



Northern  
Territory  
Government

## WASTE DISCHARGE LICENCE

(Pursuant to section 74 of the *Water Act*)

### Licence Details

<b>Licence Number:</b>	<b>WDL148-06</b>
Registered Business Address:	Level 2, Mitchell Centre 55 – 59 Mitchell Street Darwin NT 0800
ABN:	15 947 352 360
Premises Address:	80 Catalina Road Marlow Lagoon, Northern Territory Lot 1111, Location Code 590
Anniversary Date:	31 October
Commencement Date:	1 November 2017
Amendment Date:	
Expiry Date:	31 October 2019
<b>Licensed Activity</b>	The discharge of wastewater from the Palmerston Waste Stabilisation Ponds (WSPs) to Myrmidon Creek and thereafter Darwin Harbour subject to the licence conditions (appendices 6 and 7).

# WASTE DISCHARGE LICENCE (WDL 148-06)

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### INFORMATION ABOUT THIS LICENCE

#### Duration of licence

- This licence will remain in force until its expiry date, it is surrendered by the licensee, or until it is suspended or revoked by the Controller of Water Resources.
- The licensee must notify the Northern Territory Environment Protection Authority (Adminstrating Agency) within 14 days after ceasing to conduct the activity.
- The licensee may surrender the licence to the Adminstrating Agency.

#### Amendment, Modification or Revocation of licence (section 93 of the *Water Act*)

- As set out in section 93 of the Water Act, the Controller of Water Resources may, by notice:
  - amend or modify the terms and conditions of a licence;
  - revoke a licence; or
  - suspend a licence.

#### Public Register

- A copy of waste discharge licences and any plans for environmental management, reports, submissions or documents required as a condition of a waste discharge licence, will be placed on a register.
- A copy of the Annual Return and Monitoring Report will be placed on the register.
- The Adminstrating Agency makes this register freely available from the Adminstrating Agency website.

#### Environmental Interests

- This section highlights the beneficial uses as declared under the *Water Act* and the sensitivity of the surrounding land use and environment associated with the location of the approved activity.
  - Declared beneficial uses and or water quality objectives are:  
Declaration of Beneficial Uses and Objectives, Darwin Harbour Region, Northern Territory Government Gazette No. G27, 7 July 2010.
  - Sites of Conservation Significance, SOC Number 6, Darwin Harbour.

#### Cultural Interests

- It is the licensee's responsibility to contact the Aboriginal Areas Protection Authority, appropriate land council or other governing body and ensure that any Authority Certificates required as a result of conducting the licenced activity are obtained and complied with.

### RULES FOR INTERPRETING THE CONDITIONS OF THIS LICENCE

- Where there is a discrepancy between the conditions of this licence and any plan, standard, guideline or other document referred to in this licence, the conditions of this licence prevail to the extent of the inconsistency.
- Any reference to any standard (Australian or international) in this licence means the relevant

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parts of the current version of that standard.

- A reference to any guideline or code of practice (or to the relevant parts of any guideline or code of practice) in this licence means the current version of the guideline or code of practice.
- Under section 76 of the *Water Act*, any contravention of or failure to comply with this licence by the licensee may be an offence.
- In this licence, unless the contrary intention appears, words that are defined in the *Water Act* are intended to have the meaning given to them in that Act.

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### LICENCE CONDITIONS

#### GENERAL

1. The licensee must ensure the contact details recorded with the Administating Agency for this licence are correct at all times.
2. The licensee must at all times have a 24 hour emergency contact.
3. The licensee must notify the Administating Agency prior to making any operational change that will cause, or is likely to cause, an increase in the potential for environmental harm.
4. The licensee must cause clear and legible signage, in English, to be displayed in a prominent location at each public entrance to the premises that includes the following details; within six months of commencement of this licence:
  - 4.1. waste discharge licence issued under the *Water Act*; and
  - 4.2. 24 hour emergency contact .
5. The licensee must cause a copy of this licence to be available for inspection by any person, in hard copy form, at the registered business address.
6. The licensee must provide to the Administating Agency, within 10 business days of a request, a copy of any document, monitoring data or other information in relation to the activity, in the format requested by the Administating Agency.
7. All notices, reports, documents or other correspondence required to be provided as a condition of this licence, unless otherwise specified as a condition of this licence, must be provided in electronic form by emailing [waste@nt.gov.au](mailto:waste@nt.gov.au).
8. The licensee must, for the duration of this licence, implement, maintain and follow a Consultation and Communication Plan which includes a strategy for communicating with persons who are likely to have a real interest in, or be affected by, the activity.
9. The licensee must submit to the Administering Agency the consultation and communication plan within two months from the commencement date of this licence
10. The licensee must operate and maintain a community feedback number.
11. The licensee must display the community feedback number:
  - 11.1. where the licensee has a website, in a prominent location on the licensees website;
  - 11.2. in the Consultation and Communication Plan; and
  - 11.3. in other publicly available documents relating to the activity.
12. The licensee must maintain a Complaint Log for all complaints received by the licensee in relation to the activity.
13. The licensee must ensure that the Complaint Log includes, for each complaint received by the licensee, the following information:
  - 13.1. the date and time of the complaint;
  - 13.2. the contact details of the complainant if known;
  - 13.3. the nature of the complaint and events giving rise to the complaint;
  - 13.4. prevailing weather conditions at the time of the complaint;
  - 13.5. the action taken in relation to the complaint;

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- 13.6. any conclusions the licensee made regarding the cause of the complaint; and
- 13.7. any preventative measure put in place to prevent reoccurrence.

- 14. The licensee must implement, maintain and follow an Emergency Response Plan that addresses procedures for responding to emergencies associated with the activity that may cause environmental harm.

### EARLY SURRENDER OF LICENCE

- 15. Any reports, records or other information required or able to be provided by the licensee under this licence must be submitted to the Administrating Agency prior to the licensee surrendering the licence. If the date on which a report, record or other information is required falls after the date the licensee requests to surrender this licensee, the licensee must provide the report, record or information as far as possible using data available to the licensee up to and including the date the request to surrender the licence is made.

### OPERATIONAL

- 16. The licensee must, without limiting any other condition of this licence in conducting the Activity do all things reasonable and practicable to ensure the Activity does not adversely affect the Declared Beneficial Uses and Objectives as declared from time to time, including those applying to:
  - The Darwin Harbour Region (Northern Territory Government Gazette No. G27, 7 July 2010).

### DISCHARGES

- 17. This licence authorises wastewater to be discharged to water from the authorised discharge point(s) as identified in Table 1 and Appendix 1, and as otherwise allowed in accordance with the conditions of this licence.

<b>Authorised Discharge Point</b>	<b>Description</b>	<b>Location</b>
Myrmidon Creek Outfall SPAEOP	End of pipe for outlet from Pond 5 (Maturation Pond 4)	Latitude: -12.50370 Longitude: 130.94861

- 18. The licensee must ensure that any wastewater discharged from the Authorised Discharge Point in Table 1 does not:
  - 18.1. cause the presence of any visible matter, floating oil and grease or petroleum hydrocarbon sheen or scum, or litter or other objectionable matter in receiving waters;
  - 18.2. cause or generate odours which would adversely affect the use of receiving waters;
  - 18.3. cause algal blooms in receiving waters;
  - 18.4. cause visible change in the behaviour of fish or other aquatic organisms;
  - 18.5. cause mortality of fish or other aquatic organisms; or
  - 18.6. cause adverse impacts on plants in receiving waters.

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### MONITORING

19. The licensee must conduct surface water and discharge water monitoring in accordance with Appendices 1 to 3 inclusive.
20. The licensee must conduct sediment monitoring in accordance with Appendix 1 and 3.
21. The licensee must for all terrestrial sampling points required by this licence:
  - 21.1. install, maintain and provide appropriate identification signage so that they are easily identifiable at all times; and
  - 21.2. maintain safe access and egress, as is reasonably practicable.
22. The licensee must ensure that all samples and field environmental data are representative of the conditions at the time of sampling.
23. The licensee must ensure that all samples and field environmental data are collected in accordance with recognised Australian Standards and guidelines (such as AS/NZS 5667, ANZECC/ARMCANZ).
24. The licensee must ensure that all monitoring samples are analysed at a laboratory with current NATA accreditation or equivalent, for the parameters to be measured.
25. The licensee must ensure that, for each sample collected in accordance with the activity the following information must be recorded and retained:
  - 25.1. the date(s) on which the sample was collected;
  - 25.2. the time(s) at which the sample was collected;
  - 25.3. the point(s) at which the sample was collected;
  - 25.4. the name of the person who collected the sample;
  - 25.5. the chain of custody forms relating to the sample(s);
  - 25.6. any field measurements and analytical results relating to the sample; and
  - 25.7. laboratory quality assurance and quality control documentation (where laboratory analysis is required).

### RECORDING AND REPORTING

26. The licensee must keep records of all non-compliances with this licence. These records must be adequate to enable the licensee to comply with the non-compliance notification conditions of this licence.
27. The licensee must notify the Administrating Agency of any non-compliance with this licence by emailing [waste@nt.gov.au](mailto:waste@nt.gov.au), as soon as practicable after (and in any case within 5 Business days after) first becoming aware of the non-compliance.
28. The licensee must include in the notification of non-compliance the following information:
  - 28.1. when the non-compliance was detected and by whom;
  - 28.2. the date and time of the non-compliance;
  - 28.3. the actual and potential causes and contributing factors to the non-compliance;
  - 28.4. the risk of environmental harm arising from the non-compliance;
  - 28.5. the action(s) that have or will be undertaken to mitigate any environmental harm arising from the non-compliance;
  - 28.6. corrective actions that have or will be undertaken to ensure the non-

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compliance does not reoccur;

28.7. if no action was taken, why no action was taken; and

28.8. If further investigation is necessary, the date the licensee will submit an investigation report to the Administering Agency.

29. The licensee must comply with the requirements of section 14 of the *Waste Management and Pollution Control Act*.
30. The licensee must as soon as practicable and in any case within 5 Business days notify the Administering Agency of any exceedances of the surface water reporting limits specified in Appendix 4.
31. The licensee must provide to the Administering Agency a Monitoring Report not less than 30 Business days prior to the anniversary date of this licence, for each year of this licence.
32. The licensee must ensure that each Monitoring Report:
- 32.1. is prepared in accordance with the requirements of the NT EPA 'Guideline for Reporting on Environmental Monitoring';
  - 32.2. includes a tabulation of all monitoring data required as a condition of this licence;
  - 32.3. includes long-term trend analysis of monitoring data to demonstrate any environmental impact associated with the activity over a minimum period of six years (where the data is available);
  - 32.4. assess water quality in accordance with Appendix 5 and sediment quality in accordance with Appendix 3; and
  - 32.5. report on the following parameters associated with wastewater discharge:
    - total discharge (ML/year);
    - total biochemical oxygen demand (tonnes/year)
    - total phosphorous (tonnes/year); and
    - total nitrogen (tonnes/year).
33. The Administering Agency may require the licensee to revise or amend and resubmit any Monitoring Report. Where the Administering Agency requires the Monitoring Report to be resubmitted, the licensee must submit it to the Administering Agency by the date specified by the Administering Agency.
34. The licensee must submit a completed Annual Return within 10 business days prior to each anniversary date of this licence and within 30 Business days prior to the licence expiry date.

### PERFORMANCE IMPROVEMENT

35. The licensee must progress the actions identified in the WDL 148 Palmerston Waste Stabilisation Pond Improvement Plan 2017 (Improvement Plan) or as revised in accordance with condition 36.
36. The licensee must submit a revised Improvement Plan for the Activity within six months from commencement date for this licence that:
- 36.1. revises the prioritisation of Actions 6.3 and 6.4 in Table 3 of the Improvement Plan that would complete the reviews of facultative and maturation pond and process hydraulics;

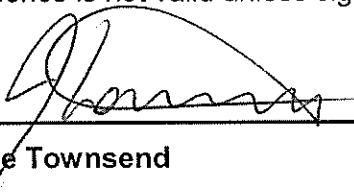


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- 36.2. incorporates a new Action in Table 3 of the Improvement Plan that provides for an investigation and report on improved monitoring of pond temperature inversions;
  - 36.3. incorporates a new Action in Table 3 of the Improvement Plan that investigates and reports on options to further limit gross pollutants in the immediate discharge area; and
  - 36.4. provides timelines for completion of Actions 6.3 and 6.4 and new actions incorporated in accordance with condition 36.2 and 36.3 prior to the licence expiry date.
37. Within one year from the commencement date of this licence, the licensee must develop a plan to conduct further investigations to better characterise the effluent load of litter from the authorised discharge point.
  38. The licensee must submit an application for the issue of a WDL for the licensed activity a minimum of 60 business days prior to the licence expiry date.
  39. The application for a WDL must be accompanied by:
    - 39.1. an updated Environmental Risk Assessment which considers the impacts of the discharge on the receiving environment and the relevant beneficial uses; and
    - 39.2. an updated Improvement Plan that identifies key actions to facilitate improvements to the Palmerston Waste Stabilisation Ponds within specified timeframes that are consistent with the recommended improvements for the site.

### END OF LICENCE CONDITIONS

This licence is not valid unless signed below:



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**Joanne Townsend**

Controller of Water Resources

Dated the 30 October 2017

### END NOTES

**This licence supersedes WDL 146-05 which was issued 1 November 2015**

WDL 148-04 was issued on 1 November 2013

WDL 148-03 was issued on 12 August 2013 (amendment to WDL 148-02)

WDL 148-02 was issued on 22 March 2013 (amendment to WDL 148-01)

WDL 148-01 was issued 1 November 2011

WDL 148 was issued 13 October 2006

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### DEFINITIONS

In this licence, unless a contrary intention appears:

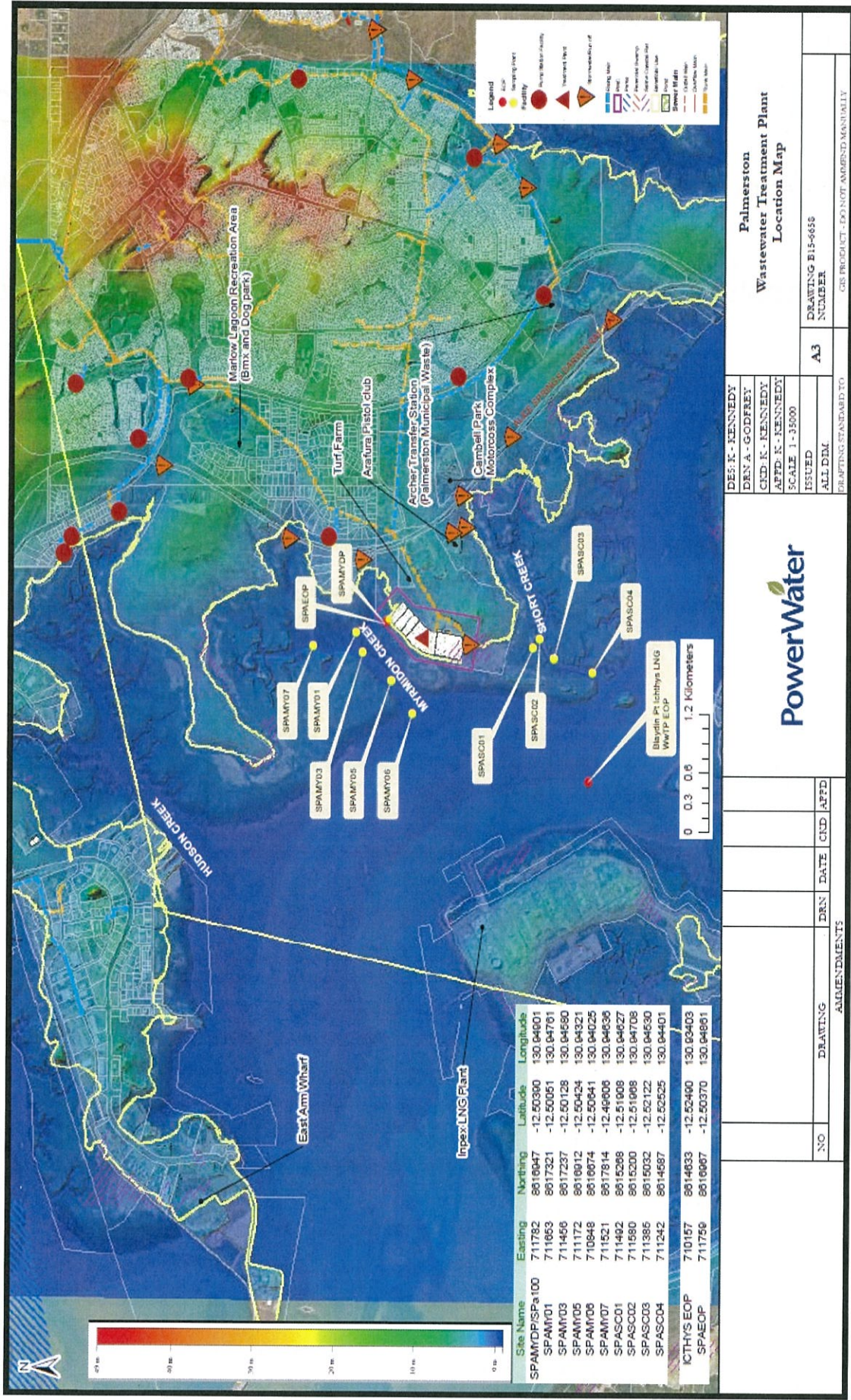
Term	Definition
24 hour emergency contact	the phone number of a person who can be contacted at any time and be capable of responding to and providing information about any incident associated with the activity.
Activity	the licenced activity as described on the covering page of this licence.
Annual Return	A prescribed format for demonstrating and reporting compliance with the conditions of this licence.
ANZECC/ARMCANZ	Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, 2000: National Water Quality Management Strategy: <i>Australian Guidelines for Water Quality Monitoring and Reporting</i> .
Business days	a day not Saturday, Sunday or a public holiday, in the Northern Territory.
Community feedback number	a telephone number enabling members of the public to contact, at any time, a person or voice mail system that can accept, on behalf of the licensee, enquiries or complaints about the activity, and to which the licensee must respond.
Complaint Log	a register of complaints to be maintained by the licensee that records the details of each complaint received in relation to the activity.
Consultation and Communication Plan	a written plan documenting proposed consultation and communications for the activity before, during and after the activity which includes a strategy for communicating with members of the public who are likely to have a real interest in, or be affected by, the activity.
Contact details	includes the 24 hour emergency contact, and name, position title and phone number of a representative of the licensee who can be contacted about the licence and activity.
Discharges	allow a liquid, gas or other substance to flow out from where it has been confined.
Emergency Response Plan	a written plan documenting the licensee's procedures for responding to emergencies caused by, resulting from or associated with the activity and that may cause environmental harm.
Environmental harm	any harm to or adverse effect on, or potential harm to or potential adverse effect on, the environment
Incident	Includes: (a) an accident, emergency or malfunction; and (b) a deliberate action, whether or not that action was taken by the person conducting the activity in the course of which the incident occurred.
NATA	National Association of Testing Authorities, Australia.
Non-compliance	failure or refusal to comply, whether by act or omission, with the conditions of this licence.
Non-compliance notification	a prescribed format for notifying the Administating Agency of a non-compliance.
Pollute	in relation to water, means directly or indirectly to alter the physical, thermal, chemical, biological or radioactive properties of the water so as to render it less fit for a prescribed beneficial use for which it is or may reasonably be used, or to cause a condition which is hazardous or potentially hazardous to:

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<b>Term</b>	<b>Definition</b>
	(a) public health, safety or welfare; (b) animals, birds, fish or aquatic life or other organisms; or (c) plants.
Premises	the premises identified in this licence which includes equipment, plant and structures, whether stationary or portable, and the land on which premises are situated.
Public entrance	access to the premises that is utilised by the public.
Waste	Includes matter or a thing, whether wholly or partly in a solid, liquid or gaseous state, which, if added to water, may pollute the water.
Wastewater	water that contains a contaminant or waste.
Water	means water, whether or not it contains impurities.
WMPC Act	the Northern Territory <i>Waste Management and Pollution Control Act</i> .

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Appendix 1: Location Map for Sampling Sites and Authorised Discharge Point



**Palmerston Wastewater Treatment Plant Location Map**

DES: K. KENNEDY  
 DRN: A. GODFREY  
 CKD: K. KENNEDY  
 APFD: K. KENNEDY  
 SCALE: 1:35000  
 ISSUED: ALL/DIM  
 DRAFTING STANDARD TO: GRIP PRODUCT - EOP-NOT-AMENDMENTALLY

NO	DRAWING	DRN	DATE	CKD	APFD

ISSUED: ALL/DIM

DRAWING B15-6638

NUMBER

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**Appendix 2: Surface Water and Discharge-Monitoring Plan**

		Sample Locations <sup>a</sup>				
		Discharge	Surface Water - Myrmidon Creek			
Site Code	SPAMYDP (SPa100)	SPAMY01	SPAMY03	SPAMY05	SPAMY06	SPAMY07
<b>Indicator</b>						
Physio-chemical parameters						
Flow		NR				
pH	F	M				
Electrical conductivity						
Dissolved oxygen						
Temperature						
Turbidity						
Total suspended solids	M					
Biological Parameters						
Biochemical oxygen demand		M				
Chlorophyll-a						
Nutrient Parameters						
Ammonia (Total as N)		M				
Total Nitrogen						
Oxidised Nitrogen (NO <sub>x</sub> as N)						
Total Phosphorous						
Filterable Reactive Phosphorous						
Metal Parameters						
Copper (filtered)		M				
Zinc (filtered)						
Pathogen Indicators						
Escherichia coli	F	M				
Enterococci						

Key: F = fortnightly; NR = not required; M = monthly

Note: Samples to be collected from 0.2 – 0.5 m below surface

<sup>a</sup> As identified in Appendix 1 (Location Map)

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**Appendix 3: Sediment Monitoring Plan and Assessment Protocol**

		Sampling Locations <sup>a</sup>											
		Test Estuary Myrmidon Creek			Reference Estuary – Short Creek								
Indicators	Matrix		Site Code	SPAMY01	SPAMY03	SPAMY05	SPAMY06	SPAMY07	SPASC01	SPASC02	SPASC03	SPASC04	
	Sediment	Pore water											
Assessment Protocol			Monitoring Frequency										
Interpretive													
Total Organic Carbon	✓	x	Calculate C:N ratios	Annual - Dry season									
Aluminium	✓	x	AI normalisation of total metals in sediment										
pH		✓	pH adjustment of SMD TV (NH <sub>3</sub> -N)										
Biological													
Chlorophyll a	✓	x	1. Compare to 2 x 80 <sup>th</sup> percentile of reference data 2. Calculate ratio to pheophytin-a	Annual - Dry season									
Nutrients													
Total N	✓	✓	1. Compare to 2 x 80 <sup>th</sup> percentile of reference data	Annual – Dry season									
Total P	✓	✓	1. Compare to 2 x 80 <sup>th</sup> percentile of reference data										
Ammonia (Total as N)	x	✓	1. Compare to pH adjusted SMD TV <sup>b</sup>										
		✓	2. Compare to 2 x 80 <sup>th</sup> percentile of reference data										
Filterable reactive phosphorous	x	✓	1. Compare to 80 <sup>th</sup> percentile of reference site data										

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Indicators		Sampling Locations <sup>a</sup>										
		Test Estuary Myrmidon Creek					Reference Estuary – Short Creek					
Matrix		Classification										
Sediment		Site Code										
Pore water		Assessment Protocol										
		Monitoring Frequency										
Copper	✓ T,B	✓ F	1. Compare 'T' in sediment to ISQG Low <sup>c</sup> and then if exceeds compare 'B' in sediment to ISQG Low <sup>c</sup>	SPAMY01	SPAMY03	SPAMY05	SPAMY06	SPAMY07	SPASC01	SPASC02	SPASC03	SPASC04
Zinc	✓ T,B	✓ F	2. Compare 'F' in pore water to SMD TV <sup>d</sup>	Annual – Dry season								
			3. Compare 'T' and 'B' in sediment and 'F' in porewater to 2 x 80th percentile of reference data									
			4. Compare AI normalised 'T' in sediment to 2 x 80th percentile of reference data in that season and assess for significant differences									

Key: T = total metal fraction; B = bioavailable fraction in sediment, estimated by dilute 1 M HCl extraction; F = filtered porewater; SMD = slightly-moderately disturbed; TV = trigger value; ISQG = interim sediment quality guideline

<sup>a</sup> Co-ordinates for all sampling locations/site codes are identified in Appendix 1, Location Map  
<sup>b</sup> pH adjusted SMD trigger value based on in-situ pore water pH, as per Table 8.3.7 of the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC and ARMCANZ 2000 – Volume 2)  
<sup>c</sup> Table 3.5.1 of the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC and ARMCANZ 2000 – Volume 1)  
<sup>d</sup> Table 3.4.1 of the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC and ARMCANZ 2000 – Volume 1)

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### Appendix 4: Surface Water Reporting Limits

	Site Code	Sampling Locations <sup>a</sup>					Reporting Trigger
		Zone of influence (ZOI)		Slightly-Moderately Disturbed Zone (SMDZ)			
		SPAMY01	SPAMY03	SPAMY05	SPAMY06	SPAMY07	
Indicator	Units	Reporting Limits					Reporting Trigger
Physio-chemical parameters							
pH	pH unit	<6 and >8.5 <sup>b</sup>		<6 and >8.5 <sup>b</sup>			Exceedance of reporting limits
Dissolved oxygen	% saturation	<30		<65 and >110 <sup>c</sup>			Exceedance of reporting limits
Total suspended solids	mg/L	-		>15 <sup>c</sup>	>20 <sup>c</sup>	Exceedance of reporting limits	
Biological Parameters							
Chlorophyll-a	µg/L	-		>8 <sup>c</sup>			Exceedance of reporting limits
Nutrient Parameters							
NH <sub>3</sub> -N	µg/L	13200 <sup>d</sup>	1320 <sup>e</sup>	1100 <sup>e</sup>	1100 <sup>e</sup>	1320 <sup>e</sup>	Exceedance of reporting limit
		-		>20 <sup>b</sup>			Exceedance of reporting limit for the median of the 6 most recent samples – only report when chlorophyll-a also exceeds reporting limit
Total Nitrogen	µg/L	-		>300 <sup>b</sup>			
NO <sub>x</sub> as N	µg/L	-		>20 <sup>b</sup>			
Total Phosphorous (TP)	µg/L	-		>30 <sup>b</sup>			
Filterable Reactive Phosphorous (FRP)	µg/L	-		>10 <sup>b</sup>			
Metal Parameters							
Copper (filtered)	µg/L	>8 <sup>f</sup>		>1.3 <sup>g</sup>			Exceedance of reporting limits
Zinc (filtered)	µg/L	>15 <sup>g</sup>		>15 <sup>g</sup>			Exceedance of reporting limits
Pathogen Indicators							
Enterococci	CFU/100 mL	-	>500 <sup>h</sup>	>200 <sup>h</sup>			Exceedance of reporting limits

<sup>a</sup> As identified in Appendix 1 (Location Map)

<sup>b</sup> *Water Quality Objectives for the Darwin Harbour Region* (NRETAS 2010)

<sup>c</sup> Adjusted *Water Quality Objectives* to account for change in assessment statistic from 'median' to individual value



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- <sup>d</sup> Acute trigger value estimated based on the pH adjusted trigger value <sup>e</sup> with a default acute to chronic ratio of 10 subsequently applied (ANZECC and ARMCANZ 2000)
- <sup>e</sup> pH adjusted SMD trigger value based on long-term average pH at these sites as per Table 8.3.7 of the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC and ARMCANZ 2000 – Volume 2)
- <sup>f</sup> 80% level of species protection trigger value for marine water as per Table 3.4.1 of the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, 2000 (ANZECC and ARMCANZ 2000 – Volume 1).
- <sup>g</sup> 95% level of species protection SMD trigger value for marine water as per Table 3.4.1 of the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, (ANZECC and ARMCANZ 2000 – Volume 1).
- <sup>h</sup> Microbial Water Quality Assessment Limits for Category B (200 enterococci/ 100 mL) and Category C (500 enterococci/ 100 mL) as per Table 5.7 of the *Guidelines for Managing Risks in Recreational Waters* (NHMRC 2008)

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### Appendix 5: Assessment Protocol for Water Quality

		Sampling Locations <sup>a</sup>				
		Zone of influence (ZOI)		Slightly-Moderately Disturbed Zone (SMDZ)		
		SPAMY01	SPAMY03	SPAMY07	SPAMY05	SPAMY06
Indicator	Unit	Assessment Criteria				Assessment Statistic
Dissolved oxygen	% saturation	<75 and > 100 <sup>b</sup>				median
Total suspended solids	mg/L	10 <sup>b</sup>				median
Chlorophyll-a*	µg/L	4 <sup>b</sup>				median
Ammonia (Total as N)	µg/L	20 <sup>b</sup>				median
		1320 <sup>c</sup>		1100 <sup>c</sup>		95 <sup>th</sup> percentile
Total nitrogen	µg/L	300 <sup>b</sup>				median
Oxidised nitrogen (NO <sub>x</sub> as N)	µg/L	20 <sup>b</sup>				median
Total phosphorous	µg/L	30 <sup>b</sup>				median
Filterable reactive phosphorous	µg/L	10 <sup>b</sup>				median
Copper (filtered)	µg/L	1.3 <sup>d</sup>				95 <sup>th</sup> percentile
Zinc (filtered)	µg/L	15 <sup>d</sup>				95 <sup>th</sup> percentile
Enterococci	Enterococci/100 mL	50 <sup>b</sup>				maximum
		A, B,C,D <sup>e</sup>				Long term 95 <sup>th</sup> percentile (Hazen Method)

<sup>a</sup> As identified in Appendix 1 (Location Map)

<sup>b</sup> Water Quality Objectives for the Darwin Harbour Region – Background Document (Department of Natural Resources, Environment, The Arts and Sport, 2010)

<sup>c</sup> Table 8.3.7 Volume 2 of ANZECC and ARMCANZ (2000) - pH adjusted SMD Trigger Value based on long-term average pH for sites in these zones

<sup>d</sup> Table 3.4.1 ANZECC and ARMCANZ (2000) – SMD Trigger Value

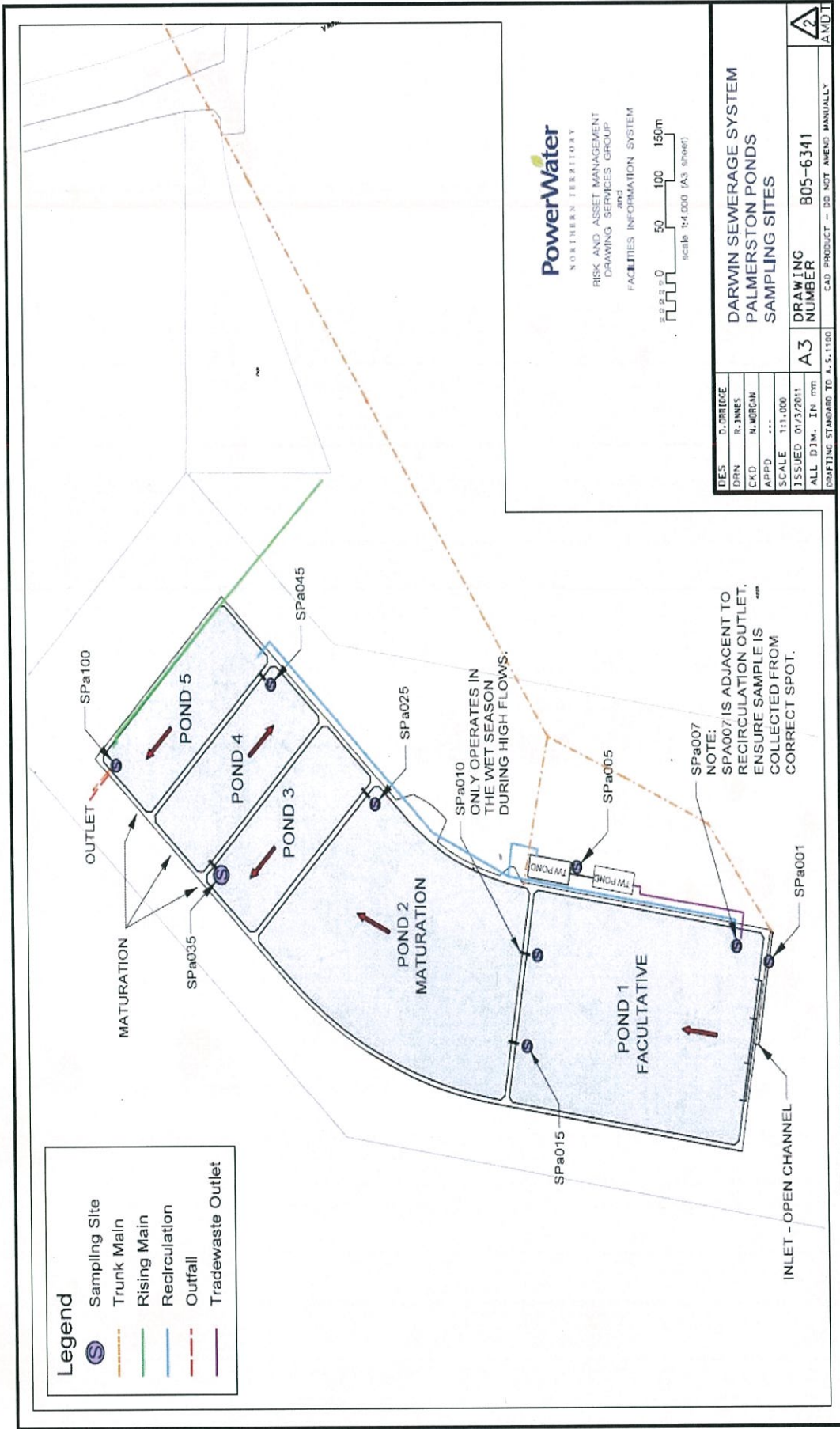
<sup>e</sup> Determine the Microbial Water Quality Assessment Category for the assessment statistic (A, B,C,D), Table 5.7 in order to apply these categories within Table 5.17 Classification Matrix for Faecal Pollution of Recreational Water Environments of the Guidelines for Managing Risks in Recreational Waters (National Health and Medical Research Council 2008)

Where, 'Long term' means all monitoring data collected to date pooled. Hazen based assessments require more data points to be reasonably accurate in terms of the true 95<sup>th</sup> percentile (i.e. N > 21)

Please note - that sites within the ZOI for the discharge are not expected to achieve default SMD criteria for all parameters however routine assessment against default SMD criteria across all zones remains useful for monitoring the scale of impact across different sites within these zones in the interests of ongoing baseline condition assessment consistent with ANZECC and ARMCANZ (2000).

WASTE DISCHARGE LICENCE (WDL 148-06)

Appendix 6: Palmerston Waste Stabilisation Ponds Site Layout



**Legend**

- Sampling Site
- Trunk Main
- Rising Main
- Recirculation
- Outfall
- Tradewaste Outlet

DES	D. BRIDGE	<b>DARWIN SEWERAGE SYSTEM PALMERSTON PONDS SAMPLING SITES</b>
DRN	R. JAMES	
CKD	H. MORGAN	
APPD	...	
SCALE	1:1,000	
ISSUED	07/3/2011	<b>A3 DRAWING NUMBER B05-6341</b>
ALL DIM. IN mm		
DRAFTING STANDARD TO A.S.1106		CAD PRODUCT - DO NOT AMEND MANUALLY A.M.V.

# CONCEPTUAL SITE MODEL – PALMERSTON DISCHARGE



## Key to Conceptual Site Model

	Pasture reef areas on rocky outcrops and mangrove vegetation assemblages
	Marine mammal fauna
	Mangrove estuarine fauna
	Pond fauna - freshwater benthic invertebrates and birds
	Commercial industrial areas (including air processing)
	Commercial shipping - transport and loading/unloading of potentially hazardous cargoes
	Oil fuel spills and devolving to maintain commercial shipping access
	Transport, storage and handling of hazardous goods
	Reel seines, recreational fishing using lines and crab pots
	Waste transfer station
	Quarrying extractive industry
	Community recreation area - multi-purpose
	Palmerston waste stabilisation ponds & trade waste ponds
	Effluent discharge point
	Built up area runoff - stormwater

## Zones within Myrmidon Creek



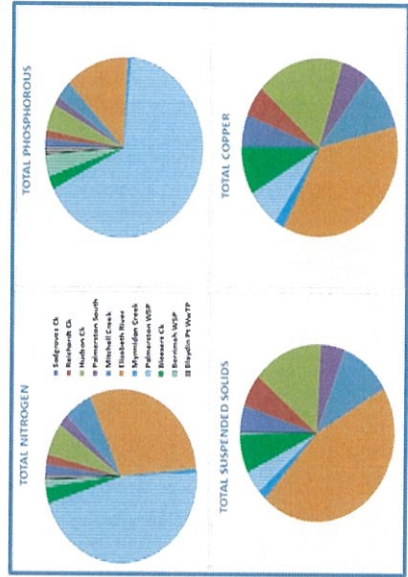
## Zone of Influence for Discharge

- Includes the:
- Minor tributary of Myrmidon Creek where the discharge ( ) enters the waterway;
  - 300 m either side of the confluence of the minor tributary with the main channel of Myrmidon Creek i.e. where mixing occurs;
  - It is the zone within the receiving waterway where default water quality criteria protective of beneficial may not be achieved for all indicators due to mixing effects.
  - The size of the ZOI is not considered atypical for a fast moving macrotidal estuary and is defined based on as near to worst-case monitoring data that can be collected (i.e. near ebb tides).

## Slightly to Moderately Disturbed Zone

- Includes the:
- Sections of the waterway within Myrmidon Creek that are beyond the zone of influence for the discharge;
  - It is the zone where the effluent discharge should be fully mixed with the receiving waterway;
  - It is the zone within the receiving waterway where default water quality criteria protective of beneficial uses should be achieved or at least where the indicator concentrations return to background levels.

## DISCHARGE VS. CATCHMENT LOADS



## TREATMENT – LOAD REDUCTION

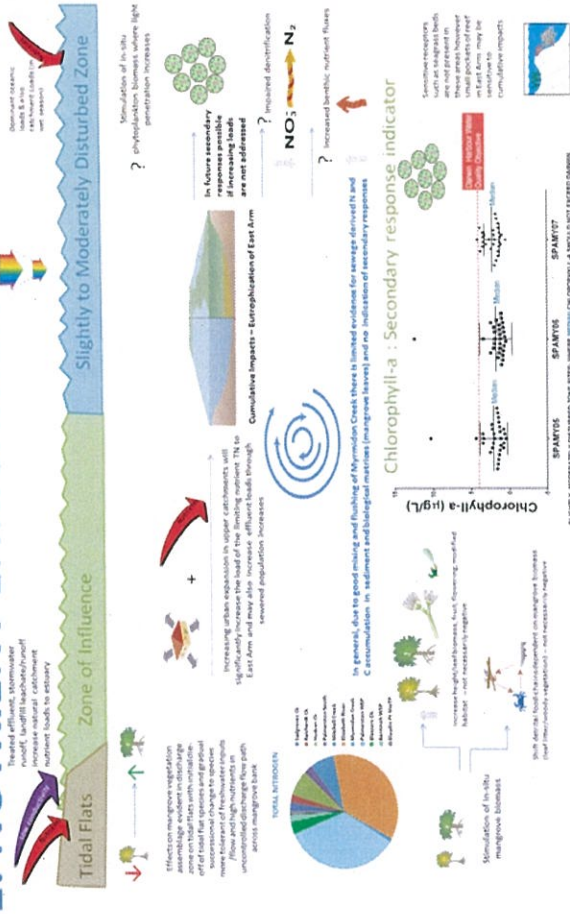
INDICATORS	TREATMENT
Nitrogen	↓ Load by 47 %
Phosphorous	↓ Load by 26 %
Ammonia	↓ Load by 57 %
BOD	↓ Load by 74 %
Copper	↓ Load by 87 %
E.coli	↓ Load by 4 orders of magnitude

## KEY STRESSORS

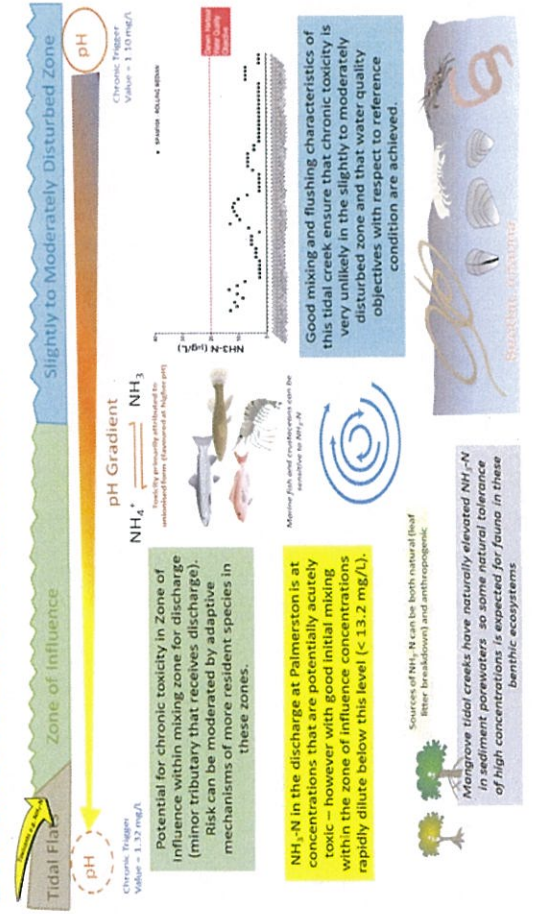


# CONCEPTUAL SITE MODELS FOR KEY PROCESSES THAT MAY IMPACT BENEFICIAL USES IN MYRMIDON CREEK

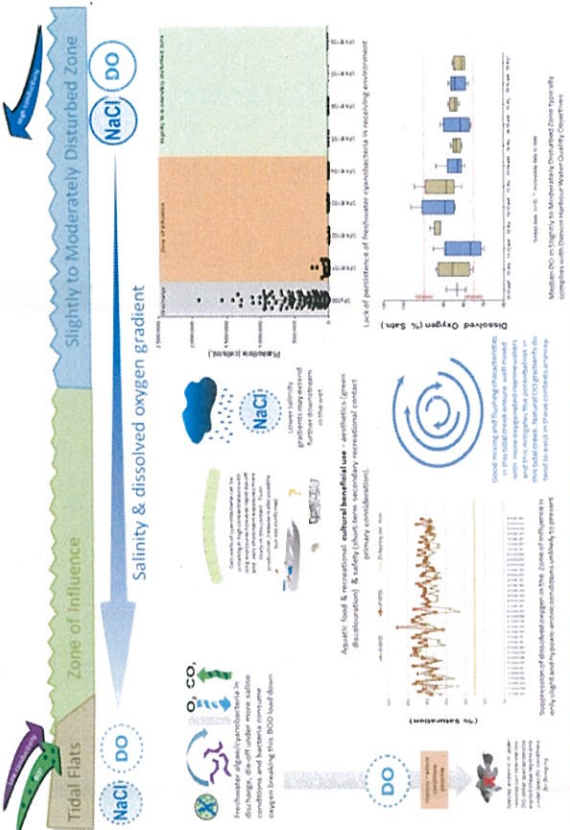
## 1. NUTRIENT ENRICHMENT



## 3. AMMONIA TOXICITY



## 2. BOD & DISSOLVED OXYGEN



## 4. PATHOGEN INDICATORS

