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**Behan's Land Restoration Ltd.
Soil Recovery Facility, Blackhall, Naas, Co. Kildare**

Annual Environmental Report 2016

Waste Licence Ref. No. W0247-01

March 2017
SLR Ref: 170330 501.0004.00038.Rev0

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1.0 INTRODUCTION

This Annual Environmental Report (AER) is prepared for the Blackhall Soil Recovery Facility operated by Behans Land Restoration Limited (BLR) at Blackhall, Punchestown, Naas, County Kildare. The Waste Licence for the facility (Ref. No. W0247-01) was issued by the Environmental Protection Agency (EPA) on the 24th June 2009. This AER covers the period from January 2016 to December 2016.

The content of this Annual Environmental Report complies with the requirements set out in on Schedule F of Waste Licence W0247-01 and follows recommended guidelines in the publication '*Guidance Note for Annual Environmental Reports*' published by the Agency.

2.0 SITE DESCRIPTION

2.1 Facility Location and Layout

The waste recovery facility is located in the townland of Blackhall, approximately 4 km southeast of Naas, County Kildare. The site is accessed via a local road running from the R410 Regional Road at Beggars End Crossroads toward Walshestown townland; refer to the site location plan reproduced in Figure 1. The existing site layout includes the following facilities a security office, paved access road at entrance, a wheel bath, a weighbridge, a construction and demolition waste recovery area, a paved waste inspection and quarantine area and a surface water interceptor. The site office and welfare facilities are located at the adjoining residence of one of the company directors.

The waste licence area comprises a worked out quarry of approximately 38.1 hectares (91.7 acres). The south-eastern quadrant of the former quarry has been almost completely backfilled to former ground level using inert natural soils, in accordance with waste permits which were previously issued by Kildare County Council under the Waste Management (Permit) Regulations 1998 (SI No. 165 of 1998).

Only partial backfilling has been undertaken to date in the south-western quadrant and central western area. No backfilling has been undertaken in the large deep open void in the north-western and north-eastern quadrants; refer to Figure 2 (Site Layout Plan).

2.2 Waste Types and Volume

Waste Licence W0247-01 regulates the backfilling and restoration of a former sand and gravel quarry using imported inert soils and stones and the recycling of inert construction and demolition waste.

The amount of inert material to be imported and placed at the facility over 15- year period is approximately 4 million tonnes. Following completion of the backfilling operations, the site will be restored to improved agricultural grassland, in keeping with the general land use and character of the surrounding area.

Inert construction and demolition waste is recycled at the facility using crushing and screening equipment to generate recycled (or secondary) aggregates. Secondary aggregates are re-used at the facility for construction of temporary haul roads and infilling of groundwater ponds. They are also sold to third parties for used as low-grade granular fill on off-site construction works sites and developments.

The Blackhall Soil Recovery facility is classified as a natural soils recovery facility, with the principal activity classified as Class R5 activity according to the Fourth Schedule to the Waste Management Acts 1996 to 2011 (*recycling or reclamation of other inorganic*

materials, which includes soil cleaning resulting in recovery of the soil and recycling of inorganic construction materials).

2.3 Waste Activities

The following are the licensed Waste Activities undertaken at the site, as per the Fourth Schedule of the Waste Management Acts 1996 to 2011 granted in the waste licence:

- Recycling and reclamation of other inorganic materials (Class R4) (Principal Activity) (subsequently reclassified as Class R5 by the European Communities (Waste Directive) Regulations 2011 – S.I. No. 126 of 2011).
- Storage of waste intended for submission to any activity referred to in a preceding paragraph of this schedule, other than temporary storage, pending collection, on the premises where such waste is produced (Class R13).

3.0 MANAGEMENT OF THE FACILITY

3.1 Site Management Structure

Behans Land Restoration Ltd. currently employs 1 person on a full time basis. The organisation and management structure in Blackhall Soil Recovery Facility is provided below.

Mr. John Behan, the facility manager and director of Behans Land Restoration is responsible for the day-to-day operation of the facility.

Table 3-1 Organisation Structure

Staff	Role
John Behan	Facility Manager/Owner
Jason Griffith	Site Foreman
Occasional	Site Machine Operators

3.2 Environmental Management System

In accordance with Condition 2.2.1, Behans Land Restoration Ltd. has prepared and documented a basic Environmental Management System for its Blackhall Soil Recovery Facility at Blackhall.

3.3 Environmental Management Programme

The Environmental Management Programme for 2016 was implemented by the company at its Blackhall Soil Recovery Facility. The principal monitoring works undertaken were monitoring of groundwater at existing site wells, noise monitoring and dust deposition monitoring and installation of some additional groundwater monitoring well infrastructure required under the terms of the waste licence. It is likely that the scope of the environmental monitoring programme at the facility will be extended further in 2017.

3.3.1 Schedule of Objectives and Targets 2016

The Schedule of Objectives and Targets set by BLR for 2016 and progress against those objectives are outlined in Table 3-2 below.

Table 3-2 Schedule of Objectives and Targets for 2016 / Environmental Management Programme 2016

No	Objective	Target	Timescale	Progress	Status 31/12/16
1	Restoration Works	Commence progressive restoration of backfilled area in NE Corner of facility – level, roll and seed with native grass mix	31/12/2016		Left it too late to commence works in Autumn 2016. Notified EPA that works would be deferred to Spring 2017
2	Environmental Compliance – Mud Carry	Meet with Kildare Co. Co to identify what (if any) further works required to minimise verge erosion along public road leading to facility	31/12/2016		No success in efforts to engage with KCC officials.
3	Specified Engineering Works	Undertake any site access or public road improvement / maintenance works agreed with Local Authority	31/12/2016		No progress - will require response / initiative from KCC before works can be progressed
4	Environmental Management System	Close out and agree waste handling and acceptance procedures with EPA	31/12/2016		Revised waste management plan submitted to EPA for approval in November 2016
5	Environmental Training and Awareness	Identify and avail of further training opportunities for site operatives	31/12/2016		No relevant training identified during 2016

3.3.2 Schedule of Objectives and Targets 2017

The Schedule of Objectives and Targets set by BLR for 2017 are outlined in Table 3-3 overleaf.

3.4 Staff Awareness and Training

No staff training was carried out in 2016.

3.5 Public Communications Programme

Records available for public inspection at the site office include:

- Copy of Waste Licence W0247-01
- Monitoring records
- Complaints file
- Incidents file
- EPA Correspondence file

Visits to the Blackhall Soil Recovery Facility can be arranged in advance by calling John Behan at 086 398 8374.

Table 3-3 Schedule of Objectives and Targets for 2017 / Environmental Management Programme 2017

No	Objective	Target	Timescale	Responsibility
1	Restoration Works	Commence progressive restoration of backfilled area in NE Corner of facility – reduce height of filling to original proposed level, roll and seed with native grass mix	31/12/2017	JB
2	Environmental Compliance – Mud Carry	Meet with Kildare Co. Co to identify what works required to minimise erosion along public road. Undertake any road improvement / maintenance works agreed with KCC	31/12/2017	JB
3	Stability Assessment	Arrange for assessment of geotechnical / slope stability and implement recommendations	31/12/2017	JB
4	Environmental Management System	Close out and agree waste handling and acceptance procedures with EPA	31/12/2017	JB
5	Install Granular Drainage Layer	Commence placement of granular inert recycled fill material within the water body in NW Corner of facility in advance of backfilling.	31/12/2017	JB
6	Site Records / Documentation	Ensure copies of all relevant documents, results and correspondence available for inspection at site office	31/12/2017	JB
7	Environmental Training and Awareness	Identify and avail of further training opportunities for site operatives	31/12/2017	JB

4.0 ENVIRONMENTAL MONITORING

An Environmental Monitoring programme is required at the facility to assess the significance of emissions from site activities. Schedule C of Waste Licence W0247–01 specifies the required level of monitoring at the Blackhall Soil Recovery facility. All of the monitoring locations are shown on Figure 2 (Site Layout Plan) of this AER.

4.1 Noise Monitoring

Noise measurements were taken at three locations (N01, N02, and N03) in 2016 during daytime hours. During the survey, observations of noise sources that influenced the noise levels were noted. A summary of results and discussion is presented below.

Table 4-1 Summary of Measured Noise Levels Noise Locations, free-field, dB,

Location	Date	Time	Measured Noise Levels – dB(A)		
			L _{Aeq,T}	L _{A10,T}	L _{A90,T}
N1	20/07/16	10:32 - 11:02	55	58	46
N1	20/07/16	12:20 - 12:50	48	50	41
N1	20/07/16	14:45 - 15:15	49	52	41
N2	20/07/16	09:52 - 10:22	46 (46+5=51)	49	40
N2	20/07/16	11:44 - 12:14	46	49	39
N2	20/07/16	14:08 - 14:38	48	50	38
N3	20/07/16	09:19 - 09:49	45	42	31
N3	20/07/16	11:10 - 11:40	50	46	37
N3	20/07/16	13:33 - 14:03	45	45	26

N1

The noise monitoring location N1 was positioned within the licensed facility boundary, near the residence adjoining the site to the north-west of the site entrance. At the time of survey noise levels at this location were influenced by activities at the adjoining licensed facility operated by Walshestown Restoration Limited, by traffic on the local road and natural noises.

Noise from site activities from the Walshestown Restoration Limited site dominated the overall noise climate at this location. Site activities from Behan's Land Restoration Ltd's facility were also audible during noise monitoring, although these had only a minor influence on the overall noise climate at this location.

N2

The noise monitoring location N2 was positioned on the side of the local lane at the residences to south-east of site entrance. At the time of survey, noise levels at this location were influenced by occasional traffic on the local road and by activities at the facility operated by Walshestown Restoration Limited. Site activities from the Behan's Land Restoration Ltd's facility were largely inaudible during noise monitoring.

N3

The noise monitoring location N3 was positioned at the side of the local road at the residence at the north end of the site. At the time of survey noise levels at this location were influenced by traffic on the local road and natural noise. Site activities from Behan's Land Restoration Ltd's facility were largely inaudible the during noise monitoring period.

4.1.1 Tonal Analysis of Noise Results

The updated Environmental Noise Standard ISO as set out in Annex D, 1996-2:2007(E) details that a prominent, discrete tonal component may be detected in one-third octave spectra if the level of a one-third octave band exceeds the level of the adjacent bands by some constant level difference.

The appropriate level differences vary with frequency. They should be greater than or equal to the following values in both adjacent one-third-octave bands:

- 15dB in low-frequency one-third-octave bands (25Hz to 125Hz);
- 8dB in middle-frequency bands (160Hz to 400Hz), and;
- 5dB in high-frequency bands (500Hz to 10,000Hz).

On examination of the 1/3 Octave Band Noise Spectra recorded on 20th July 2016, one tonal component was identified within the measured range (6.3 Hz to 20 kHz) at location N2 (09:52-10:22) at 1600 Hz, refer to Figure 4, Figure 5 and Figure 6 below.

In such circumstances, adjustment of 5 dB to the measured noise level at N2 was added. The overall noise climate at the location N2 was dominated by noise from activities from Walshestown Restoration Limited, thus it is considered that the tonal component should not be attributed solely to activities at Behan's Land Restoration Ltd.'s facility, if at all

Figure 4 N1 1/3rdOctave Band Analysis

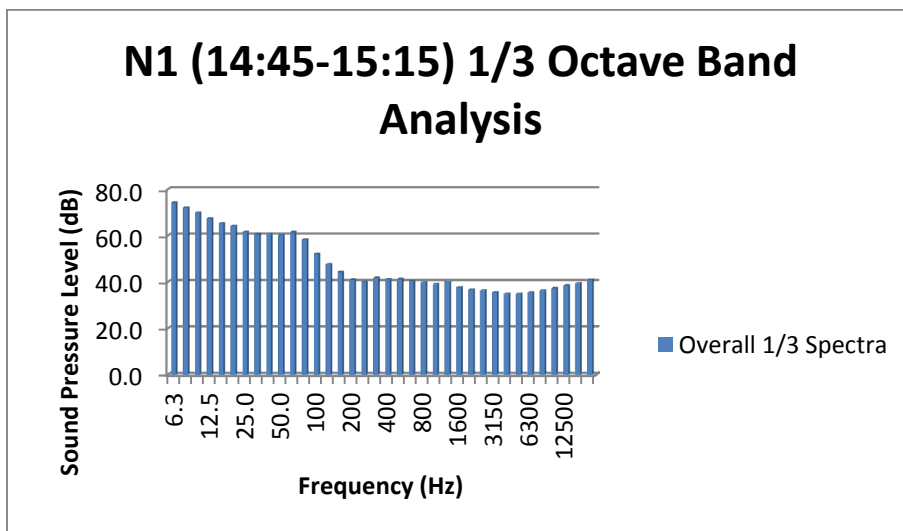
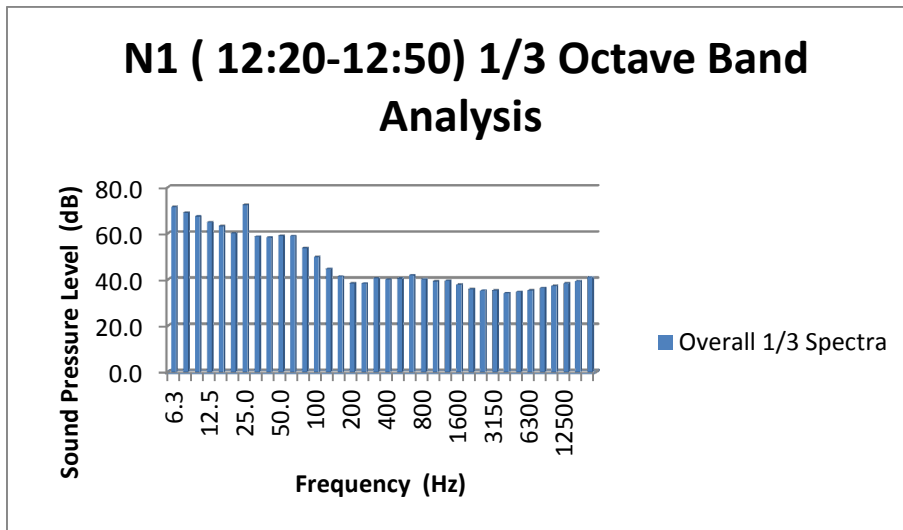
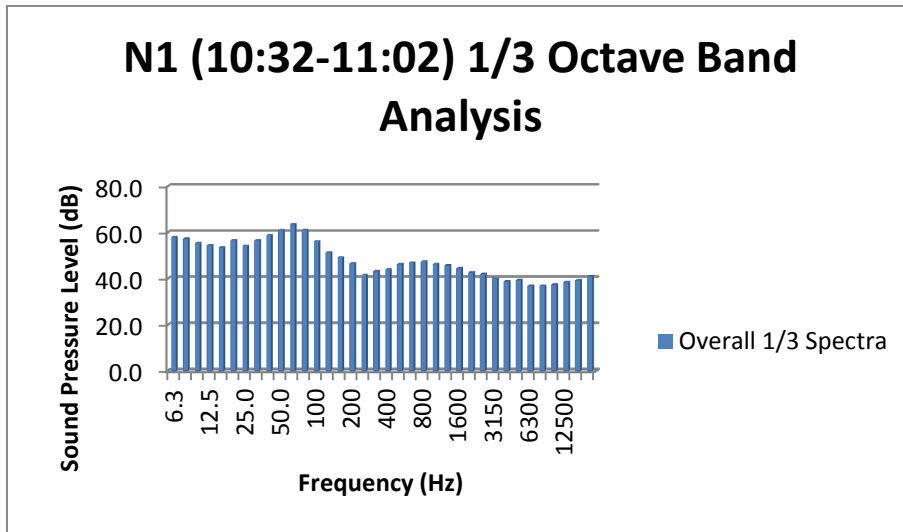


Figure 5 N2 1/3rd Octave Band Analysis

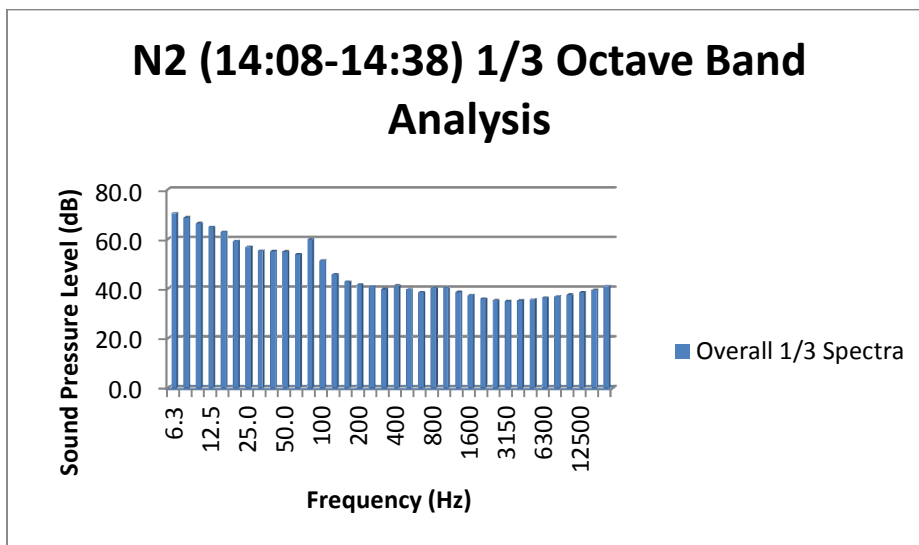
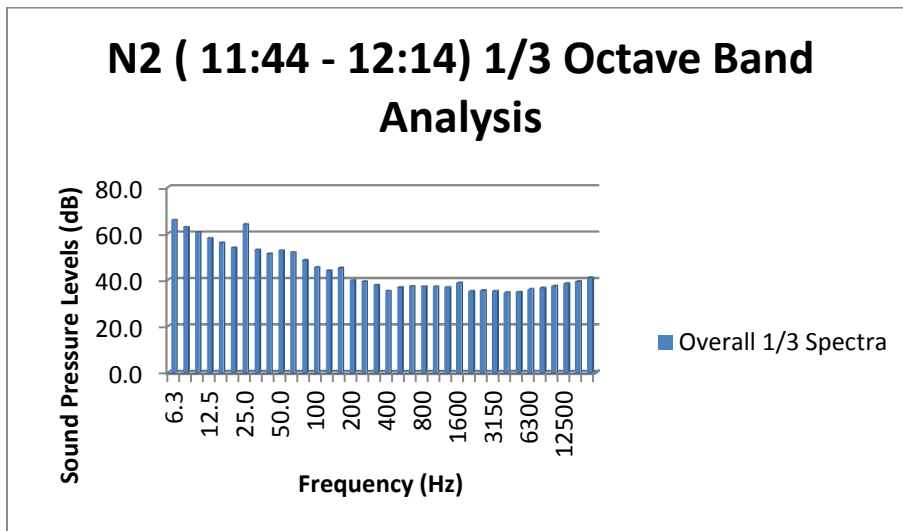
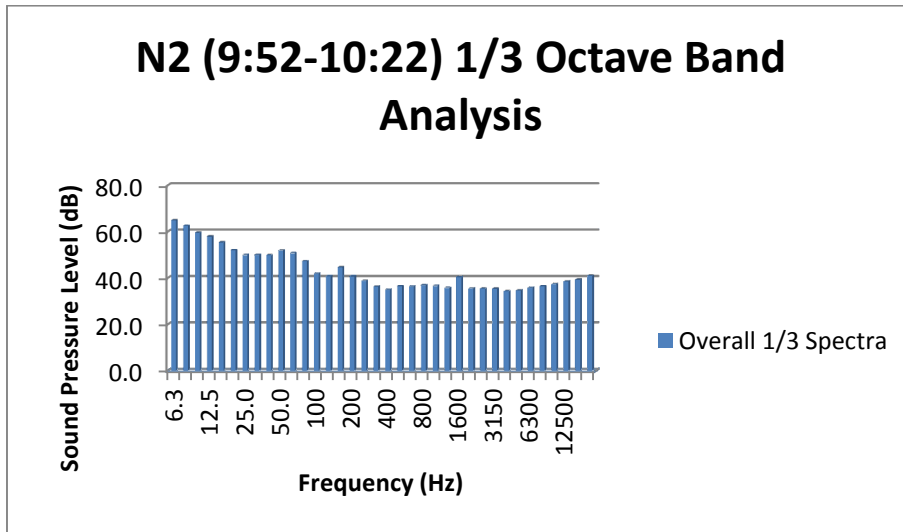
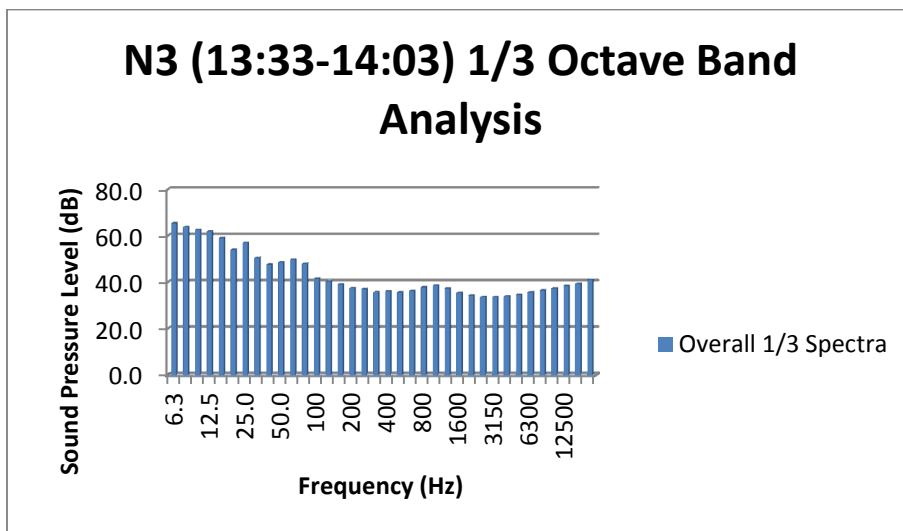
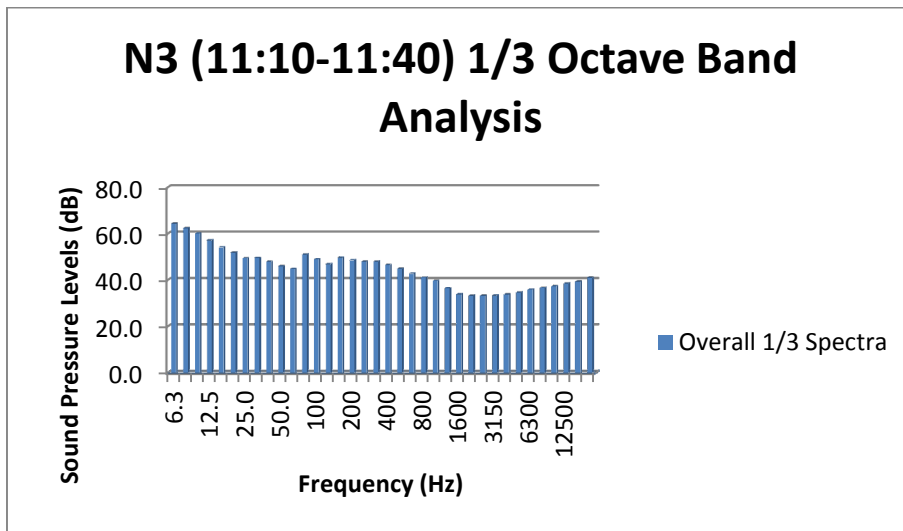
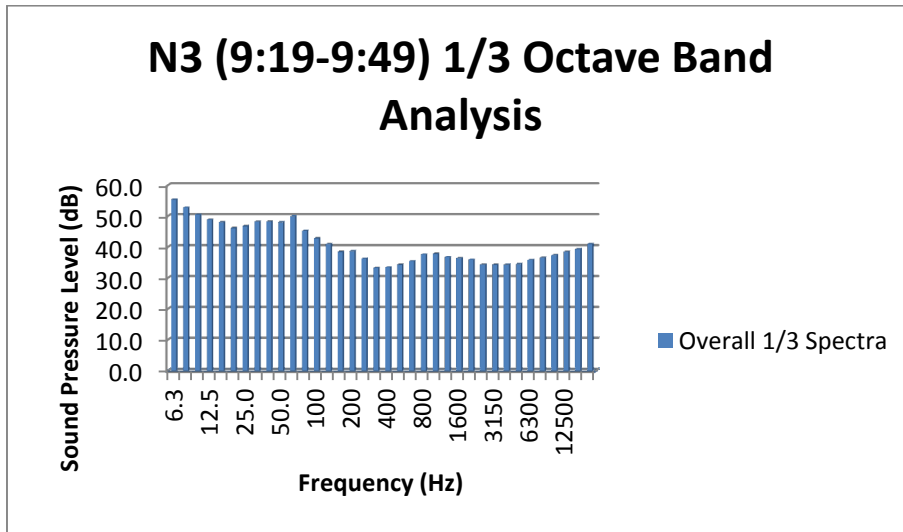


Figure 6 N3 1/3rd Octave Band Analysis



4.1.2 Assessment of Noise Results

Noise levels at N1, N2 and N3 comply with noise emission limits set out by the Waste Licence for the Blackhall Recovery Facility (Ref. No. W0247-01).

The assessment has found that the measured equivalent continuous noise levels recorded at three number of locations along the site boundary are within the permitted threshold limits of 55dB(A) L_{Aeq} (daytime).

4.2 Dust Monitoring

Dust deposition monitoring was carried out in 2016. Dust monitoring stations have been established at three locations (D1, D2, and D3). The results are as follows: -

Table 4-2 Summary of Dust Monitoring Results

Period		Deposition (mg/m ² /day)		
From	To	D1	D2	D3
31/05/16	14/07/16	336	172	49
14/07/16	24/08/16	153	44	17

4.2.1 Assessment of Dust Monitoring Results

The dust monitoring results at each of the three designated monitoring locations are below the generally accepted environmental dust emission limits of 350 milligrams per square metre per day (averaged over 30 days).

The assessment has considered the compliance of the existing soil recovery facility with the dust emission limits specified by its Waste Licence (Ref. No. W0247-01) and has established that the measured dust deposition levels are in compliance with the limits set out by its Waste Licence.

4.3 Groundwater Quality Monitoring

4.3.1 Groundwater Ponds

Monitoring of water quality in the two existing on-site pond features was carried out on a quarterly basis during 2016 (15th March, 15th June, 28th September, and 30th November).

Water samples are taken at the surface water features at locations SW2 and SW3. These features are present in closed topographic depressions, with no overland drainage path and are formed principally as a result of groundwater levels rising above the floor level of the former quarry workings. The water in the ponds comprises a mix of surface water run-off from the surrounding closed depressions and groundwater levels rising above level of surface topography. The test results provide additional insight and information on the groundwater quality, over and above the minimum requirements set out in Schedule C of the waste licence (Ref. W0247-01).

A summary of water quality test results for the water collecting in these features / close depressions is presented below in Tables 4-3 and Table 4-4 (for locations SW2 and SW3 respectively). A full copy of test results for these waters and results discussion is presented in monitoring reports in Appendix A.

Table 4-3 Summary of Chemical Analysis at SW2

Parameter	Location			SW2	SW2	SW2	SW2
	Screening Value*	Units	LOD	15/03/16	15/06/16	28/09/16	30/11/16
Temperature		T°C		8.93	20.3	15.6	7.9
pH	4.5-9.0 ≤100 mg/lCaCO3 6.0-9.0 >100 mg/lCaCO3			8.09	8.31	8.21	8.02
Electrical Conductivity		µs/cm		677	406	352	507
Dissolved Oxygen		mg/l		4.09	12.35	12.1	6.45
Dissolved Oxygen		%		36.6	138.4	12	64.3
Suspended Solids At 105C		mg/l	5.0				< 5.0
Total Dissolved Solids		mg/l	1.0				290
Alkalinity (Total)		mg CaCO3/l	10				230
Chloride		mg/l	1.0	15	14.1	15	17
Ammoniacal Nitrogen	High status ≤ 0.040 (mean) or ≤ 0.090 (95%ile) Good Status ≤ 0.065 (mean) or ≤ 0.140 (95%ile)	mg/l	0.010	0.0174	0.0944	0.0314	0.033
Nitrate		mg/l	0.50				7.6
Phosphate	High status ≤ 0.025 (mean) or ≤ 0.045 (95%ile) Good Status ≤ 0.035 (mean) or ≤ 0.075 (95%ile)	mg/l	0.050				< 0.050
Sulphate		mg/l	1.0	18.5	18.5	17.9	21
Calcium		mg/l	5.0				100
Potassium		mg/l	0.50				1.1
Magnesium		mg/l	0.50				11
Sodium		mg/l	0.50				10
Hardness		mg/l	15				300
Aluminium (Dissolved)		µg/l	10				< 10
Arsenic (Dissolved)	25	µg/l	1.0				< 1.0
Boron (Dissolved)		µg/l	20				< 20
Barium (Dissolved)		µg/l	5.0				32
Beryllium (Dissolved)		µg/l	1.0				< 1.0
Cadmium (Dissolved)		µg/l	0.080				< 0.080
Cobalt (Dissolved)		µg/l	1.0				< 1.0
Chromium (Dissolved)		µg/l	1.0				5.6
Copper (Dissolved)	5	µg/l	1.0				2.3
Iron (Dissolved)		µg/l	20				160
Mercury (Dissolved)	0.05	µg/l	0.50				< 0.50

Parameter	Location		SW2	SW2	SW2	SW2
	Date Sampled:	Units	15/03/16	15/06/16	28/09/16	30/11/16
Screening Value*	LOD					
Manganese (Dissolved)		µg/l	1.0			< 1.0
Molybdenum (Dissolved)		µg/l	1.0			< 1.0
Nickel (Dissolved)	20	µg/l	1.0			< 1.0
Lead (Dissolved)	7.2	µg/l	1.0			< 1.0
Antimony (Dissolved)		µg/l	1.0			< 1.0
Selenium (Dissolved)		µg/l	1.0			5.0
Tin (Dissolved)		µg/l	1.0			< 1.0
Strontium (Dissolved)		µg/l	1.0			180
Vanadium (Dissolved)		µg/l	1.0			< 1.0
Zinc (Dissolved)		µg/l	1.0			1.1
Thallium		µg/l	0.10			< 0.10
TPH >C5-C6		µg/l	0.10			< 0.10
TPH >C6-C7		µg/l	0.10			< 0.10
TPH >C7-C8		µg/l	0.10			< 0.10
TPH >C8-C10		µg/l	0.10			< 0.10
TPH >C10-C12		µg/l	0.10			< 0.10
TPH >C12-C16		µg/l	0.10			< 0.10
TPH >C16-C21		µg/l	0.10			< 0.10
TPH >C21-C35		µg/l	0.10			< 0.10
Total TPH >C5-C35		µg/l	10			< 10
Naphthalene		µg/l	0.10			< 0.10
Acenaphthylene		µg/l	0.10			< 0.10
Acenaphthene		µg/l	0.10			< 0.10
Fluorene		µg/l	0.10			< 0.10
Phenanthrene		µg/l	0.10			< 0.10
Anthracene		µg/l	0.10			< 0.10
Fluoranthene		µg/l	0.10			< 0.10
Pyrene		µg/l	0.10			< 0.10
Benzo[a]anthracene		µg/l	0.10			< 0.10
Chrysene		µg/l	0.10			< 0.10
Benzo[b]fluoranthene		µg/l	0.10			< 0.10
Benzo[k]fluoranthene		µg/l	0.10			< 0.10
Benzo[a]pyrene		µg/l	0.10			< 0.10
Indeno(1,2,3-c,d)Pyrene		µg/l	0.10			< 0.10
Dibenz(a,h)Anthracene		µg/l	0.10			< 0.10
Benzo[g,h,i]perylene		µg/l	0.10			< 0.10
Total Of 16 PAH's		µg/l	2.0			< 2.0
Dichlorodifluoromethane		µg/l	0.10			< 0.10
Chloromethane		µg/l	0.10			< 0.10
Vinyl Chloride		µg/l	0.10			< 0.10
Bromomethane		µg/l	2.0			< 2.0
Chloroethane		µg/l	0.20			< 0.20
Trichlorofluoromethane		µg/l	0.10			< 0.10
1,1-Dichloroethene		µg/l	0.10			< 0.10
Trans 1,2-Dichloroethene		µg/l	0.10			< 0.10
1,1-Dichloroethane		µg/l	0.10			< 0.10
cis 1,2-Dichloroethene		µg/l	0.10			< 0.10
Bromochloromethane		µg/l	0.50			< 0.50
Trichloromethane		µg/l	0.10			< 0.10
1,1,1-Trichloroethane		µg/l	0.10			< 0.10
Tetrachloromethane		µg/l	0.10			< 0.10
1,1-Dichloropropene		µg/l	0.10			< 0.10
Benzene		µg/l	0.10			< 0.10
1,2-Dichloroethane		µg/l	0.20			< 0.20
Trichloroethene		µg/l	0.10			< 0.10

Parameter	Location		SW2	SW2	SW2	SW2
	Date Sampled:	Units	15/03/16	15/06/16	28/09/16	30/11/16
Screening Value*	LOD					
1,2-Dichloropropane		µg/l	0.10			< 0.10
Dibromomethane		µg/l	0.10			< 0.10
Bromodichloromethane		µg/l	0.50			< 0.50
cis-1,3-Dichloropropene		µg/l	1.0			< 1.0
Toluene		µg/l	0.10			< 0.10
Trans-1,3-Dichloropropene		µg/l	1.0			< 1.0
1,1,2-Trichloroethane		µg/l	1.0			< 1.0
Tetrachloroethene		µg/l	0.10			< 0.10
1,3-Dichloropropane		µg/l	0.20			< 0.20
Dibromochloromethane		µg/l	1.0			< 1.0
1,2-Dibromoethane		µg/l	0.50			< 0.50
Chlorobenzene		µg/l	0.10			< 0.10
1,1,1,2-Tetrachloroethane		µg/l	0.20			< 0.20
Ethylbenzene		µg/l	0.10			< 0.10
m & p-Xylene		µg/l	0.10			< 0.10
o-Xylene		µg/l	0.10			< 0.10
Styrene		µg/l	0.10			< 0.10
Tribromomethane		µg/l	1.0			< 1.0
Isopropylbenzene		µg/l	0.10			< 0.10
Bromobenzene		µg/l	0.10			< 0.10
1,2,3-Trichloropropane		µg/l	5.0			< 5.0
N-Propylbenzene		µg/l	0.10			< 0.10
2-Chlorotoluene		µg/l	0.10			< 0.10
1,3,5-Trimethylbenzene		µg/l	0.10			< 0.10
4-Chlorotoluene		µg/l	0.10			< 0.10
Tert-Butylbenzene		µg/l	0.10			< 0.10
1,2,4-Trimethylbenzene		µg/l	0.10			< 0.10
Sec-Butylbenzene		µg/l	0.10			< 0.10
1,3-Dichlorobenzene		µg/l	0.10			< 0.10
4-Isopropyltoluene		µg/l	0.10			< 0.10
1,4-Dichlorobenzene		µg/l	0.10			< 0.10
N-Butylbenzene		µg/l	0.10			< 0.10
1,2-Dichlorobenzene		µg/l	0.10			< 0.10
1,2-Dibromo-3-Chloropropane		µg/l	5.0			< 5.0
1,2,4-Trichlorobenzene		µg/l	0.10			< 0.10
Hexachlorobutadiene		µg/l	0.10			< 0.10
1,2,3-Trichlorobenzene		µg/l	0.20			< 0.20
Methyl Tert-Butyl Ether		µg/l	0.10			< 0.10
N-Nitrosodimethylamine		µg/l	0.050			< 0.050
Phenol		µg/l	0.050			< 0.050
2-Chlorophenol		µg/l	0.050			< 0.050
Bis-(2-Chloroethyl)Ether		µg/l	0.050			< 0.050
1,3-Dichlorobenzene		µg/l	0.050			< 0.050
1,4-Dichlorobenzene		µg/l	0.050			< 0.050
1,2-Dichlorobenzene		µg/l	0.050			< 0.050
2-Methylphenol (o-Cresol)		µg/l	0.050			< 0.050
Bis(2-Chloroisopropyl)Ether		µg/l	0.050			< 0.050
Hexachloroethane		µg/l	0.050			< 0.050
N-Nitrosodi-n-propylamine		µg/l	0.050			< 0.050
4-Methylphenol		µg/l	0.050			< 0.050
Nitrobenzene		µg/l	0.050			< 0.050
Isophorone		µg/l	0.050			< 0.050
2-Nitrophenol		µg/l	0.050			< 0.050
2,4-Dimethylphenol		µg/l	0.050			< 0.050
Bis(2-		µg/l	0.050			< 0.050

Parameter	Location		SW2	SW2	SW2	SW2
	Date Sampled:	Units	15/03/16	15/06/16	28/09/16	30/11/16
Screening Value*	LOD					
Chloroethoxy)Methane						
2,4-Dichlorophenol	µg/l	0.050				< 0.050
1,2,4-Trichlorobenzene	µg/l	0.050				< 0.050
Naphthalene	µg/l	0.050				< 0.050
4-Chloroaniline	µg/l	0.050				< 0.050
Hexachlorobutadiene	µg/l	0.050				< 0.050
4-Chloro-3-Methylphenol	µg/l	0.050				< 0.050
2-Methylnaphthalene	µg/l	0.050				< 0.050
Hexachlorocyclopentadiene	µg/l	0.050				< 0.050
2,4,6-Trichlorophenol	µg/l	0.050				< 0.050
2,4,5-Trichlorophenol	µg/l	0.050				< 0.050
2-Chloronaphthalene	µg/l	0.050				< 0.050
2-Nitroaniline	µg/l	0.050				< 0.050
Acenaphthylene	µg/l	0.050				< 0.050
Dimethylphthalate	µg/l	0.050				< 0.050
2,6-Dinitrotoluene	µg/l	0.050				< 0.050
Acenaphthene	µg/l	0.050				< 0.050
3-Nitroaniline	µg/l	0.050				< 0.050
Dibenzofuran	µg/l	0.050				< 0.050
4-Chlorophenylphenylether	µg/l	0.050				< 0.050
2,4-Dinitrotoluene	µg/l	0.050				< 0.050
Fluorene	µg/l	0.050				< 0.050
Diethyl Phthalate	µg/l	0.050				< 0.050
4-Nitroaniline	µg/l	0.050				< 0.050
2-Methyl-4,6-Dinitrophenol	µg/l	0.050				< 0.050
Azobenzene	µg/l	0.050				< 0.050
4-Bromophenylphenyl Ether	µg/l	0.050				< 0.050
Hexachlorobenzene	µg/l	0.050				< 0.050
Pentachlorophenol	µg/l	0.050				< 0.050
Phenanthrene	µg/l	0.050				< 0.050
Anthracene	µg/l	0.050				< 0.050
Carbazole	µg/l	0.050				< 0.050
Di-N-Butyl Phthalate	µg/l	0.050				< 0.050
Fluoranthene	µg/l	0.050				< 0.050
Pyrene	µg/l	0.050				< 0.050
Butylbenzyl Phthalate	µg/l	0.050				< 0.050
Benzo[a]anthracene	µg/l	0.050				< 0.050
Chrysene	µg/l	0.050				< 0.050
Bis(2-Ethylhexyl)Phthalate	µg/l	0.050				< 0.050
Di-N-Octyl Phthalate	µg/l	0.050				< 0.050
Benzo[b]fluoranthene	µg/l	0.050				< 0.050
Benzo[k]fluoranthene	µg/l	0.050				< 0.050
Benzo[a]pyrene	µg/l	0.050				< 0.050
Indeno(1,2,3-c,d)Pyrene	µg/l	0.050				< 0.050
Dibenz(a,h)Anthracene	µg/l	0.050				< 0.050
Benzo[g,h,i]perylene	µg/l	0.050				< 0.050
4-Nitrophenol	µg/l	0.050				< 0.050

* S.I 327 of 2012 - European Communities Environmental Objectives (Surface Waters) (Amendment) Regulations 2012

Table 4-4 Summary of Chemical Analysis at SW3

Parameter	Screening Value*	Location		Date Sampled:			
		Units	LOD	SW3 15/03/16	SW3 15/06/16	SW3 28/09/16	SW3 30/11/16
Temperature		T°C		9	18.4	15.2	7.8
pH	4.5-9.0 ≤100 mg/lCaCO3 6.0-9.0 >100 mg/lCaCO3			8.08	8.08	8.18	8.03
Electrical Conductivity		µs/cm		601	423	365	499
Dissolved Oxygen		mg/l		4.53	8	9	6.35
Dissolved Oxygen		%		41.6	90.2	9.1	56.1
Suspended Solids At 105C		mg/l	5.0				47
Total Dissolved Solids		mg/l	1.0				390
Alkalinity (Total)		mg CaCO3/l	10				130
Chloride		mg/l	1.0	16.4	12.1	19.7	23
Ammoniacal Nitrogen	High status ≤ 0.040 (mean) or ≤ 0.090 (95%ile) Good Status ≤ 0.065 (mean) or ≤ 0.140 (95%ile)	mg/l	0.010	0.0276	0.058	0.0323	0.034
Nitrate		mg/l	0.50				< 0.50
Phosphate	High status ≤ 0.025 (mean) or ≤ 0.045 (95%ile) Good Status ≤ 0.035 (mean) or ≤ 0.075 (95%ile)	mg/l	0.050				< 0.050
Sulphate		mg/l	1.0	141	103	146	160
Calcium		mg/l	5.0				120
Potassium		mg/l	0.50				17
Magnesium		mg/l	0.50				7.6
Sodium		mg/l	0.50				19
Hardness		mg/l	15				330
Aluminium (Dissolved)		µg/l	10				< 10
Arsenic (Dissolved)	25	µg/l	1.0				1.9
Boron (Dissolved)		µg/l	20				32
Barium (Dissolved)		µg/l	5.0				43
Beryllium (Dissolved)		µg/l	1.0				< 1.0
Cadmium (Dissolved)		µg/l	0.080				< 0.080
Cobalt (Dissolved)		µg/l	1.0				< 1.0
Chromium (Dissolved)		µg/l	1.0				6.6
Copper (Dissolved)	5	µg/l	1.0				4.9
Iron (Dissolved)		µg/l	20				260
Mercury (Dissolved)	0.05	µg/l	0.50				< 0.50

Parameter	Screening Value*	Location		SW3	SW3	SW3	SW3
		Units	LOD	Date Sampled: 15/03/16	15/06/16	28/09/16	30/11/16
Manganese (Dissolved)		µg/l	1.0				1.3
Molybdenum (Dissolved)		µg/l	1.0				4.2
Nickel (Dissolved)	20	µg/l	1.0				2.7
Lead (Dissolved)	7.2	µg/l	1.0				< 1.0
Antimony (Dissolved)		µg/l	1.0				1.3
Selenium (Dissolved)		µg/l	1.0				9.5
Tin (Dissolved)		µg/l	1.0				< 1.0
Strontium (Dissolved)		µg/l	1.0				390
Vanadium (Dissolved)		µg/l	1.0				< 1.0
Zinc (Dissolved)		µg/l	1.0				5.6
Thallium		µg/l	0.10				< 0.10
TPH >C5-C6		µg/l	0.10	<0.01			< 0.10
TPH >C6-C7		µg/l	0.10	<0.01			< 0.10
TPH >C7-C8		µg/l	0.10	<0.01			< 0.10
TPH >C8-C10		µg/l	0.10	<0.01			< 0.10
TPH >C10-C12		µg/l	0.10	<0.01			< 0.10
TPH >C12-C16		µg/l	0.10	<0.01			< 0.10
TPH >C16-C21		µg/l	0.10	<0.01			< 0.10
TPH >C21-C35		µg/l	0.10	<0.01			< 0.10
Total TPH >C5-C35		µg/l	10				< 10
Naphthalene		µg/l	0.10				< 0.10
Acenaphthylene		µg/l	0.10				< 0.10
Acenaphthene		µg/l	0.10				< 0.10
Fluorene		µg/l	0.10				< 0.10
Phenanthrene		µg/l	0.10				< 0.10
Anthracene		µg/l	0.10				< 0.10
Fluoranthene		µg/l	0.10				< 0.10
Pyrene		µg/l	0.10				< 0.10
Benzo[a]anthracene		µg/l	0.10				< 0.10
Chrysene		µg/l	0.10				< 0.10
Benzo[b]fluoranthene		µg/l	0.10				< 0.10
Benzo[k]fluoranthene		µg/l	0.10				< 0.10
Benzo[a]pyrene		µg/l	0.10				< 0.10
Indeno(1,2,3-c,d)Pyrene		µg/l	0.10				< 0.10
Dibenz(a,h)Anthracene		µg/l	0.10				< 0.10
Benzo[g,h,i]perylene		µg/l	0.10				< 0.10
Total Of 16 PAH's		µg/l	2.0				< 2.0
Dichlorodifluoromethane		µg/l	0.10				< 0.10
Chloromethane		µg/l	0.10				< 0.10
Vinyl Chloride		µg/l	0.10				< 0.10
Bromomethane		µg/l	2.0				< 2.0
Chloroethane		µg/l	0.20				< 0.20
Trichlorofluoromethane		µg/l	0.10				< 0.10
1,1-Dichloroethene		µg/l	0.10				< 0.10
Trans 1,2-Dichloroethene		µg/l	0.10				< 0.10
1,1-Dichloroethane		µg/l	0.10				< 0.10
cis 1,2-Dichloroethene		µg/l	0.10				< 0.10
Bromochloromethane		µg/l	0.50				< 0.50
Trichloromethane		µg/l	0.10				< 0.10
1,1,1-Trichloroethane		µg/l	0.10				< 0.10
Tetrachloromethane		µg/l	0.10				< 0.10
1,1-Dichloropropene		µg/l	0.10				< 0.10
Benzene		µg/l	0.10				< 0.10
1,2-Dichloroethane		µg/l	0.20				< 0.20
Trichloroethene		µg/l	0.10				< 0.10

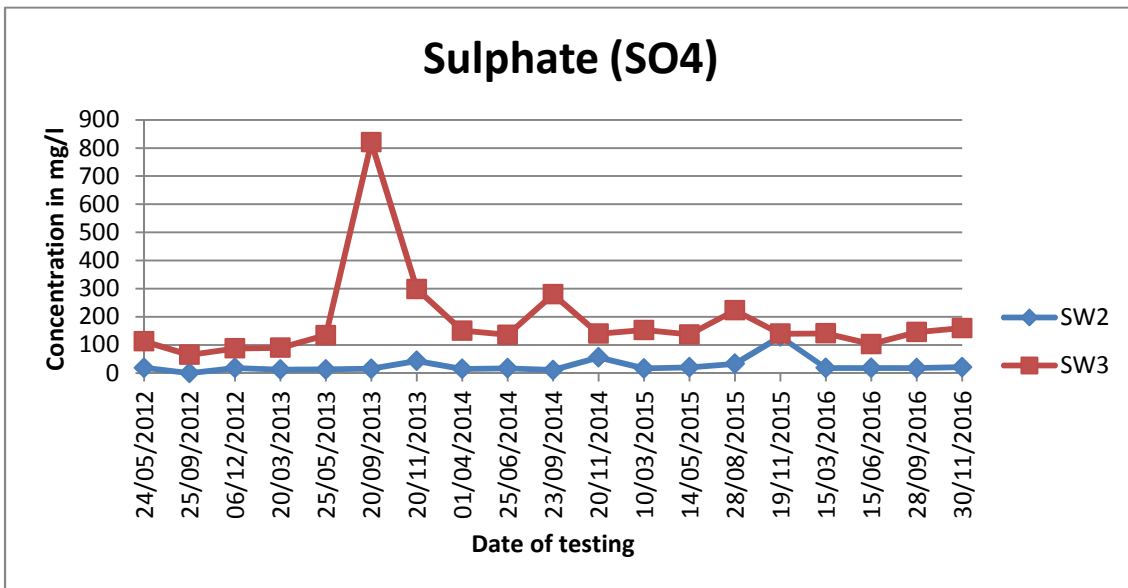
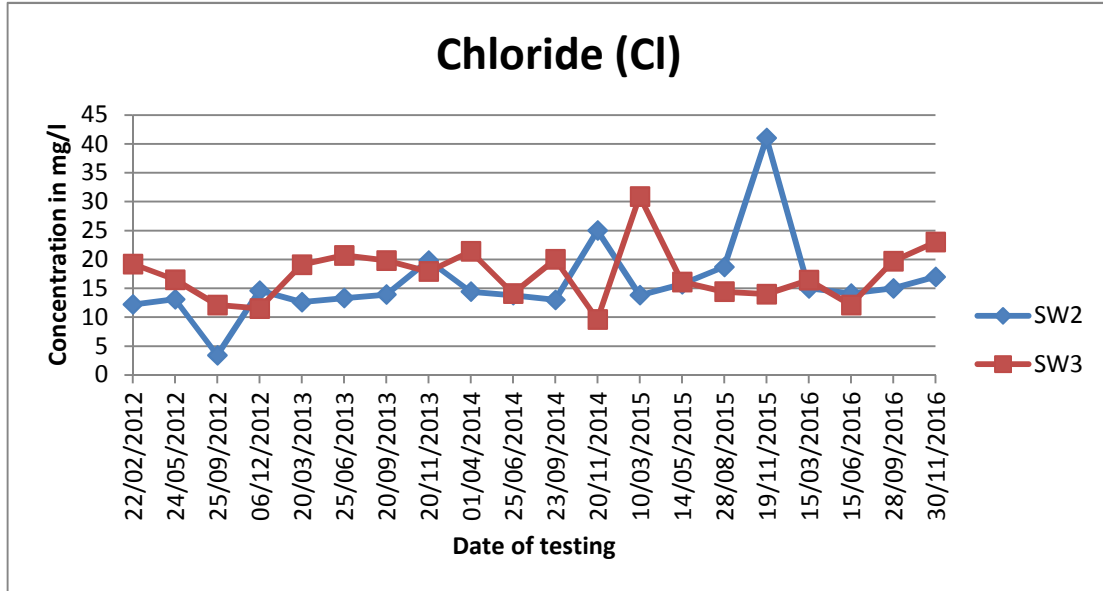
Parameter	Screening Value*	Location		SW3	SW3	SW3	SW3
		Units	LOD	15/03/16	15/06/16	28/09/16	30/11/16
1,2-Dichloropropane		µg/l	0.10				< 0.10
Dibromomethane		µg/l	0.10				< 0.10
Bromodichloromethane		µg/l	0.50				< 0.50
cis-1,3-Dichloropropene		µg/l	1.0				< 1.0
Toluene		µg/l	0.10				< 0.10
Trans-1,3-Dichloropropene		µg/l	1.0				< 1.0
1,1,2-Trichloroethane		µg/l	1.0				< 1.0
Tetrachloroethene		µg/l	0.10				< 0.10
1,3-Dichloropropane		µg/l	0.20				< 0.20
Dibromochloromethane		µg/l	1.0				< 1.0
1,2-Dibromoethane		µg/l	0.50				< 0.50
Chlorobenzene		µg/l	0.10				< 0.10
1,1,1,2-Tetrachloroethane		µg/l	0.20				< 0.20
Ethylbenzene		µg/l	0.10				< 0.10
m & p-Xylene		µg/l	0.10				< 0.10
o-Xylene		µg/l	0.10				< 0.10
Styrene		µg/l	0.10				< 0.10
Tribromomethane		µg/l	1.0				< 1.0
Isopropylbenzene		µg/l	0.10				< 0.10
Bromobenzene		µg/l	0.10				< 0.10
1,2,3-Trichloropropane		µg/l	5.0				< 5.0
N-Propylbenzene		µg/l	0.10				< 0.10
2-Chlorotoluene		µg/l	0.10				< 0.10
1,3,5-Trimethylbenzene		µg/l	0.10				< 0.10
4-Chlorotoluene		µg/l	0.10				< 0.10
Tert-Butylbenzene		µg/l	0.10				< 0.10
1,2,4-Trimethylbenzene		µg/l	0.10				< 0.10
Sec-Butylbenzene		µg/l	0.10				< 0.10
1,3-Dichlorobenzene		µg/l	0.10				< 0.10
4-Isopropyltoluene		µg/l	0.10				< 0.10
1,4-Dichlorobenzene		µg/l	0.10				< 0.10
N-Butylbenzene		µg/l	0.10				< 0.10
1,2-Dichlorobenzene		µg/l	0.10				< 0.10
1,2-Dibromo-3-Chloropropane		µg/l	5.0				< 5.0
1,2,4-Trichlorobenzene		µg/l	0.10				< 0.10
Hexachlorobutadiene		µg/l	0.10				< 0.10
1,2,3-Trichlorobenzene		µg/l	0.20				< 0.20
Methyl Tert-Butyl Ether		µg/l	0.10				< 0.10
N-Nitrosodimethylamine		µg/l	0.050				< 0.050
Phenol		µg/l	0.050				< 0.050
2-Chlorophenol		µg/l	0.050				< 0.050
Bis-(2-Chloroethyl)Ether		µg/l	0.050				< 0.050
1,3-Dichlorobenzene		µg/l	0.050				< 0.050
1,4-Dichlorobenzene		µg/l	0.050				< 0.050
1,2-Dichlorobenzene		µg/l	0.050				< 0.050
2-Methylphenol (o-Cresol)		µg/l	0.050				< 0.050
Bis(2-Chloroisopropyl)Ether		µg/l	0.050				< 0.050
Hexachloroethane		µg/l	0.050				< 0.050
N-Nitrosodi-n-propylamine		µg/l	0.050				< 0.050
4-Methylphenol		µg/l	0.050				< 0.050
Nitrobenzene		µg/l	0.050				< 0.050
Isophorone		µg/l	0.050				< 0.050
2-Nitrophenol		µg/l	0.050				< 0.050
2,4-Dimethylphenol		µg/l	0.050				< 0.050

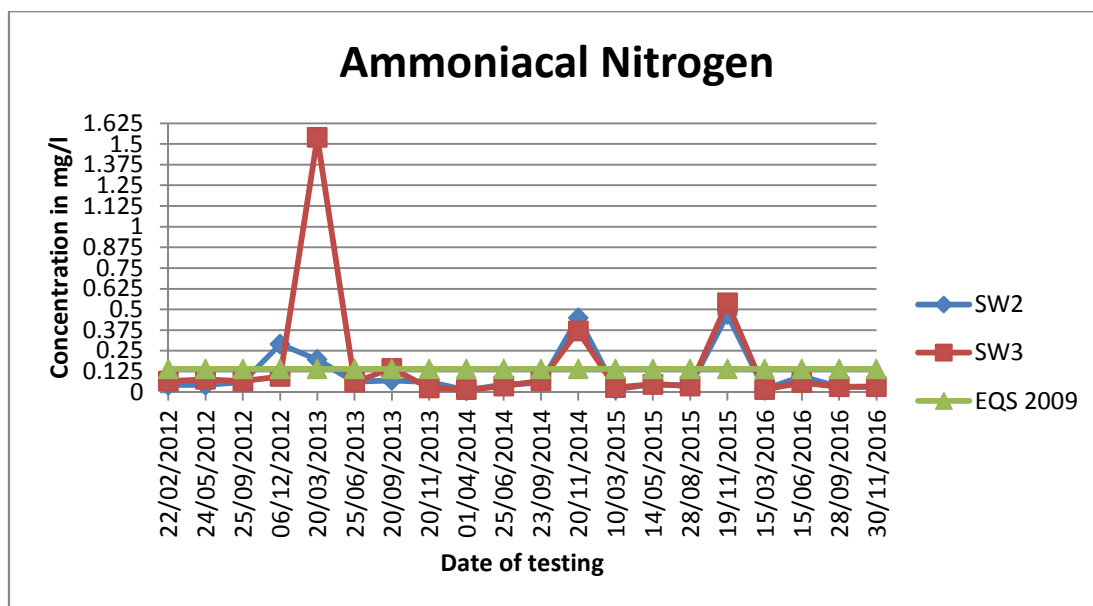
Parameter	Screening Value*	Location		SW3	SW3	SW3	SW3
		Units	LOD	15/03/16	15/06/16	28/09/16	30/11/16
Bis(2-Chloroethoxy)Methane		µg/l	0.050				< 0.050
2,4-Dichlorophenol		µg/l	0.050				< 0.050
1,2,4-Trichlorobenzene		µg/l	0.050				< 0.050
Naphthalene		µg/l	0.050				< 0.050
4-Chloroaniline		µg/l	0.050				< 0.050
Hexachlorobutadiene		µg/l	0.050				< 0.050
4-Chloro-3-Methylphenol		µg/l	0.050				< 0.050
2-Methylnaphthalene		µg/l	0.050				< 0.050
Hexachlorocyclopentadiene		µg/l	0.050				< 0.050
2,4,6-Trichlorophenol		µg/l	0.050				< 0.050
2,4,5-Trichlorophenol		µg/l	0.050				< 0.050
2-Chloronaphthalene		µg/l	0.050				< 0.050
2-Nitroaniline		µg/l	0.050				< 0.050
Acenaphthylene		µg/l	0.050				< 0.050
Dimethylphthalate		µg/l	0.050				< 0.050
2,6-Dinitrotoluene		µg/l	0.050				< 0.050
Acenaphthene		µg/l	0.050				< 0.050
3-Nitroaniline		µg/l	0.050				< 0.050
Dibenzofuran		µg/l	0.050				< 0.050
4-Chlorophenylphenylether		µg/l	0.050				< 0.050
2,4-Dinitrotoluene		µg/l	0.050				< 0.050
Fluorene		µg/l	0.050				< 0.050
Diethyl Phthalate		µg/l	0.050				< 0.050
4-Nitroaniline		µg/l	0.050				< 0.050
2-Methyl-4,6-Dinitrophenol		µg/l	0.050				< 0.050
Azobenzene		µg/l	0.050				< 0.050
4-Bromophenylphenyl Ether		µg/l	0.050				< 0.050
Hexachlorobenzene		µg/l	0.050				< 0.050
Pentachlorophenol		µg/l	0.050				< 0.050
Phenanthrene		µg/l	0.050				< 0.050
Anthracene		µg/l	0.050				< 0.050
Carbazole		µg/l	0.050				< 0.050
Di-N-Butyl Phthalate		µg/l	0.050				< 0.050
Fluoranthene		µg/l	0.050				< 0.050
Pyrene		µg/l	0.050				< 0.050
Butylbenzyl Phthalate		µg/l	0.050				< 0.050
Benzo[a]anthracene		µg/l	0.050				< 0.050
Chrysene		µg/l	0.050				< 0.050
Bis(2-Ethylhexyl)Phthalate		µg/l	0.050				< 0.050
Di-N-Octyl Phthalate		µg/l	0.050				< 0.050
Benzo[b]fluoranthene		µg/l	0.050				< 0.050
Benzo[k]fluoranthene		µg/l	0.050				< 0.050
Benzo[a]pyrene		µg/l	0.050				< 0.050
Indeno(1,2,3-c,d)Pyrene		µg/l	0.050				< 0.050
Dibenz(a,h)Anthracene		µg/l	0.050				< 0.050
Benzo[g,h,i]perylene		µg/l	0.050				< 0.050
4-Nitrophenol		µg/l	0.050				< 0.050

* S.I 327 of 2012 - European Communities Environmental Objectives (Surface Waters) (Amendment) Regulations 2012

4.3.2 Variation and trends in Surface Water Quality

The plots provided below show variations and trends in surface water quality for monitored parameters (Chloride, Sulphate, Ammoniacal Nitrogen) from the beginning of 2012. Plots show no indication of sustained increase of monitored parameters concentration over the time.





4.3.3 Groundwater Quality

Groundwater monitoring was carried out in 2015 on quarterly basis (15th March 15th June, 28th September, and 30th November). Samples were taken at seven locations (GW1, GW2, GW3, GW4, GW5 Well 1, and Well 2). A summary of results is presented below in Tables 4-5 to Table 4-11. Full copy of groundwater testing results and results discussion is presented monitoring reports in Appendix A.

Table 4-5 Summary of Chemical Analysis at GW1

Parameter	Screening Value*	Location		GW1	GW1	GW1	GW1
		Date Sampled:	Units	15/03/16	15/06/16	28/09/16	30/11/16
			LOD				
Temperature		T°C		9.14	8.9	9.9	9.9
pH				7.52	7.53	7.45	7.98
Electrical Conductivity	1875	µs/cm		618	333	340	450
Dissolved Oxygen		mg/l		3.23	9.15	9.04	5.5
Dissolved Oxygen		%		34.3	79.4	80.3	50.3
Suspended Solids At 105C		mg/l	5.0				120
Total Dissolved Solids		mg/l	1.0				300
Alkalinity (Total)		mg CaCO3/l	10				290
Chloride	187.5	mg/l	1.0	12.7	12.3	12.1	13
Ammoniacal Nitrogen	0.175	mg/l	0.010	0.0167	0.0119	0.0209	0.028
Nitrate	37.5	mg/l	0.50				8.8
Phosphate		mg/l	0.050				< 0.050
Sulphate	187.5	mg/l	1.0	8.9	6.5	7.6	11
Calcium		mg/l	5.0				92
Potassium		mg/l	0.50				0.78
Magnesium		mg/l	0.50				10
Sodium	150	mg/l	0.50				7.9
Hardness		mg/l	15				270
Aluminium (Dissolved)	150	µg/l	10				88
Arsenic (Dissolved)	7.5	µg/l	1.0				< 1.0
Boron (Dissolved)	750	µg/l	20				24
Barium (Dissolved)		µg/l	5.0				30
Beryllium (Dissolved)		µg/l	1.0				< 1.0
Cadmium (Dissolved)	3.75	µg/l	0.080				< 0.080
Cobalt (Dissolved)		µg/l	1.0				< 1.0
Chromium (Dissolved)	37.5	µg/l	1.0				8.7
Copper (Dissolved)	1500	µg/l	1.0				1.9
Iron (Dissolved)		µg/l	20				220
Mercury (Dissolved)	0.75	µg/l	0.50				< 0.50
Manganese (Dissolved)		µg/l	1.0				< 1.0
Molybdenum (Dissolved)		µg/l	1.0				< 1.0
Nickel (Dissolved)	15	µg/l	1.0				< 1.0
Lead (Dissolved)	18.75	µg/l	1.0				< 1.0
Antimony (Dissolved)		µg/l	1.0				< 1.0
Selenium (Dissolved)		µg/l	1.0				6.0
Tin (Dissolved)		µg/l	1.0				< 1.0
Strontium (Dissolved)		µg/l	1.0				180
Vanadium (Dissolved)		µg/l	1.0				< 1.0
Zinc (Dissolved)		µg/l	1.0				1.8
Thallium		µg/l	0.10				< 0.10
TPH >C5-C6		µg/l	0.10				< 0.10
TPH >C6-C7		µg/l	0.10				< 0.10
TPH >C7-C8		µg/l	0.10				< 0.10
TPH >C8-C10		µg/l	0.10				< 0.10
TPH >C10-C12		µg/l	0.10				< 0.10
TPH >C12-C16		µg/l	0.10				< 0.10
TPH >C16-C21		µg/l	0.10				< 0.10
TPH >C21-C35		µg/l	0.10				< 0.10
Total TPH >C5-C35		µg/l	10				< 10
Naphthalene		µg/l	0.10				< 0.10
Acenaphthylene		µg/l	0.10				< 0.10
Acenaphthene		µg/l	0.10				< 0.10

Parameter	Screening Value*	Location		GW1	GW1	GW1	GW1
		Units	LOD	15/03/16	15/06/16	28/09/16	30/11/16
Fluorene		µg/l	0.10				< 0.10
Phenanthrene		µg/l	0.10				< 0.10
Anthracene		µg/l	0.10				< 0.10
Fluoranthene		µg/l	0.10				< 0.10
Pyrene		µg/l	0.10				< 0.10
Benzo[a]anthracene		µg/l	0.10				< 0.10
Chrysene		µg/l	0.10				< 0.10
Benzo[b]fluoranthene		µg/l	0.10				< 0.10
Benzo[k]fluoranthene		µg/l	0.10				< 0.10
Benzo[a]pyrene		µg/l	0.10				< 0.10
Indeno(1,2,3-c,d)Pyrene		µg/l	0.10				< 0.10
Dibenz(a,h)Anthracene		µg/l	0.10				< 0.10
Benzo[g,h,i]perylene		µg/l	0.10				< 0.10
Total Of 16 PAH's		µg/l	2.0				< 2.0
Dichlorodifluoromethane		µg/l	0.10				< 0.10
Chloromethane		µg/l	0.10				< 0.10
Vinyl Chloride		µg/l	0.10				< 0.10
Bromomethane		µg/l	2.0				< 2.0
Chloroethane		µg/l	0.20				< 0.20
Trichlorofluoromethane		µg/l	0.10				< 0.10
1,1-Dichloroethene		µg/l	0.10				< 0.10
Trans 1,2-Dichloroethene		µg/l	0.10				< 0.10
1,1-Dichloroethane		µg/l	0.10				< 0.10
cis 1,2-Dichloroethene		µg/l	0.10				< 0.10
Bromochloromethane		µg/l	0.50				< 0.50
Trichloromethane		µg/l	0.10				< 0.10
1,1,1-Trichloroethane		µg/l	0.10				< 0.10
Tetrachloromethane		µg/l	0.10				< 0.10
1,1-Dichloropropene		µg/l	0.10				< 0.10
Benzene		µg/l	0.10				< 0.10
1,2-Dichloroethane		µg/l	0.20				< 0.20
Trichloroethene		µg/l	0.10				< 0.10
1,2-Dichloropropane		µg/l	0.10				< 0.10
Dibromomethane		µg/l	0.10				< 0.10
Bromodichloromethane		µg/l	0.50				< 0.50
cis-1,3-Dichloropropene		µg/l	1.0				< 1.0
Toluene		µg/l	0.10				< 0.10
Trans-1,3-Dichloropropene		µg/l	1.0				< 1.0
1,1,2-Trichloroethane		µg/l	1.0				< 1.0
Tetrachloroethene		µg/l	0.10				< 0.10
1,3-Dichloropropane		µg/l	0.20				< 0.20
Dibromochloromethane		µg/l	1.0				< 1.0
1,2-Dibromoethane		µg/l	0.50				< 0.50
Chlorobenzene		µg/l	0.10				< 0.10
1,1,1,2-Tetrachloroethane		µg/l	0.20				< 0.20
Ethylbenzene		µg/l	0.10				< 0.10
m & p-Xylene		µg/l	0.10				< 0.10
o-Xylene		µg/l	0.10				< 0.10
Styrene		µg/l	0.10				< 0.10
Tribromomethane		µg/l	1.0				< 1.0
Isopropylbenzene		µg/l	0.10				< 0.10
Bromobenzene		µg/l	0.10				< 0.10
1,2,3-Trichloropropane		µg/l	5.0				< 5.0
N-Propylbenzene		µg/l	0.10				< 0.10
2-Chlorotoluene		µg/l	0.10				< 0.10

Parameter	Screening Value*	Location		GW1	GW1	GW1	GW1
		Date Sampled:	Units	LOD	15/03/16	15/06/16	28/09/16
1,3,5-Trimethylbenzene			µg/l	0.10			< 0.10
4-Chlorotoluene			µg/l	0.10			< 0.10
Tert-Butylbenzene			µg/l	0.10			< 0.10
1,2,4-Trimethylbenzene			µg/l	0.10			< 0.10
Sec-Butylbenzene			µg/l	0.10			< 0.10
1,3-Dichlorobenzene			µg/l	0.10			< 0.10
4-Isopropyltoluene			µg/l	0.10			< 0.10
1,4-Dichlorobenzene			µg/l	0.10			< 0.10
N-Butylbenzene			µg/l	0.10			< 0.10
1,2-Dichlorobenzene			µg/l	0.10			< 0.10
1,2-Dibromo-3-Chloropropane			µg/l	5.0			< 5.0
1,2,4-Trichlorobenzene			µg/l	0.10			< 0.10
Hexachlorobutadiene			µg/l	0.10			< 0.10
1,2,3-Trichlorobenzene			µg/l	0.20			< 0.20
Methyl Tert-Butyl Ether			µg/l	0.10			< 0.10
N-Nitrosodimethylamine			µg/l	0.050			< 0.050
Phenol			µg/l	0.050			< 0.050
2-Chlorophenol			µg/l	0.050			< 0.050
Bis-(2-Chloroethyl)Ether			µg/l	0.050			< 0.050
1,3-Dichlorobenzene			µg/l	0.050			< 0.050
1,4-Dichlorobenzene			µg/l	0.050			< 0.050
1,2-Dichlorobenzene			µg/l	0.050			< 0.050
2-Methylphenol (o-Cresol)			µg/l	0.050			< 0.050
Bis(2-Chloroisopropyl)Ether			µg/l	0.050			< 0.050
Hexachloroethane			µg/l	0.050			< 0.050
N-Nitrosodi-n-propylamine			µg/l	0.050			< 0.050
4-Methylphenol			µg/l	0.050			< 0.050
Nitrobenzene			µg/l	0.050			< 0.050
Isophorone			µg/l	0.050			< 0.050
2-Nitrophenol			µg/l	0.050			< 0.050
2,4-Dimethylphenol			µg/l	0.050			< 0.050
Bis(2-Chloroethoxy)Methane			µg/l	0.050			< 0.050
2,4-Dichlorophenol			µg/l	0.050			< 0.050
1,2,4-Trichlorobenzene			µg/l	0.050			< 0.050
Naphthalene			µg/l	0.050			< 0.050
4-Chloroaniline			µg/l	0.050			< 0.050
Hexachlorobutadiene			µg/l	0.050			< 0.050
4-Chloro-3-Methylphenol			µg/l	0.050			< 0.050
2-Methylnaphthalene			µg/l	0.050			< 0.050
Hexachlorocyclopentadiene			µg/l	0.050			< 0.050
2,4,6-Trichlorophenol			µg/l	0.050			< 0.050
2,4,5-Trichlorophenol			µg/l	0.050			< 0.050
2-Chloronaphthalene			µg/l	0.050			< 0.050
2-Nitroaniline			µg/l	0.050			< 0.050
Acenaphthylene			µg/l	0.050			< 0.050
Dimethylphthalate			µg/l	0.050			< 0.050
2,6-Dinitrotoluene			µg/l	0.050			< 0.050
Acenaphthene			µg/l	0.050			< 0.050
3-Nitroaniline			µg/l	0.050			< 0.050
Dibenzofuran			µg/l	0.050			< 0.050
4-Chlorophenylphenylether			µg/l	0.050			< 0.050
2,4-Dinitrotoluene			µg/l	0.050			< 0.050
Fluorene			µg/l	0.050			< 0.050
Diethyl Phthalate			µg/l	0.050			< 0.050

Parameter	Screening Value*	Location		GW1	GW1	GW1	GW1
		Date Sampled:	Units	15/03/16	15/06/16	28/09/16	30/11/16
4-Nitroaniline			µg/l	0.050			< 0.050
2-Methyl-4,6-Dinitrophenol			µg/l	0.050			< 0.050
Azobenzene			µg/l	0.050			< 0.050
4-Bromophenylphenyl Ether			µg/l	0.050			< 0.050
Hexachlorobenzene			µg/l	0.050			< 0.050
Pentachlorophenol			µg/l	0.050			< 0.050
Phenanthrene			µg/l	0.050			< 0.050
Anthracene			µg/l	0.050			< 0.050
Carbazole			µg/l	0.050			< 0.050
Di-N-Butyl Phthalate			µg/l	0.050			< 0.050
Fluoranthene			µg/l	0.050			< 0.050
Pyrene			µg/l	0.050			< 0.050
Butylbenzyl Phthalate			µg/l	0.050			< 0.050
Benzo[a]anthracene			µg/l	0.050			< 0.050
Chrysene			µg/l	0.050			< 0.050
Bis(2-Ethylhexyl)Phthalate			µg/l	0.050			< 0.050
Di-N-Octyl Phthalate			µg/l	0.050			< 0.050
Benzo[b]fluoranthene			µg/l	0.050			< 0.050
Benzo[k]fluoranthene			µg/l	0.050			< 0.050
Benzo[a]pyrene			µg/l	0.050			< 0.050
Indeno(1,2,3-c,d)Pyrene			µg/l	0.050			< 0.050
Dibenz(a,h)Anthracene			µg/l	0.050			< 0.050
Benzo[g,h,i]perylene			µg/l	0.050			< 0.050
4-Nitrophenol			µg/l	0.050			< 0.050

* S.I. 366 of 2016 - European Union Environmental Objectives (Groundwater) (Amendment) Regulations 2016

Table 4-6 Summary of Chemical Analysis at GW2

Parameter	Screening Value*	Location		GW2	GW2	GW2	GW2
		Date Sampled:	Units	15/03/16	15/06/16	28/09/16	30/11/16
Temperature			°C	9.05	11.5	9.8	9.9
pH				7.58	7.44	7.44	8.01
Electrical Conductivity	1875		µs/cm	421	363	346	359
Dissolved Oxygen			mg/l	1.76	3.03	9.14	3.1
Dissolved Oxygen			%	15.2	28.9	80.5	32.1
Suspended Solids At 105C			mg/l	5.0			460
Total Dissolved Solids			mg/l	1.0			300
Alkalinity (Total)			mg CaCO ₃ /l	10			220
Chloride	187.5		mg/l	1.0	16.5	14.2	13.9
Ammoniacal Nitrogen	0.175		mg/l	0.010	0.194	0.022	0.0854
Nitrate	37.5		mg/l	0.50			7.5
Phosphate			mg/l	0.050			< 0.050
Sulphate	187.5		mg/l	1.0	25.8	44	42.4
Calcium			mg/l	5.0			93
Potassium			mg/l	0.50			0.89
Magnesium			mg/l	0.50			10
Sodium	150		mg/l	0.50			15
Hardness			mg/l	15			270
Aluminium (Dissolved)	150		µg/l	10			19
Arsenic (Dissolved)	7.5		µg/l	1.0			1.0

Parameter	Screening Value*	Location		GW2	GW2	GW2	GW2
		Units	LOD	15/03/16	15/06/16	28/09/16	30/11/16
Boron (Dissolved)	750	µg/l	20				< 20
Barium (Dissolved)		µg/l	5.0				45
Beryllium (Dissolved)		µg/l	1.0				< 1.0
Cadmium (Dissolved)	3.75	µg/l	0.080				< 0.080
Cobalt (Dissolved)		µg/l	1.0				< 1.0
Chromium (Dissolved)	37.5	µg/l	1.0				3.3
Copper (Dissolved)	1500	µg/l	1.0				1.6
Iron (Dissolved)		µg/l	20				220
Mercury (Dissolved)	0.75	µg/l	0.50	0.001			0.91
Manganese (Dissolved)		µg/l	1.0				37
Molybdenum (Dissolved)		µg/l	1.0				< 1.0
Nickel (Dissolved)	15	µg/l	1.0				< 1.0
Lead (Dissolved)	18.75	µg/l	1.0				< 1.0
Antimony (Dissolved)		µg/l	1.0				< 1.0
Selenium (Dissolved)		µg/l	1.0				11
Tin (Dissolved)		µg/l	1.0				1.3
Strontium (Dissolved)		µg/l	1.0				140
Vanadium (Dissolved)		µg/l	1.0				< 1.0
Zinc (Dissolved)		µg/l	1.0				3.2
Thallium		µg/l	0.10				< 0.10
TPH >C5-C6		µg/l	0.10				< 0.10
TPH >C6-C7		µg/l	0.10				< 0.10
TPH >C7-C8		µg/l	0.10				< 0.10
TPH >C8-C10		µg/l	0.10				< 0.10
TPH >C10-C12		µg/l	0.10				< 0.10
TPH >C12-C16		µg/l	0.10				< 0.10
TPH >C16-C21		µg/l	0.10				< 0.10
TPH >C21-C35		µg/l	0.10				< 0.10
Total TPH >C5-C35		µg/l	10				< 10
Naphthalene		µg/l	0.10				< 0.10
Acenaphthylene		µg/l	0.10				< 0.10
Acenaphthene		µg/l	0.10				< 0.10
Fluorene		µg/l	0.10				< 0.10
Phenanthrene		µg/l	0.10				< 0.10
Anthracene		µg/l	0.10				< 0.10
Fluoranthene		µg/l	0.10				< 0.10
Pyrene		µg/l	0.10				< 0.10
Benzo[a]anthracene		µg/l	0.10				< 0.10
Chrysene		µg/l	0.10				< 0.10
Benzo[b]fluoranthene		µg/l	0.10				< 0.10
Benzo[k]fluoranthene		µg/l	0.10				< 0.10
Benzo[a]pyrene		µg/l	0.10				< 0.10
Indeno(1,2,3-c,d)Pyrene		µg/l	0.10				< 0.10
Dibenz(a,h)Anthracene		µg/l	0.10				< 0.10
Benzo[g,h,i]perylene		µg/l	0.10				< 0.10
Total Of 16 PAH's		µg/l	2.0				< 2.0
Dichlorodifluoromethane		µg/l	0.10				< 0.10
Chloromethane		µg/l	0.10				< 0.10
Vinyl Chloride		µg/l	0.10				< 0.10
Bromomethane		µg/l	2.0				< 2.0
Chloroethane		µg/l	0.20				< 0.20
Trichlorofluoromethane		µg/l	0.10				< 0.10
1,1-Dichloroethene		µg/l	0.10				< 0.10
Trans 1,2-Dichloroethene		µg/l	0.10				< 0.10
1,1-Dichloroethane		µg/l	0.10				< 0.10

Parameter	Screening Value*	Location		GW2	GW2	GW2	GW2
		Units	LOD	15/03/16	15/06/16	28/09/16	30/11/16
cis 1,2-Dichloroethene		µg/l	0.10				< 0.10
Bromochloromethane		µg/l	0.50				< 0.50
Trichloromethane		µg/l	0.10				< 0.10
1,1,1-Trichloroethane		µg/l	0.10				< 0.10
Tetrachloromethane		µg/l	0.10				< 0.10
1,1-Dichloropropene		µg/l	0.10				< 0.10
Benzene		µg/l	0.10				< 0.10
1,2-Dichloroethane		µg/l	0.20				< 0.20
Trichloroethene		µg/l	0.10				< 0.10
1,2-Dichloropropane		µg/l	0.10				< 0.10
Dibromomethane		µg/l	0.10				< 0.10
Bromodichloromethane		µg/l	0.50				< 0.50
cis-1,3-Dichloropropene		µg/l	1.0				< 1.0
Toluene		µg/l	0.10				< 0.10
Trans-1,3-Dichloropropene		µg/l	1.0				< 1.0
1,1,2-Trichloroethane		µg/l	1.0				< 1.0
Tetrachloroethene		µg/l	0.10				< 0.10
1,3-Dichloropropane		µg/l	0.20				< 0.20
Dibromochloromethane		µg/l	1.0				< 1.0
1,2-Dibromoethane		µg/l	0.50				< 0.50
Chlorobenzene		µg/l	0.10				< 0.10
1,1,1,2-Tetrachloroethane		µg/l	0.20				< 0.20
Ethylbenzene		µg/l	0.10				< 0.10
m & p-Xylene		µg/l	0.10				< 0.10
o-Xylene		µg/l	0.10				< 0.10
Styrene		µg/l	0.10				< 0.10
Tribromomethane		µg/l	1.0				< 1.0
Isopropylbenzene		µg/l	0.10				< 0.10
Bromobenzene		µg/l	0.10				< 0.10
1,2,3-Trichloropropane		µg/l	5.0				< 5.0
N-Propylbenzene		µg/l	0.10				< 0.10
2-Chlorotoluene		µg/l	0.10				< 0.10
1,3,5-Trimethylbenzene		µg/l	0.10				< 0.10
4-Chlorotoluene		µg/l	0.10				< 0.10
Tert-Butylbenzene		µg/l	0.10				< 0.10
1,2,4-Trimethylbenzene		µg/l	0.10				< 0.10
Sec-Butylbenzene		µg/l	0.10				< 0.10
1,3-Dichlorobenzene		µg/l	0.10				< 0.10
4-Isopropyltoluene		µg/l	0.10				< 0.10
1,4-Dichlorobenzene		µg/l	0.10				< 0.10
N-Butylbenzene		µg/l	0.10				< 0.10
1,2-Dichlorobenzene		µg/l	0.10				< 0.10
1,2-Dibromo-3-Chloropropane		µg/l	5.0				< 5.0
1,2,4-Trichlorobenzene		µg/l	0.10				< 0.10
Hexachlorobutadiene		µg/l	0.10				< 0.10
1,2,3-Trichlorobenzene		µg/l	0.20				< 0.20
Methyl Tert-Butyl Ether		µg/l	0.10				< 0.10
N-Nitrosodimethylamine		µg/l	0.050				< 0.050
Phenol		µg/l	0.050				< 0.050
2-Chlorophenol		µg/l	0.050				< 0.050
Bis-(2-Chloroethyl)Ether		µg/l	0.050				< 0.050
1,3-Dichlorobenzene		µg/l	0.050				< 0.050
1,4-Dichlorobenzene		µg/l	0.050				< 0.050
1,2-Dichlorobenzene		µg/l	0.050				< 0.050
2-Methylphenol (o-Cresol)		µg/l	0.050				< 0.050

Parameter	Screening Value*	Location		GW2	GW2	GW2	GW2
		Units	LOD	15/03/16	15/06/16	28/09/16	30/11/16
Bis(2-Chloroisopropyl)Ether		µg/l	0.050				< 0.050
Hexachloroethane		µg/l	0.050				< 0.050
N-Nitrosodi-n-propylamine		µg/l	0.050				< 0.050
4-Methylphenol		µg/l	0.050				< 0.050
Nitrobenzene		µg/l	0.050				< 0.050
Isophorone		µg/l	0.050				< 0.050
2-Nitrophenol		µg/l	0.050				< 0.050
2,4-Dimethylphenol		µg/l	0.050				< 0.050
Bis(2-Chloroethoxy)Methane		µg/l	0.050				< 0.050
2,4-Dichlorophenol		µg/l	0.050				< 0.050
1,2,4-Trichlorobenzene		µg/l	0.050				< 0.050
Naphthalene		µg/l	0.050				< 0.050
4-Chloroaniline		µg/l	0.050				< 0.050
Hexachlorobutadiene		µg/l	0.050				< 0.050
4-Chloro-3-Methylphenol		µg/l	0.050				< 0.050
2-Methylnaphthalene		µg/l	0.050				< 0.050
Hexachlorocyclopentadiene		µg/l	0.050				< 0.050
2,4,6-Trichlorophenol		µg/l	0.050				< 0.050
2,4,5-Trichlorophenol		µg/l	0.050				< 0.050
2-Chloronaphthalene		µg/l	0.050				< 0.050
2-Nitroaniline		µg/l	0.050				< 0.050
Acenaphthylene		µg/l	0.050				< 0.050
Dimethylphthalate		µg/l	0.050				< 0.050
2,6-Dinitrotoluene		µg/l	0.050				< 0.050
Acenaphthene		µg/l	0.050				< 0.050
3-Nitroaniline		µg/l	0.050				< 0.050
Dibenzofuran		µg/l	0.050				< 0.050
4-Chlorophenylphenylether		µg/l	0.050				< 0.050
2,4-Dinitrotoluene		µg/l	0.050				< 0.050
Fluorene		µg/l	0.050				< 0.050
Diethyl Phthalate		µg/l	0.050				< 0.050
4-Nitroaniline		µg/l	0.050				< 0.050
2-Methyl-4,6-Dinitrophenol		µg/l	0.050				< 0.050
Azobenzene		µg/l	0.050				< 0.050
4-Bromophenylphenyl Ether		µg/l	0.050				< 0.050
Hexachlorobenzene		µg/l	0.050				< 0.050
Pentachlorophenol		µg/l	0.050				< 0.050
Phenanthrene		µg/l	0.050				< 0.050
Anthracene		µg/l	0.050				< 0.050
Carbazole		µg/l	0.050				< 0.050
Di-N-Butyl Phthalate		µg/l	0.050				< 0.050
Fluoranthene		µg/l	0.050				< 0.050
Pyrene		µg/l	0.050				< 0.050
Butylbenzyl Phthalate		µg/l	0.050				< 0.050
Benzo[a]anthracene		µg/l	0.050				< 0.050
Chrysene		µg/l	0.050				< 0.050
Bis(2-Ethylhexyl)Phthalate		µg/l	0.050				< 0.050
Di-N-Octyl Phthalate		µg/l	0.050				< 0.050
Benzo[b]fluoranthene		µg/l	0.050				< 0.050
Benzo[k]fluoranthene		µg/l	0.050				< 0.050
Benzo[a]pyrene		µg/l	0.050				< 0.050
Indeno(1,2,3-c,d)Pyrene		µg/l	0.050				< 0.050
Dibenz(a,h)Anthracene		µg/l	0.050				< 0.050
Benzo[g,h,i]perylene		µg/l	0.050				< 0.050

Parameter	Screening Value*	Location		GW2	GW2	GW2	GW2
		Date Sampled:	Units	15/03/16	15/06/16	28/09/16	30/11/16
4-Nitrophenol		µg/l	0.050				< 0.050

* S.I. 366 of 2016 - European Union Environmental Objectives (Groundwater) (Amendment) Regulations 2016

Table 4-7 Summary of Chemical Analysis at GW3

Parameter	Screening Value*	Location		GW3	GW3	GW3	GW3
		Date Sampled:	Units	15/03/16	15/06/16	28/09/16	30/11/16
Temperature		T°C		8.58	12.8	10.2	10.0
pH				7.96	7.38	7.65	8.21
Electrical Conductivity	1875	µs/cm		693	447	351	652
Dissolved Oxygen		mg/l		4.8	6.31	9.17	3.82
Dissolved Oxygen		%		40.7	59	81	34.2
Suspended Solids At 105C		mg/l	5.0				330
Total Dissolved Solids		mg/l	1.0				360
Alkalinity (Total)		mg CaCO3/l	10				330
Chloride	187.5	mg/l	1.0	15.1	16.5	17.2	17
Ammoniacal Nitrogen	0.175	mg/l	0.010	0.0211	0.0156	0.0211	0.030
Nitrate	37.5	mg/l	0.50				23
Phosphate		mg/l	0.050				< 0.050
Sulphate	187.5	mg/l	1.0	18.6	17.1	15.5	16
Calcium		mg/l	5.0				120
Potassium		mg/l	0.50				1.5
Magnesium		mg/l	0.50				11
Sodium	150	mg/l	0.50				8.3
Hardness		mg/l	15				350
Aluminium (Dissolved)	150	µg/l	10				38
Arsenic (Dissolved)	7.5	µg/l	1.0				< 1.0
Boron (Dissolved)	750	µg/l	20				< 20
Barium (Dissolved)		µg/l	5.0				45
Beryllium (Dissolved)		µg/l	1.0				< 1.0
Cadmium (Dissolved)	3.75	µg/l	0.080				< 0.080
Cobalt (Dissolved)		µg/l	1.0				< 1.0
Chromium (Dissolved)	37.5	µg/l	1.0				5.6
Copper (Dissolved)	1500	µg/l	1.0				2.0
Iron (Dissolved)		µg/l	20				230
Mercury (Dissolved)	0.75	µg/l	0.50				0.53
Manganese (Dissolved)		µg/l	1.0				1.5
Molybdenum (Dissolved)		µg/l	1.0				< 1.0
Nickel (Dissolved)	15	µg/l	1.0				< 1.0
Lead (Dissolved)	18.75	µg/l	1.0				< 1.0
Antimony (Dissolved)		µg/l	1.0				< 1.0
Selenium (Dissolved)		µg/l	1.0				8.8
Tin (Dissolved)		µg/l	1.0				< 1.0
Strontium (Dissolved)		µg/l	1.0				180
Vanadium (Dissolved)		µg/l	1.0				< 1.0
Zinc (Dissolved)		µg/l	1.0				2.4
Thallium		µg/l	0.10				< 0.10
TPH >C5-C6		µg/l	0.10				< 0.10
TPH >C6-C7		µg/l	0.10				< 0.10
TPH >C7-C8		µg/l	0.10				< 0.10

Parameter	Screening Value*	Location		GW3	GW3	GW3	GW3
		Units	LOD	15/03/16	15/06/16	28/09/16	30/11/16
TPH >C8-C10		µg/l	0.10				< 0.10
TPH >C10-C12		µg/l	0.10				< 0.10
TPH >C12-C16		µg/l	0.10				< 0.10
TPH >C16-C21		µg/l	0.10				< 0.10
TPH >C21-C35		µg/l	0.10				< 0.10
Total TPH >C5-C35		µg/l	10				< 10
Naphthalene		µg/l	0.10				< 0.10
Acenaphthylene		µg/l	0.10				< 0.10
Acenaphthene		µg/l	0.10				< 0.10
Fluorene		µg/l	0.10				< 0.10
Phenanthrene		µg/l	0.10				< 0.10
Anthracene		µg/l	0.10				< 0.10
Fluoranthene		µg/l	0.10				< 0.10
Pyrene		µg/l	0.10				< 0.10
Benzo[a]anthracene		µg/l	0.10				< 0.10
Chrysene		µg/l	0.10				< 0.10
Benzo[b]fluoranthene		µg/l	0.10				< 0.10
Benzo[k]fluoranthene		µg/l	0.10				< 0.10
Benzo[a]pyrene		µg/l	0.10				< 0.10
Indeno(1,2,3-c,d)Pyrene		µg/l	0.10				< 0.10
Dibenz(a,h)Anthracene		µg/l	0.10				< 0.10
Benzo[g,h,i]perylene		µg/l	0.10				< 0.10
Total Of 16 PAH's		µg/l	2.0				< 2.0
Dichlorodifluoromethane		µg/l	0.10				< 0.10
Chloromethane		µg/l	0.10				< 0.10
Vinyl Chloride		µg/l	0.10				< 0.10
Bromomethane		µg/l	2.0				< 2.0
Chloroethane		µg/l	0.20				< 0.20
Trichlorofluoromethane		µg/l	0.10				< 0.10
1,1-Dichloroethene		µg/l	0.10				< 0.10
Trans 1,2-Dichloroethene		µg/l	0.10				< 0.10
1,1-Dichloroethane		µg/l	0.10				< 0.10
cis 1,2-Dichloroethene		µg/l	0.10				< 0.10
Bromochloromethane		µg/l	0.50				< 0.50
Trichloromethane		µg/l	0.10				< 0.10
1,1,1-Trichloroethane		µg/l	0.10				< 0.10
Tetrachloromethane		µg/l	0.10				< 0.10
1,1-Dichloropropene		µg/l	0.10				< 0.10
Benzene		µg/l	0.10				< 0.10
1,2-Dichloroethane		µg/l	0.20				< 0.20
Trichloroethene		µg/l	0.10				< 0.10
1,2-Dichloropropane		µg/l	0.10				< 0.10
Dibromomethane		µg/l	0.10				< 0.10
Bromodichloromethane		µg/l	0.50				< 0.50
cis-1,3-Dichloropropene		µg/l	1.0				< 1.0
Toluene		µg/l	0.10				< 0.10
Trans-1,3-Dichloropropene		µg/l	1.0				< 1.0
1,1,2-Trichloroethane		µg/l	1.0				< 1.0
Tetrachloroethene		µg/l	0.10				< 0.10
1,3-Dichloropropane		µg/l	0.20				< 0.20
Dibromochloromethane		µg/l	1.0				< 1.0
1,2-Dibromoethane		µg/l	0.50				< 0.50
Chlorobenzene		µg/l	0.10				< 0.10
1,1,1,2-Tetrachloroethane		µg/l	0.20				< 0.20
Ethylbenzene		µg/l	0.10				< 0.10

Parameter	Screening Value*	Location		GW3	GW3	GW3	GW3
		Units	LOD	15/03/16	15/06/16	28/09/16	30/11/16
m & p-Xylene		µg/l	0.10				< 0.10
o-Xylene		µg/l	0.10				< 0.10
Styrene		µg/l	0.10				< 0.10
Tribromomethane		µg/l	1.0				< 1.0
Isopropylbenzene		µg/l	0.10				< 0.10
Bromobenzene		µg/l	0.10				< 0.10
1,2,3-Trichloropropane		µg/l	5.0				< 5.0
N-Propylbenzene		µg/l	0.10				< 0.10
2-Chlorotoluene		µg/l	0.10				< 0.10
1,3,5-Trimethylbenzene		µg/l	0.10				< 0.10
4-Chlorotoluene		µg/l	0.10				< 0.10
Tert-Butylbenzene		µg/l	0.10				< 0.10
1,2,4-Trimethylbenzene		µg/l	0.10				< 0.10
Sec-Butylbenzene		µg/l	0.10				< 0.10
1,3-Dichlorobenzene		µg/l	0.10				< 0.10
4-Isopropyltoluene		µg/l	0.10				< 0.10
1,4-Dichlorobenzene		µg/l	0.10				< 0.10
N-Butylbenzene		µg/l	0.10				< 0.10
1,2-Dichlorobenzene		µg/l	0.10				< 0.10
1,2-Dibromo-3-Chloropropane		µg/l	5.0				< 5.0
1,2,4-Trichlorobenzene		µg/l	0.10				< 0.10
Hexachlorobutadiene		µg/l	0.10				< 0.10
1,2,3-Trichlorobenzene		µg/l	0.20				< 0.20
Methyl Tert-Butyl Ether		µg/l	0.10				< 0.10
N-Nitrosodimethylamine		µg/l	0.050				< 0.050
Phenol		µg/l	0.050				< 0.050
2-Chlorophenol		µg/l	0.050				< 0.050
Bis-(2-Chloroethyl)Ether		µg/l	0.050				< 0.050
1,3-Dichlorobenzene		µg/l	0.050				< 0.050
1,4-Dichlorobenzene		µg/l	0.050				< 0.050
1,2-Dichlorobenzene		µg/l	0.050				< 0.050
2-Methylphenol (o-Cresol)		µg/l	0.050				< 0.050
Bis(2-Chloroisopropyl)Ether		µg/l	0.050				< 0.050
Hexachloroethane		µg/l	0.050				< 0.050
N-Nitrosodi-n-propylamine		µg/l	0.050				< 0.050
4-Methylphenol		µg/l	0.050				< 0.050
Nitrobenzene		µg/l	0.050				< 0.050
Isophorone		µg/l	0.050				< 0.050
2-Nitrophenol		µg/l	0.050				< 0.050
2,4-Dimethylphenol		µg/l	0.050				< 0.050
Bis(2-Chloroethoxy)Methane		µg/l	0.050				< 0.050
2,4-Dichlorophenol		µg/l	0.050				< 0.050
1,2,4-Trichlorobenzene		µg/l	0.050				< 0.050
Naphthalene		µg/l	0.050				< 0.050
4-Chloroaniline		µg/l	0.050				< 0.050
Hexachlorobutadiene		µg/l	0.050				< 0.050
4-Chloro-3-Methylphenol		µg/l	0.050				< 0.050
2-Methylnaphthalene		µg/l	0.050				< 0.050
Hexachlorocyclopentadiene		µg/l	0.050				< 0.050
2,4,6-Trichlorophenol		µg/l	0.050				< 0.050
2,4,5-Trichlorophenol		µg/l	0.050				< 0.050
2-Chloronaphthalene		µg/l	0.050				< 0.050
2-Nitroaniline		µg/l	0.050				< 0.050

Parameter	Screening Value*	Location		GW3	GW3	GW3	GW3
		Units	LOD	Date Sampled: 15/03/16	15/06/16	28/09/16	30/11/16
Acenaphthylene		µg/l	0.050				< 0.050
Dimethylphthalate		µg/l	0.050				< 0.050
2,6-Dinitrotoluene		µg/l	0.050				< 0.050
Acenaphthene		µg/l	0.050				< 0.050
3-Nitroaniline		µg/l	0.050				< 0.050
Dibenzofuran		µg/l	0.050				< 0.050
4-Chlorophenylphenylether		µg/l	0.050				< 0.050
2,4-Dinitrotoluene		µg/l	0.050				< 0.050
Fluorene		µg/l	0.050				< 0.050
Diethyl Phthalate		µg/l	0.050				< 0.050
4-Nitroaniline		µg/l	0.050				< 0.050
2-Methyl-4,6-Dinitrophenol		µg/l	0.050				< 0.050
Azobenzene		µg/l	0.050				< 0.050
4-Bromophenylphenyl Ether		µg/l	0.050				< 0.050
Hexachlorobenzene		µg/l	0.050				< 0.050
Pentachlorophenol		µg/l	0.050				< 0.050
Phenanthrene		µg/l	0.050				< 0.050
Anthracene		µg/l	0.050				< 0.050
Carbazole		µg/l	0.050				< 0.050
Di-N-Butyl Phthalate		µg/l	0.050				< 0.050
Fluoranthene		µg/l	0.050				< 0.050
Pyrene		µg/l	0.050				< 0.050
Butylbenzyl Phthalate		µg/l	0.050				< 0.050
Benzo[a]anthracene		µg/l	0.050				< 0.050
Chrysene		µg/l	0.050				< 0.050
Bis(2-Ethylhexyl)Phthalate		µg/l	0.050				< 0.050
Di-N-Octyl Phthalate		µg/l	0.050				< 0.050
Benzo[b]fluoranthene		µg/l	0.050				< 0.050
Benzo[k]fluoranthene		µg/l	0.050				< 0.050
Benzo[a]pyrene		µg/l	0.050				< 0.050
Indeno(1,2,3-c,d)Pyrene		µg/l	0.050				< 0.050
Dibenz(a,h)Anthracene		µg/l	0.050				< 0.050
Benzo[g,h,i]perylene		µg/l	0.050				< 0.050
4-Nitrophenol		µg/l	0.050				< 0.050

* S.I. 366 of 2016 - European Union Environmental Objectives (Groundwater) (Amendment) Regulations 2016

Table 4-8 Summary of Chemical Analysis at GW4

Parameter	Screening Value*	Location		GW4	GW4	GW4	GW4
		Units	LOD	Date Sampled: 15/03/16	15/06/16	28/09/16	30/11/16
Temperature		T°C		9.8	10.5	12.1	9.91
pH				7.8	7.23	7.23	8.01
Electrical Conductivity	1875	µs/cm		492	530	570	554
Dissolved Oxygen		mg/l		2.11	6.02	5.36	3.51
Dissolved Oxygen		%		19.4	63.8	50.1	31.3
Suspended Solids At 105C		mg/l	5.0				650
Total Dissolved Solids		mg/l	1.0				450
Alkalinity (Total)		mg CaCO3/l	10				360
Chloride	187.5	mg/l	1.0	14.1	19.1	19.7	20
Ammoniacal Nitrogen	0.175	mg/l	0.010	1.43	0.277	0.294	0.12

Parameter	Screening Value*	Location		GW4	GW4	GW4	GW4
		Units	LOD	15/03/16	15/06/16	28/09/16	30/11/16
Nitrate	37.5	mg/l	0.50				32
Phosphate		mg/l	0.050				< 0.050
Sulphate	187.5	mg/l	1.0	27.5	23.6	24.1	28
Calcium		mg/l	5.0				200
Potassium		mg/l	0.50				1.9
Magnesium		mg/l	0.50				17
Sodium	150	mg/l	0.50				11
Hardness		mg/l	15				560
Aluminium (Dissolved)	150	µg/l	10				20
Arsenic (Dissolved)	7.5	µg/l	1.0				2.3
Boron (Dissolved)	750	µg/l	20				< 20
Barium (Dissolved)		µg/l	5.0				73
Beryllium (Dissolved)		µg/l	1.0				< 1.0
Cadmium (Dissolved)	3.75	µg/l	0.080				< 0.080
Cobalt (Dissolved)		µg/l	1.0				< 1.0
Chromium (Dissolved)	37.5	µg/l	1.0				2.1
Copper (Dissolved)	1500	µg/l	1.0				2.5
Iron (Dissolved)		µg/l	20				340
Mercury (Dissolved)	0.75	µg/l	0.50				< 0.50
Manganese (Dissolved)		µg/l	1.0				510
Molybdenum (Dissolved)		µg/l	1.0				< 1.0
Nickel (Dissolved)	15	µg/l	1.0				2.2
Lead (Dissolved)	18.75	µg/l	1.0				< 1.0
Antimony (Dissolved)		µg/l	1.0				< 1.0
Selenium (Dissolved)		µg/l	1.0				17
Tin (Dissolved)		µg/l	1.0				< 1.0
Strontium (Dissolved)		µg/l	1.0				280
Vanadium (Dissolved)		µg/l	1.0				< 1.0
Zinc (Dissolved)		µg/l	1.0				2.1
Thallium		µg/l	0.10				< 0.10
TPH >C5-C6		µg/l	0.10				< 0.10
TPH >C6-C7		µg/l	0.10				< 0.10
TPH >C7-C8		µg/l	0.10				< 0.10
TPH >C8-C10		µg/l	0.10				< 0.10
TPH >C10-C12		µg/l	0.10				< 0.10
TPH >C12-C16		µg/l	0.10				< 0.10
TPH >C16-C21		µg/l	0.10				< 0.10
TPH >C21-C35		µg/l	0.10				< 0.10
Total TPH >C5-C35		µg/l	10				< 10
Naphthalene		µg/l	0.10				< 0.10
Acenaphthylene		µg/l	0.10				< 0.10
Acenaphthene		µg/l	0.10				< 0.10
Fluorene		µg/l	0.10				< 0.10
Phenanthrene		µg/l	0.10				< 0.10
Anthracene		µg/l	0.10				< 0.10
Fluoranthene		µg/l	0.10				< 0.10
Pyrene		µg/l	0.10				< 0.10
Benzo[a]anthracene		µg/l	0.10				< 0.10
Chrysene		µg/l	0.10				< 0.10
Benzo[b]fluoranthene		µg/l	0.10				< 0.10
Benzo[k]fluoranthene		µg/l	0.10				< 0.10
Benzo[a]pyrene		µg/l	0.10				< 0.10
Indeno(1,2,3-c,d)Pyrene		µg/l	0.10				< 0.10
Dibenz(a,h)Anthracene		µg/l	0.10				< 0.10
Benzo[g,h,i]perylene		µg/l	0.10				< 0.10

Parameter	Screening Value*	Location		GW4	GW4	GW4	GW4
		Units	LOD	15/03/16	15/06/16	28/09/16	30/11/16
Total Of 16 PAH's		µg/l	2.0				< 2.0
Dichlorodifluoromethane		µg/l	0.10				< 0.10
Chloromethane		µg/l	0.10				< 0.10
Vinyl Chloride		µg/l	0.10				< 0.10
Bromomethane		µg/l	2.0				< 2.0
Chloroethane		µg/l	0.20				< 0.20
Trichlorofluoromethane		µg/l	0.10				< 0.10
1,1-Dichloroethene		µg/l	0.10				< 0.10
Trans 1,2-Dichloroethene		µg/l	0.10				< 0.10
1,1-Dichloroethane		µg/l	0.10				< 0.10
cis 1,2-Dichloroethene		µg/l	0.10				< 0.10
Bromochloromethane		µg/l	0.50				< 0.50
Trichloromethane		µg/l	0.10				< 0.10
1,1,1-Trichloroethane		µg/l	0.10				< 0.10
Tetrachloromethane		µg/l	0.10				< 0.10
1,1-Dichloropropene		µg/l	0.10				< 0.10
Benzene		µg/l	0.10				< 0.10
1,2-Dichloroethane		µg/l	0.20				< 0.20
Trichloroethene		µg/l	0.10				< 0.10
1,2-Dichloropropane		µg/l	0.10				< 0.10
Dibromomethane		µg/l	0.10				< 0.10
Bromodichloromethane		µg/l	0.50				< 0.50
cis-1,3-Dichloropropene		µg/l	1.0				< 1.0
Toluene		µg/l	0.10				< 0.10
Trans-1,3-Dichloropropene		µg/l	1.0				< 1.0
1,1,2-Trichloroethane		µg/l	1.0				< 1.0
Tetrachloroethene		µg/l	0.10				< 0.10
1,3-Dichloropropane		µg/l	0.20				< 0.20
Dibromochloromethane		µg/l	1.0				< 1.0
1,2-Dibromoethane		µg/l	0.50				< 0.50
Chlorobenzene		µg/l	0.10				< 0.10
1,1,1,2-Tetrachloroethane		µg/l	0.20				< 0.20
Ethylbenzene		µg/l	0.10				< 0.10
m & p-Xylene		µg/l	0.10				< 0.10
o-Xylene		µg/l	0.10				< 0.10
Styrene		µg/l	0.10				< 0.10
Tribromomethane		µg/l	1.0				< 1.0
Isopropylbenzene		µg/l	0.10				< 0.10
Bromobenzene		µg/l	0.10				< 0.10
1,2,3-Trichloropropane		µg/l	5.0				< 5.0
N-Propylbenzene		µg/l	0.10				< 0.10
2-Chlorotoluene		µg/l	0.10				< 0.10
1,3,5-Trimethylbenzene		µg/l	0.10				< 0.10
4-Chlorotoluene		µg/l	0.10				< 0.10
Tert-Butylbenzene		µg/l	0.10				< 0.10
1,2,4-Trimethylbenzene		µg/l	0.10				< 0.10
Sec-Butylbenzene		µg/l	0.10				< 0.10
1,3-Dichlorobenzene		µg/l	0.10				< 0.10
4-Isopropyltoluene		µg/l	0.10				< 0.10
1,4-Dichlorobenzene		µg/l	0.10				< 0.10
N-Butylbenzene		µg/l	0.10				< 0.10
1,2-Dichlorobenzene		µg/l	0.10				< 0.10
1,2-Dibromo-3-Chloropropane		µg/l	5.0				< 5.0
1,2,4-Trichlorobenzene		µg/l	0.10				< 0.10
Hexachlorobutadiene		µg/l	0.10				< 0.10

Parameter	Screening Value*	Location		GW4	GW4	GW4	GW4
		Date Sampled:	Units	LOD	15/03/16	15/06/16	28/09/16
1,2,3-Trichlorobenzene			µg/l	0.20			< 0.20
Methyl Tert-Butyl Ether			µg/l	0.10			< 0.10
N-Nitrosodimethylamine			µg/l	0.050			< 0.050
Phenol			µg/l	0.050			< 0.050
2-Chlorophenol			µg/l	0.050			< 0.050
Bis-(2-Chloroethyl)Ether			µg/l	0.050			< 0.050
1,3-Dichlorobenzene			µg/l	0.050			< 0.050
1,4-Dichlorobenzene			µg/l	0.050			< 0.050
1,2-Dichlorobenzene			µg/l	0.050			< 0.050
2-Methylphenol (o-Cresol)			µg/l	0.050			< 0.050
Bis(2-Chloroisopropyl)Ether			µg/l	0.050			< 0.050
Hexachloroethane			µg/l	0.050			< 0.050
N-Nitrosodi-n-propylamine			µg/l	0.050			< 0.050
4-Methylphenol			µg/l	0.050			< 0.050
Nitrobenzene			µg/l	0.050			< 0.050
Isophorone			µg/l	0.050			< 0.050
2-Nitrophenol			µg/l	0.050			< 0.050
2,4-Dimethylphenol			µg/l	0.050			< 0.050
Bis(2-Chloroethoxy)Methane			µg/l	0.050			< 0.050
2,4-Dichlorophenol			µg/l	0.050			< 0.050
1,2,4-Trichlorobenzene			µg/l	0.050			< 0.050
Naphthalene			µg/l	0.050			< 0.050
4-Chloroaniline			µg/l	0.050			< 0.050
Hexachlorobutadiene			µg/l	0.050			< 0.050
4-Chloro-3-Methylphenol			µg/l	0.050			< 0.050
2-Methylnaphthalene			µg/l	0.050			< 0.050
Hexachlorocyclopentadiene			µg/l	0.050			< 0.050
2,4,6-Trichlorophenol			µg/l	0.050			< 0.050
2,4,5-Trichlorophenol			µg/l	0.050			< 0.050
2-Chloronaphthalene			µg/l	0.050			< 0.050
2-Nitroaniline			µg/l	0.050			< 0.050
Acenaphthylene			µg/l	0.050			< 0.050
Dimethylphthalate			µg/l	0.050			< 0.050
2,6-Dinitrotoluene			µg/l	0.050			< 0.050
Acenaphthene			µg/l	0.050			< 0.050
3-Nitroaniline			µg/l	0.050			< 0.050
Dibenzofuran			µg/l	0.050			< 0.050
4-Chlorophenylphenylether			µg/l	0.050			< 0.050
2,4-Dinitrotoluene			µg/l	0.050			< 0.050
Fluorene			µg/l	0.050			< 0.050
Diethyl Phthalate			µg/l	0.050			< 0.050
4-Nitroaniline			µg/l	0.050			< 0.050
2-Methyl-4,6-Dinitrophenol			µg/l	0.050			< 0.050
Azobenzene			µg/l	0.050			< 0.050
4-Bromophenylphenyl Ether			µg/l	0.050			< 0.050
Hexachlorobenzene			µg/l	0.050			< 0.050
Pentachlorophenol			µg/l	0.050			< 0.050
Phenanthrene			µg/l	0.050			< 0.050
Anthracene			µg/l	0.050			< 0.050
Carbazole			µg/l	0.050			< 0.050
Di-N-Butyl Phthalate			µg/l	0.050			< 0.050
Fluoranthene			µg/l	0.050			< 0.050
Pyrene			µg/l	0.050			< 0.050
Butylbenzyl Phthalate			µg/l	0.050			< 0.050

Parameter	Screening Value*	Location		GW4	GW4	GW4	GW4
		Date Sampled:	Units	15/03/16	15/06/16	28/09/16	30/11/16
Benzo[a]anthracene			µg/l	0.050			< 0.050
Chrysene			µg/l	0.050			< 0.050
Bis(2-Ethylhexyl)Phthalate			µg/l	0.050			< 0.050
Di-N-Octyl Phthalate			µg/l	0.050			< 0.050
Benzo[b]fluoranthene			µg/l	0.050			< 0.050
Benzo[k]fluoranthene			µg/l	0.050			< 0.050
Benzo[a]pyrene			µg/l	0.050			< 0.050
Indeno(1,2,3-c,d)Pyrene			µg/l	0.050			< 0.050
Dibenz(a,h)Anthracene			µg/l	0.050			< 0.050
Benzo[g,h,i]perylene			µg/l	0.050			< 0.050
4-Nitrophenol			µg/l	0.050			< 0.050

* S.I. 366 of 2016 - European Union Environmental Objectives (Groundwater) (Amendment) Regulations 2016

Table 4-9 Summary of Chemical Analysis at GW5

Parameter	Screening Value*	Location		GW5	GW5	GW5	GW5
		Date Sampled:	Units	15/03/16	15/06/16	28/09/16	30/11/16
Temperature			T°C	10.36	9.9	11.2	9.98
pH				7.6	7.11	7.17	8.01
Electrical Conductivity	1875		µs/cm	668	580	640	640
Dissolved Oxygen			mg/l	2.05	7.42	6.21	3.59
Dissolved Oxygen			%	23.7	67.5	56.9	32.1
Suspended Solids At 105C			mg/l				150
Total Dissolved Solids			mg/l				530
Alkalinity (Total)			mg CaCO3/l				440
Chloride	187.5		mg/l	12.6	12.8	12.5	14
Ammoniacal Nitrogen	0.175		mg/l	0.0185	0.0206	0.046	0.028
Nitrate	37.5		mg/l				24
Phosphate			mg/l				< 0.050
Sulphate	187.5		mg/l	9.9	16.2	18.6	26
Calcium			mg/l				220
Potassium			mg/l				1.2
Magnesium			mg/l				13
Sodium	150		mg/l				8.9
Hardness			mg/l				590
Aluminium (Dissolved)	150		µg/l				28
Arsenic (Dissolved)	7.5		µg/l				< 1.0
Boron (Dissolved)	750		µg/l				< 20
Barium (Dissolved)			µg/l				56
Beryllium (Dissolved)			µg/l				< 1.0
Cadmium (Dissolved)	3.75		µg/l				< 0.080
Cobalt (Dissolved)			µg/l				< 1.0
Chromium (Dissolved)	37.5		µg/l				8.3
Copper (Dissolved)	1500		µg/l				3.8
Iron (Dissolved)			µg/l				400
Mercury (Dissolved)	0.75		µg/l				< 0.50
Manganese (Dissolved)			µg/l				9.9
Molybdenum (Dissolved)			µg/l				< 1.0
Nickel (Dissolved)	15		µg/l				1.1
Lead (Dissolved)	18.75		µg/l				< 1.0
Antimony (Dissolved)			µg/l				< 1.0

Parameter	Screening Value*	Location		GW5	GW5	GW5	GW5
		Units	LOD	15/03/16	15/06/16	28/09/16	30/11/16
Selenium (Dissolved)		µg/l	1.0				19
Tin (Dissolved)		µg/l	1.0				< 1.0
Strontium (Dissolved)		µg/l	1.0				270
Vanadium (Dissolved)		µg/l	1.0				< 1.0
Zinc (Dissolved)		µg/l	1.0				2.4
Thallium		µg/l	0.10				< 0.10
TPH >C5-C6		µg/l	0.10				< 0.10
TPH >C6-C7		µg/l	0.10				< 0.10
TPH >C7-C8		µg/l	0.10				< 0.10
TPH >C8-C10		µg/l	0.10				< 0.10
TPH >C10-C12		µg/l	0.10				< 0.10
TPH >C12-C16		µg/l	0.10				< 0.10
TPH >C16-C21		µg/l	0.10				< 0.10
TPH >C21-C35		µg/l	0.10				< 0.10
Total TPH >C5-C35		µg/l	10				< 10
Naphthalene		µg/l	0.10				< 0.10
Acenaphthylene		µg/l	0.10				< 0.10
Acenaphthene		µg/l	0.10				< 0.10
Fluorene		µg/l	0.10				< 0.10
Phenanthrene		µg/l	0.10				< 0.10
Anthracene		µg/l	0.10				< 0.10
Fluoranthene		µg/l	0.10				< 0.10
Pyrene		µg/l	0.10				< 0.10
Benzo[a]anthracene		µg/l	0.10				< 0.10
Chrysene		µg/l	0.10				< 0.10
Benzo[b]fluoranthene		µg/l	0.10				< 0.10
Benzo[k]fluoranthene		µg/l	0.10				< 0.10
Benzo[a]pyrene		µg/l	0.10				< 0.10
Indeno(1,2,3-c,d)Pyrene		µg/l	0.10				< 0.10
Dibenz(a,h)Anthracene		µg/l	0.10				< 0.10
Benzo[g,h,i]perylene		µg/l	0.10				< 0.10
Total Of 16 PAH's		µg/l	2.0				< 2.0
Dichlorodifluoromethane		µg/l	0.10				< 0.10
Chloromethane		µg/l	0.10				< 0.10
Vinyl Chloride		µg/l	0.10				< 0.10
Bromomethane		µg/l	2.0				< 2.0
Chloroethane		µg/l	0.20				< 0.20
Trichlorofluoromethane		µg/l	0.10				< 0.10
1,1-Dichloroethene		µg/l	0.10				< 0.10
Trans 1,2-Dichloroethene		µg/l	0.10				< 0.10
1,1-Dichloroethane		µg/l	0.10				< 0.10
cis 1,2-Dichloroethene		µg/l	0.10				< 0.10
Bromochloromethane		µg/l	0.50				< 0.50
Trichloromethane		µg/l	0.10				< 0.10
1,1,1-Trichloroethane		µg/l	0.10				< 0.10
Tetrachloromethane		µg/l	0.10				< 0.10
1,1-Dichloropropene		µg/l	0.10				< 0.10
Benzene		µg/l	0.10				< 0.10
1,2-Dichloroethane		µg/l	0.20				< 0.20
Trichloroethene		µg/l	0.10				< 0.10
1,2-Dichloropropane		µg/l	0.10				< 0.10
Dibromomethane		µg/l	0.10				< 0.10
Bromodichloromethane		µg/l	0.50				< 0.50
cis-1,3-Dichloropropene		µg/l	1.0				< 1.0
Toluene		µg/l	0.10				< 0.10

Parameter	Screening Value*	Location		GW5	GW5	GW5	GW5
		Date Sampled:	Units	15/03/16	15/06/16	28/09/16	30/11/16
			LOD				
Trans-1,3-Dichloropropene		µg/l	1.0				< 1.0
1,1,2-Trichloroethane		µg/l	1.0				< 1.0
Tetrachloroethene		µg/l	0.10				< 0.10
1,3-Dichloropropane		µg/l	0.20				< 0.20
Dibromochloromethane		µg/l	1.0				< 1.0
1,2-Dibromoethane		µg/l	0.50				< 0.50
Chlorobenzene		µg/l	0.10				< 0.10
1,1,1,2-Tetrachloroethane		µg/l	0.20				< 0.20
Ethylbenzene		µg/l	0.10				< 0.10
m & p-Xylene		µg/l	0.10				0.12
o-Xylene		µg/l	0.10				< 0.10
Styrene		µg/l	0.10				< 0.10
Tribromomethane		µg/l	1.0				< 1.0
Isopropylbenzene		µg/l	0.10				< 0.10
Bromobenzene		µg/l	0.10				< 0.10
1,2,3-Trichloropropane		µg/l	5.0				< 5.0
N-Propylbenzene		µg/l	0.10				< 0.10
2-Chlorotoluene		µg/l	0.10				< 0.10
1,3,5-Trimethylbenzene		µg/l	0.10				< 0.10
4-Chlorotoluene		µg/l	0.10				< 0.10
Tert-Butylbenzene		µg/l	0.10				< 0.10
1,2,4-Trimethylbenzene		µg/l	0.10				< 0.10
Sec-Butylbenzene		µg/l	0.10				< 0.10
1,3-Dichlorobenzene		µg/l	0.10				< 0.10
4-Isopropyltoluene		µg/l	0.10				< 0.10
1,4-Dichlorobenzene		µg/l	0.10				< 0.10
N-Butylbenzene		µg/l	0.10				< 0.10
1,2-Dichlorobenzene		µg/l	0.10				< 0.10
1,2-Dibromo-3-Chloropropane		µg/l	5.0				< 5.0
1,2,4-Trichlorobenzene		µg/l	0.10				< 0.10
Hexachlorobutadiene		µg/l	0.10				< 0.10
1,2,3-Trichlorobenzene		µg/l	0.20				< 0.20
Methyl Tert-Butyl Ether		µg/l	0.10				0.10
N-Nitrosodimethylamine		µg/l	0.050				< 0.050
Phenol		µg/l	0.050				< 0.050
2-Chlorophenol		µg/l	0.050				< 0.050
Bis-(2-Chloroethyl)Ether		µg/l	0.050				< 0.050
1,3-Dichlorobenzene		µg/l	0.050				< 0.050
1,4-Dichlorobenzene		µg/l	0.050				< 0.050
1,2-Dichlorobenzene		µg/l	0.050				< 0.050
2-Methylphenol (o-Cresol)		µg/l	0.050				< 0.050
Bis(2-Chloroisopropyl)Ether		µg/l	0.050				< 0.050
Hexachloroethane		µg/l	0.050				< 0.050
N-Nitrosodi-n-propylamine		µg/l	0.050				< 0.050
4-Methylphenol		µg/l	0.050				< 0.050
Nitrobenzene		µg/l	0.050				< 0.050
Isophorone		µg/l	0.050				< 0.050
2-Nitrophenol		µg/l	0.050				< 0.050
2,4-Dimethylphenol		µg/l	0.050				< 0.050
Bis(2-Chloroethoxy)Methane		µg/l	0.050				< 0.050
2,4-Dichlorophenol		µg/l	0.050				< 0.050
1,2,4-Trichlorobenzene		µg/l	0.050				< 0.050
Naphthalene		µg/l	0.050				< 0.050
4-Chloroaniline		µg/l	0.050				< 0.050

Parameter	Screening Value*	Location		GW5	GW5	GW5	GW5
		Units	LOD	15/03/16	15/06/16	28/09/16	30/11/16
Hexachlorobutadiene		µg/l	0.050				< 0.050
4-Chloro-3-Methylphenol		µg/l	0.050				< 0.050
2-Methylnaphthalene		µg/l	0.050				< 0.050
Hexachlorocyclopentadiene		µg/l	0.050				< 0.050
2,4,6-Trichlorophenol		µg/l	0.050				< 0.050
2,4,5-Trichlorophenol		µg/l	0.050				< 0.050
2-Chloronaphthalene		µg/l	0.050				< 0.050
2-Nitroaniline		µg/l	0.050				< 0.050
Acenaphthylene		µg/l	0.050				< 0.050
Dimethylphthalate		µg/l	0.050				< 0.050
2,6-Dinitrotoluene		µg/l	0.050				< 0.050
Acenaphthene		µg/l	0.050				< 0.050
3-Nitroaniline		µg/l	0.050				< 0.050
Dibenzofuran		µg/l	0.050				< 0.050
4-Chlorophenylphenylether		µg/l	0.050				< 0.050
2,4-Dinitrotoluene		µg/l	0.050				< 0.050
Fluorene		µg/l	0.050				< 0.050
Diethyl Phthalate		µg/l	0.050				< 0.050
4-Nitroaniline		µg/l	0.050				< 0.050
2-Methyl-4,6-Dinitrophenol		µg/l	0.050				< 0.050
Azobenzene		µg/l	0.050				< 0.050
4-Bromophenylphenyl Ether		µg/l	0.050				< 0.050
Hexachlorobenzene		µg/l	0.050				< 0.050
Pentachlorophenol		µg/l	0.050				< 0.050
Phenanthrene		µg/l	0.050				< 0.050
Anthracene		µg/l	0.050				< 0.050
Carbazole		µg/l	0.050				< 0.050
Di-N-Butyl Phthalate		µg/l	0.050				< 0.050
Fluoranthene		µg/l	0.050				< 0.050
Pyrene		µg/l	0.050				< 0.050
Butylbenzyl Phthalate		µg/l	0.050				< 0.050
Benzo[a]anthracene		µg/l	0.050				< 0.050
Chrysene		µg/l	0.050				< 0.050
Bis(2-Ethylhexyl)Phthalate		µg/l	0.050				< 0.050
Di-N-Octyl Phthalate		µg/l	0.050				< 0.050
Benzo[b]fluoranthene		µg/l	0.050				< 0.050
Benzo[k]fluoranthene		µg/l	0.050				< 0.050
Benzo[a]pyrene		µg/l	0.050				< 0.050
Indeno(1,2,3-c,d)Pyrene		µg/l	0.050				< 0.050
Dibenz(a,h)Anthracene		µg/l	0.050				< 0.050
Benzo[g,h,i]perylene		µg/l	0.050				< 0.050
4-Nitrophenol		µg/l	0.050				< 0.050

* S.I. 366 of 2016 - European Union Environmental Objectives (Groundwater) (Amendment) Regulations 2016

Table 4-10 Summary of Chemical Analysis at Well1

Parameter	Screening Value*	Location		Well 1	Well 1	Well 1	Well 1
		Units	LOD	15/03/16	15/06/16	28/09/16	30/11/16
Temperature		T°C		9.1	10.2	11.2	10.2
pH				7.56	7.45	7.51	8.02
Electrical Conductivity	1875	µs/cm		520	450	530	528

Parameter	Screening Value*	Location		Well 1	Well 1	Well 1	Well 1
		Date Sampled:	Units	15/03/16	15/06/16	28/09/16	30/11/16
			LOD				
Dissolved Oxygen		mg/l		2.93	3.3	8.46	4.18
Dissolved Oxygen		%		26.2	29.5	76.9	38.5
Suspended Solids At 105C		mg/l	5.0				100
Total Dissolved Solids		mg/l	1.0				450
Alkalinity (Total)		mg CaCO3/l	10				370
Chloride	187.5	mg/l	1.0	12.6	12.8	12.8	15
Ammoniacal Nitrogen	0.175	mg/l	0.010	0.343	0.266	0.194	0.16
Nitrate	37.5	mg/l	0.50				1.2
Phosphate		mg/l	0.050				< 0.050
Sulphate	187.5	mg/l	1.0	84.9	53.8	37.6	47
Calcium		mg/l	5.0				190
Potassium		mg/l	0.50				3.9
Magnesium		mg/l	0.50				14
Sodium	150	mg/l	0.50				16
Hardness		mg/l	15				530
Aluminium (Dissolved)	150	µg/l	10				17
Arsenic (Dissolved)	7.5	µg/l	1.0				1.0
Boron (Dissolved)	750	µg/l	20				21
Barium (Dissolved)		µg/l	5.0				69
Beryllium (Dissolved)		µg/l	1.0				< 1.0
Cadmium (Dissolved)	3.75	µg/l	0.080				< 0.080
Cobalt (Dissolved)		µg/l	1.0				< 1.0
Chromium (Dissolved)	37.5	µg/l	1.0				6.4
Copper (Dissolved)	1500	µg/l	1.0				2.5
Iron (Dissolved)		µg/l	20				320
Mercury (Dissolved)	0.75	µg/l	0.50				< 0.50
Manganese (Dissolved)		µg/l	1.0				420
Molybdenum (Dissolved)		µg/l	1.0				< 1.0
Nickel (Dissolved)	15	µg/l	1.0				1.2
Lead (Dissolved)	18.75	µg/l	1.0				< 1.0
Antimony (Dissolved)		µg/l	1.0				< 1.0
Selenium (Dissolved)		µg/l	1.0				8.2
Tin (Dissolved)		µg/l	1.0				< 1.0
Strontium (Dissolved)		µg/l	1.0				340
Vanadium (Dissolved)		µg/l	1.0				< 1.0
Zinc (Dissolved)		µg/l	1.0				2.3
Thallium		µg/l	0.10				< 0.10
TPH >C5-C6		µg/l	0.10				< 0.10
TPH >C6-C7		µg/l	0.10				< 0.10
TPH >C7-C8		µg/l	0.10				< 0.10
TPH >C8-C10		µg/l	0.10				< 0.10
TPH >C10-C12		µg/l	0.10				< 0.10
TPH >C12-C16		µg/l	0.10				< 0.10
TPH >C16-C21		µg/l	0.10				< 0.10
TPH >C21-C35		µg/l	0.10				< 0.10
Total TPH >C5-C35		µg/l	10				< 10
Naphthalene		µg/l	0.10				< 0.10
Acenaphthylene		µg/l	0.10				< 0.10
Acenaphthene		µg/l	0.10				< 0.10
Fluorene		µg/l	0.10				< 0.10
Phenanthrene		µg/l	0.10				< 0.10
Anthracene		µg/l	0.10				< 0.10
Fluoranthene		µg/l	0.10				< 0.10
Pyrene		µg/l	0.10				< 0.10

Parameter	Screening Value*	Location		Well 1	Well 1	Well 1	Well 1
		Units	LOD	15/03/16	15/06/16	28/09/16	30/11/16
Benzo[a]anthracene		µg/l	0.10				< 0.10
Chrysene		µg/l	0.10				< 0.10
Benzo[b]fluoranthene		µg/l	0.10				< 0.10
Benzo[k]fluoranthene		µg/l	0.10				< 0.10
Benzo[a]pyrene		µg/l	0.10				< 0.10
Indeno(1,2,3-c,d)Pyrene		µg/l	0.10				< 0.10
Dibenz(a,h)Anthracene		µg/l	0.10				< 0.10
Benzo[g,h,i]perylene		µg/l	0.10				< 0.10
Total Of 16 PAH's		µg/l	2.0				< 2.0
Dichlorodifluoromethane		µg/l	0.10				< 0.10
Chloromethane		µg/l	0.10				< 0.10
Vinyl Chloride		µg/l	0.10				< 0.10
Bromomethane		µg/l	2.0				< 2.0
Chloroethane		µg/l	0.20				< 0.20
Trichlorofluoromethane		µg/l	0.10				< 0.10
1,1-Dichloroethene		µg/l	0.10				< 0.10
Trans 1,2-Dichloroethene		µg/l	0.10				< 0.10
1,1-Dichloroethane		µg/l	0.10				< 0.10
cis 1,2-Dichloroethene		µg/l	0.10				< 0.10
Bromochloromethane		µg/l	0.50				< 0.50
Trichloromethane		µg/l	0.10				< 0.10
1,1,1-Trichloroethane		µg/l	0.10				< 0.10
Tetrachloromethane		µg/l	0.10				< 0.10
1,1-Dichloropropene		µg/l	0.10				< 0.10
Benzene		µg/l	0.10				< 0.10
1,2-Dichloroethane		µg/l	0.20				< 0.20
Trichloroethene		µg/l	0.10				< 0.10
1,2-Dichloropropane		µg/l	0.10				< 0.10
Dibromomethane		µg/l	0.10				< 0.10
Bromodichloromethane		µg/l	0.50				< 0.50
cis-1,3-Dichloropropene		µg/l	1.0				< 1.0
Toluene		µg/l	0.10				< 0.10
Trans-1,3-Dichloropropene		µg/l	1.0				< 1.0
1,1,2-Trichloroethane		µg/l	1.0				< 1.0
Tetrachloroethene		µg/l	0.10				< 0.10
1,3-Dichloropropane		µg/l	0.20				< 0.20
Dibromochloromethane		µg/l	1.0				< 1.0
1,2-Dibromoethane		µg/l	0.50				< 0.50
Chlorobenzene		µg/l	0.10				< 0.10
1,1,1,2-Tetrachloroethane		µg/l	0.20				< 0.20
Ethylbenzene		µg/l	0.10				< 0.10
m & p-Xylene		µg/l	0.10				< 0.10
o-Xylene		µg/l	0.10				< 0.10
Styrene		µg/l	0.10				< 0.10
Tribromomethane		µg/l	1.0				< 1.0
Isopropylbenzene		µg/l	0.10				< 0.10
Bromobenzene		µg/l	0.10				< 0.10
1,2,3-Trichloropropane		µg/l	5.0				< 5.0
N-Propylbenzene		µg/l	0.10				< 0.10
2-Chlorotoluene		µg/l	0.10				< 0.10
1,3,5-Trimethylbenzene		µg/l	0.10				< 0.10
4-Chlorotoluene		µg/l	0.10				< 0.10
Tert-Butylbenzene		µg/l	0.10				< 0.10
1,2,4-Trimethylbenzene		µg/l	0.10				< 0.10
Sec-Butylbenzene		µg/l	0.10				< 0.10

Parameter	Screening Value*	Location		Well 1	Well 1	Well 1	Well 1
		Units	LOD	15/03/16	15/06/16	28/09/16	30/11/16
1,3-Dichlorobenzene		µg/l	0.10				< 0.10
4-Isopropyltoluene		µg/l	0.10				< 0.10
1,4-Dichlorobenzene		µg/l	0.10				< 0.10
N-Butylbenzene		µg/l	0.10				< 0.10
1,2-Dichlorobenzene		µg/l	0.10				< 0.10
1,2-Dibromo-3-Chloropropane		µg/l	5.0				< 5.0
1,2,4-Trichlorobenzene		µg/l	0.10				< 0.10
Hexachlorobutadiene		µg/l	0.10				< 0.10
1,2,3-Trichlorobenzene		µg/l	0.20				< 0.20
Methyl Tert-Butyl Ether		µg/l	0.10				< 0.10
N-Nitrosodimethylamine		µg/l	0.050				< 0.050
Phenol		µg/l	0.050				< 0.050
2-Chlorophenol		µg/l	0.050				< 0.050
Bis-(2-Chloroethyl)Ether		µg/l	0.050				< 0.050
1,3-Dichlorobenzene		µg/l	0.050				< 0.050
1,4-Dichlorobenzene		µg/l	0.050				< 0.050
1,2-Dichlorobenzene		µg/l	0.050				< 0.050
2-Methylphenol (o-Cresol)		µg/l	0.050				< 0.050
Bis(2-Chloroisopropyl)Ether		µg/l	0.050				< 0.050
Hexachloroethane		µg/l	0.050				< 0.050
N-Nitrosodi-n-propylamine		µg/l	0.050				< 0.050
4-Methylphenol		µg/l	0.050				< 0.050
Nitrobenzene		µg/l	0.050				< 0.050
Isophorone		µg/l	0.050				< 0.050
2-Nitrophenol		µg/l	0.050				< 0.050
2,4-Dimethylphenol		µg/l	0.050				< 0.050
Bis(2-Chloroethoxy)Methane		µg/l	0.050				< 0.050
2,4-Dichlorophenol		µg/l	0.050				< 0.050
1,2,4-Trichlorobenzene		µg/l	0.050				< 0.050
Naphthalene		µg/l	0.050				< 0.050
4-Chloroaniline		µg/l	0.050				< 0.050
Hexachlorobutadiene		µg/l	0.050				< 0.050
4-Chloro-3-Methylphenol		µg/l	0.050				< 0.050
2-Methylnaphthalene		µg/l	0.050				< 0.050
Hexachlorocyclopentadiene		µg/l	0.050				< 0.050
2,4,6-Trichlorophenol		µg/l	0.050				< 0.050
2,4,5-Trichlorophenol		µg/l	0.050				< 0.050
2-Chloronaphthalene		µg/l	0.050				< 0.050
2-Nitroaniline		µg/l	0.050				< 0.050
Acenaphthylene		µg/l	0.050				< 0.050
Dimethylphthalate		µg/l	0.050				< 0.050
2,6-Dinitrotoluene		µg/l	0.050				< 0.050
Acenaphthene		µg/l	0.050				< 0.050
3-Nitroaniline		µg/l	0.050				< 0.050
Dibenzofuran		µg/l	0.050				< 0.050
4-Chlorophenylphenylether		µg/l	0.050				< 0.050
2,4-Dinitrotoluene		µg/l	0.050				< 0.050
Fluorene		µg/l	0.050				< 0.050
Diethyl Phthalate		µg/l	0.050				< 0.050
4-Nitroaniline		µg/l	0.050				< 0.050
2-Methyl-4,6-Dinitrophenol		µg/l	0.050				< 0.050
Azobenzene		µg/l	0.050				< 0.050
4-Bromophenylphenyl Ether		µg/l	0.050				< 0.050

Parameter	Screening Value*	Location		Well 1	Well 1	Well 1	Well 1
		Date Sampled:	Units	15/03/16	15/06/16	28/09/16	30/11/16
Hexachlorobenzene			µg/l	0.050			< 0.050
Pentachlorophenol			µg/l	0.050			< 0.050
Phenanthrene			µg/l	0.050			< 0.050
Anthracene			µg/l	0.050			< 0.050
Carbazole			µg/l	0.050			< 0.050
Di-N-Butyl Phthalate			µg/l	0.050			< 0.050
Fluoranthene			µg/l	0.050			< 0.050
Pyrene			µg/l	0.050			< 0.050
Butylbenzyl Phthalate			µg/l	0.050			< 0.050
Benzo[a]anthracene			µg/l	0.050			< 0.050
Chrysene			µg/l	0.050			< 0.050
Bis(2-Ethylhexyl)Phthalate			µg/l	0.050			< 0.050
Di-N-Octyl Phthalate			µg/l	0.050			< 0.050
Benzo[b]fluoranthene			µg/l	0.050			< 0.050
Benzo[k]fluoranthene			µg/l	0.050			< 0.050
Benzo[a]pyrene			µg/l	0.050			< 0.050
Indeno(1,2,3-c,d)Pyrene			µg/l	0.050			< 0.050
Dibenz(a,h)Anthracene			µg/l	0.050			< 0.050
Benzo[g,h,i]perylene			µg/l	0.050			< 0.050
4-Nitrophenol			µg/l	0.050			< 0.050

* S.I. 366 of 2016 - European Union Environmental Objectives (Groundwater) (Amendment) Regulations 2016

Table 4-11 Summary of Chemical Analysis at Well 2

Parameter	Screening Value*	Location		Well 2	Well 2	Well 2	Well 2
		Date Sampled:	Units	15/03/16	15/06/16	28/09/16	30/11/16
Temperature			T°C	8.94	8.9	10.1	9.99
pH				7.89	7.53	7.48	8.01
Electrical Conductivity	1875		µs/cm	572	334	540	525
Dissolved Oxygen			mg/l	4.3	9.15	8.45	4.2
Dissolved Oxygen			%	49.3	79.4	76.8	36.4
Suspended Solids At 105C			mg/l	5.0			< 5.0
Total Dissolved Solids			mg/l	1.0			460
Alkalinity (Total)			mg CaCO3/l	10			380
Chloride	187.5		mg/l	1.0	20.3	20	15
Ammoniacal Nitrogen	0.175		mg/l	0.010	0.0162	0.0119	0.0236
Nitrate	37.5		mg/l	0.50			25
Phosphate			mg/l	0.050			< 0.050
Sulphate	187.5		mg/l	1.0	14.9	16.4	11
Calcium			mg/l	5.0			180
Potassium			mg/l	0.50			0.82
Magnesium			mg/l	0.50			26
Sodium	150		mg/l	0.50			12
Hardness			mg/l	15			550
Aluminium (Dissolved)	150		µg/l	10			< 10
Arsenic (Dissolved)	7.5		µg/l	1.0			< 1.0
Boron (Dissolved)	750		µg/l	20			< 20
Barium (Dissolved)			µg/l	5.0			51
Beryllium (Dissolved)			µg/l	1.0			< 1.0
Cadmium (Dissolved)	3.75		µg/l	0.080			< 0.080
Cobalt (Dissolved)			µg/l	1.0			< 1.0

Parameter	Screening Value*	Location		Well 2	Well 2	Well 2	Well 2
		Units	LOD	15/03/16	15/06/16	28/09/16	30/11/16
Chromium (Dissolved)	37.5	µg/l	1.0				2.5
Copper (Dissolved)	1500	µg/l	1.0				3.1
Iron (Dissolved)		µg/l	20				280
Mercury (Dissolved)	0.75	µg/l	0.50				< 0.50
Manganese (Dissolved)		µg/l	1.0				10
Molybdenum (Dissolved)		µg/l	1.0				< 1.0
Nickel (Dissolved)	15	µg/l	1.0				< 1.0
Lead (Dissolved)	18.75	µg/l	1.0				< 1.0
Antimony (Dissolved)		µg/l	1.0				< 1.0
Selenium (Dissolved)		µg/l	1.0				11
Tin (Dissolved)		µg/l	1.0				< 1.0
Strontium (Dissolved)		µg/l	1.0				220
Vanadium (Dissolved)		µg/l	1.0				< 1.0
Zinc (Dissolved)		µg/l	1.0				2.3
Thallium		µg/l	0.10				< 0.10
TPH >C5-C6		µg/l	0.10				< 0.10
TPH >C6-C7		µg/l	0.10				< 0.10
TPH >C7-C8		µg/l	0.10				< 0.10
TPH >C8-C10		µg/l	0.10				< 0.10
TPH >C10-C12		µg/l	0.10				< 0.10
TPH >C12-C16		µg/l	0.10				< 0.10
TPH >C16-C21		µg/l	0.10				< 0.10
TPH >C21-C35		µg/l	0.10				< 0.10
Total TPH >C5-C35		µg/l	10				< 10
Naphthalene		µg/l	0.10				< 0.10
Acenaphthylene		µg/l	0.10				< 0.10
Acenaphthene		µg/l	0.10				< 0.10
Fluorene		µg/l	0.10				< 0.10
Phenanthrene		µg/l	0.10				< 0.10
Anthracene		µg/l	0.10				< 0.10
Fluoranthene		µg/l	0.10				< 0.10
Pyrene		µg/l	0.10				< 0.10
Benzo[a]anthracene		µg/l	0.10				< 0.10
Chrysene		µg/l	0.10				< 0.10
Benzo[b]fluoranthene		µg/l	0.10				< 0.10
Benzo[k]fluoranthene		µg/l	0.10				< 0.10
Benzo[a]pyrene		µg/l	0.10				< 0.10
Indeno(1,2,3-c,d)Pyrene		µg/l	0.10				< 0.10
Dibenz(a,h)Anthracene		µg/l	0.10				< 0.10
Benzo[g,h,i]perylene		µg/l	0.10				< 0.10
Total Of 16 PAH's		µg/l	2.0				< 2.0
Dichlorodifluoromethane		µg/l	0.10				< 0.10
Chloromethane		µg/l	0.10				< 0.10
Vinyl Chloride		µg/l	0.10				< 0.10
Bromomethane		µg/l	2.0				< 2.0
Chloroethane		µg/l	0.20				< 0.20
Trichlorofluoromethane		µg/l	0.10				< 0.10
1,1-Dichloroethene		µg/l	0.10				< 0.10
Trans 1,2-Dichloroethene		µg/l	0.10				< 0.10
1,1-Dichloroethane		µg/l	0.10				< 0.10
cis 1,2-Dichloroethene		µg/l	0.10				< 0.10
Bromochloromethane		µg/l	0.50				< 0.50
Trichloromethane		µg/l	0.10				< 0.10
1,1,1-Trichloroethane		µg/l	0.10				< 0.10
Tetrachloromethane		µg/l	0.10				< 0.10

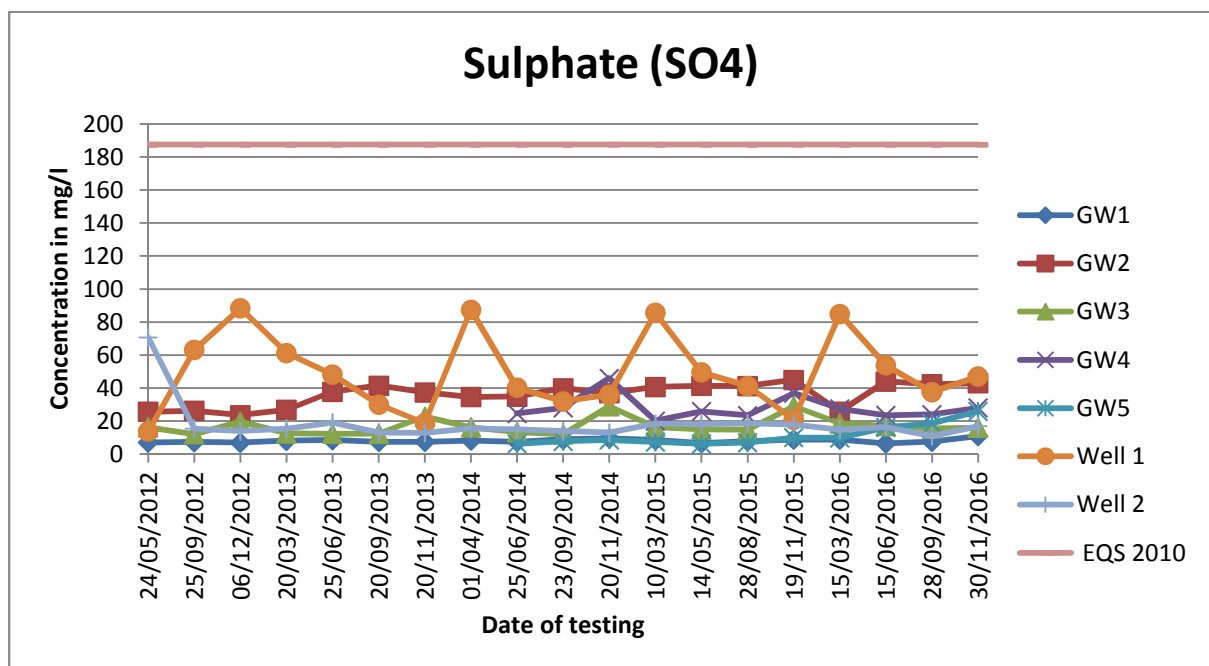
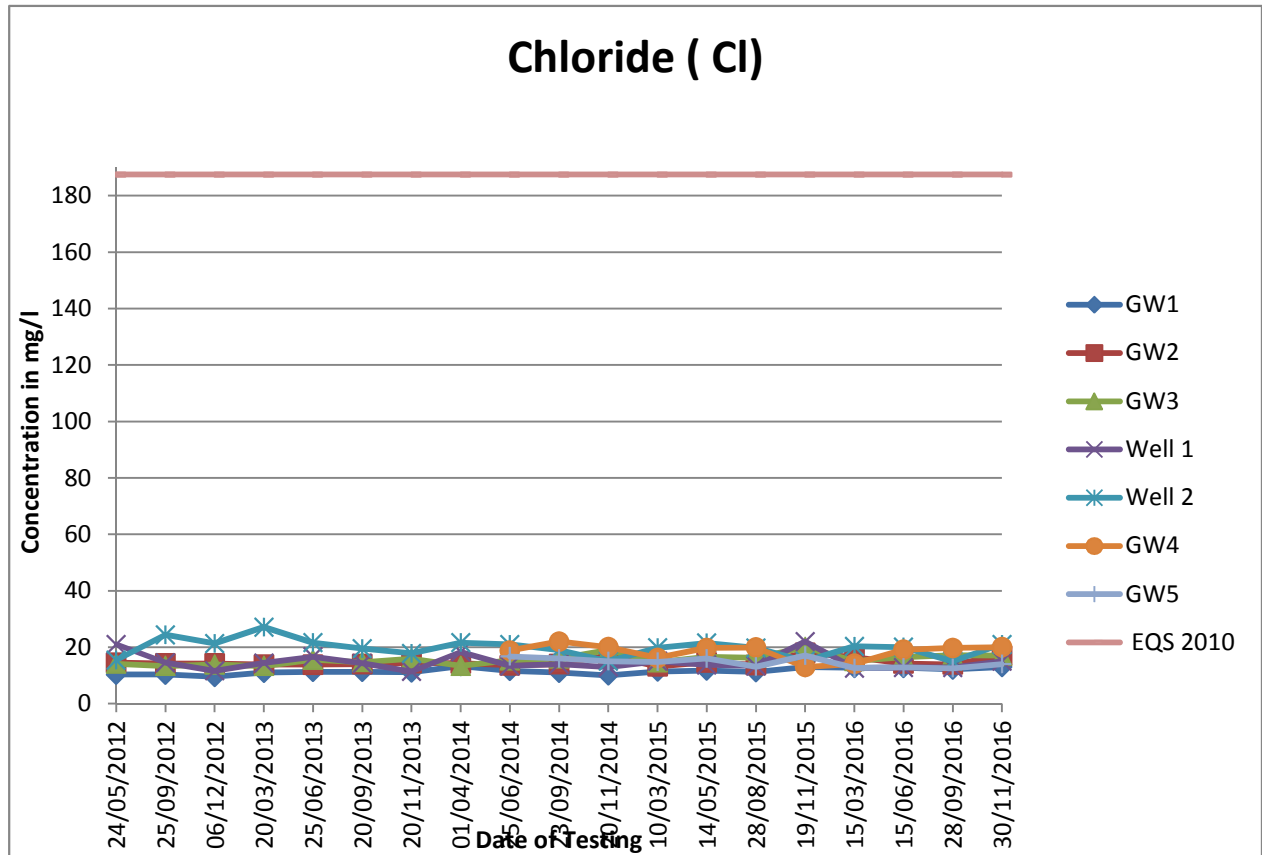
Parameter	Screening Value*	Location		Well 2	Well 2	Well 2	Well 2
		Units	LOD	15/03/16	15/06/16	28/09/16	30/11/16
1,1-Dichloropropene		µg/l	0.10				< 0.10
Benzene		µg/l	0.10				< 0.10
1,2-Dichloroethane		µg/l	0.20				< 0.20
Trichloroethene		µg/l	0.10				< 0.10
1,2-Dichloropropane		µg/l	0.10				< 0.10
Dibromomethane		µg/l	0.10				< 0.10
Bromodichloromethane		µg/l	0.50				< 0.50
cis-1,3-Dichloropropene		µg/l	1.0				< 1.0
Toluene		µg/l	0.10				< 0.10
Trans-1,3-Dichloropropene		µg/l	1.0				< 1.0
1,1,2-Trichloroethane		µg/l	1.0				< 1.0
Tetrachloroethene		µg/l	0.10				< 0.10
1,3-Dichloropropane		µg/l	0.20				< 0.20
Dibromochloromethane		µg/l	1.0				< 1.0
1,2-Dibromoethane		µg/l	0.50				< 0.50
Chlorobenzene		µg/l	0.10				< 0.10
1,1,1,2-Tetrachloroethane		µg/l	0.20				< 0.20
Ethylbenzene		µg/l	0.10				< 0.10
m & p-Xylene		µg/l	0.10				< 0.10
o-Xylene		µg/l	0.10				< 0.10
Styrene		µg/l	0.10				< 0.10
Tribromomethane		µg/l	1.0				< 1.0
Isopropylbenzene		µg/l	0.10				< 0.10
Bromobenzene		µg/l	0.10				< 0.10
1,2,3-Trichloropropane		µg/l	5.0				< 5.0
N-Propylbenzene		µg/l	0.10				< 0.10
2-Chlorotoluene		µg/l	0.10				< 0.10
1,3,5-Trimethylbenzene		µg/l	0.10				< 0.10
4-Chlorotoluene		µg/l	0.10				< 0.10
Tert-Butylbenzene		µg/l	0.10				< 0.10
1,2,4-Trimethylbenzene		µg/l	0.10				< 0.10
Sec-Butylbenzene		µg/l	0.10				< 0.10
1,3-Dichlorobenzene		µg/l	0.10				< 0.10
4-Isopropyltoluene		µg/l	0.10				< 0.10
1,4-Dichlorobenzene		µg/l	0.10				< 0.10
N-Butylbenzene		µg/l	0.10				< 0.10
1,2-Dichlorobenzene		µg/l	0.10				< 0.10
1,2-Dibromo-3-Chloropropane		µg/l	5.0				< 5.0
1,2,4-Trichlorobenzene		µg/l	0.10				< 0.10
Hexachlorobutadiene		µg/l	0.10				< 0.10
1,2,3-Trichlorobenzene		µg/l	0.20				< 0.20
Methyl Tert-Butyl Ether		µg/l	0.10				< 0.10
N-Nitrosodimethylamine		µg/l	0.050				< 0.050
Phenol		µg/l	0.050				< 0.050
2-Chlorophenol		µg/l	0.050				< 0.050
Bis-(2-Chloroethyl)Ether		µg/l	0.050				< 0.050
1,3-Dichlorobenzene		µg/l	0.050				< 0.050
1,4-Dichlorobenzene		µg/l	0.050				< 0.050
1,2-Dichlorobenzene		µg/l	0.050				< 0.050
2-Methylphenol (o-Cresol)		µg/l	0.050				< 0.050
Bis(2-Chloroisopropyl)Ether		µg/l	0.050				< 0.050
Hexachloroethane		µg/l	0.050				< 0.050
N-Nitrosodi-n-propylamine		µg/l	0.050				< 0.050
4-Methylphenol		µg/l	0.050				< 0.050

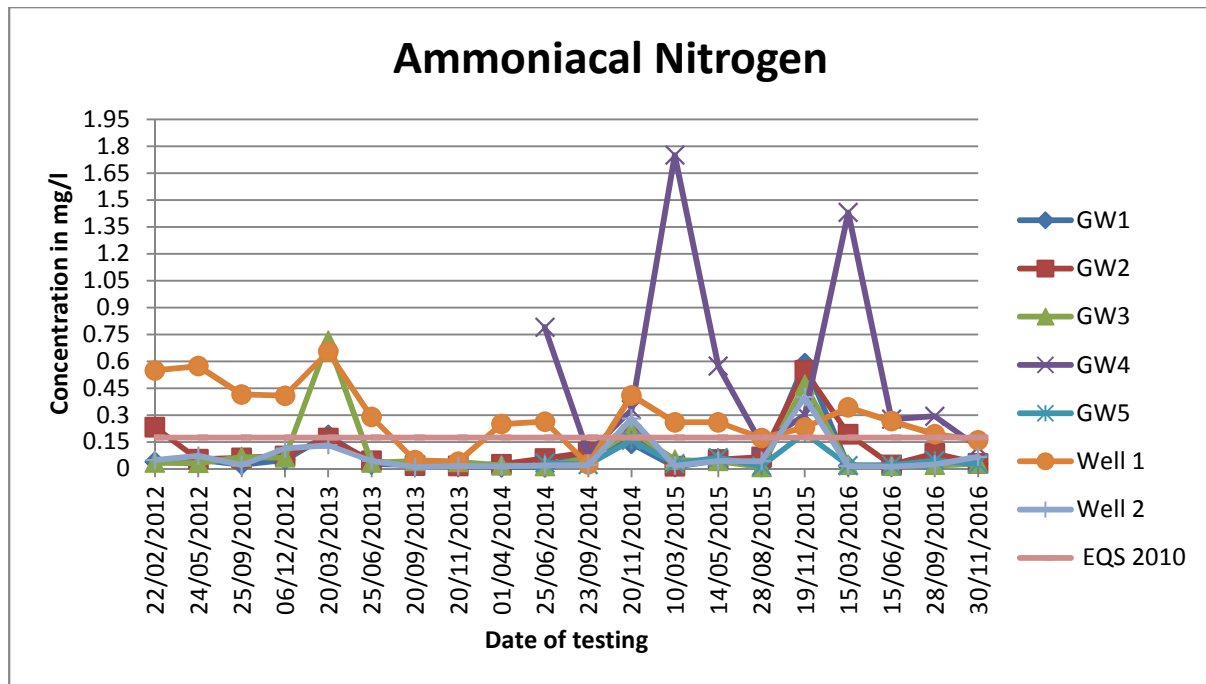
Parameter	Screening Value*	Location		Well 2	Well 2	Well 2	Well 2
		Units	LOD	15/03/16	15/06/16	28/09/16	30/11/16
Nitrobenzene		µg/l	0.050				< 0.050
Isophorone		µg/l	0.050				< 0.050
2-Nitrophenol		µg/l	0.050				< 0.050
2,4-Dimethylphenol		µg/l	0.050				< 0.050
Bis(2-Chloroethoxy)Methane		µg/l	0.050				< 0.050
2,4-Dichlorophenol		µg/l	0.050				< 0.050
1,2,4-Trichlorobenzene		µg/l	0.050				< 0.050
Naphthalene		µg/l	0.050				< 0.050
4-Chloroaniline		µg/l	0.050				< 0.050
Hexachlorobutadiene		µg/l	0.050				< 0.050
4-Chloro-3-Methylphenol		µg/l	0.050				< 0.050
2-Methylnaphthalene		µg/l	0.050				< 0.050
Hexachlorocyclopentadiene		µg/l	0.050				< 0.050
2,4,6-Trichlorophenol		µg/l	0.050				< 0.050
2,4,5-Trichlorophenol		µg/l	0.050				< 0.050
2-Chloronaphthalene		µg/l	0.050				< 0.050
2-Nitroaniline		µg/l	0.050				< 0.050
Acenaphthylene		µg/l	0.050				< 0.050
Dimethylphthalate		µg/l	0.050				< 0.050
2,6-Dinitrotoluene		µg/l	0.050				< 0.050
Acenaphthene		µg/l	0.050				< 0.050
3-Nitroaniline		µg/l	0.050				< 0.050
Dibenzofuran		µg/l	0.050				< 0.050
4-Chlorophenylphenylether		µg/l	0.050				< 0.050
2,4-Dinitrotoluene		µg/l	0.050				< 0.050
Fluorene		µg/l	0.050				< 0.050
Diethyl Phthalate		µg/l	0.050				< 0.050
4-Nitroaniline		µg/l	0.050				< 0.050
2-Methyl-4,6-Dinitrophenol		µg/l	0.050				< 0.050
Azobenzene		µg/l	0.050				< 0.050
4-Bromophenylphenyl Ether		µg/l	0.050				< 0.050
Hexachlorobenzene		µg/l	0.050				< 0.050
Pentachlorophenol		µg/l	0.050				< 0.050
Phenanthrene		µg/l	0.050				< 0.050
Anthracene		µg/l	0.050				< 0.050
Carbazole		µg/l	0.050				< 0.050
Di-N-Butyl Phthalate		µg/l	0.050				< 0.050
Fluoranthene		µg/l	0.050				< 0.050
Pyrene		µg/l	0.050				< 0.050
Butylbenzyl Phthalate		µg/l	0.050				< 0.050
Benzo[a]anthracene		µg/l	0.050				< 0.050
Chrysene		µg/l	0.050				< 0.050
Bis(2-Ethylhexyl)Phthalate		µg/l	0.050				< 0.050
Di-N-Octyl Phthalate		µg/l	0.050				< 0.050
Benzo[b]fluoranthene		µg/l	0.050				< 0.050
Benzo[k]fluoranthene		µg/l	0.050				< 0.050
Benzo[a]pyrene		µg/l	0.050				< 0.050
Indeno(1,2,3-c,d)Pyrene		µg/l	0.050				< 0.050
Dibenz(a,h)Anthracene		µg/l	0.050				< 0.050
Benzo[g,h,i]perylene		µg/l	0.050				< 0.050
4-Nitrophenol		µg/l	0.050				< 0.050

* S.I. 366 of 2016 - European Union Environmental Objectives (Groundwater) (Amendment) Regulations 2016

4.3.4 Variation and trends in Groundwater Water Quality

The plots provided below show variations and trends in groundwater water quality for monitored parameters (Chloride, Sulphate, Ammoniacal Nitrogen) from the beginning of 2012. Plots show no indication of sustained increase of monitored parameters concentration over the time.





4.4 Topographical Monitoring

A topographical survey of the licensed site was carried out in early 2017 and a site plan showing recorded ground levels and contours is reproduced as Figure 3. Total fill intake at the Blackhall Recovery Facility since the waste licence was applied for in 2008 is assessed to be approximately 1,142 537m³. The estimated intake capacity for the facility is estimated to be 2,240,000m³, indicating that the remaining intake capacity is approximately 1 097 463m³ (equivalent to approximately 1 975 433.4 tonnes¹).

4.5 Pollutant Release and Transfer Register

No PRTR Electronic Reporting workbook was submitted for Blackhall Soil Recovery Facility for 2015. Blackhall Soil Recovery facility is excluded from the PRTR reporting under the PRTR Regulations (S.I. No. 649 of 2011). Emissions to air, soil and groundwater at the facility are however likely to be minimal and to present a low risk to the environment. Complaints registered in respect of emissions from the facility in 2016 are presented in register of complaints section.

¹ Capacity multiplied by 1.8- based on average intake in 2016.

5.0 NUISANCE CONTROL

5.1 Mud, Dust, Litter

Nuisance controls at the facility include inspections of the facility and amenities immediate to the facility boundary for mud, dust, and litter. These are documented in the waste licence application submitted to the Agency in 2008.

6.0 SITE DEVELOPMENTS WORKS

6.1 Engineering Works

No Engineering Works carried out in 2016. The Agency will be notified of future engineering works as per Condition 3.3.1 of the waste licence.

6.2 Tanks and Pipeline Testing and Inspection Report

There were no storage tanks and pipelines within the waste site at Blackhall for 2016. Therefore no testing of tanks and pipelines was carried out.

6.3 Stability Assessment

No stability monitoring was carried out in 2016.

7.0 RESOURCE USE AND ENERGY EFFICIENCY

7.1 Energy Efficiency Audit

No energy efficiency audit was carried out in 2016. The principal energy use at the facility is in the form of diesel fuel for site plant and machinery and electricity supply to the security office at the gate. It is likely that energy consumption at the Blackhall Soil Recovery Facility in 2016 was relatively low given the limited volume of waste recovered over the year.

7.2 Resource Consumption Summary

Table 7-1 presents an estimate of resources used on-site from January to December 2016.

Table 7-1 Resource Consumption Summary

Energy Stream	Annual Quantity	Units	Period
Electricity	5885	kWh	2016
Diesel	40100	Litres	2016

7.3 Efficiency Assessment

Given the relatively low-tech nature of the waste recovery activities undertaken at the facility and the limited scope to introduce innovation or alternative methods of recovery, no efficiency assessment has been undertaken for this facility in 2016.

8.0 WASTE RECEIVED AND CONSIGNED FROM FACILITY

8.1 Waste Management Records

Table 8-1 shows the total quantities of waste received at the waste facility in 2016. A breakdown of the waste types is provided in accordance with the European Waste Catalogue and Hazardous Waste List. The total of quantity of inert soil / construction and demolition waste accepted at the facility between January 2016 and December 2016 was 397,661.540 tonnes.

Table 8-1 Waste Received in 2016

EWC	Description	Waste IN (Tonnes)
17 05 04	Soils and stones other than those mentioned in 17 05 03	384,236.610
17 01 01	Concrete	13,424.93 (Cumulative)
17 01 02	Bricks	
17 01 03	Tiles and Ceramics	
17 01 07	Mixture of concrete, bricks , tiles and ceramics other than those mentioned in 17 01 06	
Total Received		397,661.540

8.2 Waste Monitoring

No soil / waste monitoring were carried out in 2016. Waste handling and acceptance procedures proposals were submitted to the EPA and Behan Land Restoration Ltd is awaiting agreement on that matter.

8.3 Waste Removed / Rejected

No waste was rejected in 2016.

Table 8-2 Waste Rejected in 2016

EWC	Description	Waste (Tonnes)
17 05 04	Soils and Stones other than those mentioned in 17 05 03	0
17 01 01	Concrete	0
17 01 02	Bricks	0
17 01 03	Tiles and Ceramics	0
17 01 07	Mixture of concrete, bricks , tiles and ceramics other than those mentioned in 17 01 06	0
Total Rejected		0

8.4 Waste Consigned

No waste was consigned in 2016.

Table 8-3 Waste Consigned in 2016

EWC	Description	Waste OUT (Litres)
13 02 05	Waste Oil	0
17 03 02	Bituminous material	0
Total Consigned		0

9.0 ENVIRONMENTAL INCIDENTS AND COMPLAINTS

9.1 Incidents Summary

There were no environmental incidents during the reporting period.

9.2 Register of complaints

EPA received 9 complaints during the reporting period see attached register of complaints received in 2016 included in Appendix B.

SLR's environmental monitoring carried out in 2016 confirms that operations at the Blackhall Soil Recovery Facility are generally in compliance with Limits of its Waste Licence Conditions (Ref. No. W0247-01) and that during 2016 measures to reduce the noise and dust emissions were implemented throughout the year.

FIGURES


- Figure 1 Site Location Plan**
- Figure 2 Site Layout Plan**
- Figure 3 Topographical Survey**




NOTES

1. EXTRACT FROM 1:50,000 O.S DISCOVERY SERIES MAP NO. 49, 50, 55 & 56
2. ORDNANCE SURVEY IRELAND LICENCE NO. SU 0000714 (C) ORDNANCE SURVEY & GOVERNMENT OF IRELAND

LEGEND

 LOCATION OF QUARRY

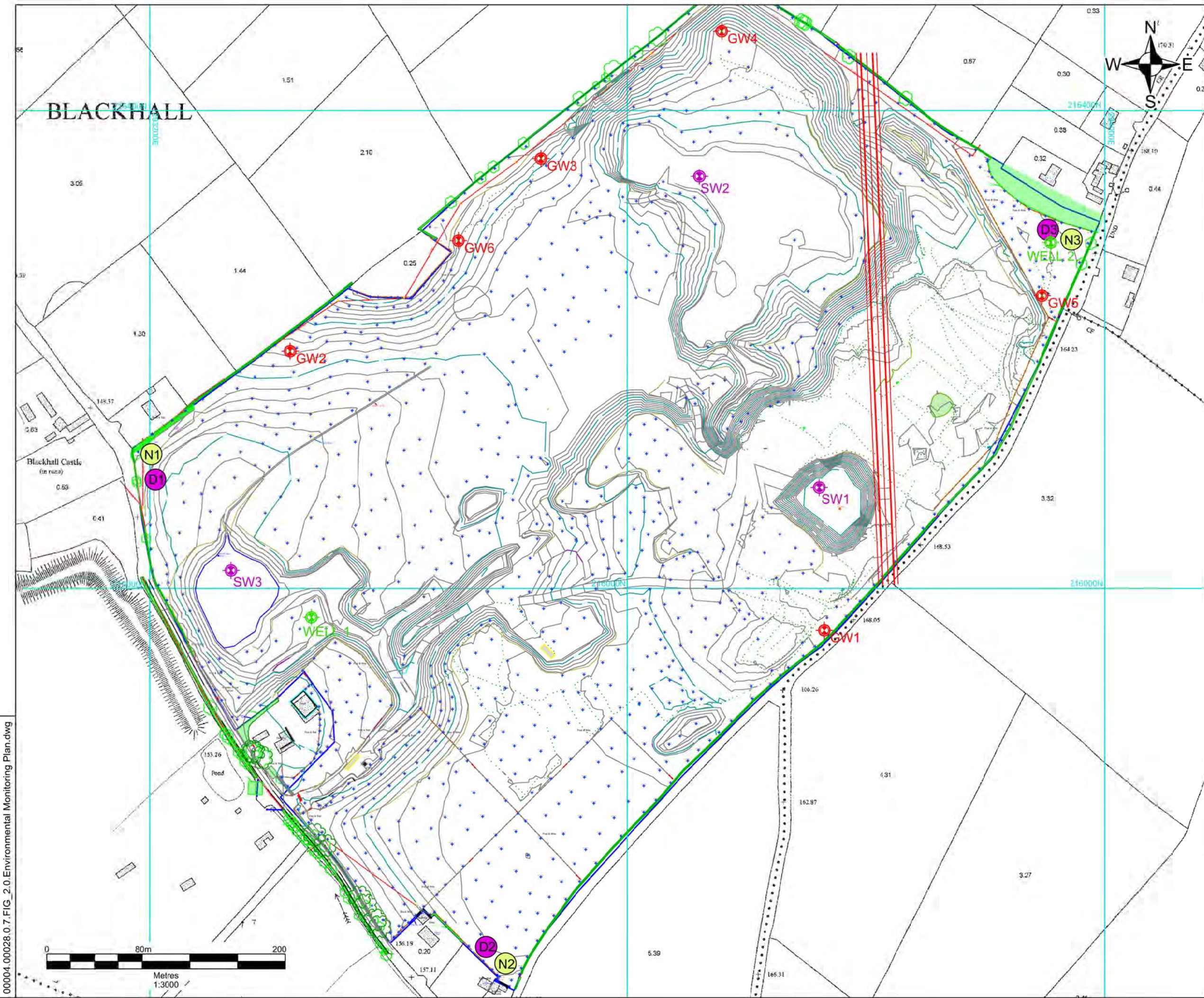
00004.00028.0.7 FIG_1.0 Site Location Plan.dwg

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NAAS, CO. KILDARE
SITE LOCATION PLAN

FIGURE 1

Scale 1:50,000 @ A3 Date JULY 2014



NOTES
 1. ORDNANCE SURVEY IRELAND LICENCE NO. SU 0000714 (C) ORDNANCE SURVEY & GOVERNMENT OF IRELAND

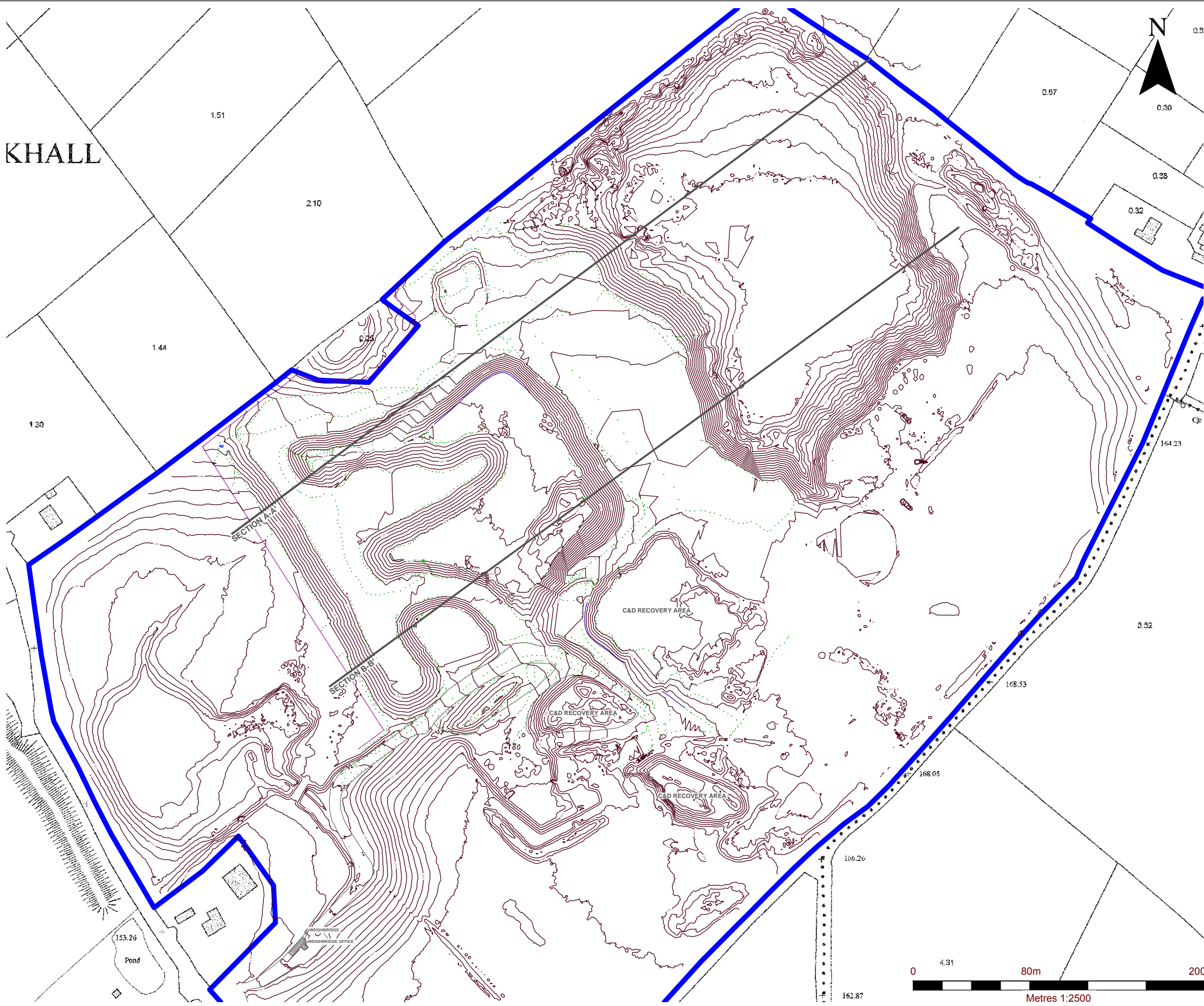
- LEGEND**
-  APPLICANTS LAND INTEREST
 -  ENVIRONMENTAL NOISE MONITORING LOCATION
 -  ENVIRONMENTAL DUST MONITORING LOCATION
 -  ENVIRONMENTAL MONITORING BOREHOLE LOCATION

00004.00028.0.7.FIG_2.0.Environmental Monitoring Plan.dwg

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ENVIRONMENTAL MONITORING PLAN

FIGURE 2
 Scale 1:3,000 @ A3 Date JUNE 2014



NOTES

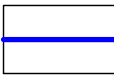
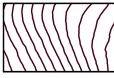
1. 'Orthomosaic produced from Aerial Photography flown September 2015 by SLR Consulting Ireland (IAA Permit No. 04/2015) www.slrconsulting.com Tel. +353-1-2964667. Orthomosaic produced using Ground Control Points; Related to Irish Transverse Mercator Coordinate System and OS Malin Head Level Datum.

The accuracy of the orthomosaics and the digital elevation models (DEM) strongly depends on the flight height, lighting conditions, availability of textures, image quality, overlap, and type of terrain. Contours / 3D data relates to the surface model and not terrain levels. Typical accuracies: E: 0.05 m; N: 0.05 m; Levels: 0.30 m. All Dimensions and Levels are to be checked on site.

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2. Topographic survey updated by SLR Consulting Ireland on 09/01/2017

LEGEND

	APPLICANTS LAND INTEREST
	SITE CONTOURS

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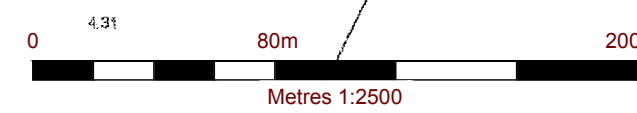
JOHN BEHAN

**BLACKHALL, PUNCESTOWN,
NAAS, CO. KILDARE**

TOPOGRAPHIC SURVEY - JANUARY 2017

FIGURE 3

Scale 1:2,500 @ A3	Date JANUARY 2017
-----------------------	----------------------



00004_00038.FIG_3.Topographic Survey - January 2017.dwg

Appendix A Monitoring Reports



global environmental solutions

**John Behan / Behan's Land Restoration Ltd.
Soil Recovery Facility, Blackhall, Naas, Co. Kildare**

**Report on Surface Water and Groundwater
Quality Monitoring: Q1 of 2016**

**March 2016
SLR Ref: 160330 501.00004.00037 Q1 2016 Rev 0**

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2.1 Surface Water Quality in Q1 of 2016	2
2.2 Variation and trends in Surface Water Quality	3
3.0 GROUNDWATER	4
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3.2 Groundwater Quality in Q1 of 2016	5
3.3 Variation and trends in Groundwater Water Quality	6
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1.0 INTRODUCTION

This surface water and groundwater monitoring report is prepared in respect of the licensed soil recovery facility operated by Behan's Land Restoration Ltd. at Blackhall, Punchestown, Naas, Co Kildare (EPA Waste Licence Ref No. W0247-01), the location of which is identified in Figure 1.

Surface water and groundwater quality monitoring at existing surface water and groundwater monitoring locations was undertaken on the 15th March 2016. Samples were analysed for contaminants listed in Schedule C2.2 of the Waste Licence for the recovery facility (Ref. W0247-01) as requiring monitoring on a quarterly basis. Monitoring point locations are shown on Figure 2.

2.0 SURFACE WATER QUALITY

2.1 Surface Water Quality in Q1 of 2016

Surface water quality monitoring was undertaken in two ponds: SW2 located in the north eastern sector of the site and SW3 located at the southwestern sector of the site (refer to Figure 2). Monitoring of physical parameters (visual inspection, temperature, pH, electrical conductivity and dissolved oxygen) was undertaken in the field using a YSI Instruments multi-parameter probe. Samples were taken for chemical quality testing and sent to ALcontrol Laboratories.

Recorded pH values in the surface water ponds were between 8.09 in SW2 and 8.08 in SW3. Recorded Dissolved Oxygen (DO) values were between 4.09 mg/l at SW2 and 4.53 mg/l at SW3. The concentration of DO will vary with temperature - the DO concentration is typically higher in winter and lower in summer. Surrounding farming activities such as the spreading of slurry or the application of nitrates can also effect DO concentration in water.

The variations in Electrical Conductivity (EC); from 0.677 mScm⁻¹ in SW2 to 0.601 mScm⁻¹ in SW3 reflect natural variation and changes within the water, often associated with seasonal changes in temperature.

Visual inspections of the ponded water were undertaken for discolouration and evidence of oil sheen / film. Odour inspections were also undertaken. The visual inspections indicated that the water was generally clear with no suspended solids or humic matter in the water. .

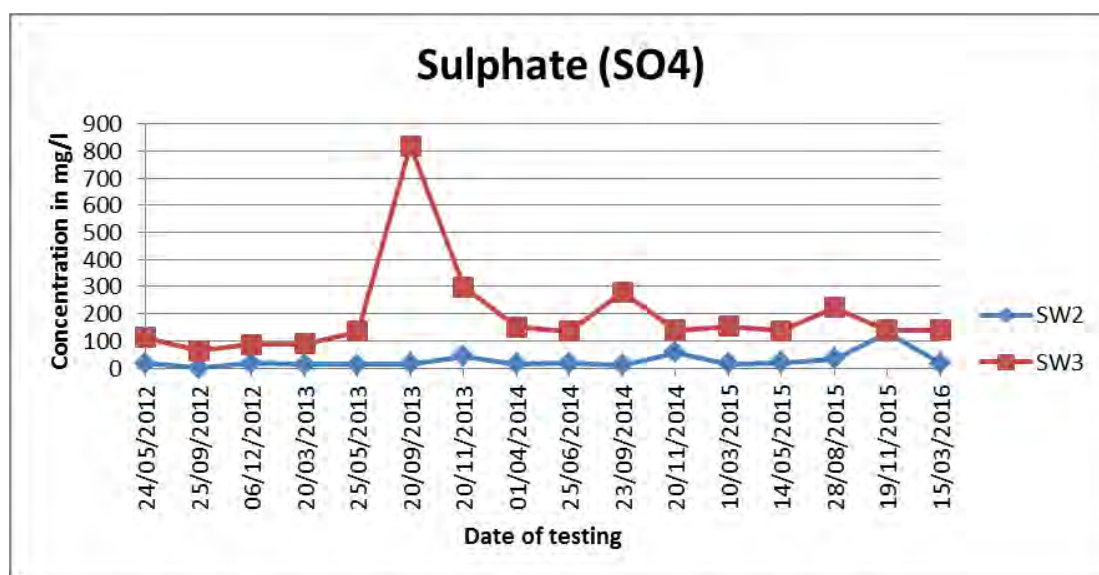
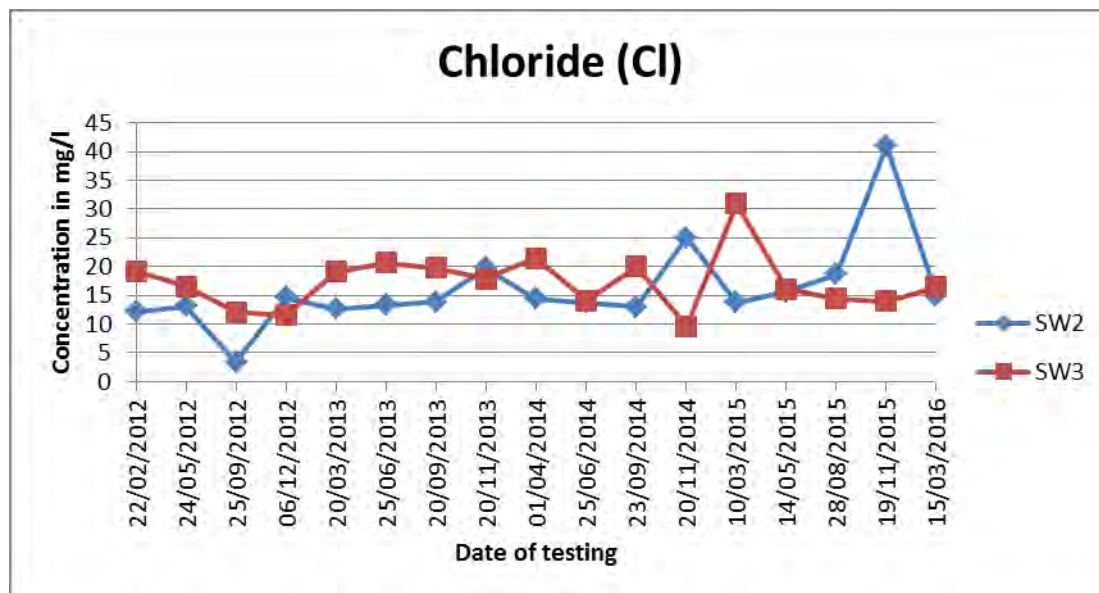
Results of surface water quality tests screened against the Surface Waters Regulations 2009 are presented in the Appendix A of this report and a copy of the certified test results is presented in Appendix C.

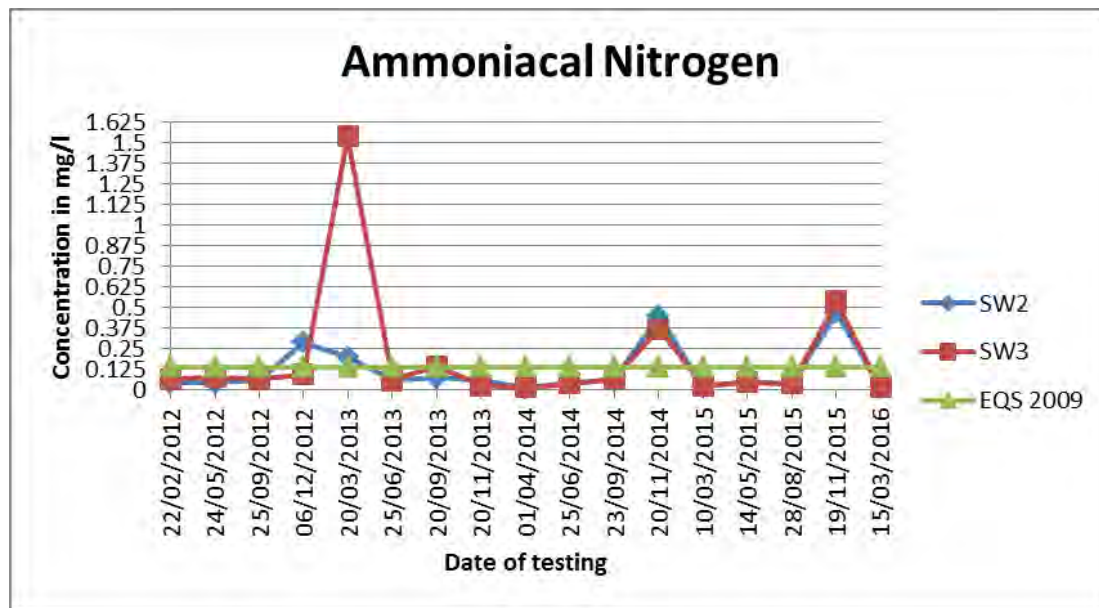
All tested parameters are within the quality standard limits for surface waters (European Communities Environmental Objectives (Surface Water) Regulations 2009).

In the view of the TPH detection in last round of sampling, SW3 was tested for these parameters in this round of sampling. No Total Petroleum Hydrocarbons (TPH) was detected at SW3 in this round of sampling.

2.2 Variation and trends in Surface Water Quality

The plots provided below show variations and trends in surface water quality for monitored parameters (Chloride, Sulphate, Ammoniacal Nitrogen) from the beginning of 2012. Plots show no indication of sustained increase of monitored parameters concentration over the time.





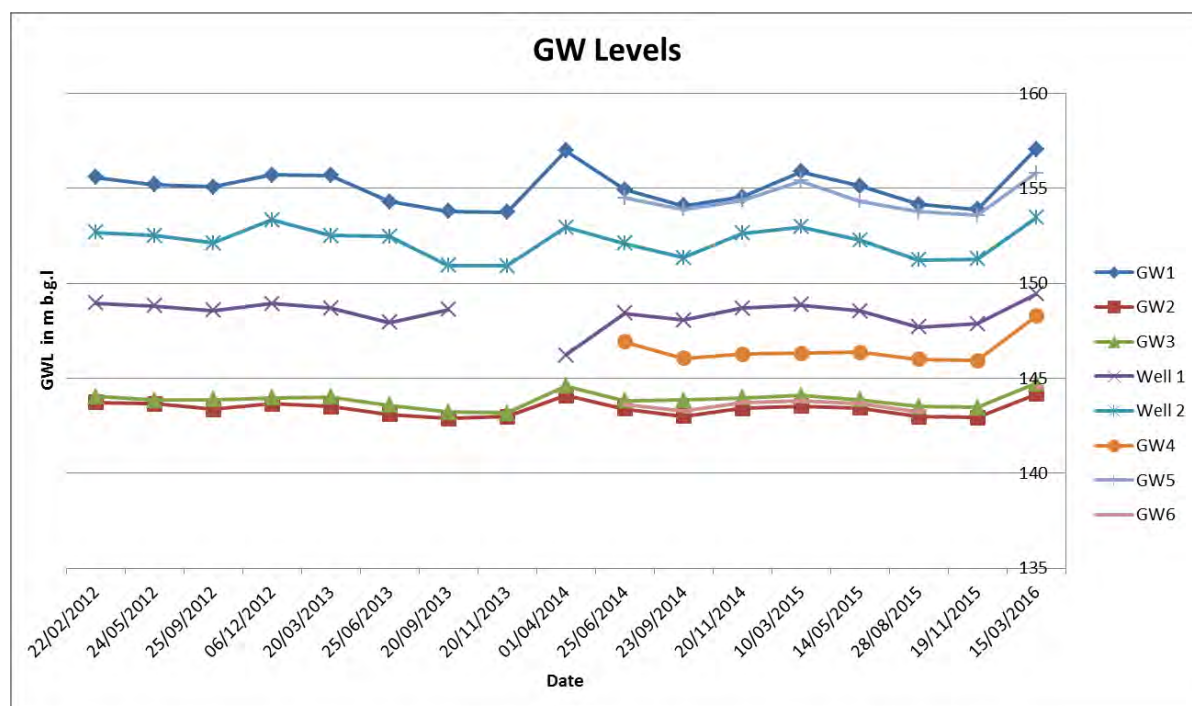
3.0 GROUNDWATER

3.1 Groundwater Level

Groundwater level monitoring was carried out at seven wells within the licensed site and at one immediately outside it (Well 2). Groundwater levels were measured using a standard 30m long dipmeter. Recorded levels are presented in Table 3.1 and plotted in chart below.

Table 3-1
Groundwater level monitoring, Soil Recovery Facility, Blackhall, Naas, Co. Kildare

Well No.	Ground Level mOD	Groundwater level mOD
GW1	168.75	157.06
GW2	157.5	144.17
GW3	160.5	144.72
GW4	153.4	148.27
GW5	163.3	155.8
GW6	162.1	144.5
Well 1	153.0	149.43
Well 2	163.8	153.47



3.2 Groundwater Quality in Q1 of 2016

Groundwater quality monitoring was undertaken at 7 No. groundwater wells, identified as GW1, GW2, GW3, GW4, GW5 (all monitoring wells); Well 1 (a domestic supply well) and Well 2. At groundwater well GW6, the water level was not sufficient to take a water sample. Well locations are indicated on Figure 2. Monitoring of physical parameters (visual inspection, pH, electrical conductivity, and dissolved oxygen) was undertaken using an YSI Instruments multiparameter probe. Samples were taken for chemical quality testing and sent to ALcontrol Laboratories for analysis.

All monitored wells except Well 1 were pumped out using a Waterra plastic tubing fitted with a foot valve and Waterra Pump. Field parameters were measured during pumping and were monitored to ensure that all standing water in monitoring boreholes was removed and fresh groundwater samples were obtained.

Laboratory test data screened against the water quality threshold limits set in the Groundwater Regulations 2010 is presented in Appendix B of this report. Certified quality results are presented in Appendix C of this Report.

Measured chloride values range from 12.6 mg/l in GW5 and Well1 to 20.3 mg/l in Well2. Measured sulphate values range from 8.9 mg/l in GW1 to 84.9 mg/l in Well1.

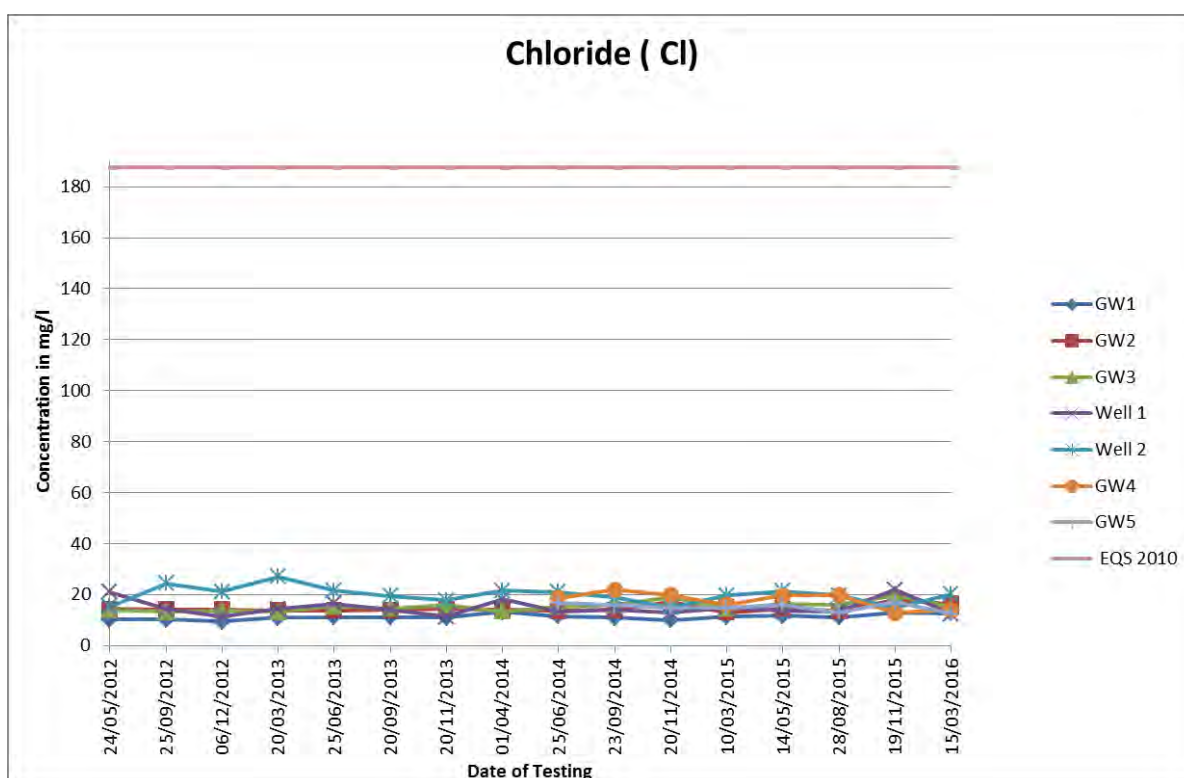
The recorded ammoniacal nitrogen concentrations at GW2, GW4 and Well1 exceeded the threshold limit of 0.175 mg/l for general quality of groundwater in a groundwater body. Interpreting the groundwater levels and groundwater flow around the site location could be suggestive of potential impact from septic tanks and/or slurry spreading. It is also noted that there is noticeable seasonal trend in ammoniacal nitrogen concentration in tested groundwater with higher parameter concentrations in winter/ spring, which possibly can be related to increased rainfall and ammoniacal nitrogen being flushed into the groundwater when rainfall increases.

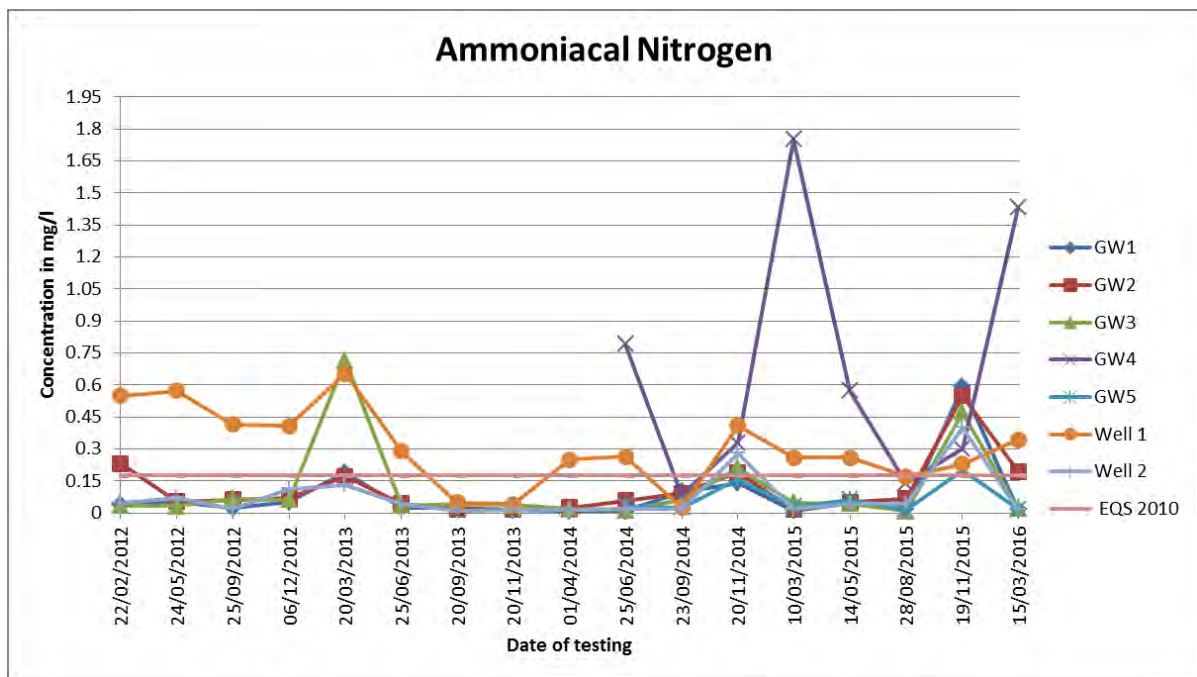
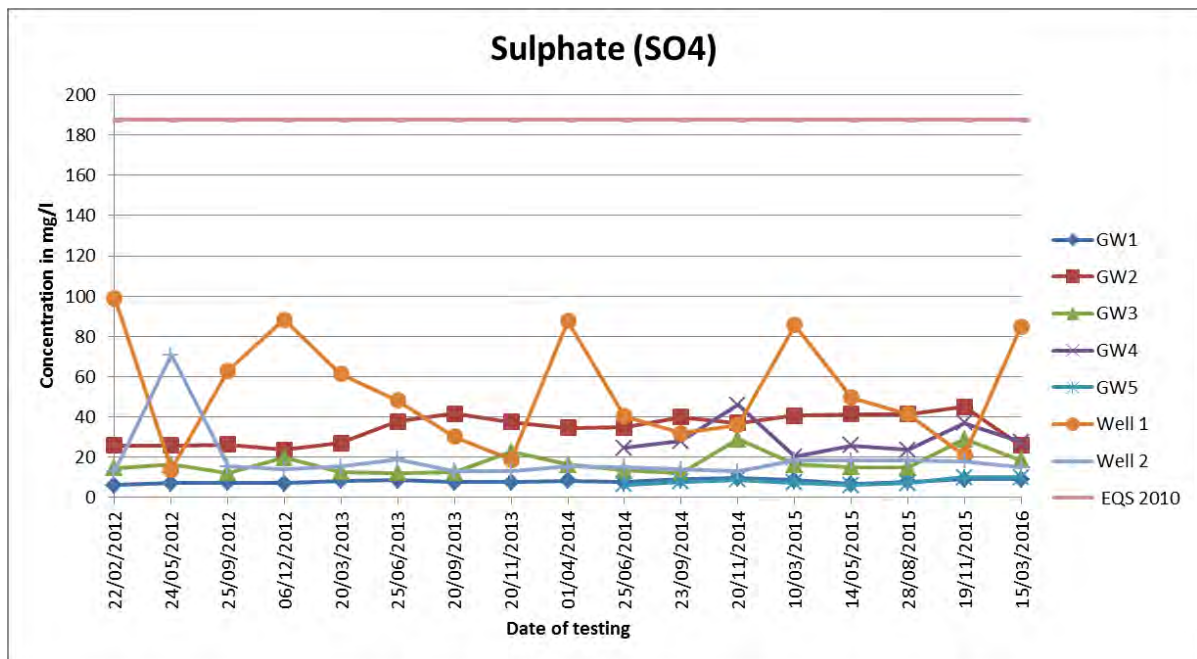
In the view of the marginal mercury exceedance in last round of sampling, GW 2 was tested for this parameter in this round of sampling. No mercury was detected at GW2 in this round of sampling.

In this round of monitoring ammoniacal nitrogen exceeded groundwater quality standard in GW2, GW4 and Well1; all other tested parameters are within the quality standard limits for groundwater (European Communities Environmental Objectives (Groundwater) Regulations 2010).

3.3 Variation and trends in Groundwater Water Quality

The plots provided below show variations and trends in groundwater water quality for monitored parameters (Chloride, Sulphate, Ammoniacal Nitrogen) from the beginning of 2012. Plots show no indication of sustained increase of monitored parameters concentration over the time.





4.0 CLOSURE

This report has been prepared by SLR Consulting Ireland with all reasonable skill, care, and diligence, and taking account of the manpower and resources devoted to it by agreement with the client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of Behan's Land Restoration Ltd.; no warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the client and others in respect of any matters outside the agreed scope of the work.

5.0 REFERENCES

Statutory Instruments No. 9 of 2010. European Communities Environmental Objectives (Groundwater) Regulations, 2010

Statutory Instruments No. 272 of 2009. European Communities Environmental Objectives (Surface Waters) Regulations, 2009

FIGURES


- Figure 1 Site Location Map**
- Figure 2 Existing Site Layout**




NOTES

1. EXTRACT FROM 1:50,000 O.S DISCOVERY SERIES MAP NO. 49, 50, 55 & 56
2. ORDNANCE SURVEY IRELAND LICENCE NO. SU 0000714 (C) ORDNANCE SURVEY & GOVERNMENT OF IRELAND

LEGEND

 LOCATION OF QUARRY

00004.00028.0.7.FIG_1.0.Site Location Plan.dwg

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SITE LOCATION PLAN

FIGURE 1

Scale 1:50,000 @ A3 Date JULY 2014



NOTES
 1. ORDNANCE SURVEY IRELAND LICENCE NO. SU 0000714 (C) ORDNANCE SURVEY & GOVERNMENT OF IRELAND

LEGEND

	APPLICANTS LAND INTEREST
	ENVIRONMENTAL NOISE MONITORING LOCATION
	ENVIRONMENTAL DUST MONITORING LOCATION
	ENVIRONMENTAL MONITORING BOREHOLE LOCATION

00004.00028.0.7.FIG_2.0.Environmental Monitoring Plan.dwg

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FIGURE 2
 Scale 1:3,000 @ A3 Date JUNE 2014

Appendix A

Surface Water Chemical Test Results



Date 30-Mar-16
 Sheet: 1 of 1
 By: AB

Project Name: Surface Water Monitoring
Location: Behans Land Restoration
 Blackhall, Naas, County Kildare

Surface Water Chemical Test Results

Date	Location	Lab ID	Sample Type	Sample Date	Temperature	pH	Electrical conductivity	Dissolved Oxygen	Dissolved Oxygen	Chloride as Cl	Sulphate as SO4	Ammoniacal Nitrogen	TPH	
Unit					T°C		mScm ⁻¹	mg/l	%	mg/l	mg/l	mg/l	mg/l	
Screening Value*						4.5-9.0 ≤100 mg/lCaCO3 6.0-9.0 >100 mg/lCaCO3						High status ≤ 0.040 (mean) or ≤ 0.090 (95%ile) Good Status ≤ 0.065 (mean) or ≤ 0.140 (95%ile)		
Detection Limits										<2	<2	<0.01	<0.01	
30-Mar-16	SW2	13106214	Water	15 March 2016	8.93	8.09	0.677	4.09	36.6	15	18.5	0.0174		
30-Mar-16	SW3	13106217	Water	15 March 2016	9	8.08	0.601	4.53	41.6	16.4	141	0.0276	<0.01	

*SI No. 272 of 2009 European Communities Environmental Objectives (Surface Waters) Regulations, 2009

Appendix B

Ground Water Chemical Test Results



Date 30-Mar-16
 Sheet: 1 of 1
 By: AB

Project Name: Groundwater Monitoring
Location: Behans Land Restoration
 Blackhall, Naas, County Kildare

Ground Water Chemical Test

Date	Location	LAB ID	Sample Type	Sample Date	GWL (mOD)	Temperature	pH	Electrical conductivity	Dissolved Oxygen	Dissolved Oxygen	Chloride as Cl	Sulphate as SO4	Ammoniacal Nitrogen as N	Mercury
						°C		mScm ⁻¹	mg/l	%	mg/l	mg/l	mg/l	mg/l
Screening Value*								1.875			187.5	187.5	0.175	0.00075
Detection Limits											1	1	0.01	0.00001
30-Mar-16	GW1	13106184	Water	15 March 2016	157.06	9.14	7.52	0.618	3.23	34.3	12.7	8.9	0.0167	
30-Mar-16	GW2	13106191	Water	15 March 2016	144.17	9.05	7.58	0.421	1.76	15.2	16.5	25.8	0.194	<0.00001
30-Mar-16	GW3	13106195	Water	15 March 2016	144.72	8.58	7.96	0.693	4.8	40.7	15.1	18.6	0.0211	
30-Mar-16	GW4	13106199	Water	15 March 2016	148.27	9.8	7.8	0.492	2.11	19.4	14.1	27.5	1.43	
30-Mar-16	GW5	13106203	Water	15 March 2016	155.8	10.36	7.6	0.668	2.05	23.7	12.6	9.9	0.0185	
30-Mar-16	Well 1	13106206	Water	15 March 2016	149.43	9.1	7.56	0.520	2.93	26.2	12.6	84.9	0.343	
30-Mar-16	Well 2	13106210	Water	15 March 2016	153.47	8.94	7.89	0.572	4.3	49.3	20.3	14.9	0.0162	

*SI No. 9 of 2010 European Communities Environmental Objectives (Groundwater) Regulations, 2010

Appendix C
Copy of Certified Results



SLR Consulting Ireland
CSA House
Unit 7
Dundrum Business Park
Windy Harbour
Dublin
Dublin14

Attention: Aldona Binchy

CERTIFICATE OF ANALYSIS

Date: 29 March 2016
Customer: D_SLRCON_DUB
Sample Delivery Group (SDG): 160317-55
Your Reference:
Location: Blackhall
Report No: 354840

We received 9 samples on Thursday March 17, 2016 and 9 of these samples were scheduled for analysis which was completed on Tuesday March 29, 2016. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

All chemical testing (unless subcontracted) is performed at ALcontrol Hawarden Laboratories.

Approved By:

Sonia McWhan

Operations Manager





SDG: 160317-55
Job: D_SLRCON_DUB-82
Client Reference:

Location: Blackhall
Customer: SLR Consulting Ireland
Attention: Aldona Binchy

Order Number: 2893
Report Number: 354840
Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
13106184	GW1		0.00 - 0.00	15/03/2016
13106191	GW2		0.00 - 0.00	15/03/2016
13106195	GW3		0.00 - 0.00	15/03/2016
13106199	GW4		0.00 - 0.00	15/03/2016
13106203	GW5		0.00 - 0.00	15/03/2016
13106214	SW02		0.00 - 0.00	15/03/2016
13106217	SW03		0.00 - 0.00	15/03/2016
13106206	Well1		0.00 - 0.00	15/03/2016
13106210	Well2		0.00 - 0.00	15/03/2016

Only received samples which have had analysis scheduled will be shown on the following pages.



SDG: 160317-55
 Job: D_SLRCON_DUB-82
 Client Reference:

Location: Blackhall
 Customer: SLR Consulting Ireland
 Attention: Aldona Binchy

Order Number: 2893
 Report Number: 354840
 Superseded Report:

LIQUID Results Legend	Lab Sample No(s)	Customer Sample Reference	AGS Reference	Depth (m)	Container				
	13106184	13106191	13106195	13106199	13106203	13106214	13106217	13106206	13106210
X Test N No Determination Possible									
	0.00 - 0.00	GW1		0.00 - 0.00	500ml Plastic (AL E2)				
	0.00 - 0.00	GW2		0.00 - 0.00	500ml Plastic (AL E2)				
	0.00 - 0.00	GW3		0.00 - 0.00	500ml Plastic (AL E2)				
	0.00 - 0.00	GW4		0.00 - 0.00	500ml Plastic (AL E2)				
	0.00 - 0.00	GW5		0.00 - 0.00	500ml Plastic (AL E2)				
	0.00 - 0.00	SW02		0.00 - 0.00	500ml Plastic (AL E2)				
	0.00 - 0.00	SW03		0.00 - 0.00	0.5l glass bottle (AL E2)				
	0.00 - 0.00	Well1		0.00 - 0.00	500ml Plastic (AL E2)				
	0.00 - 0.00	Well2		0.00 - 0.00	500ml Plastic (AL E2)				
Ammonium Low	All	NDPs: 0 Tests: 9							
Anions by Kone (w)	All	NDPs: 0 Tests: 9							
EPH CWG (Aliphatic) Aqueous GC (W)	All	NDPs: 0 Tests: 1							
EPH CWG (Aromatic) Aqueous GC (W)	All	NDPs: 0 Tests: 1							
GRO by GC-FID (W)	All	NDPs: 0 Tests: 1							
Mercury Dissolved	All	NDPs: 0 Tests: 1							
TPH CWG (W)	All	NDPs: 0 Tests: 1							



CERTIFICATE OF ANALYSIS

SDG: 160317-55
Job: D_SLRCON_DUB-82
Client Reference:

Location: Blackhall
Customer: SLR Consulting Ireland
Attention: Aldona Binchy

Order Number: 2893
Report Number: 354840
Superseded Report:

Table with columns: Results Legend, Customer Sample R, GW1, GW2, GW3, GW4, GW5, SW02. Rows include Ammoniacal Nitrogen as N (low level), Mercury (diss.filt), Sulphate, Chloride, and multiple empty rows.



CERTIFICATE OF ANALYSIS

SDG: 160317-55
Job: D_SLRCON_DUB-82
Client Reference:

Location: Blackhall
Customer: SLR Consulting Ireland
Attention: Aldona Binchy

Order Number: 2893
Report Number: 354840
Superseded Report:

Table with columns: Results Legend, Customer Sample R, SW03, Well1, Well2, Component, LOD/Units, Method. Includes data for Ammoniacal Nitrogen as N, Sulphate, and Chloride.



SDG: 160317-55
Job: D_SLRCON_DUB-82
Client Reference:

Location: Blackhall
Customer: SLR Consulting Ireland
Attention: Aldona Binchy

Order Number: 2893
Report Number: 354840
Superseded Report:

TPH CWG (W)

Results Legend		Customer Sample R	SW03				
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	0.00 - 0.00				
M	mCERTS accredited.		Water(GW/SW)				
aq	Aqueous / settled sample.		15/03/2016				
diss.filt	Dissolved / filtered sample.						
tot.unfilt	Total / unfiltered sample.						
*	Subcontracted test.						
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery		17/03/2016				
(F)	Trigger breach confirmed		160317-55				
1-5&*\$@	Sample deviation (see appendix)		13106217				
Component	LOD/Units	Method					
GRO Surrogate % recovery**	%	TM245	82	2			
GRO >C5-C12	<50 µg/l	TM245	<50	2 #			
Methyl tertiary butyl ether (MTBE)	<3 µg/l	TM245	<3	2 #			
Benzene	<7 µg/l	TM245	<7	2 #			
Toluene	<4 µg/l	TM245	<4	2 #			
Ethylbenzene	<5 µg/l	TM245	<5	2 #			
m,p-Xylene	<8 µg/l	TM245	<8	2 #			
o-Xylene	<3 µg/l	TM245	<3	2 #			
Sum of detected Xylenes	<11 µg/l	TM245	<11	2			
Sum of detected BTEX	<28 µg/l	TM245	<28	2			
Aliphatics >C5-C6	<10 µg/l	TM245	<10	2			
Aliphatics >C6-C8	<10 µg/l	TM245	<10	2			
Aliphatics >C8-C10	<10 µg/l	TM245	<10	2			
Aliphatics >C10-C12	<10 µg/l	TM245	<10	2			
Aliphatics >C12-C16 (aq)	<10 µg/l	TM174	<10				
Aliphatics >C16-C21 (aq)	<10 µg/l	TM174	<10				
Aliphatics >C21-C35 (aq)	<10 µg/l	TM174	<10				
Total Aliphatics >C12-C35 (aq)	<10 µg/l	TM174	<10				
Aromatics >EC5-EC7	<10 µg/l	TM245	<10	2			
Aromatics >EC7-EC8	<10 µg/l	TM245	<10	2			
Aromatics >EC8-EC10	<10 µg/l	TM245	<10	2			
Aromatics >EC10-EC12	<10 µg/l	TM245	<10	2			
Aromatics >EC12-EC16 (aq)	<10 µg/l	TM174	<10				
Aromatics >EC16-EC21 (aq)	<10 µg/l	TM174	<10				
Aromatics >EC21-EC35 (aq)	<10 µg/l	TM174	<10				
Total Aromatics >EC12-EC35 (aq)	<10 µg/l	TM174	<10				
Total Aliphatics & Aromatics >C5-35 (aq)	<10 µg/l	TM174	<10				



SDG: 160317-55
Job: D_SLRCON_DUB-82
Client Reference:

Location: Blackhall
Customer: SLR Consulting Ireland
Attention: Aldona Binchy

Order Number: 2893
Report Number: 354840
Superseded Report:

Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample ¹	Surrogate Corrected
TM061	Method for the Determination of EPH, Massachusetts Dept. of EP, 1998	Determination of Extractable Petroleum Hydrocarbons by GC-FID (C10-C40)		
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser		
TM174	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Waters by GC-FID		
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry		
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers		
TM245	By GC-FID	Determination of GRO by Headspace in waters		

¹ Applies to Solid samples only. DRY indicates samples have been dried at 35°C. NA = not applicable.



SDG: 160317-55
Job: D_SLRCON_DUB-82
Client Reference:

Location: Blackhall
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Attention: Aldona Binchy

Order Number: 2893
Report Number: 354840
Superseded Report:

Test Completion Dates

Lab Sample No(s)	13106184	13106191	13106195	13106199	13106203	13106214	13106217	13106206	13106210
Customer Sample Ref.	GW1	GW2	GW3	GW4	GW5	SW02	SW03	Well1	Well2
AGS Ref.									
Depth	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
Type	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID
Ammonium Low	29-Mar-2016	29-Mar-2016	29-Mar-2016	26-Mar-2016	29-Mar-2016	29-Mar-2016	29-Mar-2016	29-Mar-2016	29-Mar-2016
Anions by Kone (w)	24-Mar-2016	24-Mar-2016	24-Mar-2016	23-Mar-2016	23-Mar-2016	24-Mar-2016	24-Mar-2016	24-Mar-2016	24-Mar-2016
EPH CWG (Aliphatic) Aqueous GC (W)							24-Mar-2016		
EPH CWG (Aromatic) Aqueous GC (W)							24-Mar-2016		
GRO by GC-FID (W)							23-Mar-2016		
Mercury Dissolved		24-Mar-2016							
TPH CWG (W)							24-Mar-2016		



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Superseded Report:

Appendix

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH₄ by the BRE method, VOC TICs and SVOC TICs.

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALcontrol Laboratories reserve the right to charge for samples received and stored but not analysed.

4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

6. When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

7. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

9. NDP - No determination possible due to insufficient/unsuitable sample.

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals - total metals must be requested separately.

11. Results relate only to the items tested.

12. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%, they are generally wider for volatiles analysis, 50-150%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

14. **Product analyses** - Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethylphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

General

20. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

21. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

22. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

24. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

Sample Deviations

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
4	Holding time exceeded before sample received
5	Samples exceeded holding time before preservation was performed
\$	Sampled on date not provided
+	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to sampled on date
&	Sample Holding Time exceeded - Late arrival of instructions.

Asbestos

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALcontrol Laboratories (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALcontrol Laboratories (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Crystalline	White Asbestos
Amphibole	Brown Asbestos
Crystalline	Blue Asbestos
Fibrous Asbestos	-
Fibrous Amphibole	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.



global environmental solutions

**John Behan / Behan's Land Restoration Ltd.
Soil Recovery Facility, Blackhall, Naas, Co. Kildare**

**Report on Surface Water and Groundwater
Quality Monitoring: Q2 of 2016**

**June 2016
SLR Ref: 160627 501.00004.00037 Q1 2016 Rev 0**

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Registered in Ireland as: SLR Environmental Consulting (Ireland) Limited. Registered No.253332. VAT No. 8253332J

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1.0 INTRODUCTION

This surface water and groundwater monitoring report is prepared in respect of the licensed soil recovery facility operated by Behan's Land Restoration Ltd. at Blackhall, Punchestown, Naas, Co Kildare (EPA Waste Licence Ref No. W0247-01), the location of which is identified in Figure 1.

Surface water and groundwater quality monitoring at existing surface water and groundwater monitoring locations was undertaken on the 15th June 2016. Samples were analysed for contaminants listed in Schedule C2.2 of the Waste Licence for the recovery facility (Ref. W0247-01) as requiring monitoring on a quarterly basis. Monitoring point locations are shown on Figure 2.

2.0 SURFACE WATER QUALITY

2.1 Surface Water Quality in Q2 of 2016

Surface water quality monitoring was undertaken in two ponds: SW2 located in the north eastern sector of the site and SW3 located at the southwestern sector of the site (refer to Figure 2). Monitoring of physical parameters (visual inspection, temperature, pH, electrical conductivity and dissolved oxygen) was undertaken in the field using a YSI Instruments multi-parameter probe. Samples were taken for chemical quality testing and sent to ALcontrol Laboratories.

Recorded pH values in the surface water ponds were between 8.31 in SW2 and 8.08 in SW3. Recorded Dissolved Oxygen (DO) values were between 12.35 mg/l at SW2 and 8 mg/l at SW3. The concentration of DO will vary with temperature - the DO concentration is typically higher in winter and lower in summer. Surrounding farming activities such as the spreading of slurry or the application of nitrates can also effect DO concentration in water.

The variations in Electrical Conductivity (EC); from 0.406 mScm⁻¹ in SW2 to 0.423 mScm⁻¹ in SW3 reflect natural variation and changes within the water, often associated with seasonal changes in temperature.

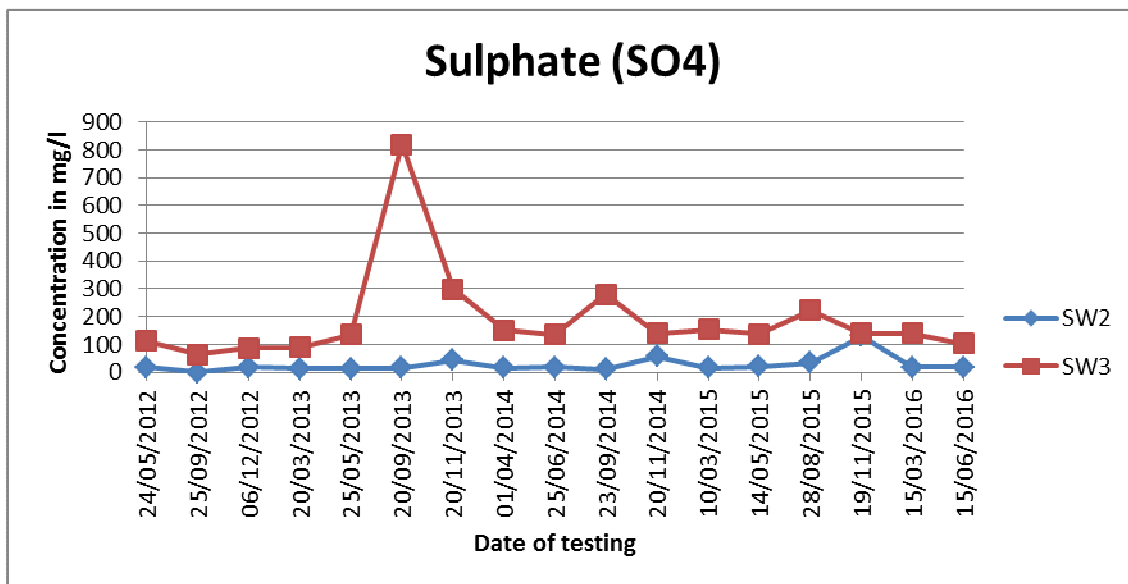
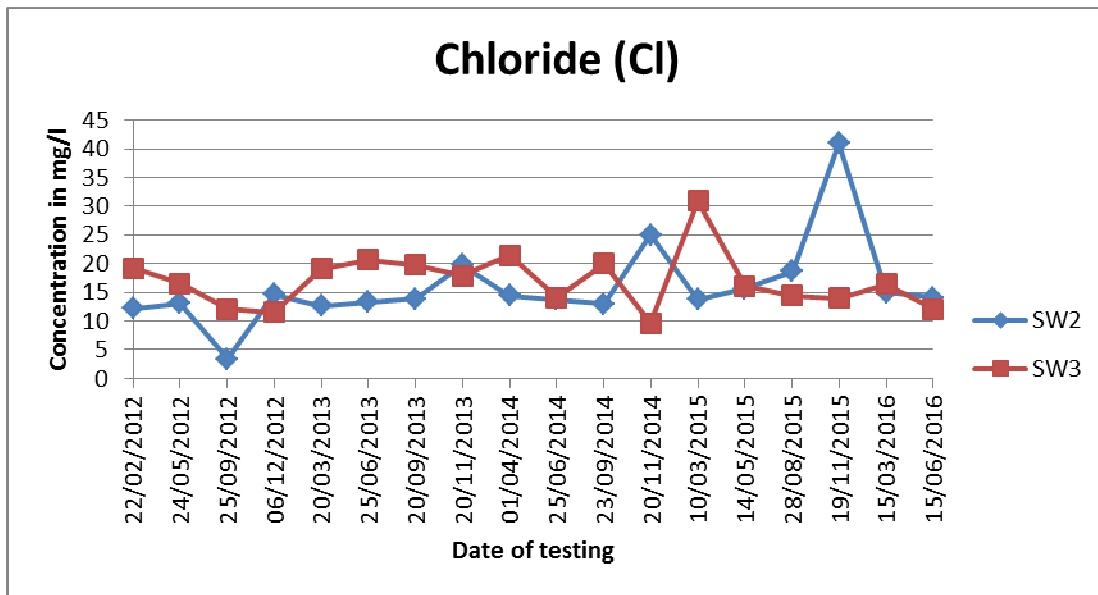
Visual inspections of the ponded water were undertaken for discolouration and evidence of oil sheen / film. Odour inspections were also undertaken. The visual inspections indicated that the water was generally clear with no suspended solids or humic matter in the water. Water level in

Results of surface water quality tests screened against the Surface Waters Regulations 2009 are presented in the Appendix A of this report and a copy of the certified test results is presented in Appendix C.

All tested parameters are within the quality standard limits for surface waters (European Communities Environmental Objectives (Surface Water) Regulations 2009).

2.2 Variation and trends in Surface Water Quality

The plots provided below show variations and trends in surface water quality for monitored parameters (Chloride, Sulphate, Ammoniacal Nitrogen) from the beginning of 2012. Plots show no indication of sustained increase of monitored parameters concentration over the time.



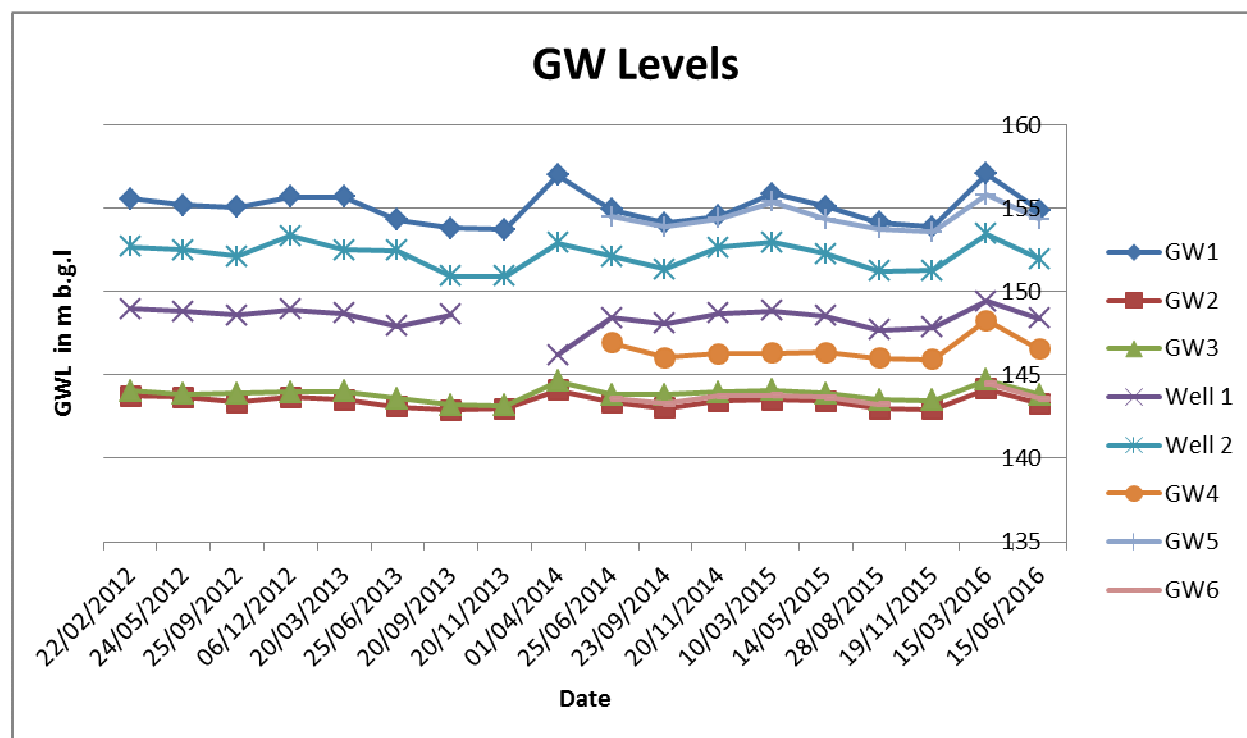
3.0 GROUNDWATER

3.1 Groundwater Level

Groundwater level monitoring was carried out at seven wells within the licensed site and at one immediately outside it (Well 2). Groundwater levels were measured using a standard 30m long dipmeter. Recorded levels are presented in Table 3.1 and plotted in chart below.

Table 3-1
Groundwater level monitoring, Soil Recovery Facility, Blackhall, Naas, Co. Kildare

Well No.	Ground Level mOD	Groundwater level mOD
GW1	168.75	154.89
GW2	157.5	143.29
GW3	160.5	143.82
GW4	153.4	146.55
GW5	163.3	154.33
GW6	162.1	148.38
Well 1	153.0	151.97
Well 2	163.8	154.89



3.2 Groundwater Quality in Q1 of 2016

Groundwater quality monitoring was undertaken at 7 No. groundwater wells, identified as GW1, GW2, GW3, GW4, GW5 (all monitoring wells); Well 1 (a domestic supply well) and Well 2. At groundwater well GW6, the water level was not sufficient to take a water sample. Well locations are indicated on Figure 2. Monitoring of physical parameters (visual inspection, pH, electrical conductivity, and dissolved oxygen) was undertaken using an YSI Instruments multiparameter probe. Samples were taken for chemical quality testing and sent to ALcontrol Laboratories for analysis.

All monitored wells except Well 1 were pumped out using a Waterra plastic tubing fitted with a foot valve and Waterra Pump. Field parameters were measured during pumping and were monitored to ensure that all standing water in monitoring boreholes was removed and fresh groundwater samples were obtained.

Laboratory test data screened against the water quality threshold limits set in the Groundwater Regulations 2010 is presented in Appendix B of this report. Certified quality results are presented in Appendix C of this Report.

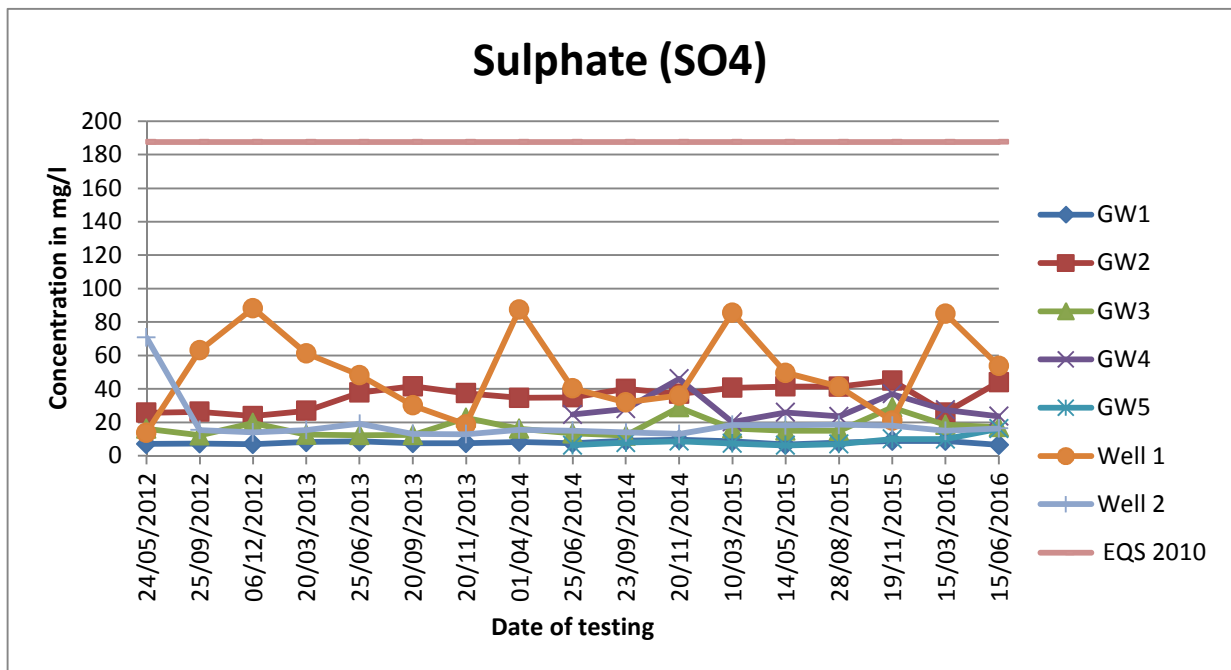
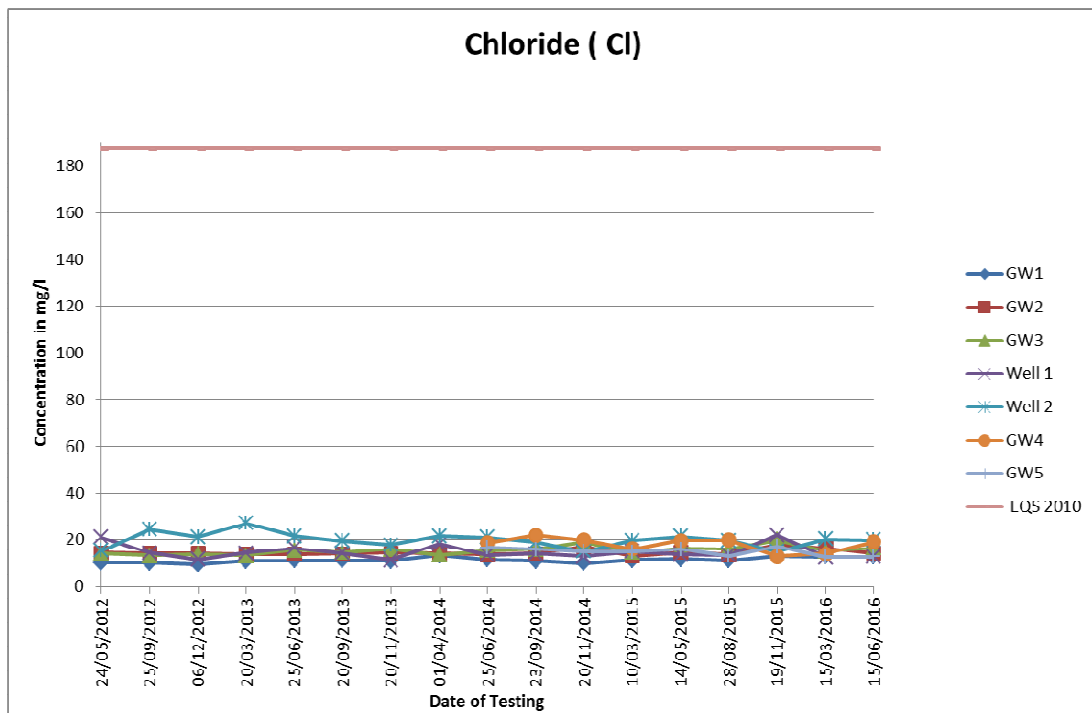
Measured chloride values range from 12.3 mg/l in GW1 and 20 mg/l in Well2. Measured sulphate values range from 6.5 mg/l in GW1 to 53.8 mg/l in Well1.

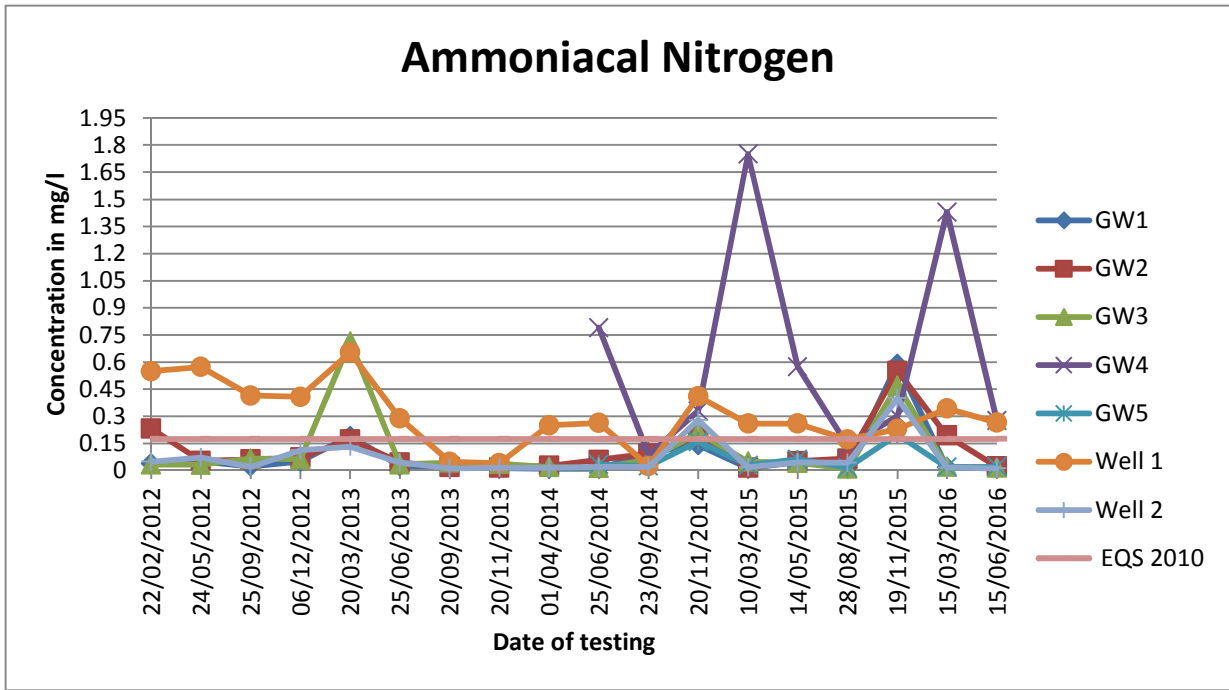
The recorded ammoniacal nitrogen concentrations at GW4 and Well1 exceeded the threshold limit of 0.175 mg/l for general quality of groundwater in a groundwater body. Interpreting the groundwater levels and groundwater flow around the site location could be suggestive of potential impact from septic tanks and/or slurry spreading. It is also noted that there is noticeable seasonal trend in ammoniacal nitrogen concentration in tested groundwater with higher parameter concentrations in winter/ spring, which possibly can be related to increased rainfall and ammoniacal nitrogen being flushed into the groundwater when rainfall increases.

In this round of monitoring ammoniacal nitrogen exceeded groundwater quality standard in GW4 and Well1; all other tested parameters are within the quality standard limits for groundwater (European Communities Environmental Objectives (Groundwater) Regulations 2010).

3.3 Variation and trends in Groundwater Water Quality

The plots provided below show variations and trends in groundwater water quality for monitored parameters (Chloride, Sulphate, Ammoniacal Nitrogen) from the beginning of 2012. Plots show no indication of sustained increase of monitored parameters concentration over the time.





4.0 CLOSURE

This report has been prepared by SLR Consulting Ireland with all reasonable skill, care, and diligence, and taking account of the manpower and resources devoted to it by agreement with the client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of Behan's Land Restoration Ltd.; no warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the client and others in respect of any matters outside the agreed scope of the work.

5.0 REFERENCES

Statutory Instruments No. 9 of 2010. European Communities Environmental Objectives (Groundwater) Regulations, 2010

Statutory Instruments No. 272 of 2009. European Communities Environmental Objectives (Surface Waters) Regulations, 2009

FIGURES


- Figure 1 Site Location Map**
- Figure 2 Existing Site Layout**




NOTES

1. EXTRACT FROM 1:50,000 O.S DISCOVERY SERIES MAP NO. 49, 50, 55 & 56
2. ORDNANCE SURVEY IRELAND LICENCE NO. SU 0000714 (C) ORDNANCE SURVEY & GOVERNMENT OF IRELAND

LEGEND

 LOCATION OF QUARRY

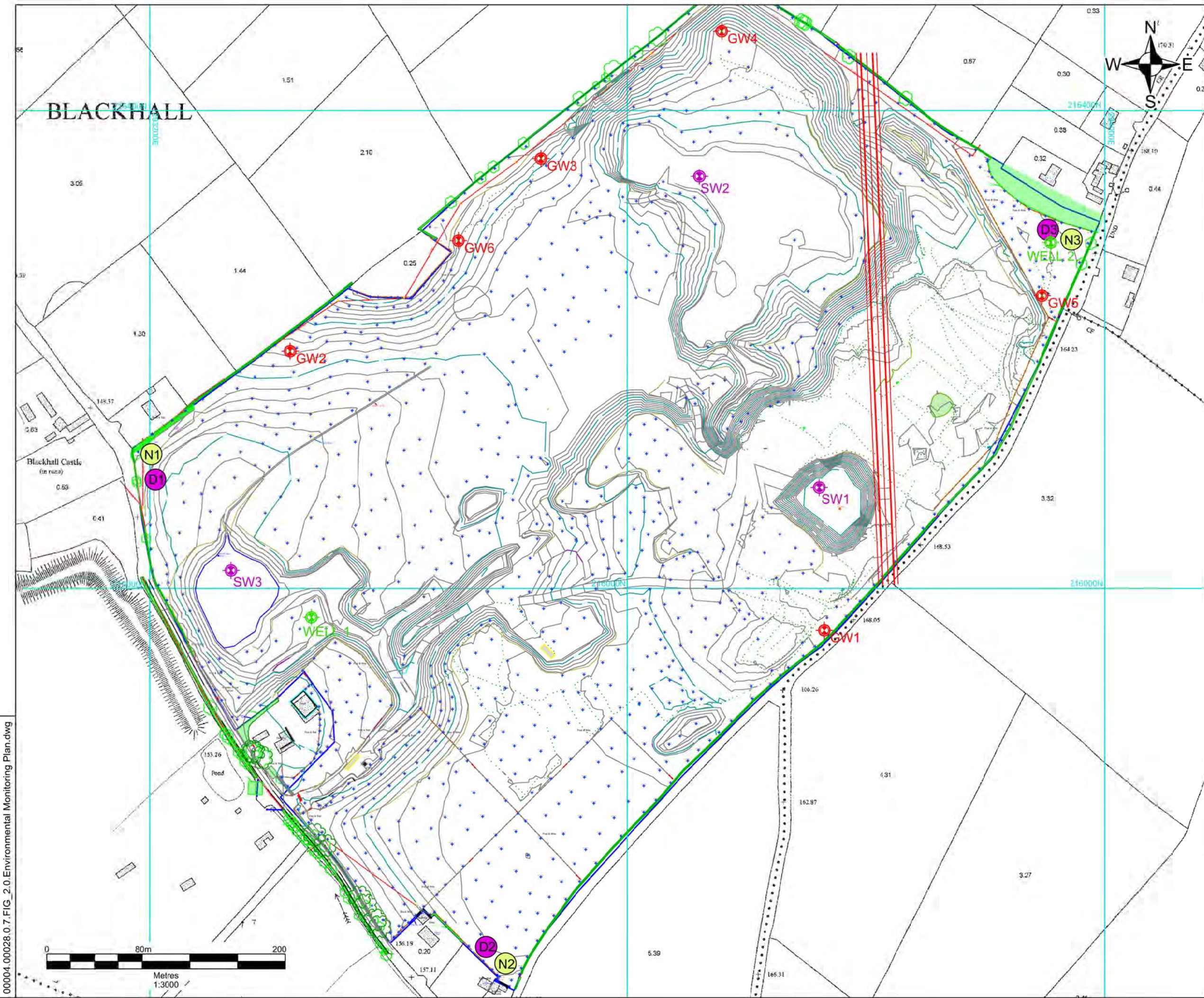
00004.00028.0.7 FIG_1.0 Site Location Plan.dwg

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JOHN BEHAN
BLACKHALL, PUNCESTOWN
NAAS, CO. KILDARE
SITE LOCATION PLAN

FIGURE 1

Scale 1:50,000 @ A3 Date JULY 2014



NOTES
 1. ORDNANCE SURVEY IRELAND LICENCE NO. SU 0000714 (C) ORDNANCE SURVEY & GOVERNMENT OF IRELAND

- LEGEND**
-  APPLICANTS LAND INTEREST
 -  ENVIRONMENTAL NOISE MONITORING LOCATION
 -  ENVIRONMENTAL DUST MONITORING LOCATION
 -  ENVIRONMENTAL MONITORING BOREHOLE LOCATION

00004.00028.0.7.FIG_2.0.Environmental Monitoring Plan.dwg

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JOHN BEHAN
 BLACKHALL, PUNCHESTOWN
 NAAS, CO. KILDARE
ENVIRONMENTAL MONITORING PLAN

FIGURE 2
 Scale 1:3,000 @ A3 Date JUNE 2014

Appendix A

Surface Water Chemical Test Results



Date 28-Jun-16
 Sheet: 1 of 1
 By: AB

Project Name: Surface Water Monitoring
Location: Behans Land Restoration
 Blackhall, Naas, County Kildare

Surface Water Chemical Test Results

Date	Location	Lab ID	Sample Type	Sample Date	Temperature	pH	Electrical conductivity	Dissolved Oxygen	Dissolved Oxygen	Chloride as Cl	Sulphate as SO4	Ammoniacal Nitrogen		
Unit					T°C		mScm ⁻¹	mg/l	%	mg/l	mg/l	mg/l		
Screening Value*						4.5-9.0 ≤100 mg/lCaCO3 6.0-9.0 >100 mg/lCaCO3						High status ≤ 0.040 (mean) or ≤ 0.090 (95%ile) Good Status ≤ 0.065 (mean) or ≤ 0.140 (95%ile)		
Detection Limits										<2	<2	<0.01		
28-Jun-16	SW2	13614309	Water	15 June 2016	20.3	8.31	0.406	12.35	138.4	14.1	18.5	0.0944		
28-Jun-16	SW3	13614312	Water	15 June 2016	18.4	8.08	0.423	8	90.2	12.1	103	0.058		

*SI No. 272 of 2009 European Communities Environmental Objectives (Surface Waters) Regulations, 2009

Appendix B

Ground Water Chemical Test Results



Date 28-Jun-16
 Sheet: 1 of 1
 By: AB

Project Name: Groundwater Monitoring
Location: Behans Land Restoration
 Blackhall, Naas, County Kildare

Ground Water Chemical Test

Date	Location	LAB ID	Sample Type	Sample Date	GWL (mOD)	Temperature	pH	Electrical conductivity	Dissolved Oxygen	Dissolved Oxygen	Chloride as Cl	Sulphate as SO4	Ammoniacal Nitrogen as N	
Unit						T°C		mScm ⁻¹	mg/l	%	mg/l	mg/l	mg/l	
Screening Value*								1.875			187.5	187.5	0.175	
Detection Limits											1	1	0.01	
28-Jun-16	GW1	13614283	Water	15 June 2016	154.89	8.9	7.53	0.333	9.15	79.4	12.3	6.5	0.0119	
28-Jun-16	GW2	13614290	Water	15 June 2016	143.29	11.5	7.44	0.363	3.03	28.9	14.2	44	0.022	
28-Jun-16	GW3	13614294	Water	15 June 2016	143.82	12.8	7.38	0.447	6.31	59	16.5	17.1	0.0156	
28-Jun-16	GW4	13614299	Water	15 June 2016	146.55	10.5	7.23	0.530	6.02	63.8	19.1	23.6	0.277	
28-Jun-16	GW5	13614304	Water	15 June 2016	154.33	9.9	7.11	0.580	7.42	67.5	12.8	16.2	0.0206	
28-Jun-16	Well 1	13614315	Water	15 June 2016	148.38	10.2	7.45	0.450	3.3	29.5	12.8	53.8	0.266	
28-Jun-16	Well 2	13614319	Water	15 June 2016	151.97	8.9	7.53	0.334	9.15	79.4	20	16.4	0.0119	

*SI No. 9 of 2010 European Communities Environmental Objectives (Groundwater) Regulations, 2010

Appendix C
Copy of Certified Results



SLR Consulting Ireland
CSA House
Unit 7
Dundrum Business Park
Windy Harbour
Dublin
Dublin14

Attention: Aldona Binchy

CERTIFICATE OF ANALYSIS

Date: 25 June 2016
Customer: D_SLRCON_DUB
Sample Delivery Group (SDG): 160617-102
Your Reference:
Location: Blackhall
Report No: 366433

We received 9 samples on Friday June 17, 2016 and 9 of these samples were scheduled for analysis which was completed on Saturday June 25, 2016. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

All chemical testing (unless subcontracted) is performed at ALcontrol Hawarden Laboratories.

Approved By:

Sonia McWhan

Operations Manager





SDG: 160617-102
Job: D_SLRCON_DUB-82
Client Reference:

Location: Blackhall
Customer: SLR Consulting Ireland
Attention: Aldona Binchy

Order Number: 2965
Report Number: 366433
Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
13614283	GW1		0.00 - 0.00	15/06/2016
13614290	GW2		0.00 - 0.00	15/06/2016
13614294	GW3		0.00 - 0.00	15/06/2016
13614299	GW4		0.00 - 0.00	15/06/2016
13614304	GW5		0.00 - 0.00	15/06/2016
13614309	SW02		0.00 - 0.00	15/06/2016
13614312	SW03		0.00 - 0.00	15/06/2016
13614315	Well 1		0.00 - 0.00	15/06/2016
13614319	Well2		0.00 - 0.00	15/06/2016

Only received samples which have had analysis scheduled will be shown on the following pages.



SDG: 160617-102
Job: D_SLRCON_DUB-82
Client Reference:

Location: Blackhall
Customer: SLR Consulting Ireland
Attention: Aldona Binchy

Order Number: 2965
Report Number: 366433
Superseded Report:

LIQUID Results Legend X Test N No Determination Possible	Lab Sample No(s)	Customer Sample Reference	AGS Reference	Depth (m)	Container	
		13614319	Well2		0.00 - 0.00	H2SO4 (ALE244)
		13614315	Well 1		0.00 - 0.00	11plastic (ALE221)
		13614312	SW03		0.00 - 0.00	H2SO4 (ALE244)
		13614309	SW02		0.00 - 0.00	11plastic (ALE221)
	13614304	GW5		0.00 - 0.00	H2SO4 (ALE244)	
	13614299	GW4		0.00 - 0.00	11plastic (ALE221)	
	13614294	GW3		0.00 - 0.00	H2SO4 (ALE244)	
	13614290	GW2		0.00 - 0.00	11plastic (ALE221)	
	13614283	GW1		0.00 - 0.00	H2SO4 (ALE244)	
					11plastic (ALE221)	
Ammonium Low	All	NDPs: 0 Tests: 9			X X X X X X X X X X	
Anions by Kone (w)	All	NDPs: 0 Tests: 9			X X X X X X X X X X	



CERTIFICATE OF ANALYSIS

SDG: 160617-102
Job: D_SLRCON_DUB-82
Client Reference:

Location: Blackhall
Customer: SLR Consulting Ireland
Attention: Aldona Binchy

Order Number: 2965
Report Number: 366433
Superseded Report:

Table with columns: Results Legend, Customer Sample R, GW1, GW2, GW3, GW4, GW5, SW02. Rows include Ammoniacal Nitrogen as N (low level), Sulphate, Chloride, and multiple empty rows.



CERTIFICATE OF ANALYSIS

SDG: 160617-102
Job: D_SLRCON_DUB-82
Client Reference:

Location: Blackhall
Customer: SLR Consulting Ireland
Attention: Aldona Binchy

Order Number: 2965
Report Number: 366433
Superseded Report:

Table with columns: Results Legend, Customer Sample R, SW03, Well 1, Well2, Component, LOD/Units, Method. Includes data for Ammoniacal Nitrogen as N, Sulphate, and Chloride.



SDG: 160617-102
Job: D_SLRCON_DUB-82
Client Reference:

Location: Blackhall
Customer: SLR Consulting Ireland
Attention: Aldona Binchy

Order Number: 2965
Report Number: 366433
Superseded Report:

Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample ¹	Surrogate Corrected
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser		
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers		

¹ Applies to Solid samples only. DRY indicates samples have been dried at 35°C. NA = not applicable.



SDG: 160617-102
Job: D_SLRCON_DUB-82
Client Reference:

Location: Blackhall
Customer: SLR Consulting Ireland
Attention: Aldona Binchy

Order Number: 2965
Report Number: 366433
Superseded Report:

Test Completion Dates

Lab Sample No(s)	13614283	13614290	13614294	13614299	13614304	13614309	13614312	13614319	13614315
Customer Sample Ref.	GW1	GW2	GW3	GW4	GW5	SW02	SW03	Well2	Well 1
AGS Ref.									
Depth	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
Type	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID
Ammonium Low	23-Jun-2016	23-Jun-2016	25-Jun-2016	23-Jun-2016	23-Jun-2016	23-Jun-2016	23-Jun-2016	23-Jun-2016	23-Jun-2016
Anions by Kone (w)	24-Jun-2016	23-Jun-2016	24-Jun-2016	24-Jun-2016	24-Jun-2016	24-Jun-2016	24-Jun-2016	24-Jun-2016	23-Jun-2016



SDG: 160617-102
Job: D_SLRCON_DUB-82
Client Reference:

Location: Blackhall
Customer: SLR Consulting Ireland
Attention: Aldona Binchy

Order Number: 2965
Report Number: 366433
Superseded Report:

Appendix

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH₄ by the BRE method, VOC TICs and SVOC TICs.

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALcontrol Laboratories reserve the right to charge for samples received and stored but not analysed.

4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERES Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERES Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

6. When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

7. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

9. NDP - No determination possible due to insufficient/unsuitable sample.

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals - total metals must be requested separately.

11. Results relate only to the items tested.

12. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%, they are generally wider for volatiles analysis, 50-150%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

14. **Product analyses** - Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethylphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

General

20. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

21. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

22. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

24. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

Sample Deviations

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
4	Holding time exceeded before sample received
5	Samples exceeded holding time before preservation was performed
\$	Sampled on date not provided
+	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to sampled on date
&	Sample Holding Time exceeded - Late arrival of instructions.

Asbestos

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALcontrol Laboratories (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALcontrol Laboratories (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Crystalline	White Asbestos
Amphibole	Brown Asbestos
Crystalline	Blue Asbestos
Fibrous Asbestos	-
Fibrous Amphibole	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.



global environmental solutions

**John Behan / Behan's Land Restoration Ltd.
Soil Recovery Facility, Blackhall, Naas, Co. Kildare**

**Report on Surface Water and Groundwater
Quality Monitoring: Q3 of 2016**

**November 2016
SLR Ref: 161121 501.00004.00037 Q3 2016 Rev 0**

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Registered in Ireland as: SLR Environmental Consulting (Ireland) Limited. Registered No.253332. VAT No. 8253332J

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1.0 INTRODUCTION

This surface water and groundwater monitoring report is prepared in respect of the licensed soil recovery facility operated by Behan's Land Restoration Ltd. at Blackhall, Punchestown, Naas, Co Kildare (EPA Waste Licence Ref No. W0247-01), the location of which is identified in Figure 1.

Surface water and groundwater quality monitoring at existing surface water and groundwater monitoring locations was undertaken on the 28th September 2016. Samples were analysed for contaminants listed in Schedule C2.2 of the Waste Licence for the recovery facility (Ref. W0247-01) as requiring monitoring on a quarterly basis. Monitoring point locations are shown on Figure 2.

2.0 SURFACE WATER QUALITY

2.1 Surface Water Quality in Q3 of 2016

Surface water quality monitoring was undertaken in two ponds: SW2 located in the north eastern sector of the site and SW3 located at the southwestern sector of the site (refer to Figure 2). Monitoring of physical parameters (visual inspection, temperature, pH, electrical conductivity and dissolved oxygen) was undertaken in the field using a YSI Instruments multi-parameter probe. Samples were taken for chemical quality testing and sent to ALcontrol Laboratories.

Recorded pH values in the surface water ponds were between 8.21 in SW2 and 8.18 in SW3. Recorded Dissolved Oxygen (DO) values were between 12.1 mg/l at SW2 and 9 mg/l at SW3. The concentration of DO will vary with temperature - the DO concentration is typically higher in winter and lower in summer. Surrounding farming activities such as the spreading of slurry or the application of nitrates can also effect DO concentration in water.

The variations in Electrical Conductivity (EC); from 0.352 mScm⁻¹ in SW2 to 0.365 mScm⁻¹ in SW3 reflect natural variation and changes within the water, often associated with seasonal changes in temperature.

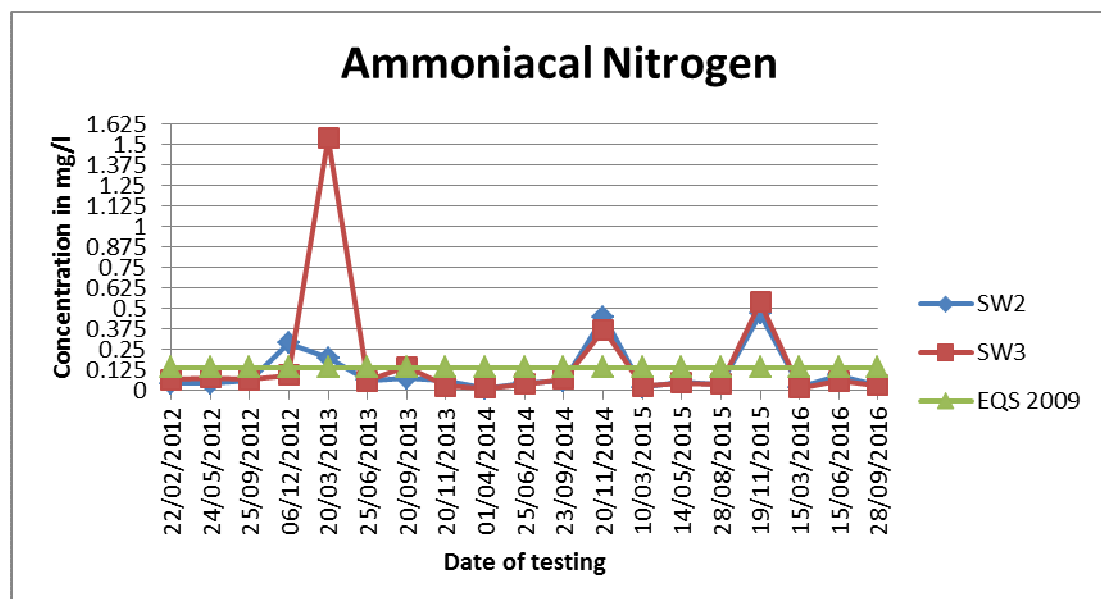
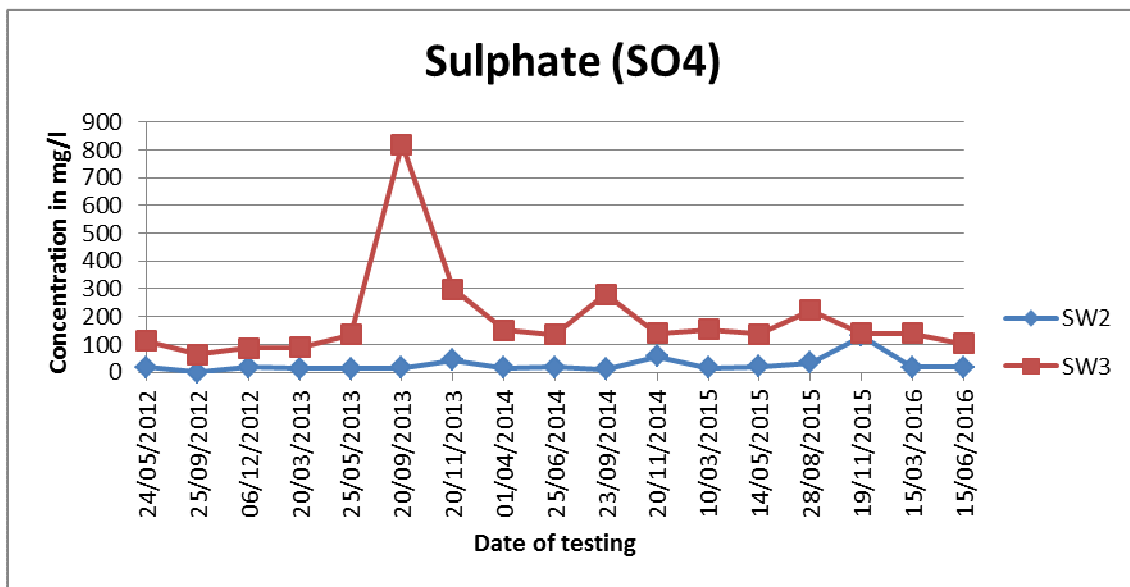
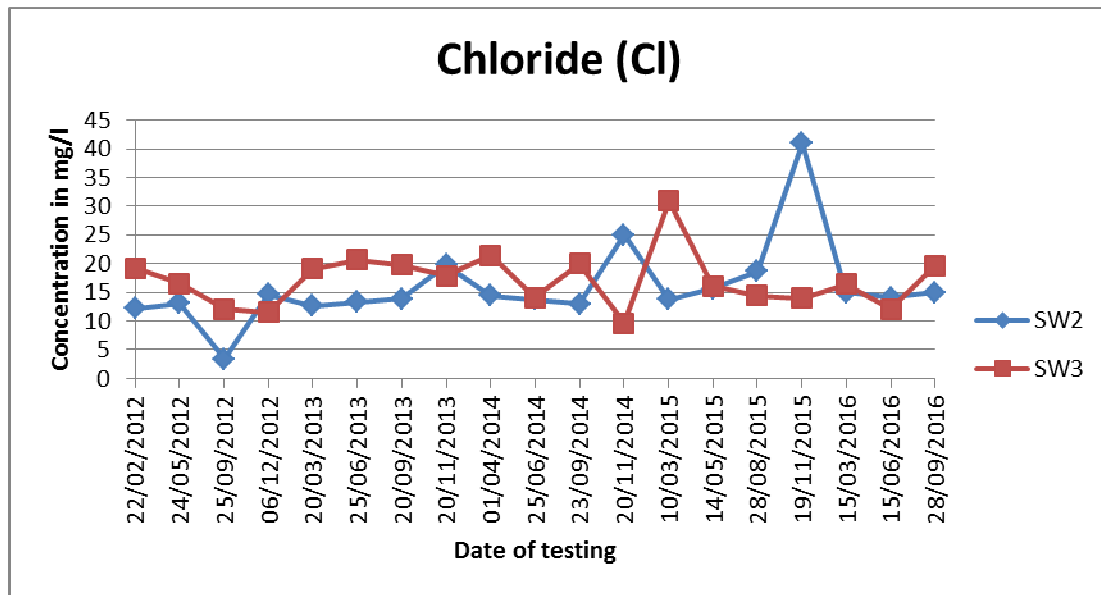
Visual inspections of the ponded water were undertaken for discolouration and evidence of oil sheen / film. Odour inspections were also undertaken. The visual inspections indicated that the water was generally clear with no suspended solids or humic matter in the water.

Results of surface water quality tests screened against the Surface Waters Regulations 2009 as amended are presented in the Appendix A of this report and a copy of the certified test results is presented in Appendix C.

All tested parameters are within the quality standard limits for surface waters (European Communities Environmental Objectives (Surface Water) Regulations 2009 as amended).

2.2 Variation and trends in Surface Water Quality

The plots provided below show variations and trends in surface water quality for monitored parameters (Chloride, Sulphate, Ammoniacal Nitrogen) from the beginning of 2012. Plots show no indication of sustained increase of monitored parameters concentration over the time.



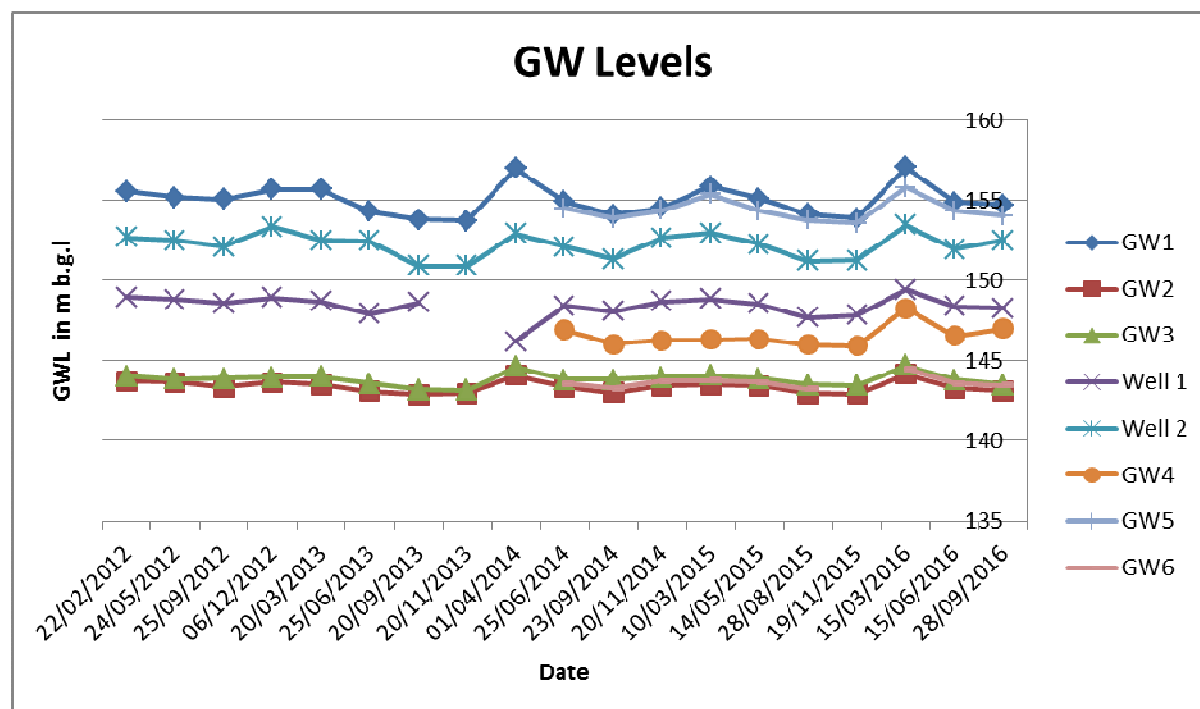
3.0 GROUNDWATER

3.1 Groundwater Level

Groundwater level monitoring was carried out at seven wells within the licensed site and at one immediately outside it (Well 2). Groundwater levels were measured using a standard 30m long dipmeter. Recorded levels are presented in Table 3.1 and plotted in chart below.

Table 3-1
Groundwater level monitoring, Soil Recovery Facility, Blackhall, Naas, Co. Kildare

Well No.	Ground Level mOD	Groundwater level mOD
GW1	168.75	154.73
GW2	157.5	143.13
GW3	160.5	143.5
GW4	153.4	147
GW5	163.3	154.04
GW6	162.1	143.48
Well 1	153.0	148.29
Well 2	163.8	152.51



3.2 Groundwater Quality in Q3 of 2016

Groundwater quality monitoring was undertaken at 7 No. groundwater wells, identified as GW1, GW2, GW3, GW4, GW5 (all monitoring wells); Well 1 (a domestic supply well) and Well 2. At groundwater well GW6, the water level was not sufficient to take a water sample. Well locations are indicated on Figure 2. Monitoring of physical parameters (visual inspection, pH, electrical conductivity, and dissolved oxygen) was undertaken using an YSI Instruments multiparameter probe. Samples were taken for chemical quality testing and sent to ALcontrol Laboratories for analysis.

All monitored wells except Well 1 were pumped out using a Waterra plastic tubing fitted with a foot valve and Waterra Pump. Field parameters were measured during pumping and were monitored to ensure that all standing water in monitoring boreholes was removed and fresh groundwater samples were obtained.

Laboratory test data screened against the water quality threshold limits set in the Groundwater Regulations 2010 as amended is presented in Appendix B of this report. Certified quality results are presented in Appendix C of this Report.

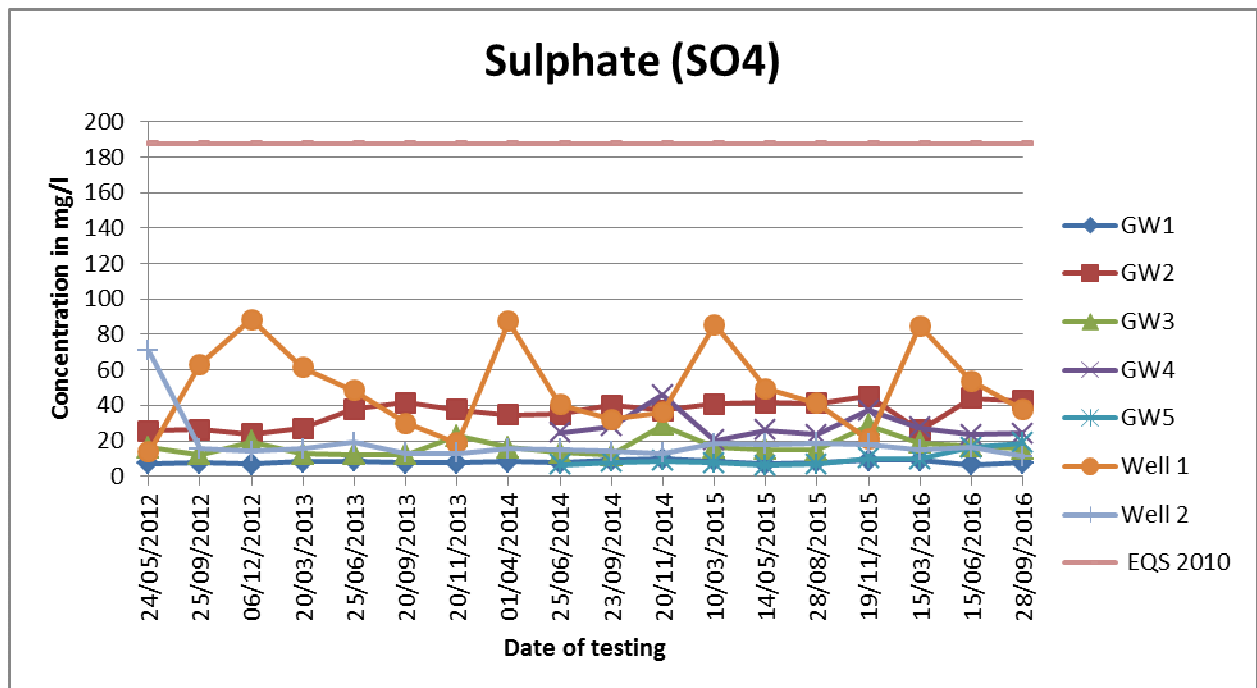
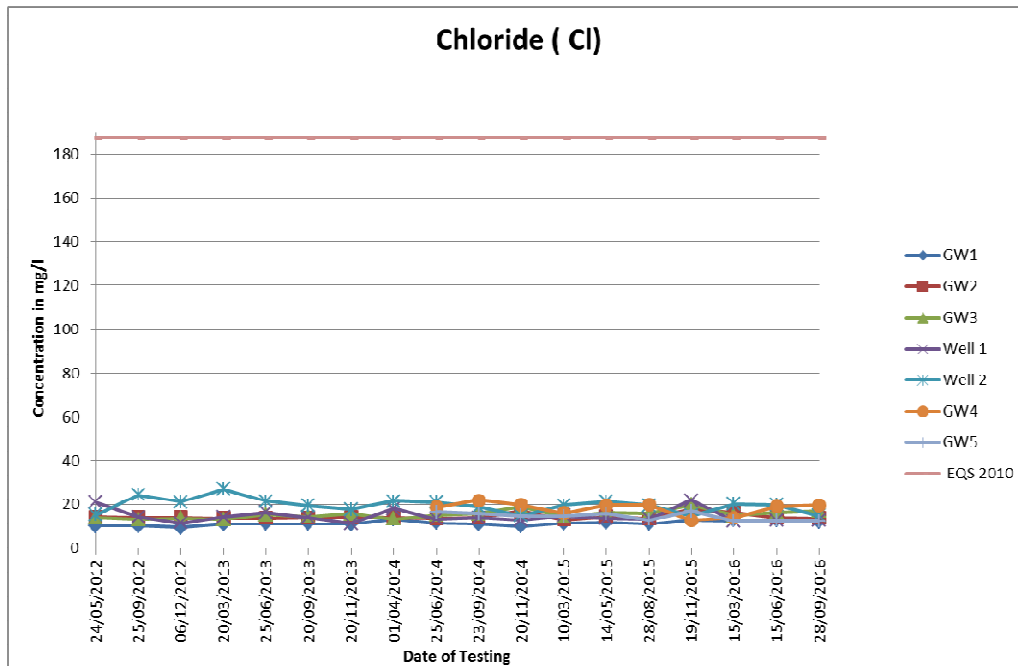
Measured chloride values range from 12.1 mg/l in GW1 and 19.7 mg/l in GW4. Measured sulphate values range from 7.6 mg/l in GW1 to 42.4 mg/l in GW2.

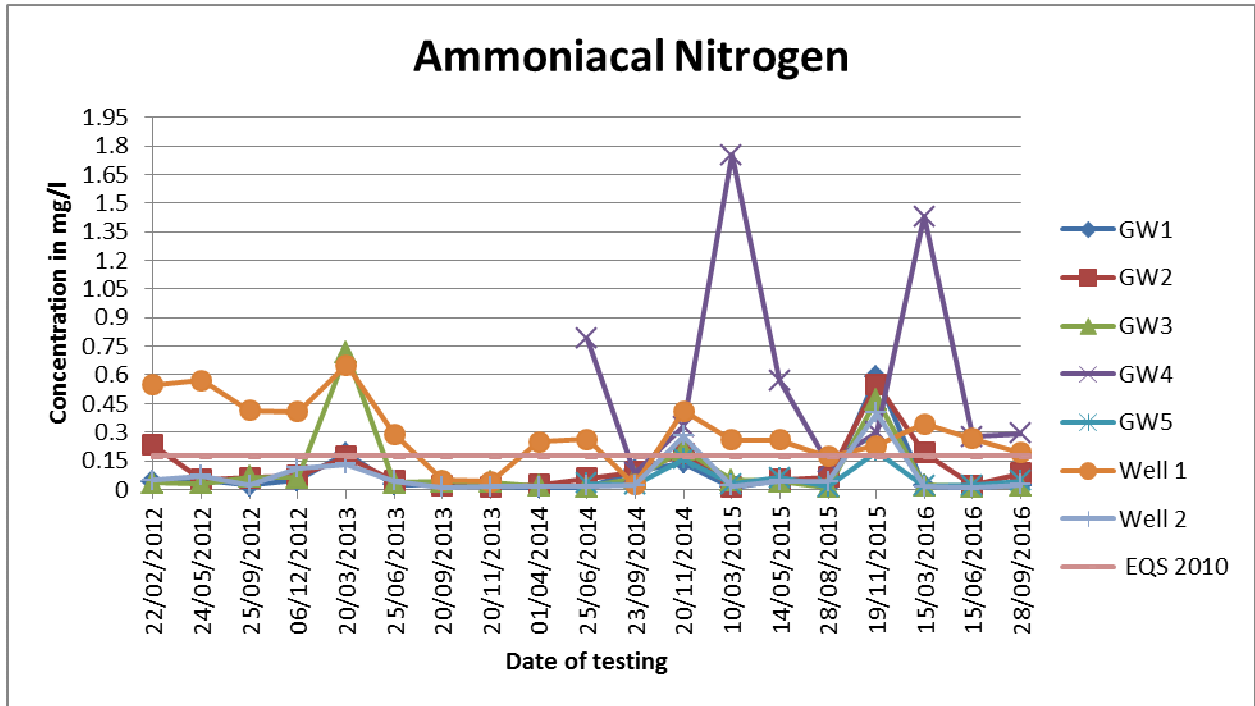
The recorded ammoniacal nitrogen concentrations at GW4 and Well1 exceeded the threshold limit of 0.175 mg/l for general quality of groundwater in a groundwater body. Interpreting the groundwater levels and groundwater flow around the site location could be suggestive of potential impact from septic tanks and/or slurry spreading. It is also noted that there is noticeable seasonal trend in ammoniacal nitrogen concentration in tested groundwater with higher parameter concentrations in winter/ spring, which possibly can be related to increased rainfall and ammoniacal nitrogen being flushed into the groundwater when rainfall increases.

In this round of monitoring ammoniacal nitrogen exceeded groundwater quality standard in GW4 and Well1; all other tested parameters are within the quality standard limits for groundwater (European Communities Environmental Objectives (Groundwater) Regulations 2010 as amended).

3.3 Variation and trends in Groundwater Water Quality

The plots provided below show variations and trends in groundwater water quality for monitored parameters (Chloride, Sulphate, Ammoniacal Nitrogen) from the beginning of 2012. Plots show no indication of sustained increase of monitored parameters concentration over the time.





4.0 CLOSURE

This report has been prepared by SLR Consulting Ireland with all reasonable skill, care, and diligence, and taking account of the manpower and resources devoted to it by agreement with the client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of Behan's Land Restoration Ltd.; no warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the client and others in respect of any matters outside the agreed scope of the work.

5.0 REFERENCES

Statutory Instruments No. 9 of 2010. European Communities Environmental Objectives (Groundwater) Regulations, 2010 as amended.

Statutory Instruments No. 272 of 2009. European Communities Environmental Objectives (Surface Waters) Regulations, 2009 as amended.

FIGURES


- Figure 1 Site Location Map**
- Figure 2 Existing Site Layout**



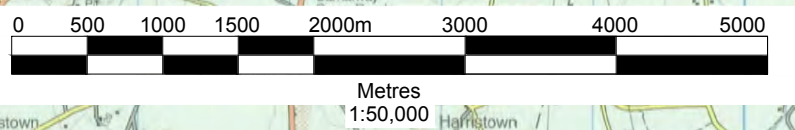
NOTES

1. EXTRACT FROM 1:50,000 O.S DISCOVERY SERIES MAP NO. 49, 50, 55 & 56
2. ORDNANCE SURVEY IRELAND LICENCE NO. SU 0000714 (C) ORDNANCE SURVEY & GOVERNMENT OF IRELAND

LEGEND

 LOCATION OF QUARRY

00004.00028.0.7 FIG_1.0 Site Location Plan.dwg

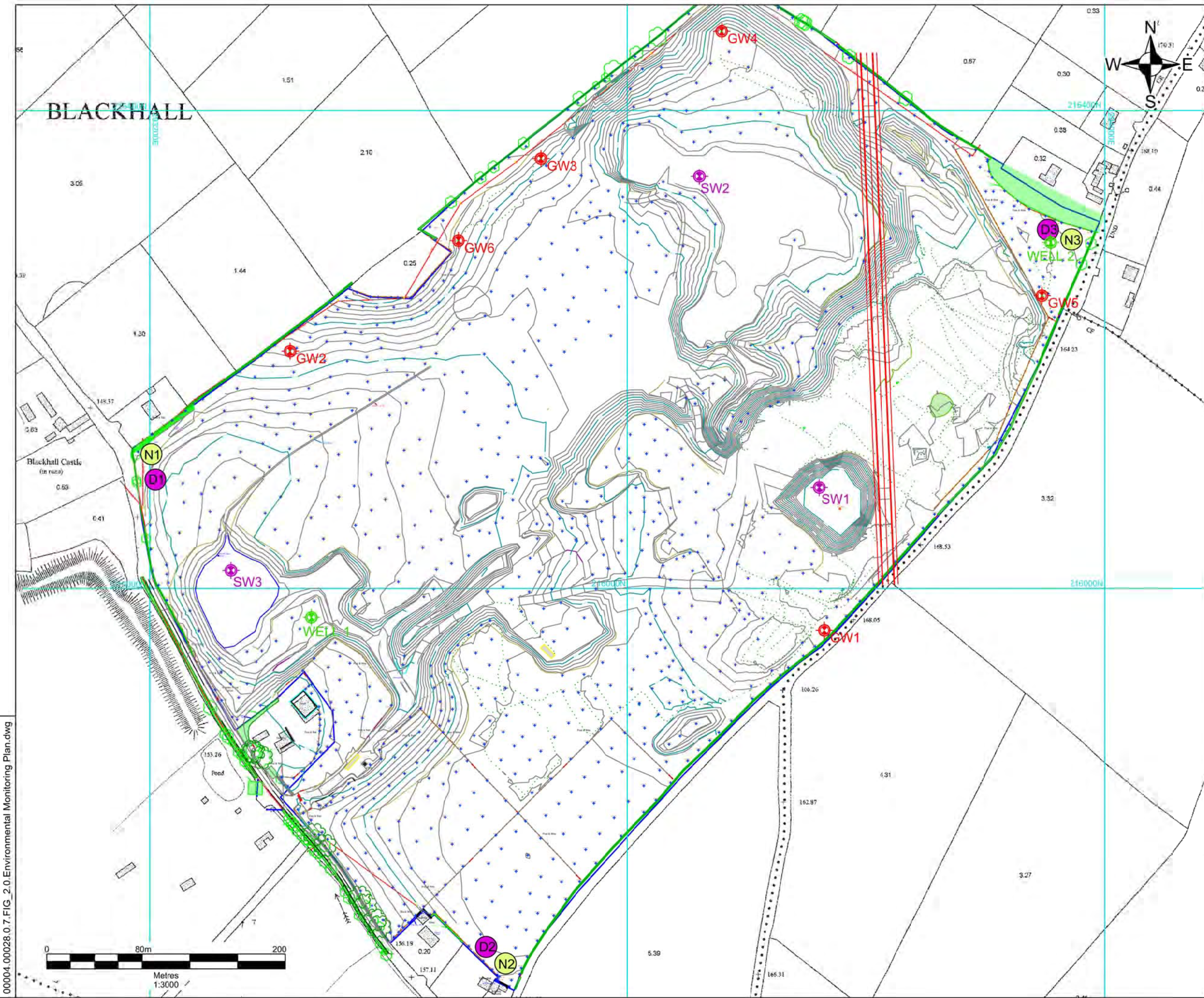


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JOHN BEHAN
BLACKHALL, PUNCHESTOWN
NAAS, CO. KILDARE
SITE LOCATION PLAN

FIGURE 1

Scale 1:50,000 @ A3 Date JULY 2014



NOTES
 1. ORDNANCE SURVEY IRELAND LICENCE NO. SU 0000714 (C) ORDNANCE SURVEY & GOVERNMENT OF IRELAND

- LEGEND
-  APPLICANTS LAND INTEREST
 -  ENVIRONMENTAL NOISE MONITORING LOCATION
 -  ENVIRONMENTAL DUST MONITORING LOCATION
 -  ENVIRONMENTAL MONITORING BOREHOLE LOCATION

00004.00028.0.7.FIG_2.0.Environmental Monitoring Plan.dwg

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JOHN BEHAN
 BLACKHALL, PUNCHESTOWN
 NAAS, CO. KILDARE
ENVIRONMENTAL MONITORING PLAN

FIGURE 2
 Scale 1:3,000 @ A3 Date JUNE 2014

Appendix A

Surface Water Chemical Test Results



Date 11-Oct-16
 Sheet: 1 of 1
 By: AB

Project Name: Surface Water Monitoring
Location: Behans Land Restoration
 Blackhall, Naas, County Kildare

Surface Water Chemical Test Results

Date	Location	Lab ID	Sample Type	Sample Date	Temperature	pH	Electrical conductivity	Dissolved Oxygen	Dissolved Oxygen	Chloride as Cl	Sulphate as SO4	Ammoniacal Nitrogen		
Unit					T°C		mScm ⁻¹	mg/l	%	mg/l	mg/l	mg/l		
Screening Value*						4.5-9.0 ≤100 mg/lCaCO3 6.0-9.0 >100 mg/lCaCO3						High status ≤ 0.040 (mean) or ≤ 0.090 (95%ile) Good Status ≤ 0.065 (mean) or ≤ 0.140 (95%ile)		
Detection Limits										<2	<2	<0.01		
11-Oct-16	SW2	14242151	Water	28 September 2016	15.6	8.21	0.352	12.1	12	15	17.9	0.0314		
11-Oct-16	SW3	14242147	Water	28 September 2016	15.2	8.18	0.365	9	9.1	19.7	146	0.0323		

*SI No. 272 of 2009 European Communities Environmental Objectives (Surface Waters) Regulations, 2009

Appendix B

Ground Water Chemical Test Results



Project Name: Groundwater Monitoring
Location: Behans Land Restoration
 Blackhall, Naas, County Kildare

Ground Water Chemical Test

Date	Location	LAB ID	Sample Type	Sample Date	GWL (mOD)	Temperature	pH	Electrical conductivity	Dissolved Oxygen	Dissolved Oxygen	Chloride as Cl	Sulphate as SO4	Ammoniacal Nitrogen as N
Unit						°C		mScm ⁻¹	mg/l	%	mg/l	mg/l	mg/l
Screening Value*								1.875			187.5	187.5	0.175
Detection Limits											1	1	0.01
11-Oct-16	GW1	14242117	Water	28 October 2016	154.73	9.9	7.45	0.340	9.04	80.3	12.1	7.6	0.0209
11-Oct-16	GW2	14242120	Water	28 October 2016	143.13	9.8	7.44	0.346	9.14	80.5	13.9	42.4	0.0854
11-Oct-16	GW3	14242123	Water	28 October 2016	143.5	10.2	7.65	0.351	9.17	81	17.2	15.5	0.0211
11-Oct-16	GW4	14242128	Water	28 October 2016	148.29	12.1	7.23	0.570	5.36	50.1	19.7	24.1	0.294
11-Oct-16	GW5	14242134	Water	28 October 2016	152.51	11.2	7.17	0.640	6.21	56.9	12.5	18.6	0.046
11-Oct-16	Well 1	14242139	Water	28 October 2016	154.04	11.2	7.51	0.530	8.46	76.9	12.8	37.6	0.194
11-Oct-16	Well 2	14242142	Water	28 October 2016	143.48	10.1	7.48	0.540	8.45	76.8	15	11	0.0236

*SI No. 9 of 2010 European Communities Environmental Objectives (Groundwater) Regulations, 2010

Appendix C Copy of Certified Results



SLR Consulting Ireland
CSA House
Unit 7
Dundrum Business Park
Windy Harbour
Dublin
Dublin14

Attention: Aldona Binchy

CERTIFICATE OF ANALYSIS

Date: 08 October 2016
Customer: D_SLRCON_DUB
Sample Delivery Group (SDG): 160930-78
Your Reference:
Location: Blackhall
Report No: 381473

We received 9 samples on Friday September 30, 2016 and 9 of these samples were scheduled for analysis which was completed on Saturday October 08, 2016. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALcontrol Laboratories Hawarden (Method codes TM) or ALcontrol Laboratories Aberdeen (Method codes S).

Approved By:

Sonia McWhan
Operations Manager





SDG: 160930-78
Job: D_SLRCON_DUB-82
Client Reference:

Location: Blackhall
Customer: SLR Consulting Ireland
Attention: Aldona Binchy

Order Number: 3048
Report Number: 381473
Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
14242117	GW01		0.00 - 0.00	28/09/2016
14242120	GW02		0.00 - 0.00	28/09/2016
14242123	GW03		0.00 - 0.00	28/09/2016
14242128	GW04		0.00 - 0.00	28/09/2016
14242134	GW05		0.00 - 0.00	28/09/2016
14242151	SW02		0.00 - 0.00	28/09/2016
14242147	SW03		0.00 - 0.00	28/09/2016
14242139	Well1		0.00 - 0.00	28/09/2016
14242142	Well2		0.00 - 0.00	28/09/2016

Only received samples which have had analysis scheduled will be shown on the following pages.



SDG: 160930-78
Job: D_SLRCON_DUB-82
Client Reference:

Location: Blackhall
Customer: SLR Consulting Ireland
Attention: Aldona Binchy

Order Number: 3048
Report Number: 381473
Superseded Report:

LIQUID Results Legend	Lab Sample No(s)		Customer Sample Reference		AGS Reference		Depth (m)		Container	
	Test	No Determination Possible								
<div style="display: flex; flex-direction: column; gap: 5px;"> <div style="border: 1px solid black; background-color: yellow; padding: 2px; display: inline-block;">X Test</div> <div style="border: 1px solid black; background-color: red; color: white; padding: 2px; display: inline-block;">N No Determination Possible</div> </div>			14242117	GW01			0.00 - 0.00	500ml Plastic (ALE209)		
			14242120	GW02			0.00 - 0.00	500ml Plastic (ALE208)		
			14242123	GW03			0.00 - 0.00	500ml Plastic (ALE209)		
			14242128	GW04			0.00 - 0.00	500ml Plastic (ALE209)		
			14242134	GW05			0.00 - 0.00	500ml Plastic (ALE209)		
			14242151	SW02			0.00 - 0.00	500ml Plastic (ALE208)		
			14242147	SW03			0.00 - 0.00	500ml Plastic (ALE208)		
			14242139	Well1			0.00 - 0.00	500ml Plastic (ALE208)		
			14242142	Well2			0.00 - 0.00	500ml Plastic (ALE244)		
Ammonium Low	All	NDPs: 0 Tests: 9								
Anions by Kone (w)	All	NDPs: 0 Tests: 9								



CERTIFICATE OF ANALYSIS

SDG: 160930-78
Job: D_SLRCON_DUB-82
Client Reference:

Location: Blackhall
Customer: SLR Consulting Ireland
Attention: Aldona Binchy

Order Number: 3048
Report Number: 381473
Superseded Report:

Table with columns for Results Legend, Customer Sample Ref., GW01, GW02, GW03, GW04, GW05, SW02, Component, LOD/Units, Method, and numerical data for various components like Ammoniacal Nitrogen, Sulphate, and Chloride.



CERTIFICATE OF ANALYSIS

Validated

SDG: 160930-78
Job: D_SLRCON_DUB-82
Client Reference:

Location: Blackhall
Customer: SLR Consulting Ireland
Attention: Aldona Binchy

Order Number: 3048
Report Number: 381473
Superseded Report:

Table with columns: Results Legend, Customer Sample Ref., SW03, Well1, Well2, Component, LOD/Units, Method. Includes data for Ammoniacal Nitrogen as N, Sulphate, and Chloride.



SDG: 160930-78
Job: D_SLRCON_DUB-82
Client Reference:

Location: Blackhall
Customer: SLR Consulting Ireland
Attention: Aldona Binchy

Order Number: 3048
Report Number: 381473
Superseded Report:

Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample ¹	Surrogate Corrected
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser		
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers		

¹ Applies to Solid samples only. DRY indicates samples have been dried at 35°C. NA = not applicable.

Chemical testing (unless subcontracted) performed at ALcontrol Laboratories Hawarden (Method codes TM) or ALcontrol Laboratories Aberdeen (Method codes S).



CERTIFICATE OF ANALYSIS

Validated

SDG: 160930-78
Job: D_SLRCON_DUB-82
Client Reference:

Location: Blackhall
Customer: SLR Consulting Ireland
Attention: Aldona Binchy

Order Number: 3048
Report Number: 381473
Superseded Report:

Test Completion Dates

Table with 10 columns (Lab Sample No(s), Customer Sample Ref., AGS Ref., Depth, Type, and 5 sample IDs) and 4 rows (Ammonium Low, Anions by Kone (w), and two unlabeled rows).

SDG: 160930-78
Job: D_SLRCON_DUB-82
Client Reference:
Location: Blackhall
Customer: SLR Consulting Ireland
Attention: Aldona Binchy

Order Number: 3048
Report Number: 381473
Superseded Report:

Appendix

General

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH₄ by the BRE method, VOC TICs and SVOC TICs.

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALcontrol Laboratories reserve the right to charge for samples received and stored but not analysed.

4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERES Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERES Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

6. When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

7. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

9. NDP - No determination possible due to insufficient/unsuitable sample.

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals - total metals must be requested separately.

11. Results relate only to the items tested.

12. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%, they are generally wider for volatiles analysis, 50-150%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

14. **Product analyses** - Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethylphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

20. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

21. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

22. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

24. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

Sample Deviations

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
4	Holding time exceeded before sample received
5	Samples exceeded holding time before preservation was performed
\$	Sampled on date not provided
+	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to sampled on date
&	Sample Holding Time exceeded - Late arrival of instructions.

Asbestos

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALcontrol Laboratories (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALcontrol Laboratories (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.



global environmental solutions

**John Behan / Behan's Land Restoration Ltd.
Soil Recovery Facility, Blackhall, Naas, Co. Kildare**

**Report on Surface Water and Groundwater
Quality Monitoring: Q4 of 2016**

**January 2017
SLR Ref: 170104 501.00004.00037 Q4 2016 Rev 0**

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Registered in Ireland as: SLR Environmental Consulting (Ireland) Limited. Registered No.253332. VAT No. 8253332J

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1.0 INTRODUCTION

This surface water and groundwater monitoring report is prepared in respect of the licensed soil recovery facility operated by Behan's Land Restoration Ltd. at Blackhall, Punchestown, Naas, Co Kildare (EPA Waste Licence Ref No. W0247-01), the location of which is identified in Figure 1.

Surface water and groundwater quality monitoring at existing surface water and groundwater monitoring locations was undertaken on the 30th November 2016. Samples were analysed for contaminants listed in Schedule C2.2 of the Waste Licence for the recovery facility (Ref. W0247-01) as requiring monitoring on a quarterly basis. Monitoring point locations are shown on Figure 2.

2.0 SURFACE WATER QUALITY

2.1 Surface Water Quality in Q4 of 2016

Surface water quality monitoring was undertaken in two ponds: SW2 located in the north eastern sector of the site and SW3 located at the southwestern sector of the site (refer to Figure 2). Monitoring of physical parameters (visual inspection, temperature, pH, electrical conductivity and dissolved oxygen) was undertaken in the field using a YSI Instruments multi-parameter probe. Samples were taken for chemical quality testing and sent to Chemtest Laboratories.

Recorded pH values in the surface water ponds were between 8.02 in SW2 and 8.03 in SW3. Recorded Dissolved Oxygen (DO) values were between 6.45 mg/l at SW2 and 6.35 mg/l at SW3. The concentration of DO will vary with temperature - the DO concentration is typically higher in winter and lower in summer. Surrounding farming activities such as the spreading of slurry or the application of nitrates can also effect DO concentration in water.

The variations in Electrical Conductivity (EC); from 0.507 mScm⁻¹ in SW2 to 0.499 mScm⁻¹ in SW3 reflect natural variation and changes within the water, often associated with seasonal changes in temperature.

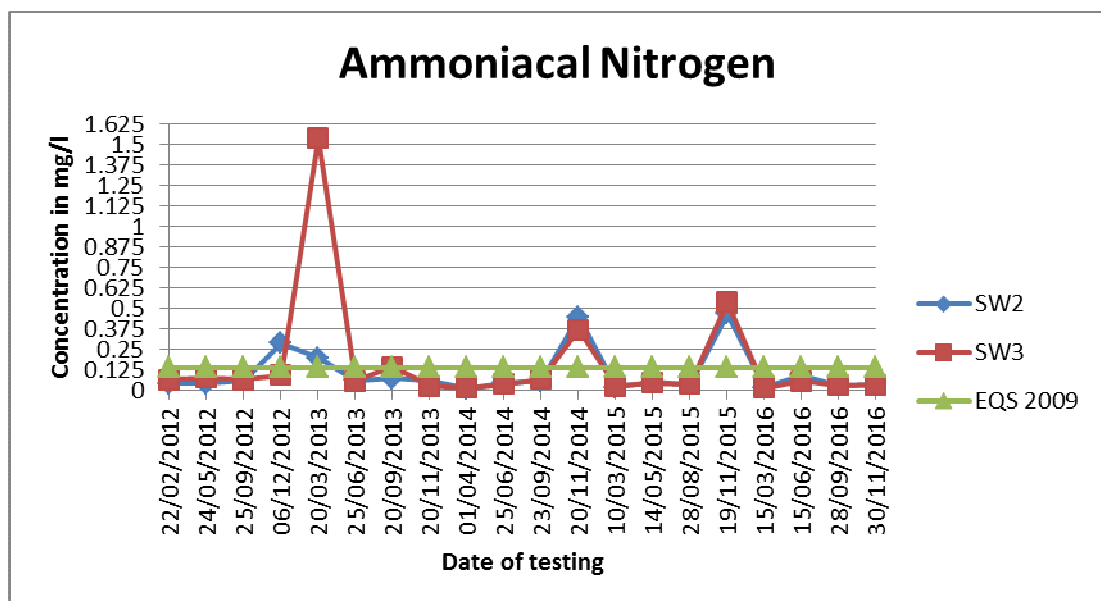
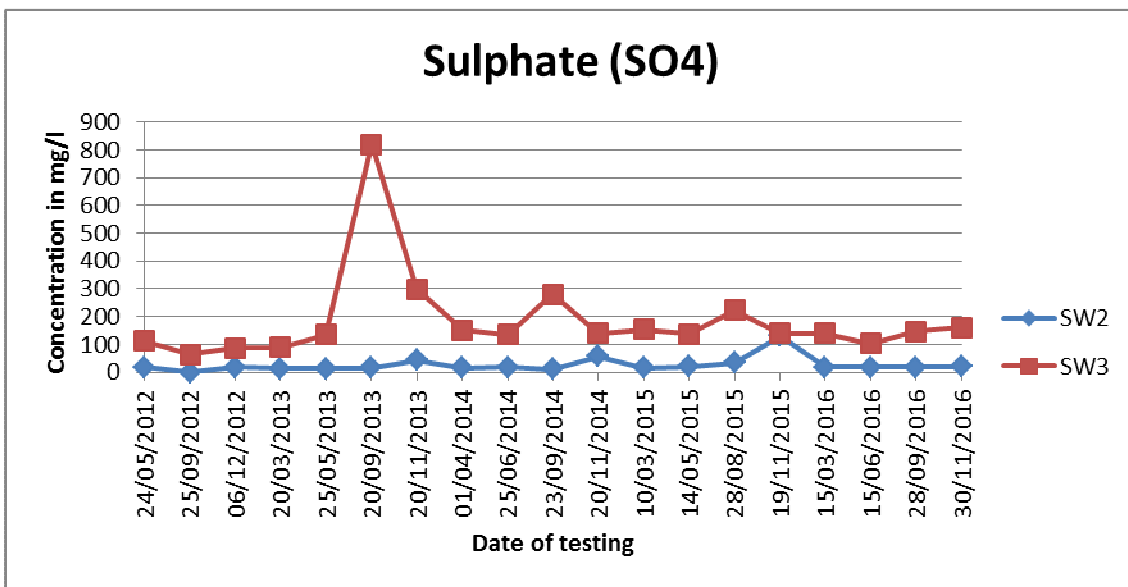
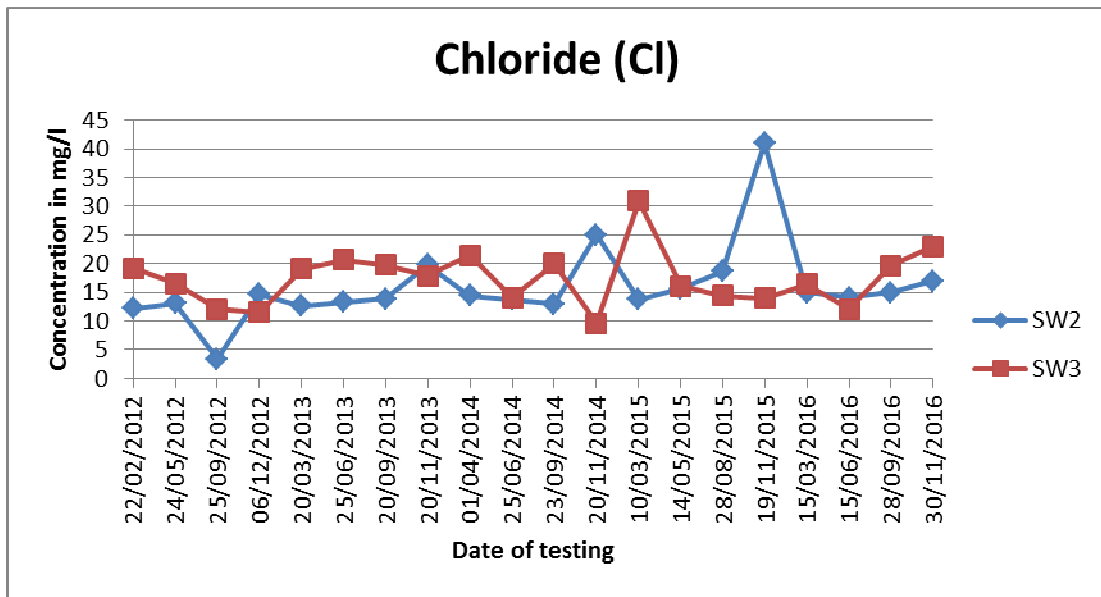
Visual inspections of the ponded water were undertaken for discolouration and evidence of oil sheen / film. Odour inspections were also undertaken. The visual inspections indicated that the water was generally clear with no suspended solids or humic matter in the water.

Results of surface water quality tests screened against the Surface Waters Regulations 2009 as amended are presented in the Appendix A of this report and a copy of the certified test results is presented in Appendix C.

All tested parameters are within the quality standard limits for surface waters (European Communities Environmental Objectives (Surface Water) Regulations 2009 as amended).

2.2 Variation and trends in Surface Water Quality

The plots provided below show variations and trends in surface water quality for monitored parameters (Chloride, Sulphate, Ammoniacal Nitrogen) from the beginning of 2012. Plots show no indication of sustained increase of monitored parameters concentration over the time.



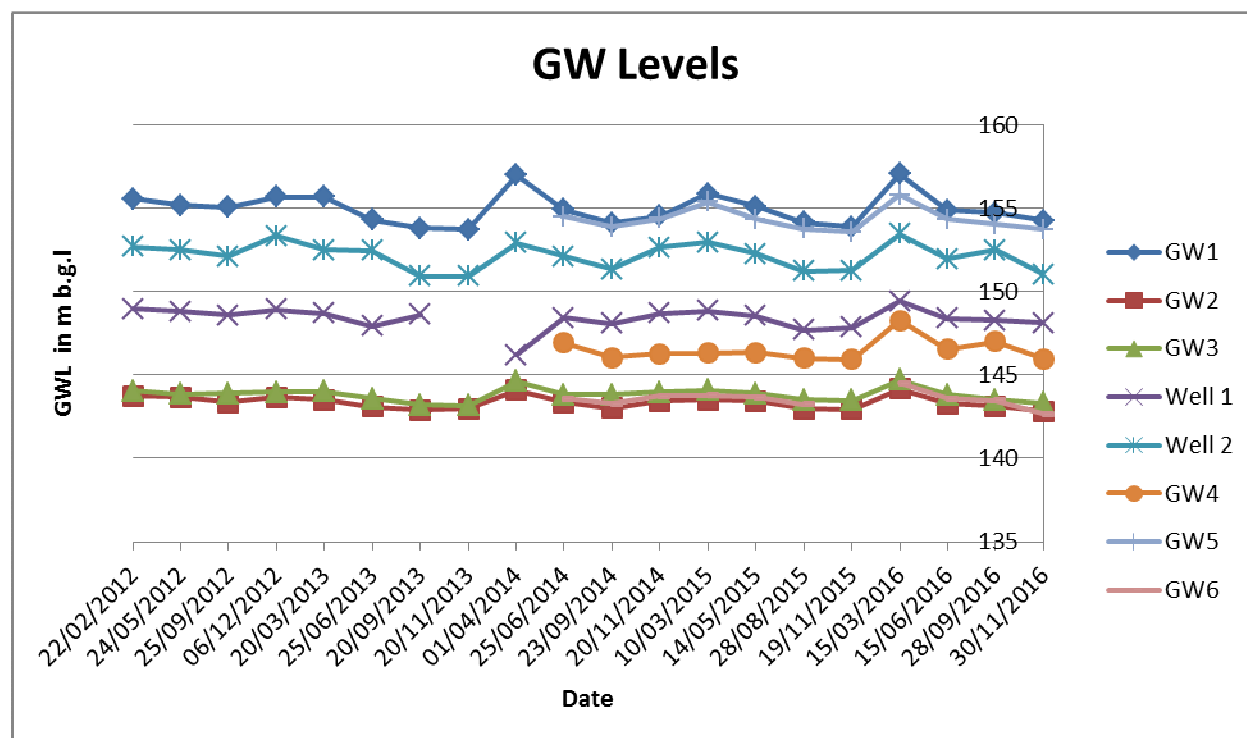
3.0 GROUNDWATER

3.1 Groundwater Level

Groundwater level monitoring was carried out at seven wells within the licensed site and at one immediately outside it (Well 2). Groundwater levels were measured using a standard 30m long dipmeter. Recorded levels are presented in Table 3.1 and plotted in chart below.

Table 3-1
Groundwater level monitoring, Soil Recovery Facility, Blackhall, Naas, Co. Kildare

Well No.	Ground Level mOD	Groundwater level mOD
GW1	168.75	154.73
GW2	157.5	143.13
GW3	160.5	143.5
GW4	153.4	147
GW5	163.3	154.04
GW6	162.1	143.48
Well 1	153.0	148.29
Well 2	163.8	152.51



3.2 Groundwater Quality in Q4 of 2016

Groundwater quality monitoring was undertaken at 7 No. groundwater wells, identified as GW1, GW2, GW3, GW4, GW5 (all monitoring wells); Well 1 (a domestic supply well) and Well 2. At groundwater well GW6, the water level was not sufficient to take a water sample. Well locations are indicated on Figure 2. Monitoring of physical parameters (visual inspection, pH, electrical conductivity, and dissolved oxygen) was undertaken using an YSI Instruments multiparameter probe. Samples were taken for chemical quality testing and sent to Chemtest Laboratories for analysis.

All monitored wells except Well 1 were pumped out using a Waterra plastic tubing fitted with a foot valve and Waterra Pump. Field parameters were measured during pumping and were monitored to ensure that all standing water in monitoring boreholes was removed and fresh groundwater samples were obtained.

Laboratory test data screened against the water quality threshold limits set in the Groundwater Regulations 2010 as amended is presented in Appendix B of this report. Certified quality results are presented in Appendix C of this Report.

Measured chloride values range from 13 mg/l in GW1 and 21 mg/l in Well 2. Measured sulphate values range from 11 mg/l in GW1 to 47 mg/l in Well 1.

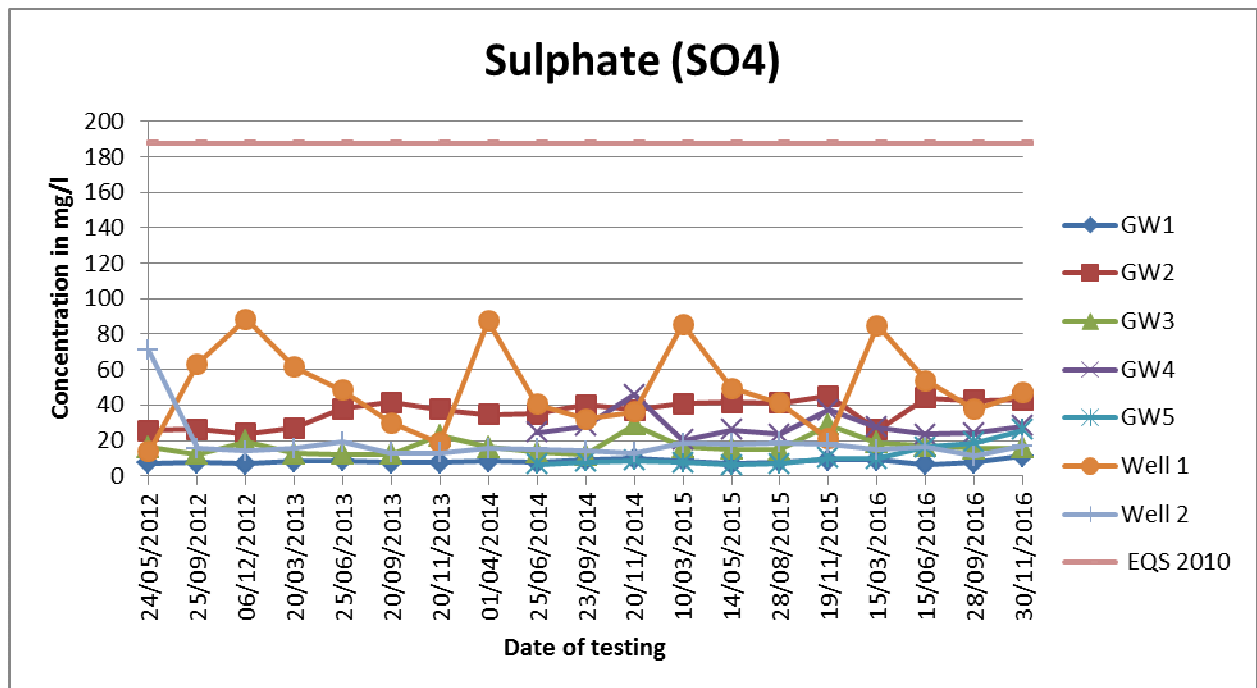
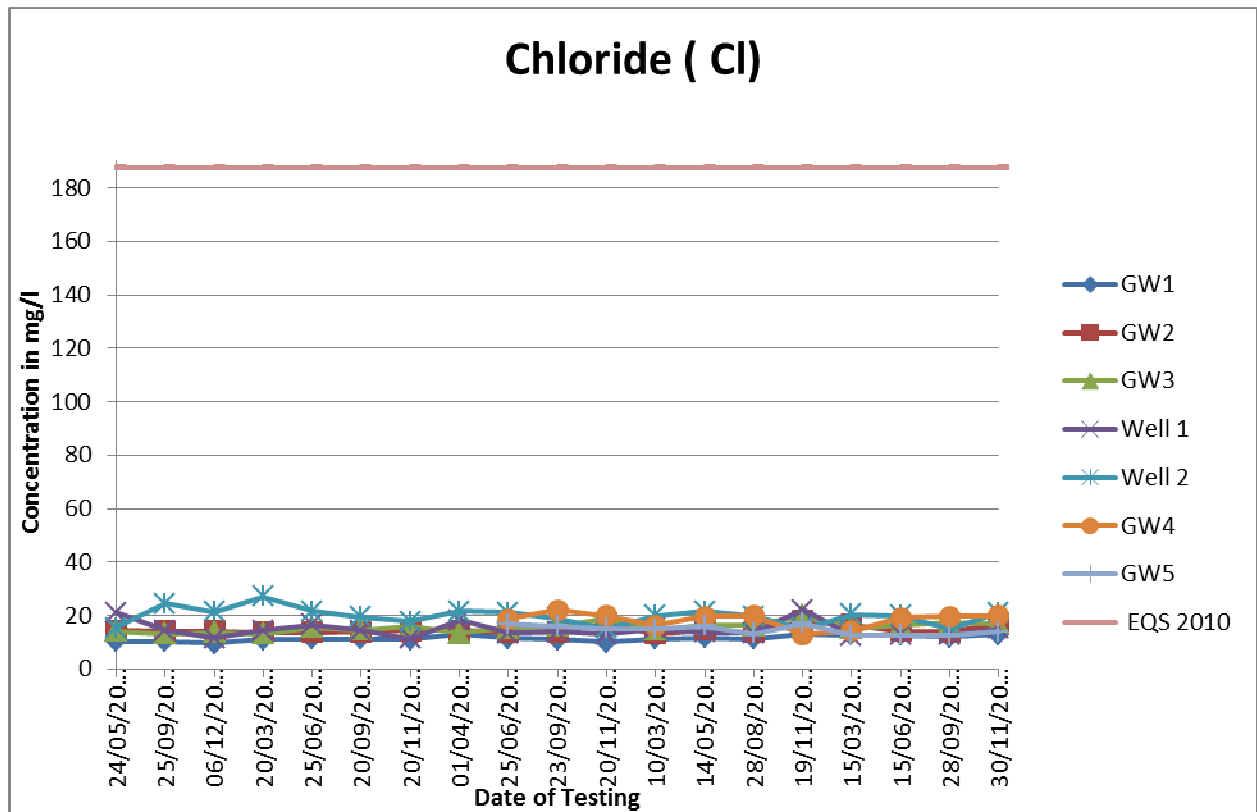
The recorded Mercury concentration of 0.00091 mg/l at GW2 exceeded the threshold limit of 0.00075 mg/l for general quality of groundwater in a groundwater body. The recorded concentration of Mercury at this location in Q4 of 2016 was above overall threshold value range (0.00075 mg/l) set by Schedule 5 of European Communities Environmental Objectives (Groundwater) Regulations 2010 as amended.

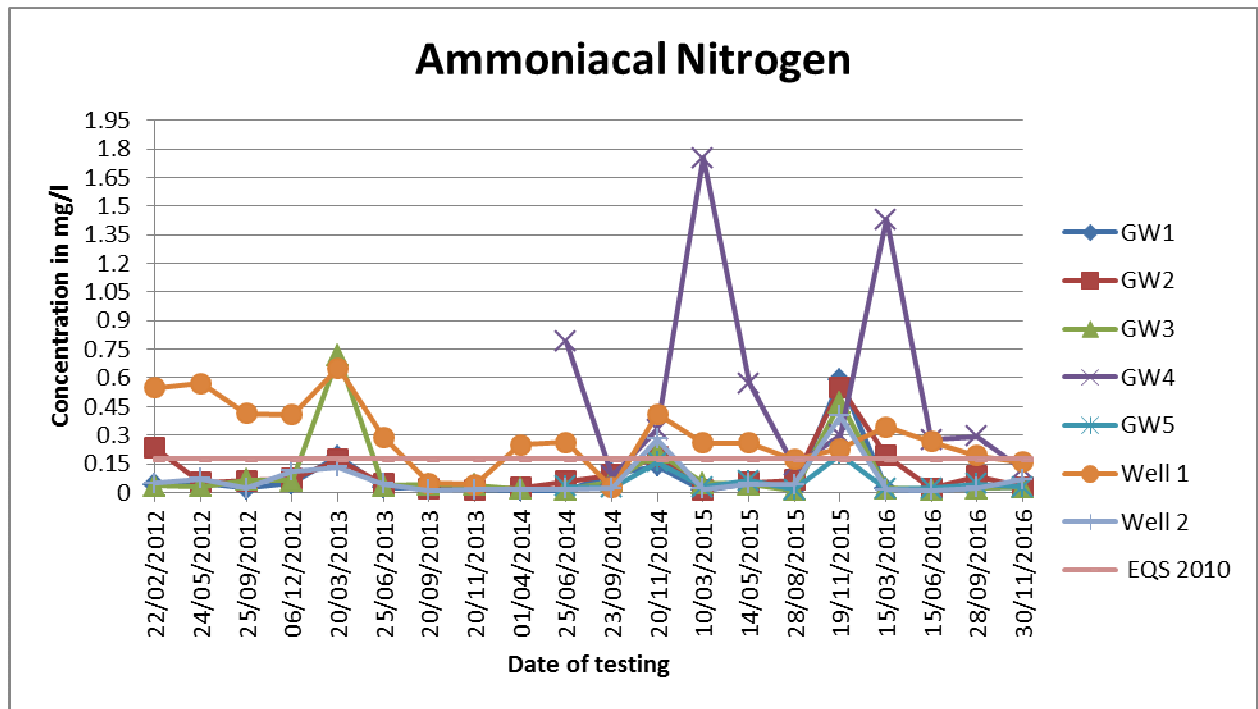
In the view of the marginal mercury exceedance it is recommended that GW 2 is tested for this parameter in next round of sampling.

In this round of monitoring Mercury exceeded groundwater quality standard in GW2; all other tested parameters are within the quality standard limits for groundwater (European Communities Environmental Objectives (Groundwater) Regulations 2010 as amended).

3.3 Variation and trends in Groundwater Water Quality

The plots provided below show variations and trends in groundwater water quality for monitored parameters (Chloride, Sulphate, Ammoniacal Nitrogen) from the beginning of 2012. Plots show no indication of sustained increase of monitored parameters concentration over the time.





4.0 CLOSURE

This report has been prepared by SLR Consulting Ireland with all reasonable skill, care, and diligence, and taking account of the manpower and resources devoted to it by agreement with the client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of Behan's Land Restoration Ltd.; no warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the client and others in respect of any matters outside the agreed scope of the work.

5.0 REFERENCES

Statutory Instruments No. 9 of 2010. European Communities Environmental Objectives (Groundwater) Regulations, 2010 as amended.

Statutory Instruments No. 272 of 2009. European Communities Environmental Objectives (Surface Waters) Regulations, 2009 as amended.

FIGURES


- Figure 1 Site Location Map**
- Figure 2 Existing Site Layout**




NOTES

1. EXTRACT FROM 1:50,000 O.S DISCOVERY SERIES MAP NO. 49, 50, 55 & 56
2. ORDNANCE SURVEY IRELAND LICENCE NO. SU 0000714 (C) ORDNANCE SURVEY & GOVERNMENT OF IRELAND

LEGEND

 LOCATION OF QUARRY

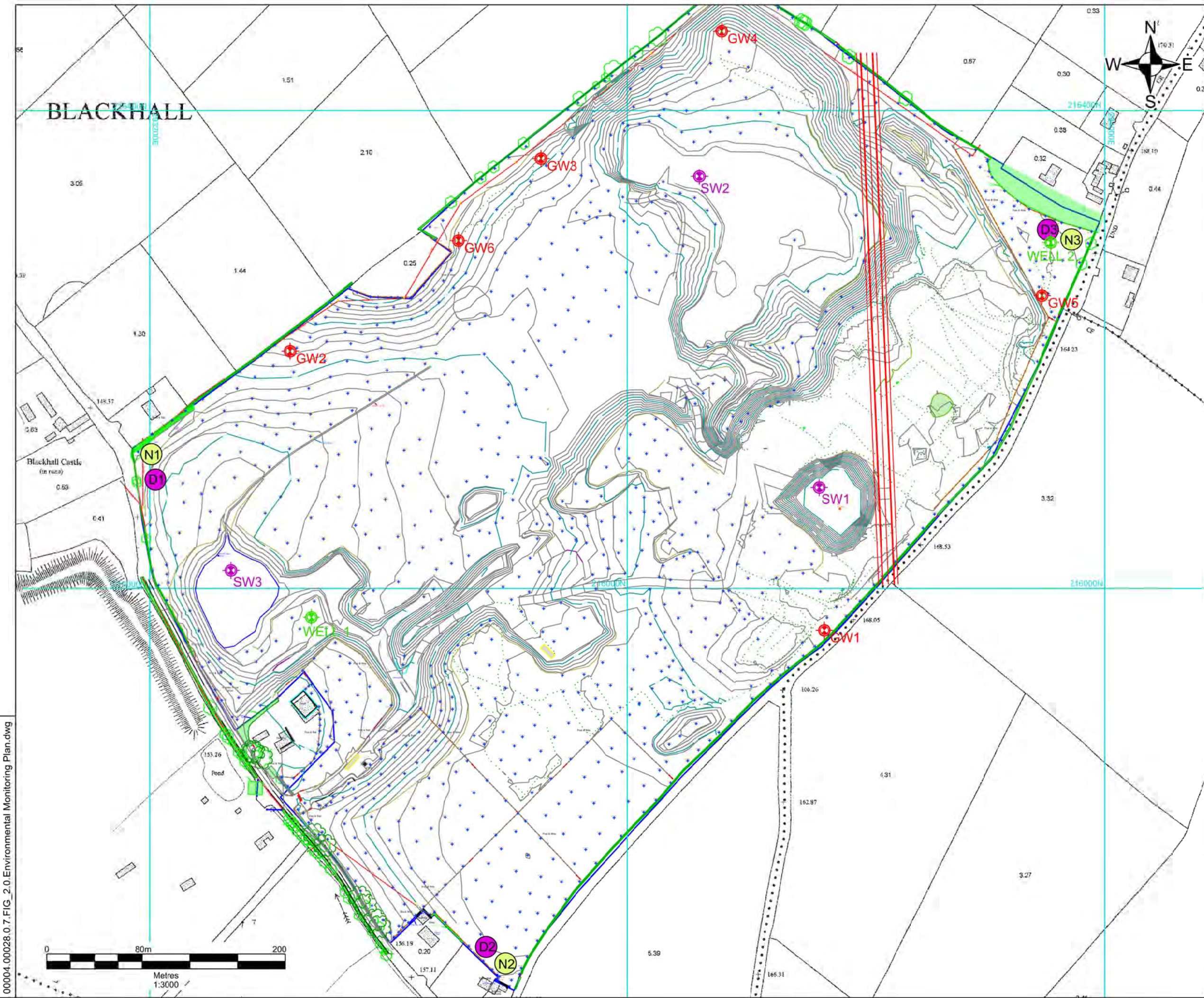
00004.00028.0.7 FIG_1.0 Site Location Plan.dwg

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JOHN BEHAN
BLACKHALL, PUNCESTOWN
NAAS, CO. KILDARE
SITE LOCATION PLAN

FIGURE 1

Scale 1:50,000 @ A3 Date JULY 2014



NOTES
 1. ORDNANCE SURVEY IRELAND LICENCE NO. SU 0000714 (C) ORDNANCE SURVEY & GOVERNMENT OF IRELAND

LEGEND

	APPLICANTS LAND INTEREST
	ENVIRONMENTAL NOISE MONITORING LOCATION
	ENVIRONMENTAL DUST MONITORING LOCATION
	ENVIRONMENTAL MONITORING BOREHOLE LOCATION

00004.00028.0.7.FIG_2.0.Environmental Monitoring Plan.dwg

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JOHN BEHAN
 BLACKHALL, PUNCHESTOWN
 NAAS, CO. KILDARE
ENVIRONMENTAL MONITORING PLAN

FIGURE 2
 Scale 1:3,000 @ A3 Date JUNE 2014

Appendix A

Surface Water Chemical Test Results



Project Name:		Lab Job No.:		16-29575	16-29575
Behans Land Restoration		Lab Sample ID.:		385944	385945
Blackhall, Naas, County Kildare		Sample ID.:		SW02	SW03
		Sample Type:		WATER	WATER
		Date Sampled:		30-Nov-2016	30-Nov-2016
Parameter	*	Units	LOD		
Temperature		T°C		7.9	7.8
pH	4.5-9.0 ≤100 mg/lCaCO3 6.0-9.0 >100 mg/lCaCO3			8.02	8.03
Electrical Conductivity		µs/cm		507	499
Dissolved Oxygen		mg/l		6.45	6.35
Dissolved Oxygen		%		64.3	56.1
Suspended Solids At 105C		mg/l	5.0	< 5.0	47
Total Dissolved Solids		mg/l	1.0	290	390
Alkalinity (Total)		mg CaCO3/l	10	230	130
Chloride		mg/l	1.0	17	23
Ammoniacal Nitrogen	High status ≤ 0.040 (mean) or ≤ 0.090 (95%ile) Good Status ≤ 0.065 (mean) or ≤ 0.140 (95%ile)	mg/l	0.010	0.033	0.034
Nitrate		mg/l	0.50	7.6	< 0.50
Phosphate	High status ≤ 0.025 (mean) or ≤ 0.045 (95%ile) Good Status ≤ 0.035 (mean) or ≤ 0.075 (95%ile)	mg/l	0.050	< 0.050	< 0.050
Sulphate		mg/l	1.0	21	160
Calcium		mg/l	5.0	100	120
Potassium		mg/l	0.50	1.1	17
Magnesium		mg/l	0.50	11	7.6
Sodium		mg/l	0.50	10	19
Hardness		mg/l	15	300	330
Aluminium (Dissolved)		µg/l	10	< 10	< 10
Arsenic (Dissolved)	25	µg/l	1.0	< 1.0	1.9
Boron (Dissolved)		µg/l	20	< 20	32
Barium (Dissolved)		µg/l	5.0	32	43
Beryllium (Dissolved)		µg/l	1.0	< 1.0	< 1.0
Cadmium (Dissolved)		µg/l	0.080	< 0.080	< 0.080
Cobalt (Dissolved)		µg/l	1.0	< 1.0	< 1.0
Chromium (Dissolved)		µg/l	1.0	5.6	6.6
Copper (Dissolved)	5	µg/l	1.0	2.3	4.9
Iron (Dissolved)		µg/l	20	160	260
Mercury (Dissolved)	0.05	µg/l	0.50	< 0.50	< 0.50
Manganese (Dissolved)		µg/l	1.0	< 1.0	1.3
Molybdenum (Dissolved)		µg/l	1.0	< 1.0	4.2
Nickel (Dissolved)	20	µg/l	1.0	< 1.0	2.7
Lead (Dissolved)	7.2	µg/l	1.0	< 1.0	< 1.0
Antimony (Dissolved)		µg/l	1.0	< 1.0	1.3
Selenium (Dissolved)		µg/l	1.0	5.0	9.5
Tin (Dissolved)		µg/l	1.0	< 1.0	< 1.0
Strontium (Dissolved)		µg/l	1.0	180	390
Vanadium (Dissolved)		µg/l	1.0	< 1.0	< 1.0
Zinc (Dissolved)		µg/l	1.0	1.1	5.6
Thallium		µg/l	0.10	< 0.10	< 0.10
TPH >C5-C6		µg/l	0.10	< 0.10	< 0.10
TPH >C6-C7		µg/l	0.10	< 0.10	< 0.10
TPH >C7-C8		µg/l	0.10	< 0.10	< 0.10
TPH >C8-C10		µg/l	0.10	< 0.10	< 0.10
TPH >C10-C12		µg/l	0.10	< 0.10	< 0.10
TPH >C12-C16		µg/l	0.10	< 0.10	< 0.10
TPH >C16-C21		µg/l	0.10	< 0.10	< 0.10
TPH >C21-C35		µg/l	0.10	< 0.10	< 0.10
Total TPH >C5-C35		µg/l	10	< 10	< 10
Naphthalene		µg/l	0.10	< 0.10	< 0.10
Acenaphthylene		µg/l	0.10	< 0.10	< 0.10
Acenaphthene		µg/l	0.10	< 0.10	< 0.10



Project Name:		Lab Job No.:		16-29575	16-29575
Behans Land Restoration		Lab Sample ID.:		385944	385945
Blackhall, Naas, County Kildare		Sample ID.:		SW02	SW03
		Sample Type:		WATER	WATER
		Date Sampled:		30-Nov-2016	30-Nov-2016
Parameter	*	Units	LOD		
Fluorene		µg/l	0.10	< 0.10	< 0.10
Phenanthrene		µg/l	0.10	< 0.10	< 0.10
Anthracene		µg/l	0.10	< 0.10	< 0.10
Fluoranthene		µg/l	0.10	< 0.10	< 0.10
Pyrene		µg/l	0.10	< 0.10	< 0.10
Benzo[a]anthracene		µg/l	0.10	< 0.10	< 0.10
Chrysene		µg/l	0.10	< 0.10	< 0.10
Benzo[b]fluoranthene		µg/l	0.10	< 0.10	< 0.10
Benzo[k]fluoranthene		µg/l	0.10	< 0.10	< 0.10
Benzo[a]pyrene		µg/l	0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene		µg/l	0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene		µg/l	0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene		µg/l	0.10	< 0.10	< 0.10
Total Of 16 PAH's		µg/l	2.0	< 2.0	< 2.0
Dichlorodifluoromethane		µg/l	0.10	< 0.10	< 0.10
Chloromethane		µg/l	0.10	< 0.10	< 0.10
Vinyl Chloride		µg/l	0.10	< 0.10	< 0.10
Bromomethane		µg/l	2.0	< 2.0	< 2.0
Chloroethane		µg/l	0.20	< 0.20	< 0.20
Trichlorofluoromethane		µg/l	0.10	< 0.10	< 0.10
1,1-Dichloroethene		µg/l	0.10	< 0.10	< 0.10
Trans 1,2-Dichloroethene		µg/l	0.10	< 0.10	< 0.10
1,1-Dichloroethane		µg/l	0.10	< 0.10	< 0.10
cis 1,2-Dichloroethene		µg/l	0.10	< 0.10	< 0.10
Bromochloromethane		µg/l	0.50	< 0.50	< 0.50
Trichloromethane		µg/l	0.10	< 0.10	< 0.10
1,1,1-Trichloroethane		µg/l	0.10	< 0.10	< 0.10
Tetrachloromethane		µg/l	0.10	< 0.10	< 0.10
1,1-Dichloropropene		µg/l	0.10	< 0.10	< 0.10
Benzene		µg/l	0.10	< 0.10	< 0.10
1,2-Dichloroethane		µg/l	0.20	< 0.20	< 0.20
Trichloroethene		µg/l	0.10	< 0.10	< 0.10
1,2-Dichloropropane		µg/l	0.10	< 0.10	< 0.10
Dibromomethane		µg/l	0.10	< 0.10	< 0.10
Bromodichloromethane		µg/l	0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene		µg/l	1.0	< 1.0	< 1.0
Toluene		µg/l	0.10	< 0.10	< 0.10
Trans-1,3-Dichloropropene		µg/l	1.0	< 1.0	< 1.0
1,1,2-Trichloroethane		µg/l	1.0	< 1.0	< 1.0
Tetrachloroethene		µg/l	0.10	< 0.10	< 0.10
1,3-Dichloropropane		µg/l	0.20	< 0.20	< 0.20
Dibromochloromethane		µg/l	1.0	< 1.0	< 1.0
1,2-Dibromoethane		µg/l	0.50	< 0.50	< 0.50
Chlorobenzene		µg/l	0.10	< 0.10	< 0.10
1,1,1,2-Tetrachloroethane		µg/l	0.20	< 0.20	< 0.20
Ethylbenzene		µg/l	0.10	< 0.10	< 0.10
m & p-Xylene		µg/l	0.10	< 0.10	< 0.10
o-Xylene		µg/l	0.10	< 0.10	< 0.10
Styrene		µg/l	0.10	< 0.10	< 0.10
Tribromomethane		µg/l	1.0	< 1.0	< 1.0
Isopropylbenzene		µg/l	0.10	< 0.10	< 0.10
Bromobenzene		µg/l	0.10	< 0.10	< 0.10
1,2,3-Trichloropropane		µg/l	5.0	< 5.0	< 5.0
N-Propylbenzene		µg/l	0.10	< 0.10	< 0.10
2-Chlorotoluene		µg/l	0.10	< 0.10	< 0.10
1,3,5-Trimethylbenzene		µg/l	0.10	< 0.10	< 0.10
4-Chlorotoluene		µg/l	0.10	< 0.10	< 0.10
Tert-Butylbenzene		µg/l	0.10	< 0.10	< 0.10
1,2,4-Trimethylbenzene		µg/l	0.10	< 0.10	< 0.10
Sec-Butylbenzene		µg/l	0.10	< 0.10	< 0.10



Project Name:		Lab Job No.:		16-29575	16-29575
Behans Land Restoration		Lab Sample ID.:		385944	385945
Blackhall, Naas, County Kildare		Sample ID.:		SW02	SW03
		Sample Type:		WATER	WATER
		Date Sampled:		30-Nov-2016	30-Nov-2016
Parameter	*	Units	LOD		
1,3-Dichlorobenzene		µg/l	0.10	< 0.10	< 0.10
4-Isopropyltoluene		µg/l	0.10	< 0.10	< 0.10
1,4-Dichlorobenzene		µg/l	0.10	< 0.10	< 0.10
N-Butylbenzene		µg/l	0.10	< 0.10	< 0.10
1,2-Dichlorobenzene		µg/l	0.10	< 0.10	< 0.10
1,2-Dibromo-3-Chloropropane		µg/l	5.0	< 5.0	< 5.0
1,2,4-Trichlorobenzene		µg/l	0.10	< 0.10	< 0.10
Hexachlorobutadiene		µg/l	0.10	< 0.10	< 0.10
1,2,3-Trichlorobenzene		µg/l	0.20	< 0.20	< 0.20
Methyl Tert-Butyl Ether		µg/l	0.10	< 0.10	< 0.10
N-Nitrosodimethylamine		µg/l	0.050	< 0.050	< 0.050
Phenol		µg/l	0.050	< 0.050	< 0.050
2-Chlorophenol		µg/l	0.050	< 0.050	< 0.050
Bis-(2-Chloroethyl)Ether		µg/l	0.050	< 0.050	< 0.050
1,3-Dichlorobenzene		µg/l	0.050	< 0.050	< 0.050
1,4-Dichlorobenzene		µg/l	0.050	< 0.050	< 0.050
1,2-Dichlorobenzene		µg/l	0.050	< 0.050	< 0.050
2-Methylphenol (o-Cresol)		µg/l	0.050	< 0.050	< 0.050
Bis(2-Chloroisopropyl)Ether		µg/l	0.050	< 0.050	< 0.050
Hexachloroethane		µg/l	0.050	< 0.050	< 0.050
N-Nitrosodi-n-propylamine		µg/l	0.050	< 0.050	< 0.050
4-Methylphenol		µg/l	0.050	< 0.050	< 0.050
Nitrobenzene		µg/l	0.050	< 0.050	< 0.050
Isophorone		µg/l	0.050	< 0.050	< 0.050
2-Nitrophenol		µg/l	0.050	< 0.050	< 0.050
2,4-Dimethylphenol		µg/l	0.050	< 0.050	< 0.050
Bis(2-Chloroethoxy)Methane		µg/l	0.050	< 0.050	< 0.050
2,4-Dichlorophenol		µg/l	0.050	< 0.050	< 0.050
1,2,4-Trichlorobenzene		µg/l	0.050	< 0.050	< 0.050
Naphthalene		µg/l	0.050	< 0.050	< 0.050
4-Chloroaniline		µg/l	0.050	< 0.050	< 0.050
Hexachlorobutadiene		µg/l	0.050	< 0.050	< 0.050
4-Chloro-3-Methylphenol		µg/l	0.050	< 0.050	< 0.050
2-Methylnaphthalene		µg/l	0.050	< 0.050	< 0.050
Hexachlorocyclopentadiene		µg/l	0.050	< 0.050	< 0.050
2,4,6-Trichlorophenol		µg/l	0.050	< 0.050	< 0.050
2,4,5-Trichlorophenol		µg/l	0.050	< 0.050	< 0.050
2-Chloronaphthalene		µg/l	0.050	< 0.050	< 0.050
2-Nitroaniline		µg/l	0.050	< 0.050	< 0.050
Acenaphthylene		µg/l	0.050	< 0.050	< 0.050
Dimethylphthalate		µg/l	0.050	< 0.050	< 0.050
2,6-Dinitrotoluene		µg/l	0.050	< 0.050	< 0.050
Acenaphthene		µg/l	0.050	< 0.050	< 0.050
3-Nitroaniline		µg/l	0.050	< 0.050	< 0.050
Dibenzofuran		µg/l	0.050	< 0.050	< 0.050
4-Chlorophenylphenylether		µg/l	0.050	< 0.050	< 0.050
2,4-Dinitrotoluene		µg/l	0.050	< 0.050	< 0.050
Fluorene		µg/l	0.050	< 0.050	< 0.050
Diethyl Phthalate		µg/l	0.050	< 0.050	< 0.050
4-Nitroaniline		µg/l	0.050	< 0.050	< 0.050
2-Methyl-4,6-Dinitrophenol		µg/l	0.050	< 0.050	< 0.050
Azobenzene		µg/l	0.050	< 0.050	< 0.050
4-Bromophenylphenyl Ether		µg/l	0.050	< 0.050	< 0.050
Hexachlorobenzene		µg/l	0.050	< 0.050	< 0.050
Pentachlorophenol		µg/l	0.050	< 0.050	< 0.050
Phenanthrene		µg/l	0.050	< 0.050	< 0.050
Anthracene		µg/l	0.050	< 0.050	< 0.050
Carbazole		µg/l	0.050	< 0.050	< 0.050
Di-N-Butyl Phthalate		µg/l	0.050	< 0.050	< 0.050
Fluoranthene		µg/l	0.050	< 0.050	< 0.050



Project Name:	Lab Job No.:		16-29575	16-29575
Behans Land Restoration	Lab Sample ID.:		385944	385945
Blackhall, Naas, County Kildare	Sample ID.:		SW02	SW03
	Sample Type:		WATER	WATER
	Date Sampled:		30-Nov-2016	30-Nov-2016
Parameter	*	Units	LOD	
Pyrene		µg/l	0.050	< 0.050
Butylbenzyl Phthalate		µg/l	0.050	< 0.050
Benzo[a]anthracene		µg/l	0.050	< 0.050
Chrysene		µg/l	0.050	< 0.050
Bis(2-Ethylhexyl)Phthalate		µg/l	0.050	< 0.050
Di-N-Octyl Phthalate		µg/l	0.050	< 0.050
Benzo[b]fluoranthene		µg/l	0.050	< 0.050
Benzo[k]fluoranthene		µg/l	0.050	< 0.050
Benzo[a]pyrene		µg/l	0.050	< 0.050
Indeno(1,2,3-c,d)Pyrene		µg/l	0.050	< 0.050
Dibenz(a,h)Anthracene		µg/l	0.050	< 0.050
Benzo[g,h,i]perylene		µg/l	0.050	< 0.050
4-Nitrophenol		µg/l	0.050	< 0.050

* S.I 327 of 2012 - European Communities Environmental Objectives (Surface Waters) (Amendment) Regulations 2012

Appendix B

Ground Water Chemical Test Results



Ptoject Name:		Lab Job No.: 16-29575								
Behans Land Restoration		Lab Sample ID.: 385937, 385938, 385939, 385940, 385941, 385942, 385943								
Blackhall, Naas, County Kildare		Sample ID.: GW1, GW2, GW3, GW4, GW5, Well 1, Well 2								
		Sample Type: WATER								
		Date Sampled: 30-Nov-2016								
Determinand	*	Units	LOD							
Temperature		T°C		9.9	9.9	10.0	9.91	9.98	10.2	9.99
pH				7.98	8.01	8.21	8.01	8.01	8.02	8.01
Electrical Conductivity	1875	µs/cm		450	359	652	554	640	528	525
Dissolved Oxygen		mg/l		5.5	3.1	3.82	3.51	3.59	4.18	4.2
Dissolved Oxygen		%		50.3	32.1	34.2	31.3	32.1	38.5	36.4
Suspended Solids At 105C		mg/l	5.0	120	460	330	650	150	100	< 5.0
Total Dissolved Solids		mg/l	1.0	300	300	360	450	530	450	460
Alkalinity (Total)		mg CaCO3/l	10	290	220	330	360	440	370	380
Chloride	187.5	mg/l	1.0	13	17	17	20	14	15	21
Ammoniacal Nitrogen	0.175	mg/l	0.010	0.028	0.030	0.030	0.12	0.028	0.16	0.067
Nitrate	37.5	mg/l	0.50	8.8	7.5	23	32	24	1.2	25
Phosphate		mg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Sulphate	187.5	mg/l	1.0	11	43	16	28	26	47	17
Calcium		mg/l	5.0	92	93	120	200	220	190	180
Potassium		mg/l	0.50	0.78	0.89	1.5	1.9	1.2	3.9	0.82
Magnesium		mg/l	0.50	10	10	11	17	13	14	26
Sodium	150	mg/l	0.50	7.9	15	8.3	11	8.9	16	12
Hardness		mg/l	15	270	270	350	560	590	530	550
Aluminium (Dissolved)	150	µg/l	10	88	19	38	20	28	17	< 10
Arsenic (Dissolved)	7.5	µg/l	1.0	< 1.0	1.0	< 1.0	2.3	< 1.0	1.0	< 1.0
Boron (Dissolved)	750	µg/l	20	24	< 20	< 20	< 20	< 20	21	< 20
Barium (Dissolved)		µg/l	5.0	30	45	45	73	56	69	51
Beryllium (Dissolved)		µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cadmium (Dissolved)	3.75	µg/l	0.080	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080
Cobalt (Dissolved)		µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chromium (Dissolved)	37.5	µg/l	1.0	8.7	3.3	5.6	2.1	8.3	6.4	2.5
Copper (Dissolved)	1500	µg/l	1.0	1.9	1.6	2.0	2.5	3.8	2.5	3.1
Iron (Dissolved)		µg/l	20	220	220	230	340	400	320	280
Mercury (Dissolved)	0.75	µg/l	0.50	< 0.50	0.91	0.53	< 0.50	< 0.50	< 0.50	< 0.50
Manganese (Dissolved)		µg/l	1.0	< 1.0	37	1.5	510	9.9	420	10
Molybdenum (Dissolved)		µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Nickel (Dissolved)	15	µg/l	1.0	< 1.0	< 1.0	< 1.0	2.2	1.1	1.2	< 1.0
Lead (Dissolved)	18.75	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Antimony (Dissolved)		µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Selenium (Dissolved)		µg/l	1.0	6.0	11	8.8	17	19	8.2	11
Tin (Dissolved)		µg/l	1.0	< 1.0	1.3	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0



Ptoject Name:	Lab Job No.:	16-29575	16-29575	16-29575	16-29575	16-29575	16-29575	16-29575	16-29575	
Behans Land Restoration	Lab Sample ID.:	385937	385938	385939	385940	385941	385942	385943		
Blackhall, Naas, County Kildare	Sample ID.:	GW1	GW2	GW3	GW4	GW5	Well 1	Well 2		
	Sample Type:	WATER	WATER	WATER	WATER	WATER	WATER	WATER		
	Date Sampled:	30-Nov-2016	30-Nov-2016	30-Nov-2016	30-Nov-2016	30-Nov-2016	30-Nov-2016	30-Nov-2016	30-Nov-2016	
Determinand	*	Units	LOD							
Strontium (Dissolved)		µg/l	1.0	180	140	180	280	270	340	220
Vanadium (Dissolved)		µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (Dissolved)		µg/l	1.0	1.8	3.2	2.4	2.1	2.4	2.3	2.3
Thallium		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
TPH >C5-C6		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
TPH >C6-C7		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
TPH >C7-C8		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
TPH >C8-C10		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
TPH >C10-C12		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
TPH >C12-C16		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
TPH >C16-C21		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
TPH >C21-C35		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total TPH >C5-C35		µg/l	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Naphthalene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's		µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Dichlorodifluoromethane		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chloromethane		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Vinyl Chloride		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Bromomethane		µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Chloroethane		µg/l	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Trichlorofluoromethane		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,1-Dichloroethene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10



<p>Project Name: Behans Land Restoration Blackhall, Naas, County Kildare</p>										
Lab Job No.:		16-29575								
Lab Sample ID.:		385937								
Sample ID.:		GW1								
Sample Type:		WATER								
Date Sampled:		30-Nov-2016								
Determinand	*	Units	LOD							
Trans 1,2-Dichloroethene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,1-Dichloroethane		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
cis 1,2-Dichloroethene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Bromochloromethane		µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichloromethane		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,1,1-Trichloroethane		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Tetrachloromethane		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,1-Dichloropropene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,2-Dichloroethane		µg/l	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Trichloroethene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,2-Dichloropropane		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibromomethane		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Bromodichloromethane		µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene		µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Trans-1,3-Dichloropropene		µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane		µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,3-Dichloropropane		µg/l	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Dibromochloromethane		µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromoethane		µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chlorobenzene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,1,1,2-Tetrachloroethane		µg/l	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Ethylbenzene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
m & p-Xylene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.12	< 0.10	< 0.10
o-Xylene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Styrene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Tribromomethane		µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Bromobenzene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,2,3-Trichloropropane		µg/l	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
N-Propylbenzene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
2-Chlorotoluene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,3,5-Trimethylbenzene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
4-Chlorotoluene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Tert-Butylbenzene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Project Name:	Lab Job No.:	16-29575	16-29575	16-29575	16-29575	16-29575	16-29575	16-29575	16-29575
Behans Land Restoration	Lab Sample ID.:	385937	385938	385939	385940	385941	385942	385943	
Blackhall, Naas, County Kildare	Sample ID.:	GW1	GW2	GW3	GW4	GW5	Well 1	Well 2	
	Sample Type:	WATER	WATER	WATER	WATER	WATER	WATER	WATER	
	Date Sampled:	30-Nov-2016	30-Nov-2016	30-Nov-2016	30-Nov-2016	30-Nov-2016	30-Nov-2016	30-Nov-2016	
Determinand	*	Units	LOD						
1,2,4-Trimethylbenzene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Sec-Butylbenzene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,3-Dichlorobenzene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
4-Isopropyltoluene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,4-Dichlorobenzene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
N-Butylbenzene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,2-Dichlorobenzene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,2-Dibromo-3-Chloropropane		µg/l	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2,4-Trichlorobenzene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Hexachlorobutadiene		µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,2,3-Trichlorobenzene		µg/l	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Methyl Tert-Butyl Ether		µg/l	0.10	< 0.10	< 0.10	< 0.10	0.10	< 0.10	< 0.10
N-Nitrosodimethylamine		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Phenol		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
2-Chlorophenol		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Bis-(2-Chloroethyl)Ether		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
1,3-Dichlorobenzene		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
1,4-Dichlorobenzene		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
1,2-Dichlorobenzene		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
2-Methylphenol (o-Cresol)		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Bis(2-Chloroisopropyl)Ether		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Hexachloroethane		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
N-Nitrosodi-n-propylamine		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
4-Methylphenol		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Nitrobenzene		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Isophorone		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
2-Nitrophenol		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
2,4-Dimethylphenol		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Bis(2-Chloroethoxy)Methane		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
2,4-Dichlorophenol		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
1,2,4-Trichlorobenzene		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Naphthalene		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
4-Chloroaniline		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Hexachlorobutadiene		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
4-Chloro-3-Methylphenol		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
2-Methylnaphthalene		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Hexachlorocyclopentadiene		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050



Ptoject Name:	Lab Job No.:	16-29575	16-29575	16-29575	16-29575	16-29575	16-29575	16-29575	16-29575	16-29575
Behans Land Restoration	Lab Sample ID.:	385937	385938	385939	385940	385941	385942	385943		
Blackhall, Naas, County Kildare	Sample ID.:	GW1	GW2	GW3	GW4	GW5	Well 1	Well 2		
	Sample Type:	WATER	WATER	WATER	WATER	WATER	WATER	WATER		
	Date Sampled:	30-Nov-2016	30-Nov-2016	30-Nov-2016	30-Nov-2016	30-Nov-2016	30-Nov-2016	30-Nov-2016	30-Nov-2016	30-Nov-2016
Determinand	*	Units	LOD							
2,4,6-Trichlorophenol		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
2,4,5-Trichlorophenol		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
2-Chloronaphthalene		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
2-Nitroaniline		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Acenaphthylene		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Dimethylphthalate		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
2,6-Dinitrotoluene		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Acenaphthene		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
3-Nitroaniline		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Dibenzofuran		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
4-Chlorophenylphenylether		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
2,4-Dinitrotoluene		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Fluorene		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Diethyl Phthalate		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
4-Nitroaniline		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
2-Methyl-4,6-Dinitrophenol		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Azobenzene		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
4-Bromophenylphenyl Ether		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Hexachlorobenzene		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Pentachlorophenol		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Phenanthrene		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Anthracene		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Carbazole		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Di-N-Butyl Phthalate		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Fluoranthene		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Pyrene		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Butylbenzyl Phthalate		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Benzo[a]anthracene		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Chrysene		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Bis(2-Ethylhexyl)Phthalate		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Di-N-Octyl Phthalate		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Benzo[b]fluoranthene		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Benzo[k]fluoranthene		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Benzo[a]pyrene		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Indeno(1,2,3-c,d)Pyrene		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Dibenz(a,h)Anthracene		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Benzo[g,h,i]perylene		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050



Project Name:		Lab Job No.:		16-29575	16-29575	16-29575	16-29575	16-29575	16-29575	16-29575
Behans Land Restoration		Lab Sample ID.:		385937	385938	385939	385940	385941	385942	385943
Blackhall, Naas, County Kildare		Sample ID.:		GW1	GW2	GW3	GW4	GW5	Well 1	Well 2
		Sample Type:		WATER	WATER	WATER	WATER	WATER	WATER	WATER
		Date Sampled:		30-Nov-2016	30-Nov-2016	30-Nov-2016	30-Nov-2016	30-Nov-2016	30-Nov-2016	30-Nov-2016
Determinand	*	Units	LOD							
4-Nitrophenol		µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050

* S.I. 366 of 2016 - European Union Environmental Objectives (Groundwater) (Amendment) Regulations 2016

Appendix C Copy of Certified Results



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Amended Report

Report No.: 16-29575-2

Initial Date of Issue: 09-Dec-2016 **Date of Re-Issue:** 13-Dec-2016

Client: SLR Consulting Ireland

Client Address: 7 Dundrum Business Park
Windy Arbour
Dundrum
Dublin 14
Dublin
Ireland

Contact(s): Aldona Binchy

Project: John Behan - 501.00004.00037

Quotation No.: Q16-07660 **Date Received:** 02-Dec-2016

Order No.: 3116 **Date Instructed:** 02-Dec-2016

No. of Samples: 9

Turnaround (Wkdays): 5 **Results Due:** 08-Dec-2016

Date Approved: 13-Dec-2016

Approved By:



Details: Robert Monk, Technical Development
Chemist

Results - Water

Client: SLR Consulting Ireland		Chemtest Job No.:											
Quotation No.: Q16-07660		Chemtest Sample ID.:											
		Client Sample ID.:											
		Sample Type:											
		Date Sampled:											
Determinand	Accred.	SOP	Units	LOD	16-29575	16-29575	16-29575	16-29575	16-29575	16-29575	16-29575	16-29575	16-29575
Suspended Solids At 105C	U	1030	mg/l	5.0	120	460	330	650	150	100	< 5.0	< 5.0	47
Total Dissolved Solids	N		mg/l	1.0	300	300	360	450	530	450	460	290	390
Alkalinity (Total)	U	1220	mg CaCO3/l	10	290	220	330	360	440	370	380	230	130
Chloride	U	1220	mg/l	1.0	13	17	17	20	14	15	21	17	23
Ammoniacal Nitrogen	U	1220	mg/l	0.010	0.028	0.030	0.030	0.12	0.028	0.16	0.067	0.033	0.034
Nitrate	U	1220	mg/l	0.50	8.8	7.5	23	32	24	1.2	25	7.6	< 0.50
Phosphate	U	1220	mg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Sulphate	U	1220	mg/l	1.0	11	43	16	28	26	47	17	21	160
Calcium	U	1415	mg/l	5.0	92	93	120	200	220	190	180	100	120
Potassium	U	1415	mg/l	0.50	0.78	0.89	1.5	1.9	1.2	3.9	0.82	1.1	17
Magnesium	U	1415	mg/l	0.50	10	10	11	17	13	14	26	11	7.6
Sodium	U	1415	mg/l	0.50	7.9	15	8.3	11	8.9	16	12	10	19
Hardness	U	1415	mg/l	15	270	270	350	560	590	530	550	300	330
Aluminium (Dissolved)	N	1450	µg/l	10	88	19	38	20	28	17	< 10	< 10	< 10
Arsenic (Dissolved)	U	1450	µg/l	1.0	< 1.0	1.0	< 1.0	2.3	< 1.0	1.0	< 1.0	< 1.0	1.9
Boron (Dissolved)	U	1450	µg/l	20	24	< 20	< 20	< 20	< 20	21	< 20	< 20	32
Barium (Dissolved)	U	1450	µg/l	5.0	30	45	45	73	56	69	51	32	43
Beryllium (Dissolved)	U	1450	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cadmium (Dissolved)	U	1450	µg/l	0.080	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080
Cobalt (Dissolved)	U	1450	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chromium (Dissolved)	U	1450	µg/l	1.0	8.7	3.3	5.6	2.1	8.3	6.4	2.5	5.6	6.6
Copper (Dissolved)	U	1450	µg/l	1.0	1.9	1.6	2.0	2.5	3.8	2.5	3.1	2.3	4.9
Iron (Dissolved)	N	1450	µg/l	20	220	220	230	340	400	320	280	160	260
Mercury (Dissolved)	U	1450	µg/l	0.50	< 0.50	0.91	0.53	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Manganese (Dissolved)	U	1450	µg/l	1.0	< 1.0	37	1.5	510	9.9	420	10	< 1.0	1.3
Molybdenum (Dissolved)	U	1450	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	4.2
Nickel (Dissolved)	U	1450	µg/l	1.0	< 1.0	< 1.0	< 1.0	2.2	1.1	1.2	< 1.0	< 1.0	2.7
Lead (Dissolved)	U	1450	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Antimony (Dissolved)	U	1450	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.3
Selenium (Dissolved)	U	1450	µg/l	1.0	6.0	11	8.8	17	19	8.2	11	5.0	9.5
Tin (Dissolved)	U	1450	µg/l	1.0	< 1.0	1.3	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Strontium (Dissolved)	N	1450	µg/l	1.0	180	140	180	280	270	340	220	180	390
Vanadium (Dissolved)	U	1450	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (Dissolved)	U	1450	µg/l	1.0	1.8	3.2	2.4	2.1	2.4	2.3	2.3	1.1	5.6
Thallium	N	1450	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
TPH >C5-C6	N	1670	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
TPH >C6-C7	N	1670	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
TPH >C7-C8	N	1670	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
TPH >C8-C10	N	1670	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
TPH >C10-C12	N	1670	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Results - Water

Client: SLR Consulting Ireland		Chemtest Job No.:		16-29575	16-29575	16-29575	16-29575	16-29575	16-29575	16-29575	16-29575	16-29575	16-29575
Quotation No.: Q16-07660		Chemtest Sample ID.:		385937	385938	385939	385940	385941	385942	385943	385944	385945	385945
		Client Sample ID.:		GW1	GW2	GW3	GW4	GW5	Well 1	Well 2	SW02	SW03	
		Sample Type:		WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	
		Date Sampled:		30-Nov-2016	30-Nov-2016	30-Nov-2016	30-Nov-2016	30-Nov-2016	30-Nov-2016	30-Nov-2016	30-Nov-2016	30-Nov-2016	30-Nov-2016
Determinand	Accred.	SOP	Units	LOD									
TPH >C12-C16	N	1670	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
TPH >C16-C21	N	1670	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
TPH >C21-C35	N	1670	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total TPH >C5-C35	N	1670	µg/l	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Naphthalene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	U	1700	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Dichlorodifluoromethane	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chloromethane	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Vinyl Chloride	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Bromomethane	N	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Chloroethane	N	1760	µg/l	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Trichlorofluoromethane	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,1-Dichloroethene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Trans 1,2-Dichloroethene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,1-Dichloroethane	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
cis 1,2-Dichloroethene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Bromochloromethane	N	1760	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichloromethane	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,1,1-Trichloroethane	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Tetrachloromethane	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,1-Dichloropropene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,2-Dichloroethane	N	1760	µg/l	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Trichloroethene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,2-Dichloropropane	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibromomethane	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Results - Water

Client: SLR Consulting Ireland		Chemtest Job No.: 16-29575											
Quotation No.: Q16-07660		Chemtest Sample ID.: 385937, 385938, 385939, 385940, 385941, 385942, 385943, 385944, 385945											
		Client Sample ID.: GW1, GW2, GW3, GW4, GW5, Well 1, Well 2, SW02, SW03											
		Sample Type: WATER, WATER, WATER, WATER, WATER, WATER, WATER, WATER, WATER											
		Date Sampled: 30-Nov-2016, 30-Nov-2016, 30-Nov-2016, 30-Nov-2016, 30-Nov-2016, 30-Nov-2016, 30-Nov-2016, 30-Nov-2016, 30-Nov-2016											
Determinand	Accred.	SOP	Units	LOD									
Bromodichloromethane	N	1760	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Trans-1,3-Dichloropropene	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,3-Dichloropropane	N	1760	µg/l	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Dibromochloromethane	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromoethane	N	1760	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chlorobenzene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,1,1,2-Tetrachloroethane	N	1760	µg/l	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Ethylbenzene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
m & p-Xylene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.12	< 0.10	< 0.10	< 0.10	< 0.10
o-Xylene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Styrene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Tribromomethane	N	1760	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Bromobenzene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,2,3-Trichloropropane	N	1760	µg/l	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
N-Propylbenzene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
2-Chlorotoluene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,3,5-Trimethylbenzene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
4-Chlorotoluene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Tert-Butylbenzene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,2,4-Trimethylbenzene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Sec-Butylbenzene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,3-Dichlorobenzene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
4-Isopropyltoluene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,4-Dichlorobenzene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
N-Butylbenzene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,2-Dichlorobenzene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,2-Dibromo-3-Chloropropane	N	1760	µg/l	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2,4-Trichlorobenzene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Hexachlorobutadiene	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
1,2,3-Trichlorobenzene	N	1760	µg/l	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Methyl Tert-Butyl Ether	N	1760	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.10	< 0.10	< 0.10	< 0.10	< 0.10
N-Nitrosodimethylamine	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Phenol	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
2-Chlorophenol	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Bis-(2-Chloroethyl)Ether	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
1,3-Dichlorobenzene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050

Results - Water

Client: SLR Consulting Ireland		Chemtest Job No.: 16-29575											
Quotation No.: Q16-07660		Chemtest Sample ID.: 385937, 385938, 385939, 385940, 385941, 385942, 385943, 385944, 385945											
		Client Sample ID.: GW1, GW2, GW3, GW4, GW5, Well 1, Well 2, SW02, SW03											
		Sample Type: WATER, WATER, WATER, WATER, WATER, WATER, WATER, WATER, WATER											
		Date Sampled: 30-Nov-2016, 30-Nov-2016, 30-Nov-2016, 30-Nov-2016, 30-Nov-2016, 30-Nov-2016, 30-Nov-2016, 30-Nov-2016, 30-Nov-2016											
Determinand	Accred.	SOP	Units	LOD									
1,4-Dichlorobenzene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
1,2-Dichlorobenzene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
2-Methylphenol (o-Cresol)	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Bis(2-Chloroisopropyl)Ether	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Hexachloroethane	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
N-Nitrosodi-n-propylamine	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
4-Methylphenol	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Nitrobenzene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Isophorone	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
2-Nitrophenol	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
2,4-Dimethylphenol	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Bis(2-Chloroethoxy)Methane	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
2,4-Dichlorophenol	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
1,2,4-Trichlorobenzene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Naphthalene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
4-Chloroaniline	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Hexachlorobutadiene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
4-Chloro-3-Methylphenol	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
2-Methylnaphthalene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Hexachlorocyclopentadiene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
2,4,6-Trichlorophenol	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
2,4,5-Trichlorophenol	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
2-Chloronaphthalene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
2-Nitroaniline	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Acenaphthylene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Dimethylphthalate	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
2,6-Dinitrotoluene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Acenaphthene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
3-Nitroaniline	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Dibenzofuran	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
4-Chlorophenylphenylether	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
2,4-Dinitrotoluene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Fluorene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Diethyl Phthalate	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
4-Nitroaniline	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
2-Methyl-4,6-Dinitrophenol	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Azobenzene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
4-Bromophenylphenyl Ether	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Hexachlorobenzene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Pentachlorophenol	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Phenanthrene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050

Results - Water

Client: SLR Consulting Ireland		Chemtest Job No.: 16-29575											
Quotation No.: Q16-07660		Chemtest Sample ID.: 385937											
		Client Sample ID.: GW1 GW2 GW3 GW4 GW5 Well 1 Well 2 SW02 SW03											
		Sample Type: WATER WATER WATER WATER WATER WATER WATER WATER WATER WATER WATER											
		Date Sampled: 30-Nov-2016 30-Nov-2016 30-Nov-2016 30-Nov-2016 30-Nov-2016 30-Nov-2016 30-Nov-2016 30-Nov-2016 30-Nov-2016 30-Nov-2016 30-Nov-2016											
Determinand	Accred.	SOP	Units	LOD									
Anthracene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Carbazole	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Di-N-Butyl Phthalate	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Fluoranthene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Pyrene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Butylbenzyl Phthalate	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Benzo[a]anthracene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Chrysene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Bis(2-Ethylhexyl)Phthalate	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Di-N-Octyl Phthalate	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Benzo[b]fluoranthene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Benzo[k]fluoranthene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Benzo[a]pyrene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Indeno(1,2,3-c,d)Pyrene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Dibenz(a,h)Anthracene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Benzo[g,h,i]perylene	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
4-Nitrophenol	N	1790	µg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050

SOP	Title	Parameters included	Method summary
1030	Total Suspended Solids	Total suspended solids	Filtration of a mixed sample through a standard glass fibre filter and determination of the mass of residue retained dried at 105°C.
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1415	Cations in Waters by ICP-MS	Sodium; Potassium; Calcium; Magnesium	Direct determination by inductively coupled plasma - mass spectrometry (ICP-MS).
1450	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1670	Total Petroleum Hydrocarbons (TPH) in Waters by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO	Pentane extraction / GC FID detection
1700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenzo[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Pentane extraction / GC FID detection
1760	Volatile Organic Compounds (VOCs) in Waters by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics. (cf. USEPA Method 8260)	Automated headspace gas chromatographic (GC) analysis of water samples with mass spectrometric (MS) detection of volatile organic compounds.
1790	Semi-Volatile Organic Compounds (SVOCs) in Waters by GC-MS	Semi-volatile organic compounds	Solvent extraction / GCMS detection

Report Information

Key

- U UKAS accredited
- M MCERTS and UKAS accredited
- N Unaccredited
- S This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
- SN This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
- T This analysis has been subcontracted to an unaccredited laboratory
- I/S Insufficient Sample
- U/S Unsuitable Sample
- N/E not evaluated
- < "less than"
- > "greater than"

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

customerservices@chemtest.co.uk



global environmental solutions

**John Behan / Behan's Land Restoration Ltd.
Soil Recovery Facility, Blackhall, Naas, Co. Kildare**

Noise Monitoring Report

Waste Licence Ref. W0247-01

July 2016

SLR Ref : 501.00004.00037.Rev0

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Figure 2	Site Location Plan
Figure 3	N1 1/3rdOctave Band Analysis
Figure 4	N2 1/3rdOctave Band Analysis
Figure 5	N3 1/3rdOctave Band Analysis

1.0 INTRODUCTION

SLR Consulting Ireland was appointed by Behan's Land Restoration Limited to carry out a noise survey as required by its Waste Licence (No. W0247-01) for recovery of inert soil and construction and demolition waste.

The waste recovery facility is located at Blackhall, Naas, Co. Kildare; refer to Figure 1 (Site Location) and Figure 2 (Existing Site Layout).

2.0 SCOPE OF THE REPORT

2.1 Waste Licence No. W0247-01

The noise survey was carried out in accordance with the requirement of Condition No 6.9.1 of Behan's Land Restoration Waste Licence (No. W0247-01) which states:

"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."

2.2 Report Structure

- Section 1: Introduction
- Section 2: Scope of the Report
- Section 3: Competent Person
- Section 4: Methodology
- Section 5: Noise Monitoring Results Summary and Discussion
- Section 6: Closure

3.0 COMPETENT PERSON

Monitoring was carried out by Aldona Binchy MSc. (Eng) AIEMA Environmental Engineering following the advice contained in the EPA Publication (2012) Guidance Note for Noise: Licence Applications, Surveys and Assessment in Relation to Scheduled Activities (NG4).

Ms Binchy has over 10 years of experience in noise surveys and assessments for planning compliance, EPA IPPC and Waste Licences, Environmental Impact Assessments.

4.0 SURVEY METHODOLOGY

4.1 Noise

The scope of work comprised:

- Daytime noise survey at noise locations.
- Assessment of compliance of measured noise levels associated with the existing facility in relation to permitted levels.
- Conclusions

Monitoring for compliance with the noise emission conditions of the Waste Licence (No. W0247-01) was carried out on the 20th July 2016.

At the measurement positions, the following noise level indices were recorded:

- $L_{Aeq,T}$ – the A-weighted equivalent continuous sound pressure level over the measurement period, effectively represents an “average” energy level of all the sampled levels.
- $L_{A90,T}$ – the A-weighted noise level exceeded for 90% of the measurement period. This parameter is often used to describe the background noise.
- $L_{A10,T}$ – the A-weighted noise level exceeded for 10% of the measurement period. This parameter is often used to describe or identify road traffic noise

A small difference in $L_{A10,T}$, $L_{Aeq,T}$ and $L_{A90,T}$ will indicate a relatively constant noise emission (or a lack of intermittent noise). The greater the difference between the $L_{A10,T}$, $L_{Aeq,T}$ and $L_{A90,T}$ noise levels, the greater the proportion of noise arising from intermittent sources such as traffic.

A-weighting is the process by which noise levels are corrected to account for the non-linear frequency response of the human ear. All noise levels are quoted in dB(A) relative to a sound pressure of 20µPa.

The survey microphone was placed 1.5m above the ground in free-field conditions, *i.e.* at least 3.5m from the nearest vertical, reflecting surface.

4.1.1 Monitoring Points

The noise monitoring was carried out at following locations:

- Location 1 (N1)
- Location 2 (N2)
- Location 3 (N3)

Monitoring points locations are shown on Figure 2 (Existing Site Layout).

4.1.2 Equipment

The measurements were carried out using Larson Davis Model 831 Sound Level Meter (Serial number: 0001642) which was field calibrated using Larson Davis Calibrator Cal 200 (Serial number: 6970) before and after measurement. The Larson Davis Model 831 Sound Level Meter has integrated octave frequency analyser for the tonal noise analysis. All noise equipment had been calibrated to a traceable standard by UKAS-accredited laboratories within 12 months preceding the survey. Standard windshield was used on the microphone during the survey.

4.1.3 Weather Conditions

The weather conditions during the survey periods were acceptable for noise monitoring. Measurements were taken in the neutral weather conditions (absence of wind – below 5m/sec - and precipitation). The prevailing weather conditions at the time of survey are detailed below:

20th July 2016 Overcast with sunny spells, Temp 18°C
Wind up to 2.5m/s, wind direction W.

4.1.4 Limits

Schedule B.4 and Schedule C of the Waste Licence (No. W0247-01) sets out the following noise emission limits from the waste recovery facility at Blackhall:

“Equivalent sound levels attributable to all on site operations associated with development shall not exceed the limit value(s):

- *Daytime L_{Aeq} (30minutes) of 55 dB(A)*
- *Night-time L_{Aeq} (30minutes) of 45 dB(A)*

When measured at the monitoring locations. There shall be no clearly audible tonal component or impulsive component in the noise emission from the activity at any noise sensitive location. “

Monitoring points locations are shown on Figure 2 (Existing Site Layout).

5.0 NOISE MONITORING RESULTS SUMMARY AND DISCUSSION

5.1 Noise Results

Noise measurements were taken at three locations (N01, N02, and N03) during daytime hours. There is no operations at the site during night-time. During the survey observations of noise sources that influenced the noise levels were noted. A summary of results and discussion is presented below.

Table 1
Summary of Measured Noise Levels, free-field, dB,

Location	Date	Time	Measured Noise Levels – dB(A)		
			L _{Aeq,T}	L _{A10,T}	L _{A90,T}
N1	20/07/16	10:32 - 11:02	55	58	46
N1	20/07/16	12:20 - 12:50	48	50	41
N1	20/07/16	14:45 - 15:15	49	52	41
N2	20/07/16	09:52 - 10:22	46 (46+5=51)	49	40
N2	20/07/16	11:44 - 12:14	46	49	39
N2	20/07/16	14:08 - 14:38	48	50	38
N3	20/07/16	09:19 - 09:49	45	42	31
N3	20/07/16	11:10 - 11:40	50	46	37
N3	20/07/16	13:33 - 14:03	45	45	26

Table 2
Measured Noise Levels Noise Locations, free-field, dB,

Location	Date	Photo
N1	20/07/16	 A photograph showing a noise meter mounted on a tripod in a grassy field. The meter is a grey device with a black microphone on top. The background consists of tall green grass and a line of trees.
N2	20/07/16	 A photograph showing a noise meter on a tripod positioned on a gravel path. The meter is tilted upwards. In the background, there is a metal fence and some buildings under a cloudy sky.
N3	20/07/16	 A close-up photograph of a noise meter on a tripod. The meter is a grey device with a black microphone and a small screen. It is positioned on a dirt path with green foliage and a fence in the background.

N1

The noise monitoring location N1 was positioned within the licensed facility boundary, near the residence adjoining the site to the north-west of the site entrance. At the time of survey noise levels at this location were influenced by activities at the adjoining licensed facility operated by Walshestown Restoration Limited, by traffic on the local road and natural noises.

Noise from site activities from the Walshestown Restoration Limited site dominated the overall noise climate at this location. Site activities from Behan's Land Restoration Ltd's facility were also audible during noise monitoring, although these had only a minor influence on the overall noise climate at this location.

N2

The noise monitoring location N2 was positioned on the side of the local lane at the residences to south-east of site entrance. At the time of survey, noise levels at this location were influenced by occasional traffic on the local road and by activities at the facility operated by Walshestown Restoration Limited. Site activities from the Behan's Land Restoration Ltd's facility were largely inaudible during noise monitoring.

N3

The noise monitoring location N3 was positioned at the side of the local road at the residence at the north end of the site. At the time of survey noise levels at this location were influenced by traffic on the local road and natural noise. Site activities from Behan's Land Restoration Ltd's facility were largely inaudible the during noise monitoring period.

5.2 Tonal Analysis Results

The updated Environmental Noise Standard ISO as set out in Annex D, 1996-2:2007(E) details that a prominent, discrete tonal component may be detected in one-third octave spectra if the level of a one-third octave band exceeds the level of the adjacent bands by some constant level difference.

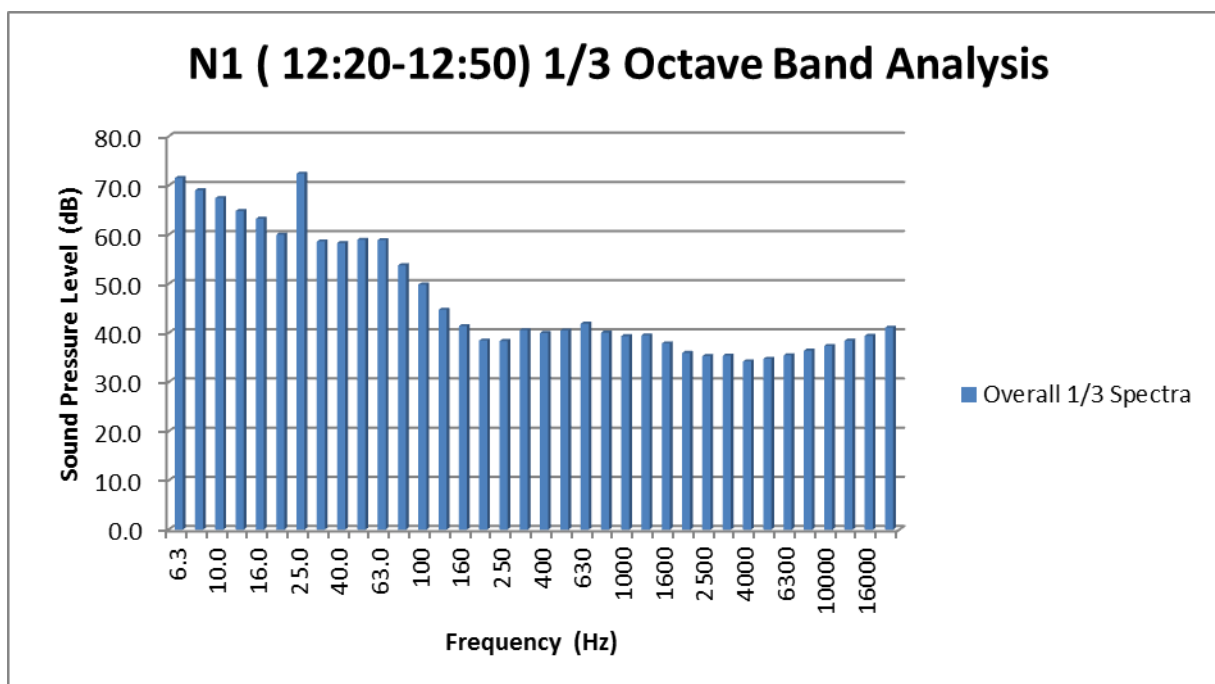
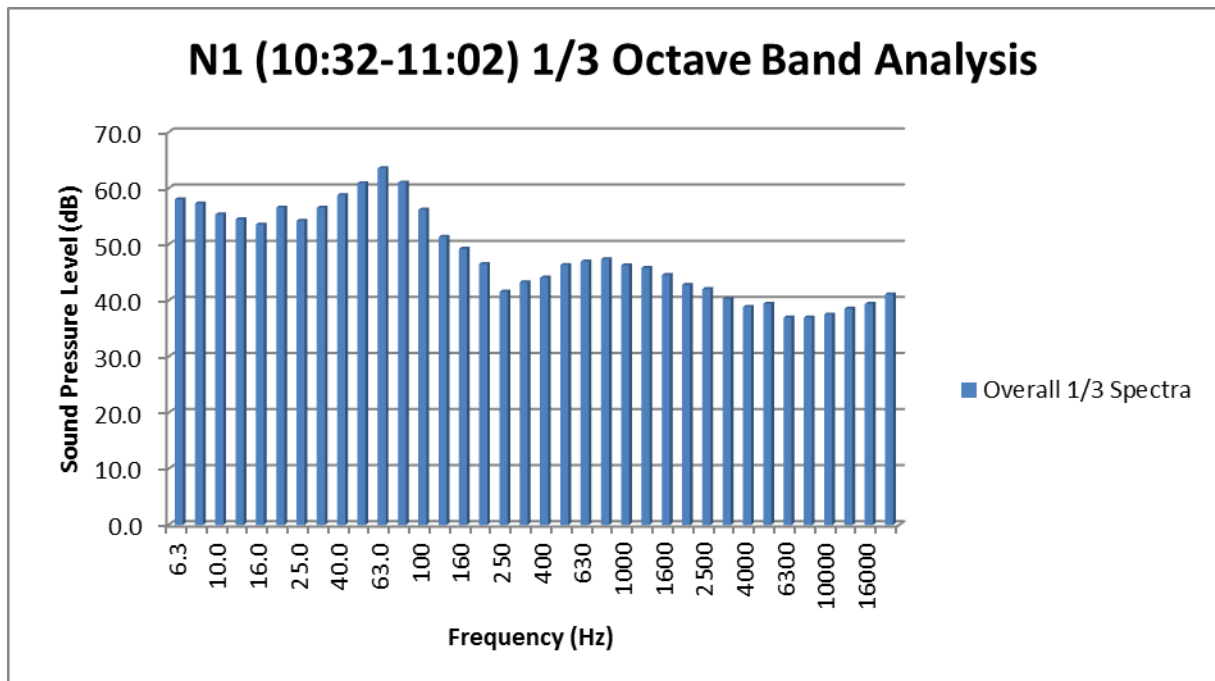
The appropriate level differences vary with frequency. They should be greater than or equal to the following values in both adjacent one-third-octave bands:

- 15dB in low-frequency one-third-octave bands (25Hz to 125Hz);
- 8dB in middle-frequency bands (160Hz to 400Hz), and;
- 5dB in high-frequency bands (500Hz to 10,000Hz).

On examination of the 1/3 Octave Band Noise Spectra recorded on 20th July 2016, one tonal component was identified within the measured range (6.3 Hz to 20 kHz) at location N2 (09:52-10:22) at 1600 Hz, refer to Figure 3, Figure 4 and Figure 5 below.

In such circumstances, adjustment of 5 dB to the measured noise level at N2 was added. The overall noise climate at the location N2 was dominated by noise from activities from Walshestown Restoration Limited, thus it is considered that the tonal component should not be attributed solely to activities at Behan's Land Restoration Ltd.'s facility, if at all.

Figure 3
N1 1/3rd Octave Band Analysis



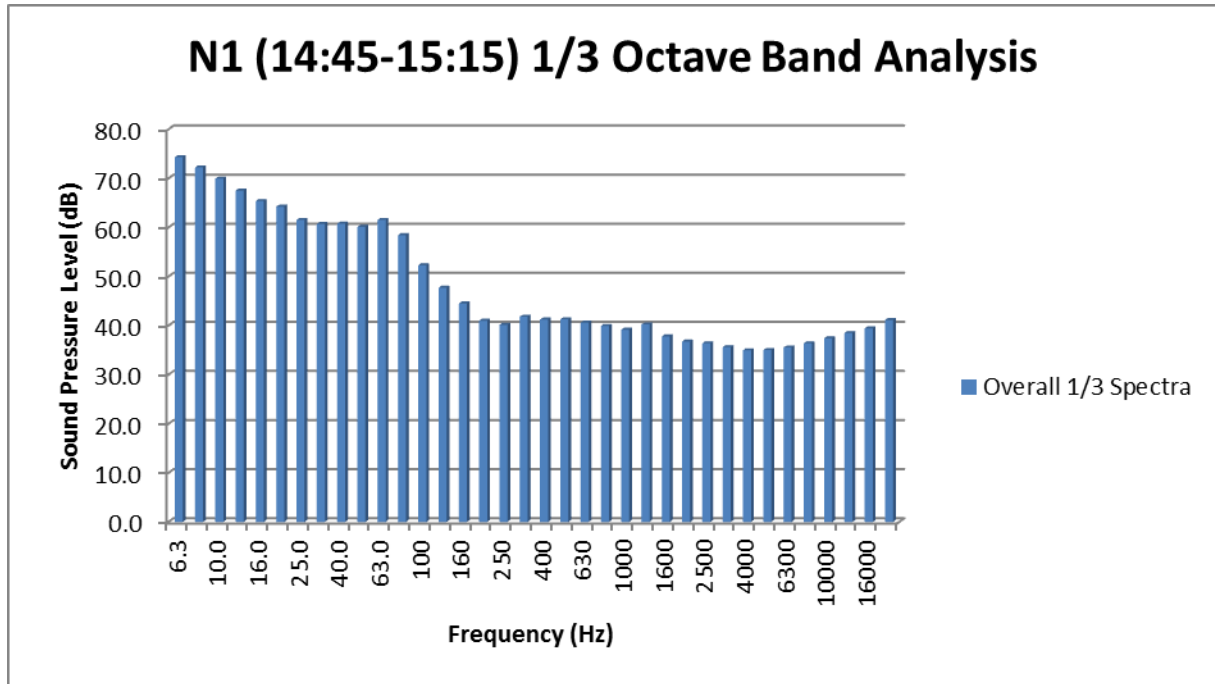
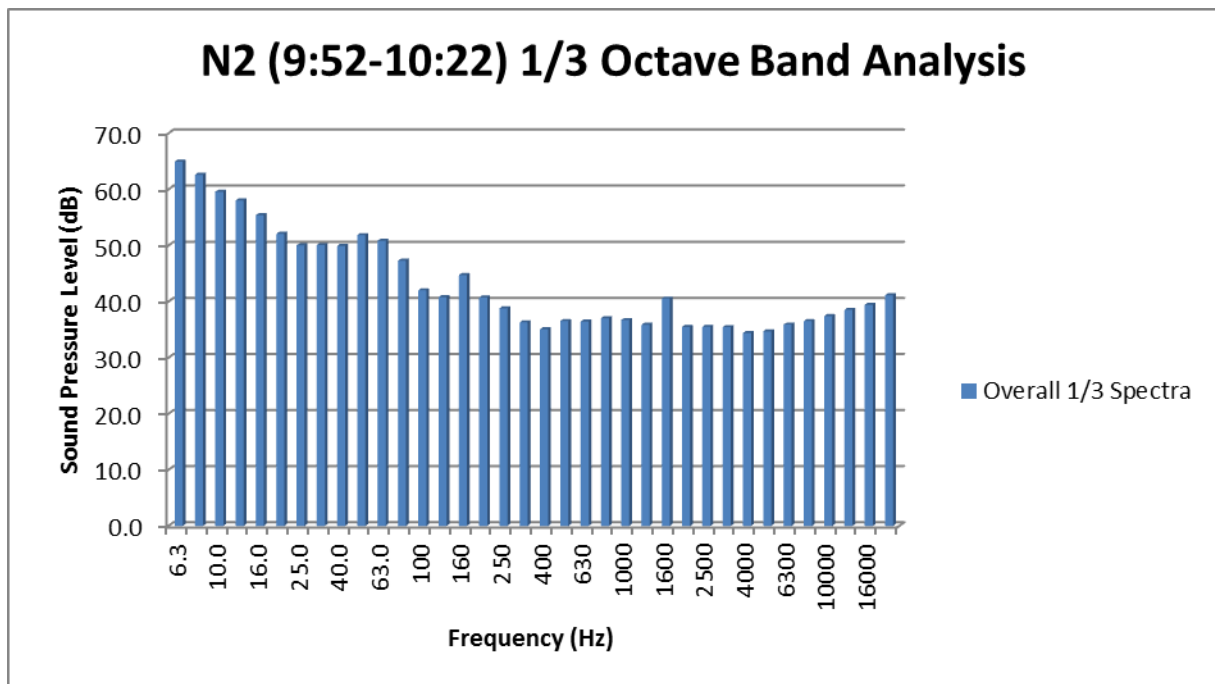
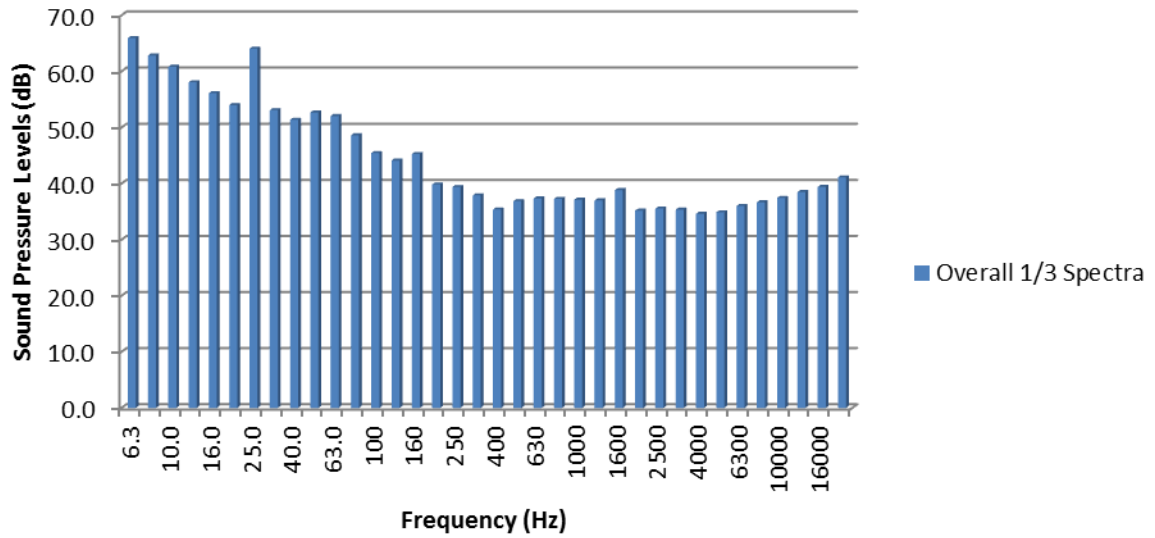


Figure 4
N2 1/3rd Octave Band Analysis



N2 (11:44 - 12:14) 1/3 Octave Band Analysis



N2 (14:08-14:38) 1/3 Octave Band Analysis

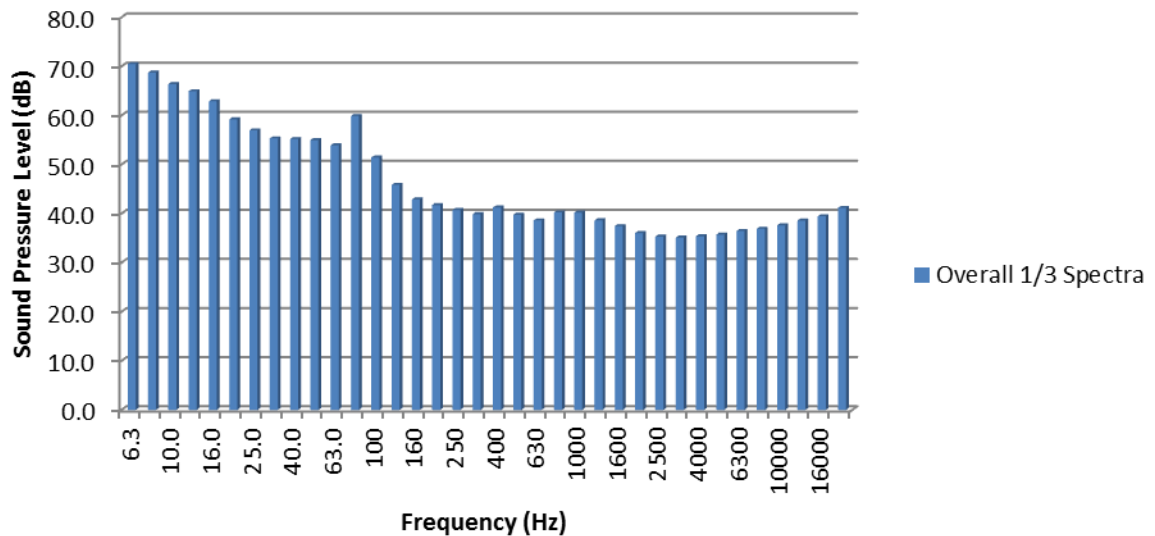
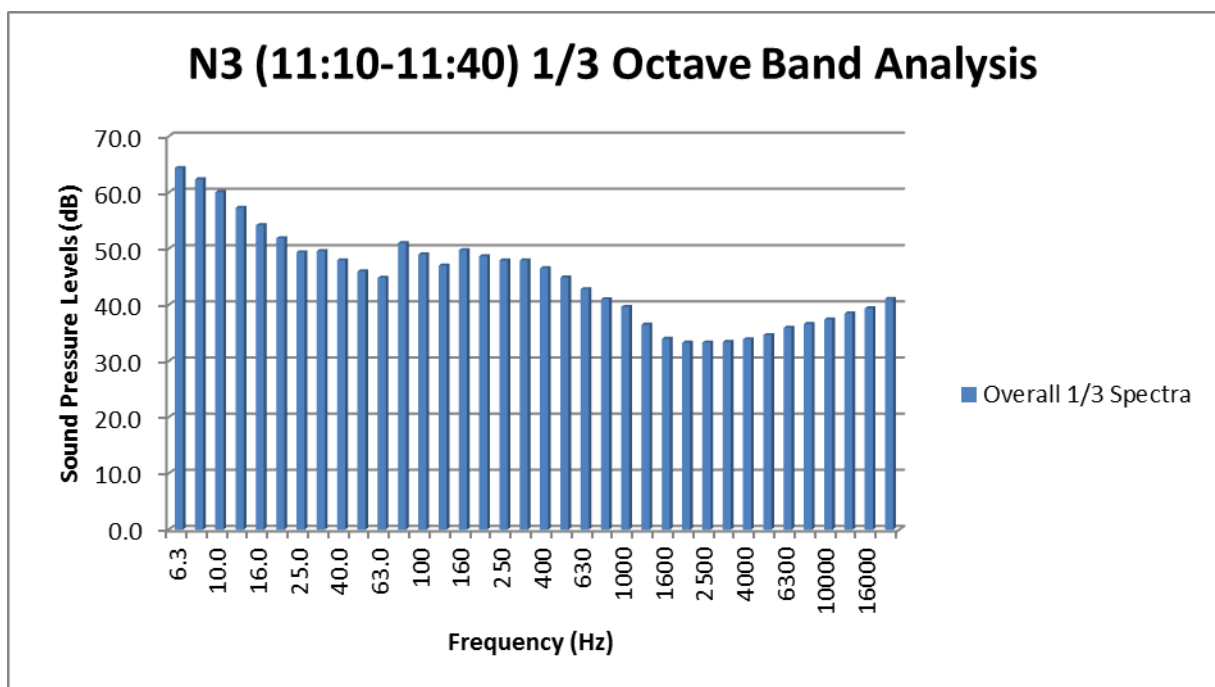
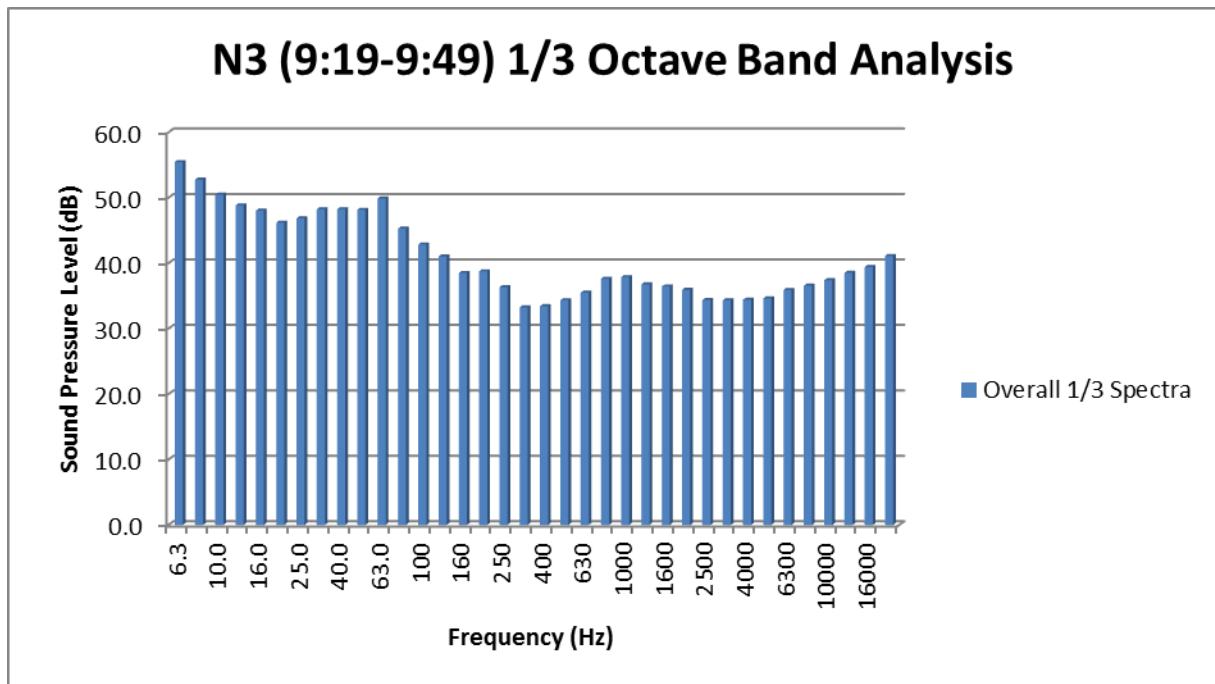
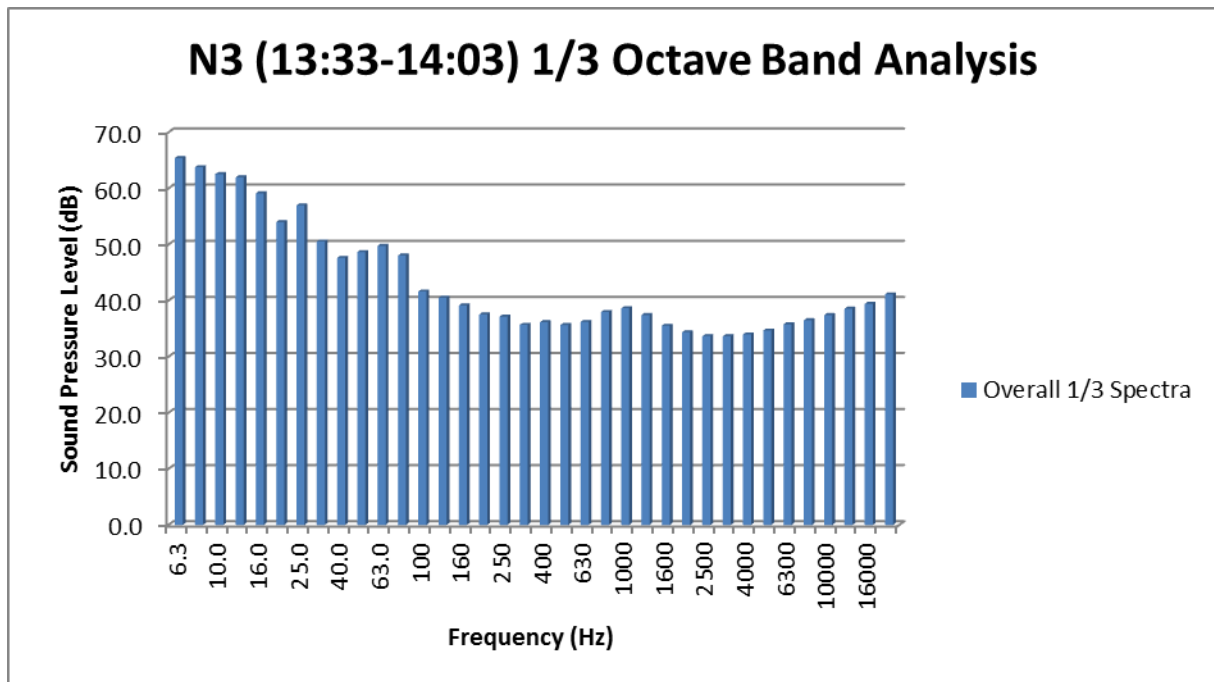


Figure 5
N3 1/3rd Octave Band Analysis





5.3 Assessment

Noise levels at N1, N2 and N3 comply with noise emission limits set out by the Waste Licence for the Blackhall Recovery Facility (Ref. No. W0247-01).

5.4 Conclusions

This assessment has considered the compliance of the existing soil recovery facility with the noise emission limits specified by its Waste Licence.

The assessment has found that the measured equivalent continuous noise levels recorded at three number of locations along the site boundary are within the permitted threshold limits of 55dB(A) L_{Aeq} (daytime).

6.0 CLOSURE

This report has been prepared by SLR Consulting Ireland with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the Client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of Behan's Land Restoration Ltd. no warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

FIGURES


Figure 1
Site Location Plan
Figure 2
Existing Site Layout




NOTES

1. EXTRACT FROM 1:50,000 O.S DISCOVERY SERIES MAP NO. 49, 50, 55 & 56
2. ORDNANCE SURVEY IRELAND LICENCE NO. SU 0000714 (C) ORDNANCE SURVEY & GOVERNMENT OF IRELAND

LEGEND

 LOCATION OF QUARRY

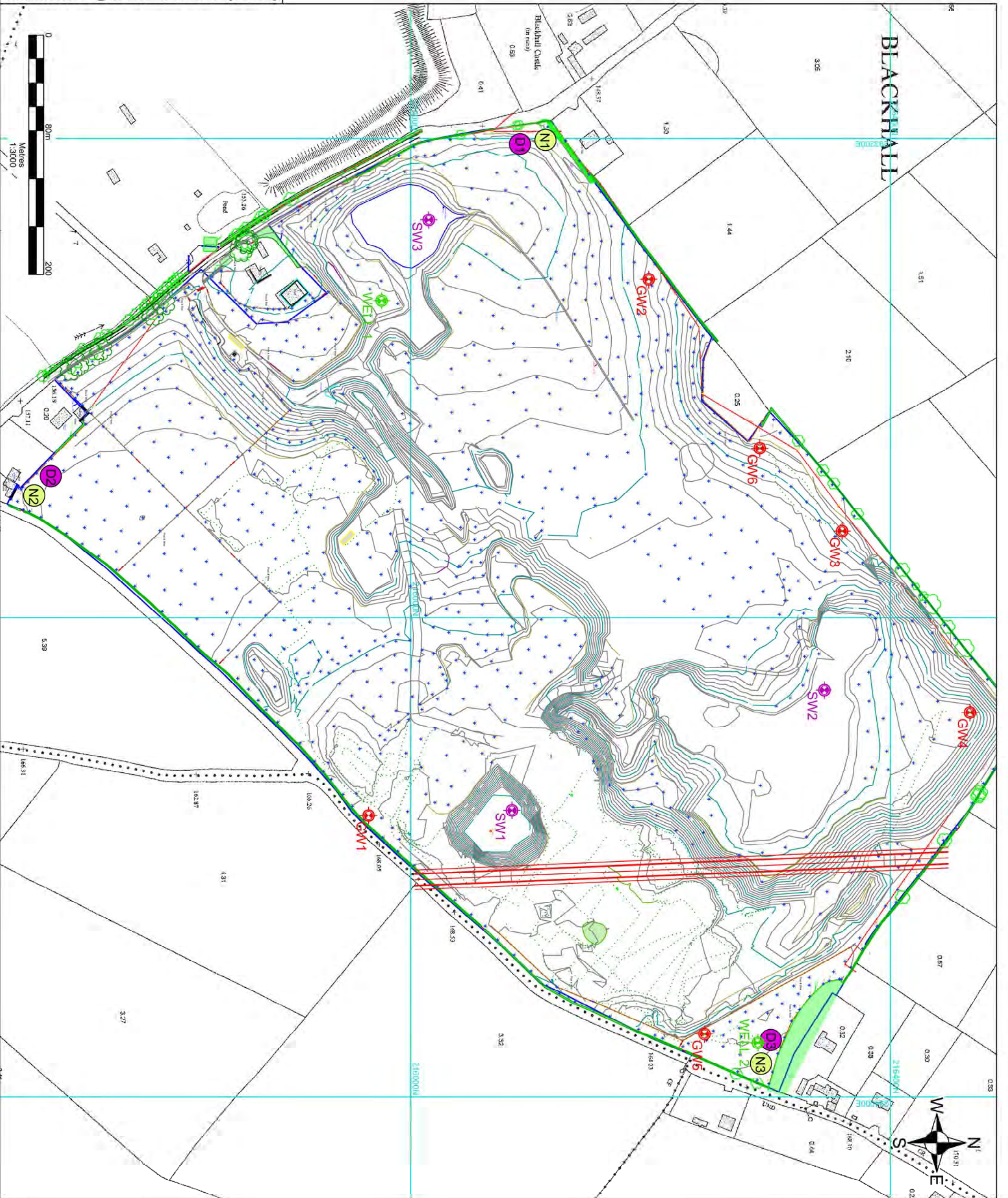
00004.00028.0.7 FIG_1.0 Site Location Plan.dwg

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JOHN BEHAN
BLACKHALL, PUNCESTOWN
NAAS, CO. KILDARE
SITE LOCATION PLAN

FIGURE 1

Scale 1:50,000 @ A3 Date JULY 2014



NOTES
 1. ORDNANCE SURVEY IRELAND LICENCE NO. SU 0000714 (C) ORDNANCE SURVEY & GOVERNMENT OF IRELAND

LEGEND	
	APPLICANTS LAND INTEREST
	ENVIRONMENTAL NOISE MONITORING LOCATION
	ENVIRONMENTAL DUST MONITORING LOCATION
	ENVIRONMENTAL MONITORING BOREHOLE LOCATION

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JOHN BEHAN
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 NAAS, CO. KILDARE
ENVIRONMENTAL MONITORING PLAN

FIGURE 2

Scale 1:3,000 @ A3 Date JUNE 2014



global environmental solutions

**John Behan / Behan's Land Restoration Ltd.
Soil Recovery Facility, Blackhall, Naas, Co. Kildare**

Dust Monitoring Report

W0247-01

October 2016
SLR Ref: 161003 501.00004.00037.R01 BRL AQ' 16 Rev0

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2.1 Waste Licence No. W0247-01.....	2
2.2 Dust Monitoring Survey Methodology.....	2
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Figure 2 Existing Site Layout	5

1.0 INTRODUCTION

SLR Consulting Ireland was appointed by Behan's Land Restoration Limited to undertake monitoring of dust deposition at its soil recovery facility at Blackhall, Punchestown, Co. Kildare as required by Condition 6 / Schedules B&C of its Waste Licence (Ref. No. W0247-01) for recovery of inert soil and construction and demolition waste.

The existing waste recovery facility is located in the townland of Blackhall, Naas, Co. Kildare; refer to Figure 1 (Site Location) and Figure 2 (Existing Site Layout).

2.0 SCOPE OF THE REPORT

2.1 Waste Licence No. W0247-01

Dust monitoring was carried out as required by Schedule B.5 and Schedule C of the waste licence.

2.2 Dust Monitoring Survey Methodology

There are currently no Irish and/or EU Air Quality Standards, existing (or pending) relating specifically to dust-fall and deposition thresholds. However German T.A Luft Regulations, 1986 are internationally adopted to set emission limits for dust deposition.

For the purposes of this survey, dust deposition monitoring was carried out by passive method using Bergerhoff gauge as referred to in the German TA-Luft guidelines VDI 2119 Part 2:1996. The 'Bergerhoff' dust gauge comprises a plastic collection bottle and a post with protective basket, set at 1500mm above ground level (see paragraph 2.2.1).

Dust precipitation is the dry residue of the input of the atmospheric matter collected in a collecting pot during the period of exposure over a planned period measurement (in general, one month is considered sufficient to identify any significant dust events). The sample is then evaporated down and the dry residue is determined gravimetrically.

Quality control procedures were adhered to in the field, in relation to the maintenance of the deposition gauge, labelling and handling the bulk sample and transporting it to the laboratory for analysis.

Samples were analysed for insoluble dry residue using gravimetric techniques and results for each sample are expressed in terms of mg/m²/day (milligrams per square meter per day).

2.2.1 Equipment

Contents of Kit:

- main assembly consisting of plastic coated stand with bird guard and bottle holder
- Overall height 2m and weight approx. 6 Kg.
- 5 litre HDPE collecting bottle
- Spare collecting bottle



Bergerhoff Deposit Dust Gauge

Benefits:

- General construction and aperture size in accordance with the German standard VDI 2119
- Bird guard reduces risk of polluted samples from bird strikes
- Removable upper section for easy transportation
- Large 5-litre bottle will accommodate 780mm rain

2.2.2 Monitoring Locations

The dust monitoring was carried out at following locations:

- Location 1 (D1)
- Location 2 (D2)
- Location 3 (D3)

Monitoring points locations are shown on Figure 2 (Existing Site Layout).

2.2.3 Limits

Schedule B.4 and Schedule C of the Waste Licence (No. W0247-01) sets out the following limits for dust deposition arising from licensed activities at the Blackhall facility:

'Dust deposition levels arising out of the activities on site shall not exceed 350 milligrams per square metre per day, averaged over 30 days; measured at the monitoring points.'

3.0 DUST MONITORING RESULTS SUMMARY AND DISCUSSION

3.1 Dust Results

Dust monitoring stations have been established at three locations (D1, D2, and D3). The results to date are as follows: -

**Table 3-1
Dust Monitoring Results**

Period		Deposition (mg/m ² /day)		
From	To	D1	D2	D3
31/05/16	14/07/16	336	172	49
14/07/16	24/08/16	153	44	17

3.2 Assessment

The dust monitoring results at each of the three designated monitoring locations are comfortably below the generally accepted environmental dust emission limits of 350 milligrams per square metre per day (averaged over 30 days).

3.3 Conclusions

This assessment has considered the compliance of the existing soil recovery facility with the dust emission limits specified by its Waste Licence (Ref. No. W0247-01) and has established that the measured dust deposition levels are in compliance with the limits set out by its Waste Licence.

4.0 CLOSURE

This report has been prepared by SLR Consulting Ireland with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the Client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

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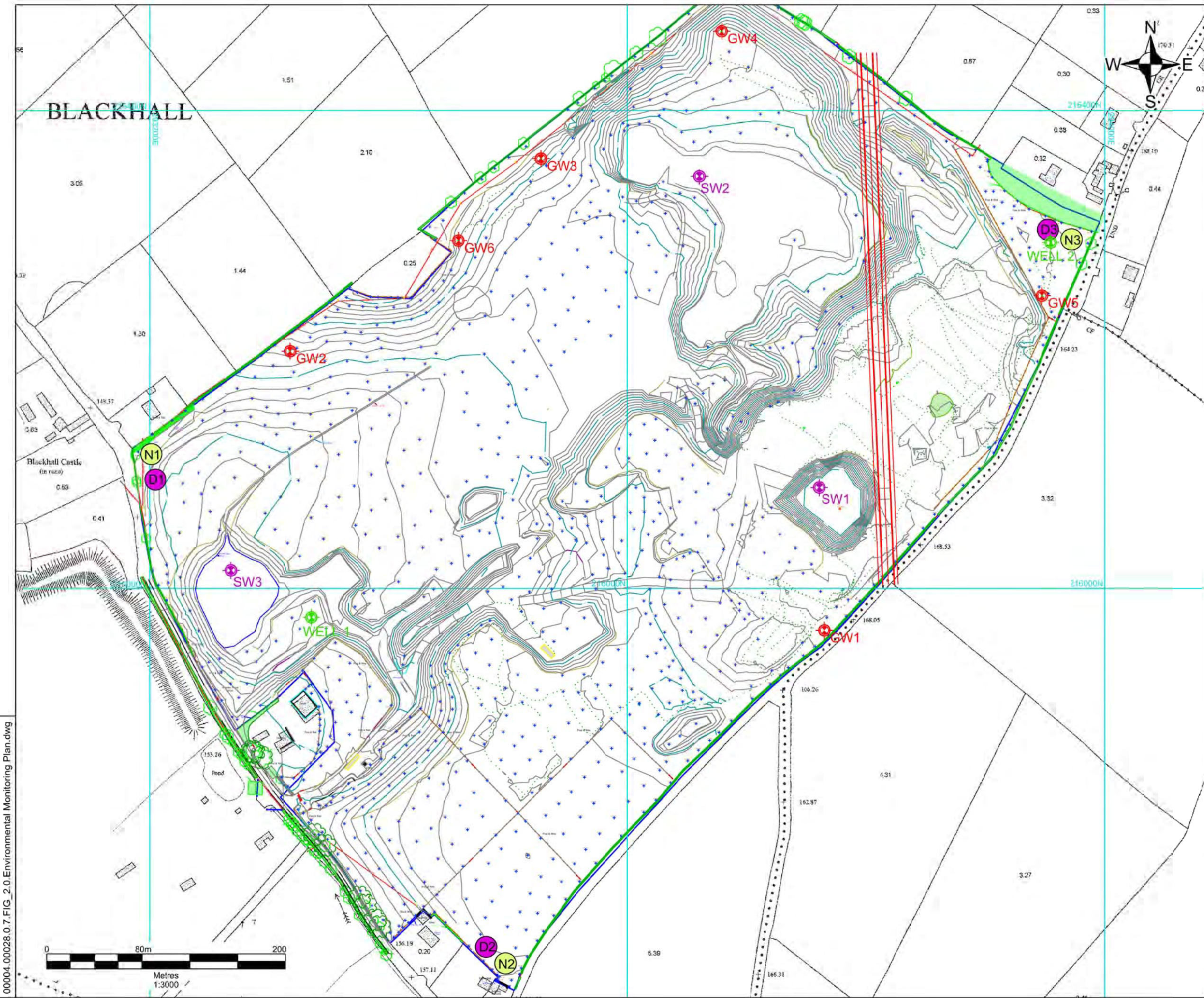
00004.00028.0.7.FIG_1.0.Site Location Plan.dwg

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JOHN BEHAN
BLACKHALL, PUNCESTOWN
NAAS, CO. KILDARE
SITE LOCATION PLAN

FIGURE 1

Scale 1:50,000 @ A3 Date JULY 2014



NOTES
 1. ORDNANCE SURVEY IRELAND LICENCE NO. SU 0000714 (C) ORDNANCE SURVEY & GOVERNMENT OF IRELAND

- LEGEND**
-  APPLICANTS LAND INTEREST
 -  ENVIRONMENTAL NOISE MONITORING LOCATION
 -  ENVIRONMENTAL DUST MONITORING LOCATION
 -  ENVIRONMENTAL MONITORING BOREHOLE LOCATION

00004.00028.0.7.FIG_2.0.Environmental Monitoring Plan.dwg

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JOHN BEHAN
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ENVIRONMENTAL MONITORING PLAN

FIGURE 2
 Scale 1:3,000 @ A3 Date JUNE 2014

Appendix B
Register of Complaints

BEHANS LAND RESTORATION LIMITED - COMPLAINTS REGISTER 2016

BLR Complaint Ref. No.	EPA Complaint Ref. No.	Date of Occurrence	Date of Complaint	Date EPA Referral	Complainant
C16/01	COM004294	03/01/2016	05/01/2016		A
C16/02	COM004375	16/01/2016	22/01/2016		B
C16/03	COM004480	05/02/2016	26/02/2016		B
C16/04	COM004779	11/05/2016	12/05/2016	11/05/2016	A
C16/05	COM004966	16/06/2016	16/06/2016	24/06/2016	C
C16/06	COM005059	06/07/2016	06/07/2016		D
C16/07	COM005194	11/08/2016	12/08/2016	19/08/2016	E
C16/08	COM005205	11/08/2016	15/08/2016	19/08/2016	F
C16/09	COM005507	17/10/2016	19/10/2016	28/10/2016	G