Australian Government
Department of Infrastructure, Transport, Regional Development and Communications

TERRITORIES DIVISION/IOT BRANCH/IOT GOVERNMENT ARRANGEMENTS

Statement of Evidence to the Parliamentary Standing Committee on Public Works

Cocos (Keeling) Islands West Island - Seawater Reverse Osmosis plant and Wastewater Treatment plant upgrade

February 2022

Table of Contents

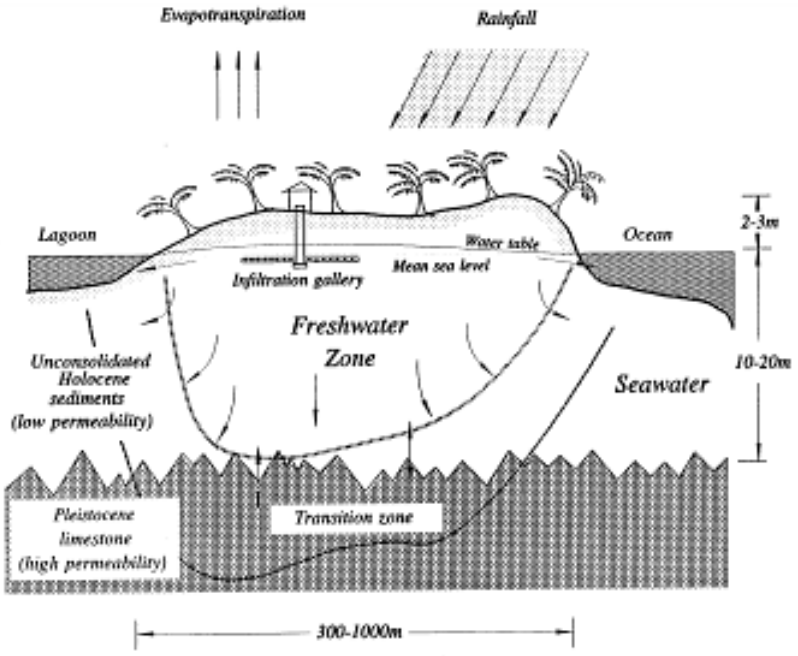
Introduction

1. The purpose of this Statement of Evidence is to provide information to the Australian public to comment on, and the Parliamentary Standing Committee on Public Works (PWC) to inquire into, works proposed under the Cocos (Keeling) Islands (CKI) construction of a new Seawater Reverse Osmosis (SWRO) plant, and a capacity upgrade of the existing Wastewater Treatment Plant (WWTP) on West Island.

2. The Projects will be delivered on CKI West Island, located in the Indian Ocean, 2,936 kilometres (km) north-west of Perth and 1,270km south-west of Jakarta, Indonesia. CKI comprises 27 coral islands with a total land area of approximately 15.6km2. A location map is shown at **Attachment 1**. Apart from North Keeling Island, which is 30km from the main group, the islands form a horseshoe-shaped atoll surrounding a lagoon, see **Attachment 2**. Two islands are occupied, with Home Island home to approximately 400 residents of Cocos-Malay descent. West Island has a residential and commercial population of approximately 140 persons.

3. The Projects proposes installing a new permanent water supply on CKI West Island to protect the community's water supply into the future. The location of the existing water source under the airfield runway is subject to possible contamination through hydrocarbon and chemical spills from airport operations, as well as possible sea water intrusion into the groundwater (freshwater lenses/zone). Figure 1 below shows a typical coral Atoll freshwater lens cross-section.

Figure 1: Cross section through a typical freshwater lens showing unconformity between unconsolidated Holocene sediments and Pleistocene limestone (Water Resources Management Review Report Indian Ocean Territories – Christmas and Cocos (Keeling) Islands, Tony Falkland, Island Hydrology Services May 2020.)



4. The WWTP on CKI West Island is operating at capacity and cannot accommodate future economic development including residential, business and tourism opportunities.

5. As CKI is administered by the Department of Infrastructure, Transport, Regional Development and Communications (the Department), the Australian Government has a duty of care to protect people and assets and provide a level of service comparable to similar mainland communities.

6. The proposed works will generate multiple benefits for the CKI community and Government by protecting water security through a sustainable water source, ensuring safer, more liveable communities and continuity of economic activity.

Purpose of works

Projects aim

7. The Projects aims to reduce the risk of possible contamination of the freshwater lenses located below the operational airfield. This freshwater lenses source is currently the only drinking water for the local community. The installation of a new SWRO plant will secure water supply for CKI West Island community and visitors into the future.

8. The capacity upgrade of the existing WWTP will support future economic development opportunities for CKI West Island.

9. The CKI economy is heavily dependent on tourism, which requires a secure freshwater source and consistent wastewater treatment capability. This proposal will build on previous and future Australian Government measures to support economic growth and diversification of CKI by supporting water security and wastewater management.

Projects objectives

10. The Projects objectives are as follows:

    a. To construct a new 200 kilolitres per day (kL/day) Seawater Reverse Osmosis plant on CKI West Island to secure the communities drinking water supply, replacing the existing groundwater source located in freshwater lenses below the airfield runway.

    b. To upgrade the capacity of the existing Wastewater Treatment plant from 50kL/day to 80kL/day to support CKI West Island economic development through increased new residential, business and tourism opportunities.

    c. To consider, assess and mitigate environmental and cultural heritage impacts at proposed work sites and any other areas affected by the works.

    d. To ensure the proposed works respond to community concerns and considerations and provide opportunities for local economic activity.

    e. To meet the Department's obligations to provide communities in the Indian Ocean Territories (IOT) with access to levels of service comparable to similar mainland communities.

Need for works

Background

11. The already vulnerable water source on CKI West Island is located below the existing airfield. This means that contamination from the airfield operations is possible, as well as saltwater intrusion into the freshwater lenses. Additionally, the WWTP on CKI West Island is at operating at capacity and cannot meet any future economic development opportunities on West Island.

12. The Government is responsible for the delivery of state-type services to local communities living in CKI, including the provision of essential services such as water and electricity. This proposal seeks approval to improve both water security and the treatment of wastewater for the CKI West Island community through the installation of a SWRO and an upgrade to the existing WWTP to increase capacity.

13. This proposal will see the CKI West Island WWTP upgrade operational and the new SWRO water source operational in January 2024.

14. The new SWRO would manage the ongoing needs of the existing population, as well as future pressures from increasing demands from tourism and increased local population.

15. Current inflows to the existing WWTP are about 50kL/day. The WWTP performance is good, however increased flows will exceed actual treatment capacity which will impact treated water quality.

16. An upgraded total capacity to 80kL/day for the existing WWTP is proposed. This would cover the short-term increase in inflows during the Department of Defence's airfield construction project (to around 67-70kL/day), and allow for future organic growth on CKI West Island, including providing for seasonal tourism fluctuations.

17. In November 2021, E.coli was detected in Gallery A2, which is one of the two freshwater lenses below the airfield runway. While investigations, treatments and continued regime of water sampling into the E.coli source are undertaken Gallery A2 has been taken off-line. This has resulted in:

    a. The CKI West Island community's water source only being taken from Gallery A3 which has a capacity of 80kL/day.

    b. A communication strategy to CKI West Island residents and businesses regarding water efficiency.

    c. Water Corporation conducting a test drill to bring 14kL/day from Home Island to West Island in an iso-container for the community to use 20L refillable bottles for drinking purposes only. Transporting water from Home Island is not a viable long-term solution.

    d. Gallery A1 which has been offline for over four years is being re-investigated as a possible water source, and determining what safety measures would need to be put in place if required for use, for example 'water must be boiled before drinking'.

Organisational basis of the need

18. CKI is governed directly by the Government, which fulfils the role of both the federal and state government. The water and wastewater infrastructure on CKI is owned by the Government and is operated and maintained by Water Corporation through an IOT Service Delivery Arrangement (SDA). Through this SDA, Water Corporation undertakes operation and maintenance of the water and wastewater infrastructure, as well as design and construction of capital funded projects for new or upgraded assets.

19. In circumstances where the Commonwealth (through the Department) provides services and facilities to the non-self-governing territories communities, it is likely to be subject to a duty of care to avoid foreseeable harm arising from those undertakings, and breaches are likely to result in an obligation on the Commonwealth to pay damages. In addition, under the *Work Health and Safety Act 2011* (Cth) (WHS Act), the Commonwealth and Departmental officers have obligations to ensure safe working conditions. A breach of these WHS obligations could result in criminal prosecution of the Commonwealth.

20. The Water Corporation is a statutory body corporate established under the Water Corporations Act 1995 (WA) of the State of Western Australia. The Water Corporation has established health, safety and environmental requirements for suppliers and contractors, and is also bound by the Work Health and Safety Act 2020 (WA).

21. Addressing safety risks in the provision of water and wastewater services is a high priority for the Government, given its obligations under the Portfolio Budget Statement Services to Territories Program 4.1 to deliver essential infrastructure that supports a comparable level of service to the territories similar to mainland communities.

Options considered

Projects

22. Proposed works are comprised of two Projects:

    a. Project 1 - Seawater Reverse Osmosis Plant

    b. Project 2 – Wastewater Treatment Plant capacity upgrade

23. Options to upgrade each Project were examined through separate processes. Analysis was informed by stakeholder consultation, site investigations and existing condition and capacity reviews.

Seawater Reverse Osmosis plant

24. The new SWRO plant on CKI West Island will be similar to the existing desalination water plant on CKI Home Island. This will provide consistency in operations and maintenance, utilising the experience of Water Corporation's local operators who have been operating the desalination plant on Home Island for more than five years. This remote technical expertise and the availability of spares (which would be interchangeable requiring less carriage of parts and materials) will ensure consistent operability of the plant.

Option - Do Nothing

25. The current CKI West Island water source is a freshwater lens that commonly occurs on coral islands. The freshwater lens is approximately 1km2 in area and sits below the CKI operational airfield runway. The freshwater lens under CKI West Island is highly vulnerable to contamination from both seawater intrusion and pollution sources due the shallow depth to groundwater, sandy porous soils and limited thickness of the lenses. Chemical pollutants, including hydrocarbons, arsenic, lead, pesticides and PFAS have been detected at some pollution monitoring boreholes across West Island, particularly around the runway, and the light industrial area near the existing water supply.

26. A ground water risk assessment was undertaken to determine the source risk of the current water supply on CKI West Island, using quantitative information (groundwater vulnerability and water quality assessment) and qualitative information (catchment risk assessment). Groundwater sources are categorised into four levels, one being the lowest level of risk, four being the highest level of risk. Generally speaking, level one sources have low groundwater vulnerability and low catchment risks. Level four sources have high groundwater vulnerability in

which groundwater is highly connected to surface water and high catchment risks. The Water Corporation considers Level four sources unsuitable for a drinking water supply.

27. There are three groundwater 'galleries' at CKI West Island (1A, 2A, 3A). Gallery 1A has been offline for more than two years, due to repeated and high microbiological contamination events. Galleries 2A and 3A abstract water from an unconsolidated and highly permeable fresh water lens. Due to the connectivity between surface water and groundwater, groundwater vulnerability is considered 'extreme'. Both galleries have urban development within their Well Head Protection Zones (WHPZ) including septic systems and other pathogen sources from surface water runoff. Pathogen sources within a WHPZ are considered an 'extreme' catchment risk. According to the Groundwater Pathogen Risk Assessment (GPRA), galleries 2A and 3A have extreme groundwater vulnerability and extreme catchment risks, and are therefore a Level four source.

28. An extensive upgrade to the CKI airfield runway is due to commence in late 2023 managed by the Department of Defence. The works on the CKI runway will further increase the risk to contamination to the community drinking water supply, and is an extreme risk to public health and continuity of water supply. Demand for drinking water and construction water for the duration of the project will also exceed production capacity and therefore a new source will be required for the community and the project.

Other options considered

29. Additional galleries in the existing lens or northern lens to increase water production for the duration of the runway upgrade were considered, however due to the high vulnerability to groundwater contamination of the CKI West Island airfield and Northern Lenses, use of the groundwater from these sources is not considered suitable by Water Corporation and the WA Department of Water and Environment Regulation for a public drinking water supply.

Wastewater Treatment plant capacity upgrade

30. The most efficient means of delivering increased capacity to the WWTP is through a modular package-type treatment system. Such systems are fabricated and fully tested in-factory before despatch from the Australian mainland, so that installation and start-up on site is relatively quick and straightforward.

31. The Department considers that these options represent the best value for money to the Commonwealth. They address identified needs, enable the Department to fulfil its duties and obligations, and are affordable within the Projects budget. The preferred options incorporate the critical infrastructure required to mitigate key health and safety risks to the CKI West Island community and visitors.

Alternative options considered

32. Although the existing WWTP was set out with the intention of future duplication of the Intermittent Decanted Extended Aeration (IDEA) treatment system, it is the Water Corporation's strong preference that the WWTP upgrade is developed around a continuous treatment configuration. It is considered that a continuous facility will be easier and simpler to operate and would provide more robust and reliable treatment performance.

33. Other technology considered include Membrane bioreactor (MBR) systems. The water industry appears to prefer to offer package MBR systems at this scale (<100kL/day). As many small systems are developed to facilitate reuse, this is understandable. However, although much progress has been made with simplifying Ultra Filtration (UF) technology, MBR systems still represent a much greater level of complexity, compared to conventional systems.

34. A Rotating Dynamic Disc Filter (RDDF) was considered, as a unit which has been under trial at the Bridgetown WWTP since late January 2021, as an alternative to conventional secondary clarification. Much like a MDR plant, RDDF technology is considered too complex for a remote location.

35. Expected benefits from the Projects include:

    a. **Safer and more secure community and infrastructure** by ensuring the community has water security through a SWRO replacing the reliance on the groundwater lenses below the CKI West Island operational airfield.

    b. **More efficient, effective response management** by instilling greater confidence in the provision of essential water and wastewater services to the CKI West Island community.

    c. **Unlocked liveability potential** by protecting the community from a groundwater source that is at high risk of contamination through airport operations and saltwater intrusion, as well as allowing economic development opportunities through the availability of essential services.

    d. **Reduced total cost of ownership** by providing water and wastewater infrastructure that enables ease of maintenance and minimises sustainment costs.

Scope of works

Location of the Projects

36. The SWRO Project will be installed adjacent to the existing WWTP on Part Lot 100 Sydney Highway, CKI West Island, refer **Attachment 3**.

Projects scope

37. This proposal seeks to secure CKI West Island community water supply, and allow for future economic development of the local community.

    a. Project 1 – Seawater Reverse Osmosis plant

    b. Project 2 –Wastewater Treatment plant capacity upgrade

Project 1 – Seawater Reverse Osmosis plant

38. Long-term water security will ensure that essential services are maintained, and households and businesses continue to have access to a safe and reliable drinking water source. Water security is an essential precursor for economic diversification and is required to support industries across CKI, including tourism, education and hospitality, as well as attracting investors by providing certainty in the provision of potable water, which will not impede the establishment, maintenance and growth of businesses or industries.

39. If water security is not addressed, critical water shortages on CKI West Island could have significant implications for human health, and impact on the provision of essential services such as healthcare. The emergency provision of water would also be expensive and logistically challenging for the Government to respond to, due to the remoteness of CKI and limited options available to secure other sources of potable water. Transporting water from Home Island to West Island is not a viable long-term option.

40. While the only potable water source on CKI West Island is the freshwater lenses below the operational airfield, the risk of contamination remains. Supply of 200kL/day water from the SWRO plant will provide an alternate water source to mitigate the risk of not having potable water available in the event that the freshwater lenses were contaminated.

SWRO Project Scope

41. The SWRO project scope is anticipated to include the following:
    - Installation and fit out of beach bores (four duty, one standby) to feed SWRO plant.
    - Seawater feed line to new water treatment plant (WTP) site (adjacent to CKI West Island WWTP). Pipeline route to be finalised after topographical review.
    - WWTP including raw water, brine and product water tanks, and containerised treatment modules (one process container, one electrical/SCADA container) with output capacity of 200kL/day, including feed pumps, pre-treatment, cartridge filters, Reverse Osmosis (RO) modules, energy recovery device, post treatment chemical dosing and potable water supply pumps. The RO membranes will have a dedicated Clean In Place (CIP) system.
      The plant will be configured as one train complete with duty/standby for critical equipment items. Design to be based on CKI Home Island Desalination Plant.
    - The SWRO will be designed to provide a treated water quality in compliance with the Australian Drinking Water Guidelines and to protect downstream infrastructure.
    - The SWRO will be housed in two standard High Cube sized (20 foot) sea containers, one containing the process plant and the other containing an electrical/control room and store room.
    - The SWRO will be fully automated and communications between the bores, SWRO and the town tanks will be included. In terms of instrumentation and control the packaged plant shall be fully automated with remote access, however, it should also have the ability to run in manual mode. These features will enable the plant to have a high level of reliability given the remote location.
    - Post-treatment chemical dosing to be via:
      – Relocation of existing canister fluoride dosing package (at current CKI West Island WTP) if feasible, or new fluoride dosing package (likely canister system) as necessary.
      – New disinfection/chlorine dosing system at new treatment plant.
      – Assessment of electro chlorination vs tablet chlorination
      – Calcite filter as used on CKI Home Island to remineralise water leaving the SWRO.
    - All necessary works for full SCADA/Instrumentation and Control (I&C), operation and integration. Provision and integration of a new ClearSCADA server to be considered.
    - Installation of shade structure for components of the plant which cannot be installed inside the containerised buildings.
    - Upgrade as necessary to existing power supply at WWTP to supply both SWRO and WWTP.
    - 3km water pressure main from new SWRO to existing CKI West Island ground water tanks (1&2).
    - Optic fibre communications cable from new SWRO to Water Corporation's CKI West Island office.
    - Brine disposal pump station and disposal pipeline (integrated with existing WWTP outfall).

Project 2 - Wastewater Treatment plant capacity upgrade

42. The existing WWTP is currently operating at capacity at 50kL/day. New economic development opportunities which rely on access to wastewater infrastructure on CKI West Island cannot be progressed until the WWTP capacity is increased. An increase of 30kL/day to a capacity of 80kL/day is proposed to enable future economic development of CKI West Island community.

43. Although the existing WWTP was set out with the intention of future duplication of the IDEA treatment system, it is the Water Corporation's strong preference that the WWTP upgrade is developed around a continuous treatment configuration. It is considered that a continuous facility will be easier and simpler to operate and would provide more robust and reliable treatment performance.

44. Initial concept design development by the Corporation (Appendix 5) is based on enhancement and conversion of the existing IDEA plant. The proposed upgrade works are configured to facilitate integration with the minimum of disruption to existing plant operations.

45. It is envisaged that the WWTP upgrade will be delivered via a Design and Construct contract. Whilst this delivery method enables innovation, the Water Corporation requires that the Preliminary Design outlined in the Design and Construct Tender is sufficiently detailed to fix non-negotiable/mandatory requirements. These requirements are outlined in the project scope summary below.

WWTP upgrade project scope

46. The WWTP upgrade project scope is anticipated to include the following:

Preliminary Treatment

- The existing grinder shall be retained as a standby pre-treatment unit and will be by-passed for normal operations.
- A new package inlet screening and grit removal system shall be provided immediately downstream of the existing grinder.
- Inlet screens shall be 2mm diameter perforated plate inclined sieve (Huber Rotamat or equal), duty + 100% standby, with manually raked high-level emergency bypass direct to grit removal system below.
- Full platform access shall be provided for elevated equipment.
- The existing inflow auto-sampler suction line shall be relocated to draw from downstream of the grit removal system.
- Consideration shall be given to provision of suitable shade-cloth (or similar) weather shelter, both side and overhead, to protect Operational personnel from the elements.

Secondary Treatment

- A modular selector zone shall be provided for biomass settleability conditioning, located between grit removal system outlet and secondary treatment tank inlet.
- The selector zone shall be sized for nominal 1 hour retention at Annual Average Daily Flow (AADF).
- The selector shall be configured so that its volume may be varied and optimised to match influent flow rates (see **Attachment 5**). Inflows may drop to as low as 40kL/day after all construction work on CKI West Island has been completed.
- Selector tanks not in use shall be configured so that they may be drained for cleaning.
- Full platform access shall be provided so that Top Water Level (TWL) of each selector tank may be observed.
- The existing Sinkair aerator devices shall be removed and replaced in the same location with submersible jet aerators (Flygt JA112 or equal) in a 2 duty + 50% standby configuration.
- Aeration control shall be via a minimum of two Dissolved Oxygen sensors.
- **Attachment 5** shows a concept arrangement for plug-flow operation of the process tank, to mimic the operation of a single pass oxidation ditch. The baffle and walkway arrangement are intended to be modular and drop-in, so that the tank does not need to be drained i.e. decommissioned.
- The existing gas-lock siphon decanter manifold shall be replaced with a DN600 bellmouth drop-inlet for constant level discharge of mixed liquor.
- The existing WAS pumps shall be retained.

Secondary Phase separation

- The existing DN150 treated water discharge pipe between the IDEA and Balance tanks shall be diverted to transfer mixed liquor for phase separation.
- Mixed liquor transfer shall be by gravity.
- Phase separation shall be achieved by provision of 1 duty + 100% standby secondary sedimentation tank (SST), equipped with full-length bridge, centre-drive, flocculation well, sloped floor echelon scraper and vee-notch launder.
- Scum removal is not required.
- Each SST shall be suitably covered/shaded to prevent access by birdlife.
- Settled sludge shall be returned to the process by 1 duty + 100% standby Return Activated Sludge (RAS) pumps. It is possible that both SSTs will be operated. RAS pump station functionality shall be such that either one or the other or both pumps may be used for sludge withdrawal from either one or both SSTs.
- RAS flow rate shall be measured by magnetic flow meter.
- RAS shall be pumped to an elevated Splitter Box located at the inlet to the selector.
- RAS splitter box design shall be based on the concept defined in drawing (**Attachment 5**), suitably sized for the design flow rates.
- RAS discharge from the Splitter Box to the selector inlet shall be measured by magnetic flow meter, whereas measurement of discharge direct to the process reactor is not required.

Tertiary Disinfection and Treated Water Disposal

- Treated water from the SSTs shall be discharged by gravity to the existing Balance Tank.
- The existing Ultra Violet system was recently upgraded. The suitability of the system for disinfection of increased flows up to 100kL/day shall be assessed.
- It is envisaged that the existing Treated Water Disposal pumps will be fit-for-purpose for the increased duty of up to 100kL/day. Nevertheless, the hydraulic capacity of the treated water storage and disposal system shall be assessed to confirm this.
- A suitable auto-sampler for inlet works and outfall sampling shall be provided for monitoring the quality of disinfected treated water. The auto-sampler shall be suitably protected from the elements.

Waste Solids Management

- Waste Activated Sludge (WAS) shall be drawn from the process tank and pumped to a geobag dewatering system. Polymer conditioning of the WAS stream is not required.
- The existing sludge drying beds shall be replaced with a new geobag storage and drainage collection bund, as depicted in **Attachment 5**.
- WAS delivery pipework shall be set out so that WAS may be delivered to geobags located anywhere within the bund area.
- The area indicated is over-sized but will provide significant operational flexibility for dewatering and storage of biosolids.
- Design intent is provision of sufficient area for storage of 4 geobags (nominal 8m long x 2m wide, with minimum 2m clear space on all sides) for 12 months.
- The bund shall be configured to drain to the existing filtrate pump station, which shall be retained.
  The hydraulic capacity of the pumpstation shall be assessed, to ensure that the existing facility is capable of managing the increased duty.
- The bund shall facilitate access by wheeled loader for biosolids removal.

Site Services

- The existing site is provided with rudimentary drainage. All new unit processes (inlet, selector, SSTs, and RAS pump station) shall be provided with suitable drainage to remove spillage and other discharges to a common collection point. Ideally, this should be the existing filtrate pump station, but this may not be possible. If not, a new general-purpose pump station to service the whole site shall be provided.
- Flow from a site drainage pump station shall be directed to the inlet of the screens.
- New Operations facilities shall be provided to replace the existing building. The drawing at **Attachment 5** shows a concept arrangement consisting of standard 6.1m container buildings (dock off-loading facilities cannot accommodate anything larger than 6.1m). The arrangement assumes co-location with facilities required by the adjacent Water Treatment Plant (WTP). As a minimum the following separate areas shall be provided:
  - WWTP electrical switch room.
  - WWTP control room/office.
  - WWTP laboratory, including:
    - sealed, exhausted fume cupboard
    - fixed, heavy-duty surface for weighing instruments.
  - Common amenities, including:
    - showers and ablutions
    - industrial washing machine and dryer.
  - Common meeting area/kitchen.
  - WTP laboratory.
  - WTP control room/office.
  - WTP electrical switch room.
- All buildings shall be equipped with suitably rated air-conditioning systems.
- Containerised buildings are prone to corrosion. Thus, any new operational facilities shall be provided with suitable cyclone-rated roofing to eliminate rainwater ponding.
- All wet services in the Operations facilities shall be discharged to the WWTP site drainage system.

Electrical, Instrumentation, Control and Operational Technology:

- The existing site power supply shall be assessed for capacity. It is assumed to be adequate for the anticipated WWTP demand, but addition of the proposed WTP demand is likely to require a supply capacity upgrade.
- The upgraded WWTP shall be designed for fully automated, remote operation, with full visibility from the CKI West Island Water Corporation depot.

Durability

- All materials for equipment and structures shall be selected to maximise durability in what is an aggressive, corrosive exposure environment. For example, coastal, chemical, etc.
- All instrumentation shall be suitably shielded and protected from the elements.

Other

- Roadworks and stormwater drainage shall be upgraded to accommodate the proposed new unit processes across both WWTP and WTP sites.
- All decommissioned and redundant assets and equipment shall be returned to the mainland for either recycling or disposal as applicable.

Planning and design concepts

Design philosophy

47. The general design philosophy for the Projects are that the proposed works will:

    a. Provide readily and safely constructible, low-maintenance and long-design-life solutions that optimise whole-of-life costs for the assets.

    b. Reduce the risk associated with contamination of the groundwater lenses from airport operations and salt water intrusion.

    c. Use existing infrastructure to minimise capital costs, where possible, while considering capacity limitations.

Master and site planning

48. Proposed works are consistent with the intent of our Cocos (Keeling) Islands 2030 Strategic Plan, the community's plan is to ensure a prosperous, sustainable, and diverse future for all within CKI. This plan supports CKI's overall aim in delivering a sustainable future that unifies the community, diversifies the economic base and enhances the natural and cultural environment.

Workplace Health and Safety measures

49. The Projects will comply with the *Work, Health and Safety Act 2011* (Cth) and the *Work, Health and Safety Act 2020* (WA). The Water Corporation also has work, health and safety requirements which all contractors and suppliers need to comply with in their service provision.

50. The Department has been in consultation with the Office of the Federal Safety Commissioner (OFSC) regarding the Australian Government Building and Construction Work Health and Safety Accreditation Scheme. The OFSC has advised that it considers that section 43 of *the Building and Construction Industry (Improving Productivity) Act 2016* (BCIIP Act) applies to these Projects. This requires the Department to take steps to ensure that all contracts for non-prescribed building work that Water Corporation enters into for delivery of the Projects are with accredited builders.

51. The Water Corporation, and their design team, will employ a safety in design approach to address risk mitigations and document safety measures to be adopted in both construction and operation of the works. The construction contractor will be required to develop and adhere to a safety management plan for the construction phase, which incorporates safety in design mitigations identified by the design team as well as other risk mitigations, prior to commencing any works.

Structural design

52. Design for the SWRO and WWTP capacity upgrade have been informed by site investigations and geotechnical and topographical conditions. Schematic and detailed designs for structural elements will be developed by suitably qualified engineers, and in accordance with Australian Standards.

Civil design

53. Civil designs will be completed by suitably qualified engineers and reviewed by Water Corporation Design Engineers.

Groundwater borehole drilling and exploration

54. The groundwater source will be relocated to an area approximately 3km north of the main settlement where catchment risks are considered acceptable. Five production bores are planned, targeting the weathered Pleistocene sediments and limestone, aiming to abstract the underlying seawater, targeting up to 200kL/day (per well). The basis of well design was prepared by Water Corporation's Hydrogeological staff and works will be completed by a suitably qualified Driller.

Security measures

55. The security design for proposed works will address risk associated with controlling unauthorised access, vandalism or unintended damage.

Materials

56. Materials specified for buildings and plant are to consider corrosion and cyclonic conditions.

Environmental sustainability

57. A key Departmental and Water Corporation requirement is for the Projects to deliver a sustainable outcome for the Australian Government by improving water security for the CKI West Island community, and by re-using or upgrading existing infrastructure (where appropriate).

58. The Projects will improve CKI West Island's environmental sustainability by providing a new secure water source for the community. Controlling the management of wastewater through a plant with increased capacity will mitigate sewerage overflows, and controlled management of release of treated water through the existing ocean outfall pipe.

59. Strategies adopted by the Projects to achieve cost-effective, ecologically sustainable development include:

    a. **Commitment to re-use the existing WWTP**. Opportunities to re-use existing infrastructure were considered throughout the design development and options review processes.

    b. **Minimisation of waste.** As the SWRO and WWTP modular upgrades will be constructed on the Australian mainland there will be minimal waste generated on the island. Any waste products from the Projects will be transported back to the mainland for disposal.

    c. **Considered choice of construction materials**. Materials and finishes will be selected for their functionality, durability and low-maintenance features to minimise environmental impacts and generate long-term cost efficiencies.

    d. **Prudent asset management.** An asset management plan is in place for the CKI water and wastewater services. This plan establishes the required maintenance and replacement schedule for the assets to optimise the design life and minimise whole-of-life costs of the infrastructure.

Anticipated impacts on the CKI community and mitigation

60. Rigorous assessment has identified potential environmental and community impacts. Results can be summarised as follows:

    a. **Visual impacts** – The Projects are not expected to cause a material change to the visual character of the sites. The proposed SWRO will be located adjacent to the existing WWTP. The borefields will be located away from beach areas frequented by residents and tourists.

    b. **Noise impacts** – Community members may experience some short-term noise impacts during construction from equipment used for clearing, excavation and construction. Community members will be informed of upcoming construction works and likely timeframes. Construction of the SWRO will be in Western Australia in a modular format and transported to CKI West Island for installation. There may be some noise and vibration which may temporarily affect local fauna, but it is unlikely to have a permanent impact.

    c. **Heritage value** – The proposed site for the SWRO and borefield is on land which contains mainly coconut palms. There are no heritage sites in the vicinity of the proposed plant.

    d. **Traffic, transportation, and road impacts** – Traffic and population numbers will increase during construction. There is only a small road system on CKI West Island, and Sydney Road is the main road between the settlement and the Port. A traffic management plan will be put in place when the plant is delivered from the Port to the site.

    e. **Existing local facilities** – The Projects are not expected to impact on any existing local facilities. The site is located away from the CKI West Island settlement.

Related Projects

61. On 7 February 2022, the PWC approved ‘early’ or ‘partial’ works required to inform the design of the SWRO. This Project includes:

    a. **Seawater borehole drilling and exploration** – It was necessary to clear vegetation, predominantly coconut palms, to drill groundwater boreholes to make an assessment of water quality.

Relevant Legislation, Codes and Standards

62. The following key legislation, standards, codes, and guidelines are applicable:

    a. *Environment Protection and Biodiversity Conservation Act 1999* (Cth)
    b. *Environmental Protection Act 1986* (WA)
    c. *Work, Health and Safety Act 2011* (Cth)
    d. *Work, Health and Safety Act 2020* (WA)
    e. *Disability Discrimination Act 1992* (Cth)
    f. *Fair Work Act 2009* (Cth)
    g. *Water Services Act 2012* (WA)
    h. Shire of Cocos (Keeling) Islands Local Planning Strategy
    i. Our Cocos (Keeling) Islands 2030 Strategic Plan
    j. Cocos (Keeling) Islands Town Planning Scheme No. 1
    k. Western Australian planning legislation, supported by a Commonwealth IOT SDA with the Western Australian Department of Planning, Lands and Heritage.

63. Proposed works will comply with all relevant standards, codes, and guidelines listed at **Attachment 4**.

64. Subject to Parliamentary approval, the design will be certified by a Consulting Engineer and reviewed by Water Corporation's Engineering staff. Construction will be inspected by technical staff to ensure compliance.

Land, zoning and approvals

65. The Shire of Cocos (Keeling) Islands Town Planning Scheme provides the statutory framework for land use and development on CKI, in accordance with Western Australian planning legislation. No changes to existing land use and water use conditions are proposed by the Projects.

66. Acquisition of land for the Projects has been obtained through a lease with the Shire of Cocos (Keeling) Island (the Shire). The *Local Government (Transition) Ordinance 1992* established the Shire by absorbing its predecessor the Cocos (Keeling) Islands Council. By this arrangement, the body corporate called the Shire of Cocos (Keeling) Islands became the trustee for the Land Trust 1984. Decisions relating to the Trust are made by the Shire Council as the decision-making arm of the body corporate.

67. The Land Trust 1984 Deed applies to all parcels of land situated and being above the high-water mark within CKI, including North Keeling Island, but not including parcels of land as described in the First Schedule of the 1984 Trust Deed. This transferred land was to be held by the Council (and later, by its successor, the Shire) 'upon trust for the benefit, advancement and wellbeing of the Cocos (Keeling) Islander's resident in the Territory on land owned by the Council'.

68. On 24 November 2021, the Shire granted development approval for the SWRO, borefield and associated infrastructure subject to the submission of final drawings for approval.

Environmental impact assessments/approvals

69. Western Australian legislation is applied as Commonwealth law in the Indian Ocean Territories (IOT) and for CKI as per Section 8A of the *Cocos (Keeling) Islands Act 1955*. The IOT is managed by the Department of Water and Environmental Regulation (DWER) through a IOT SDA with the Commonwealth, under the *Environmental Protection Act 1986* (WA)(CKI) and related subsidiary legislation.

70. The CKI West Island SWRO and beach bores will have the same design, production capacity and specifications as the existing CKI Home Island SWRO plant. Brine from the CKI Home Island SWRO is discharged via the Home Island WWTP ocean outfall and the same discharge regime is proposed for brine disposal from the West Island SWRO (i.e. via the West Island WWTP ocean outfall but with each effluent discharged separately). The West Island WWTP capacity is currently approximately 53kL/day and will be upgraded to 80kL/day.

71. In 2013, the Home Island SWRO was referred under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) and deemed not to be a controlled act (EPBC Act 2013/6833).

72. On 25 January 2022, the CKI West Island SWRO was referred to the Department of Agriculture, Water and Environment under the EPBC Act.

73. Advice received from DWER on secondary approvals:

- water production bores are considered structures (123848011) and as such clearing for their construction is exempt under Item 1, Regulation 5
- a 26D licence to construct the production bores is not required as the borefield is not in a proclaimed area.

74. Water Corporation has engaged a consultant, RPS, to undertake hydrodynamic modelling of the brine discharge to the marine environment, complete an Environmental Impact Assessment (EIA), and prepare the referral documentation required for submission under the EPBC Act.

Consultation with key stakeholders

75. The Department recognises the importance of providing local residents, statutory authorities, and other interested stakeholders an opportunity to provide input into, or raise concerns relating to, the proposed works. Where practical, community consultation for the Projects will be conducted concurrently with consultation for related projects.

76. Key stakeholders have contributed to the Projects from its inception by participating in consultation meetings, teleconferences, and review processes for key deliverables.

77. Consultation on the Projects has been undertaken, and will continue to occur, with the following stakeholders:

    a. Australian Government:
        i. Administrator of the Territory of the Cocos (Keeling) Islands
        ii. Indian Ocean Territories Administration
        iii. Indian Ocean Territories Power Service
        iv. Department of Agriculture, Water and the Environment
        v. Department of Defence

    b. Western Australian Government
        i. Department of the Premier and Cabinet
        ii. Department of Health (water quality)
        iii. Department of Water and Environmental Regulation
        iv. Department of Planning, Lands and Heritage

    c. Local Government
        i. Shire of Cocos (Keeling) Islands

    d. Other stakeholders
        i. Cocos (Keeling) Islands residential and business community
        ii. Fulton Hogan (Department of Defence contractor)
        iii. AECOM (Department of Defence contractor)
        iv. Toll (CKI airport operator)
        v. Linx (Port operator)

78. Due to the remoteness of CKI, initial consultation with the CKI community will be through an article in the local newsletter, The Atoll. This article will be supported by a Fact Sheet and Frequently Asked Questions available on the Department's website. The Water Corporation also has locally based staff on CKI who can also assist with questions raised by the community.

79. The project team will visit CKI in March or April 2022 to meet face-to-face with key stakeholders, and conduct a community information session regarding the Projects.

Cost effectiveness and public value

Projects costs

80. The estimated cost of the Projects is $18.4 million (excluding Goods and Services Tax). This includes management and design fees, construction costs, contingencies, and a provision for escalation.

81. Funding for the Projects is over two years and was approved in the 2021-22 Mid-Year Economic and Fiscal Outlook through a New Policy Proposal, as follows:

    a. SWRO - $13.3 million, and an additional funding contribution of $0.98 million from the Department of Defence's approved Development Phase budget for the CKI runway upgrade project.

    b. WWTP capacity upgrade - $4.1 million.

82. The operation and maintenance of the new SWRO and upgraded infrastructure will be managed from within the Department's Administered Appropriation for Water Corporation's IOT SDA.

Projects delivery system

83. Delivery of the Projects will be the following contracts:
    a) Design Consultancy – Preparation of bid ready documents
    b) Environmental Consultancy – Preparation of EIA and EPBC referral documentation
    c) Bore Drilling – Drilling and testing of production bores for SWRO
    d) Design and Construct Contractor – Head Contractor responsible for delivery of remainder of works.

Construction program/projects schedule

84. Subject to Parliamentary approval, construction is expected to commence in April 2023 with completion of works occurring by January 2024. Anticipated key milestones are shown in the table below.

Task No	Task	Target completion date
1	Head Contractor engagement	April 2023
2	Commence construction	April 2023
3	Construction complete – Project Element 1 (Mainland fabrication)	August 2023
4	Construction complete – Project Element 2 (CKI installation)	January 2024
5	**End of Head Contractor defects liability period**	**January 2025**
6	Post project implementation report to the PWC	February 2025

Revenue

85. The Commonwealth collects revenue for the provision of water and sewerage services to residential and commercial customers on CKI. Fees and charges are reviewed and updated annually in *the Cocos (Keeling) Islands Utilities and Services (Water, Sewerage and Building Application Service Fees) Determination 2016.*

86. Revenue received for the provision of essential services to CKI, including water and sewerage is remitted monthly by Water Corporation to the *Public Governance, Performance and Accountability Act 2013* (Cth) (IOT Special Account 2014 – Establishment) Determination 02, established on 3 November 2014.

87. The IOT Special Account 2014 allows debits to be made in delivering essential services and infrastructure to the IOT.

Public value

88. The Projects were assessed to be in the public interest. It will provide significant benefits to the CKI West Island community by:

    a. **Meeting health and safety needs**. The Projects will reduce risks to life on CKI West Island by reducing the risk of contamination to the community water supply, and the effective management and treatment of wastewater.

    b. **Providing employment opportunities**. The Projects will generate job opportunities on CKI in the short-term, predominantly in clearing vegetation for the SWRO and the borefield, and labour hire to assist the Drilling Contractor. Off-site job opportunities will also be generated through the manufacture and transportation of materials during construction. This positive economic stimulus is likely to benefit small and medium enterprises.

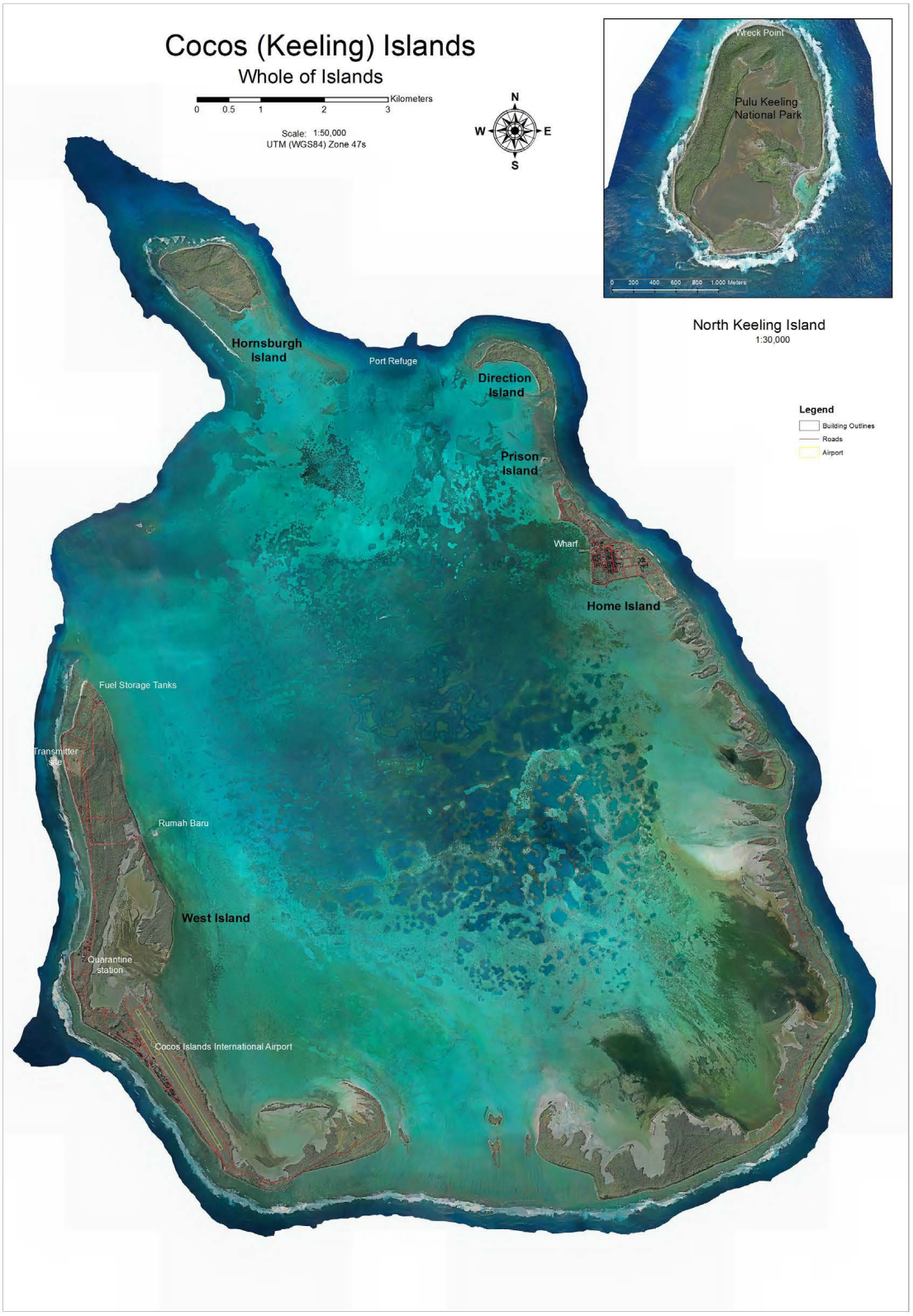
    c. **Economic development**. CKI is a tourism destination, and has become more attractive to visitors during the COVID-19 pandemic which has increased the number of visitors from the mainland to the islands. The existing WWTP is currently constrained by its capacity, without an increase no further developments can proceed which require access to wastewater treatment services.

Attachments

1. Cocos (Keeling) Islands location map
2. Cocos (Keeling) Islands Whole of Islands map
3. Cocos (Keeling) Islands Part Lot 100 Sydney Highway, West Island Site Plan
4. Design Standards, Guidelines and Codes
5. SWRO – Conceptual plant layout

Attachment 1: Cocos (Keeling) Islands location map

Attachment 2: Cocos (Keeling) Islands – Whole of Islands map



Attachment 3: SWRO and WWTP Site Plan, West Island

Attachment 4: Design Standards, Guidelines and Codes

Standard Reference	Description
ANSI/ISA S5.1	Instrumentation Symbols and Identification
ANSI/ISA S51.1	Process Instrumentation Terminology
AS 1074	Steel tubes and tubulars for ordinary service
AS 1100	Technical Drawing
AS 1111	ISO metric hexagon commercial bolts and screws
AS 1112	ISO metric hexagon nuts, including thin nuts, slotted nuts and castle nuts
AS 1159	Polyethylene pipes for pressure applications
AS 1163	Structural Steel Hollow Sections
AS 1167 Pt 2	Welding and Brazing - Filler Metals for Welding
AS 1170.1	SAA Loading Code Dead and Live Loads and Load Combination
AS 1170.2	SAA Loading Code Wind Loads
AS 1170.4	SAA Loading Code Earthquake Load
AS 1214	Hot-dip galvanised coatings on threaded fasteners
AS 1217	Acoustics - Determination of Sound Power Levels of Noise Sources
AS 1237	Flat metal washers for engineering purposes (metric series)
AS 1252	High strength steel bolts with associated nuts and washers for structural engineering
AS 1254	Unplasticised PVC (uPVC) pipes and fittings for storm and surface water applications
AS 1260	Unplasticised PVC (uPVC) pipes and fittings for drainage, waste and vent applications
AS 1275	Metric screw threads for fasteners
AS 1281	Cement mortar lining of steel pipes and fittings
AS 1289	Methods of Testing Soils for Engineering Purposes
AS 1319	Safety signs for the occupational environment
AS 1339	Code of practice for the manual handling of materials
AS 1345	Identification of the Contents of pipes, conduits and ducts
AS 1359	Rotating Electrical Machines
AS 1397	Steel Sheet and Strip - Hot Dipped Zinc Coated or Aluminium/Zinc Coated
AS 1403	Design of rotating steel shafts
AS 1418	Crane (including Hoists and Winches)
AS 1432	Copper tubes for plumbing, gas fitting and drainage applications
AS 1444	Wrought alloy steels

Standard Reference	Description
AS 1449	Wrought alloy steels – Stainless and heat-resisting steel plate, sheet and strip
AS 1460	Fittings for use with polyethylene pipes
AS 1463	Polyethylene pipe extrusion compounds
AS 1477	Unplasticised PVC (uPVC) pipes and fittings for pressure applications (metric units)
AS 1516	The cement mortar lining of pipelines in situ
AS 1538	Cold Formed Steel in Structures Codes
AS 1553 Pt 1	Covered Electrodes for Welding - Low Carbon Steel Electrodes for Metal-Arc Welding of Carbon and Carbon-Manganese Steels
AS 1553 Pt 2	Covered Electrodes for Welding - Low and Intermediate Alloy Steel Electrodes for Manual Metal-Arc Welding of Carbon Steels and Low and Intermediate Alloy Steels
AS 1554.1	Welding of steel structures
AS 1565	Copper and copper alloys - ingots and castings
AS 1579	Arc welded steel pipe for water and waste water
AS 1594	Hot rolled steel flat products
AS 1603	Automatic Fire Detection and Alarm Systems
AS 1627	Metal finishing–preparation and pre-treatment of surfaces
AS 1646	Elastomeric seals for waterworks purposes
AS 1657	SAA Code for Fixed Platforms, Walkways, Stairways and Ladders – Design
AS 1668	The use of mechanical ventilation and air conditioning in buildings
AS 1670	Fire Detection, Warning, Control & Intercom Systems – System Design, Installation and Commissioning
AS 1722	Pipe threads of whitworth form. Part 1 - sealing pipe threads
AS 1789	Electroplated Coatings - Zinc on Iron or Steel
AS 1790	Electroplated Coatings - Cadmium on Iron or Steel
AS 1858 Pt 1	Electrodes and Fluxes for Submerged-arc Welding Carbon Steels and Carbon-Manganese Steels
AS 1968	Helical Spring Lock Washers (Metric Series)
AS 2032	Code of practice for installation of uPVC pipe system
AS 2053	Non-metallic conduits and fittings
AS 2203.1	Cored Electrodes for ARC - Welding Ferritic Steel Electrodes
AS 2211.2	Laser safety – safety of optical fibre communications systems
AS 2280	Ductile iron pressure pipes and fittings

Standard Reference	Description
AS 2293	Emergency Evacuation Lighting for Buildings
AS 2417	Pumps - the international test codes
AS 2439	Perforated plastics drainage and effluent pipes and fittings
AS 2518	Fusion-Bonded Low-Density Polyethylene Coating for Pipes & Fittings
AS 2528 Sect 3	Bolts, stud bolts and nuts for flanges and other high and low temperature applications
AS 2625	Rotating and reciprocating machinery - mechanical vibration
AS 2634	Chemical Plant Equipment Made from Glass Fibre-Reinforced Plastics (GRP) Based on the Thermosetting Resins
AS 2638	Sluice valves for waterworks purposes
AS 2700	Colour standards for general purposes
AS 2729	Rolling bearings – dynamic load ratings and rating life - calculation method
AS 2837	Wrought Alloy Steels - Stainless Steel Bars and Semi Finished Products
AS 2845	Water supply – backflow prevention devices
AS 3439.1	Low Voltage Switchgear and Controlgear Assemblies - Type-Tested and Partially Type-Tested Assemblies
AS 3500	National drainage and plumbing code
AS 3518	Acrylonitrile butadiene styrene (ABS) pipes and fittings for pressure applications
AS 3578	Cast iron non return valves for general purposes
AS 3678	Hot rolled structural steel plates, floor plates and slabs
AS 3679.1	Hot Rolled Bars and Sections
AS 3679.2	Structural Steel - Welded Sections
AS 3688	Water supply - copper and copper alloy compression and capillary fittings and threaded connectors
AS 3828	Guidelines for the Erection of Building Steelwork
AS 3851	The Calculation of Short-Circuit Currents in Three-Phase AC Systems
AS 3855	Suitability of Plumbing and Water Distribution Systems Products for Contact with Potable Water
AS 3879	Solvent cements and priming fluids for use with unplasticised PVC (uPVC) pipes and fittings
AS 3992	Boilers and Pressure Vessels- Welding and Brazing Qualification
AS 4020	Products for Use in Contact with Drinking Water
AS 4024.1	Safety guarding of machinery - General principles
AS 4041	Pressure Piping

Standard Reference	Description
AS 4087	Metallic flanges for waterworks purposes
AS 4100	Steel Structures
AS 4158	Polymeric Coatings on Valves and Fittings for Water Industry Purposes
AS 4168.3	Programmable Controllers - Programming Languages
AS 4600	Cold Formed Steel Structures Code
AS 4680	Hot dipped galvanised coatings on fabricated ferrous items
AS K132	Electroplated Coatings on Threaded Components
AS/ACIF S008	Requirements for Authorised Cabling Products
AS/ACIF S009	Installation Requirements for Customer Cabling (Wiring Rules)
AS/NZS 1158	Road Lighting
AS/NZS 1680	Interior Lighting
AS/NZS 2789	Internal combustion engines: Performance
AS/NZS 3000	SAA Wiring Rules
AS/NZS 3008.1.1	Electrical Installations - Selection of Cables - Cables for Alternating Voltages up to and including 0.6/1kV - Typical Australian Installation Conditions
AS/NZS 3080	Telecommunications Installations – Integrated telecommunications cabling systems for commercial premises
AS/NZS 61000	Electromagnetic Compatibility (EMC)
AS/NZS ISO 9001	Quality systems - Model for quality assurance in design, development, production, installation and services
IEC 73	Coding of indicating devices and actuators by colours and supplementary means

Attachment 5: SWRO - Conceptual plant layout