

APPENDIX D

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MONITORING PROGRAMME OVERVIEW

The objective of the monitoring programme is to ascertain if the quality of waters and associated habitats in the receiving environment are being altered upon commencement of the proposed discharge of treated landfill leachate through a common marine outfall with the treated municipal waste water from the Newport Sewerage Scheme.

The proposed outfall location (Outfall Option A) is located at ordnance grid location reference 095 670E, 294210N.

SAMPLING STATIONS

Samples of seawater will be extracted at the following discharge points;

Station #1 Clew Bay North (Newport Bay)

within 50 metres of 094 556E, 293 589N (Latitude 53 52 52 N, Longitude 9 36 14.9 W).

The above sampling location is as specified in the Regulation 6 Action Programme for Clew Bay, County Mayo - the sampling of same which has been tasked to the Department of Communications, Marine and Natural Resources in conjunction with the Marine Institute.

Station #2 Burrishoole Channel

within 50 metres of 096 000E, 294 500N.

Station #3 Off Rosmore Peninsula

within 50 metres of 094 500E, 294 000N.

It is recommended that one additional sampling station be selected at a control point in consultation with the Environmental Protection Agency, the Marine Institute, the Department of Communications, Marine and Natural Resources, Mayo County Council with input from local stakeholders.

Samples of Shellfish Tissue (mussel or oyster) will be extracted from the most representative location in proximity to the identified sampling stations. The analytical suite shall reflect the screening limits applicable to shellfish as specified above in Table 2.5.2.

Samples of Sediment will be extracted from the most representative location in proximity to the identified sampling stations. The analytical suite shall reflect the screening limits applicable to shellfish as specified above in Table 2.5.2.

Seine Netting of Plaice/Flounder will be conducted at the most representative location in proximity to the identified sampling stations. The health of these representative fish samples obtained will be determined in accordance with an analytical approach developed in consultation with the Environmental Protection Agency, the Marine Institute, the Department of Communications, Marine and Natural Resources [including the Marine Institute], Department of the Environment, Heritage and Local Government [including National Parks and Wildlife Service], Mayo County Council with input from local stakeholders.

SAMPLING FREQUENCY

It is proposed as part of the monitoring programme which will be implemented for the Newport Sewerage Scheme that samples of sea water and shellfish tissue be obtained on a six monthly basis starting one six month period in advance of commencement of discharge. The frequency of the monitoring programme will be subject to review on completion of two years monitoring post commencement of treated leachate discharge.

Table 3.4.5 Proposed Screening Criteria for Receiving Environment

Determinand	Screening Criteria for Receiving Waters	Source	Screening Criteria for Shellfish Tissue (mg/kg)	Source
pH	7 – 9 pH units	S.I. No. 268 of 2006	Not Applicable	Not Applicable
Temperature	Differential from background levels less than 2 degrees celsius	S.I. No. 268 of 2006	Not Applicable	Not Applicable
Colouration (after filtration)	Differential from background levels of less than 10 milligrammes per litre	S.I. No. 268 of 2006	Not Applicable	Not Applicable
Suspended Solids	Differential from background levels of less than 30%	S.I. No. 268 of 2006	Not Applicable	Not Applicable
Salinity	Mandatory Less than 40 practical salinity units and differential from background levels less than 10% Guide 12-38 practical salinity units	S.I. No. 268 of 2006	Not Applicable	Not Applicable
Dissolved Oxygen	80% (average value)	S.I. No. 268 of 2006	Not Applicable	Not Applicable
Total Petroleum Hydrocarbons	No visible film or deposit on shellfish or waters nor harmful effects on shellfish	S.I. No. 268 of 2006	Not Applicable	Not Applicable
Faecal Coliforms	100 faecal coliforms per 100 millilitres	S.I. No. 268 of 2006	Equal to or less than 300 in the shellfish flesh and intervalvular fluid	S.I. No. 268 of 2006
Organohalogenated Substances	0.30 microgrammes per litre Polychlorinated Bi-phenyls	S.I. No. 268 of 2006	Mandatory 300 microgrammes per kilogramme wet weight @ 1 percent lipid Guide 100 microgrammes per kilogramme wet weight @ 1 percent lipid	S.I. No. 268 of 2006
Tributyltin	0.001 microgrammes per litre	S.I. No. 12 of 2001	Not Applicable	Not Applicable
Atrazine	1 microgramme per litre	S.I. No. 12 of 2001	Not Applicable	Not Applicable
Simazine	1 microgramme per litre	S.I. No. 12 of 2001	Not Applicable	Not Applicable
Standard Ions				
Cyanide	10 microgrammes per litre	S.I. No. 12 of 2001	Not Applicable	Not Applicable
Fluoride	1500 microgrammes per litre	S.I. No. 12 of 2001	Not Applicable	Not Applicable
Volatile Organic Compounds				
Dichloromethane	10 microgrammes per litre	S.I. No. 12 of 2001	Not Applicable	Not Applicable
Toluene	10 microgrammes per litre	S.I. No. 12 of 2001	Not Applicable	Not Applicable
Xylene	10 microgrammes per litre	S.I. No. 12 of 2001	Not Applicable	Not Applicable
Dissolved Metals				
Arsenic	40 microgrammes per litre	S.I. No. 268 of 2006	30 mg per kg dry weight	S.I. No. 268 of 2006
Cadmium	5 microgrammes per litre	S.I. No. 268 of 2006	5 mg per kg dry weight	S.I. No. 268 of 2006

Chromium	30 microgrammes per litre	S.I. No. 268 of 2006	6 mg per kg dry weight	S.I. No. 268 of 2006
Copper	10 microgrammes per litre	S.I. No. 268 of 2006	400 mg per kg dry weight	S.I. No. 268 of 2006
Mercury	0.4 microgrammes per litre	S.I. No. 268 of 2006	1 mg per kg dry weight	S.I. No. 268 of 2006
Nickel	50 microgrammes per litre	S.I. No. 268 of 2006	5 mg per kg dry weight	S.I. No. 268 of 2006
Lead	20 microgrammes per litre	S.I. No. 268 of 2006	7.5 mg per kg dry weight	S.I. No. 268 of 2006
Zinc	200 microgrammes per litre	S.I. No. 268 of 2006	4,000 mg per kg dry weight	S.I. No. 268 of 2006
Silver	10 microgrammes per litre	S.I. No. 268 of 2006	15 mg per kg dry weight	S.I. No. 268 of 2006
Organoleptic Parameters				
Taste	No impairment of taste in shellfish flesh			

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Table 10
Physico-chemical conditions supporting the biological elements
PART B: Specific pollutants

AA: annual average ⁽¹⁾

MAC: maximum allowable concentration

Unit: [$\mu\text{g/l}$]

Name of substance	Environmental quality standard (EQS) ⁽²⁾⁽³⁾⁽⁶⁾			
	AA-EQS ⁽⁷⁾ Inland surface waters	AA-EQS Other surface waters	MAC-EQS ⁽⁸⁾ Inland surface waters	MAC-EQS Other surface waters
Arsenic	25	20	-	-
Chromium III	4.7	-	32	-
Chromium VI	3.4	0.6	-	32
Copper ⁽⁴⁾	5 or 30	5	-	-
Cyanide	10	10	-	-
Diazinon	0.01	0.01	0.02	0.26
Dimethoate	0.8	0.8	4	4
Fluoride	500	1,500	-	-
Glyphosate	60	-	-	-
Linuron	0.7	0.7	0.7	0.7
Mancozeb	2	2	7.3	7.3
Monochlorobenzene	1.5	25	-	-
Phenol	8	8	46	46
Toluene	10	10	-	-
Xylenes	10	10	-	-
Zinc ⁽⁵⁾	8 or 50 or 100	10	-	-

⁽¹⁾The calculation of the arithmetic mean and the analytical method used must be in accordance with technical specifications to be adopted for chemical monitoring and quality of analytical results in accordance with Directive 2000/60/EC of the European Parliament and of the Council, including how to apply an EQS where there is no appropriate analytical method meeting the minimum performance criteria.

⁽²⁾The values for all metals are for dissolved metals i.e. after filtration through a 0.45 micron filter. In designing monitoring programmes, it was recommended that total chromium be determined. Where the result for total chromium is less than the EQS for Cr VI, no further investigation is deemed necessary. Where the total Chromium level is above the EQS, an assessment should be made of the potential discharges of Cr VI into the waterbody. Where there is a risk of Cr VI contamination, speciation studies should be included in the monitoring programme.

⁽³⁾The values for all metals, except Chromium VI, are as added values to background concentrations.

⁽⁴⁾In the case of Copper the value 5 applies where the water hardness measured in mg/l CaCO_3 is less than or equal to 100; the value 30 applies where the water hardness exceeds 100 mg/l CaCO_3 .

⁽⁵⁾In the case of Zinc, the standard shall be 8 $\mu\text{g/l}$ for water hardness with annual average values less than or equal to 10 mg/l CaCO_3 , 50 $\mu\text{g/l}$ for water hardness greater than 10 mg/l CaCO_3 and less than or equal to 100 mg/l CaCO_3 and 100 $\mu\text{g/l}$ elsewhere.

⁽⁶⁾Standards for compounds other than metals refer to total concentrations in the whole water sample.

⁽⁷⁾AA-EQS means that for each representative monitoring point within the waterbody, the arithmetic mean of the concentrations measured over a twelve month monitoring period does not exceed the standard.

⁽⁸⁾MAC-EQS means that for each representative monitoring point within the waterbody no measured concentration exceeds the standard.

SCHEDULE 6

Table 11

The environmental quality standards for priority substances and certain other pollutants to apply for the purpose of assigning chemical status

With the exception of cadmium, lead, mercury and nickel (hereinafter “metals”) the EQS values in tables 11 and 12 are expressed as total concentrations in the whole water sample. In the case of metals the EQS refers to the dissolved concentration, i.e. the dissolved fraction of a water sample obtained by filtration through a 0.45 µm filter or any equivalent pre-treatment

Priority SubstancesAA: annual average⁽¹⁾

MAC: maximum allowable concentration

Unit: [µg/l]

(1)	(2)	(3)	(4)	(5)	(6)	(7)
N°	Name of substance	Chemical Abstracts Service number	AA-EQS ⁽²⁾ Inland surface waters ⁽³⁾	AA-EQS ⁽²⁾ Other surface waters	MAC-EQS ⁽⁴⁾ Inland surface waters ⁽³⁾	MAC-EQS ⁽⁴⁾ Other surface waters
(1)	Alachlor	15972-60-8	0.3	0.3	0.7	0.7
(2)	Atrazine	1912-24-9	0.6	0.6	2.0	2.0
(3)	Benzene	71-43-2	10	8	50	50
(4)	Carbon-tetrachloride ⁽⁵⁾	56-23-5	12	12	not applicable	not applicable
(5)	Chlorfenvinphos	370-90-6	0.1	0.1	0.3	0.3
(6)	Chlorpyrifos (Chlorpyrifos-ethyl)	2921-88-2	0.03	0.03	0.1	0.1
(7a)	Cyclodiene pesticides: Aldrin ⁽⁵⁾ Dieldrin ⁽⁵⁾ Endrin ⁽⁵⁾ Isodrin ⁽⁵⁾	309-00-2 60-57-1 72-20-8 465-73-6	Σ=0.01	Σ=0.005	not applicable	not applicable
(7b)	DDT total ^{(5) (6)}	not applicable	0.025	0.025	not applicable	not applicable
	para-para-DDT ⁽⁵⁾	50-29-3	0.01	0.01	not applicable	not applicable
(8)	1,2-Dichloroethane	107-06-2	10	10	not applicable	not applicable
(9)	Dichloromethane	75-09-2	20	20	not applicable	not applicable
(10)	Di(2-ethylhexyl)-phthalate (DEHP)	117-81-7	1.3	1.3	not applicable	not applicable
(11)	Diuron	330-54-1	0.2	0.2	1.8	1.8
(12)	Fluoranthene	206-44-0	0.1	0.1	1	1
(13)	Isoproturon	34123-59-6	0.3	0.3	1.0	1.0
(14)	Lead and its compounds	7439-92-1	7.2	7.2	not applicable	not applicable

(1)	(2)	(3)	(4)	(5)	(6)	(7)
N°	Name of substance	Chemical Abstracts Service number	AA-EQS ⁽²⁾ Inland surface waters ⁽³⁾	AA-EQS ⁽²⁾ Other surface waters	MAC-EQS ⁽⁴⁾ Inland surface waters ⁽³⁾	MAC-EQS ⁽⁴⁾ Other surface waters
(15)	Naphthalene	91-20-3	2,4	1,2	not applicable	not applicable
(16)	Nickel and its compounds	7440-02-0	20	20	not applicable	not applicable
(17)	Octylphenol ((4-(1,1',3,3'-tetramethylbutyl)-phenol))	140-66-9	0,1	0,01	not applicable	not applicable
(18)	Pentachloro-phenol	87-86-5	0,4	0,4	1	1
(19)	Simazine	122-34-9	1	1	4	4
(20a)	Tetrachloro-ethylene ⁽⁵⁾	127-18-4	10	10	not applicable	not applicable
(20b)	Trichloro-ethylene ⁽⁵⁾	79-01-6	10	10	not applicable	not applicable
(21)	Trichloro-benzenes	12002-48-1	0,4	0,4	not applicable	not applicable
(22)	Trichloro-methane	67-66-3	2,5	2,5	not applicable	not applicable

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⁽¹⁾The calculation of the arithmetic mean and the analytical method used must be in accordance with the technical specifications to be adopted for chemical monitoring and quality of analytical results in accordance with Directive 2000/60/EC of the European Parliament and of the Council, including how to apply an EQS where there is no appropriate analytical method meeting the minimum performance criteria.

⁽²⁾This parameter is the Environmental Quality Standard expressed as an annual average value (EQS-AA). Unless otherwise specified, it applies to the total concentration of all isomers.

⁽³⁾Inland surface waters encompass rivers and lakes and related artificial or heavily modified water bodies.

⁽⁴⁾This parameter is the Environmental Quality Standard expressed as a maximum allowable concentration (MAC-EQS). Where the MAC-EQS are marked as "not applicable", the AA-EQS values are considered protective against short-term pollution peaks in continuous discharges since they are significantly lower than the values derived on the basis of acute toxicity.

⁽⁵⁾This substance is not a priority substance but one of the other pollutants for which the EQS are identical to those laid down in community legislation that applied prior to Directive 2008/105/EC of the European Parliament and Council on environmental quality standards in the field of water policy.

⁽⁶⁾DDT total comprises the sum of the isomers 1,1,1-trichloro-2,2 bis (*p*-chlorophenyl) ethane (CAS number 50-29-3; EU number 200-024-3); 1,1,1-trichloro-2 (*o*-chlorophenyl)-2-(*p*-chlorophenyl) ethane (CAS number 789-02-6; EU Number 212-332-5); 1,1-dichloro-2,2 bis (*p*-chlorophenyl) ethylene (CAS number 72-55-9; EU Number 200-784-6); and 1,1-dichloro-2,2 bis (*p*-chlorophenyl) ethane (CAS number 72-54-8; EU Number 200-783-0).

Table 12

The environmental quality standards for priority hazardous substances to apply for the purpose of assigning chemical status

Priority Hazardous Substances

AA: annual average ⁽¹⁾

MAC: maximum allowable concentration

Unit: [µg/l]

(1)	(2)	(3)	(4)	(5)	(6)	(7)
N ^o	Name of substance	Chemical Abstracts Service number	AA-EQS ⁽²⁾ Inland surface waters ⁽¹⁾	AA-EQS ⁽²⁾ Other surface waters	MAC-EQS ⁽⁴⁾ Inland surface waters ⁽¹⁾	MAC-EQS ⁽⁴⁾ Other surface waters
(1)	Anthracene	120-12-7	0.1	0.1	0.4	0.4
(2)	Brominated diphenylether ⁽⁵⁾	32534-81-9	0.0005	0.0002	<i>not applicable</i>	<i>not applicable</i>
(3)	Cadmium and its compounds (depending on water hardness classes) ⁽⁶⁾	7440-43-9	≤ 0.08 (Class1) 0.08 (Class2) 0.09 (Class3) 0.15 (Class4) 0.25 (Class5)	0.2	≤ 0.45 (Class1) 0.45 (Class2) 0.6 (Class 3) 0.9 (Class 4) 1.5 (Class 5)	≤ 0.45 (Class1) 0.45 (Class2) 0.6 (Class 3) 0.9 (Class 4) 1.5 (Class 5)
(4)	C10-13 Chloroalkanes	85535-84-8	0.4	0.4	1.4	1.4
(5)	Endosulfan	115-29-7	0.005	0.0005	0.01	0.004
(6)	Hexachlorobenzene	118-74-1	0.01	0.01	0.05	0.05
(7)	Hexachlorobutadiene	87-68-3	0.1	0.1	0.6	0.6
(8)	Hexachlorocyclohexane	608-93-1	0.02	0.002	0.04	0.02
(9)	Mercury and its compounds	7439-97-6	0.05	0.05	0.07	0.07
(10)	Nonylphenol (4-Nonylphenol)	104-40-5	0.3	0.3	2.0	2.0
(11)	Pentachlorobenzene	608-93-5	0.007	0.0007	<i>not applicable</i>	<i>not applicable</i>
(12)	Polyaromatic hydrocarbons (PAH) ⁽⁷⁾	<i>not applicable</i>	<i>not applicable</i>	<i>not applicable</i>	<i>not applicable</i>	<i>not applicable</i>
	Benzo(a)pyrene	50-32-8	0.05	0.05	0.1	0.1
	Benzo(b)fluoranthene	205-99-2	Σ=0.03	Σ=0.03	<i>not applicable</i>	<i>not applicable</i>
	Benzo(k)fluoranthene	207-08-9				
	Benzo(g,h,i)perylene	191-24-2	Σ=0.002	Σ=0.002	<i>not applicable</i>	<i>not applicable</i>
	Indeno(1,2,3-cd)-pyrene	193-39-5				
(13)	Tributyltin compounds (Tributhyltin-cation)	36643-28-4	0.0002	0.0002	0.0015	0.0015

- ⁽¹⁾The calculation of the arithmetic mean and the analytical method used must be in accordance with the technical specifications for chemical monitoring and quality of analytical results to be adopted in accordance with Directive 2000/60/EC of the European Parliament and of the Council, including how to apply an EQS where there is no appropriate analytical method meeting the minimum performance criteria.
- ⁽²⁾This parameter is the Environmental Quality Standard expressed as an annual average value (EQS-AA). Unless otherwise specified, it applies to the total concentration of all isomers.
- ⁽³⁾Inland surface waters encompass rivers and lakes and related artificial or heavily modified water bodies.
- ⁽⁴⁾This parameter is the Environmental Quality Standard expressed as a maximum allowable concentration (EQS-MAC). Where the MAC-EQS are marked as "not applicable", the AA-EQS values are considered protective against short-term pollution peaks in continuous discharges since they are significantly lower than the values derived on the basis of acute toxicity.
- ⁽⁵⁾For the group of priority substances covered by brominated diphenylethers listed in Decision 2455/2001/EC, an EQS is established only for congener numbers 28, 47, 99, 100, 153 and 154.
- ⁽⁶⁾For Cadmium and its compounds the EQS values vary dependent upon the hardness of the water as specified in five class categories (Class 1: < 40 mg CaCO₃/l, Class 2: 40 to < 50 mg CaCO₃/l, Class 3: 50 to <100 mg CaCO₃/l, Class 4: 100 to <200 mg CaCO₃/l and Class 5: ≥ 200 mg CaCO₃/l).
- ⁽⁷⁾For the group of substances polyaromatic hydrocarbons (PAH) each individual EQS is applicable, i.e. the EQS for Benzo(a)pyrene, the EQS for the sum of Benzo(b)fluoranthene and Benzo(k)fluoranthene and the EQS for the sum of Benzo(g,h,i)perylene and Indeno(1,2,3-cd)pyrene must be met.

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List of Additional Parameters to be included in the Proposed Monitoring Programme for Receiving Waters

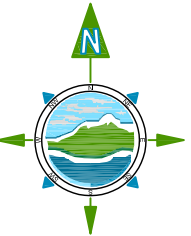
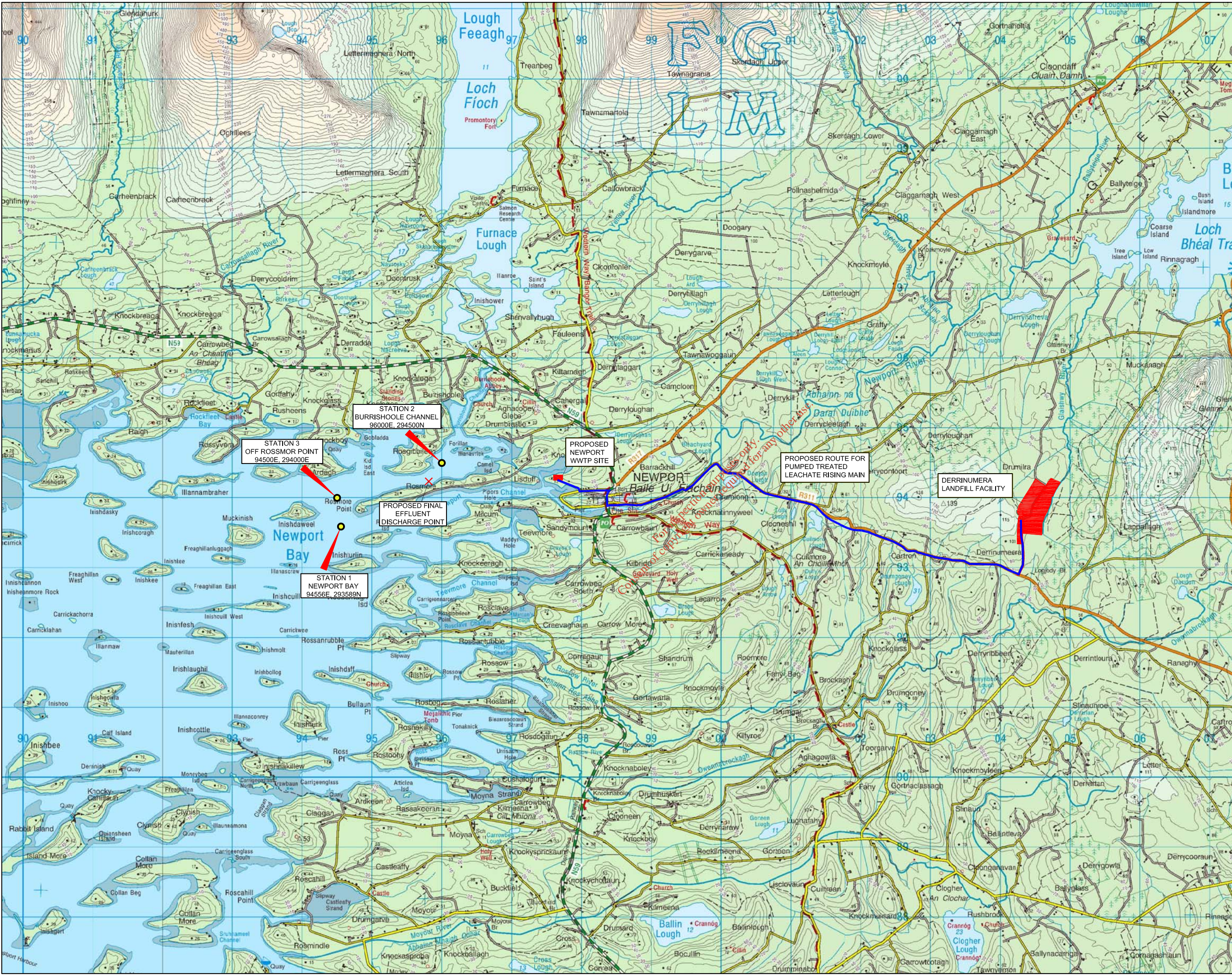
(Trace substances detected within the study area during the baseline survey)


- Barium
- Manganese
- Strontium
- Iron
- Phenanthrene
- Acenaphthene
- Pyrene
- Benzo(a)anthracene
- Chrysene
- Organic Pesticides
- Bis(2-ethylhexyl)phthalate
- Total Coliforms

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APPENDIX E

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LEGEND:
 PROPOSED TREATED LEACHATE RISING MAIN

- NOTES**
1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
 2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
 3. ENGINEER TO BE INFORMED BY THE CONTRACTOR OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
 4. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Issue	Date	Description	By	Chkd.
A	17.05.10	ISSUE TO EPA	R.K.	M.H.

Client: **MAYO COUNTY COUNCIL**

Project: **DERRINUMERA SHC & LTF - APPLICATION FOR REVIEW OF WASTE LICENCE W0021-02**

Title: **PROPOSED MONITORING PROGRAMME
SEAWATER SAMPLING STATIONS**

Scale @ A3: **1 : 50,000**

Prepared by: R.K. Checked: M.H. Date: MAY 10

Project Director: **MICHAEL F. GARRICK**



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Drawing No.: **1908 - 2415** A