Application for Works Approval

Division 3, Part V *Environmental Protection Act 1986*

Works Approval Number	W6155/2018/1
Applicant	SSHP Pty Ltd Southern Stars Holiday Park Dunsborough
ACN	619371872
File Number	DER2018/000807-1
Premises	Southern Stars Holiday Park Dunsborough 645 Vasse-Yallingup Siding Road Anniebrook WA 6280 Legal description - Lot 50 on Deposited Plan 51557. Certificate of Title Volume 2627, Folio 787 As defined by the Premises maps in Appendix 1
Date of Report	03 October 2018

1. Overview of premises

Table 1: Classification of premises

Classification of Premises	Description	*Approved Premises production or design capacity or throughput*
Category 85	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.	More than 20 but less than 100 cubic meters per day

Description of proposed activity

SSHP Pty Ltd trading as Southern Stars Holiday Park (SSHP) propose to construct a Category 85 Sewage facility to service up to 105 caravans and a residential property. The Premises is located at 645 Vasse-Yallingup Siding Road, Anniebrook (City of Busselton). The applicant is proposing to treat up to 50kL/day of sewage a day and irrigate the treated wastewater over 3 hectares of citrus trees and kikuyu grass.

The property is 33 Ha and has been used for pasture and growing citrus in the past.

The scope of assessment for this Decision Report relates to:

- Works associated with the construction of a wastewater treatment plan (WWTP) with a capacity of 50 cubic metres per day;
- The risk of emissions to the environment and public health during construction and operational phases of WWTP;
- The risk of emissions to the environment and public health by irrigating citrus trees and kikuyu with treated wastewater, and

It is noted that the nitrogen and phosphorus figures of 67 mg/L and 15 mg/L provided by the applicant in the water and nutrient balance are conservative for a package WWTP and based on the inflows rather than treated outflows. The Department of Water and Environmental Regulation (DWER) expect these figures to be lower, however have assessed the WWTP and irrigation of treated effluent on the figures submitted in the application at the request of the Applicant's representative. These figures have been used in the water balance and nutrient irrigation loading rates to determine both the effluent storage required and the area of land required to irrigate treated effluent.

Following construction under a Works Approval the premises will operate under a Category 85 Registration. Categories of Prescribed Premises are defined in Schedule 1 of the *Environment Protection Regulations 1987* (WA) (EP Regulations). A licence is not required for a Category 85 premises.

Table 2: Refer to Premises maps in Appendix 1.

	Infrastructure	**Site Layout Plan Reference**
Ref	**Prescribed Activity Category 85**	
Brief description of activities undertaken onsite which meet category 85		
1	Wastewater treatment plant associated with a caravan park.	Figure 2

	Infrastructure	Site Layout Plan Reference
	• Anaerobic – settling and breakdown stage. • Aeration – 3 stages of aeration • Settlement chamber – solids drop out and liquid effluent drains to the disinfection chamber. • Disinfection – chlorination using chlorine tablets • Irrigation Tank – chlorinated effluent pumped to irrigation tank. • Sand filters – final effluent passes through filters prior to irrigation to ensure subsurface driplines are not blocked. • Flow meter is located at the irrigation tank. • Sample valve is located next to the water meter. • 10 sewer pump stations throughout the caravan park with an additional emergency storage. • Closed loop treatment system with sludge and solids returned back to the 1st treatment tank. • Solids will be removed as required by a licensed Waste Management Contractor. • Air scrubbers mounted on farm shed 20m above ground.	
2	Irrigation of treated wastewater onto citrus trees and kikuyu grass. • Subsurface irrigation 100mm below ground. • Soil moisture probes installed to 1m depth to automatically divert irrigation water to storage dams before the soil moisture is at field capacity.	Figure 2 and 3
3	Constructed HDPE lined effluent/storage dams	Figure 2
	Other activities	
3	Caravan waste drop off area for Caravan waste cassettes. Removed by a licensed contractor when required.	Figure 2

Key emissions and discharges

A summary of key emissions and discharges are presented in Table 3 (Refer to Premises maps in Appendix 1). A comprehensive outline of all emissions and associated risks is provided in Section 5.

Ref	Source	Emission	Controls
A1	Wastewater treatment plant	Odour Leachate or spill of untreated sewage.	Contained system with an air scrubber Bunded Designated pump out area

Ref	Source	Emission	Controls
			for solids.
	Irrigation area	Leachate/ Odour	Underground irrigation with soil moisture meters Alarm system for wastewater that doesn't meet the effluent quality. Diverted back to the start of the treatment system.
A2	Caravan Waste drop off area	Potential odour	Small volumes, away from caravan sites

2. Environmental siting

Refer to Premises maps in Appendix 1

Table 4: Residential and sensitive receptors and distance from activity boundary

Residential and sensitive premises	Approximate Distance from Prescribed Premises (blue line boundary in Appendix 1)
R1 – Farm House and sheds	260 meters south east
R2 – Farm House and sheds	530 meters south west
R3 - Farm House and sheds	190 meters north east

Table 5: Environmental receptors and distance from activity boundary

Environmental receptors	Approximate Distance from Prescribed Premises (blue line boundary in Appendix 1)
E1 – Mary Brook	430 meters south west
E2 – Mary Brook Drain	250 meters south east
Broadwater Swamp (Perennial Wetland)	1.8 km north east
Indian Ocean	2.7 km north east
Depth to Groundwater	Average 2.5 m. 1.8 m peak in 1994. (DWER monitoring bore 150 m from the property. 34 year monitoring period)
Groundwater Salinity	500 – 1000mg/L (DWER Groundwater Map)
Groundwater abstraction bores	North and north east with-in the premises boundary. Owned by the applicant. 1 – Perth - Superficial Swan Aquifer 2 – Perth – Leederville Aquifer (DWER Water Register)
Acid Sulfate Soils Risk	Moderate to low risk (DWER Groundwater Map)

SSHP is located within the area of the 'Vasse Wonnerup Wetlands and Geographe Bay Water Quality Improvement Plan, 2010' (WQIP), specifically in the Annie Brook reporting catchment.

Under the WQIP, Annie Brook has been classified as an 'intervention' catchment, whereby waterways currently meet the phosphorus criteria of 0.1 mg/L, but do not meet the nitrogen criteria of 1 mg/L.

The management objectives for the Annie Brook catchment are to decrease median winter nitrogen concentrations to 1.0 mg/L and prevent further increases of phosphorus from current median winter concentrations.

Advice was sought from DWER's Principal Hydrogeologist regarding the site location, geology and groundwater information for the area. This information is summarised below.

Information from the 1:100 000 environmental geology map for the area published by the Geological Survey of Western Australia (the Yalingup Environmental Geology Map) indicates that much of the site is underlain by low dunes consisting of Bassendean Sand. Consequently soils that underlie the proposed SSHP wastewater irrigation area are generally sandy with a limited capacity to retain and store nitrogen compounds applied in the wastewater, but some sorption of phosphate is likely to take place in silty subsoils that are likely to occur at depth below the site. Therefore nitrogen compounds (predominantly ammonium ions) are likely to be the most significant contaminants to be transported from the site in groundwater flow.

The Yalingup Environmental Geology Map suggest that the site is underlain by a shallow unconfined aquifer comprised of interbedded sands and silty sands with a permanent water table occurring at a depth of about 3-5 metres. The dunes comprised of Bassendean Sand are underlain by sandy silts of the Guildford Formation, and these sediments are exposed at the land surface at the margins of the dunes to form an extensive palusplain that typically becomes waterlogged in the winter months.

It is likely that a perched water table forms within the Bassendean Sand dunes during the winter months with seepage to the palusplain taking at the margins of the dunes. Although the regional direction of groundwater flow is generally in a northerly direction in the area, it is likely that some groundwater mounding takes place beneath sand dunes in winter months. Consequently, there is likely to be a radial component of groundwater flow from dunal areas to the surrounding palusplain during winter. It is possible that nitrogen contamination in groundwater from wastewater irrigation could discharge to the land surface within a few hundred metres of the irrigation area, and then could be transported in surface drainage to Geographe Bay. This is to be managed through storage of treated effluent in winter when the soil moisture meters determine that the soil is at field capacity and no irrigation can occur. This is to reduce the waterlogging issue. A detailed risk assessment is provided in Section 5.

3. Operational aspects

The Application indicates that the WWTP design is based on Regulation 29 of the *Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974* (Regulations).

The Application states that wastewater from the caravan park will be plumbed to a number of package wastewater pump stations which will pump wastewater under pressure to the WWTP.

The WWTP design includes five tanks/containers and associated equipment, with processes including grinding and screening, anaerobic and aerobic treatment, vent and scrubber/odour control, clarification and micro filtration, disinfection and storage of treated wastewater prior to irrigation.

The WWTP will have a maximum design capacity of 50kL/d. Treated wastewater will be pumped to storage tank (22.5 kL capacity) to irrigate up to 3 hectares of citrus trees and kikuyu grass. These figures are the maximum potential irrigation rates, based on the design capacity.

The proposed irrigation area is 3 Ha within Lot 50 and is underlain by sandy soil. The irrigation area will be planted with citrus trees and kikuyu grass. The Applicant's proposed nutrient application rates and irrigation schedule are detailed in Tables 6 and 7.

Table 6: Citrus and Kikuyu nutrient application rates at the proposed irrigation area

Category	Nitrogen	Phosphorus
Effluent concentration used in NIMP calculations by the applicant	67 mg/L	15 mg/L

Category	Nitrogen	Phosphorus
High use activity turf and phosphorus retention index for established turf (Turf Guidelines[1]). Maximum allowed for irrigation.	100-200 kg/ha/year	5 kg/ha/year
Citrus nutrient uptake [2]	200–300 kg/ha/year	60 kg/ha/year
Applicant's NIMP nitrogen and phosphorus limits for the irrigation area	173 kg/ha/year	38 kg/ha/year

[1]Based on "Western Australian environmental guidelines for the establishment and maintenance of turf grass areas" Swan River Trust updated 2014.
[2] Based on Haifa Group – Crop Guide: Citrus Fertilizer Recommendations

Table 7: Application rates at proposed irrigation area

Application rates	
Max effluent volume	49 200 L/d
Irrigation area	3 ha
Pumping capacity	5L/s
Duration of irrigation all stations	2hrs

4. Legislative context and other approvals

Table 8: Relevant approvals

Legislation	Number	Approval
Planning and Development Act 2005	DA15/0530	To operate a 110 site caravan park and camp grounds
Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974.		To operate a 50kL wastewater treatment plant and subsurface irrigation of treated wastewater.

Department of Health

The Department of Health (DoH) considers the use of recycled water for sub-surface irrigation of the SSHP irrigation area presents a low risk exposure level, based on the *Guidelines for the Non-potable Uses of Recycled Water in Western Australia 2011* and has issued an approval in principle for the project with conditions relating to human exposure of pathogens. Monitoring of E.coli, total chlorine residual and irrigation times for Low Exposure Risk Level to reduce human exposure to the treated wastewater have been set for the operation of the WWTP. A licence to operate the WWTP will not be granted until a final permit from DoH has been issued after complying with all conditions of the approval in principal including commissioning and validation of the plant.

Department of Water and Environmental Regulation

Advice was sought from DWER's Contaminated Sites (CS) and Land Use Planning (LUP) areas.

Both CS and LUP did not approve the irrigation of treated wastewater as submitted due to the irrigation area being too small for the volume of effluent produced. The risk of groundwater contamination by nitrogen periodically discharging to the lands surface in a palusplain within a few hundred meters of the irrigation area. Surface drainage from the palusplain could then rapidly transport nitrogen to Geographe Bay.

Additional information was sought to increase the irrigation area, install soil moisture probes and construct additional effluent storage to ensure nutrients would not reach the groundwater.

Further information was supplied by the applicant updating the irrigation area from 1.5 ha to 3 ha, installing soil moisture meters and an additional lined effluent storage dam. The additional irrigation area and effluent dam will be staged according to the caravan occupancy and obtaining in field monitoring of soil moisture, groundwater levels and effluent produced.

Monitoring bores should be installed in the irrigation areas to obtain site specific background quality groundwater data.

5. Risk assessment

Table 9: Risk assessment – construction

Risk Event					Consequence rating	Likelihood rating	Risk	Reasoning	Regulatory controls (refer to conditions of the granted instrument)
Source/Activities	**Potential emissions**	**Potential receptors**	**Potential pathway & receptor (impact)**	**Applicant controls**					
Construction of a wastewater treatment plant and irrigation area	**Dust**: associated with construction activities	Residence 190 meters north east of the Premises	Air/wind	Health and amenity impacts	Slight	Possible	Low	The construction of the WWTP will occur over a short-term duration only with limited earth works required for installation. The nearest residence is located 190 m from the boundary of the premises.	The Delegated Officer considers that Regulatory controls are not required for this activity.

Risk Event					Consequence rating	Likelihood rating	Risk	Reasoning	Regulatory controls (refer to conditions of the granted instrument)
Source/Activities	**Potential emissions**	**Potential receptors**	**Potential pathway & receptor (impact)**	**Applicant controls**					
Construction of a wastewater treatment plant and irrigation area	**Noise**: associated with construction activities	Residence 190 meters north east of the Premises	Air/wind	Health and amenity impacts	Slight	Possible	Low	The construction of the WWTP will occur over a short-term duration only with limited earth works required for installation. this activity is likely to be exempt under r.13 as a construction activity under the Noise Regulations	The Delegated Officer considers that Regulatory controls are not required for this activity.

Table 10: Risk assessment – operation

			Potential Emissions	Potential Receptors	Potential Pathway	Potential Impacts	Continued to detailed risk assessment?	Reasoning
Source (see Section 3.1 for infrastructure references)	**Category 85** **Wastewater Treatment Plant operations**	Treatment of sewage, pipeline rupture, overtopping and desludging activities	Rupture of pipes / overtopping of holding tanks resulting in untreated and partially treated sewage discharge to land. Key contaminants include nitrogen and phosphate.	Specified ecosystems, surface water and groundwater. Mary Brook Drain 250 m south east of the Premises. Conservation category wetland located 1.8 km north east of the Premises. The nearest down-gradient groundwater abstraction bore is located approximately 150 m north and north east from the irrigation area on the boundary of the Premises.	Surface water runoff and seepage to groundwater. Ground contours indicate slight slope from Premises towards conservation category wetland, however the site is otherwise relatively flat. Groundwater levels indicate groundwater flow in a northerly direction across the premises and surrounding area.	Surface water and groundwater contamination. Soil contamination impacting native vegetation growth and survival.	Yes	See section 6.3
			Release of pathogens via airborne or direct contact (ingestion).	Current residential premises located 190m north-east and 260m south east of the Premises. There are also planned caravan park residences adjacent to the WWTP.	Direct contact and ingestion of harmful pathogens	Bacteria in the wastewater may cause gastroenteritis, spread disease or create other public health impacts	No	Regulated by the Department of Health The WWTP is a contained system and the exposure risk is limited.

			Potential Emissions	Potential Receptors	Potential Pathway	Potential Impacts	Continued to detailed risk assessment?	Reasoning
			Odour	Current residential premises located 190m north-east and 260m south east of the Premises. There are also planned caravan park residences adjacent to the WWTP.	Air/Wind	Amenity and health	Yes	See section 6.4
			Noise generated from general WWTP operation as well as from vehicle movements associated with desludging activities	Current residential premises located 190m north-east and 260m south east of the Premises. There are also planned caravan park residences adjacent to the WWTP.	Air/Wind	Amenity and health	Yes	See section 6.2
		Storage of Chemicals	Breach of containment causing chlorine discharge to land	Contamination of land, groundwater and/or surface water from a breach of containment infrastructure. Conservation category wetland located 1.8 km north east of the Premises and Mary Brook Drain 250 m south east of the Premises.	Stormwater runoff to land and seepage to groundwater	Soil contamination impacting native vegetation growth and survival	No	Chlorine tablets are used, therefore storage of liquid chemical storage is not required.
				Human receptors	Inhalation, Ingestion and dermal contact	Health	No	Dangerous Goods are regulated by Department of Mines, Industry Regulation and Safely (DMIRS)

			Potential Emissions	Potential Receptors	Potential Pathway	Potential Impacts	Continued to detailed risk assessment?	Reasoning
	Re-use Scheme	Treated wastewater applied to Irrigation area of Caravan Park	Direct discharge to land (citrus trees and kikuyu grass) of treated wastewater: Seepage of nutrients into the groundwater. Key nutrients include phosphorus and nitrogen.	Soil and Groundwater Mary Brook Drain 250 m south east of the Premises. Conservation category wetland located 1.8 km north east of the Premises. The nearest down-gradient groundwater abstraction bore is located approximately 150 m north and north east from the irrigation area on the boundary of the Premises.	Leaching of nutrients into groundwater and runoff into surface water receptors. Bore water abstraction Direct contact with soil and abstraction of groundwater According to the application groundwater is estimated to be between 1.8m to 2.5m bgl in the proposed irrigation area. .	Impacts to water quality, vegetation survival and ecological function of wetland. Potential for treated wastewater to infiltrate to groundwater, resulting in localised deterioration of groundwater quality and potential impacts to abstraction bores. Mounding of groundwater below application area. Inundation of root zone Change in soil chemistry Impacts to surrounding vegetation	Yes	Potential risk to water quality and specific ecosystems are discussed further in Section 6.5
				Human receptors		Health	No	Regulated by the DoH

			Potential Emissions	Potential Receptors	Potential Pathway	Potential Impacts	Continued to detailed risk assessment?	Reasoning
			Overtopping of effluent storage dam	Soil, surface water drain and groundwater	Overland flow and seepage into groundwater	Mounding of groundwater below application area. Inundation of root zone Change in soil chemistry Impacts to surrounding vegetation	No	The effluent storage pond is designed to hold 838 kL of treated effluent in the winter months. This is in addition to the treated effluent storage tank of 22.5kL. In the event of an overflow of the effluent storage dam, it will be piped to a stormwater storage dam on the property or the emergency overflow tank.
		Failure of disinfection system	Odour	Current residential premises located 190m north-east and 260m south east of the Premises. There are also planned caravan park residences adjacent to the WWTP. Humans using the facilities and coming into contact with the treated wastewater	Direct contact and ingestion of harmful pathogens	Bacteria in the treated wastewater may cause gastroenteritis, spread disease or create other public health impacts	No	Regulated by the DoH.
			Treated wastewater containing harmful pathogens				No	Regulated by the DoH.

6. Risk Criteria

A risk rating will be determined for risk events in accordance with the risk rating matrix set out in Table 10 below.

Table 10: Risk Criteria

Likelihood	Consequence				
	Slight	Minor	Moderate	Major	Severe
Almost certain	Medium	High	High	Extreme	Extreme
Likely	Medium	Medium	High	High	Extreme
Possible	Low	Medium	Medium	High	Extreme
Unlikely	Low	Medium	Medium	Medium	High
Rare	Low	Low	Medium	Medium	High

DWER will undertake an assessment of the consequence and likelihood of the Risk Event in accordance with Table 11 below.

Table 11: Risk criteria table

Likelihood		**Consequence**		
The following criteria has been used to determine the likelihood of the Risk Event occurring.		**The following criteria has been used to determine the consequences of a Risk Event occurring:**		
			Environment	**Public health* and amenity (such as air and water quality, noise, and odour)**
Almost Certain	The risk event is expected to occur in most circumstances	Severe	• **onsite impacts**: catastrophic • **offsite impacts local scale**: high level or above • **offsite impacts wider scale:** mid-level or above • Mid to long-term or permanent impact to an area of high conservation value or special significance^ • Specific Consequence Criteria (for environment) are significantly exceeded	• Loss of life • **Adverse health effects:** high level or ongoing medical treatment • Specific Consequence Criteria (for public health) are significantly exceeded • **Local scale impacts:** permanent loss of amenity
Likely	The risk event will probably occur in most circumstances	Major	• **onsite impacts**: high level • **offsite impacts local scale**: mid-level • **offsite impacts wider scale**: low level • Short-term impact to an area of high conservation value or special significance^ • Specific Consequence Criteria (for environment) are exceeded	• **Adverse health effects:** mid-level or frequent medical treatment • Specific Consequence Criteria (for public health) are exceeded • **Local scale impacts**: high level impact to amenity
Possible	The risk event could occur at some time	Moderate	• **onsite impacts**: mid-level • **offsite impacts local scale**: low level • **offsite impacts wider scale**: minimal • Specific Consequence Criteria (for environment) are at risk of not being met	• **Adverse health effects:** low level or occasional medical treatment • Specific Consequence Criteria (for public health) are at risk of not being met • **Local scale impacts:** mid-level impact to amenity
Unlikely	The risk event will probably not occur in most circumstances	Minor	• **onsite impacts**: low level • **offsite impacts local scale**: minimal • **offsite impacts wider scale**: not detectable • Specific Consequence Criteria (for environment) likely to be met	• Specific Consequence Criteria (for public health) are likely to be met • **Local scale impacts:** low level impact to amenity
Rare	The risk event may only occur in exceptional circumstances	Slight	• **onsite impact**: minimal • Specific Consequence Criteria (for environment) met	• **Local scale**: minimal to amenity • Specific Consequence Criteria (for public health) met

^ Determination of areas of high conservation value or special significance should be informed by the *Guidance Statement: Environmental Siting.*

* In applying public health criteria, DWER may have regard to the Department of Health's *Health Risk Assessment (Scoping) Guidelines.*

6.1. Risk Treatment

DER will treat risks in accordance with the Risk Treatment Matrix in Table 12 below:

Table 12: Risk Treatment

Rating of Risk Event	Acceptability	Treatment
Extreme	Unacceptable.	Risk event will not be tolerated. DER may refuse application.
High	Acceptable subject to multiple regulatory controls.	Risk event will be tolerated and may be subject to multiple regulatory controls. This may include both outcome-based and management conditions.
Medium	Acceptable, generally subject to regulatory controls.	Risk event is tolerable and is likely to be subject to some regulatory controls. A preference for outcome-based conditions where practical and appropriate will be applied.
Low	Acceptable, generally not controlled	Risk event is acceptable and will generally not be subject to regulatory controls.

The emission types have been identified with the pathways and receptors in Table 11 and 12.

6.2 Risk Assessment – Noise emissions from operations

General risk characterisation and impact

Noise may be generated from plant equipment when operating; mainly pumps. Pumps that are not maintained may result in increased ambient noise and may result in reduced wellbeing, amenity and comfort of sensitive noise receptors (residences immediately adjacent to the WWTP) once established.

Noise is expected to be generated from the pumps, aerator and air compressor. Excessive noise can create a nuisance effect to nearby receptors.

Criteria for assessment

Environmental Protection (Noise) Regulations 1997.

Applicant controls

The Applicant's controls for noise emissions are set out in Table 13:

Table 13: Applicant controls for noise.

Control	Description
Infrastructure design	• Pumps and air compressor at the WWTP will be enclosed tanks and a fence around the WWTP • Aerators at the WWTP will be submersed inside closed tanks • Pumps at the pump station will also be submersed inside closed pits

The Applicant has stated that expected maximum noise emissions from the WWTP will be in line with *Environmental Protection (Noise) Regulations 1997* as below:

Table 14: Expected noise emissions

Type of premises	Time of day	Assigned level (dB)		
Noise sensitive premises	All hours	L_{A10}	L_{A1}	$L_{A\ MAX}$
		60	75	80

Key findings

The Delegated Officer has reviewed the information regarding impacts from the Premises and has found:

1. *The operation of the WWTP has the potential to impact residences in the immediate vicinity of the WWTP if the plant infrastructure is not appropriately maintained.*
2. *The closest sensitive receptors are private residence located approximately 190 metres north east and 260 metres south east of the proposed WWTP, and once the WWTP is built, residences (caravans) will be located approximately 10 m from the WWTP.*
3. *The Environmental Protection (Noise) Regulations 1997 will need to be met.*

Consequence

Based on the limited information on noise emissions of equipment provided in the application and the lack of separation distances to receptors, but acknowledging much of the operating WWTP treatment processes will be enclosed and a colourbond fence surrounding the operation, the Delegated Officer has determined there may be a low impact of amenity at a local scale; therefore the consequence is ***Minor***.

Likelihood of consequence

The Delegated Officer has determined that the likelihood of noise emissions during operation of the WWTP equipment could occur at some time. Therefore, the Delegated Officer considers the consequence to be ***Possible.***

Overall rating

The Delegated Officer has compared the consequence and likelihood ratings described above for the Risk Criteria and determined that the overall rating for the risk of noise emissions during construction on sensitive receptors is ***Medium***.

6.3 Risk Assessment – Spills, Leaks of wastewater, sludge and solids at the WWTP

General risk characterisation and impact

A spill/leak of wastewater (mainly untreated or partially treated), sludge or solids could result in contamination of surface water, groundwater and soil. Contamination of groundwater could occur through infiltration of the contaminants through the soil. Surface water bodies could become contaminated by either groundwater flows expressing at the surface, impacting groundwater, or contaminated storm water runoff entering nearby surface water receptors.

Typical characteristic of untreated sewage are:

pH: 5.5 - 8

TN: 20 – 50mg/L

TP: 5 – 10 mg/L

BOD: 100 – 400 mg/L

The Applicant has proposed a number of containment measures to contain spills from the plant that are discussed in Table 15.

The nearest groundwater abstraction bores are located approximately 150m to the north and north east of the irrigation area. These are constructed the Perth- Superficial Swan aquifer and Perth – Leederville Aquifer according to DWER, GIS Mapping WIN bore data.

Department of Health conditions specify that a WWTP must be 30 metres from a well, bore or any watercourse. DoH has given approval in principle for the WWTP.

Criteria for assessment

General provisions of the *EP Act* and the *Environmental Protection (Unauthorised Discharges) Regulations 2004* apply.

Applicant controls

The Applicant's controls to reduce and manage spills and leakages are set out in Table 15:

Table 15: Applicant controls for spills, leaks of wastewater, sludge and solids

Control	Description
Bund	• The WWTP is a package plant that will be constructed on a concrete slab with bunding and drainage to limit stormwater ingress and prevent discharge to the surrounding environment
Overflow of untreated water	• Discharge pipe to the effluent storage dam will be installed at the WWTP to capture any possible overflow
Tank Overflow	• Immediate shut down on system to prevent overflow • The tanks have a buffer capacity of 54kL equal to 1 day of treatment at full capacity of the caravan park. Addition storage is available in the pump stations, pipeline and stormwater ponds if required.
Pump Failure	• Regular inspections
Pipeline failure	• Controls to notify loss of pressure in the pipeline

Control	Description
Management	• Any overflow will be confined within the bunded area and will be cleaned up immediately to avoid odour releases. • Remove wastewater and solids to the maximum practicable amount • Washing the spill area to dilute any remaining wastewater and conduct it to the collection point on site, especially where there is the potential for high public exposure • Disinfecting hard surfaces in high public exposure areas to reduce the risk to human health
Drainage management plan	• Site drainage will be designed and implemented to safely convey stormwater. This should be designed to convey potential wastewater spills away from sensitive receptors

Key findings

The Delegated Officer has reviewed the information regarding the impacts from the Premises and has found:

1. *The treatment plant will be constructed on a concrete hardstand and a 1m bund wall surrounding it.*
2. *A collection pit will be constructed to collect any spills.*
3. *Site drainage will be designed to convey potential wastewater spills away from sensitive receptors.*
4. *A spills management plan will be activated immediately if any spills occur.*
5. *The above measures are likely to prevent spills and leaks in most circumstance. In the event spills and leaks occur, there are contingency measures in place (spills management plan).*

Consequence

If chemical spills, leaks or ruptures occur, then the Delegated Officer has determined that the impact of discharges to land during operation will be low level and limited to on-site. Therefore, the Delegated Officer considers the consequence of discharges to land during operation to be **Minor**.

Likelihood of consequence

The Delegated Officer has determined that the impact of spills, leaks of wastewater, sludge and solids can be effectively managed by the Applicants implementation of regular equipment checks and infrastructure controls.

The Delegated officer has determined the risk event may only occur in exceptional circumstances and therefore the likelihood of the consequence occurring is ***Rare***

Overall rating

The Delegated Officer has compared the consequence and likelihood ratings described above for the Risk Criteria and determined that the overall rating for the risk of spills, leaks of wastewater, sludge and solids on sensitive receptors during operation is ***Low***.

6.4 Risk Assessment – Odour

General risk characterisation and impact

Odour may be generated from general operations at the Premises including;

- Fugitive emissions from the receipt, treatment and storage of wastewater;
- Irrigation of treated wastewater; and
- De-sludging activities.

Most odour is generated due to the presence of hydrogen sulfide gas which is formed by the anaerobic microbial breakdown of organic matter in a process called anaerobic digestion. Odour generated during the general operation of the WWTP may cause impacts to public amenity as well as health.

The nearest sensitive residential receptors are located approximately 190m north east of the WWTP. However once the caravan park is constructed the closest unit will be located approximately 10 m from the WWTP.

Criteria for assessment

There are no set threshold or concentration criteria for odour assessment. The general provisions of the EP Act make it an offence to cause or allow unreasonable emissions which include emissions of odour that unreasonably interfere with the health, welfare, convenience comfort or amenity of any person.

In addition the DoH guidelines for non-potable uses of recycled water in Western Australia have been used to discern risks associated to the proposal.

Applicant controls

The Applicant's controls to reduce and manage odour emissions are set out in Table 17

Table 17: Applicant's odour controls

Control	Description
Scrubbers	All contaminated air from the treatment tanks will be conducted through a scrubbing system before release into the atmosphere. A wet scrubber will be utilised to bind gas molecules (odorant) to liquid (solution of water and liquid chlorine). The flume height will be 20m from base of the WWTP.
Covers	All treatment tanks on site will be covered and ventilated through the scrubber. This is to prevent fugitive emissions of odorous gases. The covers are designed to minimise odour leakage and ensure negative pressure under the covers during normal operation.
Odour treatment units	Addition of sodium hypochlorite to the sewage at the beginning of the treatment to increase the pH of the sewage to reduce biological conversion of dissolved sulphate to hydrogen sulphide.
Management	• The Applicant will identify the source of the odour and rectification of the cause; • Any overflow will be cleaned up immediately to avoid odour releases, involving; ○ Remove wastewater and solids to the maximum practicable amount; ○ Washing the spill area to dilute any remaining wastewater and direct this

Control	Description
	wastewater to collection point on site, especially where there is the potential for high public exposure; and ○ Disinfecting hard surfaces in high public exposure areas to reduce the risk to human health.
Management	An Incident Management and Response Procedure will be implemented. Complaints received will be investigated and action undertaken until odours are at an acceptable level.
Management	The Applicant has determined according to DoH guidelines that the proposal poses a low exposure risk level (level of human contact). The guidelines specify for this risk level that access control of the irrigation area is required. The user must maintain effective control over public access to the areas being irrigated.

Key findings

The Delegated Officer has reviewed the information regarding odour impacts from the premises and has found:

1. *The closest sensitive receptors are private residence located approximately 190 metres north east and 260 metres south east of the proposed WWTP, and once the WWTP is built, residences (caravans) will be located approximately 10 metres from the WWTP.*
2. *The sensitive receptors nearby may be impacted by odour from the WWTP if there is a malfunction. Odour may be emitted if the process controls and pollution equipment controls fail. An alarm system will be in place to notify a malfunction. The Applicant will implement their odour management to reduce the amount of odour released during unexpected events and expedite clean-up of wastewater and effluent. Standby parts will be on site ready to replace failed parts to reduce the impact of odour.*

Consequence

Based on the information detailed above the Delegated Officer has determined that the consequence from odour will be short to medium term due to the odour management plan being implemented and the malfunction being rectified quickly. A small population may be affected with low level adverse health impacts or occasional medical treatment may be required. Therefore the delegated officer considers the consequence to be ***Moderate.***

Likelihood of consequence

Based on the information detailed above the likelihood of odour from the Premises causing minor consequences is ***Possible*** as the risk event occur in the event of a malfunction or breakdown.

Overall rating

The Delegated officer has compared the consequence and likelihood ratings described above for the Risk Criteria and determined that the overall rating for the risk of odour from the Premises and impacts to receptors is ***Medium***.

6.5 Risk Assessment – Reuse of treated wastewater

General risk characterisation and impact

Reuse of treated wastewater for irrigation can cause land degradation, waterlogging and adversely impact natural waters causing salinity, turbidity, nutrient enrichment, leached trace metals, pesticides and other harmful wastewater contaminants.

Treated wastewater from the Premises will be transferred to a storage tank (22.5kL). Treated wastewater will be utilised to irrigate citrus trees and kikuyu. Total maximum treated wastewater available for irrigation is 50kL/day and will be irrigated at a rate of 5L/day/m^2. In addition to the storage tank, a 838 kL storage pond is to be installed to accommodate storage of excess wastewater when required.

The SSHP application proposes an application rate of 173.5kg/ha/yr for nitrogen and 38 kg/ha/yr of phosphorus. These numbers are conservative as the nutrient irrigation loading rates have been calculated on pre-treatment effluent quality to ensure the worst case scenario has been applied.

The water balance provided by the applicant shows there is 16 days of storage capacity to accommodate consecutive rainy days and winter storage. This is based on maximum occupancy at the caravan park.

Prior to irrigation monitoring bores are required to be installed downstream and within the irrigation area and be monitored prior to and during the irrigation phase to ensure leaching of wastewater is not occurring.

Based on the DoW Water Quality Protection Note No. 70 and Government Sewage Policy, a minimum of 100m buffer distance to a wetland is recommended. The Conservation Category Wetland is approximately 1.8 km from the proposed irrigation area. Parks and Wildlife service stipulate compliance with the Government Sewerage Policy (2016) and an onsite sewage disposal system should not be located within 100m of a significant wetland.

The nearest bore to the proposed irrigation area is approximately 300m northwest within the property. If wastewater and other contaminants reach the water table water users might be exposed to harmful pathogens and contaminants.

According to the Perth Groundwater Map the groundwater quality is classed as fresh to brackish, between 500 - 1000 mg/L (milligrams of salt per litre).

According to the application the maximum separation to groundwater is 2.5m and minimum separation distance of 1.8m. There is no site specific bores to verify this data. This data has been determined from the DWER monitoring bore hydrograph located 150m north of the irrigation area.

DWER's Principal Hydrogeologist has indicate the regional direction of groundwater flow is generally in a northerly direction in the area

Due to the close proximity of the groundwater according to the DWER monitoring bores in the area and no site specific bores to verify the actual groundwater levels the risk of irrigating treated wastewater is higher.

Criteria for assessment

The following criteria have been used to evaluate the risk associated to reuse of treated wastewater:

- Department of Health's *Guidelines for the non-potable uses of recycled water in Western Australia*, low exposure risk for communal sub-surface irrigation with some restricted access and application.

- Heavy metals in wastewater should not exceed the quality criteria for irrigation use given in the *Australian and New Zealand guidelines for fresh and marine water quality*.
- *The Western Australian environmental guidelines for the establishment and maintenance of turf grass area, 2014* (Turf Guidelines, 2014) which was developed by the Swan River Trust with support from the Department of Water (DoW) and the Urban Users Working group to protect the health of waterways of the Swan and Scott Coastal Plains. The guidelines provide recommended application rates for fertilizers (nitrogen and phosphorus) on the Swan Coastal Plain. The Delegated Officer acknowledges there are differences between chemical inorganic fertilizers and organic wastewater however considers the guideline relevant for provision of criteria for the assessment of nutrients in the re-use of treated wastewater.
- Australian water quality guidelines (ANZECC and ARMCANZ 2000) provide recommended trigger values for fresh and marine water.
- *DER* Guideline: Assessment and Management of Contaminated Sites (2014) provides ecological and human health assessment levels for soil.

The Delegated Officer considers the criteria in the table below acceptable to access the citrus trees and turf needs (ability to take up nitrogen) and the soil retention capability (for phosphorus).

Applicant controls

The Applicants controls to reduce and manage reuse of treated wastewater emissions are set out in Table 18.

Table 18: Applicants controls for seepage from reuse of treated wastewater

Control	Description
Infrastructure	• There will be some restricted access and application of treated wastewater in line with DoH guidelines for low exposure risk • Control and Alarm system will be implemented to ensure target parameters of treated wastewater are achieved prior to irrigation • Free chlorine will be dosed, monitored and controlled automatically, in the event the required concentration is not achieved the delivery valve will shut and water will be looped back to the Polishing Tank for re-dosing until reaching the required disinfection • The WWTP will have 1 days buffer capacity in the irrigation tank and a further 16 days capacity in the addition effluent storage dam
Monitoring	The Applicant proposed monitoring of wastewater, including for the following parameters: • E. Coli • Biochemical Oxygen Demand • Turbidity • Disinfection • pH • Total Nitrogen • Total Phosphorus
Management	• Ongoing operation and maintenance management will maintain efficient operation of the WWTP • Irrigation water will be tested weekly for nutrient load

Control	Description
	• Irrigation water will be monitored online for turbidity and disinfection (alarm in place) • No irrigation will be carried out during rainy periods • The irrigation area is citrus trees and kikuyu grass. The irrigation is sub-surface and therefore is a low risk to patrons. • Soil moisture probes will be installed to ensure no irrigation occurs when the soil is nearing field capacity.

Key findings

The Delegated Officer has reviewed the information regarding the impacts from the premises and has found:

1. *The groundwater has been estimated to be an average of 1.8 m bgl beneath the irrigation area. This data has been determined from the DWER monitoring bore hydrograph located 150m north of the irrigation area.*
2. *The underlying sand aquifer is expected to be permeable. The key risks to groundwater are expected to be leaching of nutrients. This will be limited to the key nutrients in treated wastewater being nitrogen and phosphorus.*
3. *The available information suggests that Mary Brook and Mary Brook Drain to the south west and south east are up-hydraulic gradient of the premises and are therefore not considered to be at risk.*
4. *The closest groundwater bore is 300m northwest from the proposed irrigation area. The irrigation area is underlain by sand and therefore is expected to be highly permeable. There is therefore a risk that irrigation water could reach the groundwater.*
5. *The WWTP buffer capacity is adequate to contain total effluent during rainfall periods with a minimum 5hrs resting time after a rainfall event to prevent over application and waterlogging of the irrigated area. There is a 16 day buffer for rainy days.*
6. *The irrigation area has an estimated average depth to groundwater of 1.8m bgl across the site. With safeguards including background groundwater monitoring and ongoing monitoring the risk of leachate migration can be reduced.*
7. *Irrigation should not cause waterlogging. Soil moisture probes will be installed to ensure waterlogging of the irrigation area does not occur.*
8. *Additional monitoring bores downstream and within the boundary of the irrigation area will need to be installed.*
9. *Irrigation with treated wastewater must occur only within the area designated in the works approval.*
10. Sufficient storage of wastewater is required when irrigation cannot occur or be tankered off-site.

Consequence

Based on the information detailed above the Delegated Officer has determined that the consequence from reuse of treated wastewater at the proposed irrigation area on the groundwater is ***Moderate***.

Likelihood of consequence

Based on the information detailed above the likelihood of the risk event occurring due to reuse of treated wastewater causing ***Moderate*** consequences is ***Possible*** as the event could occur at some time.

Overall rating

The Delegated officer has compared the consequence and likelihood ratings described above for the Risk Criteria and determined that the overall rating for the risk of seepage from reuse of treated wastewater impacting sensitive receptors is ***Medium.***

Appropriateness of Works Approval conditions

The conditions in the Issued Works Approval in Attachment 1 have been determined in accordance with DWER's *Guidance Statement on Setting Conditions*.

Condition Ref	Grounds
Infrastructure and equipment 1 and 2	Environmental compliance is a valid, risk-based condition to ensure appropriate linkage between the works approval and the EP Act. Condition 6 of the Works Approval Holder requires the installation of a 22.5 storage tank and the construction of an 838kL effluent dam to ensure sufficient storage of treated wastewater in the winter months prior to November 2019. The storage capacity is based on the supporting information provided in the application.
Reporting 3, 4, 5 and 6	These conditions are valid, risk-based and enable flexibility in operations. These conditions are valid and are necessary administration and reporting requirements to ensure compliance.
Emissions 7	This condition is valid, risk-based and consistent with the EP Act.
Monitoring 8, 9,10 and 11	Monitoring is necessary to validate that conditions are being complied with by the Works Approval Holder. Conditions 10 establishes criteria for wastewater quality criteria which must be met prior to irrigating. Conditions 8, 9 and 11 establish monitoring requirements for effluent and groundwater monitoring. These conditions are valid and are necessary administration and reporting requirements to ensure compliance.
Information – Record Keeping 12 and 13	These conditions are valid and are necessary administration and reporting requirements to ensure compliance.

DWER notes that it may review the appropriateness and adequacy of controls at any time, and that following a review, DWER may initiate amendments to the works approvals under the EP Act.

Operational controls

In addition to complying with the conditions of the Works Approval, The Works Approval Holder is expected to facilitate the operation controls listed in Table 20 during operation of the WWTP at the Premises.

Table 20: Operational controls

WWTP and associated infrastructure	• Undertake regular inspections and schedule maintenance of system processes as required to maintain efficient operation of the WWTP

Odour	• Monitor critical control points • Implement procedure for system failure events • Implement an odour complaint recording and investigation procedure
Wastewater overflow event	• Remove wastewater and solids to the maximum practicable amount • Wash the spill area to dilute any remaining wastewater and conduct it to a collection point/sump on site • Disinfect hard surfaces in high public exposure areas to reduce the risk to human health • All WWTP operators will be trained to carry out preventive maintenance and use operating procedures to stop escaping substances from entering the environment • The Works Approval Holder must ensure the WWTP operates within the provisions of *The Environment Protection (Water Quality) Policy 2003 (Water Quality Policy)* which prohibits the pollution of the stormwater system and natural waters
Biosolids and Sludge management	• Biosolids and sludge collected from the Premises is taken to an appropriately licensed facility for disposal

Specified actions

Table 21: Specified action

Emission	Regulatory control
Construction Noise	The construction activities must be undertaken subject to the provisions of the *Environmental Protection (Noise) Regulations 1997*.
Acid Sulfate Soils	The Works Approval Holder must ensure that if excavation for the installation of the WWTP occurs at a depth >4m bgl ASS management is conducted in line with DWER's *Treatment and management of soil and water in acid sulfate soil landscapes (June 2015).*

Consultation

Method	Comments received	DWER response
Application advertised on DWER website	None received	N/A
Direct interest stakeholders notified	Refer to Appendix 2	Refer to Appendix 2
Applicant notified of draft	Request to issue the Works Approval as soon as possible.	N/A

Conclusion

This assessment of the risks of activities on the premises has been undertaken with due consideration of a number of factors, including the documents and policies specified in this decision report (summarised in Appendix 3).

Based on this assessment, it has been determined that the Issued Works Approval will be granted subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

DWER notes that it may review the appropriateness and adequacy of controls at any time and that, following a review, DWER may initiate amendments to the approval under the EP Act.

Rebecca Kelly

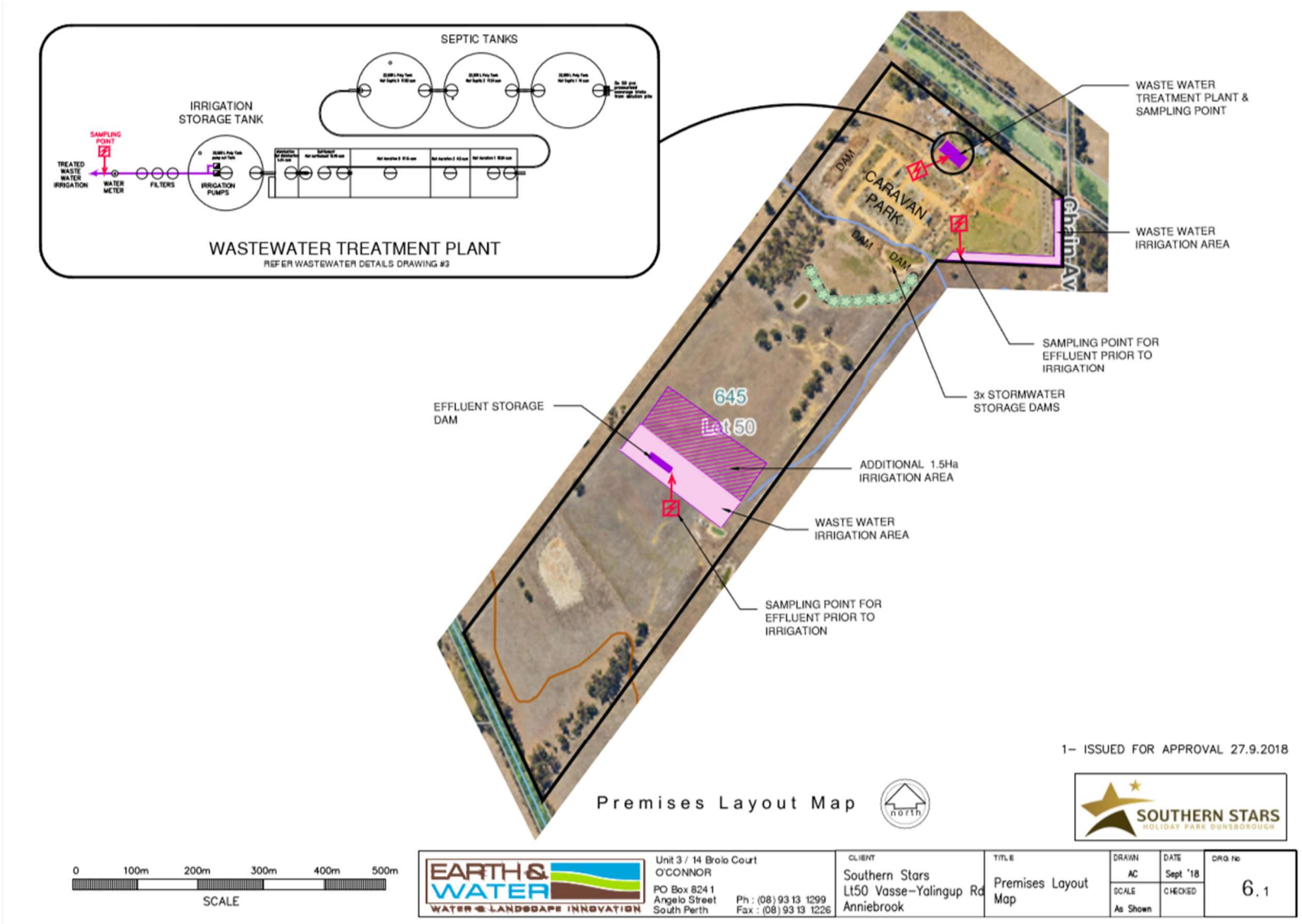
Digitally signed by Rebecca Kelly
Date: 2018.10.03 10:01:51 +08'00'

Rebecca Kelly
Manager Waste Industries
Delegated Officer under section 20 of the *Environmental Protection Act 1986*

Appendix 1: Premises maps

Figure 1: Premises Location

Figure 2: Premises Layout



Appendix 2: Summary of consultation comments

Application consultation

Person	Comment	DWER response
City of Busselton	No response	N/A
Department of Health	Approval in principle	Considered in application

Appendix 3: Key documents

Document title	In text ref	Availability
Works Approval application Southern Stars Holiday Park	W6155/2018/1	DWER records DER2018/000807-1
DER, July 2015. *Guidance Statement: Regulatory principles.* Department of Environment Regulation, Perth.	DER 2015a	accessed at www.dwer.wa.gov.au
DER, October 2015. *Guidance Statement: Setting conditions.* Department of Environment Regulation, Perth.	DER 2015b	
DER, August 2016. *Guidance Statement: Licence duration.* Department of Environment Regulation, Perth.	DER 2016a	
DER, November 2016. *Guidance Statement: Risk Assessments*. Department of Environment Regulation, Perth.	DER 2016b	
DER, November 2016. *Guidance Statement: Decision Making*. Department of Environment Regulation, Perth.	DER 2016c	