern Right Whale [75529]	Endangered*	Breeding known to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat may occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area
Manta alfredi Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat may occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Congregation or aggregation known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species

Name	Threatened	Type of Presence
		habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Catharacta skua Great Skua [59472]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat may occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area
Puffinus assimilis Little Shearwater [59363]		Foraging, feeding or related behaviour known to occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Foraging, feeding or related behaviour likely to occur within area
Sterna anaethetus Bridled Tern [814]		Foraging, feeding or

Name	Threatened	Type of Presence
		related behaviour likely to occur within area
[Sterna caspia](#) Caspian Tern [59467]		Foraging, feeding or related behaviour known to occur within area
[Thalassarche carteri](#) Indian Yellow-nosed Albatross [64464]	Vulnerable	Foraging, feeding or related behaviour may occur within area
[Thalassarche cauta](#) Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
[Thalassarche impavida](#) Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
[Thalassarche melanophris](#) Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
[Thalassarche steadi](#) White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
[Thinornis rubricollis](#) Hooded Plover [59510]		Species or species habitat known to occur within area
Fish		
[Acentronura australe](#) Southern Pygmy Pipehorse [66185]		Species or species habitat may occur within area
[Campichthys galei](#) Gale's Pipefish [66191]		Species or species habitat may occur within area
[Heraldia nocturna](#) Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
[Hippocampus angustus](#) Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area
[Hippocampus breviceps](#) Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area
[Hippocampus subelongatus](#) West Australian Seahorse [66722]		Species or species habitat may occur within area
[Histiogamphelus cristatus](#) Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area
[Lissocampus caudalis](#) Australian Smooth Pipefish, Smooth Pipefish [66249]		Species or species habitat may occur within area
[Lissocampus fatiloquus](#) Prophet's Pipefish [66250]		Species or species habitat may occur within area
[Lissocampus runa](#) Javelin Pipefish [66251]		Species or species habitat may occur within area
[Maroubra perserrata](#) Sawtooth Pipefish [66252]		Species or species

Name	Threatened	Type of Presence
		habitat may occur within area
Mitotichthys meraculus Western Crested Pipefish [66259]		Species or species habitat may occur within area
Nannocampus subosseus Bonyhead Pipefish, Bony-headed Pipefish [66264]		Species or species habitat may occur within area
Phycodurus eques Leafy Seadragon [66267]		Species or species habitat may occur within area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
Pugnaso curtirostris Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Vanacampus phillipi Port Phillip Pipefish [66284]		Species or species habitat may occur within area
Vanacampus poecilolaemus Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area
Mammals		
Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Endangered	Species or species habitat may occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Species or species

Name	Threatened	Type of Presence
		habitat known to occur within area

Whales and other Cetaceans [Resource Information]

Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area
Delphinus delphis Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Congregation or aggregation known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Leeuwin-Naturaliste	WA

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
South West WA RFA	Western Australia

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Genista linifolia Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-33.99009 114.98881,-33.99009 114.99501,-33.99886 114.99501,-33.99886 114.98881,-33.99009 114.98881

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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