Facility Information Summary	
AER Reporting Year	2016
Licence Register Number	WO145-02
Name of site	Enva Ireland Ltd.
Site Location	Raffeen Industrial Estate, Ringaskiddy Road, Monketown, Co. Cork
NACE Code	3832
Class/Classes of Activity	chedule of the waste management act. Class 13 of fourth schedule
National Grid Reference (6E, 6 N)	

A description of the activities/processes at the site for the reporting year. **This should include information such as production increases or decreases on site, any infrastructural changes, environmental performance which was measured during the reporting year and an overview of compliance with your licence** listing all exceedances of licence limits (where applicable) and what they relate to e.g. air, water, noise.

Site Performance: The company continues to demonstrate its commitment towards HSE management standards - the site maintains ISO14001 and OHSAS 18001. This ensures a standard approach is taking to managing activities from an environmental and safety aspect. There were no issues raised during the reporting period regarding maintenance to the standard. **Infrastructure / EMP progress:** Transfer of waste oil to our Portloaise office. Bulk transfer of waste oil has reduced in volume to last year. The battery transfer has ceased. **Environmental Performance:** There were no incidents or complaints in the reporting period.

Declaration:

All the data and information presented in this report has been checked and certified as being accurate. The quality of the information is assured to meet licence requirements.

Signature Group/Facility manager (or nominated, suitably qualified and experienced deputy)	31/3/17 Date

AIR-summary template	Lic No:	WO145-02	Year	2016

Answer all questions and complete all tables where relevant

			Additional information
1	Does your site have licensed air emissions? If yes please complete table A1 and A2 below for the current reporting year and answer further questions. If **you do not have licenced emissions and do not complete a solvent management plan** (table A4 and A5) you do not need to complete the tables	No	

Periodic/Non-Continuous Monitoring

2	Are there any results in breach of licence requirements? If yes please provide brief details in the comment section of TableA1 below			SELECT	
3	Was all monitoring carried out in accordance with EPA guidance note AG2 and using the basic air monitoring checklist?	Basic air monitoring checklist	AGN2	SELECT	

Table A1: Licensed Mass Emissions/Ambient data-periodic monitoring (non-continuous)

Emission reference no:	Parameter/ Substance	Frequency of Monitoring	ELV in licence or any revision therof	Licence Compliance criteria	Measured value	Unit of measurement	Compliant with licence limit	Method of analysis	Annual mass load (kg)	Comments - reason for change in % mass load from previous year if applicable
	SELECT			SELECT		SELECT	SELECT	SELECT		
	SELECT			SELECT		SELECT	SELECT	SELECT		
	SELECT			SELECT		SELECT	SELECT	SELECT		
	SELECT			SELECT		SELECT	SELECT	SELECT		

Note 1: Volumetric flow shall be included as a reportable parameter

AIR-summary template	Lic No:	WO145-02	Year	2016

Continuous Monitoring

4	Does your site carry out continuous air emissions monitoring?	SELECT	
	If yes please review your continuous monitoring data and report the required fields below in Table A2 and compare it to its relevant Emission Limit Value (ELV)		
5	Did continuous monitoring equipment experience downtime? If yes please record downtime in table A2 below	SELECT	
6	Do you have a proactive service agreement for each piece of continuous monitoring equipment?	SELECT	
7	Did your site experience any abatement system bypasses? If yes please detail them in table A3 below	SELECT	

Table A2: Summary of average emissions -continuous monitoring

Emission reference no:	Parameter/ Substance	ELV in licence or any revision therof	Averaging Period	Compliance Criteria	Units of measurement	Annual Emission	Annual maximum	Monitoring Equipment downtime (hours)	Number of ELV exceedences in current reporting year	Comments
	SELECT			SELECT	SELECT					
	SELECT				SELECT					
	SELECT				SELECT					
	SELECT				SELECT					
	SELECT				SELECT					

note 1: Volumetric flow shall be included as a reportable parameter.

Table A3: Abatement system bypass reporting table

Bypass protocol

Date*	Duration** (hours)	Location	Reason for bypass	Impact magnitude	Corrective action

* this should include all dates that an abatement system bypass occurred

** an accurate record of time bypass beginning and end should be logged on site and maintained for future Agency inspections please refer to bypass protocol link

AIR-summary template	Lic No:	WD145-02	Year	2016

Solvent use and management on site

8 Do you have a total Emission Limit Value of direct and fugitive emissions on site? if yes please fill out tables A4 and A5

SELECT	

Table A4: Solvent Management Plan Summary
Total VOC Emission limit value

Solvent regulations — Please refer to linked solvent regulations to complete table 5 and 6

Reporting year	Total solvent input on site (kg)	Total VOC emissions to Air from entire site (direct and fugitive)	Total VOC emissions as %of solvent input	Total Emission Limit Value (ELV) in licence or any revision therof	Compliance
					SELECT
					SELECT

Table A5: Solvent Mass Balance summary

	(I) Inputs (kg)	(O) Outputs (kg)						
Solvent	(I) Inputs (kg)	Organic solvent emission in waste	Solvents lost in water (kg)	Collected waste solvent (kg)	Fugitive Organic Solvent (kg)	Solvent released in other ways e.g. by-	Solvents destroyed onsite through	Total emission of Solvent to air (kg)
							Total	

AER Monitoring returns summary template-WATER/WASTEWATER(SEWER) Lic No: WD145-02 Year 2016

			Additional Information
1	Does your site have licensed emissions direct to surface water or direct to sewer? If yes please complete table W2 and W3 below for the current reporting year and answer further questions. If you do not have licenced emissions you only need to complete table W1 and or W2 for storm water analysis and visual inspections	Yes	All stormwater montoring results are compliant within the trigger levels as agreed with the agency.
2	Was it a requirement of your licence to carry out visual inspections on any surface water discharges or watercourses on or near your site? If yes please complete table W2 below summarising only any evidence of contamination noted during visual inspections	Yes	

Table W1 Storm water monitoring

Location reference	Location relative to site activities	PRTR Parameter	Licenced Parameter	Monitoring date	ELV or trigger level in licence or any revision thereof*	Licence Compliance criteria	Measured value	Unit of measurement	Compliant with licence	Comments
	SELECT	SELECT	SELECT			SELECT		SELECT	SELECT	
	SELECT	SELECT	SELECT			SELECT		SELECT	SELECT	

*trigger values may be agreed by the Agency outside of licence conditions

Table W2 Visual Inspections-Please only enter details where contamination was observed.

Location Reference	Date of inspection	Description of contamination	Source of contamination	Corrective action	Comments
			SELECT		
			SELECT		

Licensed Emissions to water and /or wastewater(sewer)-periodic monitoring (non-continuous)

				Additional Information
3	Was there any result in breach of licence requirements? If yes please provide brief details in the comment section of Table W3 below		No	
4	Was all monitoring carried out in accordance with EPA guidance and checklists for Quality of Aqueous Monitoring Data Reported to the EPA? If no please detail what areas require improvement in additional information box	External /Internal Lab Quality checklist / Assessment of results checklist	SELECT	

Table W3: Licensed Emissions to water and /or wastewater (sewer)-periodic monitoring (non-continuous)

Emission reference no:	Emission released to	Parameter/ SubstanceNote 1	Type of sample	Frequency of monitoring	Averaging period	ELV or trigger values in licence or any revision thereof Note 2	Licence Compliance criteria	Measured value	Unit of measurement	Compliant with licence	Method of analysis	Procedural reference source	Procedural reference standard number	Annual mass load (kg)	Comments
	SELECT	SELECT	SELECT		SELECT		SELECT		SELECT	SELECT	SELECT	SELECT			

Note 1: Volumetric flow shall be included as a reportable parameter

Note 2: Where Emission Limit Values (ELV) do not apply to your licence please compare results against EQS for Surface water or relevant receptor quality standards

AER Monitoring returns summary template-WATER/WASTEWATER(SEWER)	Lic No:	W0145-02	Year	2016

Continuous monitoring

			Additional information
5	Does your site carry out continuous emissions to water/sewer monitoring?	SELECT	

If yes please summarise your continuous monitoring data below in Table W4 and compare it to its relevant Emission Limit Value (ELV)

6	Did continuous monitoring equipment experience downtime? If yes please record downtime in table W4 below	SELECT	
7	Do you have a proactive service contract for each piece of continuous monitoring equipment on site?	SELECT	
8	Did abatement system bypass occur during the reporting year? If yes please complete table W5 below	SELECT	

Table W4: Summary of average emissions -continuous monitoring

Emission reference no:	Emission released to	Parameter/ Substance	ELV or trigger values in licence or any revision thereof	Averaging Period	Compliance Criteria	Units of measurement	Annual Emission for current reporting year (kg)	% change +/- from previous reporting year	Monitoring Equipment downtime (hours)	Number of ELV exceedences in reporting year	Comments
	SELECT	SELECT		SELECT	SELECT	SELECT					
	SELECT	SELECT		SELECT	SELECT	SELECT					

note 1: Volumetric flow shall be included as a reportable parameter.

Table W5: Abatement system bypass reporting table

Date	Duration (hours)	Location	Resultant emissions	Reason for bypass	Corrective action*	Was a report submitted to the EPA?	When was this report submitted?
						SELECT	

*Measures taken or proposed to reduce or limit bypass frequency

Bund/Pipeline testing template

Lic No: WD145-02 Year 2016

Bund testing

dropdown menu click to see options

		Additional information
1	Are you required by your licence to undertake integrity testing on bunds and containment structures ? If yes please fill out table B1 below listing all new bunds and containment structures on site, in addition to all bunds which failed the integrity test-all bunding structures which failed including mobile bunds must be listed in the table below, please include all bunds outside the licenced testing period (mobile bunds and chemstore included)	Yes	One bund test carried out and passed in April 2016
2	Please provide integrity testing frequency period	3 years	
3	Does the site maintain a register of bunds, underground pipelines (including stormwater and foul), Tanks, sumps and containers? (containers refers to "Chemstore" type units and mobile bunds)	Yes	
4	How many bunds are on site?	7	
5	How many of these bunds have been tested within the required test schedule?	7	
6	How many mobile bunds are on site?	0	
7	Are the mobile bunds included in the bund test schedule?	No	
8	How many of these mobile bunds have been tested within the required test schedule?	0	
9	How many sumps on site are included in the integrity test schedule?	0	
10	How many of these sumps are integrity tested within the test schedule?	0	
	Please list any sump integrity failures in table B1		
11	Do all sumps and chambers have high level liquid alarms?	No	
12	If yes to Q11 are these failsafe systems included in a maintenance and testing programme?	SELECT	
13	Is the Fire Water Retention Pond included in your integrity test programme?	No	

Table B1: Summary details of bund /containment structure integrity test

Bund/Containment structure ID	Type	Specify Other type	Product containment	Actual capacity	Capacity required*	Type of integrity test	Other test type	Test date	Integrity reports maintained on site?	Results of test	Integrity test failure explanation <50 words	Corrective action taken	Scheduled date for retest	Results of retest(if in current reporting year)
	SELECT					SELECT			SELECT	SELECT		SELECT		
	SELECT					SELECT			SELECT	SELECT		SELECT		

* Capacity required should comply with 25% or 110% containment rule as detailed in your licence

		Commentary
15	Has integrity testing been carried out in accordance with licence requirements and are all structures tested in line with BS8007/EPA Guidance? bunding and storage guidelines	SELECT	
16	Are channels/transfer systems to remote containment systems tested?	SELECT	
17	Are channels/transfer systems compliant in both integrity and available volume?	SELECT	

Pipeline/underground structure testing

1	Are you required by your licence to undertake integrity testing* on underground structures e.g. pipelines or sumps etc ? If yes please fill out table 2 below listing all underground structures and pipelines on site which failed the integrity test and all which have not been tested withing the integrity test period as specified	No	
2	Please provide integrity testing frequency period	SELECT	

*please note integrity testing means water tightness testing for process and foul pipelines (as required under your licence)

Table B2: Summary details of pipeline/underground structures integrity test

Structure ID	Type system	Material of construction:	Does this structure have Secondary containment?	Type of secondary containment	Type integrity testing	Integrity reports maintained on site?	Results of test	Integrity test failure explanation <50 words	Corrective action taken	Scheduled date for retest	Results of retest(if in current reporting year)
	SELECT	SELECT	SELECT	SELECT	SELECT	SELECT	SELECT				SELECT

Please use commentary for additional details not answered by tables/ questions above

Groundwater/Soil monitoring template	Lic No:	WO145-02	Year	2016

			Comments	
1	Are you required to carry out groundwater monitoring as part of your licence requirements?	yes		Please provide an interpretation of groundwater monitoring data in the interpretation box below or if you require additional space please include a groundwater/contaminated land monitoring results interpretaion as an additional section in this AER
2	Are you required to carry out soil monitoring as part of your licence requirements?	no		
3	Do you extract groundwater for use on site? If yes please specify use in comment section	no		
4	Do monitoring results show that groundwater generic assessment criteria such as GTVs or IGVs are exceeded or is there an upward trend in results for a substance? If yes, please complete the Groundwater Monitoring Guideline Template Report (link in cell G8) and submit separately through ALDER as a licensee return AND answer questions 5-12 below. Groundwater monitoring template	no	see attached report, uploaded to AER portal.	
5	Is the contamination related to operations at the facility (either current and/or historic)	no		
6	Have actions been taken to address contamination issues?If yes please summarise remediation strategies proposed/undertaken for the site	N/A		
7	Please specify the proposed time frame for the remediation strategy	N/A		
8	Is there a licence condition to carry out/update ELRA for the site?	yes		
9	Has any type of risk assesment been carried out for the site?	yes	ELRA carried out for the site.	
10	Has a Conceptual Site Model been developed for the site?	no		
11	Have potential receptors been identified on and off site?	no		
12	Is there evidence that contamination is migrating offsite?	no		Please enter interpretation of data here

Table 1: Upgradient Groundwater monitoring results

Date of sampling	Sample location reference	Parameter/ Substance	Methodology	Monitoring frequency	Maximum Concentration++	Average Concentration+	unit	GTV's*	SELECT**	Upward trend in pollutant concentration over last 5 years of monitoring data
							SELECT			SELECT
							SELECT			SELECT

.+ where average indicates arithmetic mean

.++ maximum concentration indicates the maximum measured concentration from all monitoring results produced during the reporting year

Table 2: Downgradient Groundwater monitoring results

Date of sampling	Sample location reference	Parameter/ Substance	Methodology	Monitoring frequency	Maximum Concentration	Average Concentration	unit	GTV's*	SELECT**	Upward trend in yearly average pollutant concentration over last 5 years of monitoring data
							SELECT			SELECT
							SELECT			SELECT

Groundwater/Soil monitoring template	Lic No:	WO145-02	Year	2016

*please note exceedance of generic assessment criteria (GAC) such as a Groundwater Threshold Value (GTV) or an Interim Guideline Value (IGV) or an upward trend in results for a substance indicates that further interpretation of monitoring results is required. In addition to completing the above table, please complete the Groundwater Monitoring Guideline Template Report at the link provided and submit separately through ALDER as a licensee return or as otherwise instructed by the EPA.	Groundwater monitoring template
More information on the use of soil and groundwater standards/ generic assessment criteria (GAC) and risk assessment tools is available in the EPA published guidance (see the link in G31)	Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites (EPA 2013).

**Depending on location of the site and proximity to other sensitive receptors alternative Receptor based Water Quality standards should be used in addition to the GTV e.g. if the site is close to surface water compare to Surface Water Environmental Quality Standards (SWEQS), if the site is close to a drinking water supply compare results to the Drinking Water Standards (DWS)	Surface water EQS	Groundwater regulations GTV's	Drinking water (private supply) standards	Drinking water (public supply) standards	Interim Guideline Values (IGV)

Groundwater/Soil monitoring template	Lic No:	W0145-02	Year	2016

Table 3: Soil results

Date of sampling	Sample location reference	Parameter/ Substance	Methodology	Monitoring frequency	Maximum Concentration	Average Concentration	unit
							SELECT
							SELECT

Where additional detail is required please enter it here in 200 words or less

Environmental Liabilities template	Lic No:	WO145-02	Year	2016

Click here to access EPA guidance on Environmental Liabilities and Financial provision

			Commentary
1	ELRA initial agreement status	Submitted and agreed by EPA	
2	ELRA review status	Review required and completed	
3	Amount of Financial Provision cover required as determined by the latest ELRA	161,625	
4	Financial Provision for ELRA status	Submitted and not agreed by EPA;	
5	Financial Provision for ELRA - amount of cover	161,625	
6	Financial Provision for ELRA - type	bond	Approved
7	Financial provision for ELRA expiry date	Enter expiry date	Not determined yet
8	Closure plan initial agreement status	sure plan submitted and not agreed by EPA	
9	Closure plan review status	Review required and completed	
10	Financial Provision for Closure status	SELECT	
11	Financial Provision for Closure - amount of cover	30,500	
12	Financial Provision for Closure - type	bond	Pending approval.
13	Financial provision for Closure expiry date	Enter expiry date	Not determined yet

Environmental Management Programme/Continuous Improvement Programme template

Lic No: WO145-02 Year 2016

Highlighted cells contain dropdown menu click to view

			Additional Information
1	Do you maintain an Environmental Mangement System (EMS) for the site. If yes, please detail in additional information	Yes	Enva Ireland Ltd are accredited to ISO 14001.
2	Does the EMS reference the most significant environmental aspects and associated impacts on-site	Yes	
3	Does the EMS maintain an Environmental Management Programme (EMP) as required in accordance with the licence requirements	Yes	
4	Do you maintain an environmental documentation/communication system to inform the public on environmental performance of the facility, as required by the licence	Yes	

Environmental Management Programme (EMP) report

Objective Category	Target	Status (% completed)	How target was progressed	Responsibility	Intermediate outcomes
Additional improvements	Review intregrity of yard and warehouse flooring, implement any improvements where identified	90%	Remaining section of seal between production floor and wall completed.	Operations Manager	Increased compliance with licence conditions
SELECT		SELECT		SELECT	SELECT
SELECT		SELECT		SELECT	SELECT

Noise monitoring summary report

Lic No: WO145-02 Year 2016

1	Was noise monitoring a licence requirement for the AER period? If yes please fill in table N1 noise summary below	Yes
2	Was noise monitoring carried out using the EPA Guidance note, including completion of the "Checklist for noise measurement report" included in the guidance note as table 6? (Noise Guidance note NG4)	Yes
3	Does your site have a noise reduction plan	No
4	When was the noise reduction plan last updated?	Enter date
5	Have there been changes relevant to site noise emissions (e.g. plant or operational changes) since the last noise survey?	No

Table N1: Noise monitoring summary

Date of monitoring	Time period	Noise location (on site)	Noise sensitive location -NSL (if applicable)	LA_{eq}	LA_{90}	LA_{10}	LA_{max}	Tonal or Impulsive noise* (Y/N)	If tonal /impulsive noise was identified was 5dB penalty applied?	Comments (ex. main noise sources on site, & extraneous noise ex. road traffic)	Is site compliant with noise limits (day/evening/night)?
01.09.16	10.24 - 10.54	N1		57	47	58	78	No	SELECT	Road traffic from N28, Wind.	
01.09.16	13.07 - 13.37	N1		56	50	58	72	No		Road traffic from N28, Wind.	
01.09.16	15.15 - 15.45	N1		57	50	57	85	No		Road traffic from N28, Wind.	
01.09.16	9.52 - 10.22	N2		57	48	61	70	No		Road traffic from N28, Background birdsong.	
01.09.16	12.35 - 13.05	N2		60	52	64	75	No		Road traffic from N28, Background birdsong.	
01.09.16	14.43 - 15.13	N2		60	53	63	77	No		Road traffic from N28, Background birdsong.	
01.09.16	9.20 - 9.50	N3		63	51	66	82	No		Road traffic from N28, Wind.	
01.09.16	12.03 - 12.33	N3		61	50	65	75	No		Road traffic from N28, Wind.	
01.09.16	14.11 - 15.41	N3		61	51	65	70	No		Road traffic from N28, Wind.	
01.09.16	10.57 - 11.27	N4		59	50	62	73	No		Road traffic from N28, Background birdsong	
01.09.16	13.39 - 14.09	N4		61	52	63	82	No		Road traffic from N28, Background birdsong	
01.09.16	15.47 - 16.17	N4		59	57	60	61	No		Road traffic from N28, Background birdsong	
01.09.16	08.15 - 08.45	N5		76	52	80	97	No		Noise location next to road so traffic is the only sou	
01.09.16	11.13 - 11.43	N5		81	61	84	93	No		Noise location next to road so traffic is the only sou	
01.09.16	13.59 - 14.29	N5		79	60	84	88	No		Noise location next to road so traffic is the only sou	

*Please ensure that a tonal analysis has been carried out as per guidance note NG4. These records must be maintained onsite for future inspection

If noise limits exceeded as a result of noise attributed to site activities, please choose the corrective action from the following options? SELECT

** please explain the reason for not taking action/resolution of noise issues?
Any additional comments? (less than 200 words)

Resource Usage/Energy efficiency summary

Lic No: WO145-02 Year 2016

			Additional information
1	When did the site carry out the most recent energy efficiency audit? Please list the recommendations in table 3 below	Apr-08	
2	Is the site a member of any accredited programmes for reducing energy usage/water conservation such as the SEAI programme linked to the right? If yes please list them in additional information	SEAI - Large Industry Energy Network (LIEN) / No	
3	Where Fuel Oil is used in boilers on site is the sulphur content compliant with licence conditions? Please state percentage in additional information	SELECT	

Table R1 Energy usage on site

Energy Use	Previous year	Current year	Production +/- % compared to previous reporting year**	Energy Consumption +/- % vs overall site production*
Total Energy Used (MWHrs)				
Total Energy Generated (MWHrs)				
Total Renewable Energy Generated (MWHrs)				
Electricity Consumption (MWHrs)				
Fossil Fuels Consumption:				
Heavy Fuel Oil (m3)				
Light Fuel Oil (m3)				
Natural gas (m3)				
Coal/Solid fuel (metric tonnes)				
Peat (metric tonnes)				
Renewable Biomass				
Renewable energy generated on site				

* where consumption of energy can be compared to overall site production please enter this information as percentage increase or decrease compared to the previous reporting year.

** where site production information is available please enter percentage increase or decrease compared to previous year

Table R2 Water usage on site

					Water Emissions	Water Consumption	
Water use	Water extracted Previous year m3/yr.	Water extracted Current year m3/yr.	Production +/- % compared to previous reporting year**	Energy Consumption +/- % vs overall site production*	Volume Discharged back to environment(m^3/yr):	Volume used i.e not discharged to environment e.g. released as steam m3/yr	Unaccounted for Water:
Groundwater							
Surface water							
Public supply							
Recycled water							
Total							

* where consumption of water can be compared to overall site production please enter this information as percentage increase or decrease compared to the previous reporting year.

** where site production information is available please enter percentage increase or decrease compared to previous year

Table R3 Waste Stream Summary

	Total	Landfill	Incineration	Recycled	Other
Hazardous (Tonnes)					
Non-Hazardous (Tonnes)					

Resource Usage/Energy efficiency summary

Lic No: WO145-02 Year 2016

Table R4: Energy Audit finding recommendations

Date of audit	Recommendations	Description of Measures proposed	Origin of measures	Predicted energy savings %	Implementation date	Responsibility	Completion date	Status and comments
			SELECT					
			SELECT					
			SELECT					

Table R5: Power Generation: Where power is generated onsite (e.g. power generation facilities/food and drink industry)please complete the following information

	Unit ID	Unit ID	Unit ID	Unit ID	Station Total
Technology					
Primary Fuel					
Thermal Efficiency					
Unit Date of Commission					
Total Starts for year					
Total Running Time					
Total Electricity Generated (GWH)					
House Load (GWH)					
KWH per Litre of Process Water					
KWH per Litre of Total Water used on Site					

Complaints and Incidents summary template

Lic No: WO145-02 Year 2016

Complaints

Have you received any environmental complaints in the current reporting year? If yes please complete summary details of complaints received on site in table 1 below		Additional information
	No	

Table 1 Complaints summary

Date	Category	Other type (please specify)	Brief description of complaint (Free txt <20 words)	Corrective action< 20 words	Resolution status	Resolution date	Further information
	SELECT				SELECT		
	SELECT				SELECT		
	SELECT				SELECT		
	SELECT				SELECT		
	SELECT				SELECT		

Total complaints open at start of reporting year	
Total new complaints received during reporting year	
Total complaints closed during reporting year	
Balance of complaints end of reporting year	

Incidents

Have any incidents occurred on site in the current reporting year? Please list all incidents for current reporting year in Table 2 below		Additional information
	No	

*For information on how to report and what constitutes an incident	What is an incident

Table 2 Incidents summary

Date of occurrence	Incident nature	Location of occurrence	Incident category*please refer to guidance	Receptor	Cause of incident	Other cause(please specify)	Activity in progress at time of incident	Communication	Occurrence	Corrective action<20 words	Preventative action <20 words	Resolution status	Resolution date	Likelihood of reoccurence
	SELECT	SELECT	SELECT	SELECT	SELECT		SELECT	SELECT	SELECT			SELECT		SELECT
	SELECT	SELECT	SELECT	SELECT	SELECT		SELECT	SELECT	SELECT			SELECT		SELECT
	SELECT	SELECT	SELECT	SELECT	SELECT		SELECT	SELECT	SELECT			SELECT		SELECT
	SELECT	SELECT	SELECT	SELECT	SELECT		SELECT	SELECT	SELECT			SELECT		SELECT
	SELECT	SELECT	SELECT	SELECT	SELECT		SELECT	SELECT	SELECT			SELECT		SELECT

Total number of incidents current year	
Total number of incidents previous year	
% reduction/ increase	

WASTE SUMMARY	Lic No:	W0145-02	Year	2016
SECTION A-PRTR ON SITE WASTE TREATMENT AND WASTE TRANSFERS TAB- TO BE COMPLETED BY ALL IPPC AND WASTE FACILITIES	PRTR facility logon		dropdown list click to see options	

SECTION B- WASTE ACCEPTED ONTO SITE-TO BE COMPLETED BY ALL IPPC AND WASTE FACILITIES

			Additional Information
1	Were any wastes accepted onto your site for recovery or disposal or treatment prior to recovery or disposal within the boundaries of your facility ?; (waste generated within your boundaries is to be captured through PRTR reporting) If yes please enter details in table 1 below	No	
2	Did your site have any rejected consignments of waste in the current reporting year? If yes please give a brief explanation in the additional information	No	
3	Was waste accepted onto your site that was generated outside the Republic of Ireland? If yes please state the quantity in tonnes in additional information	No	

Table 1 Details of waste accepted onto your site for recovery, disposal or treatment (do not include wastes generated at your site, as these will have been reported in your PRTR workbook)

Licenced annual tonnage limit for your site (total tonnes/annum)	EWC code European Waste Catalogue EWC codes	Source of waste accepted	Description of waste accepted Please enter an accurate and detailed description - which applies to relevant EWC code European Waste Catalogue EWC codes	Quantity of waste accepted in current reporting year (tonnes)	Quantity of waste accepted in previous reporting year (tonnes)	Reduction/ increase over previous year +/- %	Reason for reduction/ increase from previous reporting year	Packaging Content (%)- only applies if the waste has a packaging component	Disposal/Recovery or treatment operation carried out at your site and the description of this operation	Quantity of waste remaining on site at the end of reporting year (tonnes)	Comments -

SECTION C-TO BE COMPLETED BY ALL WASTE FACILITIES (waste transfer stations, Composters, Material recovery facilities etc) EXCEPT LANDFILL SITES

4	Is all waste processing infrastructure as required by your licence and approved by the Agency in place? If no please list waste processing infrastructure required onsite	Yes	
5	Is all waste storage infrastructure as required by your licence and approved by the Agency in place? If no please list waste storage infrastructure required on site	Yes	
6	Does your facility have relevant nuisance controls in place?	Yes	
7	Do you have an odour management system in place for your facility? If no why?	N/A	
8	Do you maintain a sludge register on site?	N/A	

SECTION D-TO BE COMPLETED BY LANDFILL SITES ONLY

Table 2 Waste type and tonnage-landfill only

Waste types permitted for disposal	Authorised/licenced annual intake for disposal (tpa)	Actual intake for disposal in reporting year (tpa)	Remaining licensed capacity at end of reporting year (m3)	Comments

Table 3 General information-Landfill only

Area ID	Date landfilling commenced	Date landfilling ceased	Currently landfilling	Private or Public Operated	Inert or non-hazardous	Predicted date to cease landfilling	Licence permits asbestos	Is there a separate cell for asbestos?	Accepted asbestos in reporting year	Total disposal area occupied by waste	Lined disposal area occupied by waste	Unlined area
										SELECT UNIT	SELECT UNIT	SELECT UNIT
Cell 8												

WASTE SUMMARY

Lic No: WD145-02 Year 2016

Table 4 Environmental monitoring-landfill only

Landfill Manual-Monitoring Standards

Was meterological monitoring in compliance with Landfill Directive (LD) standard in reporting year +	Was leachate monitored in compliance with LD standard in reporting year	Was Landfill Gas monitored in compliance with LD standard in reporting year	Was SW monitored in compliance with LD standard in reporting year	Have GW trigger levels been established	Were emission limit values agreed with the Agency (ELVs)	Was topography of the site surveyed in reporting year	Has the statement under S53(A)(5) of WMA been submitted in reporting year	Comments

.+ please refer to Landfill Manual linked above for relevant Landfill Directive monitoring standards

Table 5 Capping-Landfill only

Area uncapped*	Area with temporary cap	Area with final cap to LD Standard m2 ha, a	Area capped other	Area with waste that should be permanently capped to date under licence	What materials are used in the cap	Comments
SELECT UNIT	SELECT UNIT					

*please note this includes daily cover area

Table 6 Leachate-Landfill only

9 Is leachate from your site treated in a Waste Water Treatment Plant? SELECT

10 Is leachate released to surface water? If yes please complete leachate mass load information below SELECT

Volume of leachate in reporting year(m3)	Leachate (BOD) mass load (kg/annum)	Leachate (COD) mass load (kg/annum)	Leachate (NH4) mass load (kg/annum)	Leachate (Chloride) mass load kg/annum	Leachate treatment on-site	Specify type of leachate treatment	Comments

Please ensure that all information reported in the landfill gas section is consistent with the Landfill Gas Survey submitted in conjunction with PRTR returns

Table 7 Landfill Gas-Landfill only

Gas Captured&Treated by LFG System m3	Power generated (MW / KWh)	Used on-site or to national grid	Was surface emissions monitoring performed during the reporting year?	Comments
			SELECT	

Comments on liner type

Environmental Protection Agency

Guidance to completing the PRTR workbook

PRTR Returns Workbook

Version 1.1.19

REFERENCE YEAR	2016

1. FACILITY IDENTIFICATION

Parent Company Name	Enva Ireland Limited
Facility Name	Enva Ireland Limited (Cork)
PRTR Identification Number	W0145
Licence Number	W0145-02

Classes of Activity

No.	class_name
-	Refer to PRTR class activities below

Address 1	Unit 9
Address 2	Raffeen Industrial Estate
Address 3	Raffeen
Address 4	Monkstown
	Cork
Country	Ireland
Coordinates of Location	-8.36503 51.8335
River Basin District	IESW
NACE Code	3832
Main Economic Activity	Recovery of sorted materials
AER Returns Contact Name	Jamie Barry
AER Returns Contact Email Address	jbarry@enva.ie
AER Returns Contact Position	Operations Manager
AER Returns Contact Telephone Number	0214387220
AER Returns Contact Mobile Phone Number	0862607472
AER Returns Contact Fax Number	0214387299
Production Volume	0.0
Production Volume Units	
Number of Installations	0
Number of Operating Hours in Year	0
Number of Employees	18
User Feedback/Comments	
Web Address	

2. PRTR CLASS ACTIVITIES

Activity Number	Activity Name
5(a)	Installations for the recovery or disposal of hazardous waste
5(c)	Installations for the disposal of non-hazardous waste

3. SOLVENTS REGULATIONS (S.I. No. 543 of 2002)

Is it applicable?	No
Have you been granted an exemption ?	
If applicable which activity class applies (as per Schedule 2 of the regulations) ?	
Is the reduction scheme compliance route being used ?	

4. WASTE IMPORTED/ACCEPTED ONTO SITE

Guidance on waste imported/accepted onto site

Do you import/accept waste onto your site for on-site treatment (either recovery or disposal activities) ?	

This question is only applicable if you are an IPPC or Quarry site

4.1 RELEASES TO AIR Link to previous years emissions data

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

RELEASES TO AIR					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD				QUANTITY		
			Method Used					
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

SECTION B : REMAINING PRTR POLLUTANTS

RELEASES TO AIR					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD				QUANTITY		
			Method Used					
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

SECTION C : REMAINING POLLUTANT EMISSIONS (As required in your Licence)

RELEASES TO AIR					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD				QUANTITY		
			Method Used					
Pollutant No.	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

Additional Data Requested from Landfill operators

For the purposes of the National Inventory on Greenhouse Gases, landfill operators are requested to provide summary data on landfill gas (Methane) flared or utilised on their facilities to accompany the figures for total methane generated. Operators should only report their Net methane (CH4) emission to the environment under T(total) KG/yr for Section A: Sector specific PRTR pollutants above. Please complete the table below:

Landfill: Enva Ireland Limited (Cork)

Please enter summary data on the quantities of methane flared and / or utilised	T (Total) kg/Year	M/C/E	Method Used: Method Code	Method Used: Designation or Description	Facility Total Capacity m3 per hour	
Total estimated methane generation (as per site model)	0.0				N/A	
Methane flared	0.0				0.0	(Total Flaring Capacity)
Methane utilised in engine/s	0.0				0.0	(Total Utilising Capacity)
Net methane emission (as reported in Section A above)	0.0				N/A	

4.2 RELEASES TO WATERS Link to previous years emissions data

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

Data on ambient monitoring of storm/surface water or groundwater, conducted as part of your licence requirements, should NOT be submitted under AER / PRTR Reporting as this onl

RELEASES TO WATERS					Please enter all quantities in this section in KGs			
POLLUTANT					QUANTITY			
No. Annex II	Name	M/C/E	Method Used: Method Code	Method Used: Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

SECTION B : REMAINING PRTR POLLUTANTS

RELEASES TO WATERS					Please enter all quantities in this section in KGs			
POLLUTANT					QUANTITY			
No. Annex II	Name	M/C/E	Method Used: Method Code	Method Used: Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

SECTION C : REMAINING POLLUTANT EMISSIONS (as required in your Licence)

RELEASES TO WATERS					Please enter all quantities in this section in KGs			
POLLUTANT					QUANTITY			
Pollutant No.	Name	M/C/E	Method Used: Method Code	Method Used: Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

4.3 RELEASES TO WASTEWATER OR SEWER

Link to previous years emissions data

SECTION A : PRTR POLLUTANTS

OFFSITE TRANSFER OF POLLUTANTS DESTINED FOR WASTE-WATER TREATMENT OR SEWER					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD			QUANTITY			
			Method Used					
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

SECTION B : REMAINING POLLUTANT EMISSIONS (as required in your Licence)

OFFSITE TRANSFER OF POLLUTANTS DESTINED FOR WASTE-WATER TREATMENT OR SEWER					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD			QUANTITY			
			Method Used					
Pollutant No.	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

4.4 RELEASES TO LAND

Link to previous years emissions data

PRTR# : W0145 | Facility Name : Enva Ireland Limited (Cork) | Filename : Copy of W0145_2016.xls | Return Year : 2016 |

31/03/2017 14:31

SECTION A : PRTR POLLUTANTS

RELEASES TO LAND					Please enter all quantities in this section in KGs		
POLLUTANT		METHOD			QUANTITY		
			Method Used				
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year
					0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

SECTION B : REMAINING POLLUTANT EMISSIONS (as required in your Licence)

RELEASES TO LAND					Please enter all quantities in this section in KGs		
POLLUTANT		METHOD			QUANTITY		
			Method Used				
Pollutant No.	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year
					0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

5. ONSITE TREATMENT & OFFSITE TRANSFERS OF WASTE

| PRTR# : W0145 | Facility Name : Enva Ireland Limited (Cork) | Filename : W0145_2016 PRTR.xls | Return Year : 2016 |

Please enter all quantities on this sheet in Tonnes

Transfer Destination	European Waste Code	Hazardous	Quantity (Tonnes per Year)	Description of Waste	Waste Treatment Operation	Method Used		Location of Treatment	Haz Waste : Name and Licence/Permit No of Next Destination Facility Non Haz Waste: Name and Licence/Permit No of Recover/Disposer	Haz Waste : Address of Next Destination Facility Non Haz Waste: Address of Recover/Disposer	Name and License / Permit No and Address of Final Recoverer / Disposer (HAZARDOUS WASTE ONLY)	Actual Address of Final Destination i.e. Final Recovery / Disposal Site (HAZARDOUS WASTE ONLY)
						M/C/E	Method Used					
Within the Country	13 02 08	Yes	1258.6	other engine, gear and lubricating oils	R13	M	Weighed	Offsite in Ireland	Enva Ireland Ltd.,W0184-01	Clonminam Industrial Estate,Portlaoise,Portlaoise, Laois,Ireland	Enva Ireland Ltd.,W0184-01,Clonminam Industrial Estate,Portlaoise,.,Laois,Ireland	Clonminam Industrial Estate,Portlaoise,.,Laois,Ireland
Within the Country	13 04 03	Yes	229.6	bilge oils from other navigation	R13	M	Weighed	Offsite in Ireland	Enva Ireland Ltd.,W0184-01	Clonminam Industrial Estate,Portlaoise,Portlaoise, Laois,Ireland	Enva Ireland Ltd.,W0184-01,Clonminam Industrial Estate,Portlaoise,.,Laois,Ireland	Clonminam Industrial Estate,Portlaoise,.,Laois,Ireland
Within the Country	09 01 05	Yes	0.91	bleach solutions and bleach fixer solutions	R13	M	Weighed	Offsite in Ireland	SRCL Ltd,W0054-02	Unit 1A Allied Industrial Estate ,Kylemore Road,Ballyfermot,Dublin 10,Ireland	Avanti Environmnetal Group Ltd.,EPR/XP3038HX,Charley Wood Road ,Knowsley Industrial Estate,Merseyside,L33 7SG,United Kingdom	Charley Wood Road ,Knowsley Industrial Estate,Merseyside,L33 7SG,United Kingdom
Within the Country	18 01 03	Yes	54.66	wastes whose collection and disposal is subject to special requirements in order to prevent infection	R13	M	Weighed	Offsite in Ireland	SRCL Ltd,W0054-02	Unit 1A Allied Industrial Estate ,Kylemore Road,Ballyfermot,Dublin 10,Ireland	TRV Thermische,E3632112,Rodenkirchener Strasse,D50389,Wesseling,. ,Germany	Rodenkirchener Strasse,D50389,Wesseling,. ,Germany
Within the Country	18 01 09	No	1.8	medicines other than those mentioned in 18 01 08	R13	M	Weighed	Offsite in Ireland	SRCL Ltd,W0054-02	Unit 1A Allied Industrial Estate ,Kylemore Road,Ballyfermot,Dublin 10,Ireland		
Within the Country	18 01 10	Yes	0.06	amalgam waste from dental care	R13	M	Weighed	Offsite in Ireland	SRCL Ltd,W0054-02	Unit 1A Allied Industrial Estate ,Kylemore Road,Ballyfermot,Dublin 10,Ireland	Enva Ireland Ltd.,W0041-01,Smithstown Industrial Estate,.,.,Shannon,Ireland	Smithstown Industrial Estate,.,.,Shannon,Ireland

* Select a row by double-clicking the Description of Waste then click the delete button

AECOM

Enva Cork

Annual Groundwater Monitoring 2016

Enva Ireland Limited

Project Reference: 60530242 / CKRP0001

28 March 2017

Quality information

Prepared by	Checked by	Approved by
Brendan McCarthy Environmental Scientist	Fergus O'Regan Senior Environmental Scientist	Kevin Forde Associate Director

Revision History

Revision	Revision date	Details	Authorized	Name	Position
1	28 March 2017	Final issue		Fergus O'Regan	Senior Environmental Scientist

Prepared for:

Enva Ireland Limited
Raffeen Industrial Estate
Ringaskiddy
Cork

Prepared by:

Brendan McCarthy
Environmental Scientist
T: 021 436 5006
M: 087 187 2998
E: brendan.mccarthy@aecom.com

AECOM Ireland Limited
Douglas Business Centre
Carrigaline Road
Cork
Ireland

T: 021 4365006
aecom.com

Table of Contents

1. Introduction

AECOM Ireland Limited (AECOM) is pleased to present this report to Enva Ireland Limited (Enva) summarising the 2016 groundwater monitoring round conducted at the Enva Facility, Unit 9, Raffeen Industrial Estate, Ringaskiddy, Co. Cork (the site).

The groundwater monitoring round was conducted in accordance with AECOM Proposal *"GWM2016/CKRP0002 – Enva Cork"*, dated 07 November 2016 and approved by Enva on 14 December 2016.

The groundwater monitoring round was completed by an experienced AECOM scientist on 19 December 2016.

A site location plan is presented in Figure 1 and the site layout map showing the borehole locations is presented as Figure 2.

Under the terms of the site's Waste Licence (W0145-02), Enva is required to undertake annual groundwater monitoring of four groundwater wells (BH1, BH2, BH3 and BH4) for a range of organic and inorganic parameters.

The objective of the works presented herein was to fulfil the requirements of Waste Licence W0145-02 and to assess groundwater quality by comparison to published guidelines and previous groundwater monitoring data.

2. Scope of Works

The following scope of work was completed by AECOM on 19 December 2016:

- Water level measurement at all four on-site groundwater monitoring wells
- Well purging and measurement of water quality parameters at monitoring wells BH1, BH2, BH3 and BH4
- Groundwater sampling and analysis from monitoring wells BH1, BH2, BH3 and BH4 in accordance with Waste Licence monitoring requirements

2.1 Water Level Measurement

Measurement of water levels was completed at all four accessible on site groundwater monitoring wells.

At each well, an interface probe was used to monitor depth to groundwater and total depth of the well, to assess the presence of free phase product (either floating or sinking).

2.2 Well Purging and Water Quality Measurements

The volume of standing water in each of the four groundwater monitoring wells to be sampled was calculated based on measured water levels. A minimum of three times this volume was then purged from the wells.

Due to a water quality probe malfunction, water quality measurements could not be recorded in the field. Groundwater temperature was recorded with a spirit filled thermometer.

Monitoring wells BH1, BH2, BH3 and BH4 were purged and sampled using dedicated, in-situ, inertial lift pumping equipment to minimise volatilisation and loss of volatile organic compounds (VOCs).

2.3 Groundwater Sampling

Groundwater samples were analysed for the Waste Licence monitoring parameters, as detailed in Appendix A and Table 1.

Groundwater samples were collected into clean, laboratory-supplied sample containers. Samples were handled by field staff wearing single use, disposable nitrile gloves, which were changed between sampling locations to minimise cross-contamination.

Samples were labelled in the field and sample details were entered onto a chain of custody form. Whilst on-site and during transit, the groundwater samples were stored in a chilled cool box.

The samples were sent by overnight courier to Exova Jones Environmental Laboratories U.K., an AECOM approved laboratory with UKAS accreditation.

3. Results

3.1 Field Observations

During groundwater sampling on 19 December 2016, the following was noted:

- No separate floating/light or sinking/dense non-aqueous phase liquids (NAPLs) were detected at any of the four on site monitoring wells
- No evidence of contamination (such as sheens or odours) was noted during purging or sampling
- Groundwater was generally observed to be silty and cloudy brown in colour
- Groundwater temperatures ranged from 10.5 °C (BH4) to 11.5 °C (BH1). Temperature readings were within the typical range for groundwater in Ireland (10.0 °C to 12.0 °C)

3.2 Groundwater Flow Direction

The direction of groundwater flow under natural gradient conditions is expected to follow the local topographic gradient towards the north-east, eventually discharging to Cork Harbour.

Water levels were gauged on 19 December 2016. Well head elevations and standing water level measurements were used to calculate water table elevations and infer groundwater flow pattern which is presented in Figure 3.

The inferred groundwater gradient is relatively flat with a gradient of 0.01 towards the north and east.

3.3 Data Assessment

The required groundwater analysis is listed in Schedule C.7 of the Waste Licence and is presented in Appendix C. No Emission Limit Values are specified in the licence for groundwater; therefore, assessment criteria were sourced from published guidance selected based on the site setting as follows:

- The nearest surface water feature is the Glounatouig Stream located approximately 500 m north of the site. This stream eventually flows into Cork Harbour at Monkstown Creek, which is located approximately 750 m northwest of the site
- The bedrock aquifer is classified by the Geological Survey of Ireland (GSI) as a 'locally important aquifer – bedrock which is generally moderately productive except for local zones - Karstified'
- GSI records show that there are nine groundwater monitoring wells located in a 1 km radius of the site. Three of the wells are used for industrial purposes, while four are associated with the Raffeen landfill site. The use of the remaining two wells listed is unknown. Records indicate that there are no drinking water abstraction wells located in the vicinity of the site. As such, given the above site setting, general groundwater quality was assessed by comparing analytical results to the following guidelines:
  - European Union Environmental Objectives (Groundwater) (Amendment) Regulations, 2016 - Statutory Instrument No. 366 of 2016
  - Environmental Protection Agency's Draft Interim Guidelines Values (IGVs) for the Protection of Groundwater, 2003

3.3.1 Analytical Results

The validated laboratory report is presented in Appendix B. Groundwater analytical results are presented in Tables 3, 4, 5 and 6.

A summary of the analytical results for December 2016 is presented below.

3.3.1.1 Volatile Organic Compounds (VOCs)

VOC were not detected above the laboratory method detection limits (MDLs) in any the four groundwater samples analysed.

3.3.1.2 Semi-Volatile Organic Compounds (SVOCs)

SVOCs were not detected above the laboratory MDLs in any of the four samples analysed.

3.3.1.3 Diesel range organics (DRO) and Mineral Oil

DRO and mineral oil were not detected above the laboratory MDL in any the four samples analysed.

3.3.1.4 Dissolved Heavy Metals

The majority of dissolved heavy metals results were below the laboratory MDLs. The reported concentrations of all dissolved heavy metals analysed were below the adopted assessment criteria.

3.3.1.5 Major Ions

Reported concentrations of nitrate (as NO_3) were above the IGV (25 mg/L) in groundwater samples BH1 (30 mg/L) and BH2 (33 mg/L) on the upgradient side of the site.

Orthophosphate (as PO_4) was detected above the IGV (0.03 mg/L) at well BH3 (0.10 mg/L) on the downgradient side of the site.

The reported concentrations of all other major ions in each of the samples analysed were below the adopted assessment criteria.

3.4 Trends in Analytical Results

Analytical results for December 2016 were comparable to the previous monitoring round completed in July 2015.

VOCs, SVOCs, DRO and mineral oil were reported below laboratory MDLs since monitoring began.

Nitrate was reported above the IGV in samples BH1 (30 mg/L) and BH2 (38 mg/L) in 2015 and was reported at similar concentrations in 2016 (30 mg/L and 33 mg/L, respectively).

In December 2016, orthophosphate was detected in groundwater from well BH3 (0.10 mg/L). It was not detected above the MDL in any other well in 2016.

Orthophosphate was detected in groundwater from wells BH1 (0.06 mg/L), BH3 (0.08 mg/L) and BH4 (0.10 mg/L) in 2015. Higher concentrations for orthophosphate of 0.09 mg/L (BH3) and 0.35 mg/L (BH4) had been reported in August 2013. Trend results for orthophosphate are presented in Table 7 and Figure 4, showing historically fluctuating orthophosphate concentrations in groundwater since 2007.

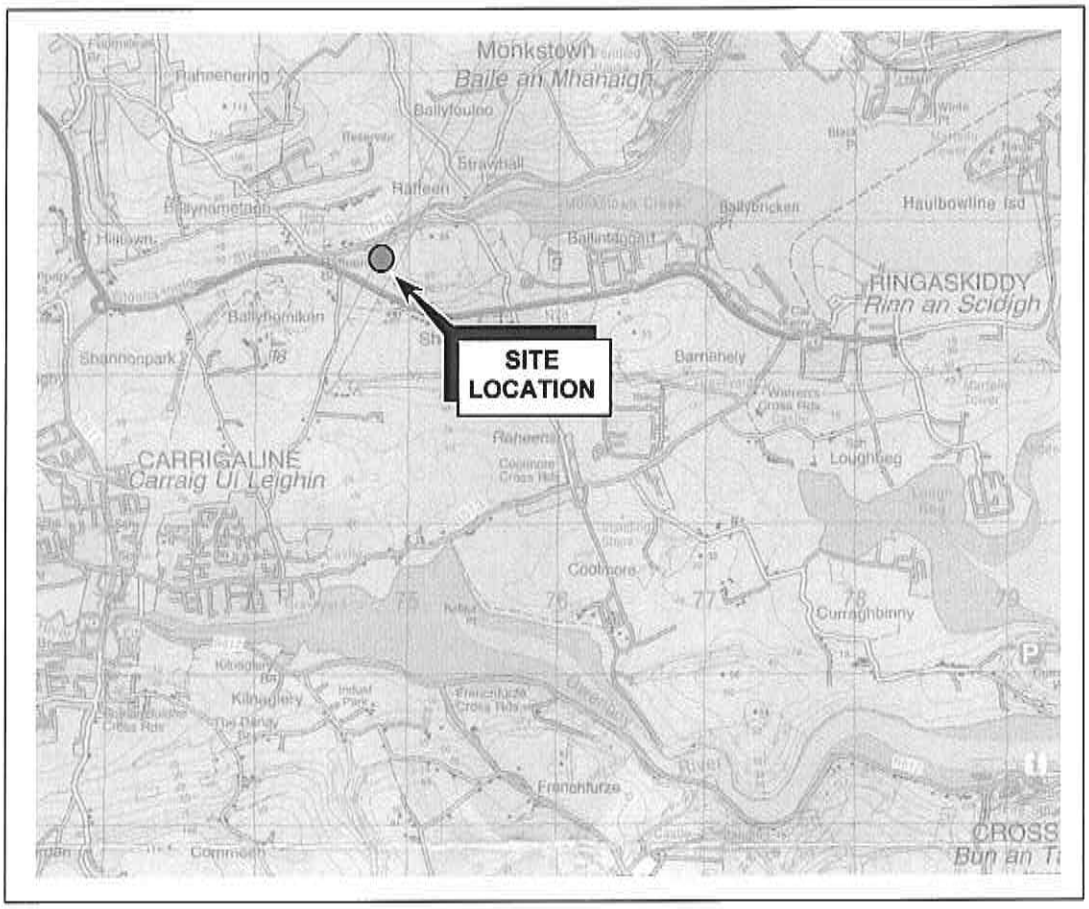
4. Conclusions

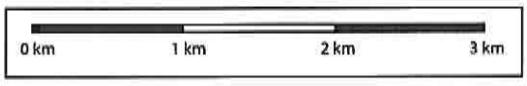
The findings of the December 2016 groundwater monitoring event are as follows:

- Groundwater contours indicate that groundwater flow is to the north and east
- Nitrate was reported above the adopted assessment criteria at wells BH1 and BH2
- Orthophosphate was reported above the adopted assessment criteria in groundwater from well BH1
- The reported concentrations of all other parameters analysed in each of the four wells in December 2016 were below the adopted assessment criteria

Figures

North





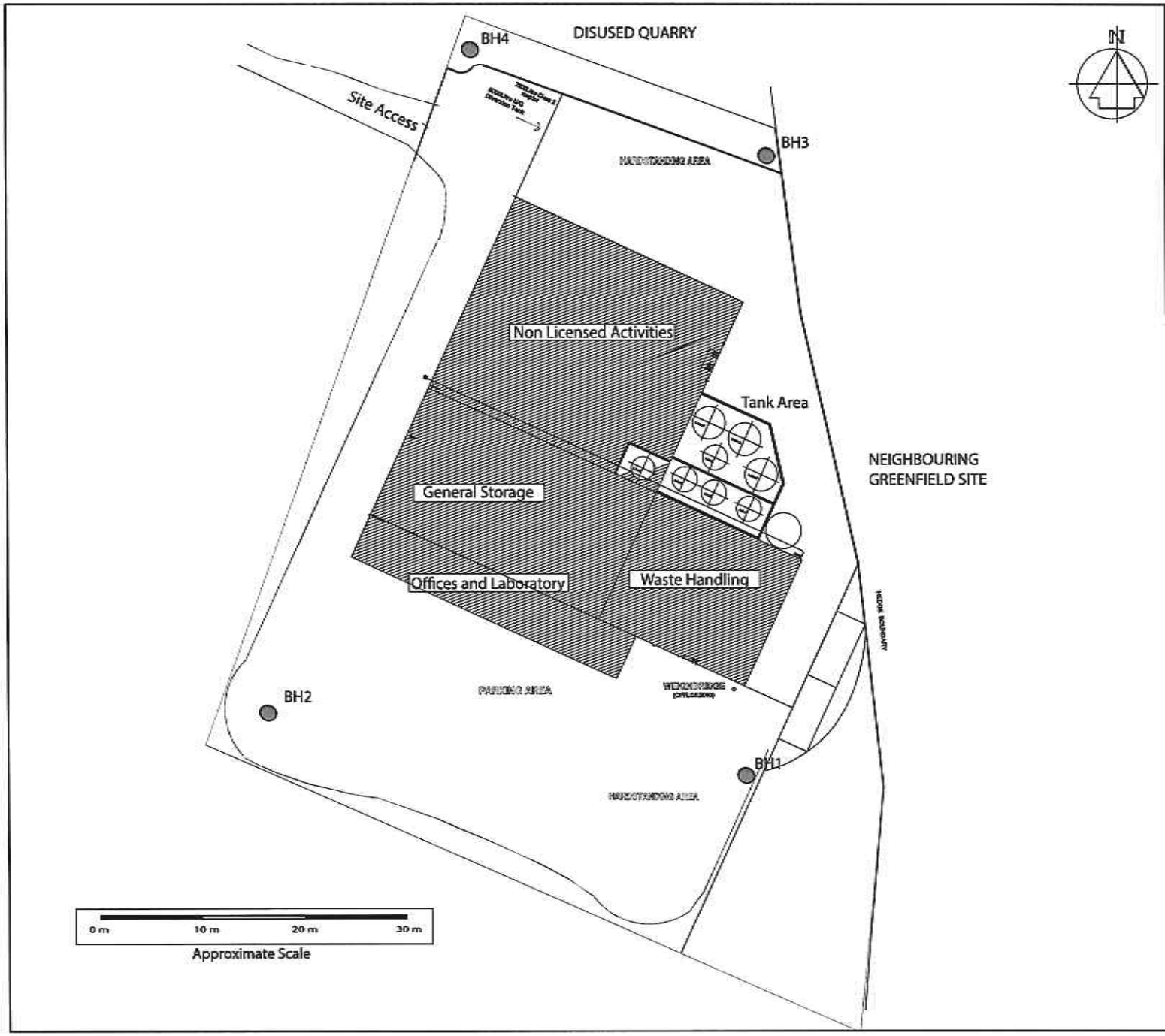
CLIENT
Enva Ireland Limited

PROJECT LOCATION
Enva Raffeen, Ringaskiddy, Co. Cork

DRAWING TITLE
Figure 1 _ Site Location Map

ENVIRONMENTAL CONSULTANTS
AECOM
Douglas Business Centre
Carrigaline Road, Douglas Cork.
Tel 021 4365 006

DRAWN	CHECKED	APPROVED	DATE
BMC	FO'R	KF	17.01.17
SCALE 1 : 50,000	JOB No. 60530242		REV. A



NOTES

Key

BH1 Monitoring Well Location and ID

STATUS

Final

ENVIRONMENTAL CONSULTANTS

AECOM

Douglas Business Centre
Carrigaline Road, Douglas Cork.
Tel 021 4365 006

CLIENT

Enva Ireland Limited

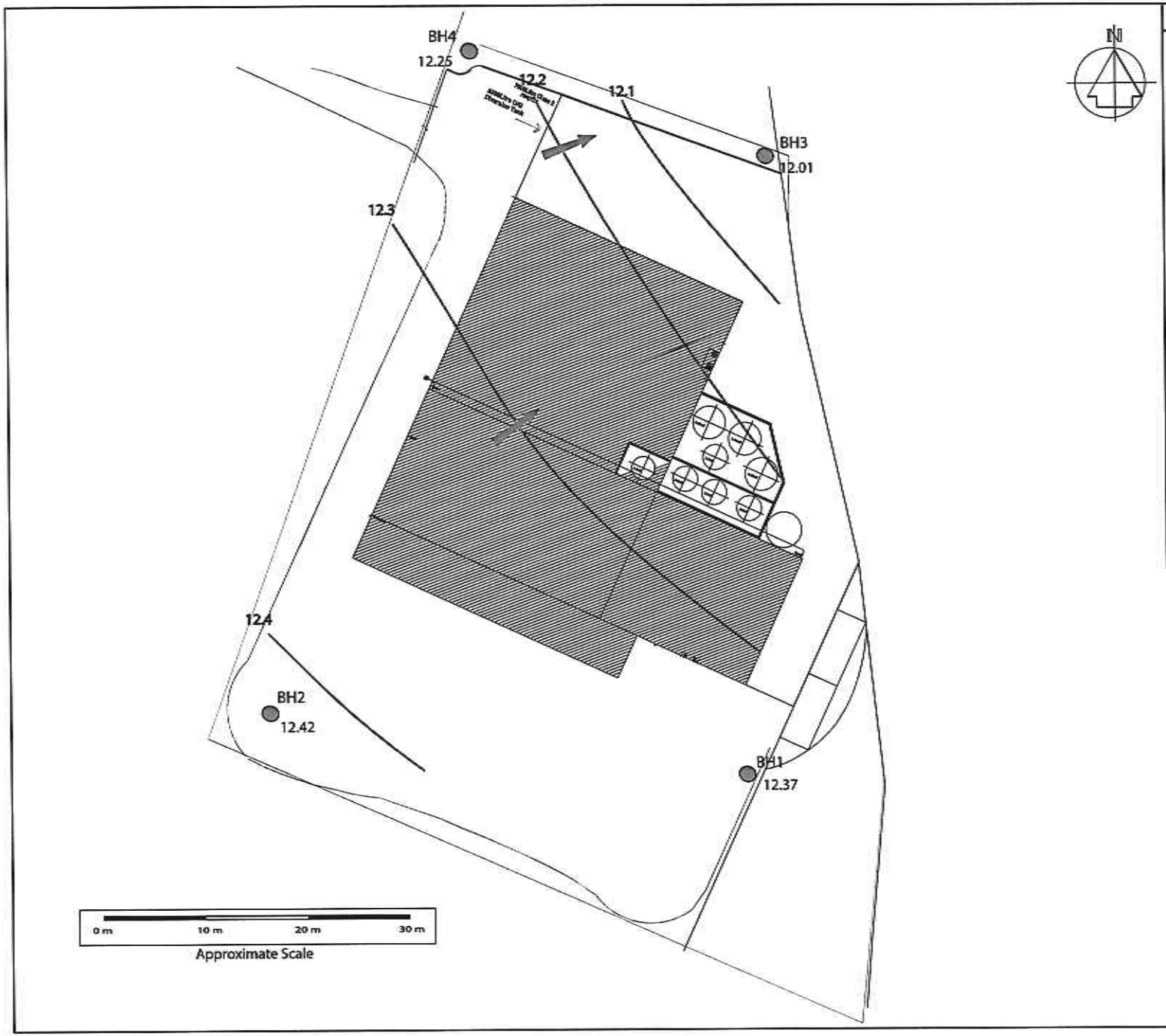
PROJECT

Enva Rafeen, Ringaskiddy, Co. Cork

DRAWING TITLE

Figure 2 _ Site Layout Plan Showing Monitoring Well Locations

DRAWN	CHECKED	APPROVED	DATE
BMC	FO'R	KF	17.01.17
SCALE: AS SHOWN	JOB No.: 60530242		REV: A



NOTES

Key

BH1	Monitoring Well Location and ID
11.20m	Groundwater Elevation Relative to Ordinance Datum
12.3m	Groundwater Contour
	Groundwater Flow Direction

STATUS

Final

ENVIRONMENTAL CONSULTANTS

AECOM
Douglas Business Centre
Carrigaline Road, Douglas Cork.
Tel 021 4365 006

CLIENT

Enva Ireland Limited

PROJECT

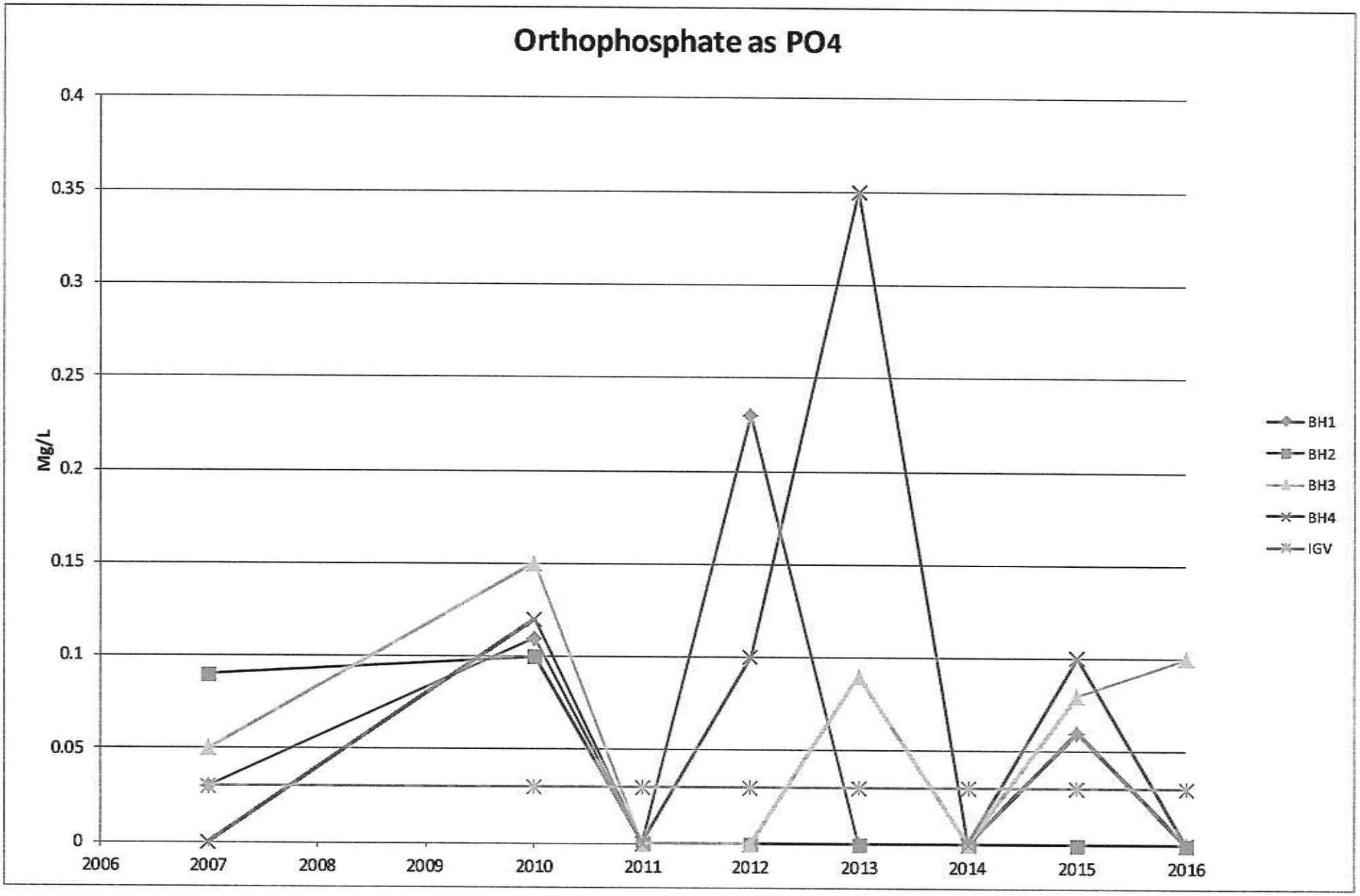
Enva Raffeen, Ringaskiddy, Co. Cork

DRAWING TITLE

Figure 3 _ Groundwater Contour Plan 19 December 2016

DRAWN	CHECKED	APPROVED	DATE
BMC	FO'R	KF	20.01.17
SCALE: AS SHOWN	JOB No.: 60530242		REV.: A

Figure 4 - Orthophosphate Trends (mg/L) to 2016



Tables

Table 1: Sample Inventory - Enva Raffeen, December 2016

Compiled by: BMC
Checked by: FO'R

Sampling Location	Field Parameters					Laboratory Parameters						
	pH	EC	Eh	T	DO	VOCs	SVOCs	COD	DRO & Mineral Oil	Total Ammonia	Major Ions	Dissolved Heavy Metals
BH1	~	~	~	x	~	x	x	x	x	x	x	x
BH2	~	~	~	x	~	x	x	x	x	x	x	x
BH3	~	~	~	x	~	x	x	x	x	x	x	x
BH4	~	~	~	x	~	x	x	x	x	x	x	x

Notes:

EC - Electrical Conductivity
Eh - Redox Potential
T - Temperature
DO - Dissolved Oxygen
~ - Not measured
X -Scheduled for analysis

VOC - Volatile Organic Compounds
SVOC - Semi-Volatile Organic Compounds
COD - Chemical Oxygen Demand
DRO - Diesel Range Organics
Major Ions - Calcium, Chloride, Sulphate, Potassium, Sodium, Magnesium, Bicarbonate Alkalinity, Nitrate, Nitrite, Phosphate and Fluoride
Metals - Arsenic, Boron, Cadmium, Chromium, Copper, Mercury, Nickel, Lead, Selenium, Zinc, Iron and Manganese

Table 2: Water Level and Field Measurements - Enva Raffeen, 19 December 2016

Compiled by: BMC
Checked by: FO'R

Sample Location	Sampling Date	SWL (m btoc)	Well Elevation (m AOD)	SWL (m AOD)	Total Depth (m)	Well Volume (L)	Minimum Purge Volume (L)	Actual Purge Volume (L)	pH	EC (µS/cm)	Eh (mV)	T (°C)	DO (mg/L)	Observations
BH1	19-Dec-16	6.488	18.85	12.37	9.28	5	16	20	-	-	-	11.5	-	Cloudy, brown, NEC.
BH2	19-Dec-16	6.195	18.62	12.42	8.60	5	14	18	-	-	-	11.0	-	Cloudy, silty brown, NEC.
BH3	19-Dec-16	6.831	18.84	12.01	9.83	6	18	18	-	-	-	11.0	-	Cloudy, silty brown, NEC.
BH4	19-Dec-16	6.370	18.62	12.25	7.95	3	9	10	-	-	-	10.5	-	Cloudy, silty brown, NEC.

Notes:

SWL - static water level
m AOD - metres above Ordnance Datum
m btoc - metres below top of casing
NEC - No evidence of contamination

EC - Electrical Conductivity
Eh - Redox Potential
T - Temperature
DO - Dissolved Oxygen

µS/cm - micro Siemens per centimetre
mV - millivolts
°C - degrees centigrade
mg/L - milligrams per litre

\- Not recorded due a probe malfunction

Table 3: Volatile Organic Compound Results (µg/L) - Enva Raffeen, Decrmber 2016

Compiled by: BMC
Checked by: FO'R

Volatile Organic Compound	MDL	Groundwater Regs 2016	EPA Draft Interim Guideline Value (IGV)	Monitoring Well			
				BH1	BH2	BH3	BH4
Dichlorodifluoromethane	2	nv	nv	-	-	-	-
Methyl Tertiary Butyl Ether	0.1	10	30	-	-	-	-
Chloromethane	3	nv	nv	-	-	-	-
Vinyl Chloride	0.1	0.375	nv	-	-	-	-
Bromomethane	1	nv	nv	-	-	-	-
Chloroethane	3	nv	nv	-	-	-	-
Trichlorofluoromethane	3	nv	nv	-	-	-	-
1,1-Dichloroethene	3	nv	30*	-	-	-	-
Dichloromethane	5	nv	10	-	-	-	-
trans-1-2-Dichloroethene	3	nv	30*	-	-	-	-
1,1-Dichloroethane	3	nv	nv	-	-	-	-
cis-1-2-Dichloroethene	3	0.375	30*	-	-	-	-
2,2-Dichloropropane	1	nv	nv	-	-	-	-
Bromochloromethane	2	nv	nv	-	-	-	-
Chloroform	2	nv	12	-	-	-	-
1,1,1-Trichloroethane	2	nv	500	-	-	-	-
1,1-Dichloropropene	3	nv	nv	-	-	-	-
Carbon tetrachloride	2	nv	2	-	-	-	-
1,2-Dichloroethane	2	2	3	-	-	-	-
Benzene	0.5	0.75	1.0	-	-	-	-
Trichloroethene	3	7.5	70, 10**	-	-	-	-
1,2-Dichloropropane	2	nv	nv	-	-	-	-
Dibromomethane	3	nv	nv	-	-	-	-
Bromodichloromethane	2	nv	nv	-	-	-	-
cis-1-3-Dichloropropene	2	nv	nv	-	-	-	-
Toluene	0.5	525	10	-	-	-	-
trans-1-3-Dichloropropene	2	nv	nv	-	-	-	-
1,1,2-Trichloroethane	2	nv	nv	-	-	-	-
Tetrachloroethene	3	7.5	10, 40***	-	-	-	-
1,3-Dichloropropane	2	nv	nv	-	-	-	-
Dibromochloromethane	2	nv	nv	-	-	-	-
1,2-Dibromoethane	2	nv	nv	-	-	-	-
Chlorobenzene	2	nv	1	-	-	-	-
1,1,1,2-Tetrachloroethane	2	nv	nv	-	-	-	-
Ethylbenzene	1	nv	10	-	-	-	-
p/m-Xylene	2	nv	10****	-	-	-	-
o-Xylene	1	nv	10****	-	-	-	-
Styrene	2	nv	nv	-	-	-	-
Bromoform	2	nv	nv	-	-	-	-
Isopropylbenzene	3	nv	nv	-	-	-	-
1,1,2,2-Tetrachloroethane	4	nv	nv	-	-	-	-
Bromobenzene	2	nv	nv	-	-	-	-
1,2,3-Trichloropropane	3	nv	nv	-	-	-	-
Propylbenzene	3	nv	nv	-	-	-	-
2-Chlorotoluene	3	nv	nv	-	-	-	-
1,3,5-Trimethylbenzene	3	nv	nv	-	-	-	-
4-Chlorotoluene	3	nv	nv	-	-	-	-
tert-Butylbenzene	3	nv	nv	-	-	-	-
1,2,4-Trimethylbenzene	3	nv	nv	-	-	-	-
sec-Butylbenzene	3	nv	nv	-	-	-	-
4-Isopropyltoluene	3	nv	nv	-	-	-	-
1,3-Dichlorobenzene	3	nv	nv	-	-	-	-
1,4-Dichlorobenzene	3	nv	nv	-	-	-	-
n-Butylbenzene	3	nv	nv	-	-	-	-
1,2-Dichlorobenzene	3	nv	10	-	-	-	-
1,2-Dibromo-3-chloropropane	2	nv	nv	-	-	-	-
1,2,4-Trichlorobenzene	3	nv	0.4*****	-	-	-	-
Hexachlorobutadiene	3	nv	0.1	-	-	-	-
Naphthalene	2	0.075[1]	1	-	-	-	-
1,2,3-Trichlorobenzene	3	nv	0.4*****	-	-	-	-

Notes:

Bold	Exceeds Groundwater Regulations 2016	*Draft IGV is for the sum of dichloroethenes
Italics	Exceeds IGV (Interim Guideline Value)	**Two Draft IGVs are given for trichloroethene
MDL	Method Detection Limit	***Two Draft IGVs are given for tetrachloroethene
-	Less than the MDL	****Draft IGV is for the sum of xylenes
nv	IGV/GTV not defined	*****Draft IGV is for the sum of trichlorobenzenes

[1]GTV is for the sum of PAHs

Table 4: Semi-volatile Organic Compound Results (µg/L) - Enva Raffeen, December 2016

Compiled by: BMC
Checked by: FO'R

Semi-Volatile Organic Compound	MDL	Groundwater Regs 2016	EPA Draft Interim Guideline Value (IGV)	Monitoring Well			
				BH1	BH2	BH3	BH4
Phenols							
2-Chlorophenol	1	nv	200	-	-	-	-
2-Methylphenol	0.5	nv	0.5 [1]	-	-	-	-
2-Nitrophenol	0.5	nv	0.5 [1]	-	-	-	-
2,4-Dichlorophenol	0.5	nv	0.5 [1]	-	-	-	-
2,4-Dimethylphenol	1	nv	0.5 [1]	-	-	-	-
2,4,5-Trichlorophenol	0.5	nv	0.5 [1]	-	-	-	-
2,4,6-Trichlorophenol	1	nv	200	-	-	-	-
4-Chloro-3-methylphenol	0.5	nv	0.5 [1]	-	-	-	-
4-Methylphenol	1	nv	0.5 [1]	-	-	-	-
4-Nitrophenol	10	nv	0.5 [1]	-	-	-	-
Pentachlorophenol	1	nv	2	-	-	-	-
Phenol	1	nv	0.5 [1]	-	-	-	-
PAHs							
2-Chloronaphthalene	1	nv	nv	-	-	-	-
2-Methylnaphthalene	1	nv	nv	-	-	-	-
Naphthalene	1	0.075[1]	1	-	-	-	-
Acenaphthylene	0.5	nv	nv	-	-	-	-
Acenaphthene	1	nv	nv	-	-	-	-
Fluorene	0.5	nv	nv	-	-	-	-
Phenanthrene	0.5	nv	nv	-	-	-	-
Anthracene	0.5	0.075[1]	10000	-	-	-	-
Fluoranthene	0.5	nv	1	-	-	-	-
Pyrene	0.5	nv	nv	-	-	-	-
Benz(a)anthracene	0.5	nv	nv	-	-	-	-
Chrysene	0.5	nv	nv	-	-	-	-
Benzo(bk)fluoranthene	1	0.075[1]	0.5, 0.05****	-	-	-	-
Benzo(a)pyrene	1	0.0075	0.01	-	-	-	-
Indeno(123cd)pyrene	1	0.075[1]	0.05	-	-	-	-
Dibenzo(ah)anthracene	0.5	nv	nv	-	-	-	-
Benzo(ghi)perylene	0.5	0.075[1]	0.05	-	-	-	-
Phthalates							
Bis(2-ethylhexyl) phthalate	5	nv	8	-	-	-	-
Butylbenzyl phthalate	1	nv	5 [2]	-	-	-	-
Di-n-butyl phthalate	1.5	nv	2	-	-	-	-
Di-n-Octyl phthalate	1	nv	5 [2]	-	-	-	-
Diethyl phthalate	1	nv	5 [2]	-	-	-	-
Dimethyl phthalate	1	nv	5 [2]	-	-	-	-
Other SVOCs							
1,2-Dichlorobenzene	1	nv	10	-	-	-	-
1,2,4-Trichlorobenzene	1	nv	0.4	-	-	-	-
1,3-Dichlorobenzene	1	nv	nv	-	-	-	-
1,4-Dichlorobenzene	1	nv	nv	-	-	-	-
2-Nitroaniline	1	nv	nv	-	-	-	-
2,4-Dinitrotoluene	0.5	nv	nv	-	-	-	-
2,6-Dinitrotoluene	1	nv	nv	-	-	-	-
3-Nitroaniline	1	nv	nv	-	-	-	-
4-Bromophenylphenylether	1	nv	nv	-	-	-	-
4-Chloroaniline	1	nv	nv	-	-	-	-
4-Chlorophenylphenylether	1	nv	nv	-	-	-	-
4-Nitroaniline	0.5	nv	nv	-	-	-	-
Azobenzene	0.5	nv	nv	-	-	-	-
Bis(2-chloroethoxy)methane	0.5	nv	nv	-	-	-	-
Bis(2-chloroethyl)ether	1	nv	nv	-	-	-	-
Carbazole	0.5	nv	nv	-	-	-	-
Dibenzofuran	0.5	nv	nv	-	-	-	-
Hexachlorobenzene	1	nv	0.03	-	-	-	-
Hexachlorobutadiene	1	nv	0.1	-	-	-	-
Hexachlorocyclopentadiene	1	nv	nv	-	-	-	-
Hexachloroethane	1	nv	nv	-	-	-	-
Isophorone	0.5	nv	nv	-	-	-	-
N-nitrosodi-n-propylamine	0.5	nv	nv	-	-	-	-
Nitrobenzene	1	nv	10	-	-	-	-

Notes:

Bold	Exceeds Groundwater Regulations 2016
Italics	Exceeds IGV (Interim Guideline Value)
MDL	Method Detection Limit
-	Less than the MDL
nv	IGV/GTV not defined

Draft IGV - EPA Draft Interim Guideline Value
Bold indicates result above IGV
1 - Draft IGV is for the sum of phenols
2 - Draft IGV is for the sum of phthalates

GTV: Groundwater threshold value, SI No. 366 of 2016
Italics indicates result above GTV
[1]GTV is for the sum of PAHs

Table 5: Hydrocarbon and Metals Results (µg/L) - Enva Raffeen, December 2016

Compiled by: BMC
Checked by:FOR

Compound	MDL	Groundwater Regs 2016	EPA Draft Interim Guideline Value (IGV)	Monitoring Well			
				BH1	BH2	BH3	BH4
DRO/Mineral Oil							
EPH (C_8-C_{40})	10	nv	nv	-	-	-	-
Mineral Oil	10	nv	nv	-	-	-	-
Metals							
Arsenic	0.9	7.5	10	2	2	1	-
Boron	12	nv	1,000	19	19	17	13
Cadmium	0.03	nv	5	-	-	-	-
Chromium	0.2	37.5	30	2	1	-	-
Copper	3	1,500	30	-	-	-	-
Mercury	0.5	0.75	1	-	-	-	-
Nickel	0.2	nv	20	-	-	-	-
Lead	0.4	7.50	10	-	-	-	-
Selenium	1.2	nv	nv	-	-	-	-
Zinc	1.5	75	100	2	-	3	-
Iron	4.7	nv	200	20	8	-	10
Manganese	1.5	nv	50	4	-	34	-

Notes:

Bold	Exceeds Groundwater Regulations 2016
Italics	Exceeds IGV (Interim Guideline Value)
MDL	Method Detection Limit
-	Less than the MDL
nv	IGV/GTV not defined

Table 6: Major Ion and COD Results (mg/L) - Enva Raffeen, December 2016

Compiled by: BMC
Checked by: FOR

Compound	MDL	Groundwater Regs 2016	EPA Draft Interim Guideline Value (IGV)	Monitoring Well			
				BH1	BH2	BH3	BH4
Total Ammonia (as N)	0.03	0.30	0.15	-	-	-	-
COD (Settled)	7	nv	nv	-	-	-	-
Chloride	0.3	187.5	250	22	28	23	13
Sodium	0.1	nv	150	11	13	12	9
Sulphate	0.5	187.5	200	13	13	9	4
Potassium	0.1	nv	5	1	1	2	2
Calcium	0.2	nv	200	102	117	76	44
Magnesium	0.1	nv	50	4	5	3	1
Bicarbonate Alkalinity as $CaCO_3$	1	nv	No abnormal change	238	263	192	147
Nitrate as NO_3	0.2	37.5	25	*30*	*33*	11	2
Nitrite as NO_2	0.02	0.375	0.1	-	-	-	-
Ortho phosphate as PO_4	0.06	nv	0.03	-	-	*0.10*	-
Fluoride	0.3	nv	1	-	-	-	-

Notes:

Bold	Exceeds Groundwater Regulations 2016
Italics	Exceeds IGV (Interim Guideline Value)
MDL	Method Detection Limit
-	Less than the MDL
nv	IGV/GTV not defined

Table 7: Trend Results - Orthophosphate (mg/L) - Enva Raffeen, 2007 to 2016

Compiled by: BMC
Checked by: FOR

Date	MDL	Groundwater Regs 2016	EPA Draft Interim Guideline Value (IGV)	2007	2010	2011	2012	2013	2014	2015	2016
BH1	0.06	nv	0.03	0.03	*0.11*	-	*0.23*	-	-	0.06	-
BH2	0.06	nv	0.03	0.09	*0.10*	-	-	-	-	-	-
BH3	0.06	nv	0.03	0.05	*0.15*	-	-	0.09	-	0.08	*0.10*
BH4	0.06	nv	0.03	-	*0.12*	-	*0.10*	0.35	-	0.10	-

Notes:

Bold	Exceeds Groundwater Regulations 2016
Italics	Exceeds IGV (Interim Guideline Value)
MDL	Method Detection Limit
-	Less than the MDL
nv	IGV/GTV not defined

Appendix A Waste Licence Monitoring Requirements

Parameter	Quarterly	Annually
Volatile Organic Compounds (VOCs), including chlorinated solvents		✓
Semi Volatile Organic Compounds (VOCs) (organohalogens)		✓
Chemical Oxygen demand (COD)		✓
Mineral Oil		✓
Total Ammonia		✓
Heavy Metals (Dutch Target List)		✓
Calcium		✓
Magnesium		✓
Potassium		✓
Sodium		✓
Chloride		✓
Bicarbonate		✓
Sulphate		✓
Nitrate		✓
Nitrite		✓
Phosphate		✓
Fluoride		✓

Appendix B Validated Laboratory Results

Exova Jones Environmental

Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

Tel: +44 (0) 1244 833780
Fax: +44 (0) 1244 833781

AECOM
Acorn Business Campus
Mahon Industrial Park
Black Rock
Cork
Ireland

Attention :	Fergus O'Regan
Date :	20th January, 2017
Your reference :	6053042
Our reference :	Test Report 16/18892 Batch 1
Location :	Raffeen Cork
Date samples received :	20th December, 2016
Status :	Final report
Issue :	1

Four samples were received for analysis on 20th December, 2016 of which four were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

Paul Lee-Boden BSc
Project Manager

Exova Jones Environmental

Client Name: AECOM
Reference: 6053042
Location: Raffeen Cork
Contact: Fergus O'Regan
JE Job No.: 16/18892

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
H=H_2SO_4, Z=ZnAc, N=NaOH, HN=$HN0_3$

J E Sample No.	1-7	8-14	15-21	22-28									
Sample ID	BH1	BH2	BH3	BH4									
Depth											Please see attached notes for all abbreviations and acronyms		
COC No / misc													
Containers	V H HN P G	V H HN P G	V H HN P G	V H HN P G									
Sample Date	19/12/2016	19/12/2016	19/12/2016	19/12/2016									
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1	1									
Date of Receipt	20/12/2016	20/12/2016	20/12/2016	20/12/2016									
											LOD/LOR	Units	Method No.
Dissolved Arsenic #	2.1	1.6	1.0	<0.9							<0.9	ug/l	TM30/PM14
Dissolved Boron	19	19	17	13							<12	ug/l	TM30/PM14
Dissolved Cadmium #	<0.03	<0.03	<0.03	<0.03							<0.03	ug/l	TM30/PM14
Dissolved Calcium #	102.3	116.8	75.6	44.0							<0.2	mg/l	TM30/PM14
Total Dissolved Chromium #	2.2	1.0	<0.2	<0.2							<0.2	ug/l	TM30/PM14
Dissolved Copper #	<3	<3	<3	<3							<3	ug/l	TM30/PM14
Total Dissolved Iron #	19.6	7.6	<4.7	9.8							<4.7	ug/l	TM30/PM14
Dissolved Lead #	<0.4	<0.4	<0.4	<0.4							<0.4	ug/l	TM30/PM14
Dissolved Magnesium #	3.8	4.6	3.1	1.2							<0.1	mg/l	TM30/PM14
Dissolved Manganese #	3.5	<1.5	33.9	<1.5							<1.5	ug/l	TM30/PM14
Dissolved Mercury #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM30/PM14
Dissolved Nickel #	<0.2	<0.2	<0.2	<0.2							<0.2	ug/l	TM30/PM14
Dissolved Potassium #	1.1	0.9	1.6	1.6							<0.1	mg/l	TM30/PM14
Dissolved Selenium #	<1.2	<1.2	<1.2	<1.2							<1.2	ug/l	TM30/PM14
Dissolved Sodium #	10.9	12.8	12.1	8.5							<0.1	mg/l	TM30/PM14
Dissolved Zinc #	2.3	<1.5	2.8	<1.5							<1.5	ug/l	TM30/PM14
EPH (C8-C40) #	<10	<10	<10	<10							<10	ug/l	TM5/PM30
C8-C40 Mineral Oil (Calculation)	<10	<10	<10	<10							<10	ug/l	TM5/PM30
Fluoride	<0.3	<0.3	<0.3	<0.3							<0.3	mg/l	TM27/PM0
Sulphate #	12.8	13.0	9.0	4.1							<0.5	mg/l	TM38/PM0
Chloride #	21.6	27.5	22.8	13.0							<0.3	mg/l	TM38/PM0
Nitrate as NO3 #	29.6	33.4	10.7	1.6							<0.2	mg/l	TM38/PM0
Nitrite as NO2 #	<0.02	<0.02	<0.02	<0.02							<0.02	mg/l	TM38/PM0
Ortho Phosphate as PO4 #	<0.06	<0.06	0.10	<0.06							<0.06	mg/l	TM38/PM0
Total Ammonia as N #	<0.03	<0.03	<0.03	<0.03							<0.03	mg/l	TM38/PM0
Bicarbonate Alkalinity as CaCO3	238	263	192	147							<1	mg/l	TM75/PM0
COD (Settled) #	<7	<7	<7	<7							<7	mg/l	TM57/PM0

Client Name: AECOM
Reference: 6053042
Location: Raffeen Cork
Contact: Fergus O'Regan
JE Job No.: 16/18892

SVOC Report : Liquid

J E Sample No.	1-7	8-14	15-21	22-28							LOD/LOR	Units	Method No.
Sample ID	BH1	BH2	BH3	BH4									
Depth													
COC No / misc													
Containers	V H HN P G	V H HN P G	V H HN P G	V H HN P G									
Sample Date	19/12/2016	19/12/2016	19/12/2016	19/12/2016									
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1	1									
Date of Receipt	20/12/2016	20/12/2016	20/12/2016	20/12/2016									
SVOC MS													
Phenols													
2-Chlorophenol #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
2-Methylphenol #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2-Nitrophenol	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4-Dichlorophenol #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4-Dimethylphenol	<1	<1	<1	<1							<1	ug/l	TM16/PM30
2,4,5-Trichlorophenol #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,4,6-Trichlorophenol	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chloro-3-methylphenol #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
4-Methylphenol	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Nitrophenol	<10	<10	<10	<10							<10	ug/l	TM16/PM30
Pentachlorophenol	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Phenol	<1	<1	<1	<1							<1	ug/l	TM16/PM30
PAHs													
2-Chloronaphthalene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
2-Methylnaphthalene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Naphthalene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Acenaphthylene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Acenaphthene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Fluorene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Phenanthrene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Anthracene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Fluoranthene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Pyrene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Benzo(a)anthracene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Chrysene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Benzo(bk)fluoranthene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Benzo(a)pyrene	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Indeno(123cd)pyrene	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Dibenzo(ah)anthracene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Benzo(ghi)perylene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Phthalates													
Bis(2-ethylhexyl) phthalate	<5	<5	<5	<5							<5	ug/l	TM16/PM30
Butylbenzyl phthalate	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Di-n-butyl phthalate #	<1.5	<1.5	<1.5	<1.5							<1.5	ug/l	TM16/PM30
Di-n-Octyl phthalate	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Diethyl phthalate #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Dimethyl phthalate	<1	<1	<1	<1							<1	ug/l	TM16/PM30

Please see attached notes for all abbreviations and acronyms

Client Name: AECOM
Reference: 6053042
Location: Raffeen Cork
Contact: Fergus O'Regan
JE Job No.: 16/18892

SVOC Report : **Liquid**

J E Sample No.	1-7	8-14	15-21	22-28									
Sample ID	BH1	BH2	BH3	BH4									
Depth											Please see attached notes for all abbreviations and acronyms		
COC No / misc													
Containers	V H HN P G	V H HN P G	V H HN P G	V H HN P G									
Sample Date	19/12/2016	19/12/2016	19/12/2016	19/12/2016									
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1	1									
Date of Receipt	20/12/2016	20/12/2016	20/12/2016	20/12/2016							LOD/LOR	Units	Method No.
SVOC MS													
Other SVOCs													
1,2-Dichlorobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
1,2,4-Trichlorobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
1,3-Dichlorobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
1,4-Dichlorobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
2-Nitroaniline	<1	<1	<1	<1							<1	ug/l	TM16/PM30
2,4-Dinitrotoluene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,6-Dinitrotoluene	<1	<1	<1	<1							<1	ug/l	TM16/PM30
3-Nitroaniline	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Bromophenylphenylether #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chloroaniline	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chlorophenylphenylether #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
4-Nitroaniline	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Azobenzene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Bis(2-chloroethoxy)methane #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Bis(2-chloroethyl)ether #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Carbazole #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Dibenzofuran #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Hexachlorobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachlorobutadiene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachlorocyclopentadiene	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachloroethane #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Isophorone #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
N-nitrosodi-n-propylamine #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Nitrobenzene #	<1	<1	<1	<1							<1	ug/l	TM16/PM30
Surrogate Recovery 2-Fluorobiphenyl	85	85	84	78							<0	%	TM16/PM30
Surrogate Recovery p-Terphenyl-d14	94	92	90	90							<0	%	TM16/PM30

Client Name: AECOM
Reference: 6053042
Location: Raffeen Cork
Contact: Fergus O'Regan
JE Job No.: 16/18892

VOC Report : **Liquid**

J E Sample No.	1-7	8-14	15-21	22-28							LOD/LOR	Units	Method No.
Sample ID	BH1	BH2	BH3	BH4									
Depth													
COC No / misc													
Containers	V H HN P G	V H HN P G	V H HN P G	V H HN P G									
Sample Date	19/12/2016	19/12/2016	19/12/2016	19/12/2016									
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1	1									
Date of Receipt	20/12/2016	20/12/2016	20/12/2016	20/12/2016									
VOC MS													
Dichlorodifluoromethane	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM15/PM10
Chloromethane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Vinyl Chloride #	<0.1	<0.1	<0.1	<0.1							<0.1	ug/l	TM15/PM10
Bromomethane	<1	<1	<1	<1							<1	ug/l	TM15/PM10
Chloroethane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Trichlorofluoromethane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Dichloromethane (DCM) #	<5	<5	<5	<5							<5	ug/l	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,1-Dichloroethane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1	<1	<1							<1	ug/l	TM15/PM10
Bromochloromethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Chloroform #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,1-Trichloroethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,1-Dichloropropene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Carbon tetrachloride #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2-Dichloroethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Benzene #	<0.5	<0.5	<0.5	<0.5							<0.5	ug/l	TM15/PM10
Trichloroethene (TCE) #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dichloropropane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Dibromomethane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Bromodichloromethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
cis-1-3-Dichloropropene	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Toluene #	<5	<5	<5	<5							<5	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,2-Trichloroethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,3-Dichloropropane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Dibromochloromethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2-Dibromoethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Chlorobenzene #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Ethylbenzene #	<1	<1	<1	<1							<1	ug/l	TM15/PM10
p/m-Xylene #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
o-Xylene #	<1	<1	<1	<1							<1	ug/l	TM15/PM10
Styrene	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Bromoform #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
Isopropylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4	<4	<4							<4	ug/l	TM15/PM10
Bromobenzene #	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,3-Trichloropropane #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Propylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
2-Chlorotoluene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
4-Chlorotoluene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
tert-Butylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
sec-Butylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
4-Isopropyltoluene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,3-Dichlorobenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,4-Dichlorobenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
n-Butylbenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dichlorobenzene #	<3	<3	<3	<3							<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Naphthalene	<2	<2	<2	<2							<2	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3	<3	<3							<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	96	97	103	99							<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	87	87	77	71							<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

Exova Jones Environmental

Notification of Deviating Samples

Client Name: AECOM
Reference: 6053042
Location: Raffeen Cork
Contact: Fergus O'Regan

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
No deviating sample report results for job 16/18892						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.
Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 16/18892

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS) accredited - UK.
SA	ISO17025 (SANAS) accredited - South Africa.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to a Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

All solid results are expressed on a dry weight basis unless stated otherwise.

JE Job No: 16/18892

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.				
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM27	Modified US EPA method 9056.Determination of water soluble anions using Dionex (Ion-Chromatography).	PM0	No preparation is required.				
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.				
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.	Yes			
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.	Yes			

JE Job No: 16/18892

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM57	Modified US EPA Method 410.4. Chemical Oxygen Demand is determined by hot digestion with Potassium Dichromate and measured spectrophotometerically.	PM0	No preparation is required.	Yes			
TM75	Modified US EPA method 310.1. Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.				

AECOM Ireland Limited
Douglas Business Centre
Carrigaline Road
Cork
Ireland

T: 021 4536136
aecom.com

CLV CONSULTING

TECHNICAL REPORT

2016 ENVIRONMENTAL NOISE SURVEY REPORT OF ENVA IRELAND LIMITED, RAFFEEN INDUSTRIAL ESTATE, RINGASKIDDY ROAD, CO, CORK.

For,
Jamie Barry,
Operations and Technical Manager,
Enva Ireland Ltd.,
Raffeen Industrial Estate,
Ringaskiddy Road,
Cork.

Report prepared by:
Niall Vaughan, B.Sc. MIOA
Our reference:
Enva_30092016ENR01
Date:
30th September 2016

Tel: +353 21 2428 704
Web: www.clvconsulting.ie
Email: info@clvconsulting.ie
Postal Address: The NSC Campus, Mahon, Cork, Ireland

EXECUTIVE SUMMARY

Enva Ireland have a site located in the Raffeen Industrial Estate, Ringaskiddy Road, Co. Cork. At this site Enva specialises in providing solutions for waste water treatment problems. The facility comes under the remit of a Waste Licence, (Register No. W0145-02) which is issued by the Environmental Protection Agency (EPA). This Waste Licence stipulates various environmental conditions which Enva is obliged to carry out.

One of these conditions is for Enva to carry out an annual environmental noise survey at the facility. The purpose of the noise survey is to measure the noise at four boundary locations around the site and at one noise sensitive location (NSL) and to assess them against the conditions which pertain to noise in Enva's Waste Licence. A description and images of these locations is contained in this report along with the noise conditions which Enva is subject to.

To comply with this requirement CLV Consulting was commissioned to carry out the 2016 environmental noise survey. The noise survey was conducted during the month of September 2016 over the course of a daytime period. It was confirmed that Enva was in normal production mode for the duration of the noise survey.

The survey data has been reviewed and compared against the noise conditions set down in Enva's waste licence. From this review and comparison of the data it has been concluded that the noise emissions from the site which were measured during the 2016 survey would satisfy the conditions which relate to noise in Enva's waste licence.

Further discussion regarding the noise emissions from the site is provided in this report.

Report Prepared By:

Niall Vaughan

NIALL VAUGHAN
Acoustic Consultant

CONTENTS Page

1.0 INTRODUCTION

Enva Ireland is a waste management and environmental solution provider. Enva offers services for the treatment and disposal of oil and hazardous waste, on-site cleaning services, water and effluent treatment, and contaminated soil across the whole industrial spectrum.

Their facility located in the Raffeen Industrial Estate, Ringaskiddy Road, Co. Cork specialises in the diagnosis of waste water treatment problems and also the provision of waste water treatment products. This facility consists of offices, a laboratory, a warehouse, storage tanks and a small number of ancillary pumps and mechanical equipment. It operates under the terms of a waste licence (Register No. W0145-02) as issued by the EPA. One of the terms of this licence is for an annual environmental noise survey to be carried out to assess the noise emanating from the site. Condition 6.14 and Schedule B.4 of the Enva's waste licence sets out the following noise conditions;

Condition 6.14

The licensee shall carry out a noise survey of the site operations annually. The survey programme shall be undertaken in accordance with the methodology specified in the "Environmental Noise Survey Guidance Document" as published by the Agency.

Schedule B.4

Daytime dB L_{Aeq} (30 minutes)	Night-time dB L_{Aeq} (30 minutes)
55 Note 1	45 Note 1

Note 1: There shall be no clearly audible tonal component or impulsive component in the noise emission from the activity of any noise sensitive location.

Please note: the facility does not operate after 1800hrs and no noise emanates from the site after this time. Therefore, a night-time noise survey is not required.

2.0 SURVEY DETAILS

The survey was conducted in accordance with ISO 1996: 2007: *Acoustics – Description and measurement of environmental noise* and the EPA guidance note – *Guidance Note for Noise: Licence Applications, Surveys and Assessments in relation to Schedules Activities (NG4), Jan 2016:* Specific details are set out below.

The hours of operation at the Enva Raffeen facility are from 08:00hrs to 18:00hrs. As the facility only operates during daytime hours the existing noise environment was assessed and quantified over a daytime period only in accordance with their waste licence. Daytime is defined in NG4 as 07:00hrs to 19:00hrs.

2.1 Choice of Measurement Locations

The noise measurements were conducted at four boundary locations and one noise sensitive location. A description of each one is provided below along with their locations in Irish grid reference.

Location 1 - N1 - (North Boundary) 174899E 064650N:

This is the North boundary location for all measurements. The measurement location is situated at the midpoint of the north boundary approximately 15m from the northern façade of the Enva building.

Location 2 - N2 - (West Boundary) 174863E 064622N:

This is the West boundary location for all measurements. The measurement location is situated at the midpoint of the west boundary adjacent to the site's entrance road. It is approximately 12m away from and directly opposite a raised fire escape door which is on the western façade of the Enva building.

Location 3 - N3 – (South Boundary) 174874E 064570N:

This is the South boundary location for all measurements. The measurement location is situated at the midpoint of the south boundary next to the staff car park. It is approximately 25m from the main reception entrance.

Location 4 - N4 – (East Boundary) 174919E 064593N:

This is the East boundary location for all measurements. The measurement location is situated at the midpoint of the east boundary and approximately 6m from a large storage vessel.

Location 5 – Noise Sensitive Location (NSL) 174863E 064535N:

The nearest NSL is a private dwelling located some 45m South of the Enva facility. The main Ringaskiddy to Cork road (N28) runs between Enva and the dwelling and the two locations are further separated by a grass verge and some light foliage. The

selected measurement location is some 7m from the north boundary of the dwelling and adjacent to the N28. The measurement location has a partial line of sight to the first floor level of the Enva facility.

2.2 Survey Periods

Measurements were conducted over the following survey periods:

- 08:30hrs to 16:17hrs on 1st September 2016;
- 12:00hrs to 12:30hrs on 2nd September 2016.

During the survey periods it was confirmed that the facility was in normal production status.

The meteorological conditions over the course of the survey period are presented below in Table 1.

Wind – m/s		Temperature - °C		Barometric Pressure - hPa	Relative Humidity - %
Speed	Direction	Daytime	Night-time		
1.5 – 1.9	South	14 - 16	N/A	1022	94

Table 1 Meteorological conditions for the 2016 environmental noise survey.

2.3 Personnel and Instrumentation

Niall Vaughan (CLV) conducted the noise level measurements during the survey periods. He holds a BSc from Bradford University in Environmental Science, a diploma in acoustics from the Institute of Acoustics and he is a member of the Institute of Acoustics. Niall has over fifteen years of experience in the field of acoustics. He has extensive knowledge in the fields of environmental noise assessment, mechanical services and manufacturing plant noise control and architectural acoustics.

The measurements were conducted using an NTI Audio type XL2 Sound Level Meter (SLM) - serial number A2A-10989-EQ. Before and after the survey the measurement apparatus was check calibrated using a Casella Cel 120 Acoustic Calibrator (AC) - serial number 3921077. The calibrations certificates for the SLM and AC are in Appendices C and D respectively of this document. The SLM was fitted with a 90mm windshield.

2.4 Procedure

Sample periods were 30 minutes in duration during the survey periods. The results were saved to the instrument memory for later analysis. Survey personnel noted all primary noise sources contributing to noise build-up.

2.5 Measurement Parameters

The survey results are presented in terms of the following five parameters:

- L_{Aeq} is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period.
- L_{Amax} is the instantaneous maximum sound level measured during the sample period.
- L_{Amin} is the instantaneous minimum sound level measured during the sample period.
- L_{A10} is the sound level that is exceeded for 10% of the sample period. It is typically used as a descriptor for traffic noise.
- L_{A90} is the sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise.

Tonal Noise Sounds which cover a range of only a few Hz which contains a clearly audible tone, i.e. distinguishable, discrete or continuous noise (whine, hiss, screech, or hum etc.) are referred to as being 'tonal'.

Impulsive Noise A noise that is of short duration (typically less than one second), the sound pressure level of which is significantly higher than the background.

The "A" suffix denotes the fact that the sound levels have been "A-weighted" in order to account for the non-linear nature of human hearing. In addition, the data is presented in A-weighted 1/3-octave spectra for each measurement. All sound levels in this report are expressed in terms of decibels (dB) relative to $2x10^{-5}$ Pa.

2.6 Results

The results of the survey data are presented below for each measurement location.

2.6.1 Location N1 – North Boundary

The results of measurements conducted during the survey at Location N1 are summarised in Table 2.

Ref	Start Time	Period	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)					Comments
			L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}	
1	10:24 – 10:54	Day	57	78	43	58	47	Road traffic. Wind.
2	13:07 – 13:37		56	72	45	58	50	
3	15:15 – 15:45		57	85	47	57	50	

Table 2 Summary of results for Location N1.

Road traffic noise from the nearby N28 was the dominant source of noise for all three daytime periods at N1. The N28 is a national primary route which serves Ringaskiddy. On account of the high volume of industry located in Ringaskiddy, the

deep water commercial shipping berth and the ferry terminal this road caters for an extremely high volume of traffic. Noise from vehicles entering and leaving Enva were also noted as occasional contributors to the noise environment. Wind noise through the nearby vegetation was audible as a background noise source but its impact on the noise levels was slight.

Enva was not audible at any point during the monitoring locations and there were no tonal or impulsive components noted from the site at this location during the monitoring periods.

Noise levels were of the order of 56dB to 57dB L_{Aeq} and 47dB to 50dB L_{A90}.

2.6.2 Location N2 – West Boundary

The results of measurements conducted during the survey at Location N2 are summarised in Table 3.

Ref	Start Time	Period	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)					Comments
			L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}	
4	09:52 – 10:22	Day	57	70	43	61	48	Road traffic. Birdsong.
5	12:35 – 13:05		60	75	46	64	52	
6	14:43 – 15:13		60	77	46	63	53	

Table 3 Summary of results for Location N2.

The ambient noise environment at N2 was dominated by N28 traffic noise. A small number of isolated traffic movements were noted from vehicles entering and leaving Enva. Birdsong was audible during brief lulls in N28 traffic although it had a very slight impact on the noise levels.

Enva was not audible at any point during the monitoring locations and there were no tonal or impulsive components noted from the site at this location during the monitoring periods.

Noise levels were of the order of 57dB to 60dB L_{Aeq} and 48dB to 53dB L_{A90}.

2.6.3 Location N3 – South Boundary

The results of measurements conducted during the survey at Location N3 are summarised in Table 4.

Ref	Start Time	Period	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)					Comments
			L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}	
7	09:20 – 09:50	Day	63	82	41	66	51	Road traffic. Wind.
8	12:03 – 12:33		61	75	45	65	50	
9	14:11 – 14:41		61	70	44	65	51	

Table 4 Summary of results for Location N3.

N28 road traffic noise was the dominant noise source at N3 for all three periods. The recorded values at N3 were the highest of all the boundary locations as this location is closest to the N28. There was a slight amount of wind noise from wind blowing through the nearby vegetation but its impact on the noise environment was marginal.

Enva was not audible at any point during the monitoring locations and there were no tonal or impulsive components noted from the site at this location during the monitoring periods.

Noise levels were of the order of 61dB to 63dB L_{Aeq} and 50dB to 51dB L_{A90}.

2.6.4 Location N4 – East Boundary

The results of measurements conducted during the survey at Location N4 are summarised in Table 5.

Ref	Start Time	Period	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)					Comments
			L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}	
10	10:57 – 11:27	Day	59	73	43	62	50	Road traffic. Birdsong.
11	13:39 – 14:09		61	82	43	63	52	
12	15:47 – 16:17		59	61	57	60	57	

Table 5 Summary of results for Location N4.

Noise emanating from the N28 was noted as the primary noise source at N4 for the duration of all three daytime periods. Birdsong in the adjacent vegetation and nearby trees was audible as a relatively continuous background but insignificant noise source.

Enva was not audible at any point during the monitoring locations and there were no tonal or impulsive components noted from the site at this location during the monitoring periods.

Noise levels were of the order of 59dB to 61dB L_{Aeq} and 450dB to 57dB L_{A90}.

2.6.5 Location NSL – Noise Sensitive Location

The results of measurements conducted during the survey at Location NSL 1 are summarised in Table 6.

Ref	Start Time	Period	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)					Comments
			L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}	
13	08:15 – 08:45	Day	76	97	43	80	52	Road traffic.
14	11:13 – 11:43		81	93	56	84	61	

15	[1]13:59 – 14:29		79	88	51	84	60	

Table 6 Summary of results for Location NSL1.

This monitoring location is situated in close proximity to the N28 and the ambient daytime noise environment is dominated by traffic noise. Throughout the periods there were no other sources of note or significance.

Enva was not audible at any point during the monitoring locations and there were no tonal or impulsive components noted from the site at this location during the monitoring periods.

Noise levels were of the order of 76dB to 81dB L_{Aeq} and 52dB to 61dB L_{A90}.

[1] **Please note:** this measurement was carried out on 2nd September 2016 as the survey on 1st September was terminated on account of heavy rainfall.

3.0 DISCUSSION AND CONCLUSIONS

To recap the noise conditions set out in Enva's waste licence at the NSL are as follows;

Daytime dB L_{Aeq} (30 minutes)	Night-time dB L_{Aeq} (30 minutes)
55 Note 1	45 Note 1

Note 1: There shall be no clearly audible tonal component or impulsive component in the noise emission from the activity of any noise sensitive location.

Traffic noise from the N28 was the dominant noise source at all of the monitoring locations throughout all of the monitoring periods and Enva was not audible at any time. The activities at Enva generally take place within the main building and while there is a limited amount of mechanical plant located externally on the eastern side of the building noise levels from the site are very low.

However, in order to try and put a measure on the noise levels from the site and assess them against Envas'a EPA noise criteria it is suggested that the ambient noise levels be reviewed. Because Enva was not audible at any point at the boundary locations it is considered reasonable to assume that the noise levels from the site would be at least 10dB below the recorded ambient levels. Subtracting 10dB from the measured boundary noise levels results in noise levels ranging from 46dB to 53dB. These values are within compliance with Enva's EPA daytime noise criteria. Furthermore, once the drop in noise from attenuation over distance to the NSL has been calculated the noise from the site at the NSL would be lower again. The site is completely shut down during night-time hours and it is therefore not subject to the night-time noise criteria.

It can therefore be concluded that Enva Ireland would meet compliance with the noise section of its Waste Licence (Register No. W0145-02) as issued by the EPA.

Tables 7 below provides a comparison between the 2013 and 2016 environmental noise surveys. Variances in noise levels are most likely attributed to fluctuations associated with N28 road traffic.

Location	Year	2013		2014		2015		2016	
	Level	L_{Aeq}	L_{A90}	L_{Aeq}	L_{A90}	L_{Aeq}	L_{A90}	L_{Aeq}	L_{A90}
N1	Day	51	46	53	49	48	44	57	47
		57	49	55	50	54	43	56	50
		56	48	60	54	58	47	57	50
N2	Day	58	50	63	54	56	56	57	48
		62	56	61	55	54	54	60	52
		57	48	63	57	55	55	60	53
N3	Day	63	49	61	52	59	49	63	51
		63	52	62	54	60	46	61	50
		61	55	63	57	59	48	61	51
N4	Day	67	45	55	43	57	47	59	50

		60	52	64	47	56	47	61	52
		61	45	58	47	59	52	59	57
S1	Day	80	61	81	68	78	58	76	52
		78	61	80	70	78	57	81	61
		79	62	81	71	79	56	79	60

Table 7 Comparison of the measured L_{Aeq} and L_{A90} noise levels between 2013 and 2016.

FIGURE 1

MEASUREMENT LOCATIONS

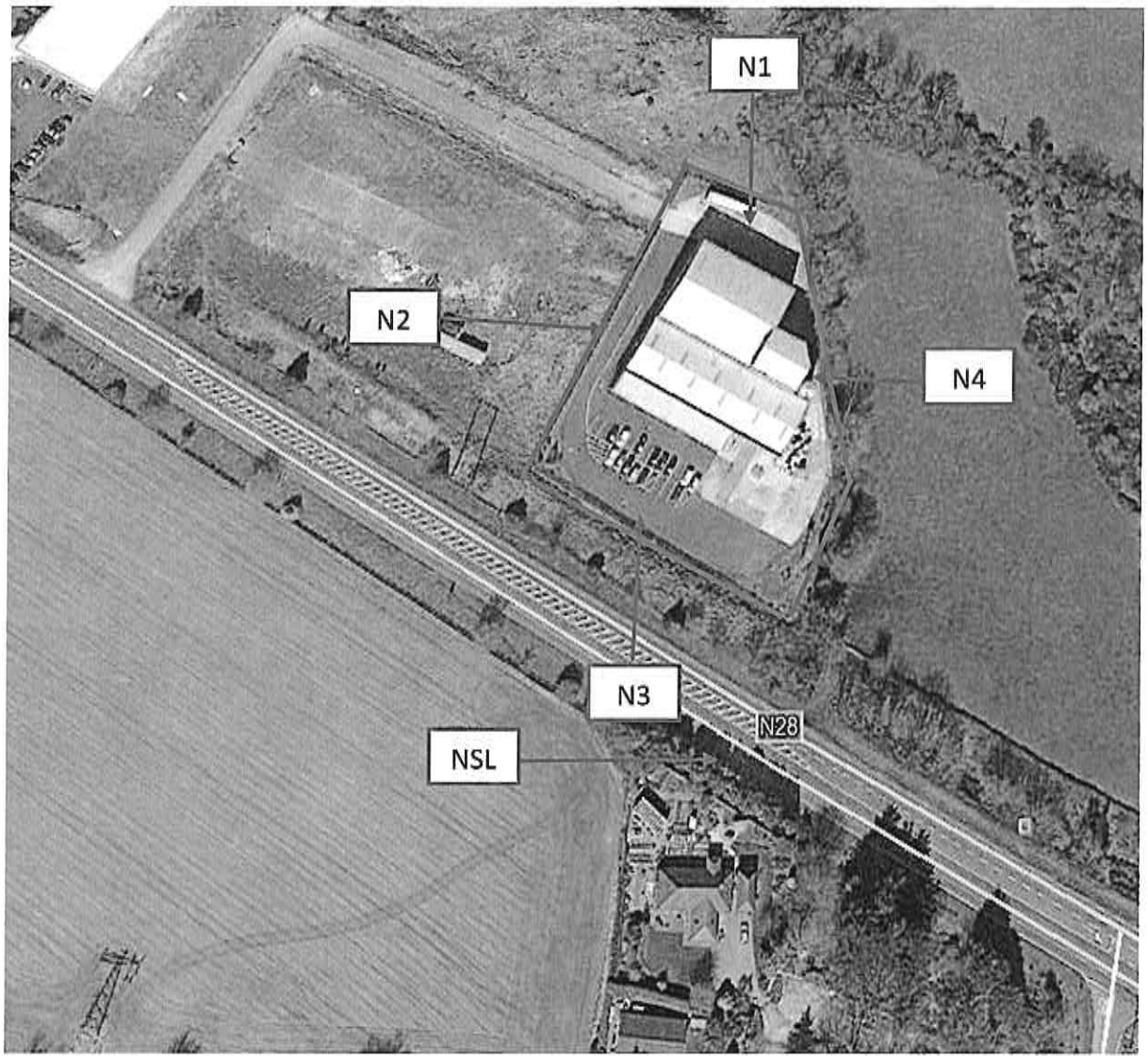


FIGURE 2

PHOTOGRAPHS OF NOISE MONITORING LOCATIONS

Location N1

Location N2

Location N3

Location N4

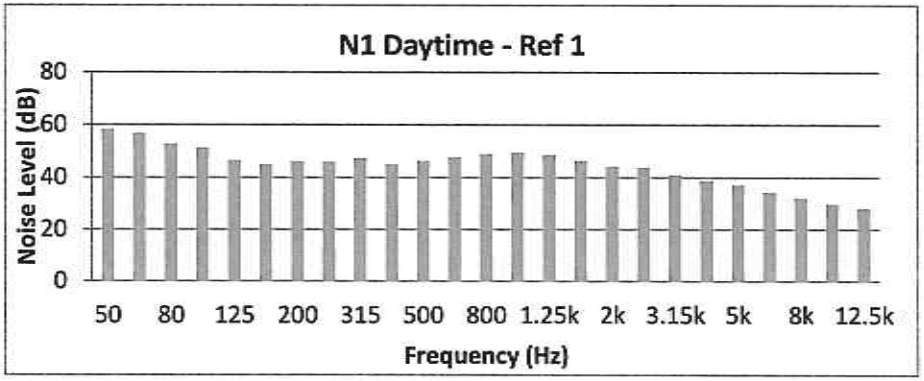
Location S1

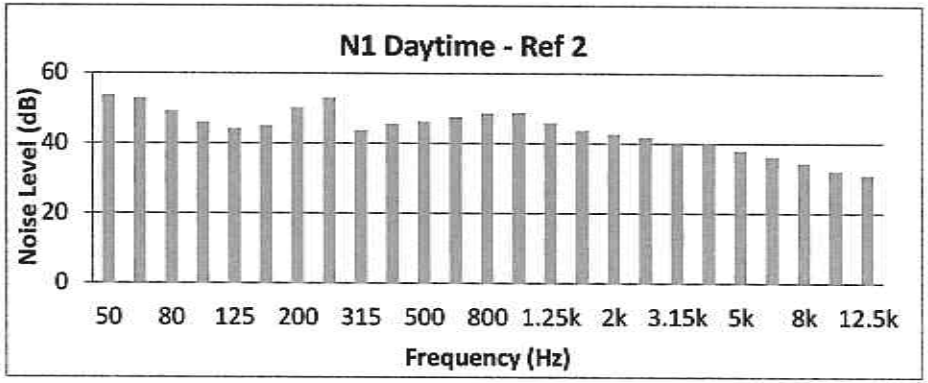
APPENDIX A

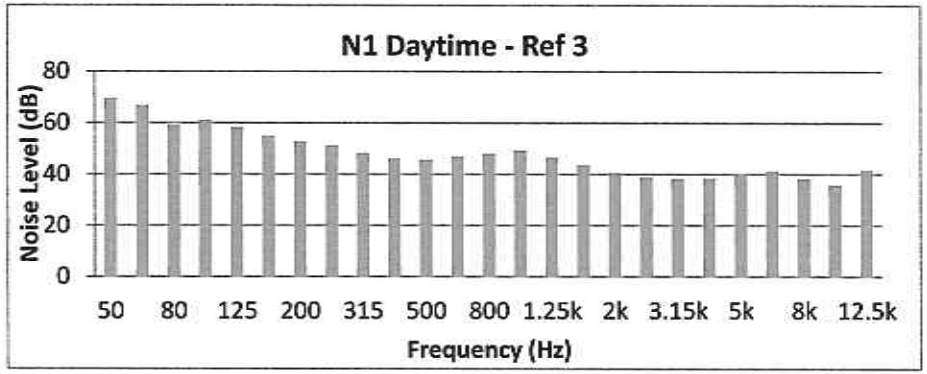
1/3 Octave Centre Frequency Date

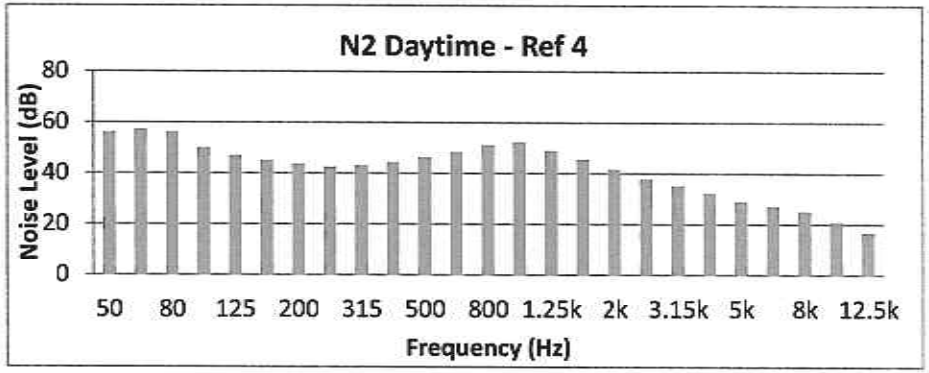
Ref			A-weighted One-third Octave Band Centre Frequency [Hz]																									A
			50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.25k	1.6k	2k	2.5k	3.15k	4k	5k	6.3k	8k	10k	12.5k	
1		Day	58	57	53	51	47	45	46	46	47	45	46	48	49	50	49	46	44	44	41	39	37	34	32	30	28	57
2	N1	Day	54	53	49	46	44	45	50	53	44	46	46	48	49	49	46	44	43	42	40	40	38	36	34	32	31	56
3		Day	70	67	59	61	58	55	53	51	48	46	46	47	48	49	47	44	41	39	38	39	40	41	38	36	42	57
4		Day	56	57	56	50	47	45	44	43	43	44	46	48	51	52	49	46	42	38	35	32	29	27	25	21	17	57
5	N2	Day	60	59	57	52	49	47	46	46	47	48	50	52	54	55	52	48	45	41	39	36	33	32	29	25	22	60
6		Day	59	58	56	52	50	48	47	46	47	48	50	52	54	55	52	48	45	42	39	37	34	32	29	25	22	60
7		Day	67	61	58	58	57	54	51	51	52	53	54	54	56	57	55	53	50	47	46	42	39	38	36	33	30	63
8	N3	Day	61	64	59	54	53	51	49	48	49	49	50	52	55	56	53	49	45	41	39	37	35	32	30	27	23	61
9		Day	59	58	56	52	50	48	47	46	47	48	50	52	54	55	52	48	45	42	39	37	34	32	29	25	22	61
10		Day	56	58	56	56	52	50	49	48	48	49	50	51	52	53	49	46	43	44	37	35	34	32	29	26	23	59
11	N4	Day	59	59	55	54	56	51	53	51	50	51	52	53	54	55	52	49	46	43	41	41	39	36	34	31	29	61
12		Day	70	53	62	52	49	50	50	48	44	44	45	48	52	54	51	47	43	40	38	35	33	31	31	29	26	59
13		Day	62	66	64	61	59	59	61	62	62	63	66	68	70	71	67	64	61	56	53	50	48	45	42	40	37	76
14	S1	Day	65	62	58	59	60	63	64	65	66	67	70	73	74	75	71	68	66	64	62	60	58	56	54	52	49	81
15		Day	59	56	63	58	58	61	60	63	63	65	67	69	72	74	71	68	65	61	58	55	53	51	50	47	45	79

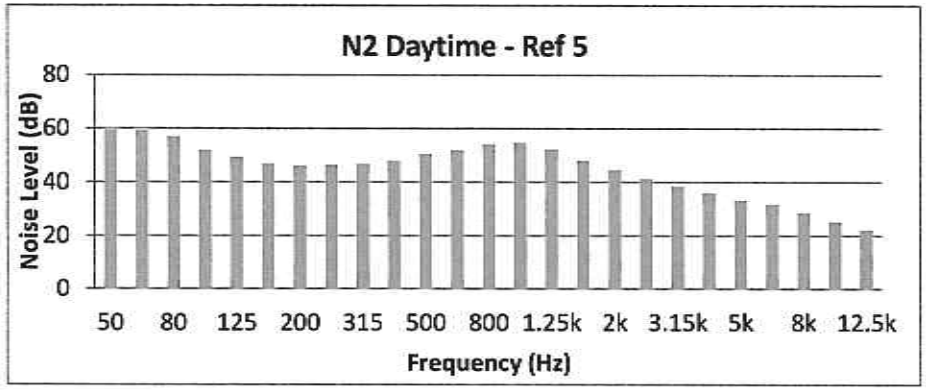
APPENDIX B
1/3 Octave Centre Frequency Data Graphical Representation

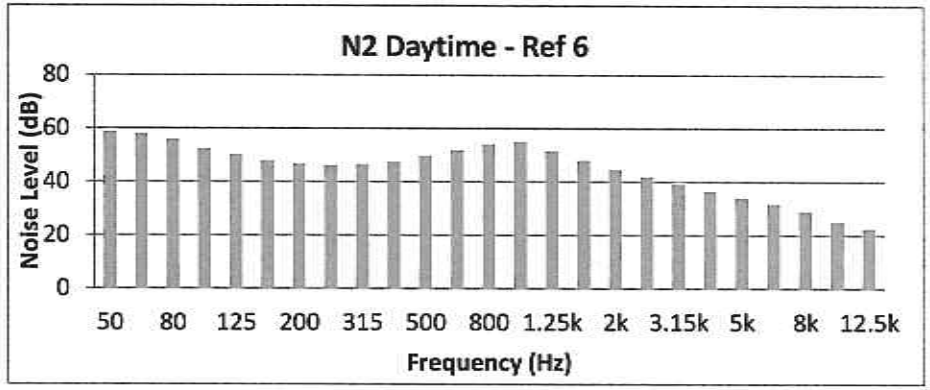


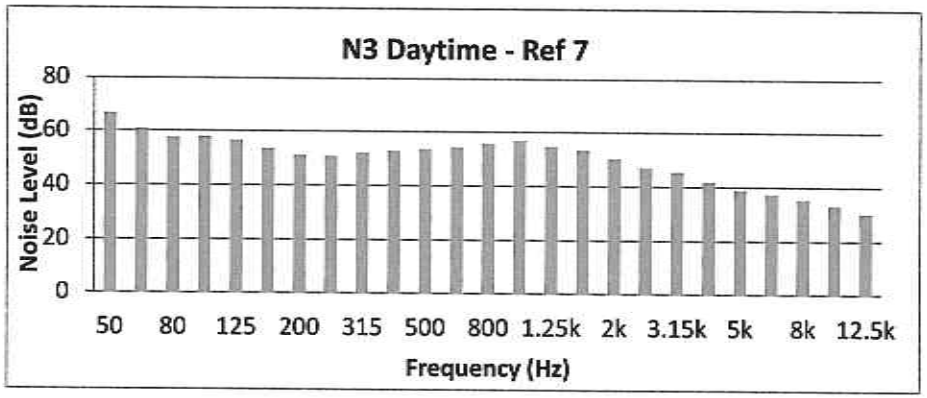


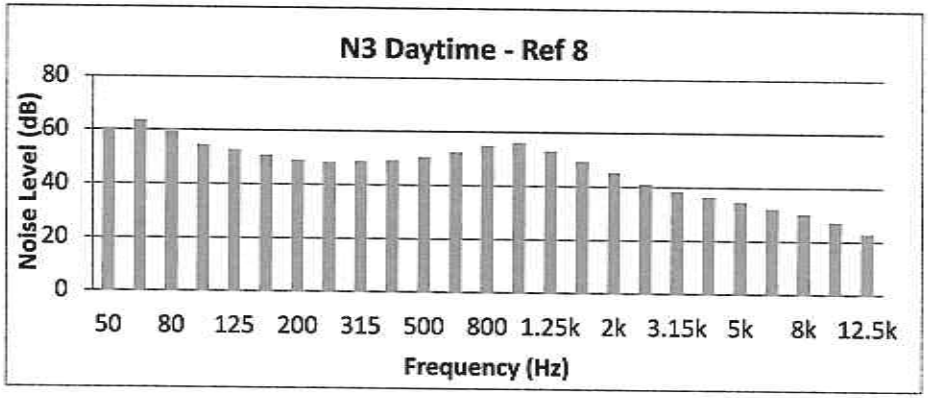


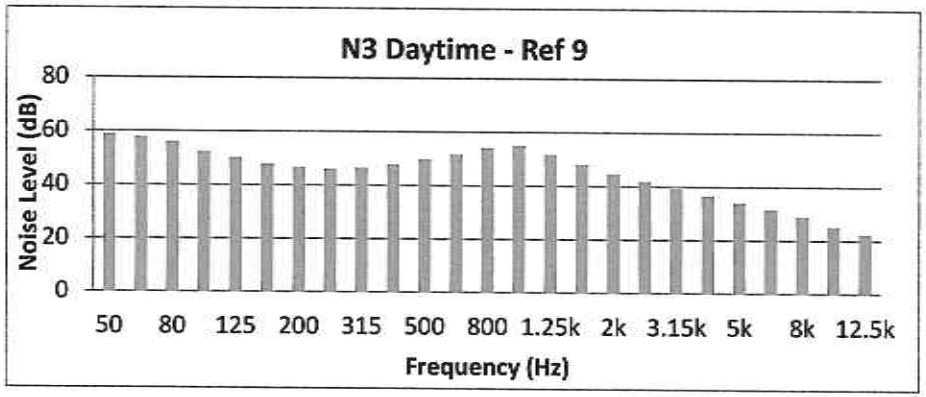







N3 Daytime - Ref 7
Noise Level (dB)
0
20
40
60
80
50 80 125 200 315 500 800 1.25k 2k 3.15k 5k 8k 12.5k
Frequency (Hz)


N3 Daytime - Ref 8
Noise Level (dB)
0
20
40
60
80
50 80 125 200 315 500 800 1.25k 2k 3.15k 5k 8k 12.5k
Frequency (Hz)


N3 Daytime - Ref 9
Noise Level (dB)
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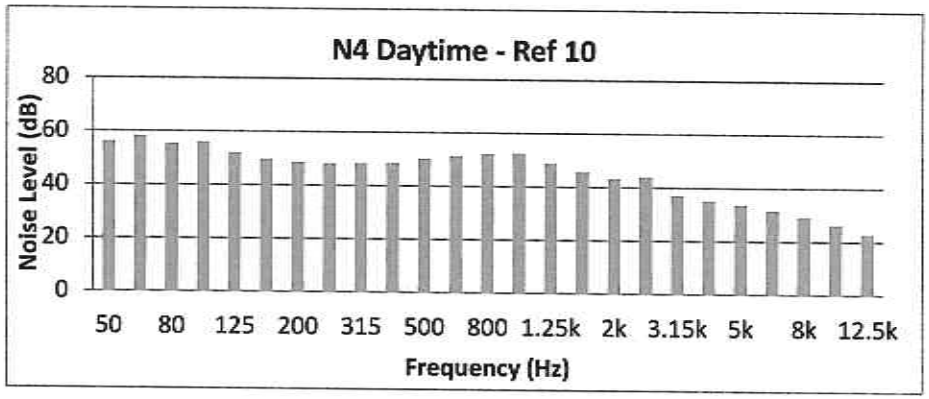
40
60
80
50 80 125 200 315 500 800 1.25k 2k 3.15k 5k 8k 12.5k
Frequency (Hz)


N4 Daytime - Ref 10
Noise Level (dB)
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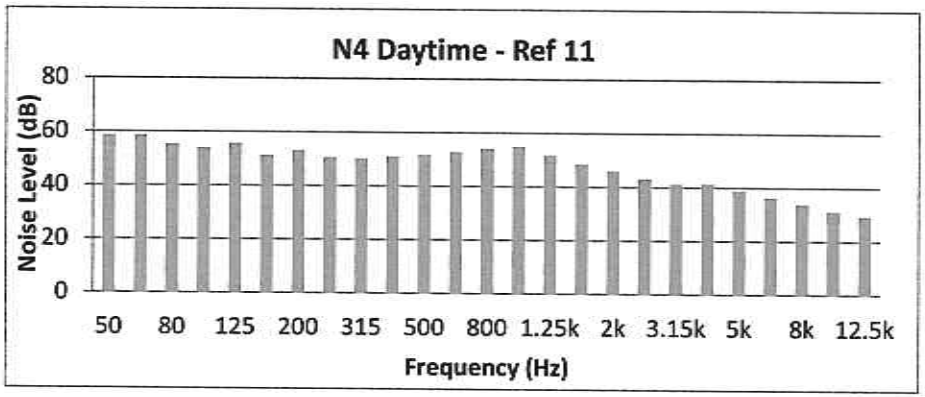
20
40
60
80
50 80 125 200 315 500 800 1.25k 2k 3.15k 5k 8k 12.5k
Frequency (Hz)


N4 Daytime - Ref 11
Noise Level (dB)
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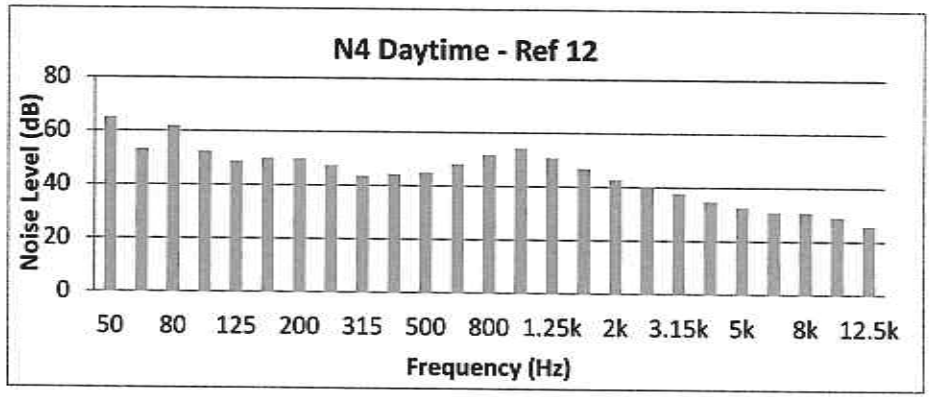
20
40
60
80
50 80 125 200 315 500 800 1.25k 2k 3.15k 5k 8k 12.5k
Frequency (Hz)


N4 Daytime - Ref 12
Noise Level (dB)
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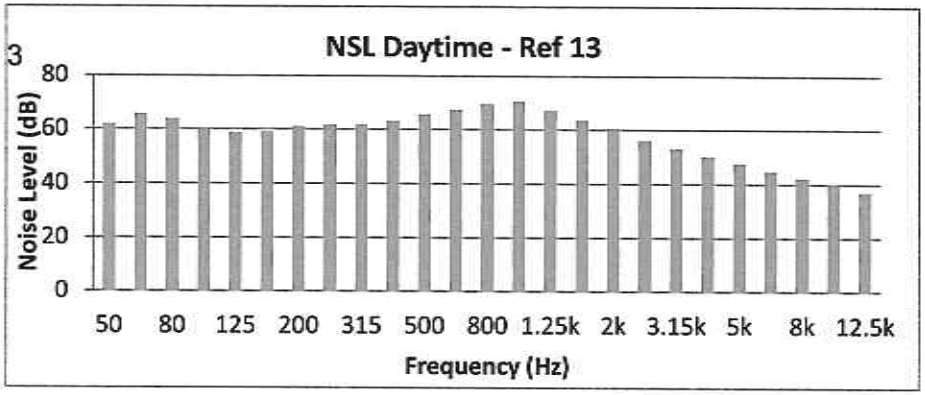
20
40
60
80
50 80 125 200 315 500 800 1.25k 2k 3.15k 5k 8k 12.5k
Frequency (Hz)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Noise Level (dB)
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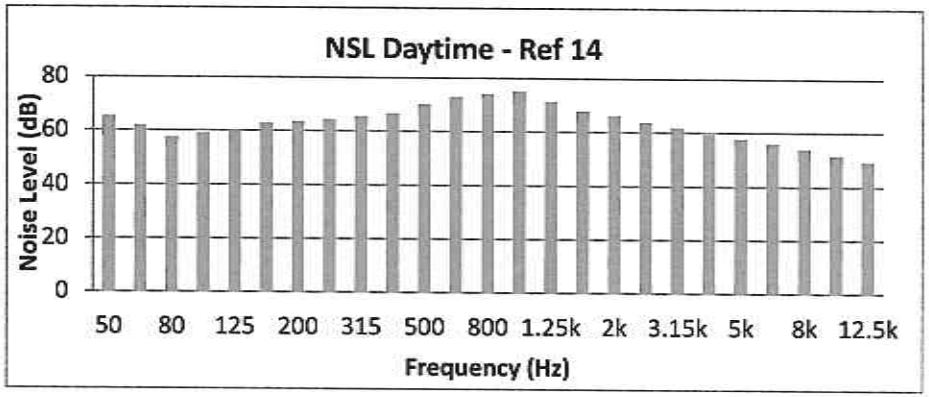
20
40
60
80
50
80
125
200
315
500
800
1.25k
2k
3.15k
5k
8k
12.5k
Frequency (Hz)


NSL Daytime - Ref 14
Noise Level (dB)
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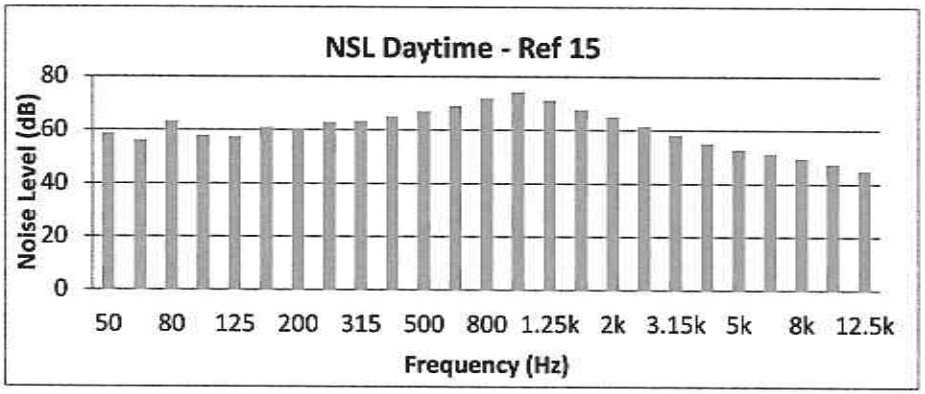
40
60
80
50
80
125
200
315
500
800
1.25k
2k
3.15k
5k
8k
12.5k
Frequency (Hz)


NSL Daytime - Ref 15
Noise Level (dB)
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20
40
60
80
50
80
125
200
315
500
800
1.25k
2k
3.15k
5k
8k
12.5k
Frequency (Hz)

APPENDIX C

Calibration Certificate of Sound Level Meter

NTi AUDIO LESS NOISE . MORE SOUND

Manufacturer Calibration Certificate

The following instrument has been tested and calibrated to the manufacturer specifications.
The calibration is traceable in accordance with ISO/IEC 17025 covering all instrument functions.

- Device Type: XL2 Audio and Acoustic Analyzer
- Serial Number: A2A-10989-E0
- Certificate Issued: 14 January 2016
- Results: PASSED
  (for detailed report see next page)

Tested by: M. Frick

Signature:

Stamp: NTi Audio AG
Im alten Riet 102
LI - 9494 Schaan
www.nti-audio.com

NTi Audio AG • Im alten Riet 102 • 9494 Schaan • Liechtenstein • Europe • Tel. +423 239 6060 • Fax. +423 239 6089
www.nti-audio.com • HR-Nr. 2 012.557 • MwStNr. 54306 • Bank: VP Bank, Vaduz, Acc No. 322 235.015

APPENDIX D

Calibration Certificate of Sound Calibrator

NSAI
National Metrology Laboratory

Certificate of Calibration

Issued to	CLV Consulting The NSC Campus Mahon Co. Cork
Attention of	Mr. Niall Vaughan

Certificate Number	160371
Item Calibrated	Casella CEL-120/1 Acoustic Calibrator
Serial Number	3921077
Client ID Number	None
Order Number	CLV01019
Date Received	29 Jan 2016
NML Procedure Number	AP-NM-13
Method	The above calibrator was allowed to stabilize for a suitable period in laboratory conditions. It was then calibrated by measuring the sound pressure level generated in its measuring cavity (half-inch configuration). The calibrator's operating frequency was also measured.
Calibration Standards	Norsonic 1504A Calibration System incorporating: Agilent 34401A Multimeter, No. 0736 [Cal due date: 20 Jul 2016] B & K 4134 Measuring Microphone, No. 0743 [Cal due date: 19 Jan 2017] B & K 4228 Pistonphone, No. 0740 [Cal due: 12 Jan 2017]

Calibrated by	David Fleming	Approved by	Paul Hetherington
Date of Calibration	15 Feb 2016	Date of Issue	15 Feb 2016

CIPM MRA

This certificate is consistent with Calibration and Measurement Capabilities (CMC's) that are included in Appendix C of the Mutual Recognition Arrangement (MRA) drawn up by the International Committee for Weights and Measures. Under the MRA, all participating institutes recognize the validity of each other's calibration certificates and measurement reports for quantities, ranges and measurement uncertainties specified in Appendix C (for details see www.bipm.org)

Glas Naíon | Baile Átha Cliath 11 | Eire
Glasnevin | Dublin 11 | Ireland T+ 353 1 808 2609 | F+353 1 808 2603 | NSAI.ie

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