Government of Western Australia
Department of Water and Environmental Regulation

Works Approval

Works approval number	W6911/2024/1
Works approval holder	Water Corporation
ACN	28003434917
Registered business address	629 Newcastle Street LEEDERVILLE WA 6007
DWER file number	DER2024/000123~1
Duration	19/09/2024 to 18/09/2029
Date of issue	19/09/2024
Premises details	Alkimos Seawater Desalination Plant Lot 3000 Brindabella Parkway ALKIMOS WA 6038 Legal description - Part of Lot 3000 on Deposited Plan 415979 Brindabella Parkway ALKIMOS WA 6038 As defined by the coordinates in Schedule 2

Prescribed premises category description (Schedule 1, *Environmental Protection Regulations 1987*)	**Assessed production capacity**
Category 54A: Water desalination plant: premises on which salt is extracted from water if – (a) wastewater is discharged into marine waters; and (b) the discharged water has a density greater than the average ambient density of the marine water at the discharge site.	50 GL per year

This works approval is granted to the works approval holder, subject to the attached conditions, on 19 September 2024, by:

Grace Heydon

Digitally signed by Grace Heydon
Date: 2024.09.19 12:52:02 +08'00'

Grace Heydon
MANAGER WASTE INDUSTRIES
an officer delegated under section 20 of the *Environmental Protection Act 1986* (WA)

Works approval history

Date	Reference number	Summary of changes
19/09/2024	W6911/2024/1	Works approval including approval for the time limited operation for Stage 1 of Alkimos Seawater Desalination Plant issued (50 GL per year).

Interpretation

In this works approval:

(a) the words 'including', 'includes' and 'include' in conditions mean "including but not limited to", and similar, as appropriate;

(b) where any word or phrase is given a defined meaning, any other part of speech or other grammatical form of that word or phrase has a corresponding meaning;

(c) where tables are used in a condition, each row in a table constitutes a separate condition;

(d) any reference to an Australian or other standard, guideline, or code of practice in this works approval:

  (i) if dated, refers to that particular version; and

  (ii) if not dated, refers to the latest version and therefore may be subject to change over time;

(e) unless specified otherwise, any reference to a section of an Act refers to that section of the EP Act; and

(f) unless specified otherwise, all definitions are in accordance with the EP Act.

NOTE: This works approval requires specific conditions to be met but does not provide any implied authorisation for other emissions, discharges, or activities not specified in this works approval.

Works approval conditions

The works approval holder must ensure that the following conditions are complied with:

Construction phase

Infrastructure and equipment

1. The works approval holder must:

(a) construct and/or install the infrastructure and/or equipment;

(b) in accordance with the corresponding design and construction / installation requirements; and

(c) at the corresponding infrastructure location; and

(d) within the corresponding timeframe,

as set out in Table 1.

Table 1: Design and construction / installation requirements.

	Infrastructure	Design and construction / installation requirements	Infrastructure location
1.	Seawater intake pumping station (SWIPS)	a) Stage 1 to accommodate a seawater intake flow of 438 ML/d. b) Must accommodate a maximum face velocity of 0.15 meters per second at subsea intake screens. c) Duty and standby continuous screens (2 total) to remove coarse suspended matter from seawater inflows. The screens shall be of the aperture type and able to be equipped at an aperture size ranging from 2mm to 10mm. d) Continuous online flow monitoring of seawater intake quantity and quality; including (as a minimum): • flowrate, • temperature, • pH, • Oxidation-Reduction Potential, • conductivity/salinity, and • turbidity. e) Seawater booster pumps to deliver flow to the RO pre-treatment area or outfall chamber. f) Five (5) seawater intake pumps (4 duty & 1 standby) that are submerged within the final chambers of the SWIPS and deliver seawater to the RO pre-treatment area. Each pump has a duty flow rate of 4,560 m^3/hr providing a total maximum seawater flow for the SWIPS of 18,233 m^3/hr. g) One (1) online and several spare 2 to 10 m^3	As depicted in Figure 3

	Infrastructure	Design and construction / installation requirements	Infrastructure location
		self-draining screening waste bins. h) Outfall discharge chamber	
2.	ActiDAFF® Treatment filtration system	a) 18 ActiDAFF® multi-media filters	As depicted in Figure 3
3.	Filtered Water Tank, Intermediate, & Reverse Osmosis Feed Pumping Station	Three rectangular, adjoining filtered water tanks: a) Tank A – 1500 m^3 nominal volume b) Tank B – 1500 m^3 nominal volume c) Tank A/B – 750 m^3 nominal volume Intermediate pumps building contains: d) Five (5) Intermediate ERD pumps. Four duty and one standby. Nominal duty flow of 2,437 m^3/hr each. e) Five (5) Intermediate HP pumps. Four duty and one standby. Nominal duty flow of 1,818 m^3/hr each. f) Three ActiDAFF® backwash pumps. Two duty and one standby. Nominal duty flow of 922 m^3/hr each.	As depicted in Figure 3
4.	Reverse Osmosis (RO) facility	a) Twelve (12) RO cartridge filters (normally 10 online and 2 standby). b) Six (6) 1st Pass Reverse Osmosis (RO) High Pressure Feed Pumps. c) Six (6) Energy Recovery Device (ERD) Booster Pumps – 1 pump per first pass RO rack. d) Six (6) first pass RO racks. e) Six (6) racks of high efficiency energy recovery devices, one ERD rack per first pass RO rack. f) Six (6) second pass RO booster pumps – 1 pump per 2nd pass RO rack. g) Six (6) second pass RO racks. h) Antiscalant dosing system. i) membrane clean-in-place systems. j) Nominal stage 1 permeate output of 158 ML/d. k) Maximum stage 1 permeate output of 166 ML/d.	As depicted in Figure 3
5.	Chemical receival, storage & dosing systems	a) Must have fully bunded closed-drain systems for receipt and storage of Dangerous Goods. b) Must have leak detection and alarming systems within the chemical storage bund for each Dangerous Good.	As depicted in Figure 3

	Infrastructure	Design and construction / installation requirements	Infrastructure location
6.	Potabilisation treatment system	The potabilisation treatment system must comprise of the following: a) Multiple disinfection units for intermittent or continuous use to accommodate a total flow capacity of 158 ML/day. b) Carbon dioxide doser. c) Lime water clarifiers and lime water dosing system. d) Fluorosilicic acid storage and dosing system. e) Sodium hypochlorite disinfection system. f) Warning alarm and interlock (chlorine only) settings for each parameter: • conductivity/salinity, • pH, • alkalinity, • temperature, • turbidity, • fluoride ion, and • free chlorine residual.	As depicted in Figure 3
7.	Sludge treatment system	a) Two (2) lamella clarifiers for sludge thickening. b) Two (2) thickened sludge holding tanks. c) Three (3) centrifuge feed pumps. d) Two (2) decanter centrifuges for sludge dewatering. e) Ferric sulphate and polyelectrolyte dosing unit. f) Decanter centrifuge. g) Sludge disposal bins.	As depicted in Figure 3
8.	Clean-in-Place (CIP) Waste Handling Systems	a) 1500 to 3000 m^3 CIP waste tank to facilitate up to 6 RO CIPs. b) Sodium hydroxide and sulphuric acid dosing units. c) Continuous online pH monitor. d) Sodium metabisulphite dosing unit.	As depicted in Figure 3
9.	Drainage and Containment Systems	a) A stormwater drainage system is to be provided and must: i. comprise of a pit and pipe network to four drainage infiltration basins in accordance with Figure 7 ; and ii. the stormwater drainage system shall be designed to retain all stormwater from a 1% AEP	As depicted in Figure 3 and Figure 7

	Infrastructure	Design and construction / installation requirements	Infrastructure location
		rain event within the prescribed premises boundary. b) Chemical storage and delivery areas must be designed and constructed to contain spills and potentially contaminated stormwater. c) A dedicated drainage network is to be provided to drain spent Reverse Osmosis Clean in Place (CIP) solution to the CIP neutralising tanks, d) A fully bunded power transformer compound drainage system is to be provided. e) A fully bunded generator / diesel storage area is to be provided. f) A fully contained brine outfall drainage system, draining to the brine outfall chamber is to be provided. g) A fully contained domestic wastewater collection system and domestic wastewater pumping station with duty and standby pumps is to be provided.	
10.	Effluent discharge system	a) Must be designed and constructed to accommodate a combined marine discharge volume of 307 ML/day for stage 1 and 611.6 ML/day for stage 2. b) Must be equipped with continuous online monitoring of the combined marine discharge stream for the following parameters (as a minimum): • Flowrate (agregate of all flowmeters on individual contributing streams), • Temperature, • Dissolved oxygen, • Oxidation-Reduction potential, • pH, • conductivity/salinity, and • turbidity.	As depicted in Figure 3
11.	Drinking water storage tanks	a) Two (2) drinking water storage tanks with a capacity of 25 ML total volume each.	As depicted in Figure 3
12.	Surge vessels	a) Up to 4 vessels of up to 120 m^3 each.	As depicted in Figure 3
13.	Drinking water pump station	a) Three variable speed pumps configured as two duty and one standby.	As depicted in Figure 3

2. The works approval holder must ensure that no visible dust generated from construction activities crosses the boundary of the premises.

3. The works approval holder must manage dust generation at the premises by:
   (a) wetting down unsealed roads and exposed areas with a water truck;
   (b) limiting all vehicle traffic within the premises to speeds of less than 40 km/hr; and
   (c) ceasing dust-generating activities during strong wind conditions.
4. The works approval holder must ensure that:
   (a) all reasonable and practicable measures are taken to ensure that no windblown waste escapes from the premises; and
   (b) any windblown waste is collected on at least a weekly basis and returned to an appropriate waste receptacle for offsite disposal.

Compliance reporting

5. The works approval holder must within 90 calendar days of an item of infrastructure or equipment required by condition 1 being constructed and/or installed:
   (a) undertake an audit of their compliance with the requirements of condition 1; and
   (b) prepare and submit to the CEO an Environmental Compliance Report on that compliance.
6. The Environmental Compliance Report required by condition 5, must include as a minimum the following:
   (a) certification by a suitably qualified civil engineer that the items of infrastructure or component(s) thereof, as specified in condition 1, have been constructed in accordance with the relevant requirements specified in condition1,
   (b) as constructed plans and a detailed site plan for each item of infrastructure or component of infrastructure specified in condition 1,
   (c) factory acceptance test results and/or supply verifications for each item of infrastructure installed (where applicable), and
   (d) be signed by a person authorised to represent the works approval holder and contains the printed name and position of that person.
7. The Environmental Compliance Report required by condition 5, must be accompanied by a Construction Quality Assurance Report that confirms that the infrastructure has been installed as per the manufacturer's recommendations and is free of defects.

Environmental commissioning phase

Environmental commissioning requirements and emission limits

8. The works approval holder may only commence environmental commissioning of an item of infrastructure listed in condition 1 once the Environmental Compliance Report has been submitted for that item of infrastructure in accordance with conditions 5 and 6 of this works approval.
9. Any environmental commissioning activities undertaken for an item of infrastructure specified in Table 2 may only be carried out:

(a) in accordance with the corresponding commissioning requirements; and

(b) for the authorised commissioning duration.

Table 2: Environmental commissioning requirements.

	Infrastructure	Commissioning requirements	Authorised commissioning duration
1.	Seawater intake pumping station (SWIPS)	a) Face velocity at subsea intake screens to be a maximum of 0.15 m/s. b) Screen washings must be well drained within self-draining bins to prevent seepage.	Commissiong must cease by 31 December 2028
2.	ActiDAFF® Treatment filtration system	a) Whenever a ferric coagulant is applied, solids in the backwash wastewater shall be separated and directed to land-based reuse or disposal and not discharged to the marine environment. b) Following solids removal, backwash wastewater shall be discharged to the brine outfall.	Commissiong must cease by 31 December 2028
3.	Filtered Water Tank, Intermediate, & Reverse Osmosis Feed Pumping Station	a) Verify that all works have been constructed as per the design (construction verification). b) The water tightness of all tanks shall be tested and confirmed (equipment commissioning). c) All tanks and pumps shall be confirmed as free of contaminants including those that may be released from the cured concrete or internal pump coating and contaminate filtered water (equipment commissioning). d) Filtered seawater will initially be directed to the outfall chamber until the downstream RO is ready to receive flow. e) Verify that all equipment controls and safeguards function as per the design (equipment commissioning). f) Test and optimise the integration of the commissioning area with upstream and downstream areas / systems, including inter-system safeguards (system commissioning).	Commissiong must cease by 31 December 2028
4.	Reverse Osmosis (RO) facility	a) Verify that all works have been constructed as per the design (construction verification). b) The internals of all piping, pumps and RO vessels shall be thoroughly flushed with filtered seawater, drinking water, or other clean water and confirmed as free of	Commissiong must cease by 31 December 2028

	Infrastructure	Commissioning requirements	Authorised commissioning duration
		contaminants. c) New RO membranes shall be loaded into the RO racks. d) Each RO rack, both first pass and second pass, shall be commissioned and tested to confirm performance is as per the design.	
5.	Chemical receival, storage & dosing systems	a) Where continuous online monitoring has determined appropriate, neutralised spent chemical waste may be discharged with RO brine.	Commissiong must cease by 31 December 2028
6.	Potabilisation treatment system	a) All potabilisation treatment system components to be maintained in good working order. b) UV disinfection is required when incoming seawater quality is poor due to high algae or turbidity	Commissiong must cease by 31 December 2028
7.	Sludge treatment system	a) All components of the sludge treatment system are to be maintained in good working order. b) Dewatered sludge cake (>20% dry solids) must be collected within appropriately impervious bins to prevent seepage. c) Separated water is to be directed to the outfall chamber. d) Turbidity analyser monitoring combined brine discharge quality will stop all flows from the sludge treatment area that are directed to the ocean outfall if a high-high turbidity if detected.	Commissiong must cease by 31 December 2028
8.	Clean-in-Place (CIP) Waste Handling Systems	a) All components of the CIP Waste Handling System are to be maintained in good working order. b) pH of the recirculating neutralisation tank contents to be monitored. c) pH of neutralisation tank contents must be within 4.5 - 10.0 prior to being discharged to the brine stream. Discharge to the brine stream shall only occur when at least two (2) first pass RO racks are in operation to ensure that there is sufficient dilution present such that the combined discharge to outfall is within pH 6.0 - 9.0.	Commissiong must cease by 31 December 2028
9.	Drainage and Containment Systems	a) All drainage and containment systems must be maintained in good condition to prevent seepage and overflow of potentially contaminated water and	Commissiong must cease by 31 December 2028

	Infrastructure	Commissioning requirements	Authorised commissioning duration
		chemicals into the environment. b) In-situ pH testing of spills in acid and base storage and transfer areas is to be conducted and chemical spills neutralised before release to the stormwater system. c) In-situ conductivity testing of spills in ionic chemicals storage areas is to be undertaken. d) Neutralised CIP chemicals are to be transferred to the brine outfall drainage system. e) Where the chemical may either contribute to neutralisation of spent CIP solutions or can be effectively neutralised in the CIP neutralisation tank, it can be transferred directly to CIP neutralisation tanks prior to discharge to the brine outfall drainage system. a) Recovered spilt chemicals that cannot be neutralised and managed onsite shall be taken offsite to a suitably licensed waste facility. b) All domestic wastewaters shall be discharged to the public sewerage collection network or the inlet of the adjacent Alkimos Wastewater Treatment Plant.	
10.	Drinking water storage tanks	a) Verify that all works have been constructed as per the design (construction verification). b) The two (2) drinking water tanks will be leak tested with potable water. The large volume of potable water used for this leak test will likely be reused for other leak testing activities across the site. Any chlorinated leak test water that is discharged to the outfall chamber will first be dechlorinated with sodium bisulphite solution. c) During process commissioning, the drinking water tanks will be allowed to overflow to the outfall chamber until the safety of the drinking water has been validated and the drinking water pumping station is commissioned, after which drinking water will be transferred to the integrated water supply system.	Commissiong must cease by 31 December 2028
11.	Drinking water pump station	a) Verify that all works have been constructed as per the design	Commissiong must cease by 31

	Infrastructure	Commissioning requirements	Authorised commissioning duration
		(construction verification). b) Disinfect the internals of all piping and equipment that conveys drinking water. c) All pumps shall be tested to confirm performance is as per design (performance testing).	December 2028
12.	Outfall Discharge Chamber	a) Test, commission and calibrate all instruments prior to commencing any discharge to the outfall (recirculation of uncontaminated seawater directly from the seawater intake is exempt from this requirement).	Commissiong must cease by 31 December 2028
13.	Surge vessels	a) Confirm noise from the surge vessels and their associated air compressors is consistent the manufacturers specification and design requirements.	Commissiong must cease by 31 December 2028

10. The works approval holder shall immediately recover, or remove and dispose of, spills of environmentally hazardous materials including fuel, oil, or other hydrocarbons, whether inside or outside an engineered containment system.

11. The works approval holder shall ensure that all material used for the recovery, removal, and/or disposal of environmentally hazardous materials is stored in an impermeable container prior to onsite treatment or disposal at an appropriately authorised facility.

12. The works approval holder must take all reasonable and practicable measures to prevent stormwater run-off becoming contaminated by the activities and operations undertaken at the premises.

13. Prior to entering any treatment process the works approval holder must ensure that liquid wastes are correctly characterised to prevent incompatible waste types being mixed in the treatment and neutralisation process and prior to discharge via the outflow chamber.

14. The works approval holder must ensure that the emissions specified in Table 3 are discharged only from the corresponding discharge point and only at the corresponding discharge point location.

Table 3: Authorised discharge points during commissioning.

Emission	Discharge point	Discharge point location
Neutralised CIP waste	Outfall chamber	As depicted in Figure 5 and Figure 6
RO brine		
Stormwater		

Emission	Discharge point	Discharge point location
Neutralised waste chemicals and clean-up residues		
Screened Seawater / Filtered Seawater		
RO permeate / filtered groundwater / chlorine free drinking water		
Lamella sludge clarifier supernatant		
Lime sludge centrifuge centrate		
ActiDAFF® rinse water		
Clean plant drainage and water overflows		

15. The works approval holder must ensure that emissions from the discharge points listed in Table 4 for the corresponding parameter do not exceed the corresponding limit when monitored in accordance with condition 16.

Table 4: Emission and discharge limits during commissioning.

Discharge point	Parameter	Limit
Outfall chamber	Temperature	+/- 3°C relative to the seawater intake
	pH	6.0 - 9.0
	Oxidation reduction potential (ORP)	< 400 mV
	Total Dissolved Solids	75,200 mg/L
	Turbidity	1.75 x seawater intake turbidity
	Dissolved oxygen	> 50%
	Combined desalination effluent volume	up to 450 ML/d

Monitoring during environmental commissioning

16. The works approval holder must monitor discharge water quality at the location listed in Table 5:

(a) for the corresponding parameters;

(b) in the corresponding units;

(c) for the corresponding averaging period;

(d) at no less than the corresponding frequency; and

(e) using the corresponding method;

as outlined in Table 5.

Table 5: Monitoring of water quality during commissioning.

Monitoring location	Parameter	Units	Frequency	Method
Intake sample point (outlet of seawater intake pump station)	Flow rate[1]	(m^3/s)	Continuous	-
Outfall sample point (outfall chamber outlet)	Flow rate of desalination effluent[1]	(m^3/s)	Continuous	-
	Flow rate of brine component of desalination effluent[1]	(m^3/s)	Quarterly	AS/NZS 5667.10
Both intake and outfall sample points	pH[1]	pH units		
	Conductivity[1]	µS/cm		
	Turbidity[1]	NTU		
	Oxidation Reduction Potential (ORP)[1]	mV		
	Dissolved Oxygen (DO)[1]	mg/L		
	Temperature[1]	°C		
	Total Dissolved Solids (TDS)[1]	mg/L		
	Salinity[2]	ppt		

Note 1 – non- NATA in situ testing permitted.
Note 2 – salinity can be derived from field sampling of electrical conductivity.

17. The works approval holder must record the results of all monitoring activity required by condition 16.

18. The works approval holder must undertake inputs and outputs monitoring during environmental commissioning in accordance with Table 6.

Table 6: Monitoring of inputs and outputs during commissioning.

Input/Output	Parameter	Units	Averaging period	Frequency
Seawater	Inflow	Kilolitre/day	Monthly	Continuous
Process effluent	Outflow from			

Input/Output	Parameter	Units	Averaging period	Frequency
Brine component of process effluent	outflow chamber			
Process solid waste	Removed from premises	Tonnes	N/A	Monthly

Environmental commissioning report

19. The works approval holder must submit to the CEO an Environmental Commissioning Report within 90 calendar days of the completion date of the environmental commissioning for each item of infrastructure specified in Table 2.

20. The works approval holder must ensure the Environmental Commissioning Report required by condition 19 of this works approval includes the following:

(a) a summary of the environmental commissioning activities undertaken, including timeframes and amount of seawater processed;

(b) a summary of the results of any chemical analysis conducted on potentially contaminated stormwater or desalination process solid waste produced on the premises;

(c) a summary of the discharge water quality monitoring results recorded in accordance with condition 16;

(d) copies of laboratory reports for discharge water quality monitoring results recorded in accordance with condition 16;

(e) a comparison of the discharge water quality monitoring results against the limits outlined in condition 15;

(f) a summary of inputs and outputs recorded in accordance with condition 18;

(g) a summary of the environmental performance of each item of infrastructure or equipment as installed, which at a minimum includes records detailing:

i. assessment of desalination plant performance against operational requirements in condition 9; and
ii. outcomes of WET Testing undertaken for each relevant waste stream set out in Table 4;

(h) the determination of an appropriate dilution factor to achieve the levels of species protection required under Ministerial Statement 1207, including justification for how this dilution factor was determined;

(i) the determination of appropriate limits for the discharge parameters monitored in accordance with condition 16, including justification for how these limits were determined and are suitable to ensure the levels of species protection required under Ministerial Statement 1207 are achieved;

(j) a comparison of current discharge limits for parameters as outlined in condition 15 with the appropriate limits for ongoing operations as determined in accordance with condition 20(h);

(k) a review of the works approval holder's performance and compliance against the conditions of the works approval; and

(l) where they have not been met, measures proposed to meet the manufacturer's design specifications and the conditions of this works approval, together with the timeframes for implementing the proposed measures.

Time limited operations phase

Commencement and duration

21. The works approval holder may only commence time limited operations for an item of infrastructure identified in condition 24 where the Environmental Commissioning Report for that item of infrastructure required by condition 19 has been submitted by the works approval holder.

22. The works approval holder may only commence discharging from authorised discharge points in accordance with condition 29 once the Environmental Commissioning Report required by condition 19 has been submitted to the CEO in writing.

23. The works approval holder may conduct time limited operations for an item of infrastructure specified in condition 24:

(a) for a period not exceeding 180 calendar days from the day the works approval holder meets the requirements of condition 21 for that item of infrastructure, or

(b) until such time as a licence for that item of infrastructure is granted in accordance with Part V of the *Environmental Protection Act 1986*, if one is granted before the end of the period specified in condition 23(a).

Time limited operations requirements and emission limits

24. During time limited operations, the works approval holder must ensure that the premises infrastructure and equipment listed in Table 7 and located at the corresponding infrastructure location is maintained and operated in accordance with the corresponding operational requirement set out in Table 7.

Table 7: Infrastructure and equipment requirements during time limited operations.

	Infrastructure	Operational requirements	Authorised time limited operations duration
1.	Seawater intake pumping station (SWIPS)	a) Stage 1 to accommodate a seawater intake flow of 360 ML/d from the two (2) offshore subsea intake structures via a single intake tunnel. b) Must accommodate a maximum face velocity of 0.15 meters per second at subsea intake screens. c) Duty and standby continuous screens (2 total) to remove coarse suspended matter from seawater inflows. The screens shall be of the aperture type and able to be equipped at an aperture size ranging from 2mm to 10mm. d) Continuous online flow monitoring of seawater intake quantity and quality; including (as a minimum):	For a period not exceeding 180 calendar days

		• flowrate, • temperature, • pH, • Oxidation-Reduction Potential, • conductivity/salinity, and • turbidity. e) Five (5) seawater booster pumps that are submerged within the final chambers of the SWIPS. f) Seawater booster pumps to deliver flow to the RO pre-treatment area. Each pump has a duty flow rate of 4,560 m^3/hr providing a total maximum seawater flow for the SWIPS of 18,233 m^3/hr g) One (1) online and several spare 2 m^3 self-draining screening waste bins that collect the removed suspended matter for offsite reuse or landfill. h) Brine discharge chamber	
2.	ActiDAFF® Treatment filtration system	a) 18 ActiDAFF® multi-media filters	For a period not exceeding 180 calendar days
3.	Filtered Water Tank, Intermediate, & Reverse Osmosis Feed Pumping Station	Three rectangular, adjoining filtered water tanks: a) Tank A – 1500 m^3 nominal volume b) Tank B – 1500 m^3 nominal volume c) Tank A/B – 750 m^3 nominal volume Intermediate pumps building contains: d) Five (5) Intermediate ERD pumps. Four duty and one standby. Nominal duty flow of 2,437 m^3/hr each. e) Five (5) Intermediate HP pumps. Four duty and one standby. Nominal duty flow of 1,818 m^3/hr each. f) Three ActiDAFF® backwash pumps. Two duty and one standby. Nominal duty flow of 922 m^3/hr each.	For a period not exceeding 180 calendar days
4.	Reverse Osmosis (RO) facility	a) Twelve (12) RO cartridge filters (normally 10 online and 2 standby). b) Six (6) 1st Pass Reverse Osmosis (RO) High Pressure Feed Pumps. c) Six (6) Energy Recovery Device (ERD) Booster Pumps – 1 pump per first pass RO rack. d) Six (6) first pass RO racks. e) Six (6) racks of high efficiency energy recovery devices, one ERD rack per first	For a period not exceeding 180 calendar days

		pass RO rack. f) Six (6) second pass RO booster pumps – 1 pump per 2nd pass RO rack. g) Six (6) second pass RO racks. h) Antiscalant dosing system. i) membrane clean-in-place systems. j) Nominal stage 1 permeate output of 158 ML/d. k) Maximum stage 1 permeate output of 166 ML/d.	
5.	Chemical receival, storage & dosing systems	a) Must have fully bunded closed-drain systems for receipt and storage of Dangerous Goods. b) Must have leak detection and alarming systems within the chemical storage bund for each Dangerous Good.	For a period not exceeding 180 calendar days
6.	Potabilisation treatment system	The potabilisation treatment system must comprise of the following: a) Eight (8) UV disinfection units for intermittent or continuous use. b) Carbon dioxide doser. c) Lime water clarifiers and lime water dosing system. d) Fluorosilicic acid storage and dosing system. e) Chlorine disinfection system. f) Continuous online drinking water analyser monitoring (as a minimum): • conductivity/salinity, • pH, • alkalinity, • temperature, • turbidity, • fluoride ion, and • free chlorine residual.	For a period not exceeding 180 calendar days
7.	Sludge treatment system	a) Two (2) lamella clarifiers for sludge thickening. b) Two (2) thickened sludge holding tanks. c) Three (3) centrifuge feed pumps. d) Two (2) decanter centrifuges for sludge dewatering. e) Ferric sulphate and polyelectrolyte dosing unit.	For a period not exceeding 180 calendar days

		f) Decanter centrifuge. g) Sludge disposal bins.	
8.	Clean-in-Place (CIP) Waste Handling Systems	a) Maximum 1000 m^3 CIP waste tank. b) Sodium hydroxide or sulphuric acid dosing units. c) Continuous online pH monitor. d) Sodium metabisulphite dosing unit. e) Continuous online analysers monitoring contents of the Brine Discharge Chamber.	For a period not exceeding 180 calendar days
9.	Drainage and Containment Systems	a) A stormwater drainage system is to be provided and must: iii. comprise of a pit and pipe network to four drainage infiltration basins in accordance with Figure 7 ; and iv. the stormwater drainage system shall be designed to retain all stormwater from a 1% AEP rain event within the prescribed premises boundary. b) Chemical storage and delivery areas must be designed and constructed to contain spills and potentially contaminated stormwater. c) A dedicated drainage network is to be provided to drain spent Reverse Osmosis Clean in Place (CIP) solution to the CIP neutralising tanks, d) A fully bunded power transformer compound drainage system is to be provided. e) A fully bunded generator / diesel storage area is to be provided. f) A fully contained brine outfall drainage system, draining to the brine outfall chamber is to be provided. g) A fully contained domestic wastewater collection system and domestic wastewater pumping station with duty and standby pumps is to be provided.	For a period not exceeding 180 calendar days
10.	Effluent discharge system	a) Must be designed and constructed to accommodate a combined marine discharge volume of 307 ML/day for stage 1 and 611.6 ML/day for stage 2. b) Must be equipped with continuous online monitoring of the combined marine discharge stream for the following parameters (as a minimum): • Flowrate (aggregate of all flowmeters on individual	For a period not exceeding 180 calendar days

		contributing streams), • Temperature, • Dissolved oxygen, • Oxidation-Reduction potential, • pH, • conductivity/salinity, and • turbidity.	
11.	Drinking water storage tanks	a) Two (2) drinking water storage tanks with a capacity of 25 ML total volume each.	For a period not exceeding 180 calendar days
12.	Surge vessels	a) Up to 4 vessels of up to 120 m^3 each.	For a period not exceeding 180 calendar days
13.	Drinking water pump station	a) Three variable speed pumps configured as two duty and one standby.	For a period not exceeding 180 calendar days

25. The works approval holder shall immediately recover, or remove and dispose of, spills of environmentally hazardous materials including fuel, oil, or other hydrocarbons, whether inside or outside an engineered containment system.

26. The works approval holder shall ensure that all material used for the recovery, removal, and/or disposal of environmentally hazardous materials is stored in an impermeable container prior to onsite treatment or disposal at an appropriately authorised facility.

27. The works approval holder must take all reasonable and practicable measures to prevent stormwater run-off becoming contaminated by the activities and operations undertaken at the premises.

28. Prior to entering any treatment process the works approval holder must ensure that liquid wastes are correctly characterised to prevent incompatible waste types being mixed in the treatment and neutralisation process and prior to discharge via the outflow chamber.

29. The works approval holder must ensure that the emissions specified in Table 8 are discharged only from the corresponding discharge point and only at the corresponding discharge point location.

Table 8: Authorised discharge points during time limited operations.

Emission	Discharge point	Discharge point location
Neutralised CIP waste	Outfall chamber	As depicted in Figure 5 and Figure 6
RO brine		
Uncontaminated stormwater		

Emission	Discharge point	Discharge point location
Neutralised waste chemicals and clean-up residues		
Screened Seawater / Filtered Seawater		
RO permeate / filtered groundwater / chlorine free drinking water		
Lamella sludge clarifier supernatant		
Lime sludge centrifuge centrate		
ActiDAFF® rinse water		
Clean plant drainage and water overflows		

30. The works approval holder must ensure that emissions from the discharge point listed in Table 9 for the corresponding parameter do not exceed the corresponding limit when monitored in accordance with condition 31.

Table 9: Emission and discharge limits during time limited operations.

Discharge point	Parameter	Maximum value
Outfall chamber	Temperature	+/- 3°C of the temperature at seawater inlet
	pH	6.0 - 9.0
	Oxidation reduction potential	< 400 mV
	Total Dissolved Solids	< 75,200 mg/L
	Turbidity	< 1.75 x turbidity measured at seawater intake
	Dissolved oxygen	> 50%
	Combined desalination effluent volume	450 ML/d

Monitoring during time limited operations

31. The works approval holder must undertake water quality monitoring during time limited operations in accordance with Table 10.

Table 10: Monitoring of water quality during time limited operations.

Monitoring location	Parameter	Units	Frequency	Method
Intake sample point (outlet of seawater intake pump station)	Flow rate[1]	(m^3/s)	Continuous	-
Outfall sample point (outfall chamber outlet)	Flow rate of desalination effluent[1]	(m^3/s)	Continuous	-
	Flow rate of brine component of desalination effluent[1]	(m^3/s)	Quarterly	AS/NZS 5667.10
Both intake and outfall sample points	pH[1]	pH units		
	Conductivity[1]	µS/cm		
	Turbidity[1]	NTU		
	Oxidation Reduction Potential (ORP)[1]	mV		
	Dissolved Oxygen (DO)[1]	mg/L		
	Temperature[1]	°C		
	Total Dissolved Solids (TDS)[1]	mg/L		
	Salinity[2]	ppt		

Note 1 – non- NATA in situ testing permitted.
Note 2 – salinity can be derived from field sampling of electrical conductivity.

32. The works approval holder must record the results of all monitoring activity required by condition 31.

33. The works approval holder must undertake inputs and outputs monitoring during environmental commissioning in accordance with Table 11.

Table 11: Monitoring of inputs and outputs during time limited operations.

Input/Output	Parameter	Units	Averaging period	Frequency
Seawater	Inflow	Kilolitre/day	Monthly	Continuous
Process effluent	Outflow from			

Input/Output	Parameter	Units	Averaging period	Frequency
Brine component of process effluent	outflow chamber			
Clean-in-place solutions and rinsings component of effluent	Discharge flow to the outfall chamber	Kilolitres	Monthly	Continuous
Clean-in-place solutions and rinsings tankered from premises	Removed from premises	Kilolitres	N/A	Monthly
Process solid waste	Removed from premises	Tonnes	N/A	Monthly

Compliance reporting

34. The works approval holder must submit to the CEO a report on the time limited operations within 90 calendar days of the completion date of time limited operations or within 90 calendar days before the expiration date of the works approval, whichever is sooner.

35. The works approval holder must ensure the report required by condition 34 includes the following:

(a) A summary of time limited operation, including timeframes and amount of wastewater processed;

(b) A summary of the results of any chemical analysis conducted on potentially contaminated stormwater or desalination process solid waste produced on the premises.

(c) A summary of discharge water quality monitoring parameter results obtained during time limited operations under condition 31.

(d) Copies of laboratory reports for discharge water quality monitoring results recorded in accordance with condition 32.

(e) A summary of inputs and outputs recorded in accordance with condition 33.

(f) A summary of the environmental performance of each item of infrastructure or equipment as installed, which at a minimum includes records detailing the:

(i) comparison of the discharge water quality monitoring results against the limits specified in Table 9; and

(ii) An assessment of the ongoing suitability of the limits specified in Table 9 based the discharge water quality monitoring results; and

(iii) Discussion on the ongoing suitability of the dilution factor obtained through WET testing to ensure the levels of species protection required under Ministerial Statement 1207 are achieved; and

(iv) assessment of the desalination plant performance against operational requirements in condition 24.

(g) A review of the works approval holder's performance and compliance against the conditions of this works approval; and

(h) Where they have not been met, measures proposed to meet the manufacturer's design specification and the conditions of this works approval, together with the timeframes for implementing proposed measures.

Monitoring (general)

36. The works approval holder must ensure that all monitoring equipment used on the premises to comply with the conditions of this works approval is calibrated in accordance with the manufacturer's specification.

37. The works approval holder must, where the requirements for calibration cannot be practicably met, or discrepancy exists in the interpretation of the requirements, bring these issues to the CEO accompanied with a report comprising details of any modifications to the methods.

38. All sample analysis must be undertaken by laboratories with current accreditation from the National Association of Testing Authorities (NATA) for relevant parameters, unless otherwise specified in this works approval.

Records and reporting (general)

39. The works approval holder must record the following information in relation to complaints received by the works approval holder (whether received directly from a complainant or forwarded to them by the Department or another party) about any alleged emissions from the premises:

(a) the name and contact details of the complainant, (if provided);

(b) the time and date of the complaint;

(c) the complete details of the complaint and any other concerns or other issues raised; and

(d) the complete details and dates of any action taken by the works approval holder to investigate or respond to any complaint.

40. The works approval holder must maintain accurate and auditable books including the following records, information, reports, and data required by this works approval:

(a) the works conducted in accordance with condition 1;

(b) commissioning conducted in accordance with condition 9;

(c) time limited operations conducted in accordance with condition 24;

(d) any maintenance of infrastructure that is performed in the course of complying with conditions 9 and 24;

(e) monitoring programmes undertaken in accordance with condition 31; and

(f) complaints received under condition 23.

41. The books specified under condition 40 must:

(a) be legible;

(b) if amended, be amended in such a way that the original version(s) and any subsequent amendments remain legible and are capable of retrieval;

(c) be retained by the works approval holder for the duration of the works approval; and

(d) be available to be produced to an inspector or the CEO as required.

Definitions

In this works approval, the terms in Table 12 have the meanings defined.

Table 12: Definitions.

Term	Definition
AS/NZS 5667.10	means the Australian/New Zealand Standard AS/NZS 5667.10 Water quality – Sampling Part 10: Guidance on sampling of waste waters
books	has the same meaning given to that term under the EP Act.
brine	means the hypersaline by-product of seawater desalination
CEO	means Chief Executive Officer. CEO for the purposes of notification means: Director General Department administering the *Environmental Protection Act 1986* Locked Bag 10 Joondalup DC WA 6919 info@dwer.wa.gov.au
CIP	means clean-in-place and is a procedure which allows the filters and membranes of the Reverse Osmosis system to be cleaned and rinsed without the need to disassemble the system.
Critical Containment Infrastructure Report	means a report to satisfy the CEO that works of critical containment infrastructure have been constructed in accordance with the works approval.
Department	means the department established under section 35 of the *Public Sector Management Act 1994* and designated as responsible for the administration of Part V Division 3 of the EP Act.
Desalination process solid waste	means solid material collected on seawater intake screens, filtration devices and membranes, not including membrane backwash effluent.
discharge	has the same meaning given to that term under the EP Act.
emission	has the same meaning given to that term under the EP Act.
environmental commissioning	means the sequence of activities to be undertaken to test equipment integrity and operation, or to determine the environmental performance, of equipment and infrastructure to establish or test a steady state operation and confirm design specifications.

Term	Definition
Environmental Commissioning Report	means a report on any commissioning activities that have taken place and a demonstration that they have concluded, with focus on emissions and discharges, waste containment, and other environmental factors.
EP Act	*Environmental Protection Act 1986* (WA).
EP Regulations	*Environmental Protection Regulations 1987* (WA).
Ministerial Statement 1207	Means Ministerial Statement 1207 as issued by the *Environmental Protection Authority* under Part IV of the EP Act
m^3/s	means cubic metres per second
µS/cm	means MicroSiemen per centimetre
mg/L	means milligrams per litre
mV	means millivolts
NATA	means the National Association of Testing Authorities, Australia.
NATA accredited	means in relation to the analysis of a sample that the laboratory is NATA accredited for the specified analysis at the time of the analysis
ppt	means parts per thousand
premises	the premises to which this licence applies, as specified at the front of this licence and as shown on the premises map (Figure 1) in Schedule 1 to this works approval.
prescribed premises	has the same meaning given to that term under the EP Act.
Suitably qualified civil engineer	means a person who: (a) holds a Bachelor of Engineering degree recognised by Engineers Australia; and (b) has a minimum of five years of experience working in a supervisory role in civil or structural engineering; and (c) is employed by an independent third party external to the Works Approval Holder's business; or is otherwise approved in writing by the CEO to act in this capacity.
time limited operations	refers to the operation of the infrastructure and equipment identified under this works approval that is authorised for that purpose, subject to the relevant conditions.
waste	has the same meaning given to that term under the EP Act.

Term	Definition
works approval	refers to this document, which evidences the grant of the works approval by the CEO under section 54 of the EP Act, subject to the conditions.
WET Testing	means *whole-of-effluent toxicity testing* as described in Ministerial Statement 1207.
works approval holder	refers to the occupier of the premises being the person to whom this works approval has been granted, as specified at the front of this works approval.

END OF CONDITIONS

Schedule 1: Maps

Premises map

The boundary of the prescribed premises is shown in the map below (**Figure 1**).

Figure 1: Map of the boundary of the prescribed premises.

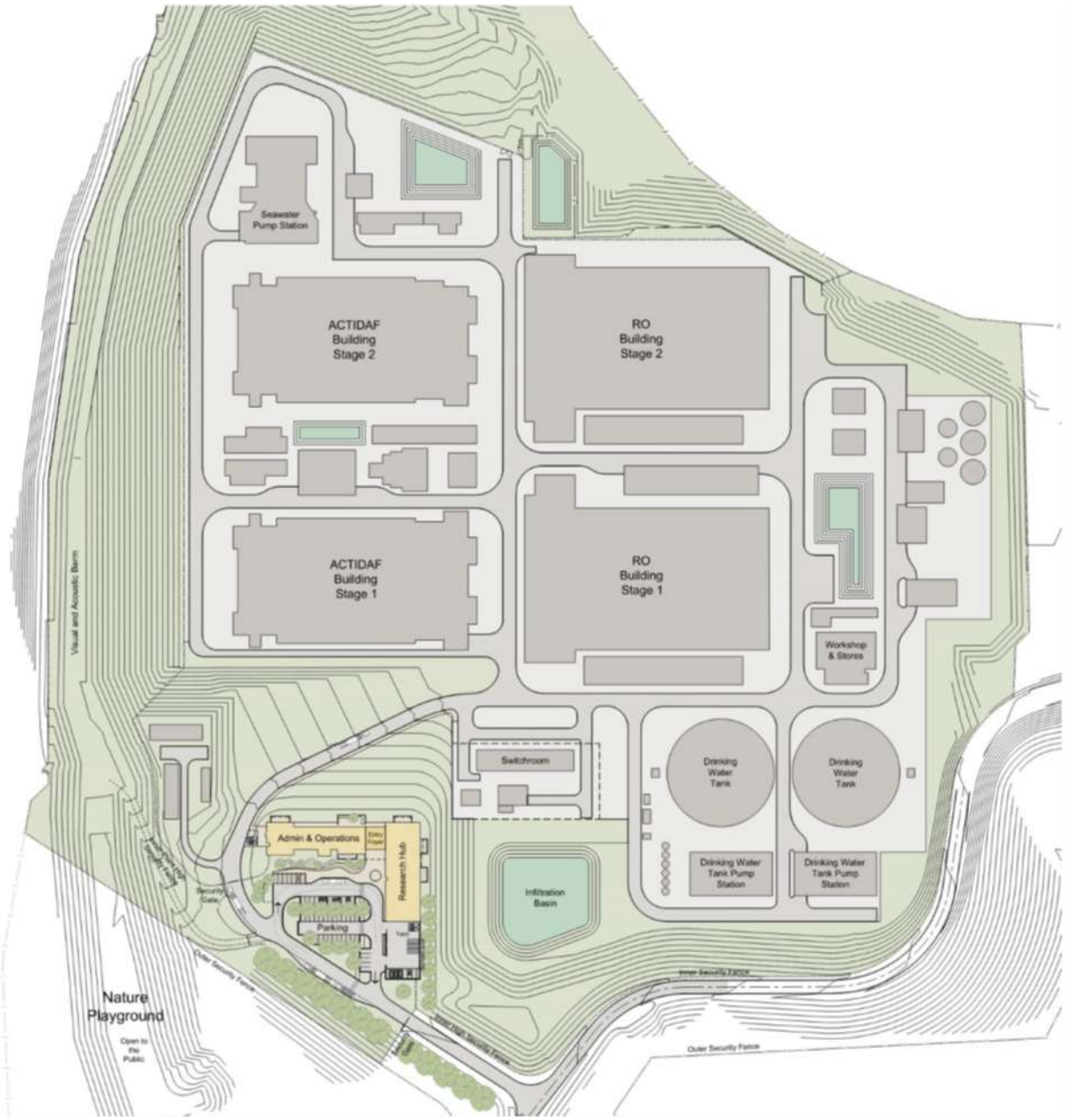

Figure 2: Alkimos Seawater Desalination Plant project site layout (Stages 1 and 2).

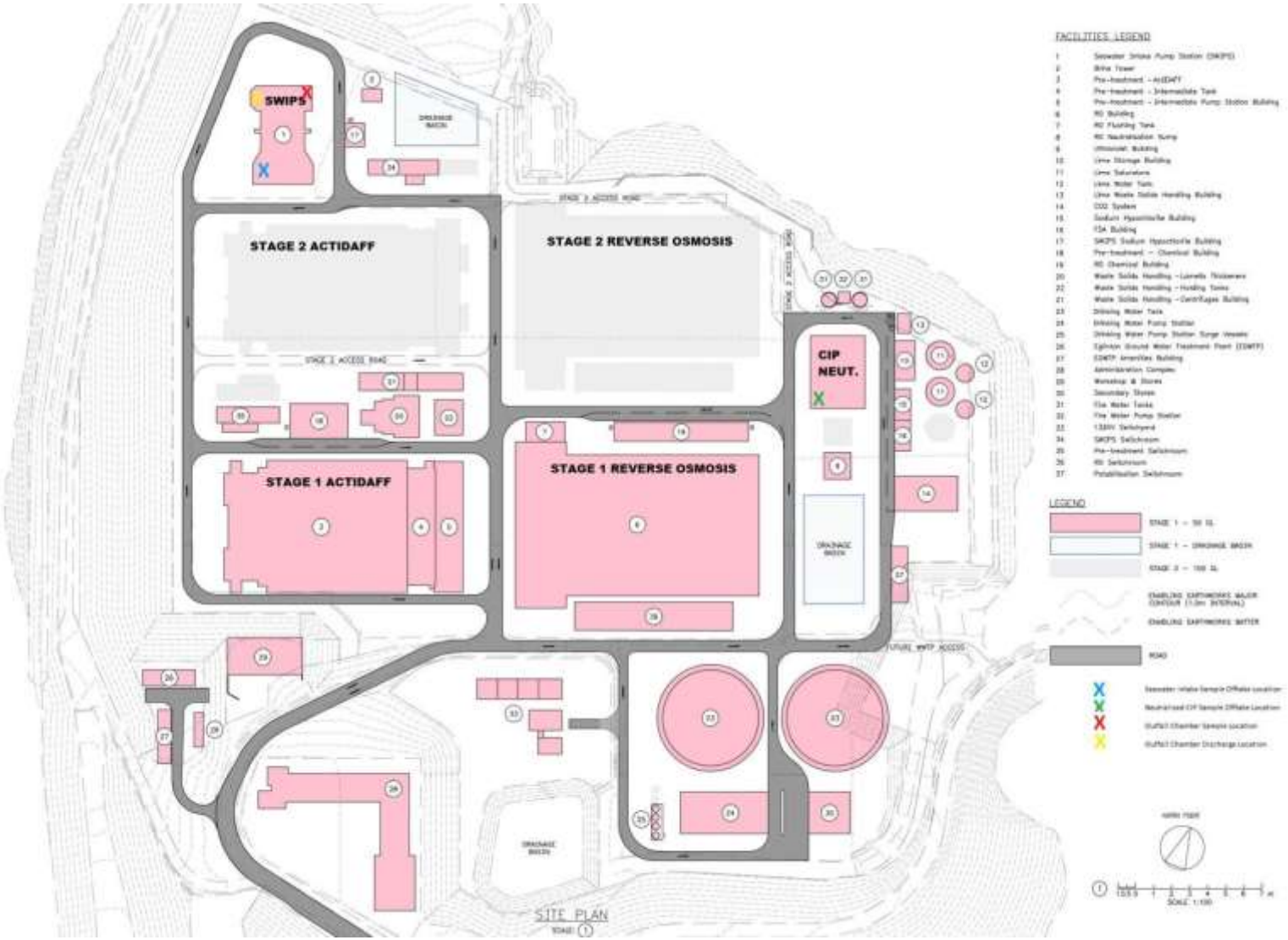

Figure 3: Detailed premises site plan.

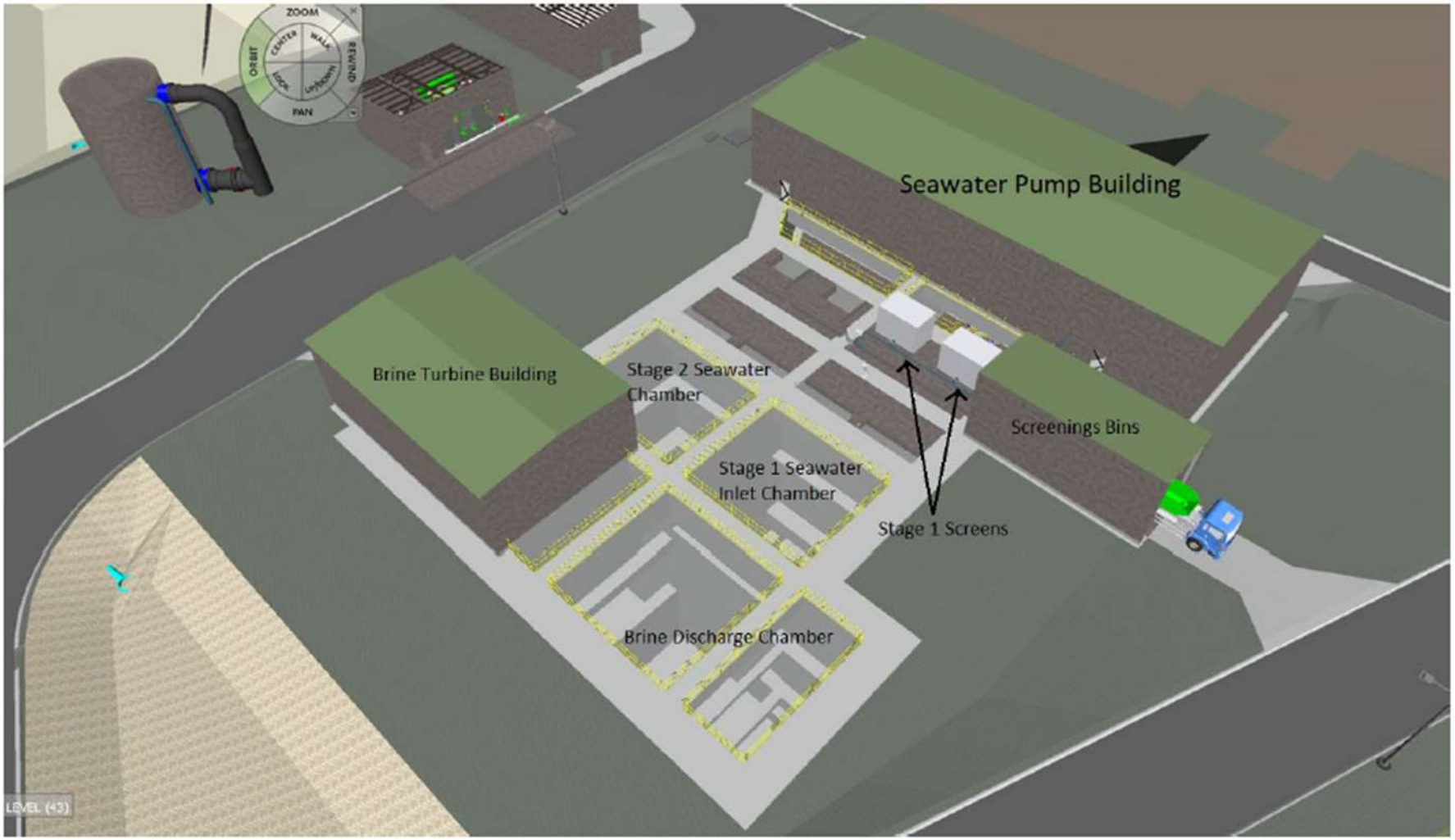

Figure 4: 3D Model of SWIPs Layout.

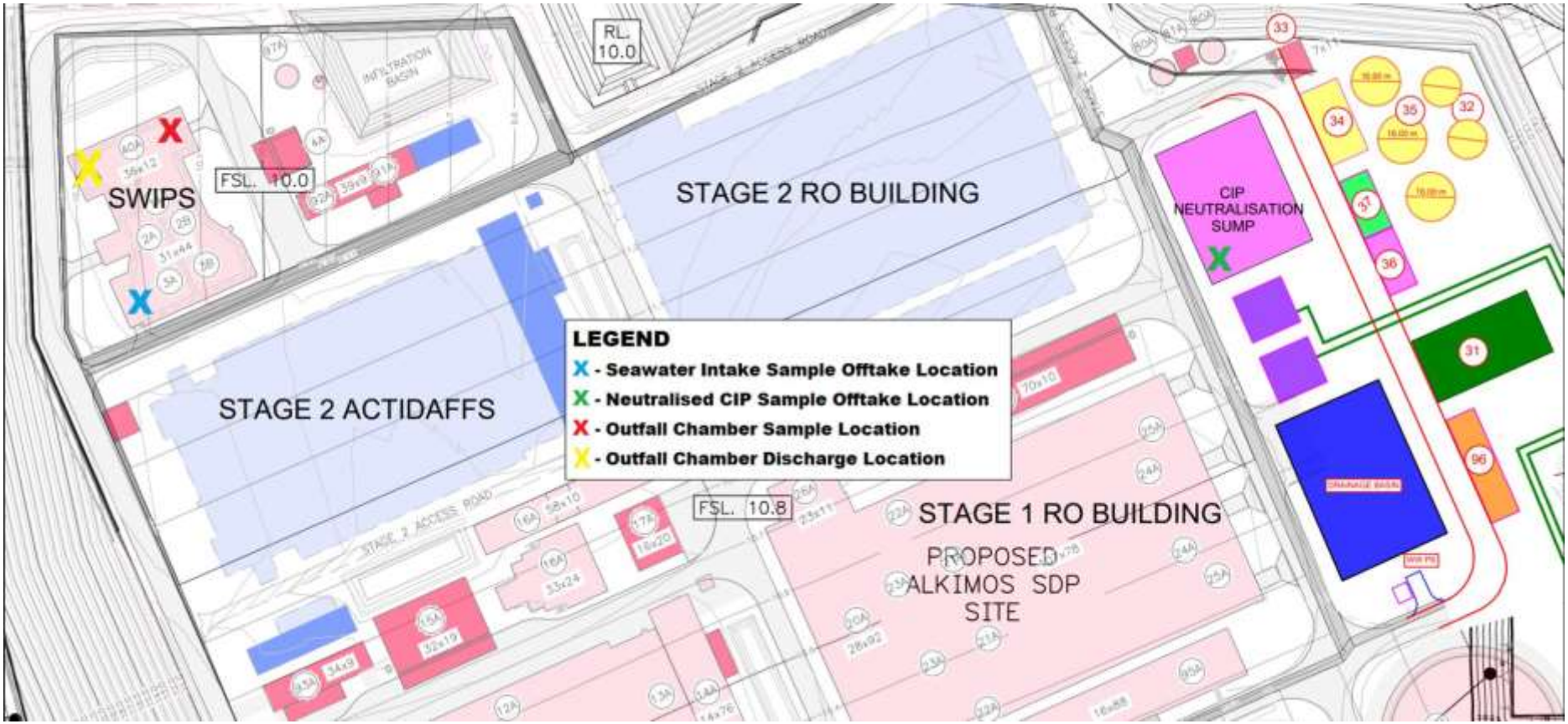

Figure 5: Premises sampling locations.

Figure 6: Intake and outflow sampling points.

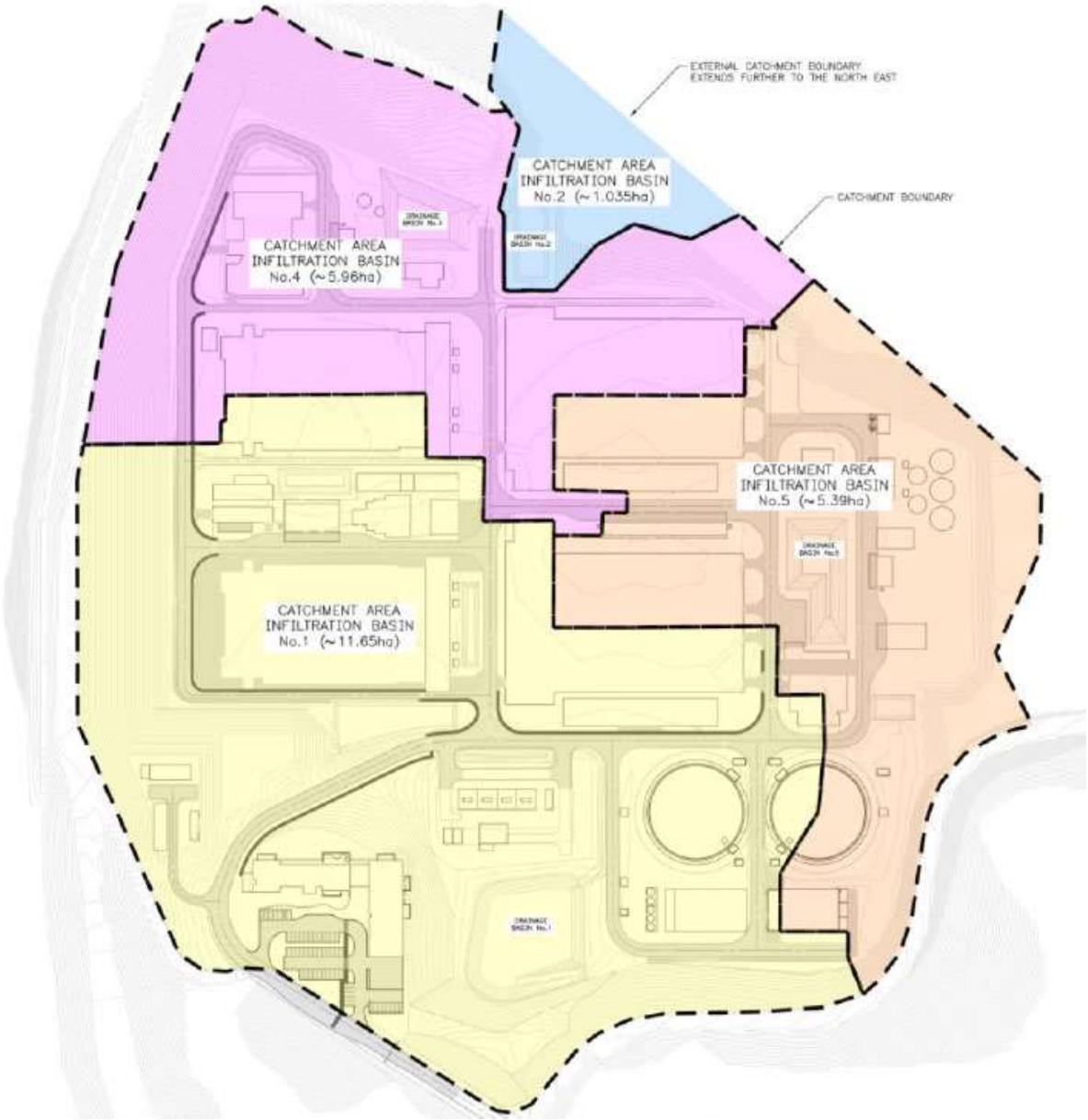

Figure 7: Stormwater drainage catchment areas.

Schedule 2: Premises boundary

The corners of the premises boundary are the coordinates listed in Table 13.

Table 13: Premises boundary coordinates (GDA2020).

	Easting	Northing	Zone
1.	373813.4	6501505	GDA20_Z50
2.	373972.4	6501508	
3.	373972.8	6501523	
4.	373982.6	6501525	
5.	373999.2	6501520	
6.	374016.3	6501481	
7.	374100	6501517	
8.	374151.3	6501510	
9.	374160.7	6501493	
10.	374271.1	6501489	
11.	374320	6501382	
12.	374312.8	6501366	
13.	374294.9	6501362	
14.	374301.2	6501345	
15.	374321.8	6501313	
16.	374335.6	6501245	
17.	374344.4	6501212	
18.	374327.5	6501180	
19.	374309.8	6501166	
20.	374278.4	6501152	
21.	374246.3	6501138	
22.	374211.1	6501123	
23.	374200.7	6501109	

24.	374191	6501072	
25.	374182.2	6501047	
26.	374168.1	6501043	
27.	374013.1	6501067	
28.	374003.8	6501057	
29.	373983	6501049	
30.	373951.7	6501060	
31.	373925.9	6501085	
32.	373907.6	6501102	
33.	373868	6501149	
34.	373903.8	6501171	
35.	373910.8	6501177	
36.	373816.5	6501400	
37.	373813.4	6501505	