

# Annual Environmental Report

2019



Ballina

D0016-01

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# 1 EXECUTIVE SUMMARY AND INTRODUCTION TO THE 2019 AER

This Annual Environmental Report has been prepared for D0016-01, Ballina, in Mayo in accordance with the requirements of the wastewater discharge licence for the agglomeration. Specified reports where relevant are included as an appendix to the AER.

## 1.1 ANNUAL STATEMENT OF MEASURES

A summary of any improvements undertaken is provided where applicable.

There were no major capital or operational changes undertaken.

## 1.2 TREATMENT SUMMARY

The agglomeration is served by a wastewater treatment plant(s)

- BALLINA (MAYO) WWTP with a Plant Capacity PE of 25000, the treatment type is 3P - Tertiary P removal

## 1.3 ELV OVERVIEW

The overall compliance of the final effluent with the Emission Limit Values (ELVs) is shown below. More detailed information on the below ELV's can be found in Section 2.

Discharge Point Reference	Treatment Plant	Discharge Type	Compliance Status	Parameters failing if relevant
TPEFF2200D0016SW001	BALLINA (MAYO) WWTP	Treated	Non-Compliant	Ammonia-Total (as N) mg/l

## 1.4 LICENCE SPECIFIC REPORTING INCLUDED IN AER

Assessment / Report	Included in AER
Toxicity of Final Effluent	Yes

## 2 TREATMENT PLANT PERFORMANCE AND IMPACT SUMMARY

### 2.1 BALLINA (MAYO) WWTP - TREATED DISCHARGE

#### 2.1.1 INFLUENT MONITORING SUMMARY - BALLINA (MAYO) WWTP

A summary of influent monitoring for the treatment plant is presented below. This monitoring is primarily undertaken in order to determine the overall efficiency of the plant in removing pollutants from the raw wastewater.

Parameters	Number of Samples	Annual Max	Annual Mean
COD-Cr mg/l	12	1040	350.33
BOD, 5 days with Inhibition (Carbonaceous BOD) mg/l	12	437	158.13
Suspended Solids mg/l	12	563	173.46
Total Nitrogen mg/l	12	86	41.47
Hydraulic Capacity	N/A	19558	6460

If other inputs in the form of sludge / leachate are added to the WWTP then these are included in Section 2.1.5 if applicable.

#### Significance of Results:

The annual mean hydraulic loading is less than the peak Treatment Plant Capacity. The annual maximum hydraulic loading is greater than the peak Treatment Plant Capacity. Further details on the plant capacity and efficiency can be found under the sectional 'Operational Performance Summary'.

## 2.1.2 EFFLUENT MONITORING SUMMARY - TPEFF2200D0016SW001

Parameter	WWDL ELV (Schedule A)	ELV with Condition 2 Interpretation included Note 1	Interim % reduction from influent concentration	Number of sample results	Number of exceedances	Number of with Condition 2 Interpretation included	Annual Mean	Overall Compliance (Pass/Fail)
<b>COD-Cr mg/l</b>	125	250	N/A	12	0	0	22.64	Pass
<b>Suspended Solids mg/l</b>	35	87.5	N/A	12	0	0	3.94	Pass
<b>BOD, 5 days with Inhibition (Carbonaceous BOD) mg/l</b>	25	50	N/A	12	0	0	1.42	Pass
<b>Ammonia-Total (as N) mg/l</b>	10	12	N/A	12	1	1	2.25	Fail
<b>pH pH units</b>	9	9	N/A	12	0	0	7.92	Pass
<b>Orthophosphate (MRP) filtered (As P) mg/l</b>	1	N/A	N/A	12	0	0	0.26	Pass
<b>Total Phosphorus (as P) mg/l</b>	N/A	N/A	N/A	12	N/A	N/A	0.41	
<b>Enterococci (Intestinal) cfu/100ml</b>	N/A	N/A	N/A	1	N/A	N/A	N/A	
<b>Nitrite (as N) mg/l</b>	N/A	N/A	N/A	12	N/A	N/A	0.18	

<b>E. Coli MPN/100ml</b>	N/A	N/A	N/A	1	N/A	N/A	2420	
<b>Total Nitrogen mg/l</b>	N/A	N/A	N/A	12	N/A	N/A	7.45	
<b>Faecal coliforms cfu/100ml</b>	N/A	N/A	N/A	1	N/A	N/A	2780	
<b>Nitrate (as N) mg/l</b>	N/A	N/A	N/A	12	N/A	N/A	3.14	
<b>Conductivity 20 C <math>\mu</math>S/cm</b>	N/A	N/A	N/A	12	N/A	N/A	500.37	

Notes:

1 – This represents the Emission Limit Values after the Interpretation provided for under Condition 2 of the licence is applied

### Cause of Exceedance(s):

**Plant or equipment maintenance at WWTP.**

### Significance of Results:

The WWTP is non-compliant with the ELV's set in the Wastewater Discharge Licence. The impact on receiving waters is assessed further in Section 2.

## 2.1.3 AMBIENT MONITORING SUMMARY FOR THE TREATMENT PLANT DISCHARGE

### TPEFF2200D0016SW001

A summary of monitoring from ambient monitoring points associated with the wastewater discharge is provided in the sections below. For discharges to rivers upstream (U/S) and downstream (D/S) location data is provided. For other ambient points in lakes, coastal or transitional waters, monitoring data from the most appropriate monitoring station is selected.

The table below provides details of ambient monitoring locations and details of any designations as sensitive areas.

Ambient Monitoring Point from WWDL (or as agreed with EPA)	Irish Grid Reference	River Station Code	Bathing Water	Drinking Water	FWPM	Shellfish	WFD Status
<b>The ambient results are included in the Appendix 7.1 - Ambient monitoring summary</b>							

### Significance of Results:

The WWTP discharge was not compliant with the ELV's set in the wastewater discharge licence.

The ambient monitoring results do not meet the required EQS. The EQS relates to the Oxygenation and Nutrient Conditions set out in the Surface Water Regulations 2009.

Based on ambient monitoring results; a deterioration in BOD and Ammonia concentrations downstream of the effluent discharge is noted.

A deterioration in water quality has been identified; however, it is not known if it is caused by the WWTP.

Other causes of deterioration in water quality in the area are: Unknown

The discharge from the wastewater treatment plant does not have an observable negative impact on the Water Framework Directive status.

## 2.1.4 OPERATIONAL PERFORMANCE SUMMARY - BALLINA (MAYO) WWTP

### 2.1.4.1 Treatment Efficiency Report - BALLINA (MAYO) WWTP

Treatment efficiency is based on the removal of key pollutants from the influent wastewater by the treatment plant. In essence the calculation is based on the balance of load coming into the plant versus the load leaving the plant. The efficiency is presented as a percentage removal rate.

A summary presentation of the efficiency of the treatment process including information for all the parameters specified in the licence is included below:

Parameter	Influent mass loading (kg/year)	Effluent mass emission (kg/year)	Efficiency (% reduction of influent load)
<b>COD</b>	845455	71499	92
<b>cBOD</b>	381630	4470	99
<b>TN</b>	100075	23546	76
<b>TP</b>	N/A	1304	N/A
<b>SS</b>	418623	12437	97

Note: The above data is based on sample results for the number of dates reported

#### 2.1.4.2 Treatment Capacity Report Summary - BALLINA (MAYO) WWTP

Treatment capacity is an assessment of the hydraulic (flow) and organic (the amount of pollutants) load a treatment plant is designed to treat versus the current loading of that plant.

BALLINA (MAYO) WWTP	
<b>Peak Hydraulic Capacity (m<sup>3</sup>/day) - As Constructed</b>	13620
<b>DWF to the Treatment Plant (m<sup>3</sup>/day)</b>	4540
<b>Current Hydraulic Loading - annual max (m<sup>3</sup>/day)</b>	19558
<b>Average Hydraulic loading to the Treatment Plant (m<sup>3</sup>/day)</b>	6460
<b>Organic Capacity (PE) - As Constructed</b>	25000
<b>Organic Capacity (PE) - Collected Load (peak week)<sup>Note1</sup></b>	15645

BALLINA (MAYO) WWTP	
Organic Capacity (PE) - Remaining	9355
Will the capacity be exceeded in the next three years? (Yes/No)	No

Nominal design capacities can be based on conservative design principles. In some cases assessment of existing plants has shown organic capacities significantly higher than the nominal design capacity. Accordingly plants that appear to be overloaded when comparing a collected peak load with the nominal design capacity can be fully compliant due to the safety factors in the original design.

## 2.1.5 SLUDGE / OTHER INPUTS - BALLINA (MAYO) WWTP

'Other inputs' to the waste water treatment plant are summarised in table below

Input type	Quantity	Unit	P.E.	% of load to WWTP	Included in Influent Monitoring (Y/N)?	Is there a leachate/sludge acceptance procedure for the WWTP?	Is there a dedicated leachate/sludge acceptance facility for the WWTP? (Y/N)
Other	2748	Volume (m <sup>3</sup> )	33.46	0.12	Yes	No	Yes

## 3 COMPLAINTS AND INCIDENTS

### 3.1 COMPLAINTS SUMMARY

A summary of complaints of an environmental nature is included below.

Number of Complaints	Nature of Complaint	Number Open Complaints	Number Closed Complaints
<b>There were no relevant environmental complaints in 2019.</b>			

### 3.2 REPORTED INCIDENTS SUMMARY

Environmental incidents that arise in an agglomeration are reported on an on-going basis in accordance with our waste water discharge licences. Where an incident occurs and it is reportable under the licence, it is reported to the Environmental Protection Agency through their Environmental Data Exchange Network, or in some instances by telephone. Some incidents which arise in the agglomeration are recorded by Irish Water but may not be reportable under our licence for example where the incident does not have an impact on environmental performance.

A summary of reported incidents is included below.

#### 3.2.1 SUMMARY OF INCIDENTS

Incident Type	Cause	No. of incident occurrences	Recurring (Y/N)	Closed (Y/N)
<b>Breach of ELV</b>	Plant or equipment maintenance at WWTP	1	No	Yes
<b>Abatement Equipment offline</b>	Plant or equipment breakdown at WWTP	1	No	No

### 3.2.2 SUMMARY OF OVERALL INCIDENTS

Question	Answer
Number of Incidents in 2019	2
Number of Incidents reported to the EPA via EDEN in 2019	2
Explanation of any discrepancies between the two numbers above	N/A

## 4 INFRASTRUCTURAL ASSESSMENTS AND PROGRAMME OF IMPROVEMENTS

### 4.1 STORM WATER OVERFLOW IDENTIFICATION AND INSPECTION REPORT

A summary of the operation of the storm water overflows and their significance where known is included below:

#### 4.1.1 SWO IDENTIFICATION

WWDL Name / Code for Storm Water Overflow	Irish Grid Ref.	Included in Schedule A4 of the WWDL	Significance of the overflow(High / Medium / Low)	Assessed against DoEHLG Criteria	No. of times activated in 2019 (No. of events)	Total volume discharged in 2019 (m3)	Monitoring Status
SW2	124978, 319144	Yes	Low	Meeting	Unknown	Unknown	Not Monitored
SW5	125068, 319270	Yes	Low	Meeting	Unknown	Unknown	Not Monitored
SW6	124856, 319021	Yes	Low	Not yet Assessed	Unknown	Unknown	Not Monitored
TBC	123870.2, 316708.73	No	Low	Not Meeting	Unknown	Unknown	Not Monitored
TBC	124855.14, 319021.07	No	Low	Meeting	Unknown	Unknown	Not Monitored
TBC	TBC	No	Unknown	Not yet Assessed	Unknown	Unknown	Not Monitored
SW4	125420, 319502	Yes	Low	Meeting	Unknown	Unknown	Not Monitored

<b>SW7</b>	124621, 318765	Yes	Low	Meeting	Unknown	Unknown	Not Monitored
<b>SW8</b>	124667, 318731	Yes	Low	Meeting	Unknown	Unknown	Not Monitored
<b>SW9</b>	124634, 318674	Yes	Low	Meeting	Unknown	Unknown	Not Monitored
<b>TBC</b>	124409.09, 318540.32	No	Low	Meeting	Unknown	Unknown	Not Monitored
<b>TBC</b>	124855, 319020	No	Low	Meeting	Unknown	Unknown	Not Monitored
<b>TBC</b>	124874, 318970	No	Low	Not Meeting	Unknown	Unknown	Not Monitored

<b>SWO Summary</b>	
<b>How much sewage was discharged via SWOs in the agglomeration in the year (m<sup>3</sup>)?</b>	Unknown
<b>Is each SWO identified as not meeting DoEHLG Guidance included in the Programme of Improvements?</b>	Yes
<b>The SWO Assessment included the requirements of relevant of WWDL schedules?</b>	Yes
<b>Have the EPA been advised of any additional SWOs / changes to Schedule C3 and A4 under Condition 1.7?</b>	N/A

## 4.2 REPORT ON PROGRESS MADE AND PROPOSALS BEING DEVELOPED TO MEET THE IMPROVEMENT PROGRAMME REQUIREMENTS.

### 4.2.1 SPECIFIED IMPROVEMENT PROGRAMME SUMMARY

A wastewater discharge licence may require a number of reports on specific subject areas to be prepared for the agglomeration in question. These reports are submitted to the EPA as part of the Annual Environmental Report. This section provides list of the various reports required for this agglomeration and a brief summary of their recommendations.

Specified Improvement Programmes (under Schedule A and C of WWDL)	Description	Licence Schedule	Licence Completion Date	Date Expired? (N/NA/Y)	Status of Works	Timeframe for Completing the Work	Comments
<b>D0016-SIP:01</b>	Upgrade SWOs to comply with DoE criteria (SW2)	C	31/12/2011	Yes	Works Completed		
<b>D0016-SIP:02</b>	Upgrading of pumping station at Bachelor's Walk (SW2)	C	01/05/2009	Yes	Works Completed		

A summary of the status of any improvements identified by under Condition 5.2 is included below.

### 4.2.2 IMPROVEMENT PROGRAMME SUMMARY

Improvement Identifier	Improvement Description / or any Operational Improvements	Improvement Source	Expected Completion Date	Comments
<b>There are no Improvement Programmes for this Agglomeration.</b>				

### **4.2.3 SEWER INTEGRITY RISK ASSESSMENT**

The utilisation of multiple capital maintenance programmes and the outputs of the workshops with the Local Authority Operations Staff held under the programme can be used to satisfy the requirements of Condition 5 regarding network integrity. Improvement works identified by way of these programmes and workshops will be included in the Improvements Summary Table.

## 5 LICENCE SPECIFIC REPORTS

A wastewater discharge licence may require a number of reports on specific subject areas to be prepared for the agglomeration in question. These reports are submitted to the EPA as part of the Annual Environmental Report. This section provides list of the various reports required for this agglomeration and a brief summary of their recommendations.

Licence Specific Report	Required by licence	Year included in AER	Included in this AER	Reference to relevant section of AER
<b>Toxicity of Final Effluent</b>	Yes	2017	Yes	5.1

### 5.1 TOXICITY OF FINAL EFFLUENT

The Toxicity of Final Effluent Report is included in Appendix 7.2 - Toxicity of Final Effluent. A summary of the findings of this report is included below.

Parameter	Value
<b>Are any procedural and/or infrastructural works to reduce the toxicity of the final discharge included?</b>	No
<b>Does the report identify that the discharge is toxic to any of the species in the study?</b>	No
<b>Has the study been carried out against 4 species in 3 trophic levels?</b>	Yes
<b>Is a Toxicity report required?</b>	Yes
<b>List species impacted</b>	N/A
<b>Recommendations</b>	None
<b>Status of any improvement measures required</b>	N/A

## 6 CERTIFICATION AND SIGN OFF

### 6.1 SUMMARY OF AER CONTENTS

Parameter	Answer
Does the AER include an Executive Summary?	Yes
Does the AER include an assessment of the performance of the Waste Water Works (i.e. have the results of assessments been interpreted against WWDL requirements and or Environmental Quality Standards)?	Yes
Is there a need to advise the EPA for consideration of a Technical Amendment / Review of the licence?	No
List reason e.g. additional SWO identified	N/A
Is there a need to request/advise the EPA of any modification to the existing WWDL with respect to condition 4 changes to monitoring location, frequency etc.	No
List reason e.g. changes to monitoring requirements	N/A
Have these processes commenced?	N/A
Are all outstanding reports and assessments from previous AERs included as an appendix to this AER	No

I certify that the information given in this Annual Environmental Report is truthful, accurate and complete:

Signed:

Date: 20/04/2020

This AER has been produced by Irish Water's Environmental Information System (EIMS) and has been electronically signed off in that system for and on behalf of,

Katherine Walshe

Acting Head of Environmental Regulation.

## 7 APPENDIX

Appendix
Appendix 7.1 - Ambient monitoring summary
Appendix 7.2 - Toxicity of Final Effluent

Ambient Points

Ambient Monitoring Point from WWDL (or as agreed with EPA)	Irish Grid Reference	EPA Feature Coding Tool code	Receiving Waters Designation (Y/N)				WFD Status
			Bathing Water	Drinking Water	FWPM	Shellfish	
Upstream Monitoring Point	125292, 319885	TPEFF2200D0016SW001	No	No	No	No	Moderate
Downstream Monitoring Point	125292, 320420	TPEFF2200D0016SW001	No	No	No	No	Moderate

Ambient Impact Assessment Table

Parameter Name	Upstream Monitoring Point Location	Upstream Monitoring Point Annual Mean	Downstream Monitoring Point Location	Downstream Monitoring Point Annual Mean	EQS (Mean)	%EQS
cBOD mg/l	TPEFF2200D0016SW001	3.65	TPEFF2200D0016SW001	4.30	1.500	-43.33%
Ortho-Phosphate (as P) mg/l	TPEFF2200D0016SW001	0.015	TPEFF2200D0016SW001	0.013	0.035	5.71%
Ammonia (as N) mg/l	TPEFF2200D0016SW001	0.012	TPEFF2200D0016SW001	0.013	0.065	-1.54%

**Ballina D0016-01 Ambient Monitoring**

Data		Station Reference	Alkalinity	Ammonia N	Biological Oxygen Demand	Calcium	Chloride	Conductivity @	E Coli	Enterococci	Faecal Coliforms	Fluoride	Magnesium
			mg/l	mg/l	mg/l	mg/l	mg/l	µS/cm	MPN/100mls	cfu/100mls	cfu/100mls	mg/l	mg/l
28-Jan-2019	Upstream Ambient	TW22005298MY1012	135	0.017	6.8	54.1	17	286	119	180	530	0.3	3.4
20-June-2019	Upstream Ambient	TW22005298MY1012		0.007	<1	70.7	20	327	>201	10	280	0.4	5
28-Jan-2019	Downstream Ambient	TW22005298MY1013	148	0.016	4.7	56.8	18	308	288	210	590	0.3	4.4
20-June-2019	Downstream Ambient	TW22005298MY1013		0.01	3.9	85	310	1247	130	15	80	0.3	30.5

Nitrate NO3	Nitrite N	Nitrite NO2	Ortho-Phospha	pH	Sulphate	Temperature	Total Nitrogen
mg/l	mg/l	mg/l	mg/l	pH units	mg/l	Degrees C	mg/l
3.4	< 0.005	<0.016	0.015	7.9	7.9	5.8	2.6
				8.4	10	16	<2.5
5.8	<0.005	<0.016	0.013	8	8.3	6	2.5
				8.6	51	16.2	<2.5

## Certificate Of Analysis

### Customer

Olivia Feeney  
Mayo County Council  
Aras an Chontae  
The Mall  
Castlebar  
Co Mayo

**Report Reference:** 19-53496

**Report Version:** 1

**Site:** Not Applicable  
**Sample Description:** Ballina WWTP  
**Sample Type:** Effluent (Final)  
**Lab Reference Number:** 431205

**Date of Sampling:** 05/03/2019  
**Time of Sampling:** 00:00  
**Date Sample Received:** 05/03/2019

Site / Method Ref.	Analysis Start Date	Parameter	Result	Units
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S/S3235#	12/03/2019	48 h EC50 to Daphnia magna	>100% giving <1 Toxic Unit	%vol/vol
S/S3239#	12/03/2019	Inhibitory effect to Vibrio fischeri	>45% giving <2.2 Toxic Units	%vol/vol

Toxicity Chemistry Suite				
S/S3011#	12/03/2019	Conductivity @ 20 °C	626.0	uS/cm @20 °C
S/S1003#	12/03/2019	Dissolved Oxygen	6.88	mg/l O2
S/S1041#	12/03/2019	PH	7.53	pH Unit
S/S3011	12/03/2019	Salinity	0.3	ppt

# = INAB Accredited, U = UKAS Accredited, \* = Subcontracted

**Note:**

PV Value is the parametric value, taken from European Communities, (Drinking Water) Regulations, 2014. S.I. No. 122 of 2014 and relates only to drinking water samples.

For queries on results, please contact us within two weeks of the report date to ensure that we can accommodate your query as samples cannot be stored indefinitely.

NAC & ATC - No abnormal change and acceptable to customers.

TVC - Total viable count

Site D = Analysed at City Analysts Dublin. Site S = Analysed at City Analysts Shannon

## Certificate Of Analysis

### Customer

Olivia Feeney  
Mayo County Council  
Aras an Chontae  
The Mall  
Castlebar  
Co Mayo

**Report Reference:** 19-53496

**Report Version:** 1

**Site:** Not Applicable  
**Sample Description:** Ballina WWTP  
**Sample Type:** Effluent (Final)  
**Lab Reference Number:** 431205

**Date of Sampling:** 05/03/2019  
**Time of Sampling:** 00:00  
**Date Sample Received:** 05/03/2019

Test Parameter	Concentration % vol. / vol.	Toxic Units	95% Confidence Limits % vol./vol.	Method of Calculation
Freshwater Crustacean	>100	<1		
Marine Bacterium	>45	<2.2		Microtox

### Comments

Freshwater Crustacean  
48hr Daphnia magna  
No Daphnia Magna were immobilised @ 100% vol/vol  
-compared to control .

Marine Bacterium  
30 min EC50 to Vibrio fischeri  
No light inhibition occurred at 45 % vol./vol.  
- compared to the control.

### Test Method(s): (see Appendix 1)

Method 1: Freshwater Crustacean  
Method 2: Marine Bacterium  
Method 10: Sampling

# = INAB Accredited, U = UKAS Accredited, \* = Subcontracted

#### Note:

PV Value is the parametric value, taken from European Communities, (Drinking Water) Regulations, 2014. S.I. No. 122 of 2014 and relates only to drinking water samples.

For queries on results, please contact us within two weeks of the report date to ensure that we can accommodate your query as samples cannot be stored indefinitely.

NAC & ATC - No abnormal change and acceptable to customers.

TVC - Total viable count

Site D = Analysed at City Analysts Dublin. Site S = Analysed at City Analysts Shannon

## Raw Data

Raw data has been provided with this Certificate of Analysis as it has been specifically requested by you. Please note that raw data results are Not Accredited. Raw data can be provided only for analysis carried out in-house.

Lab Reference Number:	Parameter	Result	Units	Site / Method Ref.
Toxicity Chemistry Suite				
431205	Conductivity @ 20°C	626	uS/cm @20°C	S/S3011
Toxicity Chemistry Suite				
431205	Dissolved Oxygen	6.88	mg/l O2	S/S1003
431205	PH	7.53	pH Unit	S/S1041
431205	Salinity	0.3130	ppt	S/S3011

# Appendix 1

## Toxicity Test Methods and Procedures

### 1. Freshwater Crustacean

Method 3235 based on ISO 6341:2012: 'Water quality – Determination of the inhibition of the mobility of *Daphnia magna* Straus (Cladocera, Crustacea)

### 3. Marine Copepod

Method 3238 based on ISO 14669:1999: 'Water quality – Determination of acute lethal toxicity to marine copepods (Copepoda, Crustacea)'

### 2. Marine Bacterium

Method 3239 based on ISO 11348-3:2007: 'Water quality - Determination of the inhibitory effect of water samples on the light emission of *Vibrio fischeri* (Luminescent bacteria test) – Part 3: Method using freeze-dried bacteria'

### 4. Marine Algae

Method 3237 based on ISO 10253:2006: 'Water quality - Marine algal growth inhibition test with *Skeletonema costatum* and *Phaeodactylum tricornutum*'

### 5. Freshwater Algae

Method 3236 based on ISO 8692:2012: 'Water quality – Freshwater algal growth inhibition test with unicellular green algae'

### 6. Freshwater Plant

Based on ISO 20079:2005: 'Water quality – Determination of the toxic effect of water constituents and waste water to duckweed (*Lemna minor*) – Duckweed growth inhibition test'

### 7. Marine Fish

Method based on OECD 1992: Guideline 203: - 'Fish, acute toxicity test'

### 8. Freshwater Fish

Based on OECD 1992: Guideline 203: - 'Fish, acute toxicity test'

### 9. Estuarine Crustacean

Based on MAFF SOP No. BEG/030:1996: 'Brown Shrimp (*Crangon crangon*) 96 h acute toxicity for liquid effluents and wastes'

### 10. Sampling

Based on ISO 5667-16:1998: 'Water quality – Sampling - Part 16: Guidance on biotesting of samples'

### 11. Eluate Generation

Based on DIN 38 414 part 4, 1984: – 'Sludge and Sediments (Group S) – Determination of leachability by water (S4)'