

Title of Proposal - Long Term Recycled Water Release Program, QLD

Section 1 - Summary of your proposed action

Provide a summary of your proposed action, including any consultations undertaken.

1.1 Project Industry Type

Waste Management (sewerage)

1.2 Provide a detailed description of the proposed action, including all proposed activities.

The Council of the City of Gold Coast operates four sewage treatment plants (STPs) that produce recycled water as part of the treatment process. While the City currently reuses this recycled water and has a program to expand the reuse of recycled water, there is a need to manage excess recycled water in a manner that protects environmental, social, and economic values of the City. The City has seen unprecedented growth over the past 20 years, and the existing excess recycled water release infrastructure is nearing capacity and capability. The city is expected to reach a population of 1.3 million by 2066 (the current population is estimated at 591,356 (Australian Bureau of Statistics, 2016 census)). This is forecast to increase excess recycled water from 137.9ML/Day (2016) to 276.9ML/Day by 2066 (Average Dry Weather Flows). This increase cannot be accommodated by the existing system. At present, there is limited demand and opportunity for the re-use of recycled water on the Gold Coast.

The City's Long Term Recycled Water Release Plan (LTRWRP) aims to provide the City with a city-wide solution to cater for excess recycled water in both average dry weather and peak wet weather flows. The intention of the LTRWRP is to provide a stable, reliable solution to manage the City's excess recycled water in a staged manner, which allows for flexibility as the demand and population growth of the City changes plus the possibility of technological advances in construction methods. The design of LTRWRP has been determined through comprehensive investigations of various options and alternatives.

The LTRWRP is currently divided into six stages that are scheduled to take place over the next 38 years:

Stage 1: currently under construction, involves the duplication of existing infrastructure (originally installed in the 1980s) which includes two sub-surface pipeline crossings (one below the Broadwater, and one below the Nerang River), upgrades to pumps at the STPs, and upgrades to the diffusers currently in the Seaway. This stage of the Project did not trigger referral under the EPBC Act on advice from the Department of Environment and Energy, but is subject to local and state level approvals and permits.

Stage 2: currently scheduled for operation in 2022, involves the installation of twin ocean release pipelines which will be constructed using subsea directional drilling (or similar) from behind the eastern beach on South Stradbroke Island to approximately 1.4km offshore. Beyond the surf zone, the pipelines will be placed on the seabed out to 3km where the diffusers will be located over the last 360m of the seabed pipeline. Stage 2 will also include overland installation of pipelines between Merrimac STP and Benowa pump station, and connections to the

Broadwater crossing at South Stradbroke Island completed in Stage 1.

Stage 3: currently scheduled for operation in 2025, involves the installation of a second twin ocean release pipeline (duplication of the installation performed during Stage 2). Additionally, the southern release point, currently at Doug Jennings Park, will be connected to the northern land-based pipe work on South Stradbroke Island using directional drilling (or similar) subsurface of the Seaway.

Stage 4: currently scheduled for completion in 2027, involves upgrading the existing Coombabah STP to Broadwater land-based pipeline.

Stage 5: currently scheduled for completion in 2035, involves the upgrade of Merrimac STP pump station.

Stage 6: currently scheduled for operation in 2050, involves the installation of a third offshore release, which is a duplication of the twin pipeline configuration described in Stages 2 and 3. In addition to the offshore release upgrade, a second Seaway crossing will be installed utilising the methodology described in Stage 3.

Timing of the Project is subject to change and has been designed to be flexible to allow for improvements in available technology and fluctuations in projected population growth numbers. The current staging is based on population projections and volumes of excess water calculated in 2015 and concept designs produced by Arcadis for the City in 2016.

Review of the Project staging from a Commonwealth approvals perspective indicates that referral under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) will be required for Stages 2, 3 and 6. As Stages 4 and 5 involve land-based construction activities in existing infrastructure corridors or within already-built assets, no Matters of National Environmental Significance (MNES) will be impacted. This referral therefore addresses infrastructure and recycled water discharges related to Stages 2,3 and 6 only.

Following a pre-lodgement meeting with representatives of the DoEE on 12th September 2018, a decision was made to submit a referral that encompasses all stages as applicable (i.e. Stages 2, 3 and 6), with investigations based on the ultimate and cumulative (Stage 6) operational impact. For example, water quality modelling undertaken has been undertaken based on the cumulative impact of Stages 2,3 and 6. Staging of the Project is subject to change and has been designed to be flexible to allow for improvements in available technology and fluctuations in projected population growth numbers. The current staging (and this referral) is based on figures calculated in 2015 and concept designs produced by Arcadis for the City in 2016. Whilst the construction methodology may change, the pipeline alignment and recycled water volumes described in this referral and associated supporting material is not expected to be significantly different. Should any significant changes to the methodology, timing or project description occur post approval, impacts to MNES will be reviewed.

Construction Methodology – Pipeline Installation and Placement

Extensive investigations conducted as part of the Stage 1 procurement and design works concluded that trenchless methods (by either horizontal directional drilling (HDD) or tunnel boring) is the most effective and environmentally-sensitive manner by which the pipes can be installed. By using trenchless technologies, significant impacts, such as increased turbidity or loss of marine habitat, is avoided by conducting all of the marine works below the sea floor. The construction of the pipelines in stages 2, 3, and 6 will utilise these methodologies to minimise impacts as much as possible. HDD involves the installation of the pipeline from a land-based position (in the Project's case, from behind the sand dunes on South Stradbroke Island,

penetrating the ground via a surface-launched drilling rig. The bore path will follow a relatively shallow arc at approximately 15 to 20 metres depth (dependent on geology) with the pipe pulled in behind it. Machinery will be located on land, and whilst there may be some vibration during impact, there is little audible noise generated during construction in the underwater environment, particularly in comparison to the already noisy marine environment, which experiences heavy recreational vessel traffic.

1.3 What is the extent and location of your proposed action? Use the polygon tool on the map below to mark the location of your proposed action.

Area	Point	Latitude	Longitude
infrastructure and recycled water release footprint	1	-27.925839645098	153.40668342319
infrastructure and recycled water release footprint	2	-27.92576380898	153.4065975925
infrastructure and recycled water release footprint	3	-27.925839645098	153.40668342319
infrastructure and recycled water release footprint	4	-27.925650054702	153.40655467716
infrastructure and recycled water release footprint	5	-27.926370496438	153.42045924869
infrastructure and recycled water release footprint	6	-27.926105071094	153.42835567203
infrastructure and recycled water release footprint	7	-27.922995754244	153.42955730167
infrastructure and recycled water release footprint	8	-27.921099785444	153.43153140751
infrastructure and recycled water release footprint	9	-27.917724878717	153.43286178318
infrastructure and recycled water release footprint	10	-27.91753527409	153.4367670795
infrastructure and recycled water release footprint	11	-27.918976260915	153.43968532291
infrastructure and recycled water release footprint	12	-27.925953399177	153.44007156101

Area	Point	Latitude	Longitude
footprint infrastructure and recycled water release footprint	13	-27.92997263309	153.43779704776
infrastructure and recycled water release footprint	14	-27.929934716487	153.43402049747
infrastructure and recycled water release footprint	15	-27.927128850973	153.43264720646
infrastructure and recycled water release footprint	16	-27.926370496438	153.42826984134
infrastructure and recycled water release footprint	17	-27.926598003357	153.42024467197
infrastructure and recycled water release footprint	18	-27.925839645098	153.40668342319
Seaway crossing	1	-27.93364403676	153.42560524811
Seaway crossing	2	-27.937018446476	153.4256910788
Seaway crossing	3	-27.937056360594	153.42539067139
Seaway crossing	4	-27.933568206117	153.42539067139
Seaway crossing	5	-27.933606121445	153.4256910788
Seaway crossing	6	-27.933568206117	153.42564816345
Seaway crossing	7	-27.93364403676	153.42560524811

1.5 Provide a brief physical description of the property on which the proposed action will take place and the location of the proposed action (e.g. proximity to major towns, or for off-shore actions, shortest distance to mainland).

Construction works will take place within the City of Gold Coast and involve underwater crossings of the Gold Coast Broadwater between (a) Quota Park (Southport) and the southern tip of South Stradbroke Island and (b) Tom Jennings Park (Southport) and South Stradbroke Island, across the Gold Coast Seaway. A series of off-shore pipelines will be installed from the southern tip of South Stradbroke Island to a location approximately 3km offshore.

The Gold Coast Broadwater is shallow coastal estuary extending from Southport to the southern end of Moreton Bay. It is popular with locals and tourists for water-related recreational activity. The southern section of South Stradbroke Island forms part of the Moreton Bay Ramsar wetland and is uninhabited. It has been extensively modified in the past through sand reclamation and foreshore works to stabilise the Gold Coast seaway entrance.

The offshore benthic environment is characterised by a sandy substrate; there are no reefs, seagrass beds or macroalgae within the pipeline or modelled recycled water release plume footprint. Whilst marine fauna may pass through the offshore environment, it offers no substantial foraging habitat (refer to the attached benthic survey report for further detail).

1.6 What is the size of the proposed action area development footprint (or work area) including disturbance footprint and avoidance footprint (if relevant)?

9,056 ha, including modelled recycled water plume

1.7 Is the proposed action a street address or lot?

Lot

1.7.2 Describe the lot number and title. Lot 255WD5704, Lot 6, CP815887, Lot 528WD6624 and unallocated state land

1.8 Primary Jurisdiction.

Queensland

1.9 Has the person proposing to take the action received any Australian Government grant funding to undertake this project?

No

1.10 Is the proposed action subject to local government planning approval?

Yes

1.10.1 Is there a local government area and council contact for the proposal?

No

1.11 Provide an estimated start and estimated end date for the proposed action.

Start date 01/2020

End date 12/2050

1.12 Provide details of the context, planning framework and State and/or Local government requirements.

Excess recycled water produced at the City of Gold Coast's sewage treatment plants is currently released to the northern and southern sides of the Gold Coast Seaway. This release is licenced by the Queensland Government under an Environmental Authority (EA) for the operation of an Environmentally Relevant Activity (sewage treatment), under the Queensland *Environmental Protection Act 1994*. The proposed project would require an ammendment to this

existing EA in terms of allowable discharge volumes and timing. The project would be considered a major amendment, which would require public consultation on the impacts of the project, through a comprehensive environmental assessment.

In addition, a number of other state approvals would be required before works could commence, including (but not limited to):

(a) permit to undertake works in the Moreton Bay Marine Park, pursuant to the *Marine Parks Act 2004*

(b) a Development Permit for operational works that is tidal works and within a Coastal Management District, pursuant to the *Planning Act 2016* and the *Coastal Protection and Management Act 1995*

(c) a Development Permit for operational works to clear native vegetation under the *Planning Act 2016* and the *Vegetation Management Act 1999*.

The proposed action would also be subject to assessment under the Gold Coast City Plan (Version 5), requiring a Development Permit for operational works.

1.13 Describe any public consultation that has been, is being or will be undertaken, including with Indigenous stakeholders.

To date, public consultation has been focused on Stage 1 of works (not included in this referral), which is to commence construction shortly. Information regarding the project is available on Council's website, and targeted consultation has been held with nearby residents and stakeholder groups. These include groups with environmental, indigenous and planning interest. During this consultation, following stages (Stages 2-6) have also been discussed.

As part of gaining approvals for Stage 1 of the LTRWRP, engagement has been held with DoEE and relevant State Government departments, including the Department of Agriculture and Fisheries (DAF), Department of Environment and Science (DES), Department of Transport and Main Roads (DTMR) and Department of State Development, Manufacturing, Infrastructure and Planning (DSTMIP).

In order to gain approvals from the State Government for Phases 2-6, a broader community consultation process will be undertaken across the Gold Coast Community. Community members will be able to view and provide feedback on the Environmental Assessment undertaken for the project.

1.14 Describe any environmental impact assessments that have been or will be carried out under Commonwealth, State or Territory legislation including relevant impacts of the project.

A Environmental Assessment will be carried out to support state and local approval applications. This assessment will provide the following as a minimum:

(a) a description of the proposed activity including:

- physical location of infrastructure and the recycled water plume extent
- potential contaminants released under a range of conditions
- characteristics of the release i.e. timing, duration, extent, composition

(b) a description of the receiving environment including:

- conservation values
- ecosystem health and its sensitivity to change
- water quality
- other potential contaminant sources and their loads

(c) a description of the assessment methodology

(d) a description of potential impacts from both construction and operation of the proposed action, including:

- water quality
- terrestrial, benthic and marine habitat values
- marine and migratory fauna
- noise and air quality
- coastal processes
- public health
- social impacts e.g. recreational fishing, water-based activities
- cumulative impacts

(d) measures to be applied to minimise any identified impacts

(e) receiving environment monitoring programs and reporting to be carried out both during

construction and on an ongoing basis.

The Environmental Assessment will be made publically available for comment, and conditions of approval applied.

1.15 Is this action part of a staged development (or a component of a larger project)?

Yes

1.15.1 Provide information about the larger action and details of any interdependency between the stages/components and the larger action.

Stage 1 of the Long Term Recycled Water Release Project is to commence construction in late 2019. A self-assessment determined that the action would not have a significant impact on any Matters of National Environmental Significance, and was not referred under the EPBC Act, upon advice from DoEE All relevant state and local approvals have been obtained for this stage of the project.

Stages 4 and 5 of the project are also not subject to this referral, as they involve disturbance of existing infrastructure corridors or Sewage Treatment Plants that are already highly disturbed. No MNES are impacted by these phases.

1.16 Is the proposed action related to other actions or proposals in the region?

No

Section 2 - Matters of National Environmental Significance

Describe the affected area and the likely impacts of the proposal, emphasising the relevant matters protected by the EPBC Act. Refer to relevant maps as appropriate. The [interactive map tool](#) can help determine whether matters of national environmental significance or other matters protected by the EPBC Act are likely to occur in your area of interest. Consideration of likely impacts should include both direct and indirect impacts.

Your assessment of likely impacts should consider whether a bioregional plan is relevant to your proposal. The following resources can assist you in your assessment of likely impacts:

- [Profiles of relevant species/communities](#) (where available), that will assist in the identification of whether there is likely to be a significant impact on them if the proposal proceeds;
- [Significant Impact Guidelines 1.1 – Matters of National Environmental Significance](#);
- [Significant Impact Guideline 1.2 – Actions on, or impacting upon, Commonwealth land and Actions by Commonwealth Agencies](#).

2.1 Is the proposed action likely to have ANY direct or indirect impact on the values of any World Heritage properties?

No

2.2 Is the proposed action likely to have ANY direct or indirect impact on the values of any National Heritage places?

No

2.3 Is the proposed action likely to have ANY direct or indirect impact on the ecological character of a Ramsar wetland?

Yes

2.3.1 Impact table

Wetlands	Impact
Moreton Bay Ramsar Wetland	Construction Some minor clearance of vegetation would occur where pipe connections occur or for site laydown areas associated with the ocean pipelines. These would be placed in areas already disturbed or of low ecological significance however i.e. on the western side of the island or behind coastal foredunes. The eastern foreshore does support marine turtles

Wetlands	Impact
	<p>and migratory waders of conservation significance, however infrastructure in this area will be installed by trenchless methods, and is not expected to cause any direct or indirect disturbance to habitat. Operations The City of Gold Coast has undertaken extensive hydrodynamic and advection-dispersion modelling to better understand the potential behaviour of the recycled water plume at various release points and design stages. The detailed modelling report is attached to this referral. For the ultimate scheme (at completion of Stage 6), modelling is showing that there is a reduction in concentrations of Total Nitrogen (TN) within the Gold Coast Broadwater in comparison to the existing approved recycled water release volumes (note this does not take into account the expected population increase and associated increase in excess recycled water released). Overall, there should be no net worsening to the receiving water within the Gold Coast Broadwater (and Moreton Bay Ramsar Wetland) with respect to statutory Water Quality Objectives (As defined by the Environmental Protection (Water) Policy 2009 related to excess TN.</p>

2.3.2 Do you consider this impact to be significant?

No

2.4 Is the proposed action likely to have ANY direct or indirect impact on the members of any listed species or any threatened ecological community, or their habitat?

Yes

2.4.1 Impact table

Species	Impact
Anthochaera phrygia	<p>This species (Regent Honeyeater) would only be an occasional visitor to the project area. It could possibly occur in the area although high quality habitat is not present. The study area is not considered good quality or important habitat. There are no direct or indirect impacts</p>

Species	Impact
Botaurus poiciloptilus	<p>anticipated for this species, as the pipeline will be directionally drilled and will involve very minimal surface disturbance on land.</p> <p>This species (Australasian Bittern) would only be an occasional visitor to the project area. It's occurrence is considered unlikely due to the lack of suitable habitat features (i.e. freshwater wetlands). There are no direct or indirect impacts anticipated for this species, as the pipeline will be directionally drilled and will involve no surface disturbance on land.</p>
Calidris ferruginea	<p>This species (Curlew Sandpiper) would only be an occasional visitor to the project area, as there is no suitable habitat or feeding areas present. A review of known shorebird habitats, distribution and threats in Gold Coast Waterways was undertaken by Griffith University in 2017; it did not identify large numbers of shorebirds within the project area. Known shorebird sites occur at the northern tip of South Stradbroke Island, Coombabah Lakelands, an island south of Wavebreak Island in the Broadwater and Currumbin Creek). From all published migratory bird surveys undertaken in Gold Coast Waterways, there were only 19 sightings of the Curlew Sandpiper between 2010 and 2016. They will be occasional visitors only and no direct or indirect impacts anticipated for this species.</p>
Diomedea exulans antipodensis	<p>The presence of this species (Antipodean Albatross) would be limited to rare vagrants in small numbers and would be highly unlikely to be disturbed by construction or operation. They will be occasional visitors only and no direct or indirect impacts anticipated for this species.</p>
Diomedea exulans exulans	<p>The presence of this species (Tristan Albatross) would be limited to rare vagrants in small numbers and would be highly unlikely to be disturbed by construction or operation. They will be occasional visitors only and no direct or indirect impacts anticipated for this species.</p>
Diomedea exulans gibsoni	<p>The presence of this species (Gibson's Albatross) would be limited to rare vagrants in small numbers and would be highly unlikely to be disturbed by construction or operation. They will be occasional visitors only and no direct or indirect impacts anticipated for this species.</p>
Diomedea exulans (sensu lato)	<p>The presence of this species (Wandering</p>

Species	Impact
	Albatross) would be limited to rare vagrants in small numbers and would be highly unlikely to be disturbed by construction or operation. There are no direct or indirect impacts anticipated for this species.
Erythrotriorchis radiatus	This species (Red Goshawk) would only be an occasional visitor to the project area. It's occurrence is possible but high quality habitat is not present. The study area is not considered good quality or important habitat due to its disturbed condition. There are no direct or indirect impacts anticipated for this species.
Fregetta grallaria grallaria	The presence of this species (White-bellied Storm-Petrel) would be limited to rare vagrants in small numbers and would be highly unlikely to be disturbed by construction or operation. There are no direct or indirect impacts anticipated for this species.
Lathamus discolor	This species (Swift Parrot) could possibly occur in the project area but high quality habitat is not present due to lack of dry sclerophyll eucalypt forests and woodlands. There are no direct or indirect impacts anticipated for this species, as the pipeline will be directionally drilled and will involve no surface disturbance on land.
Macronectes giganteus	The presence of this species (Southern Giant Petrel) would be limited to rare vagrants in small numbers and would be highly unlikely to be disturbed by construction or operation. There are no direct or indirect impacts anticipated for this species.
Macronectes halli	The presence of this species (Northern Giant Petrel) would be limited to rare vagrants in small numbers and would be highly unlikely to be disturbed by construction or operation. There are no direct or indirect impacts anticipated for this species.
Numenius madagascariensis	The Eastern Curlew is known to occur within the project area, although available habitat is limited (no sheltered mud or sand flats are available). A review of wader bird records undertaken by Griffith University (2017), did not identify South Stradbroke Island as a feeding or roosting area for the species. Known roost sites occur on an island within the Gold Coast Broadwater (to the south of Wavebreak Island) and at the northernmost tip of South Stradbroke Island. As the project predominately involves

Species	Impact
Pachyptila turtur subantarctica	<p>subsea drilling it is not anticipated that there will be any direct or indirect impacts on this species. Because of the depth of the pipeline, audible noise is not expected to be generated by drilling, although some vibration might be experienced. The background noise level experienced on the Gold Coast Broadwater is already very high as a result of recreational boat use, and any noise generated by drilling would not be discernible in comparison.</p> <p>The presence of this species (Fairy Prion) is possible as it is an oceanic species that may occur in the project area as rare vagrants in small numbers. It is not anticipated that there will be any direct or indirect impacts on this species.</p>
Phoebetria fusca	<p>The presence of this species (Sooty Albatross) would be limited to rare vagrants in small numbers and would be highly unlikely to be disturbed by construction or operation. There are no direct or indirect impacts anticipated for this species.</p>
Pterodroma neglecta neglecta	<p>The presence of this species (Kermadec Petrel) would be limited to rare vagrants in small numbers and would be highly unlikely to be disturbed by construction or operation. There are no direct or indirect impacts anticipated for this species.</p>
Rostratula australis	<p>This species (Australian Painted Snipe) is unlikely to occur within the study area due to lack of suitable habitat features (i.e. freshwater wetlands). There are no direct or indirect impacts anticipated for this species, as the pipeline will be directionally drilled and will involve no surface disturbance on land.</p>
Thalassarche cauta cauta	<p>The presence of this species (Shy Albatross) would be limited to rare vagrants in small numbers and would be highly unlikely to be disturbed by construction or operation. There are no direct or indirect impacts anticipated for this species.</p>
Thalassarche cauta salvini	<p>The presence of this species (Salvin's Albatross) would be limited to rare vagrants in small numbers and would be highly unlikely to be disturbed by construction or operation. There are no direct or indirect impacts anticipated for this species.</p>
Thalassarche cauta steadi	<p>The presence of this species (White-capped</p>

Species	Impact
	Albatross) would be limited to rare vagrants in small numbers and would be highly unlikely to be disturbed by construction or operation. There are no direct or indirect impacts anticipated for this species.
Thalassarche eremita	The presence of this species (Chatham Albatross) would be limited to rare vagrants in small numbers and would be highly unlikely to be disturbed by construction or operation. There are no direct or indirect impacts anticipated for this species.
Thalassarche melanophris	The presence of this species (Black-browed Albatross) would be limited to rare vagrants in small numbers and would be highly unlikely to be disturbed by construction or operation. There are no direct or indirect impacts anticipated for this species.
Thalassarche melanophris impavida	The presence of this species (Campbell Albatross) would be limited to rare vagrants in small numbers and would be highly unlikely to be disturbed by construction or operation. There are no direct or indirect impacts anticipated for this species.
Turnix melanogaster	This species (Black-breasted Button-quail) could possibly occur within the project area however high quality habitat is not present. A deep leaf litter layer is crucial to foraging and fallen logs and a dense, heterogeneously distributed shrub layer are also considered to be important for shelter and breeding. SSI habitats not considered high quality due to lack of habitat complexity. There are no direct or indirect impacts anticipated for this species, as the pipeline will be directionally drilled and will involve no surface disturbance on land.
Epinephelus daemeli	It is considered unlikely that this species (Black Rockcod) will occur within the project area. It may occur within southern QLD but records are limited. Preferred habitat is not present in the project footprint. As such, there are no direct or indirect impacts anticipated for this species.
Balaenoptera musculus	This species (Blue Whale) is unlikely to occur in the project area as it is transient and likely to pass through the area in deeper offshore waters. No direct impact on this species is anticipated. If they move closer to the coastline, the most likely disturbance would be related to underwater noise during construction to

Species	Impact
Chalinolobus dwyeri	<p>individuals transiting through the study area; individuals may potentially move further offshore to avoid the area of disturbance.</p> <p>Species (Large-eared Pied Bat) unlikely to occur due to lack of higher altitude moist tall open forest adjacent to rainforest. There is not anticipated to be any direct or indirect impacts on this species, as the pipeline will be directionally drilled and will involve no surface disturbance on land.</p>
Eubalaena australis	<p>This species (Southern Right Whale) is unlikely to occur in the project area as it is generally a transient species passing through the area in deeper offshore waters. It may occasionally frequent the area as they are known to calve in shallower waters, however, such activity has not been reported for the project area or immediate surrounds. No direct impact on this species is anticipated. If they move closer to the coastline, the most likely disturbance would be related to underwater noise during construction to individuals transiting through the study area; individuals may potentially move further offshore to avoid the area of disturbance.</p>
Megaptera novaeangliae	<p>This species (Humpback Whale) is likely to occur within the study area east of seaway during winter-spring migration, when offshore pipeline installation is scheduled to occur. Due to the occasional and migratory nature of its occurrence no direct impacts are expected. Whales are also vulnerable to noise and interference from vessels, dredgers and similarly noisy coastal activities. These disturbances may cause whales to modify their behavior and/or mask communication. The most likely disturbance would be related to underwater noise during construction to individuals transiting through the study area; individuals may potentially move further offshore to avoid the area of disturbance. construction vessels may also run into whales if not controlled; supporting construction vessels will have speed limits, and monitors aboard. Observation zones and shut down areas will be monitored and put in place during construction activity offshore (i.e. during pipe and diffuser placement on the sea bed).</p>
Phascolarctos cinereus	It is unlikely Koalas would be present in the

Species	Impact
	study area as it is not considered good quality habitat due to lack of extensive Eucalypt / Angophora tree cover and high disturbance levels. Remnant mixed Banksia and Lophostemon confertus open forest on the dunes to the north of the study area on SSI may provide marginal habitat for Koala. There are no direct or indirect impacts anticipated for this species, as the pipeline will be directionally drilled and will involve no surface disturbance on land.
Pteropus poliocephalus	This species could possibly occur in the project area however high quality habitat is not present. The Grey-headed Flying Fox is a canopy feeding frugivore and nectarivore that uses rainforests, open forests, closed and open woodlands, Melaleuca swamps and Banksia woodlands. No roost sites identified in the field visit or are known from previous records. There are no direct or indirect impacts anticipated for this species, as the pipeline will be directionally drilled and will involve no surface disturbance on land.
Xeromys myoides	It is possible that this species (Water Mouse) could occur within the project area however high quality habitat is not present. This species typically occurs elsewhere on SSI and Southern Moreton Bay Islands (where mangroves and saltmarsh is prevalent). A habitat assessment confirmed the lack of suitable habitat features within the study area and no habitat indicators (such as nesting mounds) were recorded in the area. It is anticipated that no direct or indirect impacts will occur.
Acacia attenuata	This species could occur within the study area although it is not considered likely as it has not been recorded there. Due to the subsea drilling activities, terrestrial plant species are unlikely to be impacted by direct or indirect species.
Arthraxon hispidus	This species may occur within the foredune habitats. Due to the subsea drilling activities, terrestrial plant species are unlikely to be impacted by direct or indirect species.
Bosistoa transversa	This species is unlikely to occur in the study area due to the degraded condition of the habitats and lack of rainforest. Due to the subsea drilling activities, terrestrial plant species are unlikely to be impacted by direct or

Species	Impact
Cryptocarya foetida	indirect species. This species is unlikely to occur in the study area due to the degraded condition of the habitats and lack of rainforest. Due to the subsea drilling activities, terrestrial plant species are unlikely to be impacted by direct or indirect species.
Cryptostylis hunteriana	It is possible this species will occur within the project site, however no individuals have been recorded within the study area. Due to the subsea drilling activities, terrestrial plant species are unlikely to be impacted by direct or indirect species.
Persicaria elatior	This species is unlikely to occur. It has been recorded in waterholes under <i>Livistona australis</i> on SSI. Wetland habitat does not occur within or directly adjacent to the study area. No direct or indirect impacts on this species are anticipated.
Phaius australis	This species is unlikely to be present in the study area as it occurs in coastal wet heath/sedgeland wetlands, swampy grasslands or swampy forest. Potentially suitable habitat does not occur within or directly adjacent to the study area. No direct or indirect impacts on this species are anticipated.
Thesium australe	It is unlikely this species will occur in the study area due to the degraded condition of habitats and lack of diverse native grasses. Due to the subsea drilling activities, terrestrial plant species are unlikely to be impacted by direct or indirect species.
Caretta caretta	The Loggerhead Turtle can occur in the project area and is common in surrounding waters. This species has been recorded nesting on the southern beach on SSI. The sandy beach on the eastern side of SSI does provide nesting habitat for both the green and loggerhead turtles that nest annually on this beach, albeit in low numbers – typically no more than ten nests per year (Cuttriss et al 2010; Van de Merwe & Cuttriss 2006). SSI is not considered a major turtle rookery in this regard. There will be no direct disturbance of turtle nesting areas on the eastern side of South Stradbroke Island as pipelines will be tunnelled beneath nesting areas. Turtle nesting may be disrupted by human disturbance, particularly light intrusion.

Species	Impact
	Any laydown areas or connection works will be located on the western side of the island and would not cause indirect disturbance of turtle nesting areas through human movement or adverse lighting. Reduced water quality from the release of recycled water may also potentially impact on individuals who utilise the project area. At present, the project area does not provide feeding opportunities for turtles, and they would be transitory visitors only whilst travelling to areas of better habitat i.e. seagrass or reefs.
Chelonia mydas	The Green Turtle is present in the marine and estuarine waters of the project area and surrounds. They commonly occur in the Broadwater, as well as and the Southern Moreton Bay Islands where abundant seagrass is available for food. A small area of seagrass will be directly affected by the construction works, which may have a minor indirect affect on this species. During the operational phase, there could be an indirect impact due to changes in water quality, however there is a lack of any notable benthic community in the area.
Coeranoscincus reticulatus	The Three-toed Snake-tooth Skink is unlikely to occur in the project area due to a lack of suitable habitat. A habitat assessment identified that the regenerating woodlands and open forest on southern SSI are not likely to provide suitable habitat for this species given the low diversity and limited structural complexity of the regrowth. It is anticipated that there will be no direct or indirect impacts on this species.
Delma torquata	The Collared Delma is unlikely to occur in the project area due to a lack of suitable habitat, there is also a lack of records indicating presence in the area. No direct or indirect impacts on this species are expected.
Dermochelys coriacea	The presence of Leatherback Turtles would be limited to rare vagrants in small numbers and would be highly unlikely to be disturbed by construction or operation. There are no direct or indirect impacts anticipated for this species.
Eretmochelys imbricata	It is considered likely Hawksbill Turtles will occasionally frequent the project area and surrounds as they are reasonably common around nearby reefs and seawalls. However,

Species	Impact
	the are relatively uncommon in southeast Queensland and are considered transient visitors to the region. There are no direct or indirect impacts anticipated for this species.
Lepidochelys olivacea	It is considered unlikely that this species (Olive Ridley Turtle) will frequent the project area. They may occur in the wider region but this is uncommon. There are no direct or indirect impacts anticipated for this species.
Natator depressus	The presence of Flatback Turtles would be limited to rare vagrants in small numbers and would be highly unlikely to be disturbed by construction or operation. There are no direct or indirect impacts anticipated for this species.
Carcharias taurus	It is likely this species (Grey nurse shark) will frequent the project area as they transit along the coastline between reefal aggregation sites. Most of the east coast population spend the majority of time in New South Wales waters. Individuals do move along the inshore waters of the southern Queensland coastline, congregating at 'aggregation sites' such as the known aggregation sites off North Stradbroke Island, Moreton Island and Rainbow Beach. The rocky reef habitat preferred by the grey nurse shark does not occur within the project footprint or immediate surrounds. It is not anticipated that there will be direct or indirect impacts on this species.
Carcharodon carcharias	This species (Great White Shark) is likely to frequent the project area as a transient visitor. There are no direct impacts anticipated. During operation, releases may result in a change of water quality in the area, this is unlikely to affect this species.
Pristis zijsron	Green Sawfish are unlikely to occur within the project area as their present distribution is thought to be restricted to tropical waters. There are no direct or indirect impacts anticipated for this species.
Rhincodon typus	Whale sharks could possibly occur within the project site as they can occasionally occur in these oceanic waters but the Gold Coast is the southern extent of their range. There are no direct or indirect impacts anticipated for this species.
Coastal Swamp Oak Forest of New South Wales and South East Queensland Ecological	An Ecological survey of South Stradbroke Island and the pipeline alignment was

Species	Impact
Community	undertaken by a qualified and experienced ecologist in 2016. The vegetation is sparse and in poor condition; no vegetation communities were identified that could constitute a TEC.
Subtropical and Temperate Coastal Saltmarsh	An Ecological survey of South Stradbroke Island and the pipeline alignment was undertaken by a qualified and experienced ecologist in 2016. The vegetation is sparse and in poor condition; no vegetation communities were identified that could constitute a TEC.

2.4.2 Do you consider this impact to be significant?

No

2.5 Is the proposed action likely to have ANY direct or indirect impact on the members of any listed migratory species, or their habitat?

Yes

2.5.1 Impact table

Species	Impact
Anous stolidus	May be disturbed by placement of the pipeline in marine waters. The presence of this species would be limited to rare vagrants in small numbers and would be highly unlikely to be disturbed by construction or operation.
Apus pacificus	May be disturbed by pipeline installation. They mostly occur over inland plains but sometimes above foothills or in coastal areas. They often occur over cliffs and beaches and also over islands and sometimes well out to sea. No good quality habitat for this species occurs within the study area.
Ardenna carneipes	May be disturbed by placement of the pipeline in marine waters. This species may be present along the eastern foreshore of SSI, however no breeding areas or high quality habitat is present.
Calonectris leucomelas	May be disturbed by placement of the pipeline in marine waters. This species may be present along the eastern foreshore of SSI, however no breeding areas or high quality habitat is present.

Species	Impact
Diomedea antipodensis	May be disturbed by placement of the pipeline in marine waters. The presence of this species would be limited to rare vagrants in small numbers and would be highly unlikely to be disturbed by construction or operation.
Diomedea exulans	May be disturbed by placement of the pipeline in marine waters. The presence of this species would be limited to rare vagrants in small numbers and would be highly unlikely to be disturbed by construction or operation.
fregata ariel	May be disturbed by placement of the pipeline in marine waters. The presence of this species would be limited to rare vagrants in small numbers and would be highly unlikely to be disturbed by construction or operation.
Fregata minor	May be disturbed by placement of the pipeline in marine waters. The presence of this species would be limited to rare vagrants in small numbers and would be highly unlikely to be disturbed by construction or operation.
Macronectes giganteus	May be disturbed by placement of the pipeline in marine waters. The presence of this species would be limited to rare vagrants in small numbers and would be highly unlikely to be disturbed by construction or operation.
Macronectes halli	May be disturbed by placement of the pipeline in marine waters. The presence of this species would be limited to rare vagrants in small numbers and would be highly unlikely to be disturbed by construction or operation.
Pheobetria fusca	May be disturbed by placement of the pipeline in marine waters. The presence of this species would be limited to rare vagrants in small numbers and would be highly unlikely to be disturbed by construction or operation.
Sternula albifrons	May be disturbed during pipeline installation. Species may occur on the eastern beaches of South Stradbroke Island although no breeding areas are known to occur. There will be no direct disturbance of shorebird habitat, as the pipeline will be installed by tunnelling methods below the foreshore zone. The use of laydown and equipment launch areas may have an indirect impact on habitat areas through movement and lights if no mitigation measures are applied. the laydown area will be located on the western side of SSI, where it is least likely to disturb shorebird habitat.

Species	Impact
Thalassarche cauta	May be disturbed by placement of the pipeline in marine waters. The presence of this species would be limited to rare vagrants in small numbers and would be highly unlikely to be disturbed by construction or operation.
Thalassarche impavida	May be disturbed by placement of the pipeline in marine waters. The presence of this species would be limited to rare vagrants in small numbers and would be highly unlikely to be disturbed by construction or operation.
Thalassarche meanophris	May be disturbed by placement of the pipeline in marine waters. The presence of this species would be limited to rare vagrants in small numbers and would be highly unlikely to be disturbed by construction or operation.
Thalassarche savini	May be disturbed by placement of the pipeline in marine waters. The presence of this species would be limited to rare vagrants in small numbers and would be highly unlikely to be disturbed by construction or operation.
Thalassarche steadi	May be disturbed by placement of the pipeline in marine waters. The presence of this species would be limited to rare vagrants in small numbers and would be highly unlikely to be disturbed by construction or operation.
Eubalaena australis	May be disturbed by placement of the pipeline in marine waters. This species is rarely recorded in Queensland waters, but may occasionally occur offshore of the Gold Coast. The most likely disturbance would be related to underwater noise during construction to individuals transiting through the study area; individuals may potentially move further offshore to avoid the area of disturbance.
Balaenoptera edeni	May be disturbed by placement of the pipeline in marine waters. This species is rarely recorded in Queensland waters, but may occasionally occur offshore of the Gold Coast. The most likely disturbance would be related to underwater noise during construction to individuals transiting through the study area; individuals may potentially move further offshore to avoid the area of disturbance.
Balaenoptera musculus	May be disturbed by placement of the pipeline in marine waters. This species is rarely recorded in Queensland waters, but may occasionally occur offshore of the Gold Coast. The most likely disturbance would be related to

Species	Impact
	underwater noise during construction to individuals transiting through the study area; individuals may potentially move further offshore to avoid the area of disturbance.
Carcharodon carcharias	May be disturbed by placement of the pipeline in marine waters. This species is likely to be common in offshore waters, however there is little benthic habitat (i.e. rocky reefs) to support the presence of this species in the study area beyond transitory visits. The most likely disturbance would be related to underwater noise during construction to individuals transiting through the study area; individuals may potentially avoid the area of disturbance during construction.
Caretta caretta	Known to nest in low numbers on the eastern beach of south stradbroke island. There will be no direct disturbance of turtle nesting habitat, as the pipeline will be installed by tunnelling methods below the foreshore zone. The use of laydown and equipment launch areas may have an indirect impact on nesting areas through movement and lights if no mitigation measures are applied. Vessels used for the placement of the pipeline on the ocean bed have potential to cause injury to turtles; underwater noise during construction could also have an adverse impact to individuals.
Chelonia mydas	Known to nest in low numbers on the eastern beach of south stradbroke island. There will be no direct disturbance of turtle nesting habitat, as the pipeline will be installed by tunnelling methods below the foreshore zone. The use of laydown and equipment launch areas may have an indirect impact on nesting areas through movement and lights if no mitigation measures are applied. Vessels used for the placement of the pipeline on the ocean bed have potential to cause injury to turtles; underwater noise during construction could also have an adverse impact to individuals.
Dermochelys coriacea	May occur in open waters and the eastern beaches in low numbers, however would only be a transitory visitor to the study area. Vessels used for the placement of the pipeline on the ocean bed have potential to cause injury to turtles; underwater noise during construction could also have an adverse impact to

Species	Impact
Dugong dugon	individuals. Dugongs are occasionally sited in the southern broadwater, but not in open waters offshore of the Gold Coast. the pipeline will be installed by tunnelling methods, avoiding any disturbance of potential habitat for Dugongs.
Eretmochelys imbricata	May occur in open waters and the eastern beaches in low numbers, however would only be a transitory visitor to the study area. Vessels used for the placement of the pipeline on the ocean bed have potential to cause injury to turtles; underwater noise during construction could also have an adverse impact to individuals.
Lamna nasus	Occurs largely in oceanic waters, but can occasionally enter coastal waters. Underwater noise during construction could have an adverse impact to individuals.
Lepidochelys olivacea	May occur in open waters and the eastern beaches in low numbers, however would only be a transitory visitor to the study area. Vessels used for the placement of the pipeline on the ocean bed have potential to cause injury to turtles; underwater noise during construction could also have an adverse impact to individuals.
Manta alfredi	May occur in coastal waters, however would likely be only a transitory visitor to the study area for occasional foraging purposes. No significant habitat or aggregation areas are known to occur that might be impacted by construction or operation. Underwater noise during construction may deter individuals from using the study area temporarily.
Manta birostris	May occur in coastal waters, however would likely be only a transitory visitor to the study area for occasional foraging purposes. No significant habitat or aggregation areas are known to occur that might be impacted by construction or operation. Underwater noise during construction may deter individuals from using the study area temporarily.
Megaptera Novaeangliae	May be disturbed by placement of the pipeline in marine waters. This species is likely to be common in offshore waters during winter-spring migration. The most likely disturbance would be related to underwater noise during construction to individuals transiting through the study area;

Species	Impact
Natator depressus	<p>individuals may potentially move further offshore to avoid the area of disturbance.</p> <p>May occur in open waters and the eastern beaches in low numbers, however would only be a transitory visitor to the study area. Vessels used for the placement of the pipeline on the ocean bed have potential to cause injury to turtles; underwater noise during construction could also have an adverse impact to individuals.</p>
Orcaella brevirostris	<p>A non-resident species that is expected to be transient and only sighted occasionally in Gold Coast waters. Underwater noise during construction could cause individuals to avoid the study area.</p>
Cuculus optatus	<p>Potential for direct removal of habitat during pipeline trenching. Species was not identified during ecological surveys and its potential to occur is considered low due to the disturbed condition of terrestrial vegetation.</p>
Orcinus orca	<p>May be disturbed by placement of the pipeline in marine waters. This species can occasionally occur in oceanic waters, but is unlikely to come close to shore. The most likely disturbance would be related to underwater noise during construction to individuals transiting through the study area; individuals may potentially avoid the area of disturbance during construction.</p>
Pristis zijsron	<p>May be disturbed by placement of the pipeline in marine waters. This species is unlikely to present, as it is generally restricted to tropical waters. The most likely disturbance would be related to underwater noise during construction to individuals transiting through the study area; individuals may potentially avoid the area of disturbance.</p>
Rhincodon typus	<p>May be disturbed by placement of the pipeline in marine waters. The Whale Shark is an oceanic and coastal, tropical to warm-temperate pelagic shark. It is often seen far offshore, but also comes close inshore and sometimes enters lagoons of coral atolls. The most likely disturbance would be related to underwater noise during construction to individuals transiting through the study area; individuals may potentially avoid the area of disturbance.</p>
Sousa chinensis	<p>A population of <i>Sousa chinensis</i> is known to</p>

Species	Impact
	occur in Moreton Bay near the mouth of the Brisbane River, but not in the southern Broadwater. It is highly unlikely this species would be present offshore of South Stradbroke Island.
Hirundapus caudacutus	Potential for direct removal of habitat during pipeline trenching. Species was not identified during ecological surveys and its potential to occur is considered low due to the disturbed condition of terrestrial vegetation.
Monarcha melanopsis	Potential for direct removal of habitat during pipeline trenching. Species was not identified during ecological surveys and its potential to occur is considered low due to the disturbed condition of terrestrial vegetation.
Monarcha tribirgatus	Potential for direct removal of habitat during pipeline trenching. Species was not identified during ecological surveys and its potential to occur is considered low due to the disturbed condition of terrestrial vegetation.
Myiagra cyanoleuca	Potential for direct removal of habitat during pipeline trenching. Species was not identified during ecological surveys and its potential to occur is considered low due to the disturbed condition of terrestrial vegetation.
Rhipidura rufifrons	Potential for direct removal of habitat during pipeline trenching. Species was not identified during ecological surveys and its potential to occur is considered low due to the disturbed condition of terrestrial vegetation.
Actitis hypoleucos	May occur in small numbers along the eastern beach of SSI, however its is mostly known in north queensland and SSI is not considered an area of national importance for the species. Species is not expected to be impacted as the pipeline will be installed by tunnelling, avoiding direct impacts to the eastern beach.
Arenaria interpres	This species is widespread in Australia, and may occur in small numbers along the eastern beach of SSI, however SSI is not considered an important site for the species. Species is not expected to be impacted as the pipeline will be installed by tunnelling, avoiding direct impacts to the eastern beach.
Calidris acuminata	This species is widespread in Australia, and may occur in small numbers along the eastern beach of SSI, however SSI is not considered an important site for the species. Species is not

Species	Impact
	expected to be impacted as the pipeline will be installed by tunnelling, avoiding direct impacts to the eastern beach.

2.5.2 Do you consider this impact to be significant?

No

2.6 Is the proposed action to be undertaken in a marine environment (outside Commonwealth marine areas)?

Yes

2.6.1 Is the proposed action likely to have ANY direct or indirect impact on the Commonwealth marine environment?

No

2.6.2 Describe the nature and extent of the likely impact on the whole of the environment.

The most likely impact to the broad environment is a change in water quality, as a result of the discharge of recycled water to the marine environment.

The City has completed a series of hydrodynamic and advection-dispersion modelling to better understand the potential behaviour of the recycled water plume at various proposed release points and design stages. Stage 6, the currently proposed final stage of the upgrades to the recycled water release system, has been modelled both far- and near-field using the 'worst-case' scenario of all recycling water associated with projected 2066 Average Dry Weather Flows (ADWF) being released approximately 3 kilometres offshore from South Stradbroke Island. The modelling considered the ultimate design option, including 225 diffuser release ports releasing up to 277 ML per day at maximum capacity, using metocean conditions from March/April 2011 and November/December 2011 as the scenario timeframe, and Total Nitrogen (TN) as a conservative tracer at current (actual) release concentrations. Not that Nitrogen decay is not included in the modelling.

Both advection-dispersion and hydrodynamic modelling outputs showed that, under the 50th percentile, the proposed Stage 6 project would result in a minimal (less than 5 µg/L) increase in TN during both the March/April and November/December 2011 metocean condition scenarios. The modelling also showed that the extent of the recycled water plume would likely be limited to south of the Jumpinpin entrance at the northern end of South Stradbroke Island to north of Burleigh Heads before dispersing below detectable levels, noting that the plume at these extents would see an increase in TN less than 2.0 µg/L TN, which is relatively insignificant. When analysed in line with the potential risk to MNES populations likely to be present (either

resident or migratory) in the Study Area, it was determined that the impact from a slight potential increase in nutrients would not be significant.

The Stage 6 Far-field modelling report has been provided with this referral, and summarises the extent and nature of the modelled recycled water plume.

2.6.3 Do you consider this impact to be significant?

No

2.7 Is the proposed action to be taken on or near Commonwealth land?

No

2.8 Is the proposed action taking place in the Great Barrier Reef Marine Park?

No

2.9 Is the proposed action likely to have ANY direct or indirect impact on a water resource related to coal/gas/mining?

No

2.10 Is the proposed action a nuclear action?

No

2.11 Is the proposed action to be taken by the Commonwealth agency?

No

2.12 Is the proposed action to be undertaken in a Commonwealth Heritage Place Overseas?

No

2.13 Is the proposed action likely to have ANY direct or indirect impact on any part of the environment in the Commonwealth marine area?

No

Section 3 - Description of the project area

Provide a description of the project area and the affected area, including information about the following features (where relevant to the project area and/or affected area, and to the extent not otherwise addressed in Section 2).

3.1 Describe the flora and fauna relevant to the project area.

Terrestrial Environment

The recycled water pipeline will involve tunnel boring beneath the southern section of South Stradbroke Island. There will be only minor surface disturbance at the tunnel entry point (on the western side of South Stradbroke Island) and for pipe laydown and stringing, where the pipeline will be 'fed' into a tunnel below the shoreline and seabed.

The composition, distribution and condition of vegetation communities and habitats on the area of South Stradbroke Island to be disturbed are determined by geology and landform, hydrology, and historic land uses. Based on current habitat condition recorded during an ecological field survey, the proposed pipeline alignments and surrounds covering Lot 6 CP815887 on the southern tip of South Stradbroke Island was created following construction of the Gold Coast Seaway in 1986. This area is currently zoned for Conservation Purposes under the *Gold Coast City Plan (2016)* and is managed by the City of Gold Coast.

The disturbance area currently supports foredunes, regenerating sand plains dominated by native species, and reclaimed sand plains dominated by an introduced species typical of post-sand mining rehabilitation sites in southern Queensland and northern New South Wales. A rockwall has been installed along the western and southern foreshore of the study area fringing the Broadwater estuary, which has eliminated tidal inundation of the foreshore and has prevented the creation of intertidal habitat suitable for marine plant establishment, namely mangroves and saltmarsh. The exposed eastern foreshore comprises oceanic beaches bounded by landward beach ridges and dunes.

In contrast to the disturbance area, lands north of Lot 6 CP815887 support extensive, undisturbed dune and swale woodlands to open forest, with beach and foreshore habitats in the east and intertidal mangroves and saltmarsh communities in the west fringing the Broadwater estuary. These diverse, contiguous and extensive communities support remnant vegetation and associated habitats in good condition, with high native species diversity and habitat complexity, and are likely to support a number of species and habitats of conservation value. These areas will not be directly or indirectly disturbed by the project.

Vegetation along the pipeline alignment was highly patchy in terms of structure due to changes in depth to the water table, soil nutrient levels and water holding capacity, proximity to exposed sites and potentially fire history. Plant species richness was consistently low across the study area with *Casuarina equisetifolia* being the dominant species.

Western Coastal Fringe

The western coastal fringe of South South Stradbroke Island adjacent to the Broadwater estuary was dominated by regenerating *Casuarina equisetifolia* woodland to open forest averaging 3-6m in height (but up to 10m in patches) and 20-50% canopy cover. Pockets of canopy dieback as a result of storm damage were recorded along the western fringe.

Casuarina equisetifolia woodland to open forest

The eastern foreshore and inland sand plains were dominated by an upper canopy of Coastal She-oak *Casuarina equisetifolia* ranging in height from 3-6m and 10-60% canopy cover in the west and reaching 8-10m in height and 50-80% canopy cover in the east. Other canopy species included sparse *Banksia integrifolia*, *Hibiscus tiliaceus* and *Leptospermum laevigatum**. The sparse low shrublayer comprised patchy *Gomphocarpus physocarpus**, *Rivina humilis* and Pink Periwinkle *Catharanthus roseus**. The sparse groundcover averaging 5% cover, increasing to 20% cover in shaded sites, was dominated by *Cyperus eglobosus* with *Isolepis nodosa* in the depressions. Occasional vines included *Passiflora foetida**, *Passiflora suberosa**, *Smilax australis* and *Stephania japonica*.

Leptospermum laevigatum/*Casuarina equisetifolia* shrubland to woodland

Parts of the inland sand plains were dominated by *Leptospermum laevigatum** and *Casuarina equisetifolia* shrubland to woodland averaging 3-6m and 20-30% canopy cover. *Leptospermum laevigatum** is an introduced species from south-eastern Australia which was introduced in the region to rehabilitate sand-mined sites. Other sparse canopy species included Coastal Wattle *Acacia sophorae* and *Banksia integrifolia*. The sparse groundcover averaging 5% cover was dominated by *Cyperus eglobosus* and *Spinifex sericeus*.

Threatened Flora Species

No threatened flora species were identified during the ecological survey of the disturbance area (BMT, 2016), nor was any good quality habitat for target species identified. In addition, there were no threatened ecological communities identified.

Fauna Habitat and Species

Some of the more significant fauna habitat observations made during the survey are:

- a) Study area comprised of diverse habitat types including native and exotic sand plain woodlands and open forest, foredune communities and beach;
- b) Most habitats showed high degrees of past disturbance particularly sand reclamation and introduction of invasive species with very low native recruitment and canopy dieback across the study area;
- c) There was a lack of diverse microhabitat features across the study area i.e. absence of large logs, rocks, stones, leaf litter which would limit its fauna diversity and values;
- d) There were no hollow bearing trees or diverse forest/woodland habitat to support a high number or diversity of arboreal mammals or hollow nesting birds;

- e) There were no intertidal habitats to support estuarine species of conservation significance;
- f) The study area does not support aquatic habitat; with the exception of the eastern foreshore, overall the study area has low habitat value for threatened fauna.

Evidence of fauna usage was low across the study area and incidental observations of fauna were very low during the habitat assessment survey. Fauna species and habitat indicators recorded within inland communities were limited to bandicoot burrows, macropod tracks, Torresian Crow (*Corvus orru*) and Bush-stone Curlew (*Burhinus grallarius*). A pair of Australian Pied Oystercatchers (*Haematopus longirostris*) and a group of Silver Gull (*Chroicocephalus novaehollandiae*) and Crested Tern (*Thalasseus bergii*) were observed on the eastern foreshore.

Due to its disturbed condition and lack of habitat complexity the fauna assemblage of the study area is expected to be of relatively low diversity and abundance. Birds are expected to be the dominant vertebrate group present whilst the number of mammals is expected to be low. In particular, very few arboreal mammals are expected due to the poor quality of woodland/forest habitat and lack of large hollow bearing trees. Reptile numbers and diversity are also expected to be low due to the lack of habitat complexity (particularly microhabitat, rocks and stones). The lack of water features is likely to restrict frog species including common taxa tolerant of very disturbed conditions.

The eastern foreshore is known to support marine turtles and may provide habitat for migratory waders.

A wide range of introduced species, including 'pests' under the *Land Protection (Pest and Stock Route) Management Act 2002*, are expected for the study area including Cane Toad (*Rhinella marina**) and Black Rat (*Rattus rattus**).

Marine Environment

Pipelines will traverse the marine environment in three locations (a) a crossing of the Gold Coast Broadwater, which will be installed by trenchless methods below the seabed (b) a crossing of the Gold Coast Seaway, which will also be installed by trenchless methods and (c) the environment offshore of South Stradbroke Island; the first kilometre of the pipeline will be installed by trenchless methods beneath the seabed, with the remaining two kilometres placed on the seabed. For the ultimate solution (by Stage 6), recycled water discharged would reach 277ML/Day of average dry weather flows and 432ML/Day of peak wet weather flow. For the 50th percentile, modelling has demonstrated that Total Nitrogen (TN) concentrations of up to 5µg/L will occur at the diffuser sites; for the 95th percentile, TN concentrations of up to 40µg/L are experienced. The total footprint of TN concentrations remains for the most part, confined to offshore waters (i.e. does not impact foreshores or the Gold Coast Seaway/Broadwater. for the 80th and 95th percentile plots, beaches and coastline south of the seaway are impacted (less than 2µg/L). Whilst there is an increase in TN in offshore locations, there is a reduction in TN within the Broadwater and Gold Coast seaway, in comparison to the **existing licenced discharges.**

A benthic survey of the area modelled to be impacted by the 50th percentile recycled water plume extent was undertaken (in both winter and summer conditions). The survey showed that

the benthic environment consisted of coarse and fine sands, with no habitat features ie. no seagrass or rocky reefs present. Very little fauna was observed, with the most abundant epifauna being small sea cucumbers; only a small number of juvenile fish were observed. The lack of reef or seagrass habitat suggests that whilst marine fauna may transit this area, it does not offer foraging or nursery environments for marine fauna.

3.2 Describe the hydrology relevant to the project area (including water flows).

The Gold Coast Broadwater is a large tidal waterway at the interface between the Nerang, Coomera, Pimpama and Albert Rivers and the Coral Sea. It is connected to Moreton Bay through a series of tidal channels to the north and is separated from the sea at the southern end by the Spit, a relatively recent coastal landform that has stabilised with the construction of the training walls at the Gold Coast Seaway to facilitate safe navigation between the Broadwater and the open ocean. The seaway is approximately 250m wide, while the depth varies, but is on average approximately 11m (City of Gold Coast, 2016).

The total catchment area of the Broadwater is 63.94km², with the Broadwater receiving urban flows that transport various sediments including sediments, nutrients, organic material, heavy metals and pesticides. Water from the catchment is mixed and exchanged with the open ocean, with tidal eddies moving water in and out of the Broadwater through the Seaway. The seaway plays an important role in the ecological health of the Broadwater.

It is framed by Moreton Bay's barrier islands to the north and a sand spit (stabilised since the construction of the Gold Coast Seaway) to the south.

It is proposed to gradually shift recycled water discharges from their present location at the Gold Coast Seaway, to a location 3km offshore of south Stradbroke Island, within the Coral Sea, although some peak wet weather flows will still occur. The key physical processes that influence the hydrology of recycled water discharged offshore include:

- a) tides, that are semi-diurnal (occur twice daily)
- b) wind and waves (direction and speed) significant influence inshore surface currents and tidal currents.
- c) longshore drift, which dominates currents immediately adjacent to the shoreline, typically in a south-easterly direction. This means that close to the shore, the prevailing current direction is to the north.
- d) seaway entrance tidal exchanges - exchange within the Gold Coast Seaway averages 100GL/day. This tidal exchange influences a large area to the north, south and east of the seaway. Areas surrounding the seaway are influenced by the flood tide, with large amounts of oceanic water entering the Broadwater. A ebb tide jet, or eddy, forms on the ebb tide, resulting with a 'jet' of water which exits the seaway from the mouth, in a north-east direction, before recirculating back towards the coastline of South Stradbroke Island

e) East Australian Current - a southward moving current east of the continental shelf has an influence on near shore coastal currents.

This various influences have been incorporated into hydrodynamic modelling of the recycled water plume.

3.3 Describe the soil and vegetation characteristics relevant to the project area.

As per Section 3.1.

3.4 Describe any outstanding natural features and/or any other important or unique values relevant to the project area.

The Gold Coast Broadwater and South Stradbroke Island have recreational, amenity and ecological values for residents and visitors to the Gold Coast.

3.5 Describe the status of native vegetation relevant to the project area.

As described in Section 3.1, the native vegetation on South Stradbroke Island has been planted, and is generally in poor condition.

3.6 Describe the gradient (or depth range if action is to be taken in a marine area) relevant to the project area.

Ocean pipelines will be directionally drilled, installed approximately 15-20m below the current seabed for a distance of 1.4km. At 1.4km offshore of SSI, pipes will rise to the seabed (at approximately -RL10.0m) and extend a further 1.4km along the seabed.

3.7 Describe the current condition of the environment relevant to the project area.

Queensland Healthy Land and Water (an independent, not-for-profit organisation) provides yearly assessments of waterway health across South East Queensland. The Gold Coast Broadwater received a 2017 rating of A, which indicates a healthy ecosystem. Water quality is considered to be excellent, and improving, with a decline in turbidity and total nitrogen pollutants over time. The Broadwater is a very popular waterway, and receives heavy visitation and recreational use. Recreational boating numbers are high, which on weekends and holidays means that it is a high noise environment. The Broadwater still retains a high portion of wetland and estuarine habitat and seagrass beds, despite significant urbanisation of the catchment. There has been substantial changes to the original shoreline of the Broadwater, with the artificial construction of the seaway, canal estates and a number of islands. It supports a number of EPBC species including migratory birds, which are known to roost on islands within the Broadwater and in the northern parts of the Broadwater i.e. northern tip of South Stradbroke

Island. The southern section of South Stradbroke Island is constructed from reclaimed material and was planted with native species. This vegetation is still in poor condition (see section 3.1) , and does not support protected species.

The Queensland Environmental Protection (Water) Policy 2009 sets a regularly framework for water quality, including setting measurable Water Quality Objectives (WQOs) to ensure the environmental values of a waterway are protected. Compliance with WQO's is regularly monitored by Healthy Land and Water at a number of sites within the Broadwater and offshore, for parameters including turbidity, Chlorophyll A, Total Phosphorous, Total Nitrogen, Oxides of Nitrogen and Ammonia Nitrogen. Generally, sites within the Broadwater have high rates of compliance for all parameters, when considering the annual median values. Non-compliance with WQO's have been recorded in a number of past years for Total Nitrogen and oxides of Nitrogen for the two sites at the southern most end of the Broadwater. Monitoring sites outside of the seaway (i.e. open ocean), also generally have good water quality, with WQO's met most of the time. The 80th percentiles however are less compliant, which represents conditions which are influenced by rainfall.

Additionally, the City of Gold Coast have undertaken a comprehensive water quality monitoring program for the study area, to inform planning for the LTRWP. A detailed baseline water quality monitoring program report has been attached to this referral, summarising water quality of the project area. The baseline water quality monitoring has been designed as a long term program, with a total of 44 sites across the Broadwater, river entrances, surf zones and offshore areas monitored since 2014. The water quality program has been informed by a Scientific Advisory Committee, made up of water quality and environmental experts in thier field. This monitoring program has informed modelling of the expected recycled water quality plume.

3.8 Describe any Commonwealth Heritage Places or other places recognised as having heritage values relevant to the project area.

Nil.

3.9 Describe any Indigenous heritage values relevant to the project area.

No heritage sites are listed in the disturbance area under the CoGC Planning Scheme or on the Queensland Heritage Register. Given the depth below the seabed at which the pipeline will be placed, and that works on South Stradbroke Island will occur on reclaimed land, this risk is very low of finding archaeological material. Traditional Owners will be consulted as approvals progress.

3.10 Describe the tenure of the action area (e.g. freehold, leasehold) relevant to the project area.

Works will require placement of pipelines and auxiliary infrastructure between Quota Park (255/WD5704 - Reserve for Local Government Purposes) across the Gold Coast Broadwater (Unallocated State Land) to South Stradbroke Island (6/CP815887 - Reserve for Local Government Purposes, with CoGC and the Gold Coast Waterway Authority the trustees). Works extending oceanwards from High Water Mark of South Stradbroke Island will occur on Unallocated State Land. Works between Doug Jennings Park (Lot 528, WD6624 - Reserve for Local Government Purposes) and South Stradbroke Island will also occur on Unallocated State Land below the High Water Mark. Owners Consent to undertake the works on state land will be sought as part of state approval processes.

3.11 Describe any existing or any proposed uses relevant to the project area.

Quota Park and Doug Jennings Park are recreational reserves or 'parks' for public use. The Gold Coast Broadwater and seaway are popular recreational areas used for water-based activities (i.e. swimming, boating, jet-skiing, fishing). The southern section of South Stradbroke Island is open space zoned for conservation purposes, which can only be reached by boat, so is not as well utilised as other more accessible public areas along the Broadwater. The offshore area is mainly used by recreational boats and fishermen.

Section 4 - Measures to avoid or reduce impacts

Provide a description of measures that will be implemented to avoid, reduce, manage or offset any relevant impacts of the action. Include, if appropriate, any relevant reports or technical advice relating to the feasibility and effectiveness of the proposed measures.

Examples of relevant measures to avoid or reduce impacts may include the timing of works, avoidance of important habitat, specific design measures, or adoption of specific work practices.

4.1 Describe the measures you will undertake to avoid or reduce impact from your proposed action.

Construction Impacts and measures to avoid or reduce impact

Physical Disturbance

The construction methodology has been chosen to largely avoid any direct disturbance to areas with ecological value. Directional drilling below the seabed of the Gold Coast Broadwater, South Stradbroke Island, Gold Coast seaway and coastal zone offshore of South Stradbroke Island will avoid disturbance of ecological habitat as well as sediment that would produce turbid plumes and cause a deterioration in water quality. The final sections of the offshore pipelines will be placed on the seabed and anchored by footings, causing minimal disturbance to the seabed. works will not involve any dredging activity.

A small area of vegetation will be cleared on South Stradbroke Island for laydown and pipe stringing - this will be located in areas already highly disturbed, that have minimal ecological value.

Noise and Vibration

The tunnel machinery, including power sources and drilling equipment, will be located on land during construction, and as such there will be limited underwater noise created by tunnelling/drilling equipment. The offshore component is likely to take between 4 and 6 months, and is likely to take place during the months of the year when seas are commonly calmest, being winter/spring; this is likely to coincide with the cetacean migratory season. The drilling machinery will be approximately 15 to 20m below the sea floor, and as such, there will be negligible audible noise created, particularly given the already high background noise levels. There may be some vibration associated with the drilling methodology, however given that drilling will occur mostly in coarse and fine sands, it is not expected that vibrational impacts will be felt in the waters above the underground construction. Noise and vibration monitoring will be undertaken during Stage 1 of works (not included in this application), to confirm assumptions

regarding underwater noise and vibration. Further modelling will also be undertaken to determine noise or vibration levels during tunnelling.

Vessel Movement and boat strike

Much of the project disturbance and machinery use will occur on land, with support vessels only required during the placement of the final offshore pipeline sections and diffusers. These vessels will be subject to speed limits and will have cetacean monitors placed aboard to reduce the likelihood of vessel strike during construction. During placement of offshore infrastructure, appropriate observation/shut down zones with trained cetacean monitors will be put in place.

General Construction Management

Other general measures to minimise or avoid impacts to MNES during construction include:

- preparing a detailed Construction Environmental Management Plan, which will include measures to prevent noise/air nuisance for sensitive receptors, manage water quality, protect vegetation and avoid impacts to wildlife. It will detail roles and responsibilities for environmental management as well as procedures in the event of an environmental incident.
- regular auditing of the contractor during construction works to ensure compliance with any conditions of approval and other legislation
- monitoring of potential construction environmental impacts e.g. water quality monitoring, noise monitoring.

Operational Impacts and measures to avoid or reduce impact

Water Quality

Once operational, the main potential impact from the action is reduced water quality at the discharge location. Gold Coast Water and Waste already undertakes extensive testing of its recycled water to ensure compliance with existing approvals and best practice water quality guidelines. Recycled water is tested and reported on regularly, and is treated to a high standard prior to discharge to meet environmental and public health standards. Parameters tested include metals, nutrients and certain pathogens (e.g. E.coli). Toxicity testing of existing releases returns no measurable toxic effects on bacteria, algae, rotifers or amphipods (Van de Merwe, 2017). The City of Gold Coast submits annual compliance reports to the Department of Environment and Science for review to demonstrate it has met its legislative conditions of approval for sewage treatment.

The proposed action has been designed to avoid an exceedance of water quality objectives within the Gold Coast Broadwater or offshore, which would occur should no further action be taken to treat increasing volumes of recycled water generated by population growth. The City has completed a series of hydrodynamic and advection-dispersion modelling to better understand the potential behaviour of the recycled water plume at various proposed release points and design stages. Stage 6, the currently proposed final stage of the upgrades to the recycled water release system, has been modelled both far- and near-field using the 'worst-case' scenario of all recycling water associated with projected 2066 Average Dry Weather Flows (ADWF) being released approximately 3 kilometres offshore from South Stradbroke Island. The modelling considered the ultimate design option, including 225 diffuser release ports releasing up to 277 ML per day at maximum capacity, using metocean conditions from March/April 2011 and November/December 2011 as the scenario timeframe, and Total Nitrogen (TN) as a conservative tracer at current (actual) release concentrations.

Both advection-dispersion and hydrodynamic modelling outputs showed that, under the 50th percentile, the proposed Stage 6 project would result in a minimal (less than 5 µg/L) increase in TN during both the March/April and November/December 2011 metocean condition scenarios. The modelling also showed that the extent of the recycled water plume would likely be limited to south of the Jumpinpin entrance at the northern end of South Stradbroke Island to north of Burleigh Heads before dispersing below detectable levels, noting that the plume at these extents would see an increase in TN less than 2.0 µg/L TN, which is relatively insignificant. When analysed in line with the potential risk to MNES populations likely to be present (either resident or migratory) in the Study Area, it was determined that the impact from a slight potential increase in nutrients would not be significant. A full modelling report describing the potential changes to existing water quality during operations is attached to this referral.

As has been previously described, the City of Gold Coast has already undertaken an extensive background water quality program, which has been endorsed by a Scientific Panel of Advisors. This will continue throughout both construction and operations of the LTRWRP. A Receiving Environment Monitoring Program will be prepared and approved as part of state government approvals - this will set parameters that will be monitored and the frequency of monitoring to meet best practice standards. It will include physical measurements of water quality as well as biological and toxicity monitoring. The Scientific Panel of Advisors will continue to review and provide input into the design and delivery of operational monitoring programs that are targetted towards maintaining ecological health.

Whilst the quality of recycled water released is high, there is potential that some toxicants may bioaccumulate in the marine food web. At present, the recycled water plume area provides minimal habitat for threatened EPBC species, with no benthic structures present. Over time, however, it is expected that above-ground infrastructure will provide a hard surface upon which marine growth may occur, attracting a greater number of feeding marine species. If this occurs, it may mean that the potential for bioaccumulation within the food web increases. Visitation by protected cetaceans and other EPBC listed threatened, migratory or marine species is transient however, and the risk of bioaccumulation is therefore considered low, given the lack of notable contaminants within recycled water. Toxicity testing will continue to be undertaken through operations of the recycled water under state government approvals to meet guideline triggers levels; should any exceedances occur, measures to remove marine growth from pipeline infrastructure will be explored, to reduce feeding opportunities and the risk of bioaccumulation.

Water Clarity

Recycled water has the potential to introduce or exacerbate tertiary pressures via changes in water clarity. Water clarity can change due to the colour of recycled water outflow and/or due to nutrients triggering increased phytoplankton production. Water clarity has been shown to be an important factor in driving habitat selection in some cetacean species (e.g. Hector's dolphin (*Cephalorhynchus hectori*); Bräger et al. 2003), but not others (e.g. Indo-Pacific Humpback dolphins (*Sousa chinensis*); Karczmarski et al. 2000). Thus, reducing water clarity in the immediate release area, especially in regions with naturally low turbidity, may cause disturbance to cetaceans depending on species needs and preferences. Cetaceans rely on eyesight (at least partially) for feeding and navigation, thus, reducing water clarity may inhibit the ability to find food, conspecifics, and important locations. Inhibiting these behaviours may result in avoidance of the affected area, or reduce health and reproductive success.

Reduction in water clarity resulting from the operational discharge of recycled water is expected to be a persistent, but low intensity stressor in the offshore release area. Offshore currents are likely to readily disperse the plume, resulting in only small increases in turbidity that decrease rapidly with distance from the diffusers. Also, resident taxa are believed to cope well with reduced water clarity given their prevalence in highly turbid estuarine environments, and transient taxa are not expected to spend much time in the area, minimising any potential effects on these animals. Therefore, we expect reduced water clarity resulting from recycled water release to have minimal effect on cetaceans.

Noise

Recycled water discharged from the system will be gravity fed, meaning that there is no active pumping. This makes the likelihood of audible noise being produced very low. The pipeline is largely self-maintaining, and any maintenance activity would be minimal.

4.2 For matters protected by the EPBC Act that may be affected by the proposed action, describe the proposed environmental outcomes to be achieved.

It is not considered that the LTRWRP will have a significant impact on matters protected by the EPBC Act.

Section 5 – Conclusion on the likelihood of significant impacts

A checkbox tick identifies each of the matters of National Environmental Significance you identified in section 2 of this application as likely to be a significant impact.

Review the matters you have identified below. If a matter ticked below has been incorrectly identified you will need to return to Section 2 to edit.

5.1.1 World Heritage Properties

No

5.1.2 National Heritage Places

No

5.1.3 Wetlands of International Importance (declared Ramsar Wetlands)

No

5.1.4 Listed threatened species or any threatened ecological community

No

5.1.5 Listed migratory species

No

5.1.6 Commonwealth marine environment

No

5.1.7 Protection of the environment from actions involving Commonwealth land

No

5.1.8 Great Barrier Reef Marine Park

No

5.1.9 A water resource, in relation to coal/gas/mining

No

5.1.10 Protection of the environment from nuclear actions

No

5.1.11 Protection of the environment from Commonwealth actions

No

5.1.12 Commonwealth Heritage places overseas

No

5.2 If no significant matters are identified, provide the key reasons why you think the proposed action is not likely to have a significant impact on a matter protected under the EPBC Act and therefore not a controlled action.

The MNES that may potentially be impacted by the project are:

- a) Ramsar Wetlands
- b) threatened and migratory species

Ramsar Wetlands

The construction methodology (installation of infrastructure by directional drilling, or tunnelling) largely avoids physical disturbance of the surrounding terrestrial or marine environment.

The project will have no direct impact on the Ramsar wetland during construction, as works will be directionally drilled or tunnelled, below the seabed of the southernmost border of the wetland. There is potential for indirect impacts associated with a change of water quality to impact on the values of the wetland once operational, however extensive water quality modelling for the project shows that with the ultimate infrastructure in place (Stages 1 to 6), there will be no net worsening of water quality within the Gold Coast Broadwater, in comparison to the existing approved discharge scenario.

Therefore, the proposal is unlikely to have a significant impact on the Moreton Bay Ramsar Wetland.

Threatened and Migratory Species

With the minimal surface disturbance footprint, it is unlikely there will be any direct impact to habitat for threatened or migratory species. Where infrastructure will be laid on the seafloor, the benthic environment is bare sand, and does not support habitat of value for protected marine

species (i.e. seagrass or reef), and species diversity and abundance is low. The project area (including the recycled water plume extent) is not known as an aggregation, feeding, nesting or breeding area for any threatened or migratory species (terrestrial or marine).

During construction, measures to manage water quality, underwater noise and vibration and the risk of vessel strike will be put in place to minimise any potential impacts to species that may occasionally utilise the study area. Most recorded threatened or migratory species that may be present in the study area are transitory species that will pass through or occasionally feed, and do not rely on the project area for its survival. It is possible that noise associated with placement of the pipeline and diffuser may cause some marine species to avoid the area. Observation and shut down procedures will be put in place during placement activity to minimise the risk of harm occurring from underwater noise.

During operations, the main risk to threatened and migratory marine species is a reduction in water quality or clarity. Recycled water is treated to A+ standards and has low levels of toxicants (e.g. metals, nutrients and pathogens), meaning that there is a low likelihood of contaminants being released to the environment at biologically relevant concentrations. Advection-dispersion and hydrodynamic modelling has demonstrated that under the 50th percentile, the proposed project (including all stages) would result in a minimal increase in TN (less than 5µg/L). The full extent of the recycled water plume would be limited to south of the Jumpinpin entrance at the northern end of South Stradbroke Island to north of Bureleigh Heads before dispersing below detectable levels. Given the existing low use of the area by marine fauna, and the transitory nature of this use, it is not likely that a change of water quality would be sufficient to significantly impact on a threatened marine fauna species population (i.e. cause a long term decrease in the size of a population, reduce the area of occupancy, adversely affect habitat critical to the survival of a species, introduce a disease that may cause the species to decline or disrupt the breeding cycle of a species).

Operation of the system is not likely to produce underwater noise, as the system is gravity-driven, meaning that water is not pumped.

Therefore, the project is unlikely to have a significant impact on threatened or migratory species.

Section 6 – Environmental record of the person proposing to take the action

Provide details of any proceedings under Commonwealth, State or Territory law against the person proposing to take the action that pertain to the protection of the environment or the conservation and sustainable use of natural resources.

6.1 Does the person taking the action have a satisfactory record of responsible environmental management? Please explain in further detail.

The Water and Waste section of the City of Gold Coast (WW) sets annual performance indicators for the management of the water and waste services it provides to the community; the results are released publically each year. This includes indicators related to environmental performance such as water quality, sewer overflows, environmental incidents and compliance with environmental licences. These performance indicators were all met in 2017/18.

The City of the Gold Coast is committed to managing Sewage Treatment Plants (STPs) and sewerage network in accordance with their Environmental Authority (EA) and the obligations under the *Environmental Protection Act 1994*. In order to deliver on this commitment, WW operates under a risk management framework. As such, number of procedures, processes and strategies have been developed and implemented to drive continuous improvement in our environmental performance.

A key achievement in 2017-18 was the collaboration between WW branches with the aim to minimise the potential for environmental impact from the daily operation of the STP and sewerage network. There was only one water quality EA exceedance recorded across all of WW's four STP's. While the City has consistently achieved a low number of water quality exceedances, this is the lowest number when compared to previous reporting years. Further demonstrating WW's commitment to responsible environmental management and a continuous improvement ethos, the total nitrogen and phosphorus load released to the Gold Coast Seaway was calculated to be 56.2% and 84.2% respectively below the EA release limits. Key strategies and operational controls which have been attributed to this exceptional achievement are outlined below:

1) The Trade Waste team in the Customer Enjoyment Branch has successfully completed a Trade Waste Improvement Programmes for 3 high volume/high risk, plus a number of low volume/high risk industrial wastewater sources. The improvements, implemented according to waste minimisation principles, have resulted in reduced volume and contaminant loads discharged to the City's sewerage network and treatment plants. The City's sewage quality continues to be managed according to risk management principles outlined in the Trade Waste Guidelines. 2) System Control Branch has successfully delivered a number of CAPEX, OPEX and renewal projects in the STPs and sewerage network to improve environmental performance and asset efficiency. The projects have achieved a number of environmental benefits including eliminating asbestos exposure, odour management, reliability and maximum utilisation of infrastructure, energy efficiency, vacuum pump efficiency and reduce water usage. 3) Network Reliability Branch has successfully delivered a number of projects and increased its proactive

efforts to ensure the risks associated with asset failure of the passive networks are managed in a prudent and efficient manner. An assessment of consequence includes environmental harm criteria which are weighted to ensure that our environmental responsibilities are at the forefront of asset management decision making. In a joint project between the WW Environmental Management Team and Griffith University, a comprehensive ecotoxicity assessment of the STP recycled water (treated effluent) was undertaken. The toxicity reported for the BLT-Screen, IPAM and rotifer 24 hr survival assays all indicated that the recycled water collected on 24 July 2017 had minimal toxicity on bacteria, algae and rotifers, respectively. These results are within the ranges reported in our previous investigations (March 2015 to May 2016). This indicates that the recycled water released by the WW at the Gold Coast Seaway presently is consistently showing negligible toxicity to important aquatic organisms at the point of discharge. Furthermore, the BLT-Screen and IPAM bioassays indicate that the recycled water would need to significantly concentrated to affect bacteria and algae (up to 30 times), indicating a significant margin of safety in the current operating conditions of the wastewater release program. The Environment Team within the Service Sustainability Branch has also successfully facilitated environmental compliance with legislative and regulatory obligations, identification and control of environmental risks, tracking and reporting on environmental performance. The team also provides training, technical advice and assistance on managing the City's sustainability obligations and responsible environmental management. The team promotes and coordinates the integration of environmental management and sustainability issues into activities, processes and functions within WW.

6.2 Provide details of any past or present proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against either (a) the person proposing to take the action or, (b) if a permit has been applied for in relation to the action – the person making the application.

In the past 3 years the Water and Waste Division of the City of Gold Coast has received a number of minor fines (<\$15,000) for breaching various environmental licence conditions; these mostly relate to landfill operations. These include failing to notify of a licence exceedence within a sufficient timeframe, releasing stormwater above licence limit and not maintaining equipment. All breaches have been fully investigated and rectified to the satisfaction of the administering authority. These incidents have been recorded and new procedures incorporated into Council's EMS system to ensure they do not reoccur.

6.3 If it is a corporation undertaking the action will the action be taken in accordance with the corporation's environmental policy and framework?

Yes

6.3.1 If the person taking the action is a corporation, please provide details of the corporation's environmental policy and planning framework.

Gold Coast Water and Waste undertake thier activities in accordance with thier ISO14001-compliant Environmental Management System. This includes environmental performance indicators that are auditing and publically reported annually. Thier environmental

policy is outlined in the Commitment Statement that is attached.

6.4 Has the person taking the action previously referred an action under the EPBC Act, or been responsible for undertaking an action referred under the EPBC Act?

Yes

6.4.1 EPBC Act No and/or Name of Proposal.

In the last five years, the following referrals under the EPBC Act have been made by the City of Gold Coast:

1. 2017/7899: Gold Coast Cruise Ship Terminal
2. 2013/7103: Natural Resource Management of Beaches between Currumbin Creek and Main Beach

Approvals more than five years old include expansion of the Helensvale Waste Transfer Station, expansion of the Pimpama Waste Water Treatment Plant, Hinze Dam Upgrade and construction of the Tugan desalination plant.

Section 7 – Information sources

You are required to provide the references used in preparing the referral including the reliability of the source.

7.1 List references used in preparing the referral (please provide the reference source reliability and any uncertainties of source).

Reference Source	Reliability	Uncertainties
LTRWRP Stage 6 Far-field Marine Modelling Assessment for Concept Design Phase, DHI, 2017	The modelling scenarios and results have been regularly peer reviewed by the scientific advisory committee. Comprehensive modelling of a number of scenarios has been undertaken, and it has been informed by extensive baseline water quality monitoring and has a high degree of reliability.	The modelling relies of population projections and recycled water volumes current as of 2016.
LTRWRP Seasonal Offshore Benthic Studies, BMT, 2018.	Benthic surveys were undertaken in accordance with the Environmental Protection (Water) Policy 2009 Monitoring and Sampling Manual, and included both winter and summer surveys to ensure it captured the full range of species potentially present. It was undertaken by qualified and experienced marine ecologists. Sediment samples were collected and sent to a licenced laboratory for testing. Both the pipeline/s alignment and the recycled water plume extent (50th percentile) were surveyed.	Nil
LTRWRP South Stradbroke Island Ecology Assessment, BMT, 2016.	A qualified and experienced terrestrial ecologist surveyed the area of potential disturbance. Additionally, available habitat mapping and species records were reviewed.	Nil.
LTRWRP EPBC Due Diligence Assessment, BMT 2016.	A desktop assessment to identify potential EPBC species present with the study area and	Relied on desktop information available regarding species presence.

Reference Source	Reliability	Uncertainties
LTRWRP Baseline Water Quality Monitoring Program, City of Gold Coast, 2016.	<p data-bbox="564 136 970 253">potential impacts guided the scope of further field investigations.</p> <p data-bbox="564 255 1070 689">The monitoring program design Nil. was reviewed and approved by the scientific advisory committee, which included representatives with expertise in water quality, monitoring and marine ecology. It represents one of the most comprehensive water quality monitoring programs undertaken in Queensland.</p>	
A Risk Assessment of impacts to cetaceans, fish and turtles completed by Council environmental staff, members of Griffith University's Marine Sciences faculty and BMT marine environmental management experts.	<p data-bbox="564 696 1018 1128">This was a desktop risk assessment study, undertaken to understand the potential risk of the project to the marine environment and its fauna. The risk assessment was undertaken in accordance with ISO/AS 14001 Standards for risk assessment and used the City of Gold Coast's standard risk procedure.</p>	<p data-bbox="1023 696 1474 853">The study relies on the findings of the above detailed studies and mitigation measures proposed within this referral.</p>

Section 8 – Proposed alternatives

You are required to complete this section if you have any feasible alternatives to taking the proposed action (including not taking the action) that were considered but not proposed.

8.0 Provide a description of the feasible alternative?

The City's recycled water reuse and release system has been systematically developed over the last 50 years with various investigations into long term release options conducted since 2003. A number of options for the management of excess recycled water were considered. This has enabled the maximum capacity of the existing system to be utilised through the implementation of short term, non-infrastructure initiatives.

An extensive planning and options study titled "Staging Solutions for the Long Term Recycled Water Release Plan" was undertaken between 2014 and 2016 by consultants Arcadis (formerly Hyder Consulting). Covering numerous options and combinations of options, this study has resulted in an infrastructure solution based on upgrading the capacity of both the existing northern and southern recycled water systems at the existing Seaway release locations in the short term prior to an offshore solution in the long term. The system discharge location (offshore of South Stradbroke Island) was chosen based as it best minimised impacts to water quality and marine ecology in comparison to other options. there are no other alternative options currently being considered, although the timing of delivery may change depending on population growth, improvements in water quality treatment or greater use of recycled water by Gold Coast users.

8.1 Select the relevant alternatives related to your proposed action.

8.27 Do you have another alternative?

No

Section 9 – Contacts, signatures and declarations

Where applicable, you must provide the contact details of each of the following entities: Person Proposing the Action; Proposed Designated Proponent and; Person Preparing the Referral. You will also be required to provide signed declarations from each of the identified entities.

9.0 Is the person proposing to take the action an Organisation or an Individual?

Organisation

9.2 Organisation

9.2.1 Job Title

Manager, City of Gold Coast

9.2.2 First Name

Kathy

9.2.3 Last Name

Baker

9.2.4 E-mail

kbaker@goldcoast.qld.gov.au

9.2.5 Postal Address

City of Gold Coast

PO Box 5042
Gold Coast QLD 9726
Australia

9.2.6 ABN/ACN

ABN

84858548460 - GOLD COAST CITY COUNCIL

9.2.7 Organisation Telephone

1300465326

9.2.8 Organisation E-mail

mail@goldcoast.qld.gov.au

9.2.9 I qualify for exemption from fees under section 520(4C)(e)(v) of the EPBC Act because I am:

Not applicable

Small Business Declaration

I have read the Department of the Environment and Energy's guidance in the online form concerning the definition of a small a business entity and confirm that I qualify for a small business exemption.

Signature:..... Date:

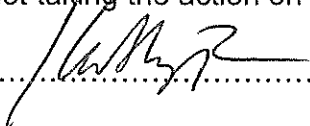
9.2.9.2 I would like to apply for a waiver of full or partial fees under Schedule 1, 5.21A of the EPBC Regulations

No

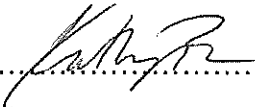
9.2.9.3 Under sub regulation 5.21A(5), you must include information about the applicant (if not you) the grounds on which the waiver is sought and the reasons why it should be made

Person proposing the action - Declaration

I, Kathryn Baker, declare that to the best of my knowledge the information I have given on, or attached to the EPBC Act Referral is complete, current and correct. I understand that giving false or misleading information is a serious offence. I declare that I am not taking the action on behalf of or for the benefit of any other person or entity.

Signature:  Date: 4/12/18

I, Kathryn Baker, the person proposing the action, consent to the designation of Kathryn Baker of City of Gold Coast as the proponent of the purposes of the action describe in this EPBC Act Referral.

Signature:  Date: 4/12/18

9.3 Is the Proposed Designated Proponent an Organisation or Individual?

Organisation

9.5 Organisation

9.5.1 Job Title

Manager

9.5.2 First Name

Kathy

9.5.3 Last Name

Baker

9.5.4 E-mail

kbaker@goldcoast.qld.gov.au

9.5.5 Postal Address

City of Gold Coast

PO Box 5042
Gold Coast QLD 9726
Australia

9.5.6 ABN/ACN

ABN

84858548460 - GOLD COAST CITY COUNCIL

9.5.7 Organisation Telephone

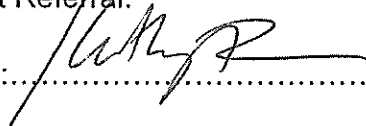
1300465326

9.5.8 Organisation E-mail

mail@goldcoast.qld.gov.au

Proposed designated proponent - Declaration

I, Kathryn Baker, the proposed designated proponent, consent to the designation of myself as the proponent for the purposes of the action described in this EPBC Act Referral.

Signature:  Date: 4/12/18

9.6 Is the Referring Party an Organisation or Individual?

Organisation

9.8 Organisation

9.8.1 Job Title

Principal

9.8.2 First Name

Lisa

9.8.3 Last Name

McKinnon

9.8.4 E-mail

lisa.mckinnon@bmtglobal.com

9.8.5 Postal Address

BMT East Coast

PO Box 203
spring hill QLD 4004
Australia

9.8.6 ABN/ACN

ABN

54010830421 - BMT EASTERN AUSTRALIA PTY LTD

9.8.7 Organisation Telephone

(07) 3831 6744

9.8.8 Organisation E-mail

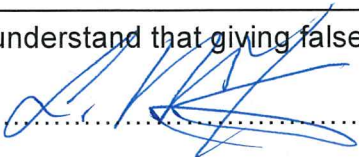
lisa.mckinnon@bmtglobal.com

Referring Party - Declaration

I, Lisa McKinnon, I declare that to the best of my knowledge the information I have given on, or attached to this EPBC Act Referral is complete, current and

correct. I understand that giving false or misleading information is a serious offence.

Signature:



Date:

04/12/2018

Appendix A - Attachments

The following attachments have been supplied with this EPBC Act Referral:

1. Fig-B1_MarApr EHMP 117-118-119-120-121.png
2. Fig-B2_MarApr EHMP 4000-4001-4002-4003.png
3. Fig-B3_MarApr WQ o01-o02-o06-o07-i03-i05.png
4. Fig-B4_NovDec EHMP 117-118-119-120-121.png
5. Fig-B5_NovDec EHMP 4000-4001-4002-4003.png
6. Fig-B6_NovDec WQ o01-o02-o06-o07-i03-i05.png
7. Fig2-1_Infrastruture configuration.png
8. Fig3-1_Annotated mesh resolution.png
9. Fig3-2_Mesh resolution.png
10. Fig4-2_LTRWRP monitoring station locations.png
11. Fig4-5_Spatial plots of 50th-80th-95th MarApr.png
12. Fig4-6_Spatial plots of 50th-80th-95th NovDec.png
13. Fig4-7_Current rose at the Northern Offshore Infra MarApr.png
14. Fig4-8_Current rose at the Northern Offshore Infra NovDec.png
15. Fig4-9_Spatial plots of difference in 50th-80th-95th MarApr.png
16. Fig4-10_Spatial plots of difference in 50th-80th-95th NovDec.png
17. Fig4-11_Coastal compartments.png
18. Fig4-12_Areas inside and outside of the Broadwater.png
19. Fig4-13_MarApr Stage6 MassInside BWMovingAve.png
20. Fig4-14_MarApr Stage6 MassInsideBW MovingAve-diff.png
21. Fig4-15_NovDec Stage6 MassInsideBW MovingAve.png
22. Fig4-16_NovDec Stage6 MassInsideBW MovingAve-diff.png
23. Fig4-17_MarApr Mass 8BeachCompartments.png
24. Fig4-18_NovDec Mass 8BeachCompartments.png
25. Fig4-19_Transport conditions isolated for further discussion.png
26. Fig4-23_NovDec Mass 8BeachCompartments.png
27. Fig4-24_MarApr Mass 3NewBeachCompartments.png
28. Fig4-25_NovDec Mass 3NewBeachCompartments.png
29. Fig4-26_main plume transport on 20110408.png
30. Hydrodynamic Assessment Part 3.pdf
31. Hydrodynamic Assessment Part 4.pdf
32. Hydrodynamic Assessment part 1.pdf
33. Hydrodynamic assessment part 2.pdf
34. Our shared commitment.pdf
35. Package 1_R.B21765.001.01.Ecological Assessment.pdf
36. Package 2_R.B21765.001.01.Ecological Assessment.pdf
37. Package 3_R.B21765.001.01.Ecological Assessment.pdf
38. R.B21765.001.01.Ecological Assessment_lowres.pdf
39. R.B22537.004.00.Seasonal_Offshore_Studies_lowres2.pdf
40. map.PNG