



## Application for Works Approval

### Part V Division 3 of the *Environmental Protection Act 1986*

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**Works Approval Number** W6807/2023/1

**Applicant** Water Corporation

**ACN** 28 003 434 917

**File number** DER2023/000233

**Premises** Toodyay Water Resource Recovery Facility (WRRF)  
211 Goomalling-Toodyay Road  
NUNILE WA 6566

Legal description  
Lot 501 on Deposited Plan 33954  
Certificate of Title Volume 2536 Folio 30  
As defined by the premises maps in Schedule 1 and the  
coordinates in Schedule 2 of the works approval

**Date of report** 31 August 2023

**Decision** Works approval granted

#### **MANAGER WASTE INDUSTRIES REGULATORY SERVICES**

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

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## 1. Decision summary

This decision report documents the assessment of potential risks to the environment and to public health from emissions and discharges during the construction and operation of the premises. As a result of this assessment, works approval W6807/2023/1 has been granted.

## 2. Scope of assessment

### 2.1 Regulatory framework

In completing the assessment documented in this decision report, the Department of Water and Environmental Regulation (the department; DWER) has considered and given due regard to its regulatory framework and relevant policy documents which are available at <https://dwer.wa.gov.au/regulatory-documents>.

### 2.2 Application summary and overview of premises

On 31 March 2023, the Water Corporation (the applicant) applied for a works approval to the department under section 54 of the *Environmental Protection Act 1986* (EP Act).

The application is for the construction of a Vertical Flow (VF) Treatment Wetlands System for wastewater treatment as part of a research and development project trial, partnered by the Water Corporation and Murdoch University, at the existing registered Toodyay Water Resource Recovery Facility (WRRF) R1264/1998/1. The premises is located approximately 3.8 km north-east of the town of Toodyay.

Wastewater is currently treated onsite via a facultative and maturation pond prior to being transferred to a storage dam, 37 ML in capacity. From the filtration pond, the water is filtered and chlorinated before being used to irrigate a woodlot onsite.

The VF Treatment Wetlands System will be a two stage 'French Style' wetlands system. Stage 1 will be for primary treatment of the wastewater using three parallel cells, 50 m<sup>2</sup> each, with the main filtering layer consisting of gravel. Solids will be removed prior to entering the cells via a coarse bar screen and the wastewater will be alternately batch fed into the cells by a dosing siphon. Only one cell will be fed at a time, while the others rest to allow for sludge degradation. Stage two will be for the secondary treatment of the wastewater from the stage one cells (and from the existing maturation pond) and will comprise of two parallel cells, 49 m<sup>2</sup> each, with the main filtering layer consisting of sand. A second dosing siphon will be used to deliver the effluent to the cells. Feeding of the cells will alternate, with one cell in operation while the other rests.

The VF Treatment Wetlands System Trial has two main objectives:

1. to demonstrate the ability of the VF wetlands to treat raw screened wastewater to secondary effluent quality, suitable for reuse or discharge, and to produce sludge/biosolids that meet land application criteria (stage one); and
2. to demonstrate the ability of single stage VF wetlands to enhance final treated wastewater quality (stage 2).

Treated effluent from the VF Treatment Wetlands will either be recirculated back to the first stage or second stage VF wetlands or discharged to the 37 ML storage dam. In the storage dam it will combine with effluent from WRRF ponds for evaporation or it will be used for woodlot irrigation after going through a filtration and disinfection tertiary treatment process.

Native wetland plant species able to maintain porosity through the accumulated sludge and sediment layer are proposed to be used. These may include:

- *Baumea articulata* (Jointed Twig Rush)
- *Baumea juncea* (Bare Twig Rush)
- *Carex appressa* (Tall Sedge)
- *Cyperus alterniflorus* (Umbrella Flat Sedge)
- *Ficinia nodosa* (knotted Club Rush)
- *Juncus pallidus* (Pale Rush)
- *Schoenoplectus Validus* (River Club Rush)

No changes are proposed to the capacity of the existing treatment plant. The trial VF Treatment Wetlands are proposed to be operated in parallel with the existing ponds for a minimum of 3 years and will not interfere with the current processes at the plant. The proposed trial VF wetland system proposes to treat an average wastewater flow of 10m<sup>3</sup>/day (approximately 15-16% of flows to the WRRF). Upon completion of the trial, the VF wetlands will be decommissioned and removed from the premises.

The premises relates to the category and assessed design capacity under Schedule 1 of the *Environmental Protection Regulations 1987* (EP Regulations) which are defined in works approval W6807/2023/1. The infrastructure and equipment relating to the premises category and any associated activities which the department has considered in line with *Guideline: Risk Assessments* (DWER 2020) are outlined in works approval W6807/2023/1.

## 2.3 Targets for the final quality of treated effluent

A recycled Water Scheme Approval (Approval No. G19/00000) was granted by the Department of Health on 19 December 2014 for the use of recycled water from the Toodyay WRRF to irrigate 3.5 Ha of a 55 Ha woodlot on site. The approval specifies the following limits for *E.coli* and pH for the recycled water:

**Table 1: Final treated effluent quality requirements for woodlot irrigation**

Parameter	Compliance Value
<i>E.coli</i>	<10,000 cfu/100 mL
pH	6.0 – 9.0

The limits in Table 1 continue to apply with the introduction of recycled water from the VF wetlands trial for irrigation of the woodlot.

The target limits which have been set for the final treated effluent quality for other parameters for the trial are shown in Table 2.

**Table 2: Final treated effluent quality target**

Parameter	Target
Biochemical oxygen demand (BOD)	<30 mg/L
Total Suspended Solids (TSS)	<30 mg/L
Total Nitrogen (TN)	<35 mg/L

Parameter	Target
Total Kjeldahl Nitrogen (TKN)	<15 mg/L
Total Phosphorus (TP)	No target (10-25% removal expected)
Sludge quality	No target (>20% total solids expected)

### 3. Risk assessment

The department assesses the risks of emissions from prescribed premises and identifies the potential source, pathway and impact to receptors in accordance with the *Guideline: Risk Assessments* (DWER 2020).

To establish a risk event there must be an emission, a receptor which may be exposed to that emission through an identified actual or likely pathway, and a potential adverse effect to the receptor from exposure to that emission.

#### 3.1 Source-pathways and receptors

##### 3.1.1 Emissions and controls

The key emissions and associated actual or likely pathway during construction and operation of the VF wetlands which have been considered in this decision report are detailed in Table 3 below. Table 3 also details the control measures the applicant has proposed to assist in controlling these emissions, where necessary.

**Table 3: Proposed applicant controls**

Emission	Sources	Potential pathways	Proposed controls
<b>Construction</b>			
Dust	<p>Construction of the VF wetlands</p> <p>Vehicle movements on unsealed roads, operation of mobile plant, excavation, and movement and stockpiling of soil.</p>	Air/windborne pathway	<ul style="list-style-type: none"> <li>• Nearest sensitive receptor is located appx. 800 m away.</li> <li>• A CEMP will be prepared prior to construction.</li> <li>• Hardstand areas will be created around infrastructure areas.</li> <li>• Visual inspections of dust plumes/emissions onsite will be undertaken during construction works to ensure that dust control measures are implemented and effective.</li> <li>• Wetting/dust suppression of unsealed surfaces using benign dust suppressants will be used on disturbed areas as required.</li> <li>• Weather forecasts will be checked daily, high risk weather conditions will be monitored, and addition dust suppressant will be used if required.</li> <li>• Speed limit onsite will be adhered to.</li> </ul>

Emission	Sources	Potential pathways	Proposed controls
Noise			<ul style="list-style-type: none"> <li>• Works will be conducted in accordance with the <i>Environmental Protection (Noise) Regulations 1997</i>;</li> <li>• Vehicles and equipment will be fitted with appropriate noise controls;</li> <li>• All plant, equipment and vehicles will be regularly inspected and maintained.</li> <li>• Works will be conducted in accordance with AS2436-2010.</li> <li>• All noise impacts during construction will be detailed in a CEMF/CEMP prior to construction works, including contingency measures, dealing with noise complaints and exceedances of assigned noise levels, and measures taken to reduce excessive noise.</li> <li>• Construction work is not expected to occur at night.</li> </ul>
Uncontrolled discharge of chemicals to land	<p>Chemical storage: Accidental spills or loss of containment</p> <p>During transfer of chemicals to/from storage containers</p> <p>Fuel/oil leaks from vehicles and machinery</p>	Overland flow and infiltration to soil and groundwater	<ul style="list-style-type: none"> <li>• A CEMP will be prepared prior to construction and will document the emergency response procedure for uncontrolled release of wastewater.</li> <li>• Spill kits, containment and recovery equipment, operator instructions/emergency procedure guides for the management of waste and chemicals will be available onsite to respond to any spills.</li> <li>• Spill response equipment will be readily accessible in areas where hazardous materials are stored.</li> <li>• All hazardous chemicals and hydrocarbons will be stored in appropriately bunded areas compliant with AS1940 and AS192 to contain spills/leaks.</li> <li>• All waste products will be stored in appropriate rubbish bins (recycling, putrescible and hydrocarbon waste will be placed in separate bins, removed offsite at regular intervals and disposed of at a licensed landfill facility.</li> <li>• Fuel will be stores within self-bunded tanks.</li> <li>• All semi-mobile equipment will be fitted with a spill kit.</li> <li>• All staff and contractors involved in the handling of hazardous chemicals and fuels will be suitable trained.</li> </ul>

Emission	Sources	Potential pathways	Proposed controls
			<ul style="list-style-type: none"> <li>Scheduled maintenance and servicing of equipment and vehicles is to be conducted offsite as per manufacturer's specifications.</li> <li>Any spills will be controlled, contained and cleaned up in accordance with a Spill Management Procedure.</li> <li>Hardstand areas created will be sufficiently graded and bunded to contain spills or accidental discharges to land/waters.</li> <li>Hydrocarbon and chemical storage areas will be inspected on a regular basis. Spill kits will be inspected on a regular basis and replenished as required.</li> </ul>
Windblown waste from packaging materials	Unpackaging of materials associated with construction works	Air/windborne pathway	<ul style="list-style-type: none"> <li>Waste materials will be collected in skip bins in dedicated waste storage areas onsite and disposed of at an appropriate licensed landfill facility or reused where possible.</li> <li>All waste will be removed from the development area at the completion of works.</li> </ul>
<b>Operation</b>			
Noise	Operation of VF wetlands	Air/windborne pathway	<ul style="list-style-type: none"> <li>Noise impacts are expected to be low due to distance from nearest residential premises and the system being located in a rural area.</li> </ul>
Odour	Operation of VF wetlands		<ul style="list-style-type: none"> <li>Proposed VF wetland system unlikely to create a new source or pathway to odours as it does not involve any significant structural modifications of the current design/footprint.</li> </ul>
Windblown waste	Production of solid waste consisting of screenings (rags, plastic, sticks) from the operation of the VF wetlands.	Air/windborne pathway	<ul style="list-style-type: none"> <li>All solid waste produced will be bagged and collected in skip bins in dedicated waste storage areas onsite and disposed of to an appropriate licensed landfill facility.</li> </ul>
Treated wastewater containing contaminants (e.g. nutrients, pathogens, metals)	Failure of VF wetland system (blockage, burst pipe, loss of liner integrity, significant rainfall event)	Overland flow to land and subsurface seepage	<ul style="list-style-type: none"> <li>All tanks will be fitted with overflow pipes leading to wetland cells.</li> <li>The inlet tank will be fitted with a high-level alarm and automatic flow shut off.</li> <li>In case of shut off failure, overflows from wetlands will be directed to the Storage</li> </ul>

Emission	Sources	Potential pathways	Proposed controls
			<p>Dam along with treated effluent.</p> <ul style="list-style-type: none"> <li>Stage 1 wetland cells will have 0.3 m freeboard, offering 4.5 days worth of storage and Stage 2 cells will provide an additional 2 days worth of storage.</li> <li>Flows to the wetland project area will remain off until malfunctioning is rectified.</li> </ul>
<p>Raw screened wastewater containing contaminants (e.g. nutrients, pathogens, metals)</p>	<p>Failure of VF wetland system (blockage, burst pipe, loss of liner integrity, significant rainfall event)</p> <p>Chemical storage: Accidental spills or loss of containment</p>		<ul style="list-style-type: none"> <li>Inlet to the Stage 1 VF wetlands to include a flow control standpipe and a mesh screen to remove rags and gross solids from the wastewater to prevent clogging of downstream distribution pipes.</li> <li>1.5 mm thick HDPE liner will line the wetland and be wrapped in geotextile to protect the liner.</li> <li>Inlet pipe from existing pressure main to primary screen tank will be the only pressurised pipe. Other pipes are no pressurised and at a lower risk of bursting.</li> </ul>
<p>Uncontrolled discharge of chemicals to land</p>	<p>Fuel/oil leaks from vehicles and machinery</p>		<ul style="list-style-type: none"> <li>All chemicals will be stored in purpose built areas that comply with AS3780: the storage and handling of corrosive substances. This includes hardstands and bunds capable of containing a major failure of storage tanks.</li> <li>Water Corporation has procedures and training in place for the use and handling of chemicals and maintenance regimes for bund and associated control equipment.</li> <li>Spill response equipment will be readily accessible in areas where hazardous materials are stored.</li> <li>All hazardous chemicals and hydrocarbons will be stored in appropriately bunded areas compliant with AS1940 and AS192 to contain spills/leaks.</li> <li>All waste products will be stored in appropriate rubbish bins (recycling, putrescible and hydrocarbon waste will be placed in separate bins, removed offsite at regular intervals and disposed of at a licensed landfill facility.</li> <li>Fuel will be stores within self-bunded tanks.</li> <li>All semi-mobile equipment will be fitted with a spill kit.</li> <li>All staff and contractors involved in the</li> </ul>



Emission	Sources	Potential pathways	Proposed controls
			<p>handling of hazardous chemicals and fuels will be suitable trained.</p> <ul style="list-style-type: none"> <li>Scheduled maintenance and servicing of equipment and vehicles is to be conducted offsite as per manufacturer's specifications.</li> <li>Any spills will be controlled, contained and cleaned up in accordance with a Spill Management Procedure.</li> <li>Hardstand areas created will be sufficiently graded and bunded to contain spills or accidental discharges to land/waters.</li> <li>Hydrocarbon and chemical storage areas will be inspected on a regular basis.</li> <li>Spill kits will be inspected on a regular basis and replenished as required.</li> </ul>
Use of treated effluent from VF wetlands trial to water onsite woodlot	Use of treated effluent from VF wetlands trial to water onsite woodlot	Subsurface seepage through soils to groundwater	<ul style="list-style-type: none"> <li>Target effluent quality parameters set for water used for woodlot irrigation.</li> <li>Recycled water from VF wetlands is mixed with water from WRRF and is further treated via filtration and chlorination prior to irrigation.</li> </ul>
Mosquitoes and other pests	Stagnation of water leading to the attraction of pests, due to the wetland system not functioning correctly	Air and land via animals and pests	<ul style="list-style-type: none"> <li>No open water should be available for mosquito breeding as flow in the VF wetlands is sub-surface.</li> <li>Mosquito mesh caps are fitted to breather pipes that rise along the batters of the cell above the top water level.</li> </ul>

### 3.1.2 Receptors

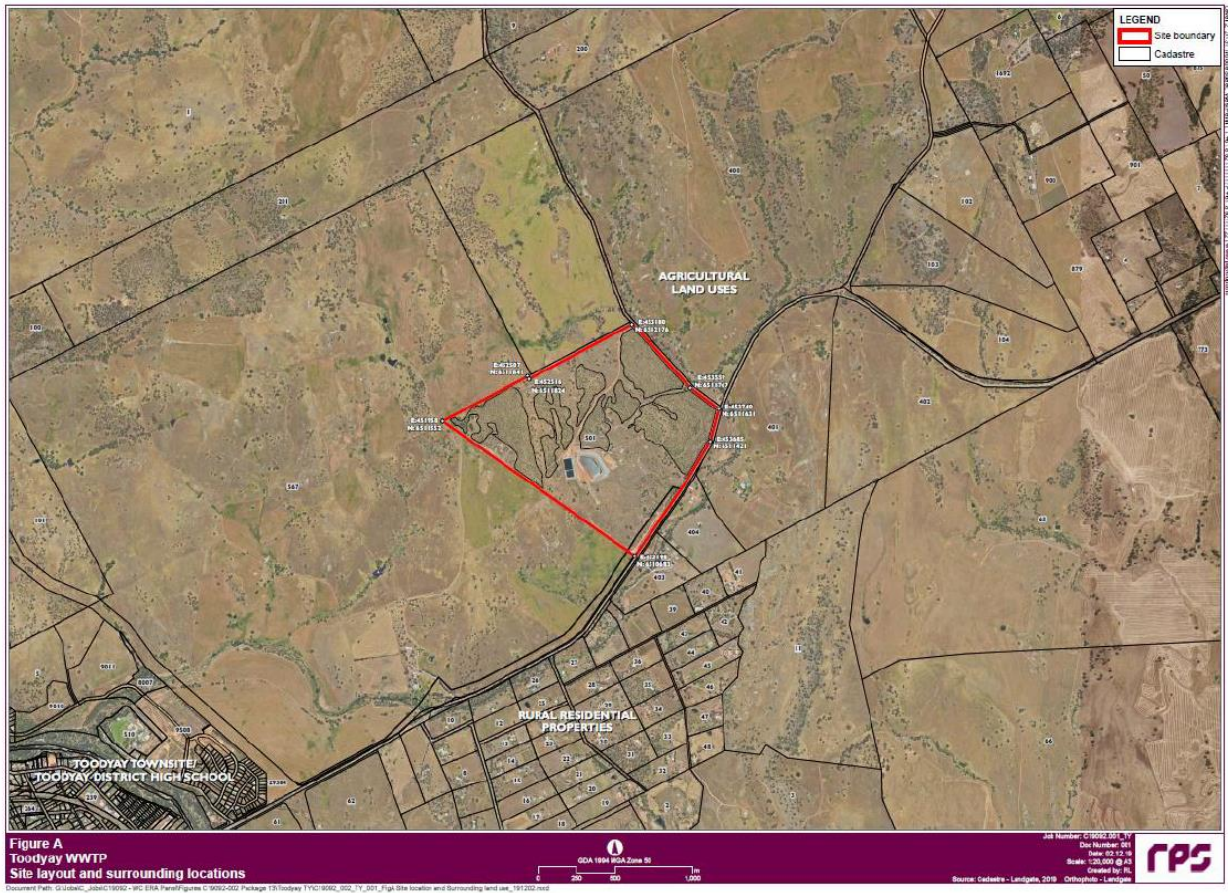
In accordance with the *Guideline: Risk Assessment* (DWER 2020), the Delegated Officer has excluded the applicant's employees, visitors, and contractors from its assessment. Protection of these parties often involves different exposure risks and prevention strategies, and is provided for under other state legislation.

Table 4 and Figure 1 below provides a summary of potential human and environmental receptors that may be impacted as a result of activities upon or emission and discharges from the prescribed premises (*Guideline: Environmental Siting* (DWER 2020)).

**Table 4: Sensitive human and environmental receptors and distance from prescribed activity**

Human receptors	Distance from prescribed activity
Agricultural properties (grain and livestock farms, small hobby farms)	Directly adjoining the premises boundaries in all directions.

Residential premises	<p>Closest houses on rural properties are appx. 520 m south-east, 310 m east/south-east, and 420 m south of the premises boundary. Closest house is approximately 1 km from the proposed VF wetland project.</p> <p>Residential premises located in the town of Toodyay (appx. 2.5 km south-west of the premises)</p>
<b>Environmental receptors</b>	<b>Distance from prescribed activity</b>
<p>Surface water:</p> <p>The Boyagerring Brook (potential groundwater aquatic and terrestrial ecosystem)</p> <p>Avon River (potential aquatic groundwater dependent ecosystem)</p> <p>Avon River Catchment Area (proclaimed RIWI Act Surface Water Area)</p>	<p>Runs parallel along the north-eastern and south-eastern premises boundaries. The most northern point of the premises boundary is approximately 65 m from the Boyagerring Brook.</p> <p>A tributary of the Boyagerring Brook begins appx. 600m north-west of the premises boundary and the most western point of the premises boundary is appx. 130m from this water line.</p> <p>Appx 3.5 km south of the premise boundary</p> <p>Within the premises boundary</p>
Underlying groundwater	<p>The Water Corporation Operational Data Storage System (ODSS) dataset for the site indicates a groundwater salinity of approximately 620mg/L, classifying the water as “marginal” according to the Australian Water Resources Council (AWRC 1988)</p> <p>Groundwater flow beneath the site is predicted to follow the topography of the site. The topography is highest west/north-west of the existing WWTP and groundwater flow is inferred to flow in a south-east direction from this point towards Boyagerring Brook (Cardno 2022).</p> <p>Historical groundwater data suggests that groundwater is between 2-12 mbgl (Cardno 2022)</p>
<p>Threatened Fauna</p> <p><i>Calyptorhynchus banksia subsp. Naso</i> (Forest Red-tailed Black Cockatoo)</p> <p><i>Dasyurus geoffroii</i> (Western Quoll)</p>	<p>Appx. 1 km south of premises boundary</p> <p>Appx. 340 m west of premises boundary</p>
<p>Threatened Ecological Communities:</p> <p>Eucalypt Woodlands of the WA Wheatbelt</p>	<p>Within 100 m of the premises boundary</p>



**Figure 1: Distance to sensitive receptors**

## 3.2 Risk ratings

Risk ratings have been assessed in accordance with the *Guideline: Risk Assessments* (DWER 2020) for each identified emission source and takes into account potential source-pathway and receptor linkages as identified in Section 3.1. Where linkages are in-complete they have not been considered further in the risk assessment.

Where the applicant has proposed mitigation measures/controls (as detailed in Section 3.1), these have been considered when determining the final risk rating. Where the delegated officer considers the applicant's proposed controls to be critical to maintaining an acceptable level of risk, these will be incorporated into the works approval as regulatory controls.

Additional regulatory controls may be imposed where the applicant's controls are not deemed sufficient. Where this is the case the need for additional controls will be documented and justified in Table 5.

Works approval W6807/2023/1 that accompanies this decision report authorises construction and initial operations of the VF wetland cell trial. The conditions in the issued works approval, as outlined in Table 5 have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

**Table 5: Risk assessment of potential emissions and discharges from the premises during construction and operation**

Risk events					Risk rating <sup>1</sup> C = consequence L = likelihood	Applicant controls sufficient?	Conditions <sup>2</sup> of works approval	Justification for additional regulatory controls
Sources / activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls				
<b>Construction</b>								
Construction of the VF wetlands	Dust	Air/windborne pathway causing impacts to health and amenity	Rural residences 520 m south-east, 310 m east/south-east, and 420 m south of the premises boundary	Refer to Section 3.1	C = Slight L = Unlikely <b>Low Risk</b>	Y	Condition 1, 2, 7	N/A
Vehicle movements on unsealed roads, operation of mobile plant, excavation, and movement and stockpiling of soil.	Noise				C = Minor L = Unlikely <b>Medium Risk</b>	Y	Condition 1, 2	N/A
Chemical storage: Accidental spills or loss of containment Fuel/oil leaks from vehicles and machinery	Uncontrolled discharge of chemicals to land	Overland flow and infiltration to soil and groundwater causing ecosystem disturbance, degradation to groundwater quality and impacts to downgradient receptors	Avon River Catchment Area Boyagerring Brook Beneficial uses of groundwater Down-gradient groundwater dependent ecosystems	Refer to Section 3.1	C = Minor L = Unlikely <b>Low Risk</b>	Y	Condition 1, 9	N/A
Unpackaging of materials associated with construction works	Windblown waste from packaging materials	Air/windborne pathway causing impacts to amenity and ecosystem disturbance	Rural residences 520 m south-east, 310 m east/south-east, and 420 m south of the premises boundary  Threatened fauna	Refer to Section 3.1	C = Slight L = Unlikely <b>Low Risk</b>	N	Condition 1 <b>Condition 8</b>	The Delegated Officer finds the controls proposed by the licence holder to be appropriate to control windblown waste. However, the Delegated Officer considers it appropriate to specify a frequency for collection of windblown waste in addition to licence holder controls.

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Risk events					Risk rating <sup>1</sup> C = consequence L = likelihood	Applicant controls sufficient?	Conditions <sup>2</sup> of works approval	Justification for additional regulatory controls
Sources / activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls				
<b>Operation</b>								
Operation of VF wetlands	Odour	Air/windborne pathway causing impacts to health and amenity	Rural residences 520 m south-east, 310 m east/south-east, and 420 m south of the premises boundary	Refer to Section 3.1	C = Minor L = Unlikely <b>Low Risk</b>	Y	Condition 5, 15	N/A
	Noise			Refer to Section 3.1	C = Minor L = Unlikely <b>Low Risk</b>	Y	Condition 15	N/A
Production of solid waste consisting of screenings (rags, plastic, sticks) from the operation of the VF wetlands	Windblown waste	Air/windborne pathway causing impacts to amenity and ecosystem disturbance	Rural residences 520 m south-east, 310 m east/south-east, and 420 m south of the premises boundary  Threatened fauna	Refer to Section 3.1	C = Slight L = Unlikely <b>Low Risk</b>	N	<b>Condition 8</b>	The Delegated Officer finds the controls proposed by the licence holder to be appropriate to control windblown waste. However, the Delegated Officer considers it appropriate to specify a frequency for collection of windblown waste in addition to licence holder controls.
Failure of VF wetland system (blockage, poor plant condition/insufficient plants, loss of integrity of liner, significant rainfall event)	Treated wastewater containing contaminants (eg. Nutrients, pathogens, metals)	Discharge to land and subsurface seepage causing contamination of soil, degradation of groundwater quality and impacts to downgradient receptors	Avon River Catchment Area  Boyagerring Brook	Refer to Section 3.1	C = Moderate L = Unlikely <b>Medium Risk</b>	N	<b>Condition 3, 4, 5, 6, 15, 18, 19, 20</b>	The Delegated Officer considers that the applicant's proposed controls are generally sufficient. However, additional regulatory controls are required due to the applicant not providing detailed liner technical specifications and a Construction Quality assurance Plan for the works.
	Raw screened wastewater containing		Beneficial uses of groundwater	Refer to Section 3.1	C = Moderate L = Unlikely	N	<b>Condition 3, 4, 5, 6, 15, 18, 19, 20</b>	The Delegated Officer has determined to specify the

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Risk events					Risk rating <sup>1</sup> C = consequence L = likelihood	Applicant controls sufficient?	Conditions <sup>2</sup> of works approval	Justification for additional regulatory controls
Sources / activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls				
	contaminants (eg. Nutrients, pathogens, metals)		Down-gradient groundwater dependent ecosystems		<b>Medium Risk</b>			<p>minimum requirement and quality assurance that must be undertaken for the works as regulatory conditions.</p> <p>The Delegated Officer also considers the maintenance of wetland plants to be essential for the successful operation of the VF wetland system. Therefore, regulatory controls have been included in the works approval for the monitoring and maintenance of wetland plants. The Delegated Officer considers the monitoring detailed in Table 7 of Monash University's <i>Vegetation guidelines for stormwater biofilters in the south-west of Western Australia</i> suitable for the VF wetlands and some of the points to check have been included within Condition 18 of the licence.</p>
Use of treated effluent from VF wetlands trial to water onsite woodlot	Treated effluent containing contaminants (e.g., Nutrients, pathogens, metals)			Refer to Section 3.1	C = Slight L = Unlikely <b>Low Risk</b>	N	<b><u>Condition 17, 19, 20</u></b>	The Delegated Officer considers it reasonable to require the licence holder to monitor the quality of treated effluent from the VF wetland cells and the quality of treated effluent used in irrigation of the woodlot on site. This will allow for data to be collected on the performance of the VF wetland trial.
Chemical storage: Accidental spills or loss of containment Fuel/oil leaks from vehicles and machinery	Uncontrolled discharge of chemicals to land			Refer to Section 3.1	C = Minor L = Unlikely <b>Low Risk</b>	Y	Condition 9	N/A

Risk events					Risk rating <sup>1</sup> C = consequence L = likelihood	Applicant controls sufficient?	Conditions <sup>2</sup> of works approval	Justification for additional regulatory controls
Sources / activities	Potential emission	Potential pathways and impact	Receptors	Applicant controls				
Failure of VF wetland system resulting in stagnation of water	Mosquitoes and other pests	Air and land via animals and pests, causing impacts to health and amenity	Rural residences 520 m south-east, 310 m east/south-east, and 420 m south of the premises boundary	Refer to Section 3.1	C = Moderate L = Rare <b>Medium Risk</b>		Condition 5 <b><u>Conditions 15, 18, 19, 20</u></b>	The Delegated Officer considers that the applicant's proposed controls are generally sufficient. However, additional regulatory controls are required to ensure that wetland plants are maintained in good condition, at appropriate densities, and do not block inlets, outlets, or wastewater flows, which may result in stagnation of water.

Note 1: Consequence ratings, likelihood ratings and risk descriptions are detailed in the *Guideline: Risk Assessments* (DWER 2020).

Note 2: Proposed applicant controls are depicted by standard text. **Bold and underline text** depicts additional regulatory controls imposed by department.



## 4. Consultation

Table 6 provides a summary of the consultation undertaken by the department.

**Table 6: Consultation**

Consultation method	Comments received	Department response
Application advertised on the department's website on 6 June 2023	None received	N/A
Local Government Authority advised of proposal on 7 June 2023	3 July 2023 Refer to Appendix 1	Refer to Appendix 1
Department of Health (DOH) advised of proposal on 7 June 2023	Comments received on 22 June 2023 Refer to Appendix 1	Refer to Appendix 1
Applicant was provided with draft documents on 21 July 2023	Comments received on 18 August 2023 Refer to Appendix 2	Refer to Appendix 2

## 5. Conclusion

Based on the assessment in this decision report, the delegated officer has determined that a works approval will be granted, subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

## References

1. Cardno (WA) Pty Ltd 2022, *Environmental Site Assessment: Toodyay Wastewater Treatment Plant*, West Perth, Western Australia
  2. Department of Environment Regulation (DER) 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
  3. Department of Health (DOH) 2011, *Guidelines for the Non-potable Uses of Recycled Water in Western Australia*, Perth, Western Australia
  4. Department of Water and Environmental Regulation (DWER) 2020, *Guideline: Environmental Siting*, Perth, Western Australia.
  5. DWER 2020, *Guideline: Risk Assessments*, Perth, Western Australia.
  6. Monash University 2014, *Vegetation guidelines for stormwater biofilters in the south-west of Western Australia*, Clayton, Victoria
  7. Water Corporation 2014, *Nutrient and Irrigation Management Plan (NIMP) Irrigation of a Woodlot (Acacia/Casuarina hosts for Sandalwood) using Treated Wastewater (TWW) near Toodyay, Western Australia*, Western Australia
- Water Corporation 2022, *Toodyay WWTP – Vertical Flow Treatment Wetland Trial – Concept Design Report*, Western Australia

## Appendix 1: Summary of submissions received

Concern or comment	Department's response
<p><b>Department of Health (DoH)</b></p> <p>DoH advised that they supported the proposal subject to the following conditions:</p> <ul style="list-style-type: none"> <li>• The vertical flow wetland trial being operated for no more than 3 years, after which time it shall be decommissioned and removed from the Toodyay Wastewater Recovery and Reuse Facility (WRRF) site.</li> <li>• Water quality objectives associated with an 'extra low' exposure risk recycled water end use, as outlined in Recycled Water Scheme Approval G19/00000 (which is attached with this letter for ease of reference), shall be met post storage dam filtration and chlorination.</li> <li>• The wetland system shall be lined with an impervious HDPE (or equivalent) liner to prevent seepage to groundwater in accordance with <i>Water Quality Protection Note 26: Liners for containing pollutants, using synthetic membranes (Government of Western Australia 2013)</i>. The Department of Water and Environmental Regulation (DWER) should also consider a minimum separation distance between the base of the wetland system and maximum known groundwater level to prevent interaction with groundwater, though groundwater levels for the subject site are not referenced within the works approval application.</li> <li>• It is recommended a certificate of compliance be submitted to DWER that demonstrates that the media supplied for the Stage 2 main filtration layer has an effective particle size (d10) of 0.25-0.4mm and a uniformity coefficient (Uc) of &lt;5 as proposed, and as determined by <i>AS 1289.3.6.1:2009 Methods of testing soils for engineering purposes Soil classification tests - Determination of the particle size distribution of a soil - Standard method of analysis by sieving</i>. This is to mitigate the risk of clogging from use of media which does not meet this specification.</li> <li>• The wetland system shall be operated in a manner which prevents scouring (which can cause filter damage) or excessive surface ponding (which can create an open water body for mosquito breeding) of the filter beds.</li> <li>• A minimum level of freeboard shall be maintained within the wetland system in accordance with the proposal for water retention and sludge accumulation (500mm is proposed for stage 1 and 300mm for stage 2).</li> <li>• Overflow from the wetland system should be confirmed to be directed towards the WRRF storage dam by means of gravity.</li> <li>• In the event of a significant wetland system failure there shall be a mechanism in place which shuts off wastewater flow to the wetland system and diverts all incoming flows to the pond treatment system until the fault is remediated.</li> <li>• Suitable permitter fencing to be installed around the wetland system to prevent unauthorised access.</li> <li>• There should be a process in place which allows for the safe removal of any excessive sludge which accumulates on the filter beds. It is not clear from the proposal how this will be achieved.</li> </ul>	<p>DoH's conditions have been included as conditions within the Works Approval apart from limiting the operation of the vertical flow wetland trial to no more than 3 years.</p> <p>The Water Corporation have requested a minimum of 3 years for the operation of the trial and expect it to run for a maximum of 10 years.</p> <p>The Delegated Officer considers it appropriate for the works approval to have a duration of 5 years. This will provide time for construction of the trial wetlands and allow an initial operating period for the collection of water quality monitoring and system performance data.</p> <p>Upon expiry of the Works Approval, operation of the wetland trial may occur under the existing Registration for the premises (based on the design capacity for the prescribed premises remaining below 100 m<sup>3</sup> per day).</p> <p>The Department requires site closure investigations to be undertaken upon closure of prescribed premises to ensure that there are no ongoing risks to public health or the environment from the activities undertaken on the premises. The decommissioning and removal of the Vertical Flow Treatment wetlands will be included as a part of this process.</p>

Works approval: W6807/2023/1

Concern or comment	Department's response
<p><b>Shire of Toodyay</b></p> <p>The proposal is consistent with the objective of the Shire of Toodyay's <i>Strategic Community Plan – Toodyay 2028</i> to ensure sustainable operating practices. Additionally, the Shire's <i>Environmental Management Strategy</i> seeks to promote improved management of natural resources on privately held lands.</p> <p>Under a local planning scheme, section 6 bodies carrying out a public work do not need approval to commence development. However, they must comply with the requirements of section 6(2) and (3) of the <i>Planning and Development Act 2005</i> by having due regard to:</p> <p>(a) the purpose and intent of any planning scheme that has effect in the locality where, and at the time when, the right is exercised; and</p> <p>(b) the orderly and proper planning, and the preservation of the amenity, of that locality at that time; and</p> <p>(c) any advice provided by the responsible authority in the course of the consultation required under subsection (3) in respect of the exercise of the right.</p> <p>In this instance, the Shire of Toodyay considers that the proposed development is likely to provide improved outcomes – albeit in a limited trial, by utilising innovative methods. It is noted that the proposed VF wetlands construction and operation will not create a new source or pathway for odour impacts which are considered to be the most likely impact on local amenity. Additionally, it is noted that potential impacts associated with construction activities including noise, odour emissions, light emissions, dust, unintended discharges and waste can be adequately mitigated and managed to ensure the risk of impact to nearby sensitive receptors is low.</p> <p>Residual operational risks of the VF wetlands are considered to be low or no risk for the potential impacts to the environment, human health and amenity with identified incomplete Source-Pathway-Receptor linkages or adequate mitigation or management measures in place to reduce residual risk.</p>	<p>The Shire of Toodyay's comments are noted.</p>

## Appendix 2: Summary of applicant’s comments on risk assessment and draft conditions

Condition	Applicant’s comment	Department’s response
<p>Condition 15, Table 3, item 3 (g)</p> <p><i>“Each cell must only be operated for a maximum of 3.5 days at a time and allowed a minimum of 7 days to rest between operating periods.”</i></p>	<p>This is the recommended operation in temperate climates (regional France), in tropical and subtropical climates loading periods can increase and resting periods decrease. The loading and resting regime can also be adjusted according to season (temperature). An objective of the research is to prove the loading boundaries of the system so that both design and operational parameters can be optimised to WA conditions, using WA native plants. This is an Australian first in terms of R&amp;D. Imposing operational limits to loading and resting regimes would be detrimental to the research and limit our ability to optimise the system.</p> <p>Request to delete item (g)</p>	<p>The Delegated Officer has resolved to delete item (g)</p>
<p>Condition 15, Table 3, item 5 (d)</p> <p><i>“Each cell must only be operated a maximum of 3.5 days at a time and allowed a minimum of 3.5 days to rest between operating periods.”</i></p>	<p>As per above, this is the recommended operation in temperate climates (regional France), in tropical and subtropical climates loading periods can increase and resting periods decrease. The loading and resting regime can also be adjusted according to season (temperature). An objective of the research is to prove the loading boundaries of the system so that both design and operational parameters can be optimised to WA conditions, using WA native plants. This is an Australian first in terms of R&amp;D. Imposing operational limits to loading and resting regimes would be detrimental to the research and limit our ability to optimise the system.</p> <p>Request to delete item (d)</p>	<p>The Delegated Officer has resolved to delete item (d)</p>
<p>Condition 15, Table 3, item 8 (b)</p> <p><i>“Operated to alternate wastewater flows between parallel wetland cells in each stage every 3.5 days.”</i></p>	<p>As per above, operational flexibility is paramount to achieve research objectives. The 3.5 days period serves as general guidance only.</p> <p>Requested change:</p> <p><i>“Operated to alternate wastewater flows between parallel wetland cells in each stage every 3.5 days, or in accordance with experimental operational scenario being tested, provided operation is not detrimental to requirements set in items 3 and 5.”</i></p>	<p>The Delegated Officer has resolved to amend 8 (b) to the following:</p> <p><i>“Operated to alternate wastewater flows between parallel wetland cells in each stage every 3.5 days, or in accordance with the experimental operational scenario being tested, provided that operation is not detrimental to the requirements set in rows 3 and 5 of this table.”</i></p>

Condition	Applicant's comment	Department's response
<p>Condition 17, Table 5</p> <p>Water quality monitoring (discharge point)</p>	<p>This is considered an Extra Low risk reuse scheme in accordance with DoH's classification. The DoH recycling approval requires monthly E.coli and pH sampling only. The proposed monitoring frequency is conflicting with the current DoH's reuse conditions and considered onerous in light of DWER's registration requirements and the (small) scale nature of the VF wetland research project.</p> <p>Operational monitoring (non regulatory) for TN, TP, E.coli, pH, SS, BOD is currently undertaken monthly at the pond outlet (SP Toodyay Overflow Weir Final Effluent - FL S5008000). Comparison of these data with the VF wetland effluent data will provide more meaningful information in terms of treatment performance and mitigation of environmental risk.</p> <p>Additional sampling for nutrients at the irrigation point will put additional resource/cost pressures on project/region.</p> <p>The applicant requested the following changes:</p> <p>Item 2 Replace frequency for <i>E.coli</i> and pH to 'Monthly' . (In line with DoH's reuse scheme approval – extra low risk).</p> <p>Delete parameters 'BOD, TSS, TN and TP'.</p> <p>Monitoring Location: 'WWTP post filtration and chlorination' (Coordinates: 453013.89 E; 6511301.2N)</p>	<p>The DoH's classification is based on risk to human/public health. DWER would like an understanding of the final quality of water being used to irrigate the woodlot and the risk it presents to the environment as well as to human health. Therefore, the Delegated Officer has determined to retain BOD, TSS, TN and TP parameters. However, the frequency for monitoring has been amended from weekly to quarterly to reduce resource/cost pressures on the project.</p> <p>The Delegated Officer has resolved to amend the monitoring frequency for E.coli and pH to monthly.</p>
<p>Condition 17, Table 6</p> <p>Water quality monitoring (VF wetland cells)</p> <p>Monitoring locations proposed for the outlet pit of each wetland cell, with monitoring conducted weekly.</p>	<p>The proposed monitoring locations are not appropriate given the alternating nature of the operational loading regime (this means that only one cell per stage is operating at any given time while others are in resting mode – no effluent). Although operational monitoring of the effluent from Stage 1 and Stage 2 wetlands is expected to be undertaken as part of the research project to allow us to quantify the performance of the individual stages in the treatment train, it is considered that from an environmental risk management perspective, monitoring of the final effluent (post stage 2 wetlands at the Effluent Tank) alone would be sufficient to inform risk to downstream storage dam and irrigation area (discharge point). Data and discussion on the performance of</p>	<p>The Delegated Officer has resolved to amend the monitoring location to 'Effluent Tank' and reduce monitoring frequency to fortnightly.</p>

Condition	Applicant's comment	Department's response
	<p>individual stages will be included in the research outputs from this project (some of which are expected to be made publicly available as publications).</p> <p>As nature-based solutions, microbial process and pollutant degradation rates in constructed wetlands occur at lower rates than mechanised, high-rate wastewater treatment plants (such as activated sludge). For this reason, these systems also tend to be less subject to short term fluctuations in water quality and performance. Because of the reported robustness and buffer capacity of wetlands, we believe that a fortnightly water quality monitoring regime would be sufficiently appropriate to capture performance, inform operation and future design of vertical flow constructed wetlands, and address potential environmental risk to downstream receptor.</p> <p>The applicant requested the monitoring location to be the 'Effluent Tank' and for the frequency of all parameters to be replaced to 'Fortnightly'</p>	

## Appendix 3: Application validation summary

SECTION 1: APPLICATION SUMMARY (as updated from validation checklist)				
<b>Application type</b>				
Works approval	<input checked="" type="checkbox"/>			
Licence	<input type="checkbox"/>	Relevant works approval number:		None <input type="checkbox"/>
		Has the works approval been complied with?	Yes <input type="checkbox"/> No <input type="checkbox"/>	
		Has time limited operations under the works approval demonstrated acceptable operations?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	
		Environmental Compliance Report / Critical Containment Infrastructure Report submitted?	Yes <input type="checkbox"/> No <input type="checkbox"/>	
		Date report received:		
Renewal	<input type="checkbox"/>	Current licence number:		
Amendment to works approval	<input type="checkbox"/>	Current works approval number:		
Amendment to licence	<input type="checkbox"/>	Current licence number:		
		Relevant works approval number:		N/A <input type="checkbox"/>
Registration	<input type="checkbox"/>	Current works approval number:		None <input type="checkbox"/>
Date application received	31/03/2023			
<b>Applicant and premises details</b>				
Applicant name/s (full legal name/s)	Water Corporation			
Premises name	Toodyay Water Source Recovery Facility			
Premises location	Lot 501 on Deposited Plan 33954			
Local Government Authority	Shire of Toodyay			
<b>Application documents</b>				
HPCM file reference number:	DER2023/000233			
Key application documents (additional to application form):	Works Approval Application Supporting Information – March 2023 Appendix D: Toodyay WWTP Baseline Assessment RPS 2020 Appendix E Toodyay WWTP Upgrade – Environmental Site Assessment Appendix F: Toodyay WRRF – Vertical Flow Treatment Wetland Trial – Concept Design Report, WC 2022 Appendix G: Nutrient and Irrigation Management Plan (NIMO) Irrigation of a Woodlot using TWW Toodyay, WC 2014			
<b>Scope of application/assessment</b>				



## SECTION 1: APPLICATION SUMMARY (as updated from validation checklist)

<p>Summary of proposed activities or changes to existing operations.</p>	<p>Works approval</p> <p>Construction of a Vertical Flow (VF) Treatment Wetlands System for wastewater treatment as part of a research and development project trial, partnered by the Water Corporation and Murdoch University, at the existing registered Toodyay Water Resource Recovery Facility (WRRF) R1264/1998/1.</p> <p>The objective of the trial is to demonstrate the ability of VF wetlands to treat raw screened wastewater to secondary effluent quality and the ability of single stage VF wetlands to enhance final treated wastewater quality.</p> <p>No changes are proposed to the capacity of the existing treatment plant. The trial VF Treatment Wetlands are proposed to be operated in parallel with existing ponds for a minimum of 3 years and will not interfere with current processes.</p>
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Category number/s (activities that cause the premises to become prescribed premises)

Table 1: Prescribed premises categories

Prescribed premises category and description	Assessed production or design capacity	Proposed changes to the production or design capacity (amendments only)
<p>Category 85: Sewage facility: premises –</p> <p>(a) on which sewage is treated (excluding septic tanks); or</p> <p>from which treated sewage is discharged onto land or into waters.</p>	92 m <sup>3</sup> per day	N/A

### Legislative context and other approvals

<p>Has the applicant referred, or do they intend to refer, their proposal to the EPA under Part IV of the EP Act as a significant proposal?</p>	<p>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>	<p>Referral decision No: N/A</p> <p>Managed under Part V <input checked="" type="checkbox"/></p> <p>Assessed under Part IV <input type="checkbox"/></p>
<p>Does the applicant hold any existing Part IV Ministerial Statements relevant to the application?</p>	<p>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>	<p>Ministerial statement No: N/A</p> <p>EPA Report No: N/A</p>
<p>Has the proposal been referred and/or assessed under the EPBC Act?</p>	<p>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p>	<p>Reference No: N/A</p>
<p>Has the applicant demonstrated occupancy (proof of occupier status)?</p>	<p>Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p>	<p>Certificate of title <input checked="" type="checkbox"/></p> <p>General lease <input type="checkbox"/> Expiry:</p> <p>Mining lease / tenement <input type="checkbox"/> Expiry:</p> <p>Other evidence <input type="checkbox"/> Expiry:</p>

**SECTION 1: APPLICATION SUMMARY (as updated from validation checklist)**

Has the applicant obtained all relevant planning approvals?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/>	Approval: Expiry date: If N/A explain why?
Has the applicant applied for, or have an existing EP Act clearing permit in relation to this proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	CPS No: N/A No clearing is proposed.
Has the applicant applied for, or have an existing CAWS Act clearing licence in relation to this proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Application reference No: N/A Licence/permit No: N/A No clearing is proposed.
Has the applicant applied for, or have an existing RIWI Act licence or permit in relation to this proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Application reference No: N/A Licence/permit No: N/A Licence / permit not required.
Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the EP Act)?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Name: N/A Type: Proclaimed Surface Water Area Has Regulatory Services (Water) been consulted? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Regional office: Swan Avon
Is the Premises situated in a Public Drinking Water Source Area (PDWSA)?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Name: N/A Priority: N/A Are the proposed activities/ landuse compatible with the PDWSA (refer to <a href="#">WQPN 25</a> )? Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/>
Is the Premises subject to any other Acts or subsidiary regulations (e.g. <i>Dangerous Goods Safety Act 2004, Environmental Protection (Controlled Waste) Regulations 2004, State Agreement Act xxxx</i> )	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Is the Premises within an Environmental Protection Policy (EPP) Area?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Is the Premises subject to any EPP requirements?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	

**SECTION 1: APPLICATION SUMMARY (as updated from validation checklist)**

Is the Premises a known or suspected contaminated site under the <i>Contaminated Sites Act 2003</i> ?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Classification: N/A Date of classification: N/A
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