Government of Western Australia
Department of Environment Regulation

Works Approval

Environmental Protection Act 1986, Part V

Works Approval Holder: Water West Pty Ltd

Works Approval Number: W5902/2015/1

Registered office (and address for notifications):
Floor 34 Exchange Plaza
2 The Esplanade
PERTH WA 6000

ACN: 166 442 824

Premises address: North Dandalup Recycled Water Scheme
Part of Lot 101 Shanns Road North within coordinates (MGA Zone 50) E401695.67, N6400962.38; E402014.90, N6400965.51; E402126.34 N6401115.83; E402430.67, N6400937.41; E401940.14, N6400371.07; E401697.74, N6400588.43.
NORTH DANDALUP WA 6207
As depicted in Schedule 1

Issue date: Thursday, 10 March 2016

Commencement date: Monday, 14 March 2016

Expiry date: Wednesday, 13 March 2019

The following category/s from the *Environmental Protection Regulations 1987* cause this Premises to be a prescribed premises for the purposes of the *Environmental Protection Act 1986*:

Category number	Category description	Category production or design capacity	Assessed production or design capacity
54	Sewage facility premises – (a) on which sewage is treated (excluding septic tanks); or (b) from which treated sewage is discharged onto land or into waters.	100 cubic metres or more per day	160 cubic metres per day

Conditions
This Works Approval is subject to the Conditions set out in the attached pages.

Date signed: 10 March 2016
.....
Ruth Dowd
Officer delegated under section 20
of the *Environmental Protection Act 1986*

Works Approval Conditions

1 General

1.1 Interpretation

1.1.1 In the Works Approval, definitions from the *Environmental Protection Act 1986* apply unless the contrary intention appears.

1.1.2 In the Works Approval, unless the contrary intention appears:

'Act' means the *Environmental Protection Act 1986;*

'AHD' means the Australian height datum;

'AS/NZS 3780' means the Australian Standard AS/NZS 3780 *The storage and handling of corrosive substances*;

'AS/NZS 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/NZS 5667.11' means the Australian Standard AS/NZS 5667.11 *Water Quality – Sampling – Guidance on sampling of groundwaters;*

'ASTM D5092-04(2010)e1' means the standard ASTM D5092-04(2010)e1 *Standard practice for design and installation of groundwater monitoring wells*;

'BGL' means below ground level;

'CEO' means Chief Executive Officer of the Department of Environment Regulation;

'CEO' for the purpose of correspondence means;

Chief Executive Officer
Department Administering the *Environmental Protection Act 1986*
Locked Bag 33
CLOISTERS SQUARE WA 6850
Email: info@der.wa.gov.au

'CEO Request' means a request made by the CEO to the Works Approval Holder in writing, sent to the Works Approval Holder's address for notifications as described at the front of this Works Approval, in relation to:

(a) information, records or reports in relation to specific matters in connection with this Works Approval including in relation to compliance with any conditions and the calculation of fees (whether or not a breach of condition or the Act is suspected); or
(b) reporting, records or administrative matters:
    (i) which apply to all works approvals granted under the EP Act; or
    (ii) which apply to specified categories of works approvals within which this Works Approval falls.

'Commissioning' means the process of operation and testing the sewage facility with sewage that verifies the works and all relevant systems, plant, machinery and equipment have been installed and are performing in accordance with the design specification set out in the works approval application;

'Condition' means a condition to which this Works Approval is subject under Section 62 of the Act, and as set out in this Works Approval.

'freeboard' means the distance between the maximum water surface elevations and the top of retaining banks or structures at their lowest point;

'hardstand' means a surface with a permeability of 10^{-9} metres/second or less at a thickness of ≥10 cm depth;

'*Identification and investigation of acid sulfate soils and acidic landscapes*' means the document Department of Environment Regulation 2015*, Identification and investigation of acid sulfate soils and acidic landscapes* published by the Government of Western Australia and amended from time to time;

'MB' means monitoring bore;

'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;

'Premises' means the area defined in the Premises Map in Schedule 1 and listed as the Premises address on page 1 of the Works Approval;

'Schedule 1' means Schedule 1 of this Works Approval unless otherwise stated;

'Schedule 2' means Schedule 2 of this Works Approval unless otherwise stated;

'spot sample' means a discrete sample representative at the time and place at which the sample is taken;

'*Treatment and management of soils and water in acid sulfate soil landscapes*' means the documents Department of Environment Regulation 2015*, Treatment and management of soils and water in acid sulfate soil landscapes* published by the Government of Western Australia and amended from time to time;

'Works' means the works for the interim treatment plant and irrigation scheme as detailed in condition 1.2.1 and condition 1.2.3 and depicted in the maps and schematic in Schedule 1;

'Works Approval' means this Works Approval numbered W5902/2015/1 and issued under the Act; and

'Works Approval Holder' means the person or organisation named as the Works Approval Holder on page 1 of the Works Approval.

1.1.3 Any reference to an Australian or other standard in the Works Approval means the relevant parts of the standard in force from time to time during the term of this Works Approval.

1.1.4 Any reference to a guideline in the Works Approval means the current version of the guideline in force from time to time, and shall include any amendments or replacements to that guidelines made during the term of this Works Approval.

1.2 General conditions

1.2.1 The Works Approval Holder must ensure that the Works specified in Column 1 of Table 1.2.1 meet or exceed the specifications in Column 2 of Table 1.2.1 for the infrastructure in each row of Table 1.2.1.

1.2.2 The Works Approval Holder must not depart from the specifications in Table 1.2.1 except:

(a) where such departure is minor in nature and does not materially change or affect the infrastructure; or

(b) where such departure improves the functionality of the infrastructure and does not increase risks to public health, public amenity or the environment;

and all other Conditions in this Works Approval are still satisfied.

Table 1.2.1: Works specifications

Column 1 Infrastructure	Column 2 Specifications (design and construction)
1) All	(a) All sewage and treated wastewater storage and treatment tanks, transfer pipelines and conveyance infrastructure must be impermeable and free of leaks or defects. (b) The design and construction standard must meet or exceed the Design Specifications in Table 2.1 in Schedule 2. (c) Stormwater conveyance infrastructure must not direct stormwater into any sewage and treated wastewater storage and treatment tanks, transfer pipelines and conveyance infrastructure.

Table 1.2.1: Works specifications	
Column 1 **Infrastructure**	**Column 2** **Specifications (design and construction)**
2) Sewage treatment system	The sewage treatment system must be designed and constructed to meet the following specifications: (a) all above ground infrastructure located on a hardstand; (b) have the capacity to determine if seepage or containment failure from below ground infrastructure is occurring; (c) be able to receive and treat a sewage inflow of up to 200 m^3/ day; (d) direct all treated wastewater to the storage dams; (e) be located at least 50 meters from any sensitive receptor boundary; (f) treat sewage to the following emission standards: (i) treated wastewater outflow ≤200 m^3/ day; (ii) biochemical oxygen demand <20 mg/L; (iii) *Escherichia coli* <1000 cfu/ 100 mL (iv) pH ≥6.5 - ≤8.5 (range) (v) total nitrogen <12 mg/L; (vi) total phosphorus <4 mg/L; and (vii) total suspended solids <30 mg/L. (g) have a sewage flow balance tank that has: (i) a storage capacity of 200 m^3; (ii) two transfer pumps (duty and standby). (h) ensure that all sewage inflow passes through a screening unit of 2 mm aperture; (i) be a dual treatment train sequential treatment batch reactor with the following treatment phases: (i) anoxic filling; (ii) aerated filling; (iii) biological degradation; (iv) settling; (v) decant; and (vi) idling. (j) have a clarification tank, UV disinfection system and residual chlorination system capable of handling a sewage inflow of 200m^3/day; (k) ensure alum, acetic acid, chloride, sodium hypochlorite and sodium hydroxide are used in the sewage treatment process. (l) ensure all alum, acetic acid, sodium hypochlorite and sodium hydroxide are stored separately within an above ground vessel enclosed by bunds with a holding capacity of 110% of the total vessel contents. (m) ensure chemicals are stored in accordance with Australian Standard AS3780; (n) have waste activated sludge storage tanks: (i) enclosed by bunds with a holding capacity of 110% of the total tank contents; and (ii) return leachate back to the flow balance tank. (o) have odour scrubber unit/s which service all venting from the inlet screen and flow balance tank.

Table 1.2.1: Works specifications Column 1 Infrastructure	Column 2 Specifications (design and construction)
3) Storage dams	The three storage dams must be designed and constructed within the irrigation area to meet the following specifications: (a) ensure a vertical separation distance to the highest seasonal groundwater level of at least 1.4 meters from the storage dam HDPE liner is maintained. (b) provide a combined total storage capacity of no less than 11 ML allowing for 500 mm of operational freeboard. (c) dam liners must be high density polyethylene (HDPE) and meet or exceed the following specifications: (i) minimum thickness of 1.55 mm (tolerance of up to 5%) for low hazard waste containment with mechanical jointing; (ii) specific gravity of 0.94 or more (ASTM method D1505) (iii) melt index of 0.05 g to 0.30 g in 10 minutes (ASTM method D1238, condition E 190/ 2.16); (iv) carbon black content of 2–3% (ASTM method D1603); (v) minimum tensile strength at yield of 16 000 kN/m^2; (vi) minimum tensile strength at break of 550 kN/m2 (ASTM method D638, type IV 2); (vii) minimum elongation at yield of 10%, and at break 300% (ASTM method D638). (d) HDPE dam liners must extend to at least 500 mm above the level of the spillway, to ensure that all treated wastewater is contained within the HDPE liner including provision for the additional 500 mm of operational freeboard.
4) Irrigation system and irrigation area	The irrigation system and irrigation area must be designed and constructed so as to meet the following specification: (a) be enclosed by a contiguous secure fence which includes an internal 50 meter buffer to the irrigation area; (b) consists of an 8 hectare irrigation area; (c) the surface level of the irrigation area must be at least 0.7 m above the highest seasonal groundwater level. (d) bunding surrounding the irrigation area irrigation area preventing surface run off leaving the boundary of the fenced irrigation area; (e) have monitoring devices that provide representative data on the whole wastewater application area for: (i) soil moisture levels at a depth of 40-50 cm BGL; (ii) groundwater separation distances; and (iii) irrigation application rates. (f) have an automated weather station capable of monitoring wind direction, wind speed, temperature, humidity and rainfall; (g) be able to automatically control and cease irrigation based on the following parameters: (i) wind speed (m/sec); (ii) relative humidity (%); (iii) rainfall (mm/ hour); and (iv) soil moisture levels (%v/v) at a depth of 40-50 cm BGL.

Table 1.2.1: Works specifications	
Column 1 Infrastructure	**Column 2 Specifications (design and construction)**
5) Groundwater monitoring bores[1]	(a) Six groundwater monitoring bores (MB 1 through MB 6) must be installed in accordance with ASTM D5092-04(2010)e1 and sited according to the following specifications: (i) all six bores must be located within the hydrological flow line of the irrigation area as depicted by the irrigation area schematic in Schedule 1; (ii) the bore located centrally within the area of wastewater application designed and constructed as a cluster to allow monitoring of the shallow groundwater quality and the deep groundwater quality (5-10 m; and (iii) all bores must be located at least 100 metres apart. (b) Where the existing groundwater monitoring bores ND1, ND2 and ND11 as depicted in Schedule 1 do not meet the installation specification of ASTM D5092-04(2010)e1 new monitoring bores must be designed and installed in accordance with ASTM D5092-04(2010)e1 and located adjacent to (within 50m of) each bore ND1, ND2 and ND11[2]. (c) All groundwater monitoring bores must be surveyed to allow the ground level and groundwater level (AHD and BGL) at each groundwater monitoring bore to be accurately determined during monitoring events.

Note 1: Where the groundwater monitoring bores ND10 and ND12 as defined in Schedule 1 meet the installation specification of ASTM D5092-04(2010)e1 and are located within the irrigation area they may be incorporated into the six groundwater monitoring bores required under Row 5 item (a).
Note 2: New groundwater monitoring bores required in accordance with Row 5 item (b) shall be known as MB 7, MB 8 and MB 9.

1.2.3 Subject to the Conditions of this Works Approval, the Works Approval Holder must construct the Works in accordance with the document listed in Table 1.2.2.

Table 1.2.2: Construction Requirements[1]		
Document	**Parts**	**Date of Document**
Water West Pty Ltd, Application for DER works approval North Dandalup recycled waste scheme	All	25 September 2015
Addendum to the application: Water West Pty Ltd, Re – North Dandalup RWS Works Approval	All	15 February 2016

Note 1: Where the details and commitments of the documents listed in condition 1.2.3 are inconsistent with any other condition of this Works Approval, the Conditions of this Works Approval shall prevail.

1.2.4 The Works Approval Holder must :
(a) determine the presence and potential to disturb acid sulfate soils in accordance with the guideline *Identification and investigation of acid sulfate soils and acidic landscapes*; and
(b) manage any acid sulfate soils that are disturbed during construction, where avoidance is not possible, in accordance with the guideline *Treatment and management of soils and water in acid sulfate soil landscapes*.

1.2.5 At least 21 days prior to the commencement of the Works, the Works Approval Holder must provide to the CEO:
(a) detailed engineering and construction drawings and plans that are certified by a suitably qualified professional engineer that each item of infrastructure specified in Column 1 of Table 1.2.1 meets or exceeds the specifications in Column 2 of Table 1.2.1 for the infrastructure in each row of Table 1.2.1; and
(b) certification by a suitably qualified professional hydrologist that the irrigation area has been designed in accordance with the conditions of this Works Approval.

1.3 Premises operations

1.3.1 The Works Approval Holder must not undertake commissioning or operation of the Works.

2 Monitoring

2.1 Baseline monitoring data

2.1.1 The Works Approval Holder must obtain monthly monitoring data from each groundwater bore for a period of not less than 12 months prior to the proposed commencement date of commissioning or operation of the WWTP.

2.1.2 The Works Approval Holder must ensure that:
(a) all water samples are collected and preserved in accordance with AS/NZS 5667.1;
(b) all groundwater sampling is conducted in accordance with AS/NZS 5667.11; and
(c) all laboratory samples are submitted to and tested by a laboratory with current NATA accreditation for the parameters being measured unless indicated otherwise in the relevant table.

2.1.3 The Works Approval Holder must ensure that monthly monitoring is undertaken at least 15 days apart.

2.1.4 The Works Approval Holder must ensure that all monitoring equipment used on the Premises to comply with the Conditions of this Licence is calibrated in accordance with the manufacturer's specifications and the requirements of the Licence.

2.1.5 The Works Approval Holder must undertake the monitoring in Table 2.1.1 according to the specifications in Table 2.1.1.

Table 2.1.1: Monitoring of ambient groundwater quality

Monitoring point reference	Parameter	Units	Averaging period	Frequency
ND1, ND2, ND10, ND11, ND12 (as depicted in Schedule 1) and any new monitoring bores if required under condition 1.2.1, Table 1.2.1, row 5, item (a) and (b) once installed.	Standing water level[1]	m(AHD) m(BGL)	Spot sample	Monthly
	pH[1]	-		
	Electrical conductivity[1]	µS/cm		
	Escherichia coli	cfu/ 100 mL		
	Ammonium	mg/L		
	Major ions: (calcium, carbonate, chloride, magnesium, potassium, sodium and sulphate)	mg/L		
	Metals (total): arsenic and iron	mg/L		
	Nitrate + nitrite – nitrogen	mg/L		
	Oxidation-reduction potential	-		
	Sodium absorption ratio (SAR)	-		
	Total dissolved solids	mg/L		
	Total nitrogen	mg/L		
	Total phosphorus	mg/L		

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

3 Information

3.1 Reporting

3.1.1 If Condition 1.2.2 applies, then the Works Approval Holder must provide the CEO with a list of departures which are certified as complying with Condition 1.2.2 at the same times, and from the same professional, as the certifications under Conditions 1.2.5, 3.1.2 and 3.1.3.

3.1.2 The Works Approval Holder must submit a construction compliance document to the CEO, following the construction of the Works.

3.1.3 The Works Approval Holder must ensure the construction compliance document:
(a) is certified by a suitably qualified professional engineer or builder that each item of infrastructure specified in Column 1 of Table 1.2.1 with the specifications in Column 2 of Table 1.2.1 has been constructed with no material defects;
(b) is certified by a suitably qualified professional hydrologist in respect of the as built irrigation area, that the irrigation area has been constructed in accordance with Conditions of this Works Approval;
(c) summarises any management actions required in response to the presence of acid sulfate soils as specified in Condition 1.2.4; and
(d) be signed by a person authorised to represent the Works Approval Holder and contain the printed name and position of that person within the company.

3.1.4 The Works Approval Holder must maintain accurate records including information, reports and data in relation to the Works.

3.1.5 All information and records required under this Works Approval must:
(a) be legible;
(b) if amended, be amended in such a ways that the original and subsequent amendments remain legible or are capable of retrieval; and
(c) be retained for six years after the expiry of this Works Approval.

3.1.6 If requested by the CEO from time to time, the Works Approval Holder must provide the CEO with reports or information relating to the Works, the Premises or any condition in this Works Approval (including data from any monitoring conditions, environmental risk assessment studies).

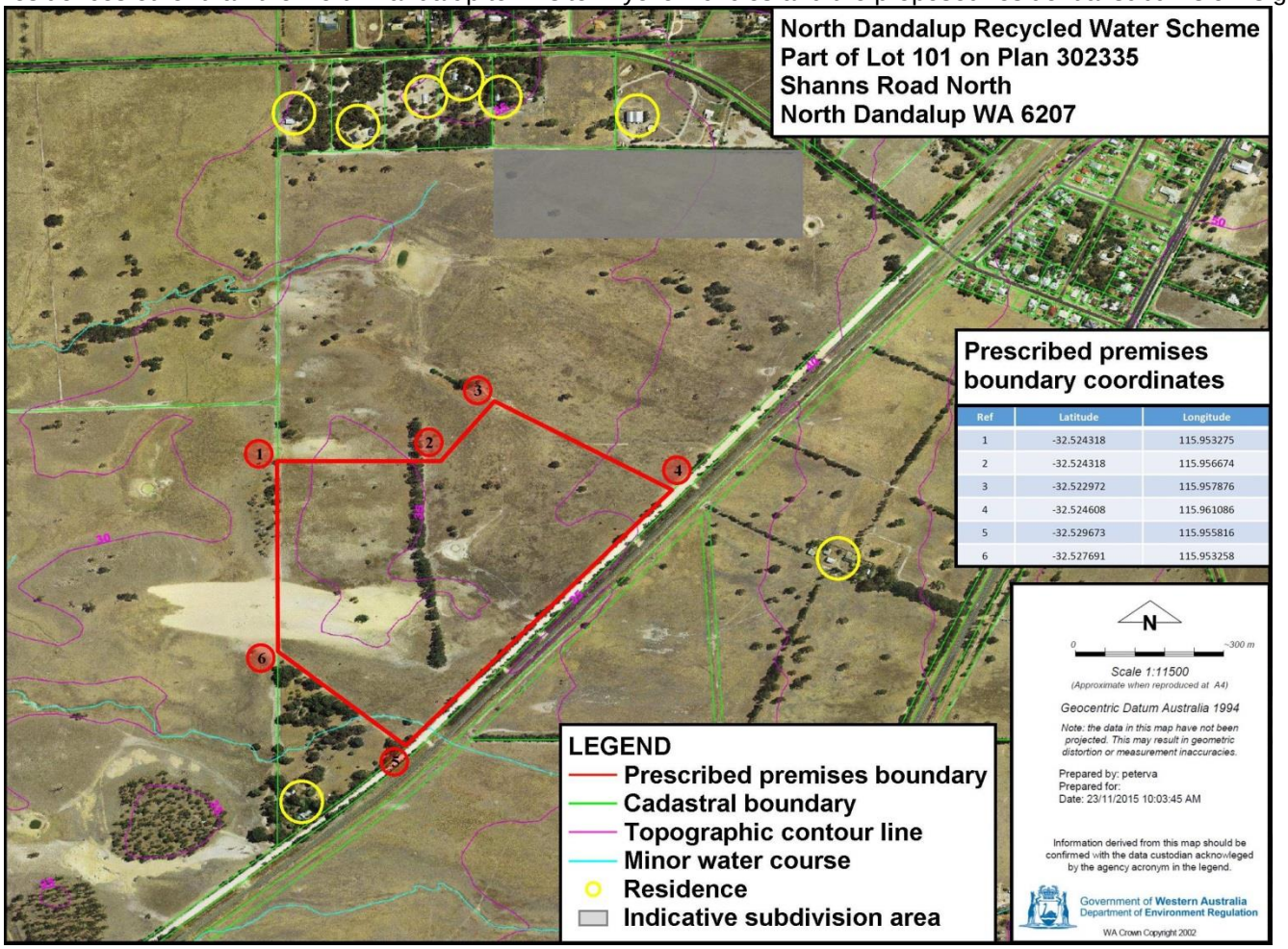
3.1.7 Reports or information must be in such form as the CEO may require in a CEO Request.

3.1.8 The Works Approval Holder must comply with a CEO Request within seven days from the date of the CEO Request or such other period specified in the CEO Request.

Schedule 1: Maps

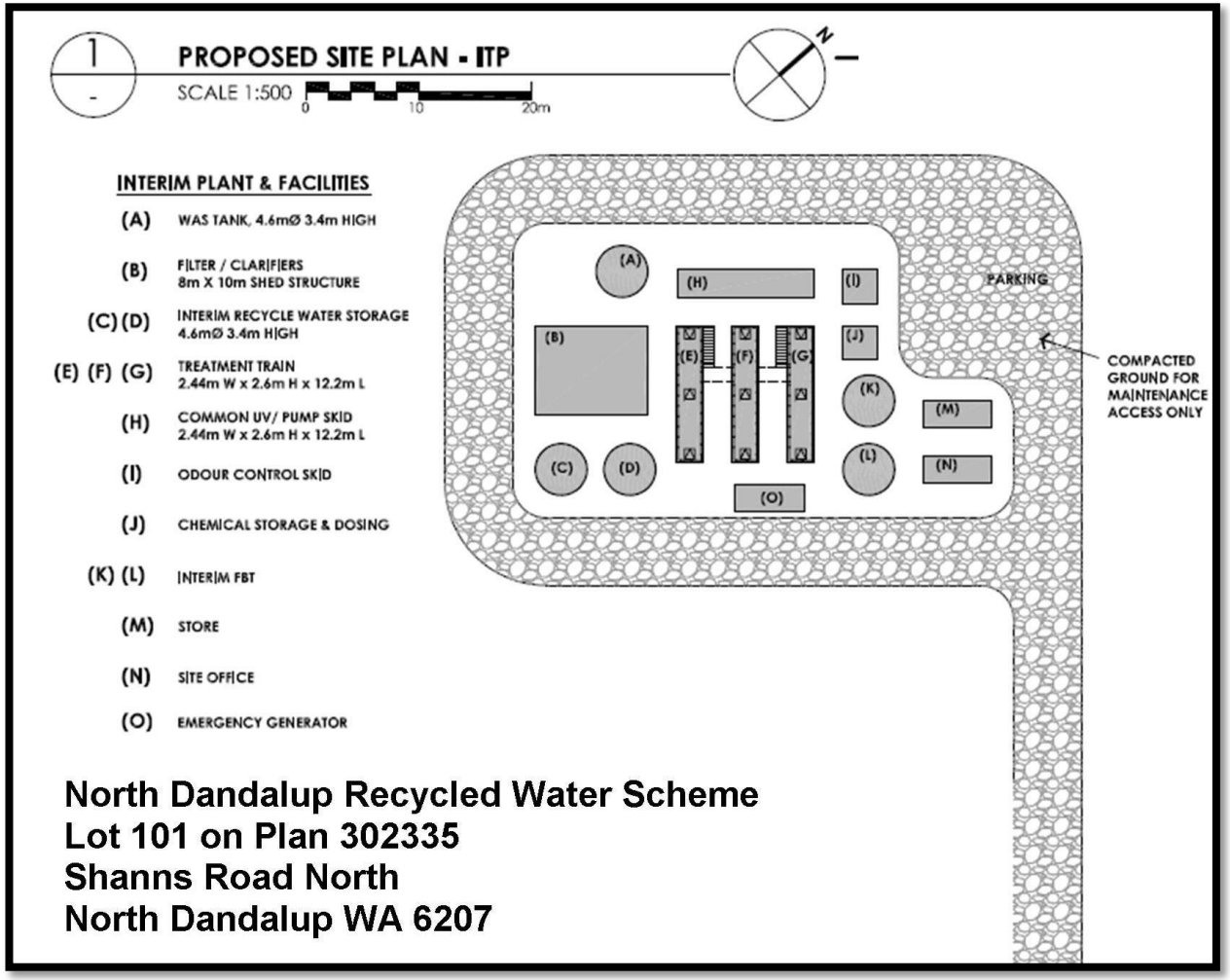
Premises map

The Premises is shown in the maps below. The red line depicts the Premises boundary. Other features are identified within the legend including known residences other than the North Dandalup town site in yellow circles and the proposed residential subdivision is grey shading.



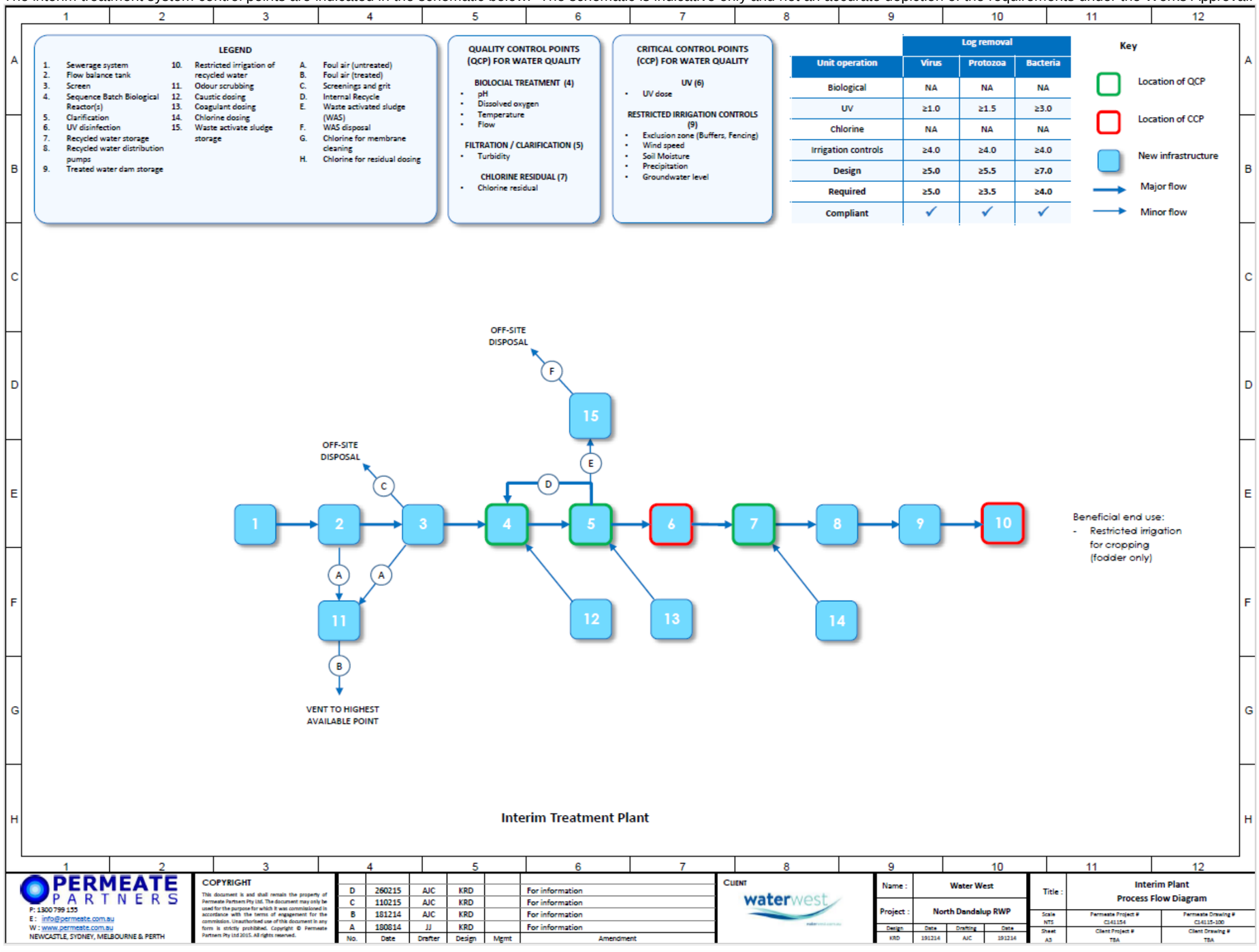
Sewage interim treatment plant schematic

The interim treatment system infrastructure arrangement is indicated in the schematic below. The schematic is indicative only and not an accurate depiction of the requirements under the Works Approval. The interim treatment system process is further clarified in the control point schematic below.



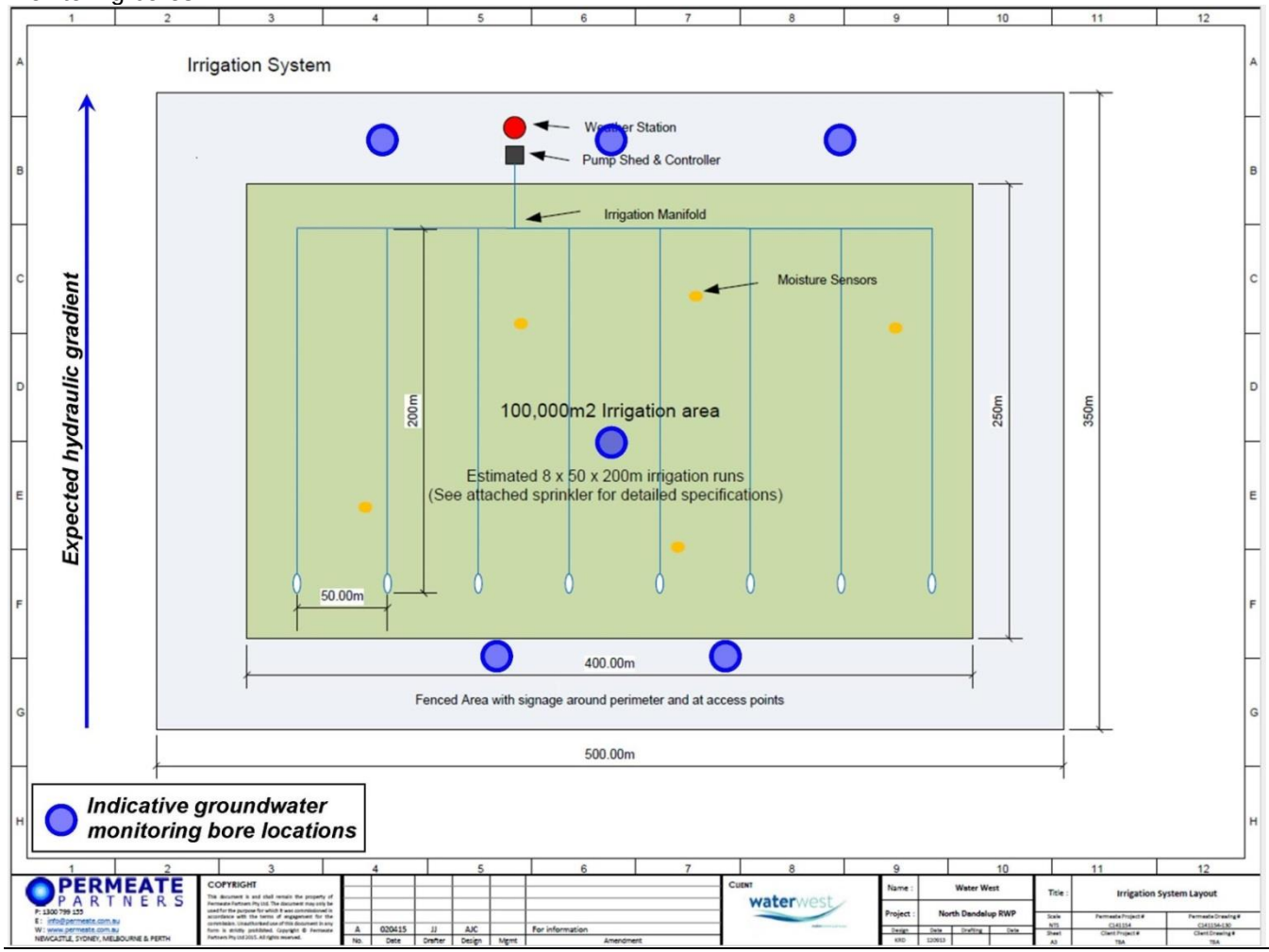
Sewage interim treatment plant control point schematic

The interim treatment system control points are indicated in the schematic below. The schematic is indicative only and not an accurate depiction of the requirements under the Works Approval.



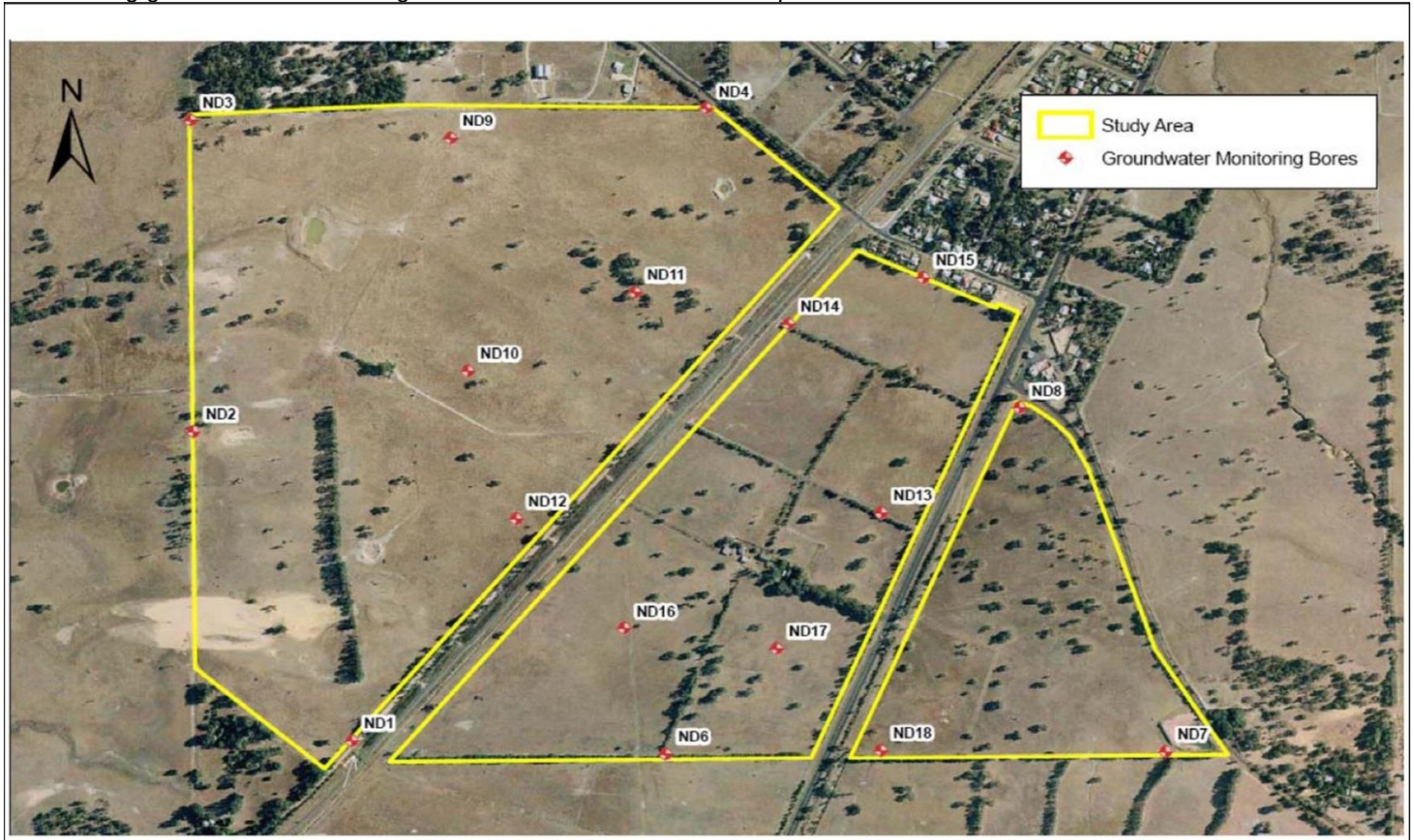
Irrigation area schematic

The irrigation system infrastructure arrangement, allowing for a 20% contingency within the 10 hectare area is indicated in the schematic below. The schematic is indicative only and not an accurate depiction of the requirements under the Works Approval. Blue circles indicate the location of groundwater monitoring bores.



Existing groundwater monitoring bore location map

The existing groundwater monitoring bore network is shown in the map below.



Data Source: Skyview 2007

Job No. J4058

Ecoscape (Aust) Pty Ltd
Groundwater Investigation for Lots 101, A24, 102 North Dandalup
Figure 1: ND Monitoring Bore Locations

Schedule 2: Design specifications

The Works Approval Holder must ensure that the proposed Works specified in Column 1 of Table 2.1 meets or exceeds the specifications in Column 2 of Table 2.1 for the infrastructure in each row of Table 2.1.

Table 2.1 Design specifications	
Column 1 **Infrastructure**	**Column 2** **Specifications (material)**
All wetted components	PVC, PE100 or 316 stainless steel
Fasteners	Hot dipped galvanised or 316 stainless steel
Steel tanks	Glass liner steel for sewage or colourbond steel with liner for recycled water
Steel frames and supports	Hot dipped galvanised or 316 stainless steel
Plastic tanks	HDPE
Chemical systems	As per Australian standards and manufacturer's recommendations
Control panels	316 stainless steel
Thread protection	Grease, dense tape or nickel based anti-seize shall be applied to all threads in accordance with industry best practice.
Dam linings	Synthetic materials in accordance with Department of Water Western Australia 2013, *Water Quality Protection Note 26 Liners for containing pollutants using synthetic membranes*.
Infrastructure	**Specifications (design life)**
Concrete structures	>25 years
Buildings	>25 years
Tanks (including roof)	>20 years
Pipework, fittings and valves	>15 years
Protective coatings	>10 years
Pumps	>10 years
Electrical and controls	>10 years
Instruments	>8 years

Government of Western Australia
Department of Environment Regulation

Decision Document

Environmental Protection Act 1986, Part V

Proponent: Water West Pty Ltd

Works Approval: W5902/2015/1

Registered office:	Floor 34 Exchange Plaza 2 The Esplanade PERTH WA 6000
ACN:	166 442 824
Premises address:	North Dandalup Recycled Water Scheme Part of Lot 101 Shanns Road North within coordinates (MGA Zone 50) E401695.67, N6400962.38; E402014.90, N6400965.51; E402126.34 N6401115.83; E402430.67, N6400937.41; E401940.14, N6400371.07; E401697.74, N6400588.43. NORTH DANDALUP WA 6207 As depicted in Appendix A
Issue date:	Thursday, 10 March 2016
Commencement date:	Monday, 14 March 2016
Expiry date:	Wednesday, 13 March 2019

Decision

Based on the assessment detailed in this document the Department of Environment Regulation (DER) has decided to issue a works approval. DER considers that in reaching this decision, it has taken into account all relevant considerations and legal requirements and that the Works Approval and its conditions will ensure that an appropriate level of environmental protection is provided.

Decision Document prepared by:	Peter van Schoubroeck Licensing Officer
Decision Document authorised by:	Ruth Dowd Delegated Officer

Contents

1 Purpose of this Document

This Decision Document explains how DER has assessed and determined the application and provides a record of DER's decision-making process and how relevant factors have been taken into account. Stakeholders should note that this document is limited to DER's assessment and decision making under Part V of the *Environmental Protection Act 1986.* Other approvals may be required for the proposal, and it is the proponent's responsibility to ensure they have all relevant approvals for their Premises.

2 Administrative summary

Administrative details		
Application type	Works Approval ☒ New Licence ☐ Licence amendment ☐ Works Approval amendment ☐	
Activities that cause the premises to become prescribed premises	**Category number(s)**	**Assessed design capacity**
	54	160 cubic metres per day
Application verified Application fee paid	Date: 21/09/2015 Date: 22/09/2015	
Works Approval has been complied with Compliance Certificate received	Yes☐ No☐ N/A☒ Yes☐ No☐ N/A☒	
Commercial-in-confidence claim	Yes☒ No☐	
Commercial-in-confidence claim outcome	Final redacted submission dated 25/09/2015	
Is the proposal a Major Resource Project?	Yes☐ No☒	
Was the proposal referred to the Environmental Protection Authority (EPA) under Part IV of the *Environmental Protection Act 1986*?	Yes☐ No☒	Referral decision No: Managed under Part V ☐ Assessed under Part IV ☐
Is the proposal subject to Ministerial Conditions?	Yes☐ No☒	Ministerial statement No: EPA Report No:
Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the *Environmental Protection Act 1986*)?	Yes☒ No☐ Department of Water consulted Yes☒ No☐	
Is the Premises within an Environmental Protection Policy (EPP) Area Yes☒ No☐ *Environmental Protection Peel Inlet – Harvey Estuary Policy 1992*;		
Is the Premises subject to any EPP requirements? Yes☒ No☐ *Environmental Protection Peel Inlet – Harvey Estuary Policy 1992* requirements: • Sets environmental quality objectives for the Estuary catchment and sets that mass of total phosphorus which can flow into the Estuary. Total phosphorus mass export limits are applicable to the Premises.		

3 Executive summary of proposal and assessment

A works approval application has been submitted by Water West Pty Ltd (Applicant) for a proposed new prescribed premises situated within part of Lot 101 on Plan 302335 Shanns Road North, North Dandalup, Western Australia (Premises) as depicted in Appendix A. The Applicant is seeking approval to construct and subsequently operate a sewage treatment facility with a capacity to treat up to 160 m^3/ day (maximum treatment design capacity of 200 m^3/ day), to service a proposed new residential subdivision development of ~400 homes and dispose of treated sewage (wastewater) to an irrigation area.

The Application is for an interim treatment plant and irrigation system to treat and dispose of 160 m^3/ day. The interim sewage treatment plant will have a peak load capacity of 200 m^3/ day to accommodate periods of high inflow. Where appropriate infrastructure has been specified as needing to accommodate the 200 m^3/ day load however, the emission risk from the irrigation area has been assessed at the nominated capacity of 160 m^3/ day.

The Applicant has proposed a first stage interim treatment plant prior to the development of a second stage permanent treatment plant. The permanent sewage treatment facility will have a capacity to treat up to ~950 m^3/ day and service the full residential subdivision development of 1,409 residential lots (stage 2). The stage 2 sewage treatment facility proposal will be assessed under a separate application. The Works Approval applies only to the interim treatment plant. With appropriate emission management controls in place the stage 2 sewage treatment facility is a viable proposal.

The Application has an inherent level of uncertainty built into the emission risk assessment due to some specifications of the Works not being fully defined. This includes the emission risk posed by the application to land of treated wastewater being largely justified based of MEDLI modelling to inform quality requirements for the treated wastewater. The rigour and value of the MEDLI modelling is acknowledged however, all models have inherent assumptions and uncertainty. This uncertainty is addressed by regulatory controls within the Works Approval.

This Decision Document is based on an assessment of the Applicant's revised Application for a Part V *Environmental Protection Act 1986* Works Approval dated 25 September 2015 (Application) and the additional information dated 15 February 2016 (addendum). This Decision Document identifies the emission risks of the Works, where possible emission risks for the operation of those Works, the proposed Applicant controls and required regulatory controls (Conditions) for the emission risks. In summary:

- The Applicant has established that construction of the Works is acceptable at the Premises and that subject to the verification of MEDLI modelling outcomes and characteristics of the irrigation area has established that the operation of the irrigation area will likely be acceptable;
- The Works Approval is granted subject to Conditions reflecting the controls set out in section 4 of this Decision Document;
- The Applicant may apply for a licence to operate the Works which in part would likely contain conditions also described in section 4 of this Decision Document; and
- The commissioning and operation of the interim treatment plant and irrigation scheme or any emission of treated wastewater at the Premises is not authorised or fully assessed under the Works Approval. Further information is required to allow a risk assessment to be completed for the risk of premises operation (stormwater) and emission to land (irrigation).

Location and siting

The Premises is located southwest of the North Dandalup town site with the proposed Works to be constructed about one kilometre from existing town site residences. North Dandalup is located about 15 kilometres northeast of the Pinjarra town site within the Murray River Catchment. The Premises location current features include:

- Land use: the site has previously served as agricultural land.
- Topography: the land generally slopes across the Premises from east to west with a slope generally less than two degrees. A small elevated area occurs in the south west area.
- Geology: geological conditions at the Premises were established by a geotechnical investigation instigated by the Applicant. The investigation included analysis of the soil type, properties and potential presence of acid sulfate soils. The majority of soils at the Premises were classified as Colluvium, with Bassendean Sand extending through western and south-western areas. Smaller areas of Guilford Formation potentially overlain by thin layers of Bassendean Sands were also present. The Premises is location within the Palusplain land type, being seasonally water logged and historically an interconnected wetland system.
- Hydrology: hydrological conditions at the Premises were established by a hydrological investigation instigated by the Applicant. Groundwater was found to be between 70 and 160 cm below ground level at test pits within or adjacent to the proposed Works. Depth to groundwater is estimated at 60-80 cm below ground level across the proposed irrigation area. Surface water was observed within the Premises under wet conditions.

The Premises is located within or adjacent to the following policy and planning areas, described as relevant to the assessment of the Application where appropriate:

- *Environmental Protection Peel Inlet – Harvey Estuary Policy 1992*:
  - Sets environmental quality objectives for the Estuary catchment and sets the mass of total phosphorus which should flow into the Estuary.
- *Statement of Planning Policy No. 2.1 Peel Harvey coastal plain catchment*:
  - Provides planning control on land development within the catchment and gives effect to the *Environmental Protection Peel Inlet – Harvey Estuary Policy 1992.*
- Department of Water 2011, *Murray drainage and water management plan*:
  - Provides a planning framework to facilitate total water-cycle management principles and water sensitive urban design best-management practices.
  - Describes the rationale behind the nutrient export limit of 0.3 kg/ha/year total phosphorus and export target of 2.4 kg/ha/year total nitrogen.
- Environmental Protection Authority 2008, *Water quality improvement plan for the rivers and estuaries of the Peel-Harvey system – Phosphorus management*:
  - Recommends a combination of management measures to reduce phosphorus discharges in the catchment to achieve the mass limits of total phosphorus within each river system.
- The *Rights in Water Irrigation Act 1914* Dandalup River System catchment proclaimed Murray Groundwater Area and proclaimed Dandalup River System surface water area:
  - No abstraction from surface waters or groundwater is proposed by the Applicant.
  - Emissions from the operations of the Works need to be consider surface water and groundwater values.
- The *Waterways Conservation Act 1976* Peel Inlet Management Area (located ~ 9.5 kilometres southwest of which the North Dandalup River is a tributary):
  - Emissions from the operations of the Works need to consider surface water values.
- The *Environmental Protection and Biodiversity Conservation Act 1999* RAMSAR listed Peel-Yalgorup System:
  - Emissions from the operations of the Works need to consider system values.

An application for a works approval must be consistent with an approved policy (Section 60 of the *Environmental Protection Act 1986*). This Works Approval is consistent with the environmental quality objectives of the *Environmental Protection Peel Inlet – Harvey Estuary Policy 1992* (EPP) and cannot be issued in contrary of the EPP.

Potential sensitive receptors in the vicinity of the Premises are:

- Groundwater: hydrological conditions at the Premises indicate the presence of perched shallow superficial aquifers during wet periods. The local groundwater forms part of the Murray Groundwater Area within the Peel-Harvey catchment and ultimately groundwater will discharge into surface waters of the catchment.

- Surface water: perched surface water during periods of winter inundation may connect to the North Dandalup River via minor ephemeral drainage lines located at the northern and southern ends of the Premises.
- Existing residences: the sewage facility infrastructure is proposed to be sited ~50 metres from the closest sensitive receptor (rural property boundary) with the closest residences located ~100 meters southwest of the boundary. All other existing sensitive receptor boundaries are located more than ~250 meters from sewage treatment and irrigation area infrastructure.
- Future residences: under the stage 1 subdivision development about 400 residences will be developed about 750 metres northeast of the sewage treatment plant and about 250 metres north of the irrigation area. The stage 2 subdivision development will see land within the current Application footprint be developed for residences. Residences associated with the stage 2 subdivision development are not considered within this assessment.

Proposed works

The Applicant proposes the following works:

- A sewage treatment system that will meet the following treated wastewater quality limits:
  - Treated wastewater outflow ≤200 m^3/ day;
  - Biochemical oxygen demand <20 mg/L;
  - *Escherichia coli* <1000 cfu/ 100 mL;
  - pH ≥6.5 - ≤8.5 (range);
  - Total nitrogen[1] <15 mg/ L;
  - Total phosphorus[1] <5 mg/L; and
  - Total suspended solids <30 mg/L.
- A sewage treatment system that includes the following components:
  - Inflow balance tanks with pumps and 24 hour (200 kL) storage capacity;
  - Sequencing batch reactor biological treatment unit which incorporates anoxic filling, aerated filling, biological degradation, settling, decant and idling treatment processes;
  - Clarification, UV disinfection and residual chlorine dosing unit;
  - Chemical storage and dosing infrastructure that may include the following chemicals: alum, acetic acid, sodium hypochlorite, citric acid and sodium hydroxide;
  - Three treated wastewater storage dams with a combined storage capacity of ~11 ML; and
  - Automated control system with remote monitoring capability.
- A treated wastewater irrigation system that will meet the following limits:
  - Nutrient export limit for phosphorus of 0.3 kg/ ha/ year; and
  - Nutrient export limit for nitrogen of 2.4 kg/ ha/ year.
- A treated wastewater irrigation disposal system that will be comprised of the following components:
  - An irrigation area with a functional irrigation area of ≥80,000 m^2;
  - Rain and wind weather monitoring system; and
  - Irrigation optimisation program which includes an appropriate monitoring program for groundwater levels and quality, soil moisture and irrigation loading rates.
- Imported fill to elevate infrastructure and irrigation areas where required.

Note 1: Regulatory controls have been imposed under the Works Approval for the total nitrogen and total phosphorus treated wastewater quality limits to be 12 mg/L and 4 mg/L respectively.

The Applicant has not specified the exact interim sewage treatment plant that will be installed. The Applicant's proposal states:

> *"All infrastructure is to be designed and installed in accordance with the latest revision of relevant Australian standards, water industry codes/guidelines (ie WSAA), and/or manufacturer's recommendations. Where there is no specific standard, code, guideline or manufacturer recommendation the infrastructure is to be designed and installed in accordance with industry best practice for the water industry in Australia"* (page 11 of the Application).

Potential emissions
The main potential emission risks as a result of the works and operation of the works are:

- Acid sulfate soils: potential acid sulfate soils have been identified within the development area.
- Emissions to land: potential emissions may arise as a result of the events detailed below. A minimal vertical separation distance to groundwater of ~0.7 metres in the irrigation area has been proposed.
  - Containment failure: potential emissions may arise from the failure of containment infrastructure within the sewage treatment system, storage dams or conveyance pipelines.
  - Seepage: potential emissions may arise from failures in the integrity of containment infrastructure within the sewage treatment system, storage dams or conveyance pipelines.
  - Irrigation: emissions to the irrigation area are proposed under controlled conditions year round. Due to a lack of certainty regarding the design and operation specifications of the irrigation area a risk assessment cannot be completed for the risk of irrigation at this stage. Any licence application to allow irrigation of treated wastewater at the Premises must demonstrate that nutrient export limits are not exceeded.

Further details and assessment of emission controls proposed by the Applicant and for the construction and operation of the Works are detailed within the Decision Table and relevant Appendixes.

Planning approval application
Under the Shire of Murray local planning scheme Premises land is zoned residential development. Land to the west, east and south is zoned rural and land to the north is zoned special rural and residential.

An application for planning approval was submitted to the Shire of Murray on 13 October 2015. The planning approval application went to Council on the 17 December 2015 (item 12.3 of the Agenda); approved was granted (dated 21 December 2015).

Premises occupation
The Premises is currently owned by Silversun Corporation Pty Ltd and occupational control is currently provided to Water West under a binding terms agreement which extends beyond the timeframe of approval for this Works Approval. Formal ownership of relevant lands may be secured in the future by the Applicant.

Consultation
The Application was referred to the following stakeholders on 01/10/2015:

- Department of Agriculture and Food;
- Department of Health;
- Department of Water;
- Peel-Harvey Catchment Council; and
- Shire of Murray.

The draft works approval was referred to the Applicant on 22 December 2015.

Consultation responses are summarised in Section 5 of this Decision Document.

Approval of works
This Decision Document and the Works Approval specifies the assessment of the Application, the regulatory requirements[1] for the Works to proceed and gaps identified in the specifications of the Application. Approval for the construction of the Works in granted, operation of the Works is not being granted at this time.

Note 1: The following regulatory requirements with Table 1.2.1 of the Works Approval are Works specifications (controls) beyond those proposed by the Applicant:

- Row 1 items (a) and (c);
- Row 2 items (a) and (b);
- Row 3 item (d);
- Row 4 items (c) and parts of (d) and (f); and
- All specifications within row 5.

The regulatory requirements under row 2 items (f)v and (f)vi were developed in consultation with the Applicant.

All other specifications within Table 1.2.1 are commitments made by the Applicant.

Regulatory controls for the operation of the Works will be further considered following the application for a licence with relevant supporting information specified in the Works Approval and this Decision Document. The risk assessment for the application of treated wastewater to the irrigation area is still subject to the provision of specifications for operations and the receiving environment to allow a risk assessment to be completed, informing the regulatory controls that will be required.

4 Decision table

All applications are assessed in line with the *Environmental Protection Act 1986*, the *Environmental Protection Regulations 1987*, DER Guidance Statement: *Regulatory Principles*, DER Guidance Statement: *Setting Conditions* and DER's Operational Procedure on Assessing Emissions and Discharges from Prescribed Premises. Where other references have been used in making the decision they are detailed in the Decision Document.

Expert advice has been taking into account for the decisions justified herein and is referenced accordingly.

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description and decision methodology where relevant)**	**Reference documents**
Interpretation	W1.1.1 – 1.1.4	**Construction** Conditions 1.1.1 – 1.1.4 requires that terminology used within the Works Approval is referenced to the appropriate definitions where applicable and that any reference to a standard or guideline is to the most current version of that standard or guideline. **Operation** Interpretation regulatory controls for the operation of the Works will be considered at the licensing stage. Interpretation regulatory controls for the operation of the Works would likely include those contained within the Works Approval and amended definitions where appropriate.	General provisions of the *Environmental Protection Act 1986*

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description and decision methodology where relevant)**	**Reference documents**
General conditions	W1.2.1-1.2.5	**Construction** The specifications of the Works and receiving environment are not fully defined in the application. Subsequently Conditions 1.2.1 and 1.2.2 define the minimum planning, design and construction requirements for the Works. In conjunction with Conditions 1.2.1 and 1.2.2, Condition 1.2.3 specifies the general planning, design and construction requirements of the Application. The risk assessment informing the regulatory requirements (Conditions 1.2.1 – 1.2.3 and 1.2.5) under general conditions during construction is contained in the *Emissions to land including monitoring* section of this Decision Table. The risk assessments informing the regulatory requirements with regards to acid sulfate soils (Condition 1.2.4) and hazardous materials (Condition 1.2.1, Table 1.2.1 row 2 items (l) and (m)) are contained in Appendix B. Condition 1.2.5 requires the submission of detailed construction plans, drawings and irrigation area designs. The submission will verify that the infrastructure to be constructed meets the specifications of the Application and the Works Approval conditions by way of qualified professional certification. The condition includes the provision for minor deviation from design and construction specifications under Condition 1.2.2. Documentation of deviation is required by Condition 3.1.1. The risk assessment informing the regulatory requirements with regards to stormwater is contained in Appendix B for construction of the Works. **Operation** General regulatory controls for the operation of the Works will be further considered at the licensing stage. The risk assessments informing the likely regulatory requirements with regards to acid sulfate soils, hazardous materials and stormwater are contained in Appendix B for operation of the Works.	Department of Environment Regulation 2015*, Treatment and management of soils and water in acid sulfate soil landscapes* *Environmental Protection (Unauthorised Discharge) Regulations 2004* General provisions of the *Environmental Protection Act 1986*

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description and decision methodology where relevant)**	**Reference documents**
Premises operation	W1.3.1	**Construction** No approval is provided in the Works Approval to commission or operate the Works at the Premises. The risk assessment informing the regulatory requirements (Condition 1.3.1) under premises operation during construction is contained in the *Emissions to land including monitoring* section of this Decision Table. **Operation** Premises operation regulatory controls for the operation of the Works will be further considered at the licensing stage. Premises operation regulatory controls for the operation of the Works will likely include: • Provisions for commissioning, validation and operation of the sewage treatment system and irrigation system. • Limits on the type and quantity of waste accepted at the Premises; • Minimum specified requirements for authorised infrastructure including the irrigation area; • Process controls for the waste treatment; • Containment controls for the storage and treatment of waste; • Emission controls for the operation of the irrigation area; • Operational controls for the sewage treatment system, sludge management, storage dams and irrigation area; and • Site security controls to prevent unauthorised access to the sewage treatment system, storage ponds and irrigation area.	General provisions of the *Environmental Protection Act 1986*

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description and decision methodology where relevant)**	**Reference documents**
Emissions to land including monitoring	N/A	**Construction** No emissions to land are expected to arise during the construction of the sewage treatment plant and no specified conditions within the Works Approval are therefore required. **Operation** Emissions to land regulatory controls for the operation of the Works will be further considered at the licensing stage. The risk assessments identifying the requirement for regulatory controls under the Works Approval for emission risks during commissioning and operation of the Works and the requirement for regulatory requirements under emissions to land during commissioning and operation are contained in Appendix C. Emissions to land regulatory controls for the operation of the Works if authorised will likely include: • Provisions for commissioning, validation and operation of the sewage treatment system and irrigation system. • Limits on the quantity and quality of waste discharged at the Premises; • Limits on the area waste can be discharged at the Premises; • Requirements to investigate any limits exceeded; • Process controls requiring irrigation to cease when soil moisture monitoring indicates soil moisture is at field capacity. • Emissions to be undertaken in accordance with provisions of a nutrient irrigation management plan and the capacity to undertake controlled nutrient loading trials (to maximise the efficacy of nutrient management through the irrigation area); and • Process, emission and ambient monitoring requirements. The control of the irrigation of treated wastewater based on the soil moisture levels within the plant root zone combined with the export of biomass harvested from the irrigation area are considered to be critical components for controlling the risk of emission to land as a result of irrigation practices.	General provisions of the *Environmental Protection Act 1986*

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description and decision methodology where relevant)**	**Reference documents**
Fugitive emissions	N/A	**Construction** Emission description: *Emission:* Dust arising from the operations of construction equipment and vehicle movements during the construction of the Works. *Impact:* Reduced local air quality from airborne particulates, the closest property boundary is located about 50 meters from the Works and the closest residence is located about 100 metres to the southwest of the proposed Works. *Controls:* The Applicant has committed to containment of emissions within the construction site, and water based suppression and surfacing high traffic areas. Risk assessment: *Consequence:* Insignificant *Likelihood:* Possible *Risk Rating:* Low Regulatory controls: It is considered that the provisions of Section 49 of the *Environmental Protection Act 1986* are sufficient to regulate dust emissions during construction. Residual risk: *Consequence:* Insignificant *Likelihood:* Possible *Risk Rating:* Low **Operation** Fugitive dust emission regulatory controls for the operation of the Works will be considered at the licensing stage. No fugitive dust emissions are expected to arise during the operation of the Works and no specified conditions within the licence are expected to be required.	General provisions of the *Environmental Protection Act 1986* Section 49 of the *Environmental Protection Act 1986*

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description and decision methodology where relevant)**	**Reference documents**
Odour	N/A	**Construction** No odour emissions are expected to arise during the construction of the sewage treatment plant and no specified conditions within the Works Approval are required. **Operation** Emission description: *Emission:* Odour arising from the treatment, storage and disposal of sewage and treated wastewaters and sludge storage and disposal activities. *Impact:* Interference with the health, welfare, convenience, comfort or amenity of sensitive residential receptors is possible. The closest property boundary is located about 50 meters from the Works and the closest residence is located about 100 metres to the southwest of the proposed Works. The subdivision which the Works service will be located about 200 metres north of the Works (irrigation area). *Controls:* The Applicant has committed to buffer zones, odour scrubber treatment for venting of sewage treatment components (inlet screens, flow balance tank and emergency storage tank), maintenance of sewage treatment system within design parameters and development of an odour management plan (which can be considered at the time of licence application). Risk assessment: *Consequence:* Insignificant *Likelihood:* Possible *Risk Rating:* Low Regulatory controls: Odour emission regulatory controls for the operation of the Works will be further considered at the licensing stage. No odour emission regulatory controls are likely to be required for operation of the Works beyond the provisions of Section 49 of the Act. To support this Condition 1.2.1, Table 1.2.1, row 2, item (o) has been included to require odour management commitments within the Application to be implemented. Residual risk: *Consequence:* Insignificant *Likelihood:* Possible *Risk Rating:* Low	General provisions of the *Environmental Protection Act 1986* Section 49 of the *Environmental Protection Act 1986*

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description and decision methodology where relevant)**	**Reference documents**
Noise	N/A	**Construction** Emission description: *Emission:* Noise arising from construction activities, machinery movement and earthworks. *Impact:* Interference with the health, welfare, convenience, comfort or amenity of sensitive residential receptors, the closest property boundary is located about 50 meters from the Works and the closest residence is located about 100 metres to the southwest of the proposed Works. *Controls:* The Applicant has committed to only undertaking works during normal business hours and relies on the existing separation distance between the Works and receptors. Risk assessment: *Consequence:* Insignificant *Likelihood:* Possible *Risk Rating:* Low Regulatory controls: It is considered that the provisions of *Environmental Protection (Noise) Regulations 1997* will be sufficient to regulate noise emissions during construction. Residual risk: *Consequence:* Insignificant *Likelihood:* Possible *Risk Rating:* Low **Operation** *Emission:* Noise arising from operation activities, low level noise emissions are likely to arise from pumps, aerators and operators accessing the Premises. *Impact:* Interference with the health, welfare, convenience, comfort or amenity of sensitive residential receptors, the closest property boundary is located about 50 meters from the Works and the closest residence is located about 100 metres to the southwest of the proposed Works.	*Environmental Protection (Noise) Regulations 1997*

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description and decision methodology where relevant)**	**Reference documents**
Noise (continued)		*Controls:* The Applicant has committed to the use of acoustic covers and insulation of relevant infrastructure. Sound emissions are not expected to exceed 80 dBA at 1 metre and a noise management plan will be developed (which can be considered at the time of licence application). Risk assessment: *Consequence:* Insignificant *Likelihood:* Unlikely *Risk Rating:* Low Regulatory controls: Noise emission regulatory controls for the operation of the Works will be further considered at the licensing stage. No noise emission regulatory controls are likely to be required for operation of the Works beyond the provisions of the provisions of *Environmental Protection (Noise) Regulations 1997*. Residual risk: *Consequence:* Insignificant *Likelihood:* Unlikely *Risk Rating:* Low	

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description and decision methodology where relevant)**	**Reference documents**
Monitoring	W2.1.1 - 2.1.5	**Construction** The risk assessment informing the regulatory requirements under monitoring during construction is contained in the *Emissions to land including monitoring* section of this Decision Table (Conditions 2.1.1 and 2.1.5). Conditions 2.1.2 - 2.1.4 require precision and accuracy during sample collection, analysis and reporting and ensure Condition 2.1.5 can be undertaken to a reliable standard. **Operation** Monitoring regulatory controls for the operation of the Works will be further considered at the licensing stage. Monitoring controls for the operation of the Works would likely include those contained within the Works Approval. Additional monitoring regulatory controls for the operation of the Works are discussed further under the *Emissions to land including monitoring* section of this Decision Table and referred to under Appendix E.	General provisions of the *Environmental Protection Act 1986*

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description and decision methodology where relevant)**	**Reference documents**
Information	W3.1.1 – W3.1.8	**Construction** The specifications of the Works and receiving environment are not fully defined in the application. A staged approach to the Works is required which involves the following reporting process: • Condition 3.1.1 requires documentation submitted to the CEO to identify where the provisions for minor deviations under Condition 1.2.2 have been applied. Documentation submitted where Condition 3.1.1 is applicable are Condition 1.2.5, 3.1.2 and 3.1.3. • Conditions 3.1.2 and 3.1.3 require the submission of a construction compliance document; the document will verify that the constructed Works meet the specifications of the Application and the Works Approval conditions by way of qualified certification. • Conditions 3.1.4 – 3.1.8 require the Applicant to maintain accurate information and records of the Works and make relevant information and records available to the CEO upon request within an appropriate timeframe of a CEO Request. **Operation** Information controls for the operation of the Works will be further considered at the licensing stage. Information controls for the operation of the Works will likely include: • The investigation of any descriptive or numerical limit exceeded; • Information and reporting is clear, legible and retained for an appropriate time period; • A complaints management system implemented and maintained; • An Annual Audit Compliance Report completed and submitted; • An Annual Environmental Report completed and submitted, including all monitoring data for the annual period and referenced to longer term trends in the data; and • Notification requirements including when a limit is breached, when process equipment is taken offline and when sludge management activities are undertaken.	General provisions of the *Environmental Protection Act 1986*

DECISION TABLE			
Works Approval / Licence section	**Condition number W = Works Approval L= Licence**	**Justification (including risk description and decision methodology where relevant)**	**Reference documents**
Works approval duration	N/A	**Construction** This Works Approval is proposed to be granted for approximately three years, until early 2019. Construction activities are proposed to be completed within a one and a half year period starting as soon as possible. Other statutory approvals that have been identified as limiting the proposed Works are: • Department of Planning approvals; • Department of Health approvals; • Department of Water approvals; and • Shire of Murray planning consent and planning approval. **Operation** Licence duration for the operation of the Works will be considered at the licensing stage. The document *Guidance statement: licence duration* defines the factors considered when determining the duration of a licence.	Department of Environment Regulation 2015, *Guidance statement: Licence duration* General provisions of the *Environmental Protection Act 1986*

5 Advertisement and consultation table

Date	Event	Comments received/Notes	How comments were taken into consideration
28/09/2015	Application advertised in West Australian (or other relevant newspaper)	None applicable	None applicable
30/09 – 01/10 2015	Application referred to interested parties listed: (1) Department of Agriculture and Food (2) Department of Health (3) Department of Water (4) Peel-Harvey Catchment Council (5) Shire of Murray	Comments are summarised in Appendix D	Considerations are summarised in Appendix D
22/12/2015 and 09/03/2016	Proponent sent a copy of draft instrument	Comments are summarised in Appendix E	Considerations are summarised in Appendix E
14/03/2016	Instrument grant was advertised in West Australian		

6 Risk Assessment

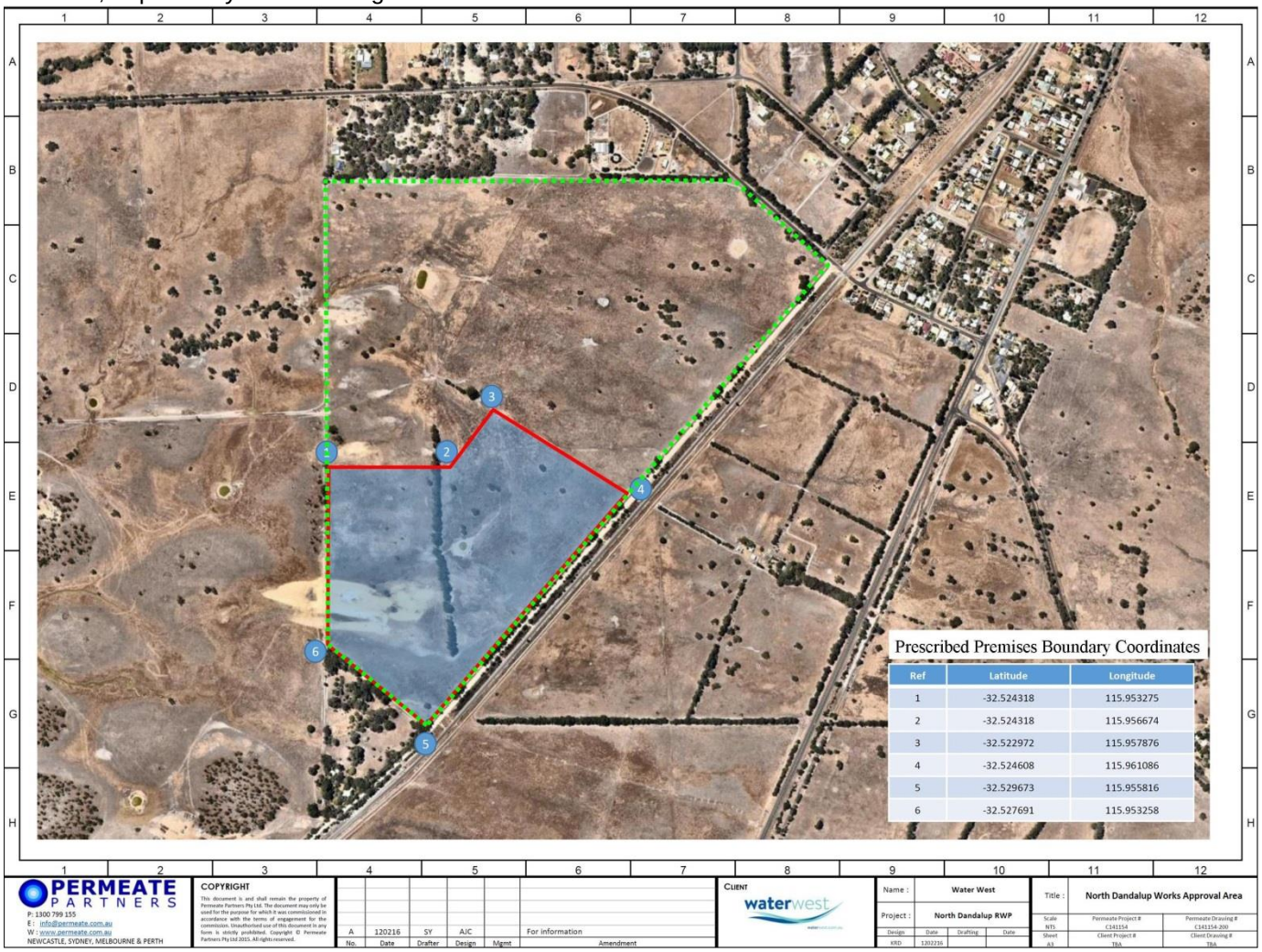
Note: This matrix is taken from the DER Corporate Policy Statement No. 07 - Operational Risk Management

Table 1: Emissions Risk Matrix

Likelihood	Consequence				
	Insignificant	Minor	Moderate	Major	Severe
Almost Certain	Moderate	High	High	Extreme	Extreme
Likely	Moderate	Moderate	High	High	Extreme
Possible	Low	Moderate	Moderate	High	Extreme
Unlikely	Low	Moderate	Moderate	Moderate	High
Rare	Low	Low	Moderate	Moderate	High

Appendix A

Premises map: the red line depicts the prescribed premises boundary, being part of Lot 101 on Plan 302335 Shanns Road North, North Dandalup, Western Australia, depicted by the dashed green line.



Appendix B

General conditions: Emission risk (stormwater)

Construction

Emission: The quality of stormwater discharged from the Premises may deteriorate where stormwater is not appropriately managed or comes into contact with contaminants (e.g. hydrocarbons or cement) or becomes loaded with sediment.

Impact: Stormwater and contaminants leaving the Premises and entering adjacent properties may impact the health, welfare, convenience, comfort or amenity of those residences. No likely pathways to surface waters have been identified. Some contaminants may have the potential to migrate through soils into the groundwater which could in turn impact beneficial users of groundwater or surface waters down hydraulic gradient.

Controls: The specifications of the Works, particularly the irrigation area, are not fully defined in the Application. The Applicant has committed to filter berms if required and construction during the dry season. The generally low gradient of the Premises topography is also expected to assist in controlling stormwater flow.

Risk assessment:
Consequence: Minor
Likelihood: Unlikely
Risk Rating: Moderate

Regulatory controls:
It is considered that the provisions of Section 49 of the *Environmental Protection Act 1986* and the provisions of the *Environmental Protection (Unauthorised Discharge) Regulations 2004* are sufficient to regulate the emissions of stormwater.

Residual risk:
Consequence: Minor
Likelihood: Unlikely
Risk Rating: Moderate

Operation

Emission: The quality of stormwater discharged from the Premises may deteriorate where stormwater is not appropriately managed or comes into contact with contaminants (sewage, treated wastewater) or becomes loaded with sediment.

Impact: Stormwater and contaminants leaving the Premises and entering adjacent properties may impact the health, welfare, convenience, comfort or amenity of those residences. No likely pathways to surface waters have been identified. Some contaminants may have the potential to migrate through soils into the groundwater which could in turn impact beneficial users of groundwater or surface waters down hydraulic gradient.

Controls: The specifications of the Works, particularly the irrigation area, are not fully defined in the Application.

Risk assessment:
Consequence: Minor
Likelihood: Unlikely
Risk Rating: Moderate

Regulatory controls:
It is considered that the provisions of Section 49 of the *Environmental Protection Act 1986* and the provisions of the *Environmental Protection (Unauthorised Discharge) Regulations 2004* will be sufficient to regulate the emissions of stormwater. Regulatory controls under the Works Approval should help reduce the stormwater related emissions risk, specifically Condition 1.2.1 row 1 item (c) and row 4 item (d).

Residual risk:
Consequence: Minor
Likelihood: Unlikely
Risk Rating: Moderate

General conditions: Emission risk (acid sulfate soils)

Construction

Emission: During construction acid sulfate soils (ASS) may be exposed to oxygen which produces sulphuric acid which may also mobilise metals and contaminants within the soil profile.

Impact: Deterioration in local groundwater quality which may in turn impact beneficial users of groundwater or surface waters within the catchment resulting in reduced ecosystem health.

Controls: Potential ASS have been identified within the Premises however, the initial geotechnical study of the Premises indicates that the construction areas for the Works do not contain ASS. The Applicant has committed to additional soil sampling prior to undertaking construction, active avoidance of any ASS and any areas containing ASS that are disturbed being managed in accordance with the guideline '*Treatment and management of soils and water in acid sulfate soil landscapes*'.

Risk assessment:
Consequence: Moderate
Likelihood: Possible
Risk Rating: Moderate

Regulatory controls:

- Condition 1.2.4 requires that determination and identification of acid sulfate soils is undertaken in accordance with the guideline Department of Environment Regulation 2015, *Identification and investigation of acid sulfate soils and acidic landscapes.* Where disturbance of acid sulfate soils is unavoidable that the acid sulfate soil disturbance will be managed in accordance with the guideline Department of Environment Regulation 2015, *Treatment and management of soils and water in acid sulfate soil landscapes*.
- Condition 3.1.3 requires a construction compliance document to be submitted; part (c) of the condition requires a summary of management actions required in response to the presence of any acid sulfate soils to be provided and will assist in the verification of compliance against Condition 1.2.4.

Note: As part of the broader subdivision approval process further controls for the management of acid sulfate soils are outlined in the document Western Australian Planning Commission and Department of Planning and Infrastructure 2008, *Acid sulfate soils planning guidelines*, available: http://www.planning.wa.gov.au/dop_pub_pdf/Acid_Sulfate_Soils_Planning_Guidelines.pdf.

Residual risk:
Consequence: Moderate
Likelihood: Unlikely
Risk Rating: Moderate

Operation

No disturbance of land, in particular acid sulfate soils is proposed for the commissioning or operation of the Works. No specified conditions within the licence are expected to be required.

General conditions: Emission risk (hazardous materials)

Construction

Emission: During construction hydrocarbons may be used on site with the potential for spills and leakage such as during refuelling of machinery and storage. No bulk storage of hazardous material (hydrocarbons) during construction is proposed in the Application.

Impact: Hydrocarbons could contaminate local soils and potentially migrate to the groundwater which could impact beneficial groundwater users and connected surface water ecosystems.

Controls: No controls are specified in the Application.

Risk assessment:

Consequence: Minor
Likelihood: Possible
Risk Rating: Moderate

Regulatory controls:

It is considered that the provisions of the *Environmental Protection Act 1986* and the provisions of the *Environmental Protection (Unauthorised Discharge) Regulations 2004* are sufficient to regulate the risk of emissions of hazardous material during construction.

Residual risk:

Consequence: Minor
Likelihood: Possible
Risk Rating: Moderate

Operation

Emission: During operation the following hazardous materials may be present at the Premises for use in the interim treatment plant: alum (aluminium sulphate), acetic acid, chlorine gas, sodium hypochlorite and sodium hydroxide. The form of chlorine for dosing in the sewage treatment process has not been specified in the Application.

Impact: Hazardous materials could contaminate local soils and potentially migrate to the groundwater and/ or impact the health of human receptors at or nearby the Premises.

Controls: The applicant has committed to storing chemicals in accordance with Australian Standard AS3780.

Risk assessment:

Consequence: Major
Likelihood: Unlikely
Risk Rating: Moderate

Regulatory controls:

- Conditions 1.2.1 and 1.2.2 require design and construction standards to be maintained to ensure potential emissions are contained. The condition includes the following provisions in Table 1.2.1: row 2 items (l) and (m). The construction specifications will reduce the risk of emission during operation.
- It is considered that the provisions of the *Environmental Protection Act 1986* and the provisions of the *Environmental Protection (Unauthorised Discharge) Regulations 2004* are also applicable from the regulation of hazardous material during operation.
- Additional regulatory controls outside of the provisions of the *Environmental Protection Act 1986* may need to be considered by the Applicant with regards to the storage and handling of hazardous materials.

Residual risk:

Consequence: Major
Likelihood: Rare
Risk Rating: Moderate

Appendix C

Emissions to land including monitoring summary

All risk from and any approvals for emissions to land (irrigation) are based upon the Works and regulatory controls being consistent with the approved EPP policy (Section 60 of the *Environmental Protection Act 1986*). Subsequently nutrient export from the Premises must be within the following limits:

- total phosphorus of 0.3 kg/ ha/ year; and
- total nitrogen of 2.4 kg/ ha/ year.

Construction

No emissions to land are proposed or approved under the Works Approval for the construction of the Works and no specified conditions within the Works Approval are required.

Operation

Emission: Potential sources of emissions to land as a result of the commissioning and operations of the Works at the Premises are:

(a) Containment failure: Potential emissions may arise from the failure of containment infrastructure within the sewage treatment system, storage dams or conveyance pipelines.

(b) Seepage: Potential emissions may arise from failures in the integrity of containment infrastructure within the sewage treatment system, storage dams or conveyance pipelines.

(c) Irrigation: Emissions to land are planned under controlled conditions year round with all treated wastewater discharged to the irrigation area. Sewage will be treated to a tertiary standard (low strength).

The following components must be considered in all risks of emission:

- Nutrients: nitrogen and phosphorus;
- Pathogens/ Escherichia coli;
- Other contaminants such as heavy metals, surfactants and endocrine disrupting chemicals; and
- Secondary impacts.

No off-Premises nutrient export via surface water flow is proposed, assessed or approved.

Impact: Potential pathways of emissions to land a result of the commissioning and operations of the Works at the Premises are[1]:

(a) Over land: It may be possible for emissions to land to migrate across land to surface waters or neighbouring residences under exceptional circumstances such as saturated soil conditions and catastrophic failure of containment infrastructure.

(a, b, c) Through land: Emissions to land could infiltrate local soils and enter the groundwater at rates dependant on many factors and additional controls that may be put in place by the Applicant. Factors to consider include:

(i) Nutrient export quantities will be dependent on factors including the wastewater application quality and quantity (rate), crop type, crop growth stage and harvest yields, soil properties, depth to groundwater and season variations.

(ii) The construction specifications of the irrigation area which are not clearly defined may include surface and subsurface soil treatments.

(iii) Under the Department of Agriculture and Food soil and landscape capability assessment the soils within the Premises have been defined as Pinjarra System (type B1 and P1a) in western areas and Forrestfield System (type F3) in middle and eastern areas.

(iv) The Draft *Model Planning Policy: Horticultural development in local governments of the Peel-Harvey Coastal Plain Catchment* (V2.5, July 2015) describes B1 soil types as not being suitable for any in ground horticulture activities, P1a soil types as being potentially suitable only for annual in ground horticulture activities and F3 soil types as being potentially suitable for perennial and annual in-ground horticulture activities.

(v) The rate of groundwater flow is likely to vary considerably with depth and seasonally. For in situ soils lateral groundwater flow rates in the shallow sand may be of the order of a few tens of metres per year when it is seasonally saturated however, is likely to be less than 10 metres per year in the underlying clayey sands and less than 1 metre per year in clayey materials (*Expert advice from Dr Steve Appleyard)*.

(vi) Preliminary assessment of groundwater mounding was undertaken through the use of a spread sheet-based groundwater model that utilised the Hantush method for determining groundwater mounding. This assessment suggested that wastewater irrigation could seasonally increase the water table elevation by about 40 cm beneath the irrigated area and could potentially increase both the extent of the area that is seasonally waterlogged and the duration of soil waterlogging each year (*Expert advice from Dr Steve Appleyard)*.

Potential receptors of emissions to land:

- Adjacent properties and residences;
- Groundwater users;
- Groundwater dependant ecosystems;
- Surface water users;
- Surface waters and dependant ecosystems; and
- The Peel Harvey catchment.

Potential impacts of emissions to land:

- Impact the health, welfare, convenience, comfort or amenity of nearby residences, adjacent land owners and recreational activities (e.g. surface water users);
- Impact current or future uses of groundwater abstraction;
- Impact local soil structure and terrestrial vegetation ecosystem health;
- Impact surface water (streams, pools, rivers) ecosystem health;
- Impact catchment health and potential to contribute to eutrophication within the catchment[1].

Note 1: Nutrients export into the Dandalup River System catchment drains into the Peel Harvey Estuary and the RAMSAR listed Peel-Yalgorup System; nutrients within surface waters can lead to eutrophication, a known problem within the catchment.

Applicant controls:

The Works and the receiving environment (the irrigation area) are not yet fully characterised and the Applicant controls for the application of treated wastewater (irrigation system) during commissioning and operation are not fully defined. A defined irrigation area profile and an emission and ambient environmental monitoring regime will need to be specified.

The Applicant has undertaken MEDLI modelling to help establish the acceptability of the proposed Works and irrigation system based on total nitrogen and total phosphorus treated wastewater quality limits of 15 mg/L and 5 mg/L respectively to be achieved. The Applicant's MEDLI modelling indicates:

- a leached NO_3-N outcome of 13.25 kg/ha/year which exceeds the total nitrogen export limit of 2.4 kg/ha/year; and
- a leached PO_4^{-4} outcome of 0.096 kg/ha/year which is within the total phosphorous export limit of 2.4kg/ha/year[1].

While maintaining the acceptability of the 15 mg/L and 5 mg/L values, the treatment limits for total nitrogen and total phosphorus of 12 mg/L and 4 mg/L respectively are accepted by Applicant. These values are proposed in response to concerns arising from the assumptions and uncertainties built into the modelling process, the unspecified elements of the Application and the requirement to ensure that the Application and Works Approval are consistent with the EPP requirements.

Note 1: the export values are stated within Table 4 on page 208 of 273 in the Application as 'nutrient loads in deep drainage'.

Individual risk assessments for containment failure, seepage and irrigation are undertaken in the sections below. These sections further described the relevant Applicant controls, risk assessments and describe specific regulatory controls which inform the residual risk for each potential source of emission to land.

Emission description (containment failure):

Emission and *Impact* are addressed in the *Emissions to land including monitoring summary* section above.

Controls: The specifications of the Works are not fully defined. The Applicant has committed to:

- Relevant infrastructure being designed and installed in accordance with the latest revisions of relevant Austrian Standards, water industry codes/ guidelines and/ or manufacturer's recommendations at the time of construction.
- Relevant infrastructure being constructed with specified minimum material requirements for construction and design life of key components.
- Storage dams designed and constructed in accordance with relevant Australian standards, Department of *Water 2013, Water Quality Protection Note 26 Liners for containing pollutants, using synthetic membranes* and the guidelines established by the Australian National Committee on Large Dams.
- General maintenance of the Works will be applied during operation.

MEDLI modelling indicates that the modelled storage dam dimensions are '*sized to ensure no more than 10% overflow over long-term climate period*'[1].

Applicant proposed controls have not been defined for the containment of the irrigation area during commissioning and operation.

Note 1: The MEDLI modelling has indicated that the proposed storage dam capacity is acceptable; approval for the storage dams to overflow under normal operating conditions is unlikely to be granted.

Risk assessment:

Consequence: Moderate
Likelihood: Rare
Risk Rating: Moderate

Regulatory controls:

The risk of emissions to land due to containment failure can largely be addressed through regulatory controls for the construction of the Works. The proposed regulatory controls to ensure that the risk of containment failure during operation can be adequately managed are:

- Conditions 1.2.1 and 1.2.2 require design and construction standards to be maintained to ensure potential discharges are contained and stormwater is excluded from the system (stormwater infiltration can impact containment and treatment capabilities). The condition includes the following provisions in Table 1.2.1: row 1 item (a), (b) and (c); row 2 item (a)[1], (c), (d), (g)i and (n); row 3 item (b); and row 4 item (d).
  Note 1: hardstand is defined to require a material with a permeability of ≤10^{-9} m/sec at a depth of ≥10 cm to ensure the integrity of the hardstand is maintained subject to weight bearing infrastructure and vehicle traction on the surface.
- Conditions 1.2.1 and 1.2.2 require contingency measures to be implemented to allow potential containment failures to be identified; these include the following provisions in Table 1.2.1: row (2) item (b)[1].
  Note 1: Specifications under Table 1.2.1: row (5) may provide a role in determining if potential below ground emissions are occurring subject to the final placement of the storage dams and groundwater monitoring bores. Further consideration may be given to the need for additional groundwater monitoring bores in proximity to the storage dams once the final composition of the Works in known.
- Condition 1.2.3 requires the Works to be constructed in accordance with the Application where it does not deviate for the Works Approval Condition requirements, the contents of which include an overview of all Works and provisions for containment.
- Condition 1.2.5 requires the submission of a construction plan; the plan will verify that the Works to be constructed meet the specifications of the Application and the Works Approval Conditions.
- Conditions 3.1.2 and 3.1.3 require the submission of a construction compliance document; the document will verify that the Works meet the specifications of the Application and the Works Approval Conditions by way of qualified certification.

- Conditions 1.2.5, 3.1.2 and 3.1.3 include the provision for minor deviation from design and construction specifications under Condition 1.2.2. Deviations must be to be reported in accordance with Condition 3.1.1.

Emissions to land regulatory controls for the operation of the Works will be further considered at the licensing stage. Regulatory controls for the operation of the Works will likely include the maintenance of minimum specified requirements for authorised infrastructure. Controls proposed by the Applicant for the irrigation area may result in the risk of containment failure being re-assessed.

Residual risk:
Consequence: Moderate
Likelihood: Rare
Risk Rating: Moderate

Emission description (seepage):
Emission and *Impact* are addressed in the *Emissions to land including monitoring summary* section above.
Controls: The specifications of the Works are not fully defined in the application. The Applicant has committed to:

- Relevant infrastructure being designed and installed in accordance with the latest revisions of relevant Austrian Standards, water industry codes/ guidelines and/ or manufacturer's recommendations at the time of construction.
- Relevant infrastructure is proposed to be constructed with specified minimum material requirements for construction and design life of key components.
- Three storage dams with a combined storage capacity of ≥11ML, synthetically lined in accordance with the Department of Water 2013, *Water quality protection note 26: liners for containing pollutants using synthetic membranes*, the guidelines established by the Australian National Committee on Large Dams, a minimum separation distance to groundwater of 1.2 metres and an operational freeboard minimum of 500 mm.
- General maintenance of the Works will be applied during operation.

Risk assessment:
Consequence: Moderate
Likelihood: Unlikely
Risk Rating: Moderate

Regulatory controls:
The risk of emissions to land due to seepage can largely be addressed through regulatory controls for the construction of the Works. The proposed regulatory controls to ensure that the risk of seepage during operation can be adequately managed are:

- Conditions 1.2.1 and 1.2.2 require design and construction standards to be maintained to ensure potential emissions are contained, these include the following provisions in Table 1.2.1: row 1 item (a)[1] and (b); row 2 item (a); and row 3 items (a), (c) and (d).
  Note 1: a minimum separation distance to groundwater of 1.4 metres from the storage dam HDPE liner has been specified, greater than the 1.2 metres proposed by the Applicant. Currently the exact design, location and in situ hydrogeological features for the storage dams are not known. Due to this uncertainty a greater level of confidence is required to ensure that groundwater does not intercept with the storage dam liners and promote increased seepage to the environment. Amendment to this provision can be considered where additional supporting information is provided by the Applicant to justify the acceptability of a smaller separation distance to groundwater.
- Conditions 1.2.1 and 1.2.2 require contingency measures to be implemented to allow potential containment failures to be identified; these include the following provisions in Table 1.2.1: row 2 item (b)[1].
  Note 1: Specifications under Table 1.2.1: row (5) may provide a role in determining if potential below ground emissions are occurring subject to the final placement of the storage dams and groundwater monitoring bores. Further consideration may be given to the need for additional groundwater monitoring bores in proximity to the storage dams once the final composition of the Works in known.

- Condition 1.2.3 requires the Works to be constructed in accordance with the Application where it does not deviate for the Works Approval condition requirements, the contents of which include an overview of all Works and provisions for seepage prevention.
- Condition 1.2.5 requires the submission of a construction plan; the plan will verify that the Works to be constructed meet the specifications of the Application and the Works Approval Conditions.
- Conditions 3.1.2 and 3.1.3 require the submission of a construction compliance document; the document will verify that the Works meet the specifications of the Application and the Works Approval Conditions by way of qualified certification.
- Conditions 1.2.5, 3.1.2 and 3.1.3 include the provision for minor deviation from design and construction specifications under Condition 1.2.2. Deviations must be to be reported in accordance with Condition 3.1.1.

Emissions to land regulatory controls for the operation of the Works will be further considered at the licensing stage. Regulatory controls for the operation of the Works will likely include the maintenance of minimum specified requirements for authorised infrastructure.

Residual risk:
Consequence: Moderate
Likelihood: Unlikely
Risk Rating: Moderate

Emission description (irrigation)

An overview *of Emission* and *Impact* are addressed in the *Emissions to land including monitoring summary* section above. Irrigation has been identified as the foremost emission risk arising from the Application. Further detail on *Emission* and *Impact* are provided herein.

Emission[1]*:* Irrigation of treated wastewater to the irrigation area could contain elevated[2] levels of:

(i) Nutrients: nitrogen and phosphorus treatment standards, proposed at ≤15 mg/L and ≤5 mg/L respectively for application to the irrigation area. The sewage treatment system design capacity of 200 m^3/ day could produce 73 ML/ year treated wastewater equating to 1095 kg total nitrogen and 365 kg total phosphorus. At the assessed capacity of 160 m^3/ day the volumes are reduced to 846 kg and 292 kg respectively.

(ii) Pathogens: *Escherichia coli* concentrations no greater than greater than 1,000 cfu/ 100mL are proposed. *Escherichia coli* are considered a good indicator of the level of faecal contamination.

(iii) Other contaminants: such as heavy metals, surfactants and endocrine disrupting chemicals.

Note 1: The hydraulic load applied to the irrigation area is also a key emission parameter however, due to the lack of a defined irrigation area profile and controls the associated risk cannot be adequately defined and is considered secondary to the nutrient levels being applied. The control of wastewater application to the irrigation area based on soil moisture levels will be considered as a primary control for the operation of the irrigation area as per Condition 1.2.1, row 4 items (e)i and (g)iv in the Works Approval.
Note 2: The quality of the treated wastewater is dependent on the performance of the treatment system. Abnormal and emergency operating conditions could result in elevated contaminant levels within the treated wastewater and must be considered in the risk assessment. Efficient operation of the treatment system and residence time in the storage dams could result in lower contaminant levels.

Impact: Irrigation of treated wastewater to the irrigation area could result in:

(i) Nutrients: could be exported via groundwater into the Dandalup River System catchment which drains into the Peel Harvey Estuary and the RAMSAR listed Peel-Yalgorup System. Nutrients within surface waters can lead to eutrophication, a known problem within the catchment. Due to the existing environmental issues within the catchment, the potential impacts of the emission need to be considered in a cumulative context.

(ii) Pathogens/ *Escherichia coli*: could pose a health risk to nearby groundwater users and via potential spray drift to residences and members of the public.

(iii) Other contaminants: heavy metals, surfactants and endocrine disrupting chemicals could bio-accumulate, impact ecosystem health and values and/ or pose a health risk to nearby groundwater users.

(iv) Potential secondary impacts:

- The rate of hydraulic loading and any potential mounding of the groundwater will affect the nutrient stripping efficiency of any vegetation within the irrigation area and the potential for off-Premises export of nutrients and contaminants via the groundwater.
- The infiltration of treated wastewater with a high biochemical oxygen demand and nutrient concentrations into the groundwater could locally create chemical conditions that lead to the mobilisation of naturally occurring arsenic from aquifer sediments through the reductive dissolution of iron oxide minerals in the sediments. Elevated concentrations of arsenic could pose a health risk to nearby groundwater users and impact ecosystem health and values (*Expert advice from Dr Steve Appleyard)*.

Controls: The specifications of the Works are not fully defined; the Applicant has undertaken MEDLI modelling to establish the acceptability of the proposed irrigation and committed to:

- A functional irrigation area of no less than 8 hectares (80,000 m^2).
- A yet to be developed nutrient irrigation management plan.
- Modifying the proposed irrigation area to:
  - Avoid irrigating low areas and during periods of high groundwater;
  - Provide additional clean fill with phosphorus absorption indices and permeability characteristics greater than those used in the MEDLI modelling process; and
  - Ensure a minimum 0.6-0.8 m separation to groundwater.
- Infrastructure which includes:
  - Weather station (wind, temperature, humidity and precipitation monitoring);
  - Monitoring infrastructure (groundwater levels, groundwater quality, soil moisture and irrigation rates);
  - Irrigation distribution system (spray irrigators, fixed where gradients are >3%);
  - Buffers and access restrictions (fenced irrigation area with a 50 metre internal buffer and signage in accordance with section 7.6 of Department of Health 2011, *Guidelines for the non-potable use of recycled wastewater in Western Australia*);
  - Quality and critical control points (nutrient quality not specified); and
  - Automated controls system (waste level alarms within storage dams, flow monitoring devices; water quality parameter alarms; operating power and time controls which includes diesel powered generator will serve as back up).
- Harvest lucerne crops (or equivalent) at a rate of ≥4,000 kg/ha/year;
- Ensure the nutrient export limit of 0.3 kg/ha/yr for total phosphorus is met (*MEDLI modelling*[1] *land application method indicated 0.096 kg/ ha/year [0.77 kg/ year / 8 hectares]*) and
- Ensure the nutrient export limit of 2.4 kg/ha/yr for total nitrogen is met (*MEDLI modelling*[1] *land application method indicated 13.25 kg/ha/year [106 kg/year/ 8 hectares]*).
- A treatment sewage emission standard of <1,000 cfu/ 100mL *Escherichia coli* prior to discharge to the irrigation area.
- A 50 day commissioning period to refine the operation of the sewage treatment and irrigation system.
- Unspecified irrigation critical/ quality control points which include an exclusion area, precipitation, groundwater level, soil moisture level, wind speed and irrigation rate.

The initially low volumetric inflow to the sewage facility will provide a significant buffer period to establish more site specific nutrient loading program. The Applicant will have the capacity to undertake controlled nutrient loading trials following the establishment of the irrigation area during the operation of the sewage facility provided emissions do not exceed the nutrient export limits established under the EPP.

Note 1: the export values are stated within Table 4 on page 208 of 273 in the Application as 'nutrient loads in deep drainage'.

Risk assessment:

Consequence: Moderate
Likelihood: Unable to determine
Risk Rating: Unable to determine

Regulatory controls:
The uncertainties relating to the risk of emissions to land due to irrigation can in part be addressed through regulatory controls for the construction of the Works. The proposed regulatory controls to ensure that the risk of irrigation during commissioning and operation can in part be managed are:

- Conditions 1.2.1 and 1.2.2 require design and construction standards to be maintained to ensure emissions from irrigation do not result in nutrient export levels greater than the limits derived from the EPP or that other contaminants emitted and secondary impacts that may occur do not present an unacceptable risk of impact on receptors. These provisions include the following in Table 1.2.1:
    - Row 2 item (f) specifies that the treatment standard of the interim treatment plant is increased from <15 mg/L total nitrogen and <5 mg/L total phosphorus to <12 mg/L and <4 mg/L respectively. The values are considered achievable and in part address the uncertainty regarding the irrigation system construction specifications and emission risk. At the assessed capacity of 160 m^3/ day the nutrient loads are reduced to 676.8 kg and 233.6 kg per year for total nitrogen and total phosphorus respectively.
    - Row 2 items (e),(f),(h), (i) and (j) are all specified controls that help ensure the sewage treatment system can meet the emission standards specified under row 2 item (f).
    - Row 4 item (a) specifies a 50 m enclosing the irrigation area; this is inconsideration of the pathogens/ *Escherichia coli* treatment standard and potential for windblown dispersion of treated wastewater during irrigation.
- Conditions 1.2.1 and 1.2.2 require contingency measures to be implemented to help ensure that emissions from irrigation do not result in nutrient export levels greater than the export limits derived from the EPP or other contaminants can be detected. The provisions include the following in Table 1.2.1: row 4 item (h)ii; and row 5 (all items).
- Condition 1.2.3 requires the Works to be constructed in accordance with the Application where it does not deviate for the Works Approval condition requirements, the contents of which include an overview of all Works and provisions for irrigation management.
- Condition 1.2.5 requires the submission of a construction plan; the plan will verify that the Works to be constructed meet the specifications of the Application and the Works Approval Conditions.
- Condition 1.3.1 requires that commissioning and operation of the Works is not undertaken. Commissioning is proposed in the Application referred to within Condition 1.2.3.
- Condition 2.1.5 requires existing groundwater monitoring bores proximate to the Works to be monitored for specified parameters. When new bores come online they must also be monitored. Condition 2.1.1 requires a minimum 12 months monitoring of the groundwater which will help establish a baseline data set and inform monitoring results when irrigation occurs.
- Conditions 3.1.2 and 3.1.3 require the submission of a construction compliance document; the document will verify that the Works meet the specifications of the Application and the Works Approval Conditions by way of qualified certification.
- Conditions 1.2.5, 3.1.2 and 3.1.3 include the provision for minor deviation from design and construction specifications under Condition 1.2.2. Deviations must be to be reported in accordance with Condition 3.1.1.

Emissions to land regulatory controls for the commissioning and operation of the Works will be further considered at the assessment of the licence application. Regulatory controls will include the operation of the irrigation area and application of treated wastewater. Controls proposed by the Applicant for the irrigation area will result in the risk being re-assessed. These will include the details identified in Appendix F.

Residual risk:
Consequence: Moderate
Likelihood: Unable to determine
Risk Rating: Unable to determine

Appendix D

Comments Received	Environmental/ public health risk and consideration
Department of Agriculture and Food 04/11/2015: **(a)** Assessment of phosphorus retention index (PRI) for each soil horizon is required. **(b)** Soil property PRI values may require amendment, amendment and target PRI values need to be specified. **(c)** Total nitrogen and total phosphorus irrigation levels (<15 mg/L and <5 mg/L respectively) will make a soil solution with nutrient levels above the optimal for plant growth, subsequently offsite nutrient export will occur. **(d)** A nutrient irrigation management plan is required. **(e)** A simple nutrient balance is required; estimates may show that without some form of precipitation system in the treatment system, without the nutrient export limits may be exceeded. **(f)** Lucerne may not be the best choice of crop, noting nitrogen fixation. **(g)** Water storage needs to be created above the water table.	**(a, b, d, e and f)** The composition of the irrigation area has not been finalised and operation is not approved under the Works Approval. Additional information is required to demonstrate that irrigation is acceptable. **(c)** Addressed by regulatory control condition 1.2.1, row 2, item (f)(v) and (vi) and additional regulatory controls with respect to the irrigation area and approach documented within this Decision Document. **(g)** Addressed by regulatory control condition 1.2.1, Table 1.2.1, row 3, item (a).
Department of Health 12/08/2015: **(a)** The proposed interim treatment plant design is considered adequate to achieve the fit for purpose recycled wastewater quality required for the intended irrigation use of stage 1. **(b)** No approval from the Department of Health to construct or install the interim treatment plant is possible due to no detailed specifications and drawings to scale having been submitted. **(c)** The Department of Health will require algal and mosquito management plans for the storage dams prior to in principal approval is granted.	**(a)** Noted. **(b)** Noted. **(c)** Noted.
Department of Water 15/08/2015: **(a)** The demonstrated achievement of modelled nutrient outputs is not clear; MEDLI modelling assumptions assume 1.2 m of imported fill while the application states the irrigation area will have a 0.6 m clearance. **(b)** The modelled outputs do not comply with the nutrient export target 2.4. kg/ha/yr total nitrogen however, this is considered acceptable due to the irrigation area comprising only a portion of the total development area. **(c)** The yet to be developed Environmental Management Plan and Nutrient Irrigation Management Plan need to include groundwater monitoring with trigger values for water quality and contingency action in the case of triggers being exceeded.	**(a)** The composition of the irrigation area has not been finalised and operation is not approved under the Works Approval. Additional information is required to demonstrate that irrigation is acceptable. **(b)** Addressed by regulatory controls with respect to treated wastewater, the irrigation area and approach documented within this Decision Document. **(c)** The composition of the irrigation area has not been finalised and operation is not approved under the Works Approval. Additional information is required to demonstrate that irrigation is acceptable.

Peel-Harvey Catchment Council 22/10/2015: **(a)** General support of the intent for reuse proposals. **(b)** General opposition to the proposal in its current form. **(c)** The assessment reports do not appear to have been scoped to adequately assess the capability of the Premises to receive treated wastewater and maintain appropriate standards. **(d)** Aspects of the application are not clear with regards to what is being applied for approval. **(e)** Aspects of the application are incomplete regarding management of discharge of nutrients to the catchment. **(f)** The modelling is based on incomplete site specific information to accurately determine outcomes. **(g)** A nutrient irrigation management plan is critical and not provided in the application. **(h)** All new developments in the catchment must demonstrate compliance with *Environmental Protection Peel Inlet – Harvey Estuary Policy 1992* and *Statement of Planning Policy No. 2.1 Peel Harvey coastal plain catchment.* **(i)** Nutrient input rates under the application are higher than those in *Hydrological and nutrient modelling of the Peel-Harvey Catchment*, being 45 kg/ha/yr total nitrogen (TN) input, 6.5 kg/ha/yr total phosphorus (TP) input and 0.28 kg/ha/yr TP offsite export. **(j)** Nutrient export limits in the catchment are 0.3 kg/ha/yr TP and 2.4 kg/ha/yr TN. **(k)** The application should demonstrate using more detailed modelling and site specific information how the targets for discharge from the irrigation area of 0.82 mg/L TN and 0.093mg/L TP will be met (reference Department of Water 2014, Peel-Harvey catchment nutrient report South Dandalup River 2014 update). **(l)** The assumption that the irrigation area's soils will have a P sorption capacity of 50-100 mg/L should be verified through site specific phosphorus retention index (PRI) analysis. **(m)** The achievement of a 2 meter separation distance to groundwater from the base of the storage dams is not demonstrated. **(n)** Containment of water within the irrigation area during wet periods is not demonstrated. **(o)** Evidence of the long term management responsibility systems that will be put in place to ensure long-term maintenance and performance of the treatment systems should be provided.	**(a)** Noted. **(b)** Noted. **(c, e, f, g, l)** The composition of the irrigation area has not been finalised and operation is not approved under the Works Approval. Additional information is required to demonstrate that irrigation is acceptable. **(d)** Addressed by regulatory control condition 1.2.5 in conjunction with the Conditions of the Works Approval. **(h)** Operation is not approved under the Works Approval; the Works Approval is in accordance with the EPP, as required by Section 60 of the *Environmental Protection Act 1986*. **(i)** Operation is not approved under the Works Approval; addressed by regulatory controls with respect to treated wastewater, the irrigation area and approach documented within this Decision Document. **(j)** Noted. **(k)** The Application is assessed under the obligations in the *Peel Inlet – Harvey Estuary Policy 1992* and relevant supporting policy and planning documents. **(m)** Addressed by regulatory control condition 1.2.1, Table 1.2.1, row 3, item (a) and supporting documentation within this Decision Document. **(n)** Addressed by regulatory control condition 1.2.1, Table 1.2.1, row 4, item (d). **(o)** If granted a licence to commission and operate the Works under Part V of the *Environmental Protection Act 1986* will be granted to the occupier. A licence would likely specify regulatory controls for maintenance and performance. Ongoing monitoring would also be required to demonstrate system performance.
Shire of Murray 22/10/2015: **(a)** General opposition to the proposal in its current form. **(b)** Further communication with stakeholders including residents and alternate reuse options should be explored. **(c)** Referral to the Office of the Environmental Protection Authority (EPA) should be undertaken. **(d)** Irrigation system: **(i)** Overall scheme development specifications are not adequately defined. **(ii)** Long term treatment and disposal details are lacking including the permanent treatment plant (PTP) disposal arrangement. **(iii)** The irrigation area may be at risk of contamination. **(iv)** Storage dams sizing and holding capacity during periods are not suitable for irrigation.	**(a)** Noted. **(b)** Noted, consultation processes under the provisions of the *Environmental Protection Act 1986* have been undertaken. **(c)** Any entity can refer an application to the EPA under section 38 of the *Environmental Protection Act 1986*. The Application for the interim treatment plant has not been considered a 'significant proposal' and can be regulated under Part V of the *Environmental Protection Act 1986* and other relevant decision making authorities. **(d)** The composition of the irrigation area has not been finalised and

(v) The irrigation area is not adequately sized. **(vi)** Can the proposed sewer scheme service the existing town site? **(vii)** If recycled water supply proposal does not go ahead can the excess wastewater be managed at the Premises? **(e)** Nutrient impacts: **(i)** The means to achieve the stated compliance with *Statement of Planning Policy No. 2.1 Peel Harvey coastal plain catchment* is not demonstrated. **(ii)** A nutrient irrigation management plan is required. **(iii)** The irrigation area soil profile properties need to be defined. **(iv)** Shire requirements for nutrient treatment standards are normally <1 mg/L TP and <10 mg/L TN, the proposal is for <5 mg/L TP and <15 mg/L TN. **(v)** The WQIP loading targets for nutrients are 45 kg/ha/yr TN and 6.5 kg/ha/yr TP, modelling indicates application rates of 107 kg/ha/yr TN and 36.4 kg/ha/yr TP without irrigation area soil profile characteristics being defined. **(vi)** The 600 mm fill should be amended to ensure a high phosphorous retention index value. **(vii)** Monitoring and contingency measures should be defined to address potential nutrient impacts. **(viii)** Where is the regulatory control from the Department of Water? **(ix)** Soil analysis is lacking and modelling assumptions are higher than for Bassendean sands. **(f)** Health: **(i)** Does the sewer system meet the standards of Water Corporation? **(ii)** The irrigation area should form part of the long term sub development proposal. **(iii)** Reuse management arrangements under the permanent treatment plant proposal are not detailed. **(iv)** Storage dam odour risk has not been addressed. **(v)** Spray drift from irrigation area canon sprinklers can occur. **(vi)** Storage dam mosquito breeding risk and maintenance requirements need to be addressed. **(vii)** Meteorological data has been used from the Bureau of Meteorology Dwellingup Station. **(g)** Ownership and management: **(i)** Who will be responsible for the long term maintenance of the recycled water scheme? **(ii)** What contingencies are in place should the private operators cease operational control?	operation is not approved under the Works Approval. Additional information is required to demonstrate that irrigation is acceptable. **(ii)** Application is for the interim treatment plant; the permanent treatment plant is not assessed or approved in the Works Approval. **(iii)** Site contamination is regulated under *Contaminated Sites Act 2003*; emissions from the Works will be regulated under Part V of the *Environmental Protection Act 1986* and are not likely to result in contamination of the Premises. **(vi)** Addressed by regulatory controls with respect to treated wastewater, the irrigation area and approach documented within this Decision Document. **(vii)** The management of excess wastewater will be subject to the provisions of the *Environmental Protection Act 1986*. **(e)** The composition of the irrigation area has not been finalised and operation is not approved under the Works Approval. Additional information is required to demonstrate that irrigation is acceptable. **(iv)** Noted. **(viii)** Outside of scope of Part V *Environmental Protection Act 1986* assessment process. **(f)** The composition of the irrigation area has not been finalised and operation is not approved under the Works Approval. Additional information is required to demonstrate that irrigation is acceptable. **(i)** Outside of scope of Part V *Environmental Protection Act 1986* assessment process. **(ii-iii)** Application is for the interim treatment plant, the permanent treatment plant is not assessed or approval in the Works Approval. **(iv)** Addressed in part by regulatory control Section 49 *Environmental Protection Act 1986*. **(vi)** Addressed by Department of Health. **(vii)** Noted. **(g)** If approved a licence to commission and operate the Works under Part V of the *Environmental Protection Act 1986* will be issued to the occupier. A licence would likely specify regulatory controls for maintenance and performance. In the absence of a licence the general provisions of the *Environmental Protection Act 1986* apply.

Appendix E

Comments Received: Water West Pty Ltd 15 February 2016	Environmental/ public health risk and consideration
1) General conditions: Water West understand that the following terminal limits apply in relation to the works approval: - Treatment – inlet to the FBT / inlet Screens. - Disposal – Boundary of the to the irrigation area buffer zone. For the avoidance of doubt this includes; - The treatment plant - All storage tanks with the boundaries of the lot designated - RW Storage Dams - Irrigation area (including buffer zone) - Interconnection pipework o Within the plant o Between the plant and the RW storage dams o Between the RW storage dams and the irrigation network. It excludes: - All sewage collection network infrastructure Once Plant selection is completed an amendment to the works approval may be submitted to reflect the actual overall design for construction. An infrastructure staging plan which will demonstrate how the ITP will be implemented will be provided to DER once final equipment selection has been completed.	The terminal limits of the Works Approval with regards to the design and construction specifications are those Works bound by the prescribed premises boundary. This excludes the sewage collection network within the residential subdivision. Deviations from the specification under Table 1.2.1 are approved where they are in accordance with Condition 1.2.2. Alternately a request for an amendment to the Works Approval can be considered. The infrastructure staging plan is understood to be in reference to the requirements of Works Approval Condition 1.2.5.
2) Infrastructure: Testing of all tanks, pipelines and conveyance infrastructure will be undertaken as part of the commissioning process to demonstrate they are impermeable and free from leaks and defects.	Based on the now inserted definition of 'commissioning' in the Works Approval, it is clarified that the testing for leaks and defects is not considered to be commissioning unless undertaken with sewage.
3) Infrastructure: Water West request an amendment revising the condition above to reflect that no material volumes of stormwater will be able to enter any sewage and treated wastewater storage treatment tanks, transfer pipelines and conveyance infrastructure.	Condition amended to clarify intent and ensure compliance can be determined, being to the effect: reword: '*Stormwater conveyance infrastructure must not direct stormwater into any* …'

4) Sewage network: Accepted excluding the proposed TN and TP parameters set out in (v.) and (vi.) noting the following: - Water West is committed to achieving the required nutrient export targets (as expressed in Clause 4(d) of Table 1.2.1 of the draft works approval conditions). - MDELI modelling is an industry recognised tool which has been used to demonstrate that wastewater nutrient loading will enable the export targets to be achieved - Water West has demonstrated through MDELI modelling that higher nutrient loadings than those proposed by DER (and also proposed by Water West) can be supported and should improve nutrient uptake and optimise plant growth. As such, Water West request an opportunity to review the MEDLI modelling and proposed parameters with the DER's technical representative(s) to demonstrate the appropriateness of the originally proposed targets and discuss the potential for seasonal optimisation of the loadings.	In consideration of the additional correspondence and addendum dated 15 February 2016 the treatment standards have been amended to 12 mg/ L and 4 mg/ L for total nitrogen and total phosphorus respectively. This is further addressed within this Decision Document. These values take into consideration the uncertainly regarding the specifications of the Application, the assumptions in the modelling and capacity to review and potentially amend the operation and regulatory controls for the irrigation of treated wastewater to land as more information and certainty become available.
5) Sewage network: Accepted, noting that the detailed design and a staging plan for the implementation of the scheme will be provided to the DER after equipment selection and that the mixer will be installed if required.	Reference to mixer has been deleted.
6) Sewage network: Accepted noting no chlorine gas (Clause (n)) will be used or stored on the premise. Chlorine in this context refers to Sodium Hypo Chloride which is used for disinfection purposes and will be stored in liquid form in accordance with the relevant Australian Standards.	Reference to chlorine gas has been deleted
7) Sewage network: Accepted noting that the flow balance tank and inflow balance tank are one in the same.	Reference to 'inflow' balance tank has been standardised to only refer to 'flow' balance tank.
8) Storage dams: Confirm rationale and requirement for a 2 metre vertical separation from groundwater levels noting: - Dams will be fuller in wetter months when water table is higher. - All planned maintenance would be carried out in dryer months.	Two meters separation is a standard value referred to in multiple jurisdictions. The Application is noted to not define the dam locations, construction specifications or how separation to groundwater will be managed. A lack of groundwater separation can impact the liner integrity (via osmosis) and structural stability. The separation distance has been amended to a minimum of 1.4 meters with additional supporting information provided in the Decision Document.
9) Storage dams: Accepted noting that either two or three storage dams will be constructed (dependant on site conditions). Total capacity will be at least 11ML (subject to any amendments determined by the updating of the water balance and/or MEDLI modelling). Water West will provide the specification of the proposed dam liner and the overall dam design to the DER for review.	The liner specifications are derived from the Department of *Water 2013, Water Quality Protection Note 26 Liners for containing pollutants, using synthetic membranes.* Deviation from these specifications is acceptable where is can be shown there is no increase in the risk to the environment and public health.

10) Irrigation system and irrigation area Accepted excluding Item (e), noting the following; - Export limits in clause (d) are accepted noting the point of assessment is at the edge of the proposed irrigation area buffer zones. - Irrigation design will be based upon the most up to date MEDLI modelling available. Water West wish to discuss the proposed PRI 5 value as part of the broader MEDLI modelling/nutrient management discussion.	Specification of the nutrient export limits have been removed and addressed within the Decision Documents in further detail. The nutrient export values are an operational parameter and fundamental to the design and construction of the Works. Final irrigation design specifications (actual) are expected to be provided and are essential to regulate the Premises operations. The irrigation area, being the point at which the nutrient export limits are considered to be applied, is inclusive of the irrigation area buffer area (land enclosed by the fence). The phosphorus retention index value is expected to be met be the insitu soils proposed for irrigation. A phosphorus retention capacity within the irrigation area soil profile is considered essential to reduce the risk of nutrient export particularly in times of low crop uptake or crop failure. The specification has been deleted on the basis that the: • Regulatory controls with respect to treated wastewater, the irrigation area and approach documented within this Decision Document; • The expected phosphorus retention capacity of the proposed irrigation area in situ non-Bassendean soils; and • The elevated likelihood that the absence of soils with phosphorus retention capacities within the irrigation area will result in additional regulatory controls being implemented based on the risk of nutrient export and potential that irrigation may not be approved; and
11) Groundwater monitoring bores: Accepted with the exception of item v.) which is contradictory to item ii.) Suggest this be revised to be simply bores must be at least 100m apart.	The condition set has been amended and reference to an updated plan within Schedule 1 of the Works Approval clarifies the regulatory requirements regarding the placement of groundwater monitoring bores.

12) Premises operation Water West request that the condition be amended to reflect: - Water West shall not commence commissioning until an operating licence is established, noting that the commissioning in this context relates to the commissioning of the plant with Raw sewage from the development. That DER will not unreasonably delay the transition from wet (water) commissioning to sewage commissioning and therefore the timeline for any approvals should reflect the transition between the two to be able to be achieved with a 48 hour period.	The regulatory control not approving commissioning or operation will be removed on the basis of the compliant establishment of the wastewater treatment system and granting of a licence with relevant regulatory controls. It is not clear what the final proposal or staged commissioning process proposed by Water West will be; therefore the exact format of the regulatory controls cannot be defined at this stage. It is likely that stage commissioning, operation and ongoing works will be regulated under the licence. Issue of a new instrument (the licence) becomes effective on a Monday due to administrative requirements; subject to timely application and processing of a defined operational and commissioning approach the transition period should be achievable.
13) Baseline monitoring data Accepted noting that commencement of the sampling may be undertaken prior to the application of the fill to the irrigation area.	The in situ environmental variability is expected to outweigh any variability/ influence from the unspecified addition of fill to the irrigation area. This factor is not specified by the regulatory control.

Appendix F

Nutrient irrigation details

The following nutrient irrigation details will be required to assess the risk of the irrigation scheme with sufficient confidence:

(1) A conceptual site model, wastewater source and treatment prior to application and treated wastewater application method.

(2) Identification of key factors which will ensure that the following nutrient export limits are not exceeded:
   (a) Total phosphorus of 0.3 kg/ ha/ year; and
   (b) Total nitrogen of 2.4 kg/ ha/ year.

(3) A description of the irrigation area which includes:
   (a) The defined irrigation area and wastewater application area including:
      (i) the location, including Global Position System coordinates in UTM (Universal Transverse Mercator) MGA (Map Grid of Australia) Zone 50 of the boundaries;
      (ii) the size/ area and perimeter measurements; and
      (iii) a topographic description.
   (b) A detailed description of the irrigation area soil profile and properties:
   (c) A detailed description of the irrigation area groundwater profile and properties, including:
      (i) direction and rate of groundwater flow; and
      (ii) seasonal variability in groundwater depth/ levels and quality.

(4) Identification of irrigation area process controls:
   (a) Treated wastewater application (irrigation) regime including:
      (i) final treated wastewater quality monitoring regime;
      (ii) treated wastewater application methods, rates of application (mm/ hour) and duration of applications (cycles per day, minutes per cycle and cycles per crop season);
      (iii) treated wastewater application quantity and quality limits;
      (iv) details of the relationship between nutrient application, plant uptake, evapotranspiration rates and how application is matched to uptake;
      (v) controls to avoid runoff, excessive water table mounding and nutrient leaching; and
      (vi) detail the use of any lysimeters and/ or soil moisture probes.
   (b) Critical control, stop point and contingency actions for:
      (i) treated wastewater quality limits to the irrigation application including treated wastewater quality;
      (ii) soil parameter limits to irrigation application including soil moisture levels; and
      (iii) groundwater parameter limits to irrigation application including groundwater levels and groundwater parameter quality.
   (c) Details of the cropping regime, including:
      (i) definition of the crop species, any rotational areas, harvest rates and monitoring of yields, and crop failure contingencies;
      (ii) definition of the crop health monitoring and maintenance program; and
      (iii) demonstrate harvest rates equivalent to or greater than a yield of 4000 kg/ha/ year of Lucerne.
   (d) A soil profile maintenance schedule.
   (e) Define critical control, stop point and contingency actions for meteorological limits to irrigation application for each of the following parameters:
      (i) Wind speed (m/sec);
      (ii) Relative humidity (%); and
      (iii) Rainfall (mm/ hour).

(5) Details of the soil monitoring program.

(6) Details of the groundwater monitoring program.