Emergency Response Plan

Berrimah Waste Stabilisation Ponds 2022

PowerWater

Document History

Revision	Purpose	Date	PWC
0.1	**Internal draft for review**	**15/03/2019**	**Wayne Sharp** **Di Rose** **Skefos Tsoukalis**
1.0	**Final version – D2019/131237**	**10/04/2019**	**DENR**
1.1	**Updated v1.0 to 2022**	**21/07/2022**	**Oliver Crick**

Emergency Contacts

Hazard	Combat Agency	Phone number
Medical Emergency	NT Ambulance	000
Fire	NT Fire Brigade	000
Bush Fire	NT Fire Brigade	000
	Local Rural Fire Service	000
Spill or Leak	DENR (pollution incident reporting)	1800 064 567
	NT Police	000
	NT Department of Health	(08) 8999 2400

If an emergency or incident of any description occurs, those listed below should be notified

Contact	Phone Number
Power and Water – Water Services General Manager	(08) 8985 7134
Power and Water – Water Services Operations/Service Delivery Senior Manager	(08) 8936 4641
Power and Water – Environmental Services Team	(08) 8985 7195
DEPaWS – Pollution incident reporting	1800 064 567
NT Department of Health	(08) 8999 2400
NT Worksafe	1800 019 115

Abbreviations and Glossary

Abbreviation	Meaning
Beneficial Use	The use of biosolids for any purpose which provides benefit without harming or threatening public health and safety or the environment.
Biosolids	Biosolids are sewage sludge treated to a standard acceptable for beneficial use. Biosolids have been treated in a way to reduce or eliminate health risks and improve beneficial characteristics.
BOD	Biochemical Oxygen Demand
BMP	Biosolids Management Plan
Biosolids products	Material containing any component of biosolids including undiluted biosolids in the form of liquid or dewatered material, or biosolids derived materials such as compost, lime amended biosolids or pellets.
Buffer Zone	An area of vegetated land between an area of biosolids application and a drainage line, creek, river or sensitive area.
Bund	A wall structure, usually formed with soil, designed to retain or exclude run-off.
Contaminant	Metals, organic compounds (including pharmaceutical and pesticides) and physical contaminants (such as plastics) occurring in biosolids and soils.
DENR	Department of Environment and Natural Resources (Administering Agency for WDLs and providing advice to NT EPA in relation to WMPC Act and pollution investigations)
DoH	Department of Health (Primary agency in relation to factors impacting on public health)
Enterococci	Intestinal enterococci are organisms that are excreted in human and animal waste.
EMP	Environmental Management Plan
NT EPA	Northern Territory Environment Protection Authority.
Groundwater	Water saturating the voids in rocks and soil.
Organic Material	Organic material (or organic matter) is matter that has come from a once-living organism; is capable of decay, or is the product of decay; or is composed of organic compounds.
Pathogens	Disease causing organisms.
PWC	Power and Water Corporation
Sensitive Area	Land areas which are consider to be of ecological, natural, cultural or heritage value and worthy of preservation.
Sewage	Water borne waste of human origin comprising faecal matter, greywater, urine or liquid household waste.
Surface Water	Any river, stream, lake, lagoon, swamp, wetland, unconfined surface water, dam or tidal water. A river or stream may be perennial or intermittent, flowing in a natural channel with an established bed or in an artificially modified channel which has changed the course of the stream.
Stabilisation	The processing of biosolids to reduce or eliminate the potential for putrefaction and thus reduce pathogens, vector attraction and offensive odours.
Stabilisation Grade	Grading category used to describe the quality of a biosolids product based on its microbiological characteristics, vector attraction and potential to generate offensive odours.
TSS	Total Suspended Solids
Water Table	The level below which the ground is completely saturated with water.
WDL	Waste Discharge Licence
WSP	Waste Stabilisation Pond
WwTP	Wastewater Treatment Plant - A processing facility that treats sewage and in the process produces biosolids and treated water or effluent (which can be treated further to use as recycled water) and minor residuals (screenings and grit).

Contents

1.Introduction

1.1. Background

The Berrimah Waste Stabilisation Ponds (WSPs) are located eight kilometres east of Darwin near the East Arm of Darwin Harbour. The WSPs were constructed in 1979 to service the Berrimah and East Arm industrial and commercial precinct; however most of the wastewater received is domestic sewage. The Berrimah WSPs currently cater for an equivalent population of approximately 2980, treating an average of 500 kilolitres of wastewater per day.

1.2. Treatment

WSPs offer a very cost-effective form of wastewater treatment as they are primarily driven by sunlight. The Berrimah WSPs consist of three ponds that operate in series. The first pond is a facultative pond that provides primary treatment. The second and third ponds are maturation ponds that perform secondary treatment (primarily pathogen and some nutrient removal). The treated effluent is then discharged into Bleesers Creek.

1.3. Facultative Ponds

Facultative ponds provide the initial physical settling of solids matter (primary treatment). This is followed by algal growth, which uses sunlight and oxygen to drive the initial breakdown of organic matter and the removal of nutrients in the wastewater. Well performing facultative ponds are often dark green due to the large numbers of micro-algae.

1.4. Maturation Ponds

Maturation ponds provide biological or secondary treatment of the wastewater. At Berrimah the maturation ponds are arranged in sequence and receive primary treated effluent from the facultative pond.

Their primary function is to remove pathogens, principally faecal bacteria and viruses prior to effluent discharge. Sunlight intensity, time and temperature are important factors in this process. The size and number of maturation ponds are important factors in determining the efficacy of pathogen removal.

1.5. Return to the Environment

WSPs provide a significant centralised treatment barrier to the nutrient and pathogen loads inherent in wastewater.

The Northern Territory Environment Protection Authority licenses the discharge from the Berrimah WSPs under Section 74 of the Water Act 1992 (NT) as Waste Discharge Licence (WDL) 146.

The treated effluent from the Berrimah WSPs is discharged via a gravity fed outfall pipe to a mangrove estuary in Bleesers Creek. Bleesers Creek eventually flows into the East Arm of Darwin Harbour.

2. Emergency Response and Troubleshooting

2.1. General

This section contains a summary of possible emergency events, some common problems and potential solutions for the effective management of WSP. This section will be continuously updated and operator knowledge will be captured to assist in the future and provide a solid basis for ~~the~~ new staff.

2.2. Environmental Emergencies

Major environmental emergencies which may be encountered at WSP site and may affect treatment efficiency are:

- Storm surge / heavy rainfall may lead to overflow of ponds. Spill / overflow should be managed as described in Section 2.3 below considering that the spilled water is highly diluted.
- Abnormal weather especially on the turn of seasons and in the second half of dry season may cause process upsets and lead to foul odours. Section 2.4 below provides a detailed troubleshooting guide and lists a number of options for remediating pond performance in such events.
- Illegal discharges (i.e. hydrocarbons) into the ponds may affect performance of the ponds and be damaging to the receiving environment upon discharge. Visual inspections undertaken as part of routine duties will assist with detection of potential illegal discharges, prompting remediation of the site. A description of actions related to various process failures are listed within Section 2.4 below.
- Bushfires may lead to contamination of ponds with ash thus reducing treatment efficiency (similar to oil sleek formation on the pond surface) and may result in limited access to site. Management of Bushfires should be as per Fire Management Procedure CONTROL0036. Fire should be extinguished using clean water, location of fire hydrants at each site is shown in the corresponding asset summaries. The use of pond water or firefighting chemicals in the vicinity of WSP is not preferred and a specific risk assessment has to be conducted to confirm whether this option is acceptable in each individual case.

2.3. Spill / Overflow / Seepage

Response to sewage spill / overflow / seepage should be as per Power and Water Corporation Sewage Spills / Overflows Work Instruction CONTROL0789. A quick reference sheet which includes instructions on assessment, escalation, containment, clean up and reporting is included in Appendix A.

Information on the receiving environments, likely water quality, site access and available flow control infrastructure is available within the site-specific Asset Summary (D2017/66416).

In the context of WSP, spill /overflow / seepage may occur as a result of:

- Failure of inlet structures resulting in raw sewage being released outside the primary pond;
- Blockage of inlet/outlet in each individual pond resulting in overflow from the upstream ponds;
- Exceedance of pond capacity in case of abnormally high inflow / rainfall or storm surge resulting in overflow of highly diluted sewage;
- Failure of pond walls resulting in seepage of raw and/or partially treated sewage

As a result, receiving environment may be polluted with:

- Nutrients, particularly nitrogen and phosphorus

- Pathogens (i.e., bacteria, viruses)
- Sediments
- Gross pollutants, including plastic, rags and organic matter

Containment of the sewage should in the first instance focus on:

- Elimination of human contact by fencing-off and setting up signage around the affected area, and
- Elimination of the spill spreading and causing further pollution

Table 1 below describes the best methods for elimination of further pollution.

Clean up requirements are dependent of site access and the type of environment which was affected but common activities may include:

- removal of gross pollutants such as paper and rags from the impacted area,
- use of sucker trucks to remove the bulk of polluting nutrients, pathogens, grease, etc dissolved in the spilled water
- wash down with clean water (may be also accompanied by removal of wash down using sucker trucks)
- application of lime and/or granular chlorine to further minimise the impact (application dependant on receiving environment)

For a more detailed explanation of clean up procedures for various receiving environments please refer to Appendix A.

All unauthorised discharges (discharges other than via an authorised discharge point) must be reported via Event Management System and accompanied by the Sewage Spill Overflow Log Sheet. Upon reporting within the Power and Water Event Management System, the Risk Assessment of the incident should take into account the quality and the quantity of the discharged sewage as well as the susceptibility of the receiving environment to the contaminants including the potential risk to animals and humans.

An operator on duty must immediately advise of any spill / overflow / seepage to the Treatment Coordinator, who will then follow the reporting protocol as per the Waste Discharge Licence requirements, also outlined in the Sewage Spills / Overflow Work Instruction CONTROL0789, resulting in a notification to Department of Environment Parks and Water Security (DEPaWS).

Table 1: Pollution Containment Methods

Source	Containment method
Any spill into environment	Use sand bags / spill kit booms / temporary bunds to prevent the spill from spreading away from the initially affected area
Raw sewage spill prior to entering primary pond	Set up diversion upstream of the problem area and direct raw sewage into primary pond, isolate and perform repairs in the problem area
Overflow from one of the ponds	Operate inlet / outlet flow control devices (if available) to minimise inflow and increase outflow from overtopping pond

	Set up bypass pipeline (may require use of portable pumps) from overflowing pond to the next pond in sequence Clean inlet / outlet structures of any blockages to reinstate normal flow Note that in case of storm surge the whole pond system may be inundated
Seepage from one of the ponds	Isolate and drain the pond as per normal maintenance regime, conduct structural assessment and rectify

2.4. Process Failures

In addition to daily checks performed by the operators, each pond performance is monitored continuously as agreed under the corresponding Waste Discharge Licence and summarised in the Wastewater Monitoring Program (CONTROL0420). Operations Engineering group is able to provide ongoing reports, and annual reporting to regulator is handled by the Assurance group.

Odour indicators

Use the odour identification wheel (Figure 1) to help you work out what you can smell, then check Table 2 for possible causes and mitigating actions. Make sure you also check the Visual Indicators and correlate odours with pond appearance.

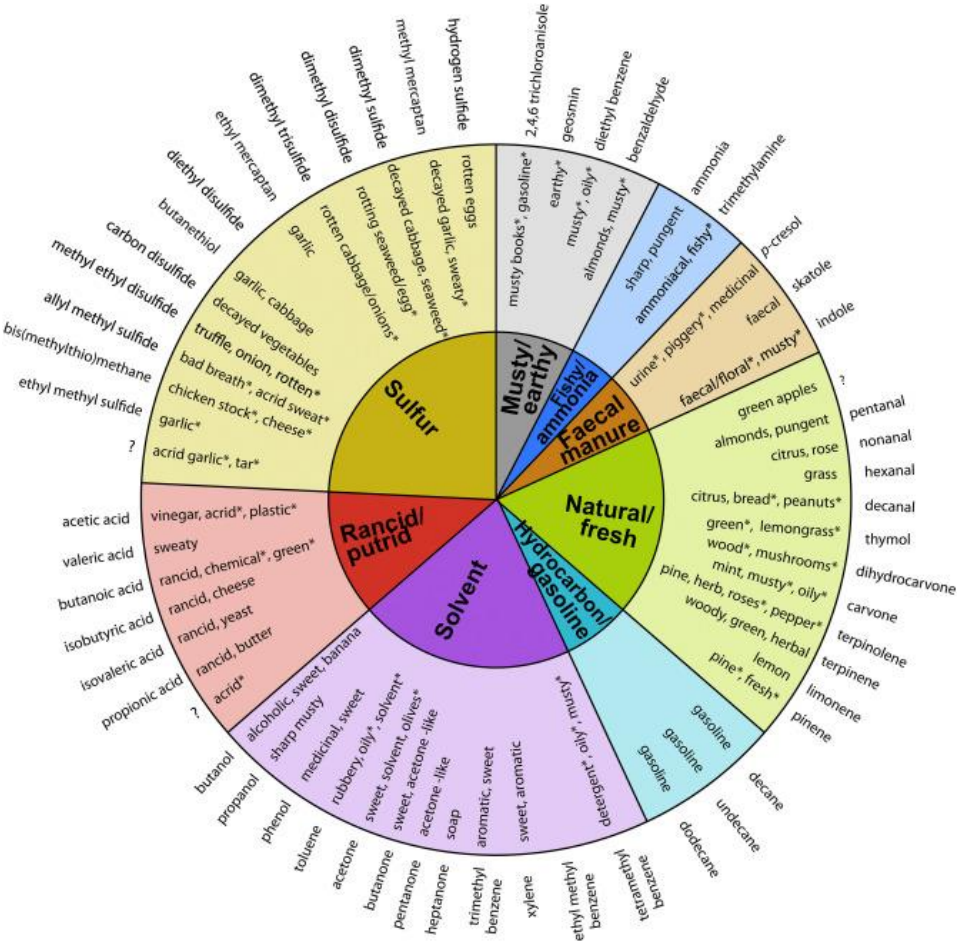


Figure 1: Odour identification wheel (http://www.odour.unsw.edu.au/research-highlights-3)

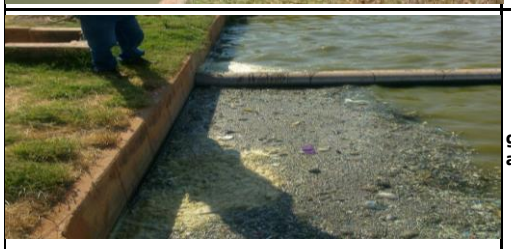
Table 2: Odour descriptions, causes and mitigating actions

DESCRIPTION	CAUSES	ACTION
"Sweet" earthy	Treatment working well	Can increase the raw sewage flow if necessary but be alert for deterioration
Hydrocarbon/gasoline	illegal trade effluent discharge	Look for oily rainbow film in raw sewage inlet or on surface of pond Investigate source with aid of Trade Waste Officers Consider use of an absorbant boom to remove floating hydrocarbons Consider increasing aeration to drive off volatile hydrocarbons Be alert for signs of distressed or ill wildlife, restrict wildlife access to pond area affected (consider bird scarer/ scarecrow) Increase monitoring in consultation with WQ group, as treatment performance may be affected if sufficient quantity of substance to kill algae & bacteria
Soapy / detergent	illegal trade effluent discharge OR vandalism (detergent dumped) or laundry (first dry day after extended rain)	Look for appearence of soapy foam (crisp white foam) around inlets and aeration equipment. Check raw sewage pH. If pH >8 likely to be detergent/laundry waste. Consider use of a dispersing agent (dosed into raw sewage inlet) if foam is in sufficent amount to blow out and cause issues for neighbours or is blocking light and affecting algal growth
Solventy (acetone/ medicinal/alcohol)	illegal trade effluent discharge	Investigate source with aid of Trade Waste Officers, consider whether illegal drug manufacture or industrial in source Consider Collection of a sample of raw sewage and get analysed for organics (GCMS scan) to identify solvent type and help with source ID Consider increasing aeration to drive off volatile hydrocarbons Be alert for signs of distressed or ill wildlife, restrict wildlife access to pond area affected (consider bird scarer/ scarecrow) Increase monitoring in consultation with WQ group, as treatment performance may be affected if sufficient quantity of substance to kill algae & bacteria
"Sharp" trade waste (acidic or solventy)	Illegal discharge – oil; pickling or plating solutions	Contact the operator on pump stations and ask if unusual colours observed in wells, review nearby painting activities in proximity to pump station Work with Trade Waste officers to pinpoint likely industrial areas/source and CCTV of industrial area Check raw sewage pH and conductivity. pH may be lower than usual (more acidic) conductivity may be higher than usual
DESCRIPTION	**CAUSES**	**ACTION**
Rancid / Putrid	Low flows causing severely anaerobic raw sewage, illegal trade effluent discharge or pump station clean down (fat cleaned off wet well walls), dead animals near or in the ponds	Review where odour is coming from - is it the raw sewage or fat/carcasses in or near the ponds themselves Examine the site for indications of dead wildlife If raw sewage is the cause : Review flow records. If flows low consider pump station operational settings changes - to minimise retention in the sewers. Check sewer crew maintenence activities Check septic tanker truck visit records Look for collected fat balls (likely grease trap or commercial kitchen waste) Check for presence of flesh fragments or blood (abbatoir/ home kill) Vinegary or yeasty (Brewery / winery waste or bakery waste) Investigate source with aid of Trade Waste Officers, consider whether likely sources could be abbatoir, home kill, bakery, restaurant, dumping of grease trap waste, milk or other dairy, brewery (yeasty)
Sulphur / rotten egg	Anaerobic conditions / Not enough oxygen	Review where odour is coming from - is it the raw sewage or the ponds themselves? Look for evidence of sludge belching from the bottom of the ponds / seasonal pond inversion Consider retention in trade waste pond, trickle feed into facultative pond to maintain DO, increase recirc from terminal ponds to increase DO, may need to consider supplementry aeration to speed biological breakdown - either mechanical or dosing of chemical oxidants into raw sewage or pump stations Check sludge depth by survey → desludge if excessive → add aerator short term (take care not to agitate excessively and suspend more bottom sludge) Contact WQ group to organise additional raw sewage BOD sampling → to confirm out of the ordinary loading → add aerator for short term Check stratification → use power boat to mix if practical → add mixer at mid depth for long term recovery
Musty / earthy (unpleasant)	Geosmin is the issue, caused by disturbed soil around pond or death of bacteria / cyanobacteria	Check for evidence of soil disturbance in the area. Geosmin is produced by the gram-positive bacteria *Streptomyces* and various cyanobacteria, and released when these microorganisms die. Check for evidence of cyanobacteria bloom (Blue green algae bloom) coming to an end - floating blue-green algal mat may be drying out with consequent death of algae and release of geosmin. Remove by skimming off or sucker truck algal mats - be aware of dangers of cyanobacteria toxin release on wildlife and humans
DESCRIPTION	**CAUSES**	**ACTION**
Fishy / ammoniacal	Raw sewage (septic or septage) OR bacteria / algae imbalance or overgrowth in the ponds	Check where smell is coming from to identify cause. If raw sewage: Review flow records. If flows low consider pump station operational settings changes - to minimise retention in the sewers. Check septic tanker truck visit records If ponds themselves : look for algal blooms, mats of dying algae or blue green algae (cyanobacteria) and remove, look for evidence jelly -like slimey mucilage Increase recirculation of higher DO desirable pond contents into affected area, increase DO mechanically if necessary to select against problem organisms
Faecal manure		Check where smell is coming from to identify cause. If raw sewage: Review flow records. If flows low consider pump station operational settings changes - to minimise retention in the sewers. Check septic tanker truck visit records If ponds themselves : look for floating sludge / evidence of anaerobic conditions Increase recirculation of higher DO desirable pond contents into affected area, increase DO mechanically if necessary

Visual Indicators

Compare your observations of Colour and Scum/Foam with the pictures on the following pages to help you work out what you are seeing, then check the relevant advice on the following pages. Make sure you refer back to the previous section to correlate your visual observations with any odours you can smell.

Table 3: Visual indicators of pond performance

LOOKS LIKE	DESCRIPTION	CAUSES	ACTIONS
	**pinky grey (in the photo see also old floating sludge - old sludge determined due to green algae on it, not freshly risen sludge)**	**If smells "bad" overloaded pond, evidence of belched anaerobic sludge at some time previous**	Look for evidence of sludge belching from the bottom of the ponds / seasonal pond inversion Consider retention in trade waste pond, trickle feed into facultative pond to maintain DO, increase recirc from terminal ponds to increase DO, may need to consider supplementry aeration to speed biological breakdown - either mechanical or dosing of chemical oxidants into raw sewage or pump stations Check sludge depth by survey → desludge if excessive → add aerator short term (take care not to agitate excessively and suspend more bottom sludge) Contact WQ group to organise additional raw sewage BOD sampling → to confirm out of the ordinary loading → add aerator for short term Check stratification → use power boat to mix if practical → add mixer at mid depth for long term recovery
	**red / purple (in the photo see also old collected floating sludge - old sludge determined due to green algae on it, not freshly risen sludge)**	**Check if pond overloaded. If not cause of colour may be red algae bloom or Daphnia (water fleas stressed due to lack of food) If smells "bad" overloaded pond, evidence of belched anaerobic sludge at some time previous**	If cause identified as red algae or Daphnia, no action necessary Look for evidence of sludge belching from the bottom of the ponds / seasonal pond inversion Consider retention in trade waste pond, trickle feed into facultative pond to maintain DO, increase recirc from terminal ponds to increase DO, may need to consider supplementry aeration to speed biological breakdown - either mechanical or dosing of chemical oxidants into raw sewage or pump stations Check sludge depth by survey → desludge if excessive → add aerator short term (take care not to agitate excessively and suspend more bottom sludge) Contact WQ group to organise additional raw sewage BOD sampling → to confirm out of the ordinary loading → add aerator for short term Check stratification → use power boat to mix if practical → add mixer at mid depth for long term recovery
	**greeny tan/brown - cloudy**	**pond may be trending towards or recovering from overloading, could be wash in of clay material**	Eliminate clay as source of colour and cloudiness by checking for soil disturbence in sewer catchment or in area surrounding ponds. Once this is eliminated , check for bad odours and react accordingly, monitor DO and check pond loading to ensure recovery
	**green tan/browny - accumulated scum**	**pond may be trending towards overloading, scum in photo looks fatty. Additionally screening poor (debris)**	Look for evidence of sludge belching from the bottom of the ponds / seasonal pond inversion Consider retention in trade waste pond, trickle feed into facultative pond to maintain DO, increase recirc from terminal ponds to increase DO, may need to consider supplementry aeration to speed biological breakdown - either mechanical or dosing of chemical oxidants into raw sewage or pump stations Check sludge depth by survey → desludge if excessive → add aerator short term (take care not to agitate excessively and suspend more bottom sludge) Contact WQ group to organise additional raw sewage BOD sampling → to confirm out of the ordinary loading → add aerator for short term Check stratification → use power boat to mix if practical → add mixer at mid depth for long term recovery
	**tan/grey with fresh floating scum**	**If smells "bad" overloaded pond, evidence of belched anaerobic sludge**	Look for evidence of sludge belching from the bottom of the ponds / seasonal pond inversion Consider retention in trade waste pond, trickle feed into facultative pond to maintain DO, increase recirc from terminal ponds to increase DO, may need to consider supplementry aeration to speed biological breakdown - either mechanical or dosing of chemical oxidants into raw sewage or pump stations Check sludge depth by survey → desludge if excessive → add aerator short term (take care not to agitate excessively and suspend more bottom sludge) Contact WQ group to organise additional raw sewage BOD sampling → to confirm out of the ordinary loading → add aerator for short term Check stratification → use power boat to mix if practical → add mixer at mid depth for long term recovery
	**floating mat of algae**	**algae or cyanobacteria bloom (overgrowth)**	Mixing needed for horizontal and vertical directions Too many maturation ponds → consider closing Check that inlet structures are not blocked and are structurally sound Lower outlet weir to reduce retention time within any specific pond and promote natural flow between ponds. Initiate pumping or other measures promoting water movement. Initiate / increase recirculation to dilute incoming raw sewage.
	**mineral oil (and risingsludge)**	**illegal trade effluent (hydrocarbons) plus sludge accumulation**	Look for oily rainbow film in raw sewage inlet or on surface of pond Investigate source with aid of Trade Waste Officers Consider use of an absorbant boom to remove floating hydrocarbons Consider increasing aeration to drive off volatile hydrocarbons Be alert for signs of distressed or ill wildlife, restrict wildlife access to pond area affected (consider bird scarer/ scarecrow) Increase monitoring in consultation with WQ group, as treatment performance may be affected if sufficient quantity of substance to kill algae & bacteria Desludge as appropriate (issue not related to oil entry to pond, just due for a desludge)

LOOKS LIKE	DESCRIPTION	CAUSES	ACTIONS
	**dry crusty layer of fatty scum (rancid smell) or dry crusty layer of dried belched scum (putrid smell)**	**scum / risen sludge has been allowed to accumulate and dry out**	Prevention is better than cure (too late now!) Mechanical removal with scrapper or sucker truck
	**whitish grey (non-greasy) scum of dead "bleached looking" algae cells**	**Mineral oil or other toxin has killed algae**	Investigate source with aid of Trade Waste Officers, consider whether illegal drug manufacture or industrial in source Consider Collection of a sample of raw sewage and get analysed for organics (GCMS scan) to identify solvent type and help with source ID Consider increasing aeration to drive off volatile hydrocarbons Be alert for signs of distressed or ill wildlife, restrict wildlife access to pond area affected (consider bird scarer/ scarecrow) Increase monitoring in consultation with WQ group, as treatment performance may be affected if sufficient quantity of substance to kill algae & bacteria If possible recirculate from a healthy pond to "reseed" affected pond with healthy microorganisms (bacteria and algae)
	**crisp white foam**	illegal trade effluent discharge OR vandalism (detergent dumped) or laundry (first dry day after extended rain)	Look for appearence of soapy foam (crisp white foam) around inlets and aeration equipment. Check raw sewage pH. If pH >8 likely to be detergent/laundry waste. Consider use of a dispersing agent (dosed into raw sewage inlet) if foam is in sufficent amount to blow out and cause issues for neighbours or is blocking light and affecting algal growth
	**clear sparkling green with healthy wildlife population**	**No problem except...check for elevated E.coli and ammonia in particular in final effluent (review all FE results)**	Presence of birds may be introducing excessive nitrogen and bacterialogical load in final pond. Bird scarer or scarecrow if practical or may need to closely monitor and modify disinfection method
	**clear sparkling green**	**No problem**	
	**clear sparkling green with floating scum of bleached looking algae**	**recovery from bloom, also elevated water temperatures may affect non-motile algae**	Check temperatures Introduce mixing if indicated as necessary
	**pea soup green or streaks of greeny-blue**	**Blue-green algae (cyanobacteria) bloom May be due to too long retention time (pond too large in surface area or depth or both)**	Surface agitation Investigate modifications to flow pattern and consider taking some ponds offline if necessary to maintain movement through the system Increase recirculation of higher DO desirable pond contents into affected area, increase DO mechanically if necessary to select against problem organisms
	**debris making its way through the system (& see duckweed below)**	**poor screening removal, inlet works design or capacity issues**	Manually remove debris Improve inlet works For manually cleared screens, increase screenings removal frequency
	**duckweed**	**high nutrients, overloaded ponds**	Surface agitation Reduce recirc to prevent re-seedingAerate to reduce loading

Sampling Problems and Solutions

Table 4: Sampling problems and solutions

Scenario	Problem	Possible solution
Sampling	Daily variation in results due to biological process	pH, conductivity, total dissolved solids and dissolved oxygen tests to be undertaken at the same time as samples taken – and to be sampled at same time of day if possible
	Daily variation in water quality - single grab sample is unrepresentative	1. Sample at the same time of day 2. If possible use a 24 hour sampler 3. Ensure outlet scum board is set at 50mm below normal static water surface
	The cost of full sampling is too expensive.	Sampling program review
	Contamination: • Difficult to keep sampling kits clean when prime duty is undertaking O&M • Scum or duck weed at the sampling point	• Clean sampling equipment as needed, particularly for pathogen analysis • Move duckweed the day before sampling – i.e. with use of aerator
	Delays: Sewage is often at 30°C, where biological action is twice as rapid as at 20°C leading to very different data	Storing the sample in ice will slow down the bacteriological activity
Pond operation	No discharge flow	• Check for blockages • Monitor system

3. Appendices

Appendix A – Overflow response

Table 5: Overflow response action sequence

Step	Action	
Step 1: Assess		
	• Where there is potential that the spill/ overflow may have contaminated any waste supply infrastructure, isolate water infrastructure and contact your supervisor/ manager. • Identify any immediate hazards such as traffic or access by members of the public. • If the public can access the spill (e.g. accidently walking through it), fence off and put up signage. • Keep unauthorised vehicles, personnel and the public at a safe distance. • Confirm the extent and size of the spill. • Identify the receiving environment (i.e. swimming beach, mangrove community, fishing/ shellfish collection area).	
Step 2: Initial incident notification		
	• Notify your supervisor or co-ordinator immediately	
Step 3: Contain		
	Containment methods will be dependent upon the size of the overflow, location, the receiving environment and seasonal weather events. Consider the following methods where containment is possible: • Diversion of upstream flows using pipe plugs and vacuum trucks • Bypass pumping and/ or use of bypass pipeline • In sewer storage or dedicated or temporary overflow points • Temporary generators or pumps • Sand bagging or spill kit booms • Use of temporary weirs or bunds	
Step 4: Clean up		
Receiving environment	**Definitions**	**Clean Up Procedures**
Mangroves and Creeks	Various types of trees and shrubs that grow in saline coastal sediment and are subject to tidal level changes. Fresh Creek (stream): A body of freshwater that will end up in a river or the ocean. Tidal Creek: a portion of a stream this is affected by ocean tides.	Clean up procedures are only applicable during low tide. • If low tide and safe to do so, remove any gross contamination (including paper, rags, etc.) from impacted area, place in a robust plastic bag and dispose of appropriately. • Wash down entire area where spill has occurred with clean water. • In consultation with the Department of Health – Environmental Health (1800 095 646) where there is potential for impact to a sensitive receiving environment (as defined in the Sewage Spill/Overflow Log Sheet) undertake appropriate: – Containment and control; and – Public communication notifications, e.g. Signage.
Stormwater Drain – Sealed and Unsealed	Takes excess rain and discharges into Harbour or wet land via buried pipe work or open channels.	• Remove any gross contamination (including paper, rags, etc.) from impacted area, place in a robust plastic bag, and dispose of appropriately. • If practicable, place sandbags to contain wash down water. • Wash down the entire area with clean water and disinfecting product. • Use sucker truck to remove water from clean up area.

Marina (Cullen Bay, Tipperary Waters, Bayview)	A dock with moorings for boats that was built and not subject
	to tidal changes.
		• Remove any gross contamination (including paper, rags, etc.) from impacted area, place in a robust plastic bag and dispose of appropriately
		• Depending on tides, consider flushing the marina (following consultation with all relevant stakeholder)
		• Contact the Marina/ Lock master
		• In consultation with the Department of Health – Environmental Health (1800 095 646) undertake appropriate:
		  • Containment and control
		  • Public communication notification e.g. signage

Unsealed land (beaches, parks, open land and gardens) and public footpaths
Bushland
	An area of open space provided for recreational use and/or landscaped/maintained.
	Land which supports remnant vegetation or land which is disturbed but still remains a predominance of the original floristic and structure.
		• Remove any gross contamination (including paper, rags, etc.) from impacted area, place in a robust plastic bag, and dispose of appropriately.
		• Where ponding has occurred, apply lime or granular chlorine until surface ponding is eliminated and then apply 50mm imported topsoil. On private land discuss with landowner
		• In consultation with the Department of Health – Environmental Health (1800 095 646) Where practical, restrict access to the contaminated area. Measures may include:
		  • Installation of barrier fencing around any contaminated area (leave in place for 5 days post clean up)
		  • Installation of advisory signage.
		• On private property, advise landholders (if applicable) not to enter affected areas for a minimum of 5 days after clean up.

Step 5: Reporting		
Step 5: Reporting	Spills or overflows are to be recorded using the Sewage Spill Overflow Logsheet. A copy of this can be obtained from the following locations: • Power and Water intranet • Your supervisor • Environmental Services Regulatory reporting to be undertaken as per Waste Discharge Licence requirements. IMPORTANT: All spills must be reported within the Event Management System.	

Contact

Name – Title

Business Unit

Phone or Email

powerwater.com.au

PowerWater