Government of Western Australia
Department of Water and Environmental Regulation

Works Approval

Works approval number	W6771/2023/1
Works approval holder	Water Corporation
Registered business address	629 Newcastle Street LEEDERVILLE WA 6007
DWER file number	DER2022/000591 and INS-0002808
Duration	13/02/2025 to 12/02/2030
Date of issue	13/02/2025
Premises details	Mt Barker Woodlot 47 Omrah Road MOUNT BARKER 6324 Legal description –

Lot Number	Plan/Diagram Number	Volume	Folio
Lot B 21	Diagram 111	1886	142
Lot 1367	Deposited Plan 114634		
Lot 1611	Deposited Plan 122001		
Lot 5262	Deposited Plan 163872		
Lot 2063	Deposited Plan 131157	1809	472

As defined by the coordinates in Schedule 2 of the works approval

Prescribed premises category description (Schedule 1, Environmental Protection Regulations 1987)	Assessed design capacity
Category 54: Sewage facility	1,280 cubic metres per day

This works approval is granted to the works approval holder, subject to the attached conditions, on 13 February 2025, by:

Melissa Chamberlain

Digitally signed by Melissa Chamberlain
Date: 2025.02.13 11:41:08 +08'00'

MANAGER WASTE INDUSTRIES
REGULATORY SERVICES

an officer delegated under section 20 of the *Environmental Protection Act 1986* (WA)

Works approval history

Date	Reference number	Summary of changes
13/02/2025	W6771/2023/1	Works approval granted.

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.

This works approval does not provide any implied authorisation for the undertaking of any action that has, will have or is likely to have a significant impact on a protected matter under the *Environment Protection and Biodiversity Conservation Act 1999*.

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 equipment;

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

(c) at the corresponding infrastructure location,

as set out in Table 1.

Table 1: Construction / installation requirements

Infrastructure and equipment		Construction / installation requirements	Infrastructure location
1.	Storage dam	(a) In accordance with the critical containment infrastructure requirements of condition 2; and (b) In accordance with the details in Figure 4, Figure 5, Figure 6, Figure 7 and Figure 8.	Storage dam as shown in Figure 2
2.	Pump system	(a) Must include two pumps in a duty/standby arrangement; and (b) A flow meter must be installed after the pumps and prior to the filtration system; and (c) Arranged in accordance with Figure 9.	Pump station as shown in Figure 2
3.	Chlorinator and filtration system	(a) A flow meter must be installed after the filters to measure filtered wastewater volumes being sent to irrigation; and (b) Sufficient pipework must be installed so that backwash from the filters can be directed back to the storage dam; and (c) Arranged in accordance with Figure 9.	
4.	Pump and irrigation controls	(a) A telemetry and control system must be installed that allows for remote monitoring and scheduling of the woodlot irrigation scheme; and (b) Arranged in accordance with Figure 9.	

Infrastructure and equipment		Construction / installation requirements	Infrastructure location
5.	Proposed Bore 1, 2 and 3	(a) Designed and constructed in accordance with *ASTM D5092/D5092M-16: Standard practice for design and installation of groundwater monitoring bores*; (b) A record of the geology encountered during drilling must be described and classified in accordance with the Australian Standard Geotechnical Site Investigations AS1726; (c) Must be developed after drilling to remove fine sand, silt, clay and any drilling mud residues from around the well screen to ensure the hydraulic functioning of the well; (d) The vertical (top of casing) and horizontal position of each monitoring well must be surveyed and subsequently mapped by a suitably qualified surveyor; and (e) Well construction details must be documented within a well construction log to demonstrate compliance with *ASTM D5092/D5092M-16*. The construction logs shall include records of the geology encountered, well development activities, elevations of the top of casing position to be used as the reference point for water-level measurements, and the elevations of the ground surface protective installations.	As shown in Figure 10

2. The works approval holder must construct the storage dam in accordance with the features and corresponding design and construction / installation requirements set out in Table 2.

Table 2: Critical containment infrastructure requirements

Feature		Design and construction / installation requirements
1.	Capacity	(a) Must have a full operating capacity of at least 60 ML; and (b) Must be capable of storing a 1 in 10 year, 72 hour rainfall event prior to operation of the spillway.
2.	Spillway	(a) An emergency overflow spillway must be installed to allow for controlled releases during overflow events; (b) The spillway crest level must be positioned so that a freeboard height of at least 300 mm is provided when the dam is operated to full operating capacity; and (c) The spillway must be capable of controlling discharges up to a 1 in 100 year, 72 hour rainfall event before overtopping of embankments occurs.
3.	Embankments	(a) Internal embankment slopes must be no steeper than 1V : 3H; and (b) A vertical and horizontal filter must be installed within the dam embankment for intercepting seepage through the embankment to control pore pressure and internal erosion.

Feature		Design and construction / installation requirements
4.	Subgrade	(a) Pockets of weak or otherwise unsuitable material must be removed from below the general subgrade level during site preparation; and (b) Prior to receiving clay liner material, the top 150 mm of the subgrade must be sufficiently moistened and compacted.
5.	Compacted clay liner	(a) The floor and internal embankments of the storage dam must be lined with a compacted clay liner that has an average permeability of less than 5 x 10^{-9} m/s; (b) The compacted liner must be a minimum 450 mm thick on the floor of the storage dam and a minimum 1 m thick horizontal to internal embankments; (c) Clay liner material must be placed in continuous lifts that are compacted to a thickness of no more than 150 mm; (d) The material in each layer must have a moisture content during and after compaction of ±1% OMC and be compacted to minimum 98% SMDD; and (e) The surface of each lift must be worked to a sufficient depth to provide a satisfactory bonding surface before placement of the next lift.
6.	Liner protection	(a) A minimum 150 mm thick layer of gravel must be installed above the clay liner for protection; (b) A minimum 300 mm thick layer of rip-rap must be installed above the gravel protection layer on internal embankments; and (c) Erosion protection must be installed around the treated wastewater inlet pipe to prevent damage to the clay liner.
7.	Intercept drains	(a) An upgradient drain must be installed along the outer edge of the dam embankment to intercept groundwater flow and to collect surface water run-off from the catchment area uphill to the east and south of the dam; (b) A downgradient drain must be installed on the outer edge of the toe embankment to intercept groundwater flow and to collect drainage from the vertical and horizontal dam filters; and (c) Both drains must be lined with rock-pitching where there is a risk of erosion.
8.	Inlet and outlet	(a) The inlet and outlet of the dam must be installed as far apart as possible to maximise storage turnover.

3. Prior to construction of the storage dam, the works approval holder must prepare a CQA Plan that provides procedures for identifying nonconformances with technical specifications and the requirements of conditions 1 and 2.

4. The CQA Plan required by condition 3, must include as a minimum the following:

(a) descriptions of responsibilities, qualifications and obligations for each party involved in the plan and the proposed level of supervision for liner construction and installation;

(b) material testing information, including sampling locations, frequency of testing, test methods, laboratories, accreditations, applicable specifications and quality standards, data evaluation, acceptance and rejection criteria, and contingency measures in the event of failure;

(c) hold and inspection points for key stages of the work that cannot later be rectified because they will no longer be accessible;

(d) subgrade preparation and liner installation procedures, including protection from weather and other damage during installation, regular inspections, repair testing and recording and any protection from desiccation after installation; and

(e) reporting and record keeping requirements.

Compliance reporting

5. The works approval holder must within 90 calendar days of the storage dam identified by condition 1 being constructed:

(a) undertake an audit of their compliance with the requirements of condition 2; and

(b) prepare and submit to the CEO a Critical Containment Infrastructure Report on that compliance.

6. The Critical Containment Infrastructure Report required by condition 5 must include as a minimum the following:

(a) certification by a suitably qualified civil or geotechnical engineer (as is relevant) that the storage dam or components thereof, as specified in conditions 1 and 2, has been built and installed in accordance with the requirements specified in condition 2;

(b) as constructed plans and a detailed site plan showing the location and dimensions for the storage dam or components thereof, as specified in conditions 1 and 2;

(c) photographic evidence of the installation of the storage dam and components thereof;

(d) be signed by a person authorised to represent the works approval holder and contains the printed name and position of that person;

(e) a copy of the CQA Plan required by condition 2; and

(f) a CQA Validation Report from an independent third party which demonstrates that the storage dam meets the requirements of the technical specification and the minimum requirements specified in condition 2.

7. The works approval holder must within 90 calendar days of all the items of infrastructure and 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.

8. The Environmental Compliance Report required by condition 7, must include as a minimum the following:

(a) certification by a suitably qualified 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 condition 1;

(b) as constructed plans and a detailed site plan for each item of infrastructure or component of infrastructure specified in condition 1;

(c) the well construction logs for proposed bores 1, 2 and 3; and

(d) be signed by a person authorised to represent the works approval holder and contains the printed name and position of that person.

Environmental commissioning and time limited operations phase

Environmental commissioning phase commencement and duration

9. The works approval holder may only commence environmental commissioning for the storage dam critical containment infrastructure identified in condition 1:

(a) where the CEO has notified the works approval holder that the Critical Containment Infrastructure Report as required by condition 5 meets the requirements of that condition; or

(b) where at least 20 business days have passed after the Critical Containment Infrastructure Report for the storage dam as required by condition 5 has been submitted to the CEO.

10. The works approval holder may only commence environmental commissioning for an item of infrastructure and equipment identified in condition 1 where the Environmental Compliance Report as required by condition 7 has been submitted by the works approval holder for that item of infrastructure.

11. The works approval holder may conduct environmental commissioning for the items of infrastructure identified in condition 1 for a period not exceeding 90 calendar days from the day the works approval holder meets the requirements of condition 9 and 10.

Environmental commissioning report

12. The works approval holder must submit to the CEO an Environmental Commissioning Report within 60 calendar days of the completion date of environmental commissioning for each item of infrastructure specified in condition 1.

13. The works approval holder must ensure the Environmental Commissioning Report required by condition 12 of this works approval includes the following:

(a) a summary of the environmental commissioning activities undertaken, including timeframes and amount of treated wastewater received and irrigated;

(b) the point-source emissions monitoring and/or ambient concentrations monitoring results recorded in accordance with conditions 23 and/or 24;

(c) a summary of the environmental performance of each item of infrastructure or equipment as constructed or installed;

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

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

Time limited operations phase commencement and duration

14. The works approval holder may only commence time limited operations for an item of infrastructure identified in condition 1 where the Environmental Commissioning Report for that item of infrastructure as required by condition 12 has been submitted by the works approval holder.

15. The works approval holder may conduct time limited operations:

(a) for a period not exceeding 180 calendar days from the day the works approval holder meets the requirements of condition 14; or

(b) until such time as a licence for the items 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 15(a).

Environmental commissioning and time limited operations requirements and emission limits

16. During environmental commissioning and time limited operations, the works approval holder must only accept onto the premises waste of a type that:

(a) does not exceed the rate at which that waste is received; and

(b) meets the relevant acceptance specification,

as set out in Table 3.

Table 3: Waste acceptance criteria

Waste type	Rate at which waste is received	Acceptance specification
Treated sewage	1,280 m^3/day	(a) Accepted via pipeline inflow or tanker into the storage dam.

17. During environmental commissioning and time limited operations, the works approval holder must ensure that the premises infrastructure and equipment listed in Table 4 and located at the corresponding infrastructure location is maintained and operated in accordance with the corresponding operational requirement set out in Table 4.

Table 4: Infrastructure and equipment requirements during environmental commissioning and time limited operation

Infrastructure and equipment		Operational requirements	Infrastructure location
1.	Storage dam	(a) A compacted clay liner must be maintained at all times that has a minimum 450 mm floor thickness, minimum 1 m horizontal embankment thickness and a permeability of less than 5 x 10^{-9} m/s; (b) A spillway crest freeboard height equal to or greater than 300 mm must be maintained; (c) A minimum water level of 300 mm must be maintained at all times; (d) Vegetation and floating debris (emergent or otherwise) must be prevented from growing or accumulating onto embankments; and (e) Pore pressure build up must be adequately controlled by groundwater intercept drains and embankment filters so that the stability of the dam is not adversely affected.	Storage dam as shown in Figure 2

Infrastructure and equipment		Operational requirements	Infrastructure location
2.	Irrigation pump station, chlorinator and filtration system	(a) Backwash from the filters must be directed back to the storage dam.	Pump station as shown in Figure 2
3.	Fencing and site security	(a) Suitable fencing must be erected and maintained to prevent unauthorised access to the premises; (b) Any entrance gates to the premises must be securely locked when the premises is unattended; and (c) Regular inspections must be undertaken of all security measures and damage repaired within 10 working days of identification.	N/A
4.	Groundwater monitoring bores	(a) Must be maintained in good working order to allow representative groundwater samples to be taken.	As shown in Figure 10

18. During environmental commissioning and time limited operations, the works approval holder must ensure that the emission specified in Table 5, is discharged only from the corresponding discharge points and only at the corresponding discharge point locations.

Table 5: Authorised discharge points during environmental commissioning and time limited operations

Emission		Discharge points	Discharge point locations
Primary irrigation zones			
1.	Treated sewage	Surface dripper irrigation lines installed between each planted row within Plots 3, 4, 5, 10, 15, 16 and 17	As shown in Figure 3
Alternative irrigation zones			
2.	Treated sewage	Surface dripper irrigation lines installed between each planted row within Plots 7 and 11	As shown in Figure 3
Redundancy irrigation zones			
3.	Treated sewage	Surface dripper irrigation lines installed between each planted row within Plot 6	As shown in Figure 3

19. The works approval holder must ensure treated sewage is only discharged to land at the discharge locations specified in Table 6 in accordance with the corresponding discharge requirements.

Table 6: Irrigation requirements during environmental commissioning and time limited operation

Discharge point		Discharge via irrigation requirements
1.	All authorised discharge points in accordance with condition 18	(a) Irrigation generated runoff or discharge must not occur beyond the boundary of the irrigation plots; (b) Irrigation must not occur on land that is waterlogged; (c) Irrigation must not be undertaken immediately prior to, during or after a rainfall event; (d) Irrigation must be evenly distributed over the irrigation plots, so that no ponding or pooling occurs; (e) No fertiliser application to the irrigation plots is permitted; (f) Livestock must be prevented from grazing the irrigation plots; and (g) Irrigation must not take place during the year in which a woodlot plot is harvested and may only take place in the following year during re-establishment where low soil moisture conditions are experienced.
2.	Plots 7 and 11 in accordance with condition 18	(a) Irrigation of the plots must only occur as a contingency measure during harvesting periods of the primary irrigation zones or in the event of excess water in the storage dam requiring management.
3.	Plot 6 in accordance with condition 18	(a) Irrigation must only occur where additional area is required in addition to the contingency provided by Plots 7 and 11.

20. During environmental commissioning and time limited operations, the works approval holder must ensure that the nutrient loading limits specified in Table 7 are not exceeded as a result of treated sewage irrigation to the discharge points authorised by condition 18.

Table 7: Nutrient loading limits during environmental commissioning and time limited operations

Parameter	Loading limit
Total nitrogen	132 kg/ha/yr
Total phosphorus	32 kg/ha/yr

21. During environmental commissioning and time limited operations, the works approval holder must ensure that vegetation at the woodlot plots is managed in accordance with the requirements set out in Table 8.

Table 8: Vegetation management requirements

Woodlot plots		Vegetation material	Requirements
1.	Woodlot Plots 3, 4, 5, 6, 7, 10, 11, 15, 16 and 17 as shown in Figure 3	Blue Gum (*Eucalyptus globulus*)	(a) Harvesting must be scheduled to ensure that adequate nutrient and hydraulic uptake is maintained in each woodlot plot, and there are sufficient irrigation areas available in any one year; (b) All harvested material must be removed from the premises; and (c) All pruned material must be removed from the premises.
2.		Grasses and weeds	(a) Cut material must be removed from the premises or transferred to unirrigated areas for use as mulch to ensure nitrogen and phosphorus from the material does not contribute additional nutrients to the woodlot plots; and (b) Herbicide and pesticide application must be administered by an appropriately qualified person with woodlot weed control experience.

Monitoring during environmental commissioning and time limited operations

22. The works approval holder must record the total amount of waste accepted onto the premises according to the specifications set out in Table 9.

Table 9: Input monitoring

Waste type	Unit	Frequency	Averaging period	Method
Treated sewage	m^3/day	Continuous	Monthly	Flow metering device

23. The works approval holder must monitor emissions during environmental commissioning and time limited operations in accordance with Table 10.

Table 10: Emissions and discharge monitoring during time limited operations

Discharge point	Monitoring location	Parameter	Unit	Frequency	Averaging period	Method
Woodlot Plots 3, 4, 5, 6, 7, 10, 11, 15, 16 and 17 as shown in Figure 3	SP Northern Valve Woodlot Mount Barker S7016307	pH[1]	-	Quarterly	Monthly	Spot sample in accordance with AS/NZS 5667.1 and AS/NZS 5667.10
		BOD_5	mg/L			
		TSS				
		TDS				
		TN				
		NH_4-N				

Discharge point	Monitoring location	Parameter	Unit	Frequency	Averaging period	Method
		NO_x-N				
		TP				
		E. coli	CFU or MPN /100 mL			
	Mt Barker TFarm Dam 1 Meter 1 S7013166B	Cumulative volume irrigated to the woodlot[1]	kL/day	Continuous	Monthly	Flow metering device

Note 1: In-field non-NATA accredited analysis permitted.

24. The works approval holder must conduct an ambient monitoring program in accordance with the requirements specified in Schedule 3 and record the results of all monitoring activity conducted under that program.

25. The works approval holder must ensure that all sample analysis undertaken pursuant to conditions 23 and 24 is undertaken by a holder of a current accreditation from NATA for the methods of analysis relevant to the corresponding parameter.

26. The works approval holder must ensure that all monitoring equipment used to comply with conditions 22, 23 and 24 is operated and calibrated in accordance with the manufacturer's specifications.

Management plans

27. The works approval holder must maintain and implement a Nutrient Irrigation Management Plan that is consistent with the conditions of this works approval and sets out in prescriptive detail:

(a) the arrangement of the woodlot irrigation scheme, including:

(i) the total size and location of the areas to be irrigated; and
(ii) the sprinkler type, layout and zoning of the irrigation system;

(b) the characteristics of the treated sewage to be used for irrigation;

(c) the design irrigation rates, watering duration per cycle and watering frequency that will be used, including how the irrigation system will be operated in response to seasonal and weather conditions;

(d) procedures for the management of treated sewage storage volumes during the irrigation season, winter shutdown periods and any emergency, maintenance or harvesting related shutdowns;

(e) operating procedures and management practices to ensure that operational requirements and nutrient loading limits set out in conditions 19 and 20 are not exceeded during operation of the irrigation scheme;

(f) inspections, tests and maintenance to be carried out to ensure there are no system failures and the requirements of condition 19 are being met;

(g) vegetation management practices and harvest planning to meet the requirements of condition 21;

(h) ongoing monitoring, sampling and analysis in accordance with conditions 23 and 24;

(i) how the Nutrient Irrigation Management Plan will be reviewed and revised in response to operational improvements and matters arising from monitoring data or compliance audits; and

(j) recordkeeping requirements in accordance with the relevant conditions of this works approval.

Compliance reporting

28. The works approval holder must submit to the CEO a report on the time limited operations within 60 calendar days of the completion date of time limited operations or 30 calendar days before the expiration date of the works approval, whichever is the sooner.

29. The works approval holder must ensure the report required by condition 28 includes the following:

(a) a summary of the time limited operations, including timeframes and amount of treated wastewater processed;

(b) a summary of monitoring results obtained during time limited operations under conditions 22, 23 and 24;

(c) a review of performance and compliance against the conditions of the works approval; and

(d) where the manufacturer's design specifications and the conditions of this works approval have not been met, what measures will the works approval holder take to meet them, and what timeframes will be required to implement those measures.

Records and reporting (general)

30. 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.

31. 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 conditions 1 and 2;

(b) any maintenance or repairs of infrastructure that is performed in the course of complying with condition 1, 2 and 17;

(c) monitoring programs undertaken in accordance with conditions 22, 23 and 24; and

(d) complaints received under condition 30.

32. The books specified under condition 31 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 11 have the meanings defined.

Table 11: Definitions

Term	Definition
AEP	Annual Exceedance Probability
AS 4482.1	means the Australian Standard AS 4482.1 *Guide to the investigation and sampling of sites with potentially contaminated soil – Non-volatile and semi-volatile compounds*.
AS 5667.1	means the Australian Standard AS/NZS 5667.1 *Water quality – Sampling – Guidance of the Design of sampling programs, sampling techniques and the preservation and handling of samples*.
AS 5667.6	means the Australian Standard AS/NZS 5667.6 *Water quality – Sampling – Guidance on sampling of rivers and streams*.
AS 5667.10	means the Australian Standard AS/NZS 5667.10 *Water Quality – Sampling – Guidance on sampling of waste waters*.
AS 5667.11	means the Australian Standard AS/NZS 5667.11 *Water quality – Sampling – Guidance on sampling of groundwaters*.
BOD_5	5-day biochemical oxygen demand
books	has the same meaning given to that term under the EP Act.
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
CFU or MPN /100 mL	colony forming units or most probable number per 100 millilitres
CQA Plan	means a document that sets out a planned system of activities and procedures that will be undertaken during and after construction of the storage dam to identify any nonconformances with the requirements of the works approval and technical specifications.
CQA Validation Report	means a report on the planned system of activities outlined in the CQA Plan required by condition 3 that were undertaken to provide assurance that the components of the storage dam were constructed and installed in accordance with the requirements of the works approval and technical specifications.
critical containment infrastructure	means the storage dam listed in condition 1.

Term	Definition
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.
discharge	has the same meaning given to that term under the EP Act.
DO	dissolved oxygen
E. coli	*Escherichia coli*
EC	electrical conductivity
ECEC	effective cation exchange capacity
emission	has the same meaning given to that term under the EP Act.
Environmental Compliance Report	means a report to satisfy the CEO that the conditioned infrastructure and equipment has been constructed and installed in accordance with the works approval.
EP Act	*Environmental Protection Act 1986* (WA).
EP Regulations	Environmental Protection Regulations 1987 (WA).
ESP	exchangeable sodium percentage
mAGL	metres above ground level
mAHD	metres Australian height datum
mBGL	metres below ground level
ML	megalitres
NH_4-N	ammonium as nitrogen
NO_2-N	nitrite as nitrogen
NO_3-N	nitrate as nitrogen
NO_x-N	nitrate + nitrite as nitrogen
Nutrient Irrigation Management Plan	means the plan specified in condition 27 of this works approval
OMC	optimal moisture content
PBI	phosphorus buffering index

Term	Definition
premises	the premises to which this works approval applies, as specified at the front of this works approval, as shown on the premises map (Figure 1) in Schedule 1 to this works approval and as listed in the coordinates table (Table 12) in Schedule 2 to this works approval.
prescribed premises	has the same meaning given to that term under the EP Act.
PRI	phosphorus retention index
SMDD	standard maximum dry density
suitably qualified civil or geotechnical engineer	means a person who: (a) holds a Bachelor of Engineering recognised by Engineers Australia; (b) has a minimum of five years of experience working in a supervisory area of civil or geotechnical engineering (as is relevant); and (c) is an independent third party to the principal.
SWL	standing water level
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.
TDS	total dissolved solids
TKN	total Kjeldahl nitrogen
TN	total nitrogen
TOC	total organic carbon
TP	total phosphorus
TSS	total suspended solids
waste	has the same meaning given to that term under the EP Act.
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.
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: Figures

Premises maps

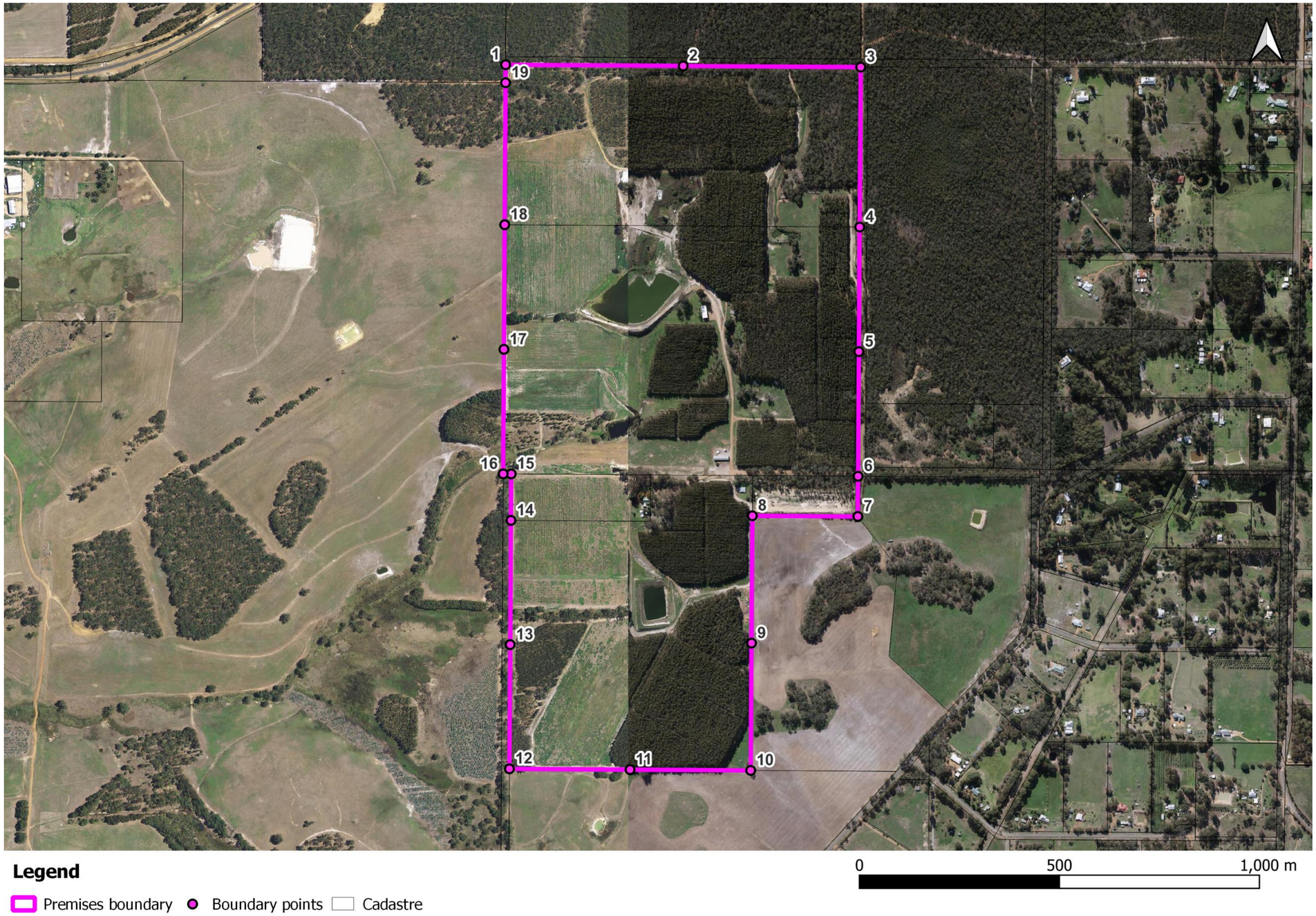


Figure 1: Map of the boundary of the prescribed premises

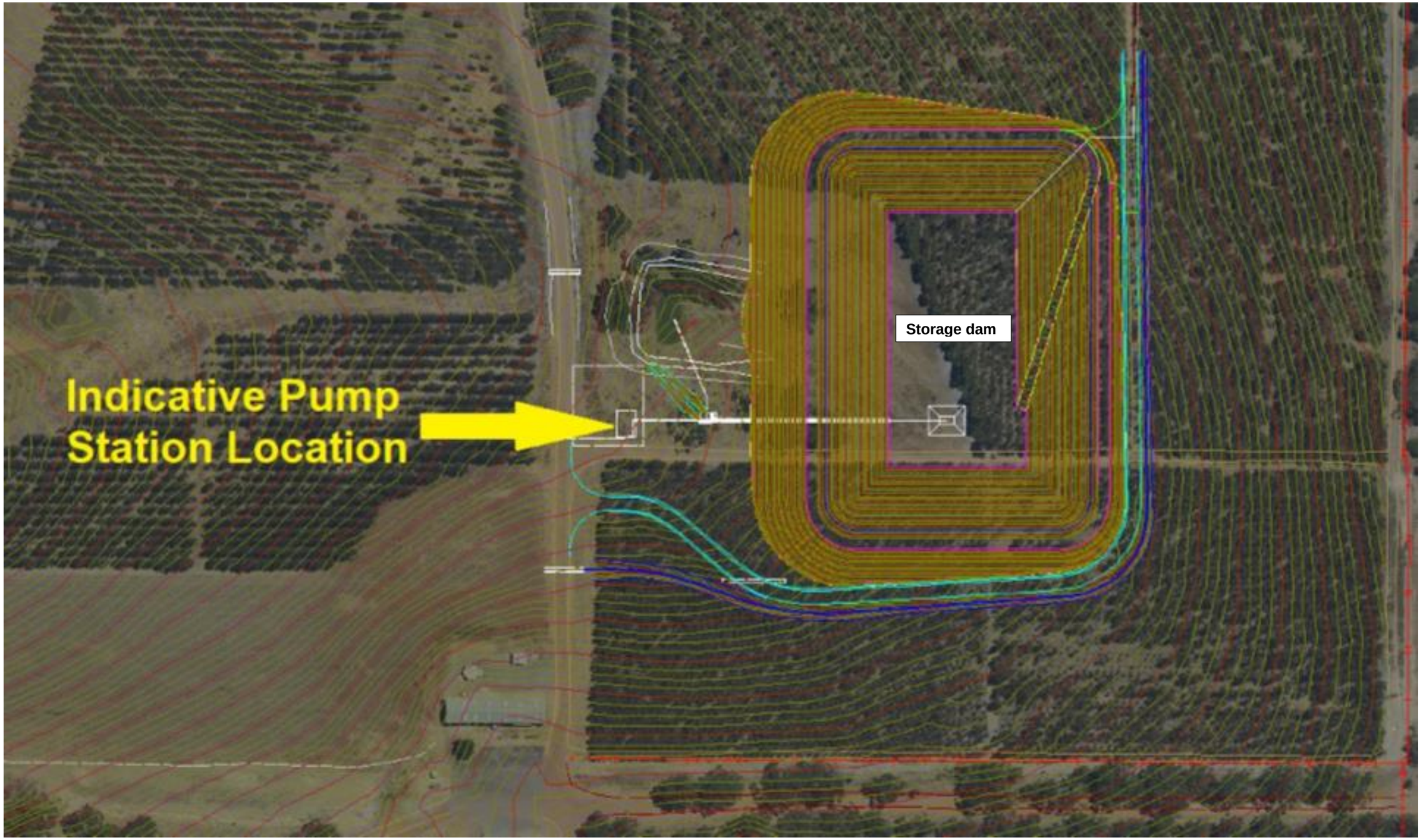


Figure 2: Storage dam and pump station location

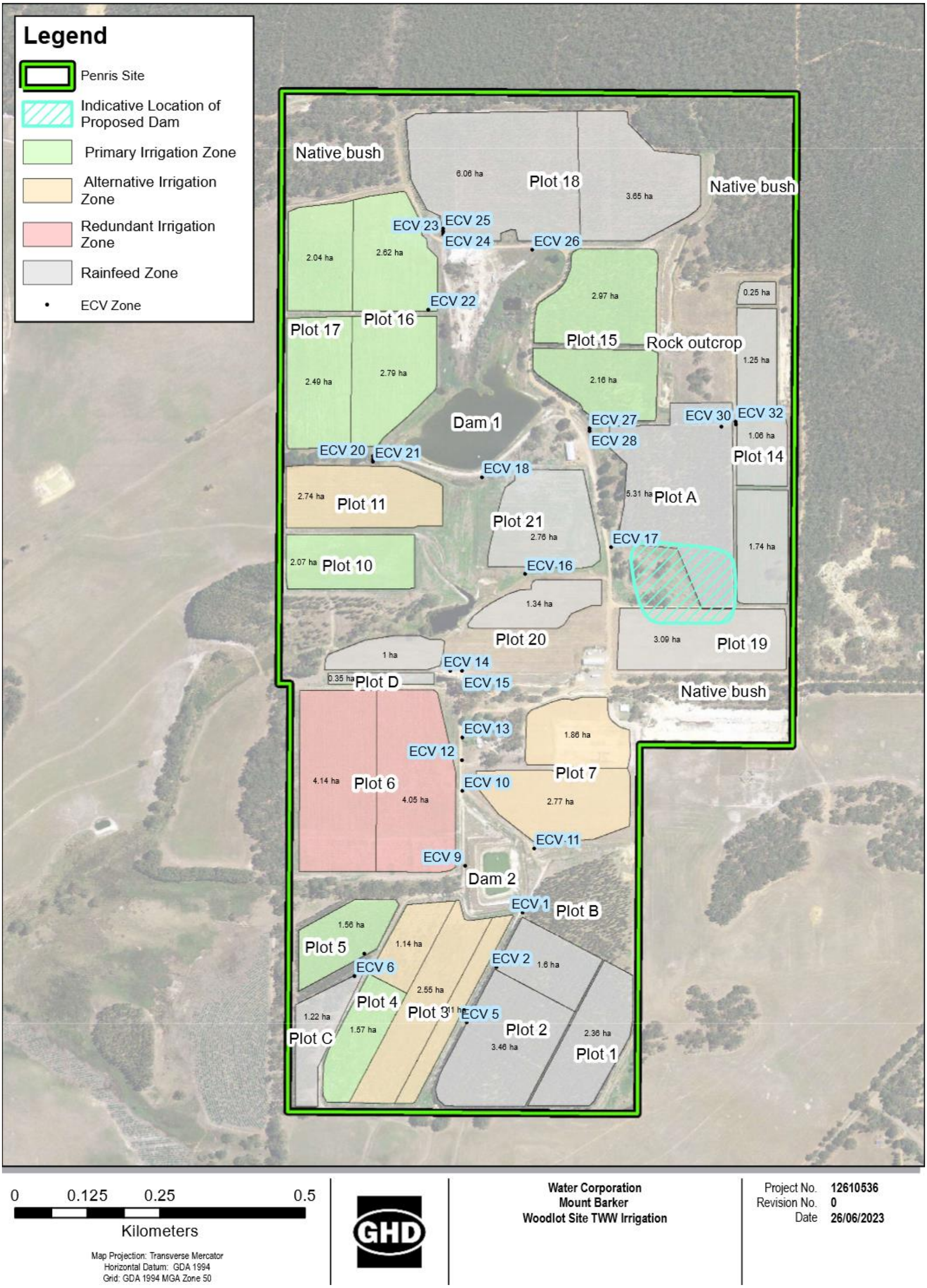


Figure 3: Woodlot irrigation plots

Schematics and details of proposed works

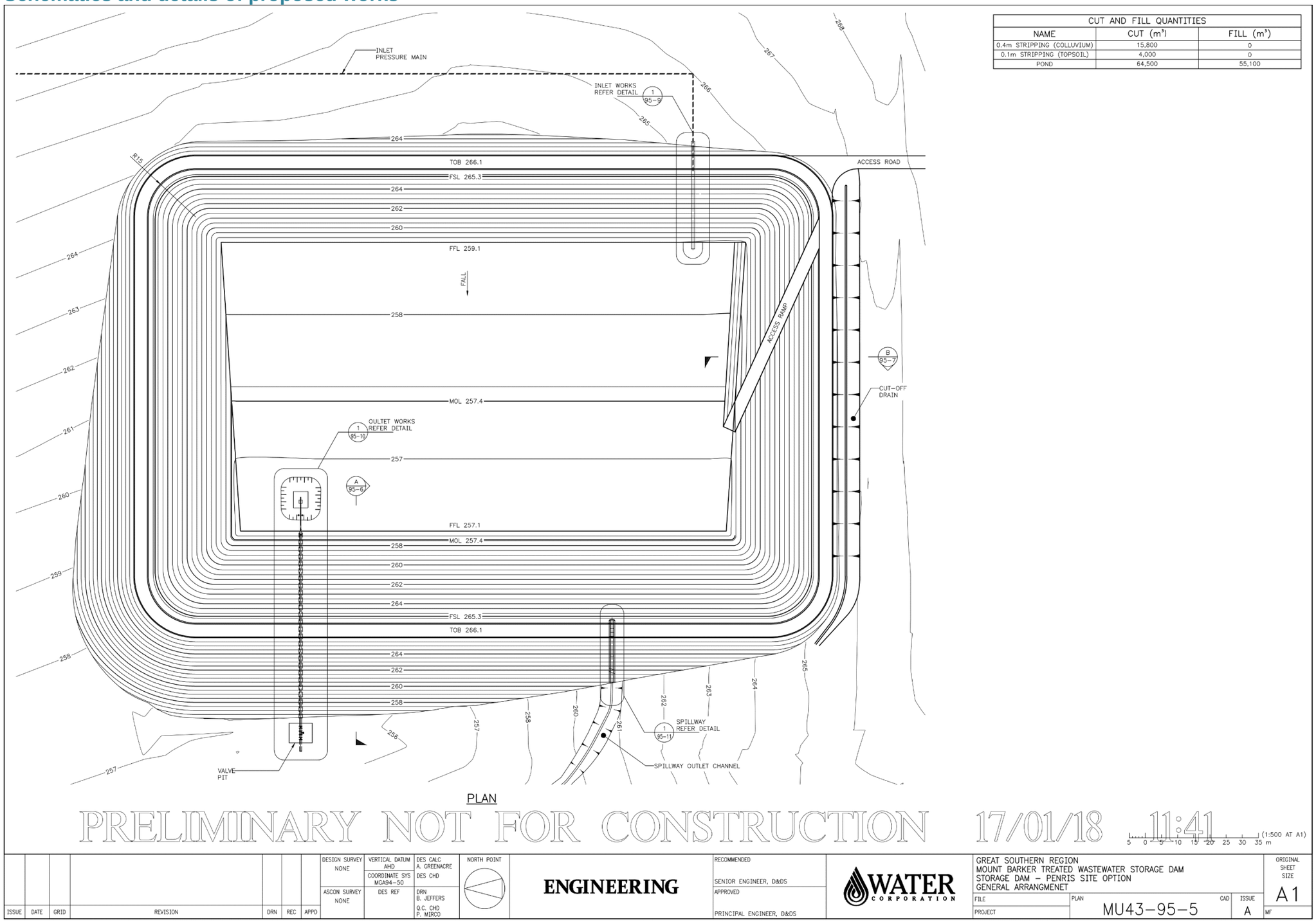
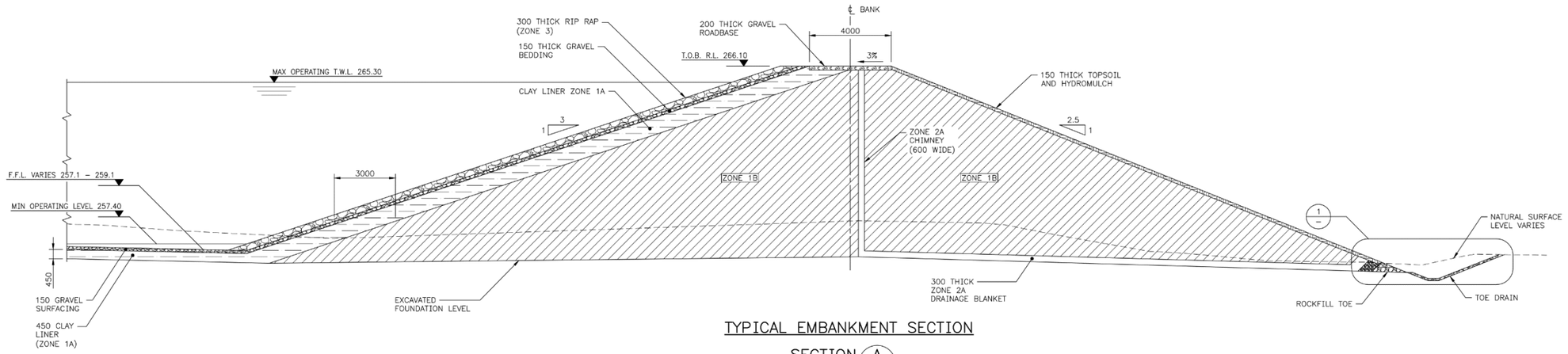


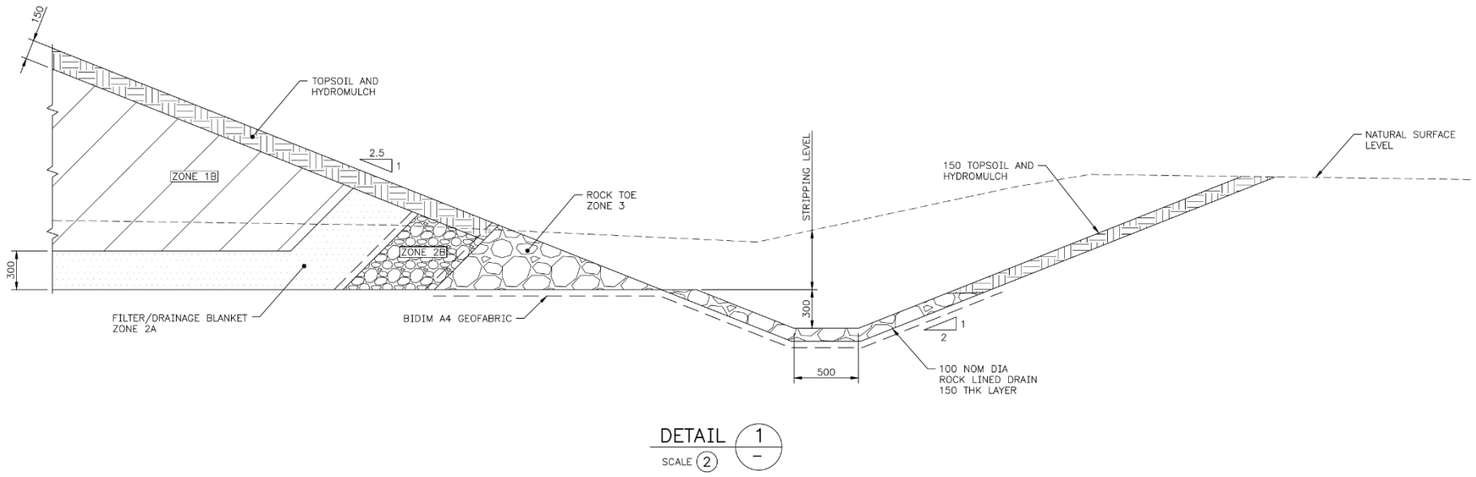
Figure 4: Storage dam general arrangement



TYPICAL EMBANKMENT SECTION

SECTION A 95–5

SCALE 1



DETAIL 1 –

SCALE 2

PRELIMINARY NOT FOR CONSTRUCTION

17/01/18

1 (1:100 AT A1) 1 0.5 0 1 2 3 4 5 6 7 m

2 (1:20 AT A1) 500 0 500 1000 mm

ISSUE	DATE	GRID	REVISION	DRN	REC	APPD

DESIGN SURVEY NONE | VERTICAL DATUM AHD | COORDINATE SYS MGA94–50 | DES CALC A. GREENACRE | DES CHD

ASCON SURVEY NONE | DES REF | DRN B. JEFFERS | Q.C. CHD P. MIRCO

NORTH POINT

ENGINEERING

RECOMMENDED SENIOR ENGINEER, D&DS

APPROVED PRINCIPAL ENGINEER, D&DS

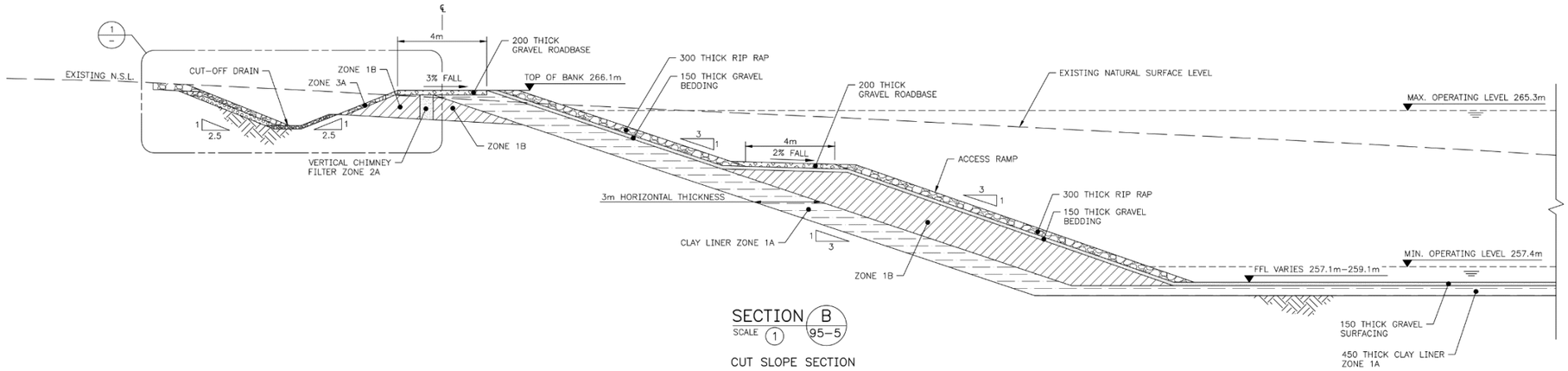
WATER CORPORATION

GREAT SOUTHERN REGION
MOUNT BARKER TREATED WASTEWATER STORAGE DAM
STORAGE DAM – PENRIS SITE OPTION
SECTION A

FILE | PROJECT | PLAN MU43–95–6 | CAD | ISSUE A

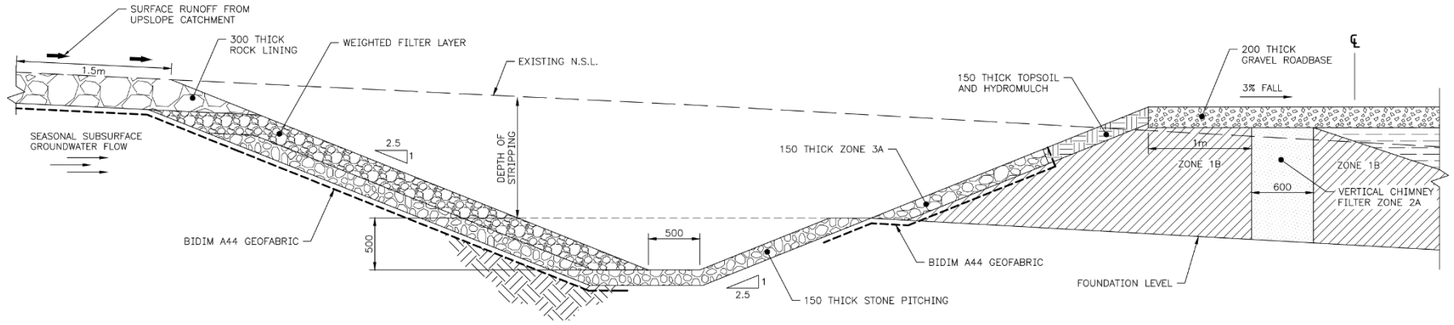
ORIGINAL SHEET SIZE A1 MF

Figure 5: Storage dam embankment section A



SECTION B
SCALE 1 95-5

CUT SLOPE SECTION



DETAIL 1
SCALE 2 –

CUT-OFF DRAIN

PRELIMINARY NOT FOR CONSTRUCTION 17/01/18

1 (1:100 AT A1) 1 0.5 0 1 2 3 4 5 6 7 m
2 (1:25 AT A1) 500 0 500 1000 1500 mm

ISSUE	DATE	GRID	REVISION	DRN	REC	APPD

DESIGN SURVEY NONE
VERTICAL DATUM AHD
COORDINATE SYS MGA94-50
ASCON SURVEY NONE
DES REF
DES CALC A. GREENACRE
DES CHD
DRN B. JEFFERS
Q.C. CHD P. MIRCO
NORTH POINT

ENGINEERING

RECOMMENDED
SENIOR ENGINEER, D&DS
APPROVED
PRINCIPAL ENGINEER, D&DS

WATER CORPORATION

GREAT SOUTHERN REGION
MOUNT BARKER TREATED WASTEWATER STORAGE DAM
STORAGE DAM – PENRIS SITE OPTION
SECTION B

FILE
PROJECT
PLAN MU43-95-7
CAD
ISSUE A
ORIGINAL SHEET SIZE A1
MF

Figure 6: Storage dam embankment section B

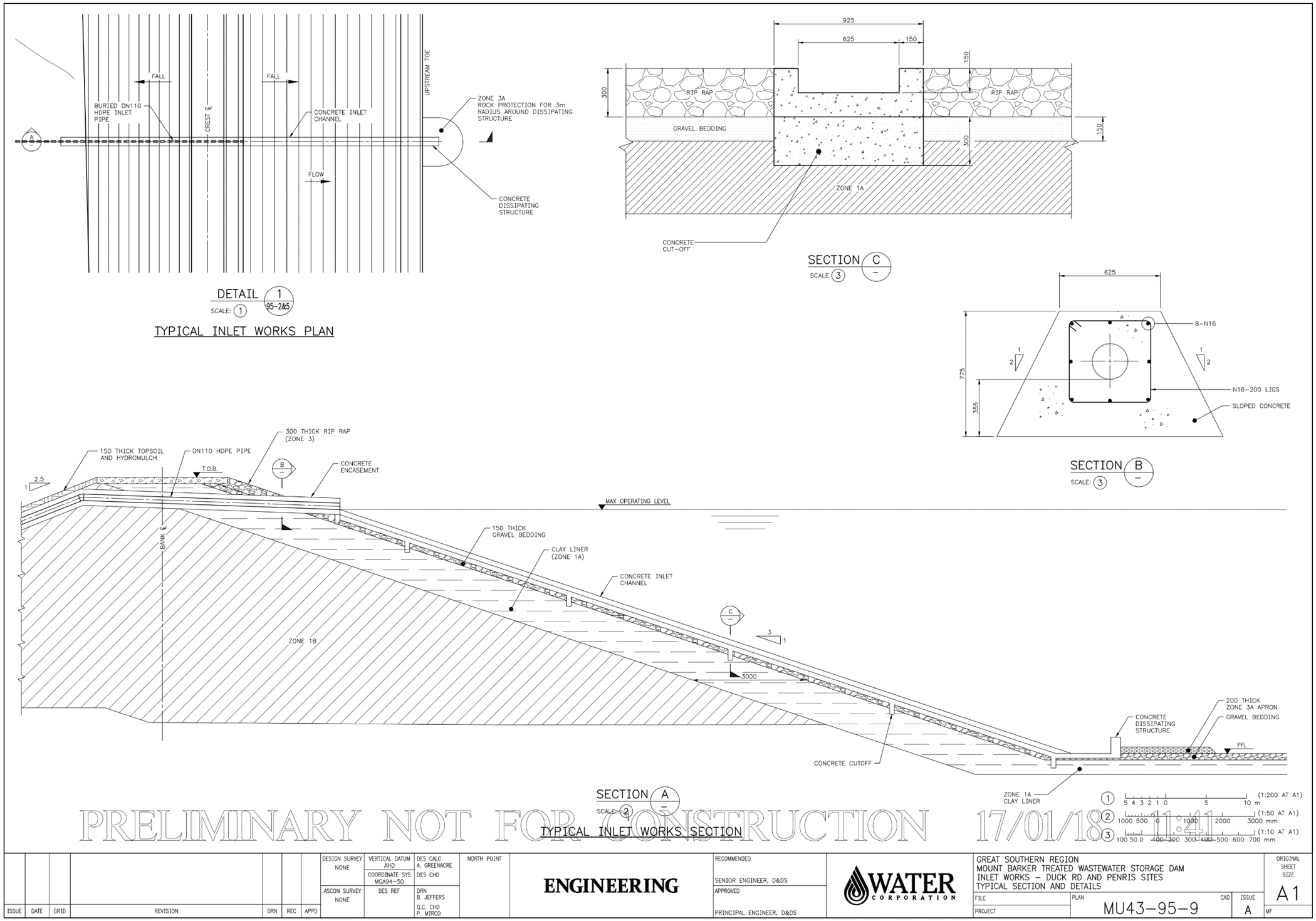
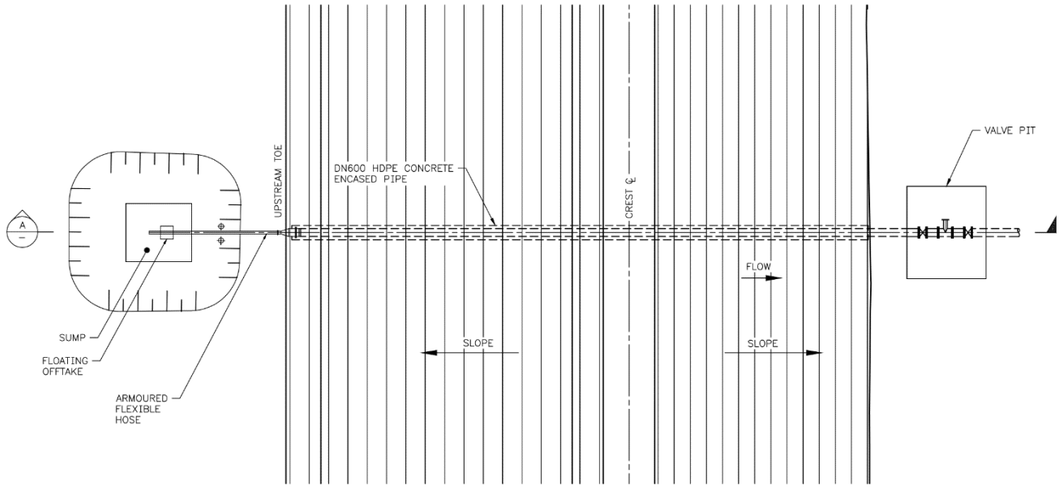
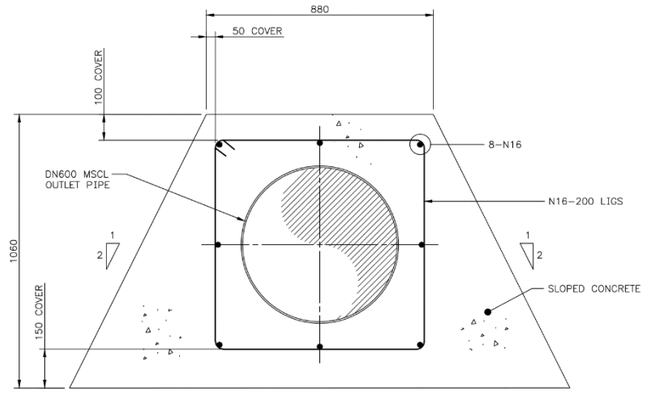


Figure 7: Storage dam inlet works



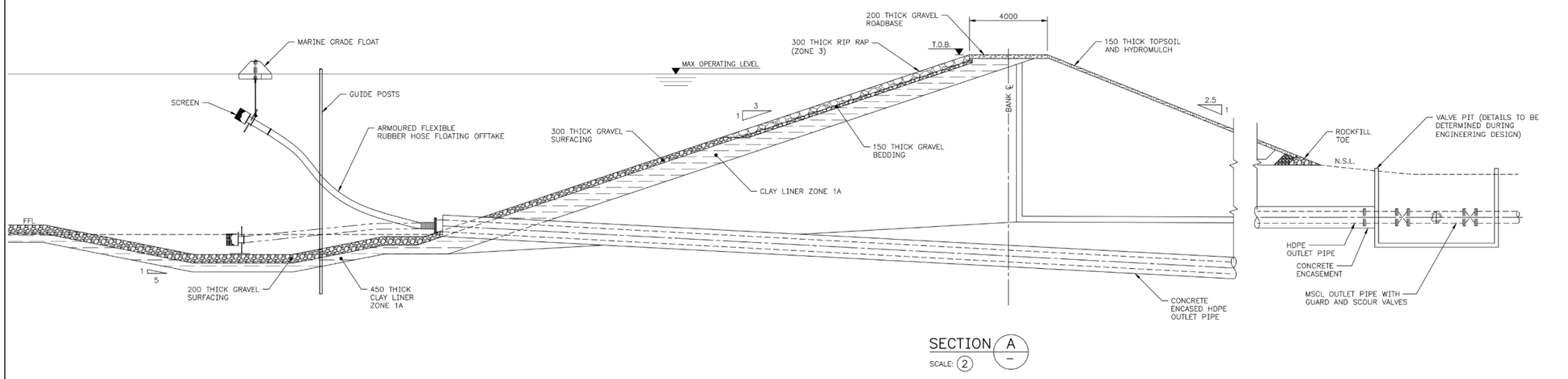
DETAIL 1 (95–2&5)
SCALE: 1

TYPICAL OUTLET WORKS PLAN



OUTLET CONDUIT CONCRETE ENCASEMENT

SECTION B (–)
SCALE: 3



SECTION A (–)
SCALE: 2

PRELIMINARY NOT FOR CONSTRUCTION 17/01/18

1 (1:200 AT A1) 5 4 3 2 1 0 5 10 m
2 (1:100 AT A1) 1 0.5 0 1 2 3 4 5 6 7 m
3 (1:10 AT A1) 100 50 0 100 200 300 400 500 600 700 mm

ISSUE	DATE	GRID	REVISION	DRN	REC	APPD

DESIGN SURVEY: NONE
VERTICAL DATUM: AHD
COORDINATE SYS: MGA94–50
ASCON SURVEY: NONE
DES REF:
DES CALC: A. GREENACRE
DES CHD:
DRN: B. JEFFERS
Q.C. CHD: P. MIRCO
NORTH POINT

ENGINEERING

RECOMMENDED: SENIOR ENGINEER, D&DS
APPROVED: PRINCIPAL ENGINEER, D&DS

WATER CORPORATION

GREAT SOUTHERN REGION
MOUNT BARKER TREATED WASTEWATER STORAGE DAM
OUTLET WORKS – DUCK RD AND PENRIS SITES
TYPICAL SECTION AND DETAILS

FILE
PROJECT
PLAN: MU43–95–10
CAD
ISSUE: A
ORIGINAL SHEET SIZE: A1
MF

Figure 8: Storage dam outlet works

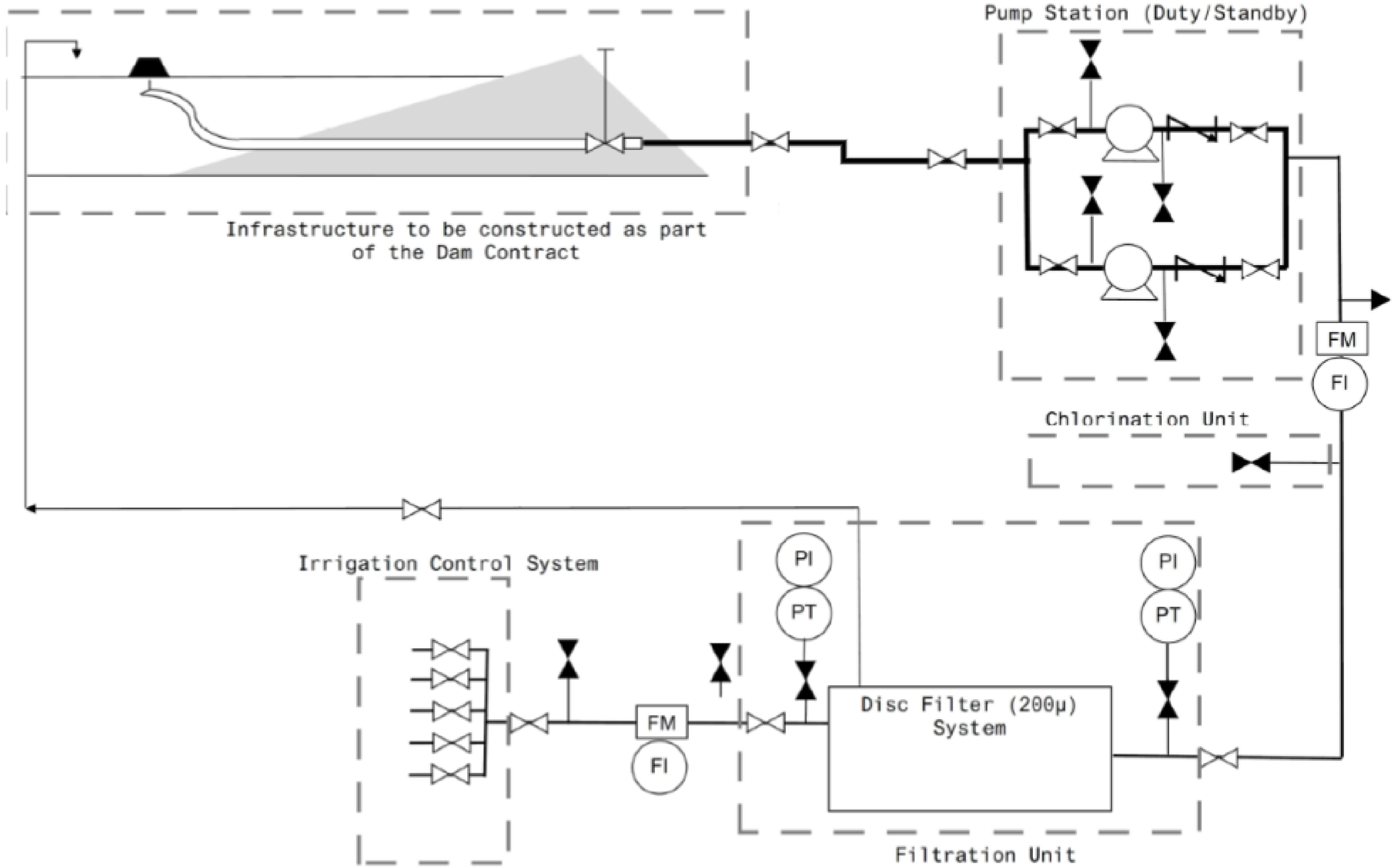


Figure 9: Pump station arrangement

Schedule 2: Premises boundary

The vertices of the premises boundary are the coordinates listed in Table 12.

Table 12: Premises boundary coordinates (GDA2020 MGA Zone 50)

Point	Easting	Northing
1.	557907.149	6167418.168
2.	558350.87	6167415.285
3.	558794.592	6167412.403
4.	558792.071	6167012.274
5.	558790.109	6166700.565
6.	558788.146	6166388.855
7.	558787.474	6166288.32
8.	558523.842	6166290.086
9.	558521.708	6165971.595
10.	558519.575	6165653.105
11.	558218.084	6165655.088
12.	557916.593	6165657.072
13.	557918.475	6165967.791
14.	557920.357	6166278.509
15.	557921.062	6166394.7
16.	557900.953	6166394.835
17.	557902.84	6166706.446
18.	557904.726	6167018.057
19.	557906.877	6167373.327

Schedule 3: Monitoring program

Groundwater monitoring

1. The works approval holder must monitor groundwater during time limited operations for concentrations of the identified parameters in accordance with Table 13.

Table 13: Groundwater monitoring during time limited operations

Monitoring location	Parameter	Unit	Frequency	Method
Field measurements				
PEN_MB05C, MtB03/19, MtB04/19, MtB05/19, MtB06/19, Proposed Bore 1, Proposed Bore 2, Proposed Bore 3 as shown in Figure 10	SWL[1]	mBGL and mAHD	March and September	Spot sample in accordance with AS/NZS 5667.1 and AS/NZS 5667.11
	pH[1]	-		
	EC[1]	µS/cm		
	Redox[1]	mV		
	Temperature[1]	°C		
	DO[1]	mg/L		
Water quality parameters				
PEN_MB05C, MtB03/19, MtB04/19, MtB05/19, MtB06/19, Proposed Bore 1, Proposed Bore 2, Proposed Bore 3 as shown in Figure 10	TN	mg/L	March and September	Spot sample in accordance with AS/NZS 5667.1 and AS/NZS 5667.11
	TKN			
	NH_4-N			
	NO_x-N			
	NO_3-N			
	NO_2-N			
	TP			
Metals (dissolved)				
PEN_MB05C, MtB03/19, MtB04/19, MtB05/19, MtB06/19, Proposed Bore 1, Proposed Bore 2, Proposed Bore 3 as shown in Figure 10	Arsenic	mg/L	March and September	Spot sample in accordance with AS/NZS 5667.1 and AS/NZS 5667.11
	Cadmium			
	Chromium			
	Copper			
	Lead			
	Manganese			

Monitoring location	Parameter	Unit	Frequency	Method
	Mercury			
	Nickel			
	Zinc			

Note 1: In-field non-NATA accredited analysis permitted.

Surface water monitoring

2. The works approval holder must monitor surface water during time limited operations for concentrations of the identified parameters in accordance with Table 14.

Table 14: Surface water monitoring during time limited operations

Monitoring location	Parameter	Unit	Frequency	Method
Field measurements				
SW6, and SW8 as shown in Figure 10	Water level[1]	mAGL and mAHD	Twice yearly when flowing	Spot sample in accordance with AS/NZS 5667.1 and AS/NZS 5667.6
	pH[1]	-		
	EC[1]	µS/cm		
	Redox[1]	mV		
	Temperature[1]	°C		
	DO[1]	mg/L		
Water quality parameters				
SW6, and SW8 as shown in Figure 10	BOD_5	mg/L	Twice yearly when flowing	Spot sample in accordance with AS/NZS 5667.1 and AS/NZS 5667.6
	TSS			
	TN			
	TKN			
	NH_4-N			
	NO_x-N			
	NO_3-N			
	NO_2-N			
	TP			
	Reactive phosphorus as P			

Monitoring location	Parameter	Unit	Frequency	Method
Metals (total)				
SW6, and SW8 as shown in Figure 10	Arsenic	mg/L	Twice yearly when flowing	Spot sample in accordance with AS/NZS 5667.1 and AS/NZS 5667.6
	Cadmium			
	Chromium			
	Copper			
	Lead			
	Manganese			
	Mercury			
	Nickel			
	Zinc			
Pathogens				
SW6, and SW8 as shown in Figure 10	*E. coli*	CFU or MPN / 100 mL	Twice yearly when flowing	Spot sample in accordance with AS/NZS 5667.1 and AS/NZS 5667.6

Note 1: In-field non-NATA accredited analysis permitted.

Soil monitoring

3. The works approval holder must monitor soil during time limited operations for concentrations of the identified parameters in accordance with Table 15.

Table 15: Soil monitoring during time limited operations

Monitoring location	Parameter	Unit	Frequency	Method
SM1, SM2, SM3, SM4, SM5, and SM6 as shown in Figure 10	$pH_{1:5}$	-	Once at commencement and every 5 years	Composite sample in accordance with AS 4482.1. Composites must be taken for four depth increments up to 1.2 metres and positioned within major soil horizons or layers. Sampling must occur along dripper lines at a minimum of 5 locations within each corresponding plot area.
	$EC_{1:5}$	dS/m		
	Calcium	mg/kg		
	Magnesium			
	Sodium			
	Potassium			
	ECEC	meq /100 g		
	ESP	%		

Monitoring location	Parameter	Unit	Frequency	Method
	TOC			
	TN			
	NH_4-N			
	NO_3-N			
	TP			
	Colwell phosphorus			
	PRI	-		
	PBI	-		
	Sulfur	mg/kg		
	Copper			
	Iron			
	Manganese			
	Zinc			

Figure 10: Monitoring locations