global environmental solutions

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

Annual Environmental Report 2012

Waste Licence Ref. No. W0247-01

March 2013
SLR Ref: 501.00004.00021. Rev0

SLR Consulting Ireland, 7 Dundrum Business Park, Windy Arbour, Dublin 14, Ireland
T : +353 1 296 4667 F : +353 1 296 4676 www.slrconsulting.com

CONTENTS

TABLES

FIGURES

APPENDICES

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 2012 to December 2012.

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 south east 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 2012 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 infrastructure required by the terms of the waste licence. It is hoped to extend the scope of the environmental monitoring programme at the facility in 2013.

3.3.1 Schedule of Objectives and Targets 2012

The Schedule of Objectives and Targets was set by BLR for 2012 are outlined in Table 3-2 below.

Table 3-2 Schedule of Objectives and Targets for 2012 / Environmental Management Programme 2012

No	Objective	Target	Timescale	Responsibility	Progress
1	Environmental Management System	Establish waste handling and acceptance procedures	31/12/2011	JB	Plan submitted Yet to obtain Agency approval
2	Environmental Management Plan	Install 1 No. additional groundwater monitoring well Commence soil / waste monitoring Extend scope of environmental monitoring		JB	Slow to date – available funding use to fund required waste infrastructure. To progress 2013.
3	Environmental Training and Awareness			JB	No suitable course identified
4	Environmental Compliance	Review licence conditions		JB	Completed
6	Specified Engineering Works	Provide and maintain waste inspection and quarantine areas with concrete impermeable surface and buried tank Provide and maintain weighbridge Provide and maintain subsurface drainage		JB	Near completion. Waste quarantine and inspection area constructed. Weighbridge and SW drainage interceptor both installed.
7	CRAMP	Submit Closure, Restoration and Aftercare Management Plan to EPA		JB	Submitted Sept 12
8	ELRA	Submit to EPA Environmental Liabilities Risk assessment and Financial Provision Report		JB	Submitted Sept 12

3.3.2 Schedule of Objectives and Targets 2013

The Schedule of Objectives and Targets set by BLR for 2013 are outlined in Table 3-3 overleaf.

3.4 Staff Awareness and Training

No staff training was carried out in 2012.

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 2013 / Environmental Management Programme 2013

No	Objective	Target	Timescale	Responsibility
1	Environmental Management System	Close out and agree waste handling and acceptance procedures with EPA	31/12/2013	JB
2	Environmental Management Plan	Install 1 No. additional groundwater monitoring well	31/12/2013	JB
		Commence soil / waste monitoring		
		Extend scope of environmental monitoring		
3	Environmental Training and Awareness	Identify suitable training opportunities for site operatives	31/12/2013	JB
4	Environmental Compliance	Review licence conditions	31/12/2013	JB
6	Specified Engineering Works	Commission waste inspection and quarantine areas	31/12/2013	JB
		Test, commission and maintain weighbridge		
		Commission and maintain interceptor and SW drainage infrastructure.		

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 monitoring was carried out in 2012. Noise measurements were taken at three monitoring locations (N01, N02, and N03) 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)			Noise Emission Limits $L_{Aeq,T}$
			$L_{Aeq,T}$	$L_{A10,T}$	$L_{A90,T}$	
N1	31/10/12	12:49-13:19	48.4	52.8	35.3	55
N2	31/10/12	12:04-12:34	51.7	43.3	30.0	55
N3	31/10/12	11:32-12:02	54.6	46.3	28.7	55

N1

The noise monitoring location N1 is positioned on the side of the local road at 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 traffic on the local road; natural noises such as the breeze through the trees and birds singing. Site activities are barely audible at this location.

N2

The noise monitoring location N2 is positioned on the side of the local lane at the residence to south-east of site entrance. At the time of survey, noise levels at this location were influenced by natural noises such as the breeze through the trees and birds singing. Site activities are barely audible at this location.

N3

The noise monitoring location N3 is 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, natural noises such as the breeze through the trees and birds singing, dogs barking, site activities are audible at this location.

Tonal Analysis Results

British Standard 7445:1991 – Description and measurement of environmental noise gives guidance on tonality, and suggests that where a single 1/3rd-octave band level is at least 5dB higher than the level in both of the two adjacent bands, then tonal character may be present. There were no observed changes in activity at the site during the monitoring periods.

On examination of the 1/3 Octave Band Noise Spectra recorded on 31st October 2012, no tonal components were identified within the measured range (6.3 Hz to 20 kHz) at any of the

monitoring locations (See Figure 3, Figure 4 and Figure 5 below). The broader peak at location N2 around 50 Hz and 1.6 kHz; N3 around 50 Hz and 63 Hz would not be judged as tonal.

ISO 1996-2 'Acoustics – Description and measurement of environmental noise – Part 2: Acquisition of data pertinent to land use' states

'If tonal components are clearly audible and their presence can be detected by a one-third octave analysis, the adjustment may be 5 to 6 dB. If the components are only just detectable by the observer and demonstrated by narrow-band analysis, an adjustment of 2 to 3 dB may be appropriate'.

In this instance, the observer did not detect any tonal or impulsive components and no tonal components were identified by one-third octave analysis. In such circumstances no adjustment of the measured noise levels is warranted.

Figure 1 Location N1 : 1/3rd Octave Band Analysis

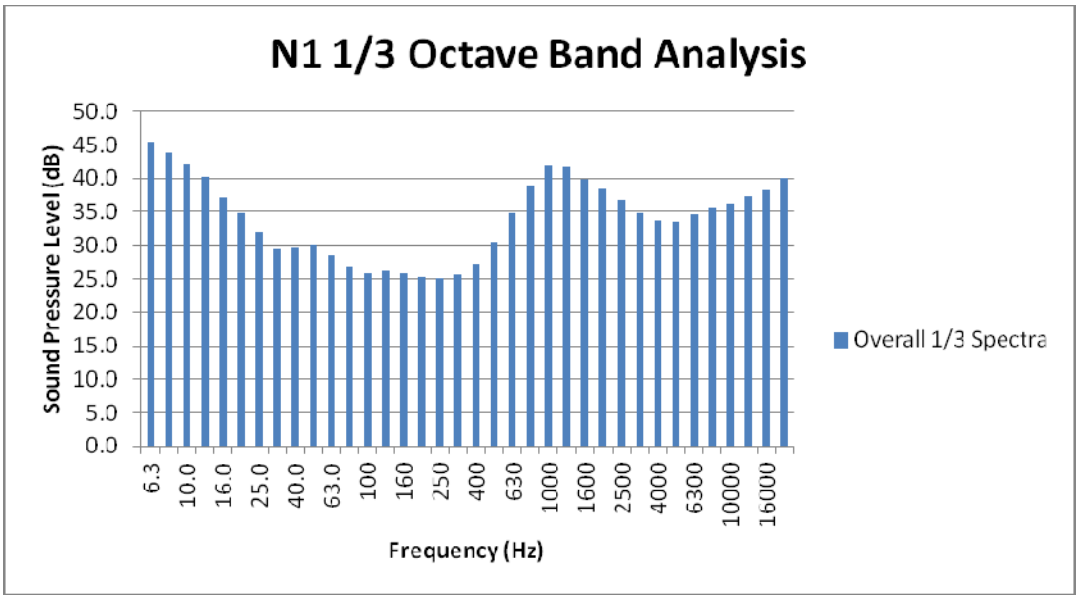


Figure 2 Location N2 : 1/3rd Octave Band Analysis

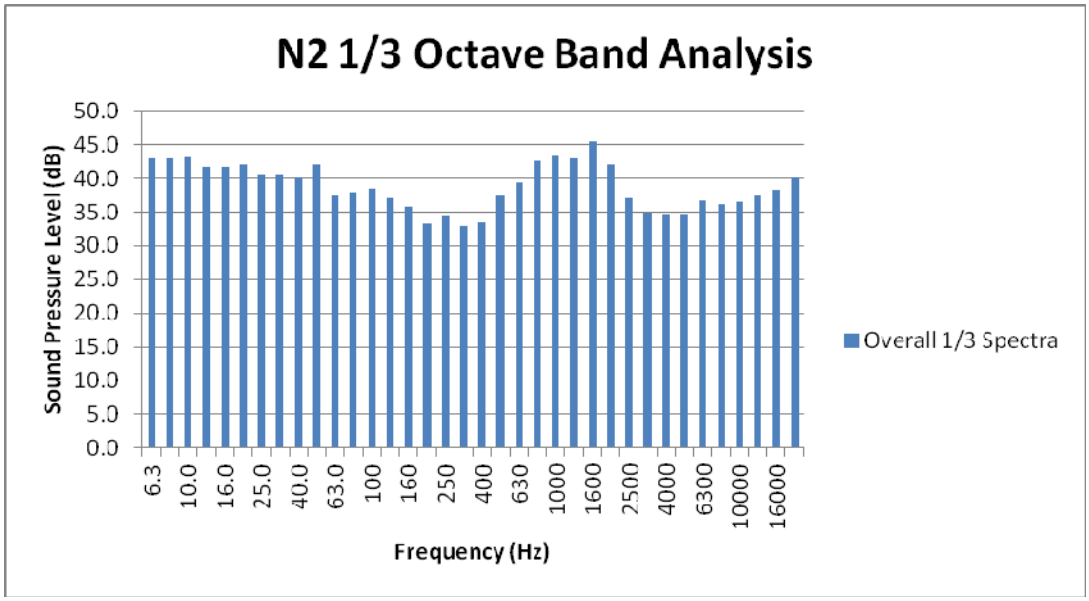
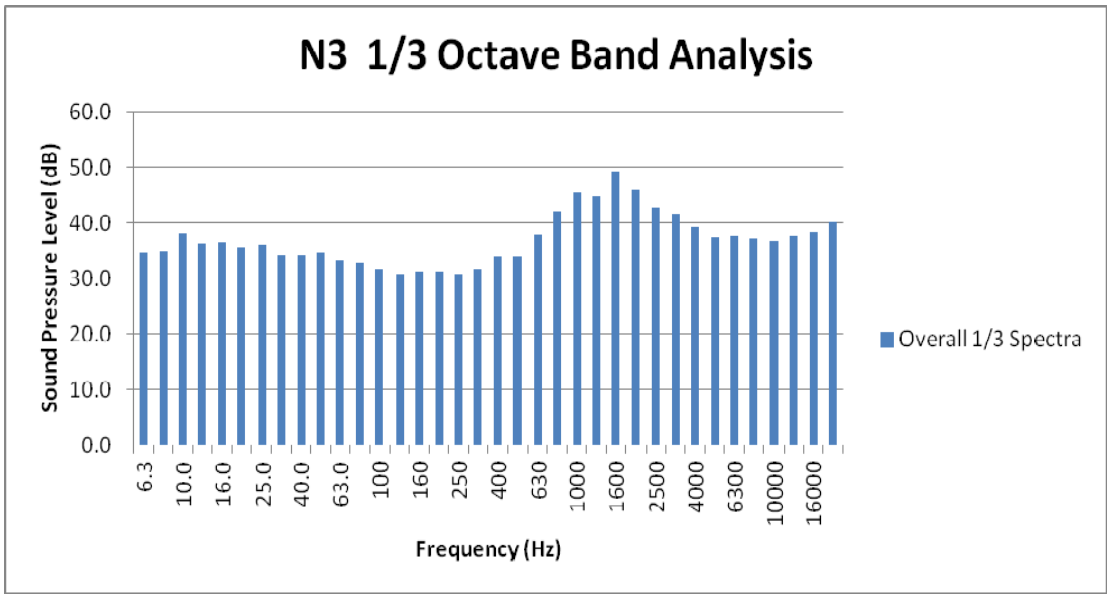


Figure 3 Location N3 : 1/3rd Octave Band Analysis



This assessment has considered the compliance of the existing soil recovery facility with the noise emission limits specified by its Waste Licence (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 2012 between 25th September to 31st October 2012. 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/m²/day)			Deposition Limit
From	To	D1	D2	D3	mg/m²/day
25/9/12	31/10/12	131	1	<1	350

The dust monitoring results are comfortably below the dust emission limits of 350 milligrams per square metre per day (averaged over 30 days) specified by its Waste Licence (Ref. No. W0247-01), 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 groundwater ponds monitoring was carried out on a quarterly basis in 2012 (22nd February, 24th April, 25th September and 6th December. Samples were taken at two locations (SW2, SW3). A summary of results is presented below in Tables 4-3 and Table 4-4. Full copy of groundwater ponds testing results and results discussion is presented monitoring reports in Appendix A.

Table 4-3 Summary of Chemical Analysis at SW2

Location	Unit	Screening Value*	Detection Limits	SW2	SW2	SW2	SW2
Sample Date				22/02/2012	24/05/2012	25/09/2012	06/12/2012
Temperature	**T°C**			8.73	18.12	10.22	4.3
pH		4.5-9.0 ≤100 mg/lCaCO3 6.0-9.0 >100 mg/lCaCO3		7.36	8.38	7.63	8.11
Electrical conductivity	**$mScm^{-1}$**			0.491	0.444	0.305	0.327
Dissolved Oxygen	**mg/l**			172	12.53	10.33	11.93
Dissolved Oxygen	**%**			19.80	132.70	93.3	96.6
Chloride as Cl	**mg/l**		<2	12.2	13.1	3.4	14.6
Sulphate as SO4	**mg/l**		<2	14.9	18.9	<2	18.4

Location	Unit	Screening Value*	Detection Limits	SW2	SW2	SW2	SW2
Ammoniacal Nitrogen	**mg/l**	High status ≤ 0.040 (mean) or ≤ 0.090 (95%ile) Good Status ≤ 0.065 (mean) or ≤ 0.140 (95%ile)	<0.01	0.043	0.0435	0.0603	0.29
Total Suspended Solids	**mg/l**		<2				2
Total Dissolved Solids	**mg/l**		<5				365
Total Hardness	**mg/l**		<1				268
Total Alkalinity	**mg/l**		<2				245
Aluminium	**mg/l**		<0.0029				0.0029
Antymony	**mg/l**		<0.00016				<0.00016
Arsenic	**mg/l**		<0.00012				0.000876
Barium	**mg/l**		<0.00003				0.0412
Beryllium	**mg/l**		<0.00007				<0.00007
Boron	**mg/l**		<0.009				0.0155
Cadmium	**mg/l**		<0.0001				<0.0001
Chromium	**mg/l**		<0.00022				0.00162
Cobalt	**mg/l**		<0.00006				0.00086
Cooper	**mg/l**		<0.00085				<0.00085
Lead	**mg/l**		<0.00002				<0.00002
Manganese	**mg/l**		<0.00001				0.000089
Molybdenum	**mg/l**		<0.00024				0.00431
Nickel	**mg/l**		<0.00015				0.000758
Selenium	**mg/l**		<0.00039				0.00883
Strontium	**mg/l**		<0.00005				0.236
Thallium	**mg/l**		<0.00096				<0.00096
Tin	**mg/l**		<0.00036				<0.00036
Vanadium	**mg/l**		<0.00024				0.000391
Zinc	**mg/l**		<0.00041				0.000497
Mercury	**mg/l**		<0.00001				<0.00001
EPH Range >C10-C40	**mg/l**		<0.01				<0.01
Phosphate	**mg/l**	High status ≤ 0.025 (mean) or ≤ 0.045 (95%ile) Good Status ≤ 0.035 (mean) or ≤ 0.075 (95%ile)	<0.05 as PO4				<0.016 as P
Nitrate	**mg/l**		<0.3				11.7
Calcium	**mg/l**		<0.012				92.6
Sodium	**mg/l**		<0.076				9.51
Magnesium	**mg/l**		<0.036				8.78
Potassium	**mg/l**		<2.335				<2.34
Iron	**mg/l**		<0.019				<0.019

Location	Unit	Screening Value*	Detection Limits	SW2	SW2	SW2	SW2
Silver	mg/l		<0.0015				<0.0015
Total PAH (16)	mg/l		<0.000247				<0.000247
SVOC	mg/l		<0.001				<0.001
SVOC n-Dibutyl phathalate	mg/l		<0.001				<0.001
VOC	mg/l		<0.001				<0.001
(VOC) Benzene	mg/l	0.05	<0.001				0.00208

Table 4-4 Summary of Chemical Analysis at SW3

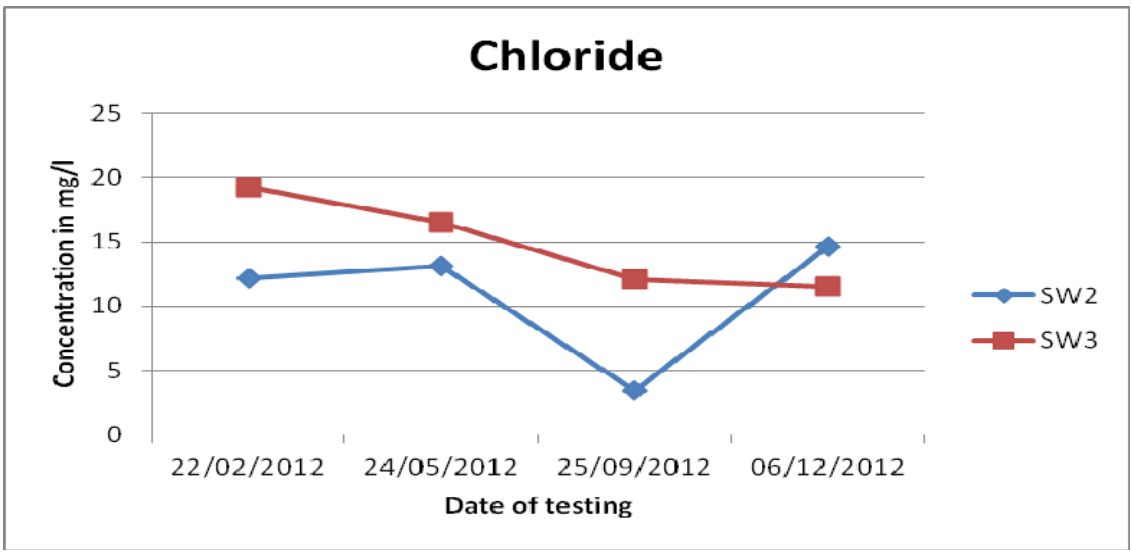
Location	Unit	Screening Value*	Detection Limits	SW3	SW3	SW3	SW3
Sample Date				22/02/2012	24/05/2012	25/09/2012	06/12/2012
Temperature	$T^{O}C$			10.24	19.63	11	2.1
pH		4.5-9.0 ≤100 mg/lCaCO3 6.0-9.0 >100 mg/lCaCO3		6.85	8.45	7.55	8.13
Electrical conductivity	$mScm^{-1}$			0.319	0.591	0.471	0.315
Dissolved Oxygen	mg/l			100	9.19	7.76	11.39
Dissolved Oxygen	%			11.16	101.10	71.2	88.29
Chloride as Cl	mg/l		<2	19.2	16.5	12.1	11.5
Sulphate as SO4	mg/l		<2	138	113	64.8	87.7
Ammoniacal Nitrogen	mg/l	High status ≤ 0.040 (mean) or ≤ 0.090 (95%ile) Good Status ≤ 0.065 (mean) or ≤ 0.140 (95%ile)	<0.01	0.0667	0.0769	0.0664	0.0942
Total Suspended Solids	mg/l		<2				3.5
Total Dissolved Solids	mg/l		<5				380
Total Hardness	mg/l		<1				264
Total Alkalinity	mg/l		<2				180
Aluminium	mg/l		<0.0029				0.00654
Antymony	mg/l		<0.00016				<0.00016
Arsenic	mg/l		<0.00012				0.00182

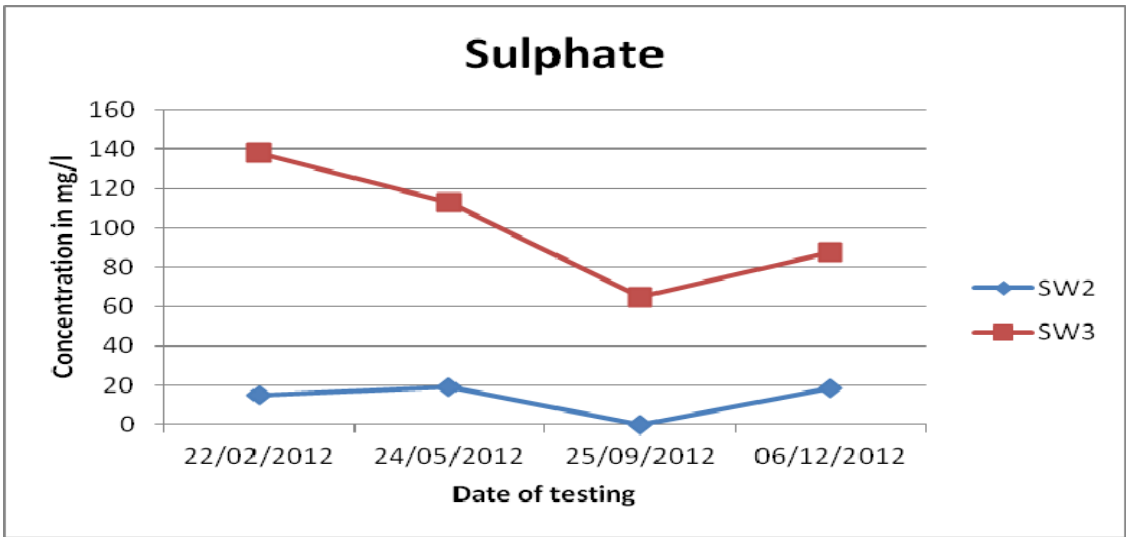
Location	Unit	Screening Value*	Detection Limits	SW3	SW3	SW3	SW3
Barium	**mg/l**		<0.00003				0.027
Beryllium	**mg/l**		<0.00007				<0.00007
Boron	**mg/l**		<0.009				0.0312
Cadmium	**mg/l**		<0.0001				<0.0001
Chromium	**mg/l**		<0.00022				0.00333
Cobalt	**mg/l**		<0.00006				0.00019
Cooper	**mg/l**		<0.00085				0.00252
Lead	**mg/l**		<0.00002				0.000237
Manganese	**mg/l**		<0.00001				0.00538
Molybdenum	**mg/l**		<0.00024				0.00253
Nickel	**mg/l**		<0.00015				0.00323
Selenium	**mg/l**		<0.00039				0.00055
Strontium	**mg/l**		<0.00005				0.346
Thallium	**mg/l**		<0.00096				<0.00096
Tin	**mg/l**		<0.00036				<0.00036
Vanadium	**mg/l**		<0.00024				0.00156
Zinc	**mg/l**		<0.00041				0.00402
Mercury	**mg/l**		<0.00001				<0.00001
EPH Range >C10-C40	**mg/l**		<0.01				<0.01
Phosphate	**mg/l**	High status ≤ 0.025 (mean) or ≤ 0.045 (95%ile) Good Status ≤ 0.035 (mean) or ≤ 0.075 (95%ile)	<0.05 as PO4				<0.016 as P
Nitrate	**mg/l**		<0.3				1.36
Calcium	**mg/l**		<0.012				94.9
Sodium	**mg/l**		<0.076				12.1
Magnesium	**mg/l**		<0.036				6.44
Potassium	**mg/l**		<2.335				6.17
Iron	**mg/l**		<0.019				<0.019
Silver	**mg/l**		<0.0015				<0.0015
Total PAH (16)	**mg/l**		<0.000247				<0.000247
SVOC	**mg/l**		<0.001				<0.001
SVOC n-Dibutyl phathalate	**mg/l**		<0.001				0.00111
VOC	**mg/l**		<0.001				<0.001
(VOC) Benzene	**mg/l**	0.05	<0.001				0.00193

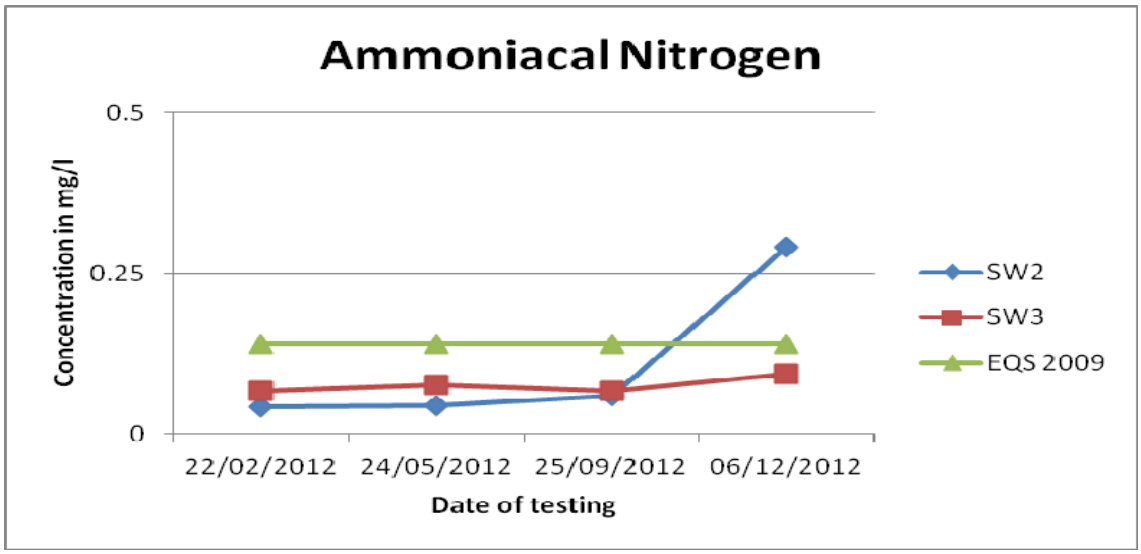
*European Communities Environmental Objectives (Surface Waters) Regulations 2009, S.I. No. 272 of 2009

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.







4.3.3 Groundwater Quality

Groundwater monitoring was carried out in 2012 on quarterly basis (22nd February, 24th April, 25th September and 6th December). Samples were taken at five locations (GW1, GW2, GW3, Well 1, and Well 2). A summary of results is presented below in Tables 4-5 to Table 4-10. 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

Location	Unit	Screening Value*	Detection Limits	GW1	GW1	GW1	GW1
Sample Date				22/02/2012	24/05/2012	25/09/2012	06/12/2012
Temperature	**T°C**			9.76	9.85	9.95	10.04
pH				6.36	6.97	6.93	7.34
Electrical conductivity	**$mScm^{-1}$**	1.875		0.473	0.513	0.460	0.354
Dissolved Oxygen	**mg/l**			14.64	15.27	9.02	6.76
Dissolved Oxygen	**%**			129.1	134.9	81.7	60.8
Chloride as Cl	**mg/l**	187.5	<2	10	10.3	10.3	9.5
Sulphate as SO4	**mg/l**	187.5	<2	6.2	7.1	7.4	7
Ammoniacal Nitrogen	**mg/l**	0.175	<0.01	0.0394	0.0504	0.0227	0.05
Total Suspended Solids	**mg/l**		<2				19
Total Dissolved Solids	**mg/l**		<5				341
Total Hardness	**mg/l**		<1				276
Total Alkalinity	**mg/l**		<2				245
Aluminium	**mg/l**	0.150	<0.0029				<0.0029
Antymony	**mg/l**		<0.00016				<0.00016
Arsenic	**mg/l**	0.0075	<0.00012				0.000678

Location	Unit	Screening Value*	Detection Limits	GW1	GW1	GW1	GW1
Barium	**mg/l**		<0.00003				0.0317
Beryllium	**mg/l**		<0.00007				<0.00007
Boron	**mg/l**	0.750	<0.009				0.0146
Cadmium	**mg/l**	0.00375	<0.0001				<0.0001
Chromium	**mg/l**	0.0375	<0.00022				0.00161
Cobalt	**mg/l**		<0.00006				0.00009
Cooper	**mg/l**	1.5	<0.00085				<0.00085
Lead	**mg/l**	0.01875	<0.00002				<0.00002
Manganese	**mg/l**		<0.00001				0.000121
Molybdenum	**mg/l**		<0.00024				0.000437
Nickel	**mg/l**	0.015	<0.00015				0.000563
Selenium	**mg/l**		<0.00039				0.00716
Strontium	**mg/l**		<0.00005				0.182
Thallium	**mg/l**		<0.00096				<0.00096
Tin	**mg/l**		<0.00036				<0.00036
Vanadium	**mg/l**		<0.00024				0.000408
Zinc	**mg/l**		<0.00041				<0.00041
Mercury	**mg/l**	0.00075	<0.00001				<0.00001
EPH Range >C10-C40	**mg/l**		<0.01				<0.01
Phosphate as PO4	**mg/l**		<0.05				<0.05
Nitrate as NO3	**mg/l**	37.5	<0.3				7.75
Calcium	**mg/l**		<0.012				94.9
Sodium	**mg/l**	187.5	<0.076				7.16
Magnesium	**mg/l**		<0.036				9.32
Potassium	**mg/l**		<2.34				<2.34
Iron	**mg/l**		<0.019				<0.019
Silver	**mg/l**		<0.0015				<0.0015
Total PAH (16)	**mg/l**		<0.000247				<0.000247
SVOC	**mg/l**		<0.001				<0.001
VOC	**mg/l**		<0.001				<0.001
VOC Carbon disulphide	**mg/l**		<0.001				
VOC Benzene	**mg/l**	0.00075	<0.001				

Table 4-6 Summary of Chemical Analysis at GW2

Location	Unit	Screening Value*	Detection Limits	GW2	GW2	GW2	GW2
Sample Date				22/02/2012	24/05/2012	25/09/2012	06/12/2012
Temperature	**$T^{O}C$**			10.95	11.73	10.65	9.6
pH				6.91	6.93	6.97	7.7
Electrical conductivity	**$mScm^{-}_{1}$**	1.875		0.494	0.597	0.528	0.403
Dissolved Oxygen	**mg/l**			9.53	8.83	4.31	4.83

Location	Unit	Screening Value*	Detection Limits	GW2	GW2	GW2	GW2
Dissolved Oxygen	%			87.6	81.7	44.2	46.6
Chloride as Cl	mg/l	187.5	<2	15	14.5	14.2	14.2
Sulphate as SO4	mg/l	187.5	<2	25.9	25.7	26.3	23.7
Ammoniacal Nitrogen	mg/l	0.175	<0.01	0.232	0.053	0.0614	0.0723
Total Suspended Solids	mg/l		<2				180
Total Dissolved Solids	mg/l		<5				394
Total Hardness	mg/l		<1				293
Total Alkalinity	mg/l		<2				275
Aluminium	mg/l	0.150	<0.0029				<0.0029
Antymony	mg/l		<0.00016				0.00185
Arsenic	mg/l	0.0075	<0.00012				0.000962
Barium	mg/l		<0.00003				0.074
Beryllium	mg/l		<0.00007				<0.00007
Boron	mg/l	0.750	<0.009				0.0144
Cadmium	mg/l	0.00375	<0.0001				<0.0001
Chromium	mg/l	0.0375	<0.00022				0.00187
Cobalt	mg/l		<0.00006				0.000115
Cooper	mg/l	1.5	<0.00085				<0.00085
Lead	mg/l	0.01875	<0.00002				0.000036
Manganese	mg/l		<0.00001				0.106
Molybdenum	mg/l		<0.00024				0.00127
Nickel	mg/l	0.015	<0.00015				0.000825
Selenium	mg/l		<0.00039				0.00584
Strontium	mg/l		<0.00005				0.224
Thallium	mg/l		<0.00096				<0.00096
Tin	mg/l		<0.00036				0.000832
Vanadium	mg/l		<0.00024				0.000422
Zinc	mg/l		<0.00041				0.00445
Mercury	mg/l	0.00075	<0.00001				<0.00001
EPH Range >C10-C40	mg/l		<0.01				<0.01
Phosphate as PO4	mg/l		<0.05				<0.05
Nitrate as NO3	mg/l	37.5	<0.3				10
Calcium	mg/l		<0.012				99.4
Sodium	mg/l	187.5	<0.076				10.1
Magnesium	mg/l		<0.036				10.70
Potassium	mg/l		<2.34				<2.34
Iron	mg/l		<0.019				<0.019
Silver	mg/l		<0.0015				<0.0015
Total PAH (16)	mg/l		<0.000247				<0.000247
SVOC	mg/l		<0.001				<0.001
VOC	mg/l		<0.001				<0.001

Location	Unit	Screening Value*	Detection Limits	GW2	GW2	GW2	GW2
VOC Carbon disulphide	mg/l		<0.001				
VOC Benzene	mg/l	0.00075	<0.001				

Table 4-7 Summary of Chemical Analysis at GW3

Location	Unit	Screening Value*	Detection Limits	GW3	GW3	GW3	GW3
Sample Date				22/02/2012	24/05/2012	25/09/2012	06/12/2012
Temperature	$T^{O}C$			8.27	11.23	11.92	6.6
pH				6.7	7.01	6.95	7.66
Electrical conductivity	$mScm^{-}_{1}$	1.875		0.515	0.577	0.535	0.327
Dissolved Oxygen	mg/l			17.75	12.97	7.87	8.86
Dissolved Oxygen	%			150.7	110.8	73.1	71.9
Chloride as Cl	mg/l	187.5	<2	12	14.1	13.3	13.8
Sulphate as SO4	mg/l	187.5	<2	14.6	16.2	12.2	19.6
Ammoniacal Nitrogen	mg/l	0.175	<0.01	0.0334	0.0318	0.0662	0.0626
Total Suspended Solids	mg/l		<2				248
Total Dissolved Solids	mg/l		<5				369
Total Hardness	mg/l		<1				278
Total Alkalinity	mg/l		<2				275
Aluminium	mg/l	0.150	<0.0029				<0.0029
Antymony	mg/l		<0.00016				0.00683
Arsenic	mg/l	0.0075	<0.00012				0.000947
Barium	mg/l		<0.00003				0.0396
Beryllium	mg/l		<0.00007				<0.00007
Boron	mg/l	0.750	<0.009				0.0175
Cadmium	mg/l	0.00375	<0.0001				<0.0001
Chromium	mg/l	0.0375	<0.00022				0.00153
Cobalt	mg/l		<0.00006				0.000097
Cooper	mg/l	1.5	<0.00085				<0.00085
Lead	mg/l	0.01875	<0.00002				0.000059
Manganese	mg/l		<0.00001				0.000168
Molybdenum	mg/l		<0.00024				0.00217
Nickel	mg/l	0.015	<0.00015				0.000797
Selenium	mg/l		<0.00039				0.00614
Strontium	mg/l		<0.00005				0.228
Thallium	mg/l		<0.00096				<0.00096
Tin	mg/l		<0.00036				0.00236

Location	Unit	Screening Value*	Detection Limits	GW3	GW3	GW3	GW3
Vanadium	mg/l		<0.00024				0.000418
Zinc	mg/l		<0.00041				<0.00041
Mercury	mg/l	0.00075	<0.00001				<0.00001
EPH Range >C10-C40	mg/l		<0.01				<0.01
Phosphate as PO4	mg/l		<0.05				<0.05
Nitrate as NO3	mg/l	37.5	<0.3				12.9
Calcium	mg/l		<0.012				95.7
Sodium	mg/l	187.5	<0.076				9.1
Magnesium	mg/l		<0.036				9.45
Potassium	mg/l		<2.34				<2.34
Iron	mg/l		<0.019				<0.019
Silver	mg/l		<0.0015				<0.0015
Total PAH (16)	mg/l		<0.000247				<0.000247
SVOC	mg/l		<0.001				<0.001
VOC	mg/l		<0.001				<0.001
VOC Carbon disulphide	mg/l		<0.001				
VOC Benzene	mg/l	0.00075	<0.001				

Table 4-8 Summary of Chemical Analysis at Well1

Location	Unit	Screening Value*	Detection Limits	Well 1	Well 1	Well 1	Well 1
Sample Date				22/02/2012	24/05/2012	25/09/2012	06/12/2012
Temperature	$T^{O}C$			10.24	11.34	12.75	10.5
pH				6.85	6.91	6.95	7.65
Electrical conductivity	$mScm^{-1}$	1.875		0.319	0.760	0.729	0.525
Dissolved Oxygen	mg/l			11.16	7.32	7.26	6.95
Dissolved Oxygen	%			100	68.4	70.8	64.5
Chloride as Cl	mg/l	187.5	<2	15.8	21	14.5	11.6
Sulphate as SO4	mg/l	187.5	<2	99.1	13.8	63.1	88.3
Ammoniacal Nitrogen	mg/l	0.175	<0.01	0.549	0.573	0.415	0.408
Total Suspended Solids	mg/l		<2				5
Total Dissolved Solids	mg/l		<5				377
Total Hardness	mg/l		<1				286

Location	Unit	Screening Value*	Detection Limits	Well 1	Well 1	Well 1	Well 1
Total Alkalinity	**mg/l**		<2				175
Aluminium	**mg/l**	0.150	<0.0029				0.00473
Antymony	**mg/l**		<0.00016				0.000265
Arsenic	**mg/l**	0.0075	<0.00012				0.00236
Barium	**mg/l**		<0.00003				0.0252
Beryllium	**mg/l**		<0.00007				<0.00007
Boron	**mg/l**	0.750	<0.009				0.0335
Cadmium	**mg/l**	0.00375	<0.0001				<0.0001
Chromium	**mg/l**	0.0375	<0.00022				0.00179
Cobalt	**mg/l**		<0.00006				0.00019
Cooper	**mg/l**	1.5	<0.00085				<0.00085
Lead	**mg/l**	0.01875	<0.00002				0.000114
Manganese	**mg/l**		<0.00001				0.00474
Molybdenum	**mg/l**		<0.00024				0.0024
Nickel	**mg/l**	0.015	<0.00015				0.00217
Selenium	**mg/l**		<0.00039				0.00914
Strontium	**mg/l**		<0.00005				0.324
Thallium	**mg/l**		<0.00096				<0.00096
Tin	**mg/l**		<0.00036				<0.00036
Vanadium	**mg/l**		<0.00024				0.00105
Zinc	**mg/l**		<0.00041				0.00142
Mercury	**mg/l**	0.00075	<0.00001				<0.00001
EPH Range >C10-C40	**mg/l**		<0.01				<0.01
Phosphate as PO4	**mg/l**		<0.05				<0.05
Nitrate as NO3	**mg/l**	37.5	<0.3				0.613
Calcium	**mg/l**		<0.012				103
Sodium	**mg/l**	187.5	<0.076				13.3
Magnesium	**mg/l**		<0.036				6.82
Potassium	**mg/l**		<2.34				6.76
Iron	**mg/l**		<0.019				<0.019
Silver	**mg/l**		<0.0015				<0.0015
Total PAH (16)	**mg/l**		<0.000247				<0.000247
SVOC	**mg/l**		<0.001				<0.001
VOC	**mg/l**		<0.001				<0.001
VOC Carbon disulphide	**mg/l**		<0.001				
VOC Benzene	**mg/l**	0.00075	<0.001				

Table 4-9 Summary of Chemical Analysis at Well 2

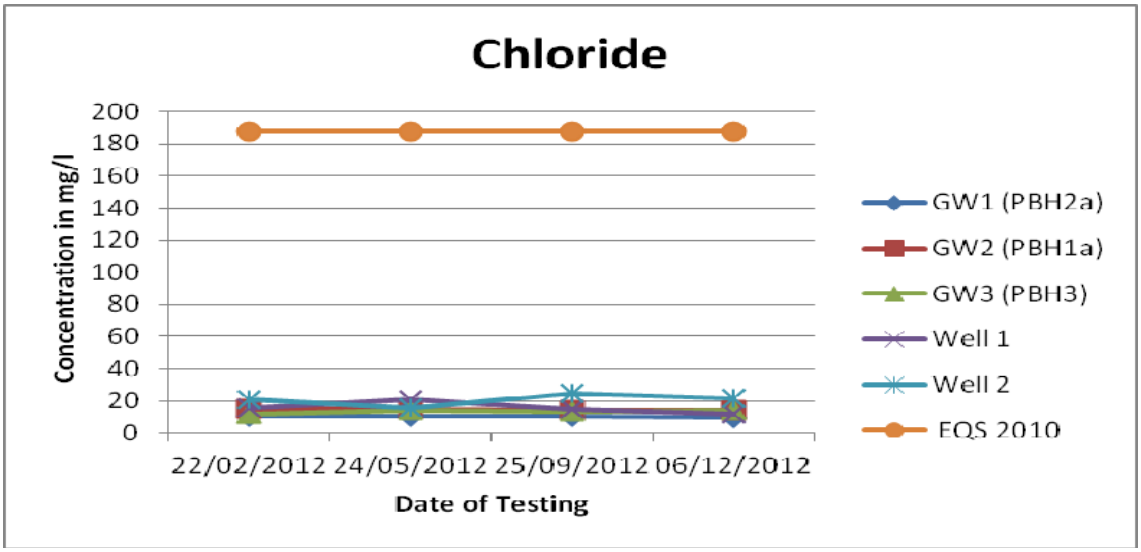
Location	Unit	Screening Value*	Detection Limits	Well 2	Well 2	Well 2	Well 2
Sample Date				22/02/2012	24/05/2012	25/09/2012	06/12/2012
Temperature	$T^{O}C$			10.35	10.82	10.17	10.86
pH				6.52	6.82	6.6	7.18
Electrical conductivity	$mScm^{-1}$	1.875		0.757	0.758	0.755	0.536
Dissolved Oxygen	mg/l			14.54	13.4	8.43	6.67
Dissolved Oxygen	%			130.3	120.2	75.6	50.3
Chloride as Cl	mg/l	187.5	<2	20.6	15.4	24.4	21.3
Sulphate as SO4	mg/l	187.5	<2	12.9	70.7	15.4	14
Ammoniacal Nitrogen	mg/l	0.175	<0.01	0.0486	0.0722	0.0207	0.113
Total Suspended Solids	mg/l		<2				150
Total Dissolved Solids	mg/l		<5				516
Total Hardness	mg/l		<1				399
Total Alkalinity	mg/l		<2				365
Aluminium	mg/l	0.150	<0.0029				<0.0029
Antymony	mg/l		<0.00016				<0.00016
Arsenic	mg/l	0.0075	<0.00012				0.00105
Barium	mg/l		<0.00003				0.0554
Beryllium	mg/l		<0.00007				<0.00007
Boron	mg/l	0.750	<0.009				0.0193
Cadmium	mg/l	0.00375	<0.0001				<0.0001
Chromium	mg/l	0.0375	<0.00022				0.00263
Cobalt	mg/l		<0.00006				0.00010
Cooper	mg/l	1.5	<0.00085				<0.00085
Lead	mg/l	0.01875	<0.00002				0.000031
Manganese	mg/l		<0.00001				0.0001
Molybdenum	mg/l		<0.00024				<0.00024
Nickel	mg/l	0.015	<0.00015				0.000949
Selenium	mg/l		<0.00039				0.0137
Strontium	mg/l		<0.00005				0.276
Thallium	mg/l		<0.00096				<0.00096
Tin	mg/l		<0.00036				<0.00036
Vanadium	mg/l		<0.00024				0.000656
Zinc	mg/l		<0.00041				<0.00041
Mercury	mg/l	0.00075	<0.00001				<0.00001
EPH Range >C10-C40	mg/l		<0.01				<0.01
Phosphate as PO4	mg/l		<0.05				<0.05
Nitrate as NO3	mg/l	37.5	<0.3				22.1
Calcium	mg/l		<0.012				127
Sodium	mg/l	187.5	<0.076				10.8

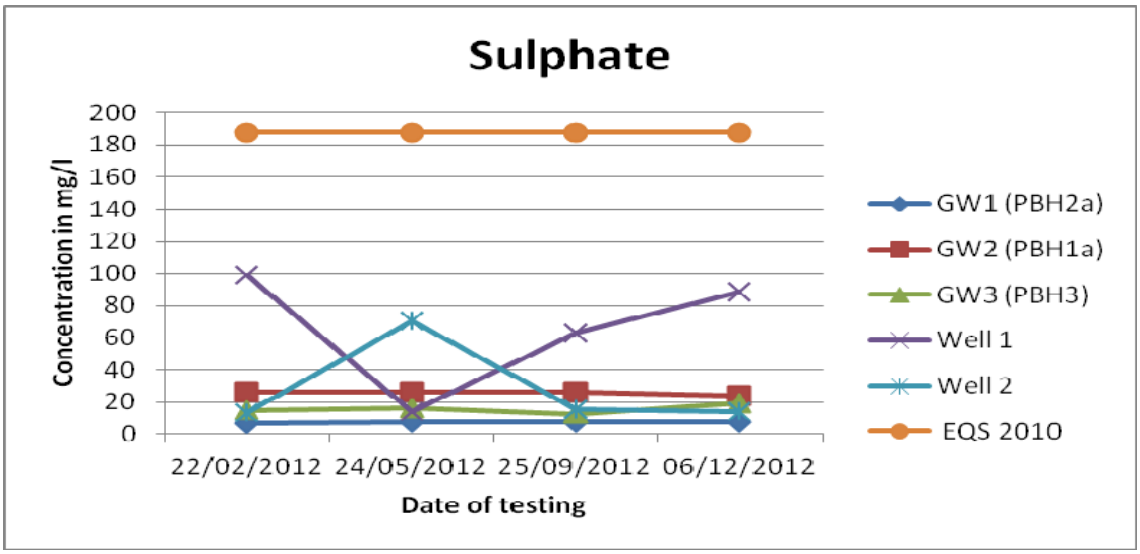
Location	Unit	Screening Value*	Detection Limits	Well 2	Well 2	Well 2	Well 2
Magnesium	**mg/l**		<0.036				19.9
Potassium	**mg/l**		<2.34				<2.34
Iron	**mg/l**		<0.019				<0.019
Silver	**mg/l**		<0.0015				<0.0015
Total PAH (16)	**mg/l**		<0.000247				<0.000247
SVOC	**mg/l**		<0.001				<0.001
VOC	**mg/l**		<0.001				<0.001
VOC Carbon disulphide	**mg/l**		<0.001				0.00114
VOC Benzene	**mg/l**	0.00075	<0.001				0.00133

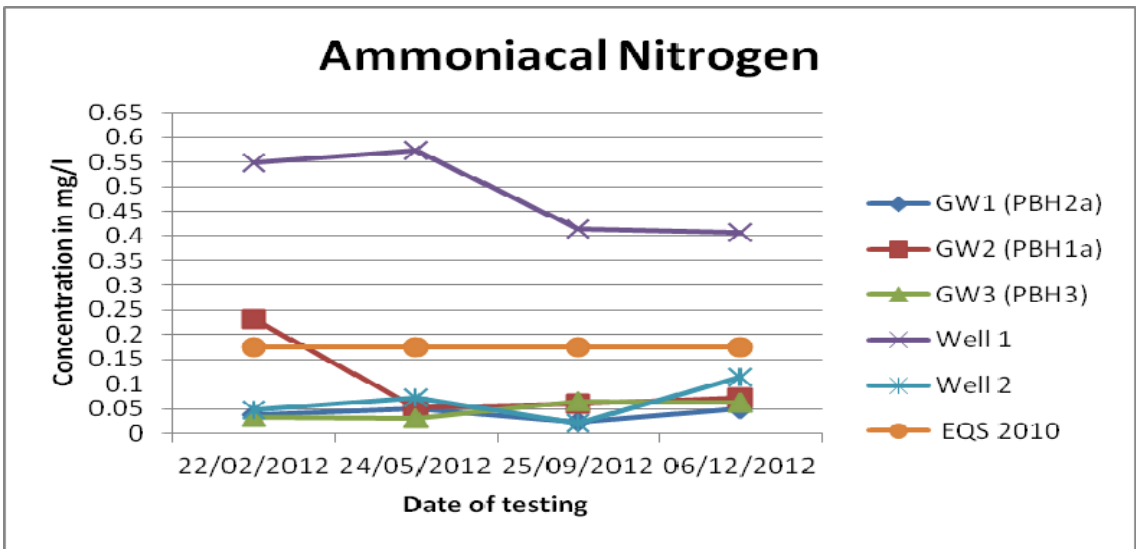
*European Communities Environmental Objectives (Groundwater) Regulations 2010, S.I No. 9 of 2010

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.







4.4 Topographical Monitoring

No topographical monitoring was carried out in 2012. Therefore it is not possible to provide any definitive estimation of remaining void to be filled. While the rate of recovery and site infilling has been markedly slower than envisaged at the time the waste licence application was submitted, given the uncertain economic climate prevailing at the present time, no definitive site closure / completion date is available.

4.5 Pollutant Release and Transfer Register

No PRTR Electronic Reporting workbook was submitted for Blackhall Soil Recovery Facility for 2012. 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. No complaints registered in respect of emissions from the facility were registered in 2012.

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

Engineering Works carried out in 2012 included installation of waste quarantine and inspection area, weighbridge and surface water drainage run-off (interceptor) tank. 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 much of 2012. Therefore no testing of tanks and pipelines was carried out.

6.3 Stability Assessment

No stability monitoring was carried out in 2012.

7.0 RESOURCE USE AND ENERGY EFFICIENCY

7.1 Energy Efficiency Audit

No energy efficiency audit was carried out in 2012. 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 2012 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 2012.

Table 7-1 Resource Consumption Summary

Energy Stream	Annual Quantity	Units	Period
Electricity	0	kWh	2012
Diesel	62,000	Litres	2012

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 2012.

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 2012. A break down 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 2012 and December 2012 was xxx 000 tonnes.

Table 8-1 Waste Received in 2012

EWC	Description	Waste in (tonnes)
17 05 04	Soils and stones other than those mentioned in 17 05 03	100,455
17 01 01	Concrete	(Cumulative) 33,485
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	133,940

8.2 Waste Monitoring

No soil / waste monitoring was carried out in 2012.

8.3 Waste Removed / Rejected

Table 8-2
Waste Rejected in 2012

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

Table 8-3
Waste Consigned in 2012

EWC	Description	Waste OUT (Litres)
13 02 05	Waste Oil	150
17 03 02	Bituminous material	0
	Total Consigned	150

9.0 ENVIRONMENTAL INCIDENTS AND COMPLAINTS

9.1 Incidents Summary

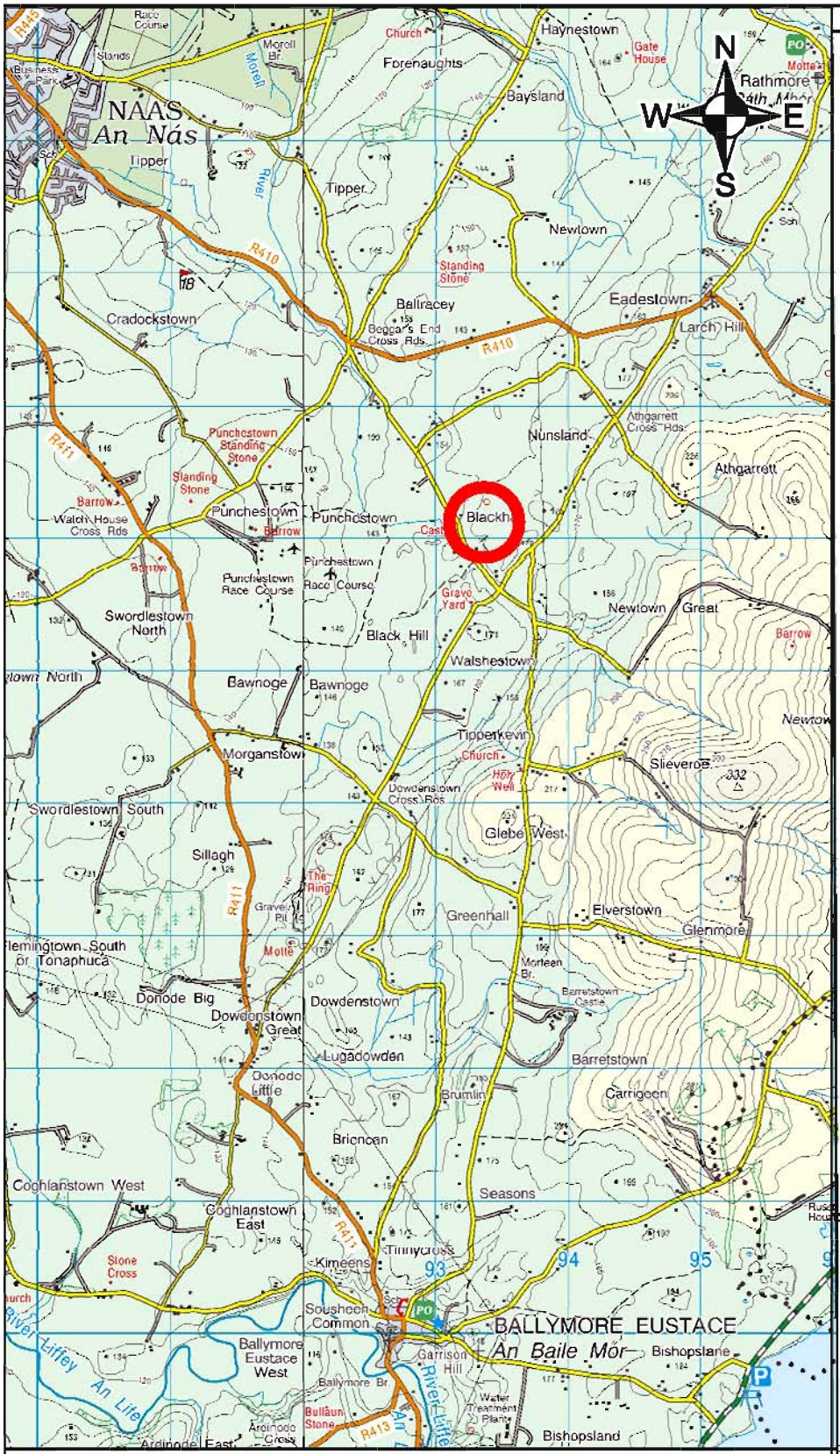
There were no environmental incidents during the reporting period.

9.2 Register of complaints

No complaints were received during the reporting period.

FIGURES

Figure 4Site Location Plan
Figure 5Site Layout Plan



0 500 1000 1500 2000m 3000 4000 5000

Metres
1:50,000

LEGEND

SITE LOCATION

1. Extract from 1:50,000 O.S. Discovery Series Map No. 56

2. Ordnance Survey Ireland Licence No. SU 00007011 (c) Ordnance Survey Ireland & Government of Ireland

SLR CONSULTING IRELAND
7 DUNDRUM BUSINESS PARK
WINDY ARBOUR
DUBLIN 14
T: +353-1-2964667
F: +353-1-2964676
www.slrconsulting.com

JOHN BEHAN LAND RESTORATION

BLACKHALL, PUNCHESTOWN, NAAS, CO. KILDARE

SITE LOCATION PLAN

FIGURE 1

Scale	Date
1:50,000	September 2012

00004.00013.0.7.001.0 Site Location.dwg

LEGEND

1. Survey Provided By Erkina Surveys Ref : 0941-1 Rev.0 Dated 22-08-07

2. Ordnance Survey Ireland Licence No. SU 0000709 (c) Ordnance Survey Ireland & Government of Ireland

- GATE
- DECIDUOUS TREE
- MANHOLE (SEWER)
- FENCE
- 2007 BOREHOLE / MONITORING WELL
- BUILDING
- ESB / EIRCOM POLE & CABLE
- EMBANKMENT
- TREES
- DITCHLINE
- GROUNDWATER MONITORING WELL
- SURFACE WATER MONITORING WELL
- 155 GROUND CONTOURS
- 155 GROUND WATER LEVELS
- 6.0

SLR CONSULTING IRELAND
7 DUNDRUM BUSINESS PARK
WINDY ARBOUR
DUBLIN 14
T: +353-1-2964667
F: +353-1-2964676
www.slrconsulting.com

JOHN BEHAN LAND RESTORATION

BLACKHALL, PUNCHESTOWN
NAAS, CO. KILDARE

SITE LAYOUT PLAN

FIGURE 2

Scale: 1:2,500 @ A3

Date: SEPTEMBER 2012

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 February 2012

March 2012
SLR Ref: 501.00004.00014. Rev0

SLR Consulting Ireland, 7 Dundrum Business Park, Windy Arbour, Dublin 14, Ireland
T +353 1 296 4667 F +353 1 296 4676 W www.slrconsulting.com

CONTENTS

TABLES

FIGURES

APPENDICES

PROJECT DETAILS
CLIENT : JOHN BEHAN / BEHANS LAND RESTORATION LTD
PROJECT : SURFACE WATER AND GROUNDWATER QUALITY MONITORING
BLACKHALL , NAAS, CO. KILDARE
JOB NO : 501.0004.00014

DOCUMENT TITLE	REVISION	STATUS	DATE
Report Surface Water and Groundwater Quality Monitoring Blackhall, Naas, Co. Kildare	Rev 0	Issued	12th March 2012

REV.	AUTHOR	REVIEWED	APPROVED	DATE
Rev 0	Aldona Binchy	Derek Luby	Derek Luby	12th March 2012

DISTRIBUTION	Paper	Electronic	Post	E-mail	NO. OF COPIES
Behans Land Restoration		✓		✓	1
SLR Consulting Ireland	✓	✓			

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 22nd February 2011, see Figure 2 for monitoring point locations. 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.

2.0 SURFACE WATER QUALITY

Surface water quality monitoring was undertaken in two ponds SW2 located in the north-eastern sector of the site and SW3 located at the south-western 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 multiparameter probe. Samples were taken for chemical quality testing and sent to ALcontrol Laboratories.

Recorded pH values in the surface water ponds were between 7.36 in SW2 and 7.43 in SW3. Recorded Dissolved Oxygen (DO) values were between 19.80 mg/l at SW2 and 18.25 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 0.491 $mScm^{-1}$ in SW2 to 0.672 $mScm^{-1}$ 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 both ponds was relatively high at the time of sampling.

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.

3.0 GROUNDWATER

3.1 Groundwater Level

Groundwater level monitoring was carried out at four existing 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 below.

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

Well No.	Ground Level mOD	Groundwater level mOD
GW1 (PBH 2a)	168.75	155.59
GW2 (PBH 1a)	157.5	143.74
GW3 (PBH3)	160.5	144.04
Well 1	153.0	148.95
Well 2	163.8	152.68

3.2 Groundwater Quality

Groundwater quality monitoring was undertaken at 5 No. groundwater wells, identified as GW1 (PBH2a), GW2 (PBH1A), GW3 (PBH3) (all monitoring wells); Well 1 (a domestic supply well) and Well 2. Well locations are indicated on Figure 2. Monitoring of physical parameters (visual inspection, pH, electrical conductivity, and dissolved oxygen) was undertaken using a YSI Instruments multiparameter probe. Samples were taken for chemical quality testing and sent to ALcontrol Laboratories,

All monitored wells were pumped out using a Waterra plastic tubing fitted with foot valve and Waterra Pump. Field parameters measured during the pumping 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 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 10 mg/l in GW1 (PBH2a) to 20 mg/l in Well 2. Measured Sulphate values range from for 6.2 mg/l in GW1 (PBH 2a) to 99.1 mg/l in Well 1 for Sulphate. There was a exceedance of the environmental quality standard for ammoniacal nitrogen at location GW2 (PBH 1a) and Well 1. At those locations, the recorded ammoniacal nitrogen concentration of 0.232 mg/l in GW2 (PBH 1a) and 0.549 mg/l in Well 1 exceeded the threshold limit of 0.175 mg/l for general quality of groundwater in groundwater body.

Interpreting the groundwater levels and groundwater flow around the site location could be indicative of sewage contamination from septic tanks of nearby dwellings and/or slurry spreading.

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.

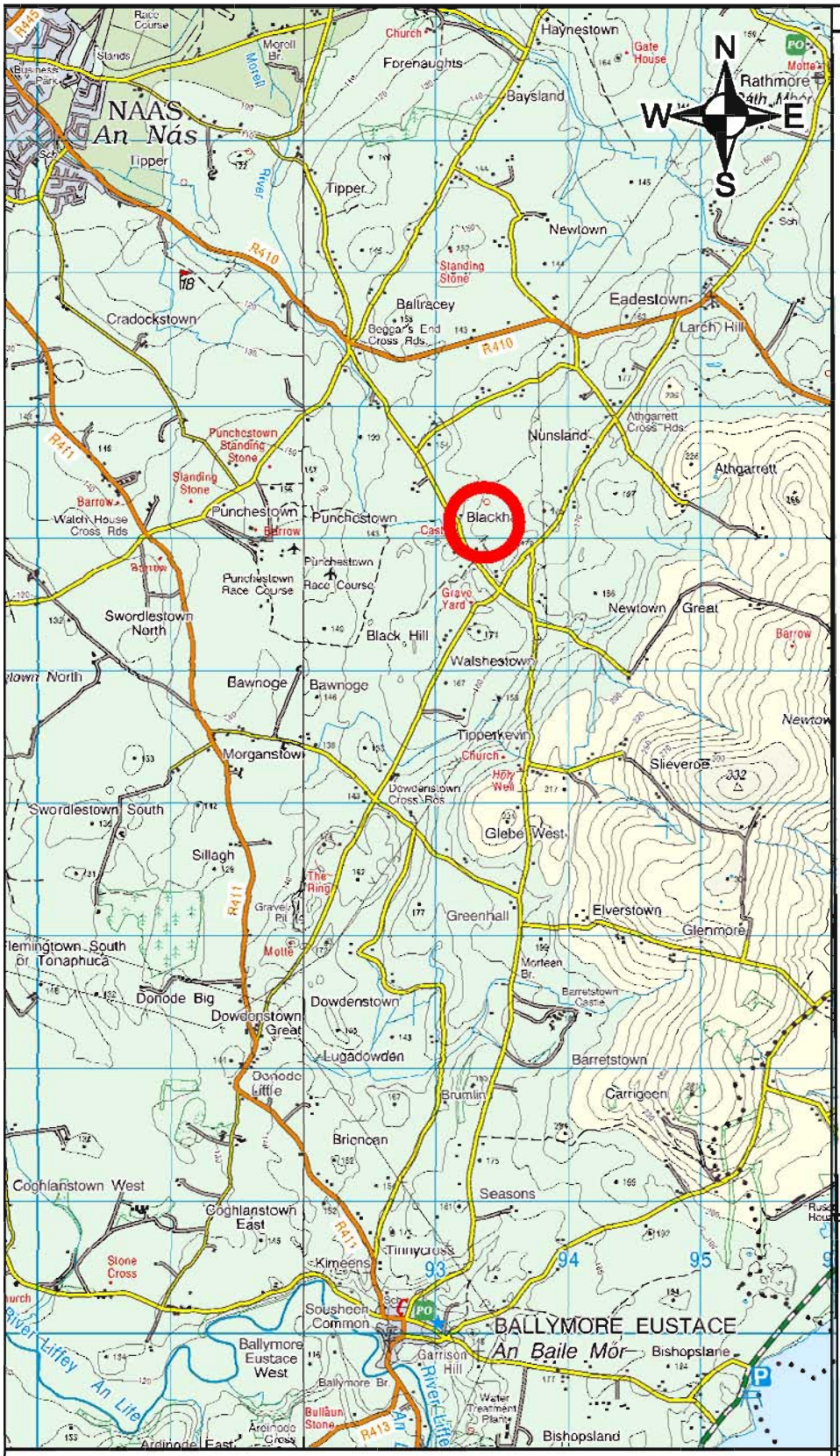
5.0 REFERENCES

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 1Site Location Map
Figure 2Existing Site Layout



0 500 1000 1500 2000m 3000 4000 5000

Metres
1:50,000

LEGEND

SITE LOCATION

1. Extract from 1:50,000 O.S. Discovery Series Map No. 56

2. Ordnance Survey Ireland Licence No. SU 00007012 (c) Ordnance Survey Ireland & Government of Ireland

SLR CONSULTING IRELAND
7 DUNDRUM BUSINESS PARK
WINDY ARBOUR
DUBLIN 14
T: +353-1-2964667
F: +353-1-2964676
www.slrconsulting.com

JOHN BEHAN LAND RESTORATION

BLACKHALL, PUNCHESTOWN, NAAS, CO. KILDARE

SITE LOCATION PLAN

FIGURE 1

Scale	Date
1:50,000	February 2012

00004.00014.0.7.001.0 Site Location.dwg

N
W E
S

GW2(PBH1a)

GW3(PBH3)

WL 145

WL 145

WATER LEVEL
145.52

Pond

SW3

WL 150

WELL 1

6.1

6.2

6.5

SW2

Pond

WL 150

12" Concrete Pipe

Outfall Pipe

6.4

Buried 12" Concrete Pipe

MH
CL 152.62

SW1

WATER LEVEL
153.32

6.3

6.6

WL 155

GW1(PBH2a)

154.47 WL

WL 155

0 10 20 30 40m 60 80 100
Metres
1:1250

00004.00014.0.7.002.0. Site Layout Plan.dwg

LEGEND

1. Survey Provided By Erkina Surveys Ref : 0941-1 Rev.0 Dated 22-08-07

2. Ordnance Survey Ireland Licence No. SU 0000709 (c) Ordnance Survey Ireland & Government of Ireland

- GATE
- DECIDUOUS TREE
- MANHOLE (SEWER)
- FENCE
- 2007 BOREHOLE / MONITORING WELL
- BUILDING
- ESB / EIRCOM POLE & CABLE
- EMBANKMENT
- TREES
- DITCHLINE
- GROUNDWATER MONITORING WELL
- SURFACE WATER MONITORING WELL
- 155 GROUND CONTOURS
- 155 GROUND WATER LEVELS
- 6.6

SLR CONSULTING IRELAND
7 DUNDRUM BUSINESS PARK
WINDY ARBOUR
DUBLIN 14
T: +353-1-2964667
F: +353-1-2964678
www.slrconsulting.com

JOHN BEHAN LAND RESTORATION

BLACKHALL, PUNCHESTOWN
NAAS, CO. KILDARE

SITE LAYOUT PLAN

FIGURE 2

Scale: 1:1,250

Date: February 2012

Appendix A
Surface Water Chemical Test Results

Date	02-Mar-12
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					**$T^{o}C$**		**$mScm^{-1}$**	**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
02 March 2012	SW2	5231723	Water	22 February 2012	8.73	7.36	0.491	172	19.80	12.2	14.9	0.043
02 March 2012	SW3	5231725	Water	22 February 2012	10.24	6.85	0.319	100	11.16	19.2	138	0.0667

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

Appendix B
Ground Water Chemical Test Results

SLR											Date	02-Mar-12	
											Sheet:	1 of 1	
											By:	AB	
Project Name:		Groundwater Monitoring									***Ground Water Chemical Test***		
Location:		Behans Land Restoration Blackhall, Naas, County Kildare											
Date	**Location**	**LAB ID**	**Sample Type**	**Sample Date**	**GWL (m g.l)**	**Temperature**	**pH**	**Electrical conductivity**	**Dissolved Oxygen**	**Dissolved Oxygen**	**Chloride as Cl**	**Sulphate as SO4**	**Ammoniacal Nitrogen as N**
Unit						$T^{O}C$		$mScm^{-1}$	mg/l	%	mg/l	mg/l	mg/l
Screening Value*								1.875			187.5	187.5	0.175
Detection Limits											<2	<2	0.01
02-Mar-12	GW1 (PBH2a)	5231718	Water	22 February 2012	13.16	9.76	6.36	0.473	14.64	129.1	10	6.2	0.0394
02-Mar-12	GW2 (PBH1a)	5231719	Water	22 February 2012	13.76	10.95	6.91	0.494	9.53	87.6	15	25.9	0.232
02-Mar-12	GW3 (PBH3)	5231720	Water	22 February 2012	16.46	8.27	6.7	0.515	17.75	150.7	12	14.6	0.0334
02-Mar-12	Well 1	5231721	Water	22 February 2012	4.05	10.24	6.85	0.319	11.16	100	15.8	99.1	0.549
02-Mar-12	Well 2	5231722	Water	22 February 2012	11.12	10.35	6.52	0.757	14.54	130.3	20.6	12.9	0.0486

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

Appendix C
Copy of Certified Results

ALcontrol Laboratories

Unit 18A
Rosemount Business Park
Ballycoolin
Dublin 11
Tel : (0035) 3188 29893

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

Attention: Aldona Binchy

CERTIFICATE OF ANALYSIS

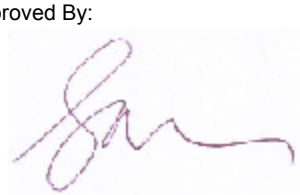
Date:	02 March 2012
Customer:	D_SLRCON_DUB
Sample Delivery Group (SDG):	120225-47
Your Reference:	
Location:	
Report No:	172835

We received 7 samples on Thursday February 23, 2012 and 7 of these samples were scheduled for analysis which was completed on Friday March 02, 2012. 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

CERTIFICATE OF ANALYSIS

SDG:	120225-47	**Location:**		**Order Number:**	1650
Job:	D_SLRCON_DUB-35	**Customer:**	SLR Consulting Ireland	**Report Number:**	172835
Client Reference:		**Attention:**	Aldona Binchy	**Superseded Report:**	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
5231718	GW1(PBH2a)			22/02/2012
5231719	GW2(PBH1a)			22/02/2012
5231720	GW3(PBH3)			22/02/2012
5231723	SW2			22/02/2012
5231725	SW3			22/02/2012
5231721	WELL 1			22/02/2012
5231722	WELL 2			22/02/2012

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

ALcontrol Laboratories

Validated

CERTIFICATE OF ANALYSIS

SDG:	120225-47	**Location:**		**Order Number:**	1650
Job:	D_SLRCON_DUB-35	**Customer:**	SLR Consulting Ireland	**Report Number:**	172835
Client Reference:		**Attention:**	Aldona Binchy	**Superseded Report:**	

LIQUID

Results Legend

X **Test**

N **No Determination Possible**

			Lab Sample No(s)	5231721	5231723	5231722	5231725	5231718	5231719	5231720
			Customer Sample Reference	WELL 1	SW2	WELL 2	SW3	GW1(PBH2a)	GW2(PBH1a)	GW3(PBH3)
			AGS Reference							
			Depth (m)							
			Container	1plastic (ALE221)	H2SO4 (ALE244)	1plastic (ALE221)	H2SO4 (ALE244)	1plastic (ALE221)	H2SO4 (ALE244)	1plastic (ALE221)	H2SO4 (ALE244)	1plastic (ALE221)	H2SO4 (ALE244)	1plastic (ALE221)	H2SO4 (ALE244)
Ammonium Low	All	NDPs: 0 Tests: 7		X	X	X	X	X	X	X	X	X	X	X	X
Anions by Kone (w)	All	NDPs: 0 Tests: 7		X	X	X	X	X	X	X	X	X	X	X	X

ALcontrol Laboratories

Validated

CERTIFICATE OF ANALYSIS

SDG:	120225-47	**Location:**		**Order Number:**	1650
Job:	D_SLRCON_DUB-35	**Customer:**	SLR Consulting Ireland	**Report Number:**	172835
Client Reference:		**Attention:**	Aldona Binchy	**Superseded Report:**	

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
§	Deviating sample.
aq	Aqueous / settled sample.
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
(F)	Trigger breach confirmed

Component	LOD/Units	Method	Customer Sample R	GW3(PBH3)	GW1(PBH2a)	GW2(PBH1a)	SW2	SW3	WELL 1
			Depth (m)	.	.	.	.	.	.
			Sample Type	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)
			Date Sampled	22/02/2012	22/02/2012	22/02/2012	22/02/2012	22/02/2012	22/02/2012
			Date Received	23/02/2012	23/02/2012	23/02/2012	23/02/2012	23/02/2012	23/02/2012
			SDG Ref	120225-47	120225-47	120225-47	120225-47	120225-47	120225-47
			Lab Sample No.(s)	5231720	5231718	5231719	5231723	5231725	5231721
			AGS Reference						
Ammoniacal Nitrogen as N (low level)	<0.01 mg/l	TM099		0.0334 #	0.0394 #	0.232 #	0.043 #	0.0667 #	0.549 #
Sulphate	<2 mg/l	TM184		14.6 #	6.2 #	25.9 #	14.9 #	138 #	99.1 #
Chloride	<2 mg/l	TM184		12 #	10 #	15 #	12.2 #	19.2 #	15.8 #

CERTIFICATE OF ANALYSIS

SDG:	120225-47	**Location:**		**Order Number:**	1650
Job:	D_SLRCON_DUB-35	**Customer:**	SLR Consulting Ireland	**Report Number:**	172835
Client Reference:		**Attention:**	Aldona Binchy	**Superseded Report:**	

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
§	Deviating sample.
aq	Aqueous / settled sample.
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
(F)	Trigger breach confirmed

Component	LOD/Units	Method	Customer Sample R	WELL 2
			Depth (m)	.
			Sample Type	Water(GW/SW)
			Date Sampled	22/02/2012
			Date Received	23/02/2012
			SDG Ref	120225-47
			Lab Sample No.(s)	5231722
			AGS Reference	
Ammoniacal Nitrogen as N (low level)	<0.01 mg/l	TM099		0.0486 #
Sulphate	<2 mg/l	TM184		12.9 #
Chloride	<2 mg/l	TM184		20.6 #

CERTIFICATE OF ANALYSIS

SDG:	120225-47	**Location:**		**Order Number:**	1650
Job:	D_SLRCON_DUB-35	**Customer:**	SLR Consulting Ireland	**Report Number:**	172835
Client Reference:		**Attention:**	Aldona Binchy	**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.

CERTIFICATE OF ANALYSIS

SDG:	120225-47	**Location:**		**Order Number:**	1650
Job:	D_SLRCON_DUB-35	**Customer:**	SLR Consulting Ireland	**Report Number:**	172835
Client Reference:		**Attention:**	Aldona Binchy	**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	5231720	5231718	5231719	5231723	5231725	5231721	5231722
Customer Sample Ref.	GW3(PBH3)	GW1(PBH2a)	GW2(PBH1a)	SW2	SW3	WELL 1	WELL 2
AGS Ref.							
Depth							
Type	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID
Ammonium Low	02-Mar-2012	02-Mar-2012	02-Mar-2012	02-Mar-2012	02-Mar-2012	02-Mar-2012	01-Mar-2012
Anions by Kone (w)	01-Mar-2012	01-Mar-2012	01-Mar-2012	02-Mar-2012	01-Mar-2012	01-Mar-2012	01-Mar-2012

SDG:	120225-47	**Location:**		**Order Number:**	1650
Job:	D_SLRCON_DUB-35	**Customer:**	SLR Consulting Ireland	**Report Number:**	172835
Client Reference:		**Attention:**	Aldona Binchy	**Superseded Report:**	

Appendix

1. Results are expressed on a dry weight basis (dried at 35ºC) 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 2 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. 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 for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **Surrogate recoveries** -Most of our organic methods include surrogates, the recovery of which is monitored and reported. For EPH, MO, PAH, GRO and VOCs on soils the result is not surrogate corrected, but a percentage recovery is quoted. Acceptable limits for most organic methods are 70 -130 %.

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 Dimethyphenol, 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 all leachate preparations (NRA, DIN, TCLP, BSEN 12457-1, 2, 3) volatile loss may occur, as we do not employ zero headspace extraction.

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.

SOLID MATRICES EXTRACTION SUMMARY

ANALYSIS	D&C OR WET	EXTRACTION SOLVENT	EXTRACTION METHOD	ANALYSIS
SOLVENT EXTRACTABLE MATTER	D&C	DCM	SOXTHERM	GRAVIMETRIC
CYCLOHEXANE EXT. MATTER	D&C	CYCLOHEXANE	SOXTHERM	GRAVIMETRIC
ELEMENTAL SULPHUR	D&C	DCM	SOXTHERM	HPLC
PHENOLS BY GCMS	WET	DCM	SOXTHERM	GC-MS
HERBICIDES	D&C	HEXANE:ACETONE	SOXTHERM	GC-MS
PESTICIDES	D&C	HEXANE:ACETONE	SOXTHERM	GC-MS
EPH (DRO)	D&C	HEXANE:ACETONE	END OVER END	GC-FID
EPH (MIN OIL)	D&C	HEXANE:ACETONE	END OVER END	GC-FID
EPH (CLEANED UP)	D&C	HEXANE:ACETONE	END OVER END	GC-FID
EPH CWG BY GC	D&C	HEXANE:ACETONE	END OVER END	GC-FID
PCB AROCLOR 1254 / PCB CON	D&C	HEXANE:ACETONE	END OVER END	GC-MS
POLYAROMATIC HYDROCARBONS (MS)	WET	HEXANE:ACETONE	MICROWAVE TM218.	GC-MS
>C6-C40	WET	HEXANE:ACETONE	SHAKER	GC-FID
POLYAROMATIC HYDROCARBONS RAPID GC	WET	HEXANE:ACETONE	SHAKER	GC-FID
SEMI VOLATILE ORGANIC COMPOUNDS	WET	DCM:ACETONE	SONICATE	GC-MS

LIQUID MATRICES EXTRACTION SUMMARY

ANALYSIS	EXTRACTION SOLVENT	EXTRACTION METHOD	ANALYSIS
PAH MS	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC MS
EPH	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
EPH CWG	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
MINERAL OIL	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
PCB 7 CONGENERS	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC MS
PCB AROCLOR 1254	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC MS
SVOC	DCM	LIQUID/LIQUID SHAKE	GC MS
FREE SULPHUR	DCM	SOLID PHASE EXTRACTION	HPLC
PESTOCP/OPP	DCM	LIQUID/LIQUID SHAKE	GC MS
TRIAZINE HERBS	DCM	LIQUID/LIQUID SHAKE	GC MS
PHENOLS MS	ACETONE	SOLID PHASE EXTRACTION	GC MS
TPH by INFRARED (IR)	TCE	STIRRED EXTRACTION (STIR-BAR)	IR
MINERAL OIL by IR	TCE	STIRRED EXTRACTION (STIR-BAR)	IR
GLYCOLS	NONE	DIRECT INJECTION	GC FID

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials or those identified as potentially asbestos containing during sample description 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 May2012

June 2012
SLR Ref: 501.00004.00015. Rev0

SLR Consulting Ireland, 7 Dundrum Business Park, Windy Arbour, Dublin 14, Ireland
T +353 1 296 4667 F +353 1 296 4676 W www.slrconsulting.com

CONTENTS

TABLES

FIGURES

APPENDICES

PROJECT DETAILS
CLIENT : JOHN BEHAN / BEHANS LAND RESTORATION LTD
PROJECT : SURFACE WATER AND GROUNDWATER QUALITY MONITORING
BLACKHALL , NAAS, CO. KILDARE
JOB NO : 501.0004.00015

DOCUMENT TITLE	REVISION	STATUS	DATE
Report Surface Water and Groundwater Quality Monitoring Blackhall, Naas, Co. Kildare	Rev 0	Issued	6th June 2012

REV.	AUTHOR	REVIEWED	APPROVED	DATE
Rev 0	Aldona Binchy	Derek Luby	Derek Luby	6th June 2012

DISTRIBUTION					NO. OF COPIES
	Paper	Electronic	Post	E-mail	
Behans Land Restoration		✓		✓	1
SLR Consulting Ireland	✓	✓			

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 24th May 2012. 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

Surface water quality monitoring was undertaken in two ponds:` SW2 located in the north-eastern sector of the site and SW3 located at the south-western 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 multiparameter probe. Samples were taken for chemical quality testing and sent to ALcontrol Laboratories.

Recorded pH values in the surface water ponds were between 8.38 in SW2 and 8.45 in SW3. Recorded Dissolved Oxygen (DO) values were between 12.53 mg/l at SW2 and 9.19 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 0.444 $mScm^{-1}$ in SW2 to 0.591 $mScm^{-1}$ 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 both ponds was relatively high at the time of sampling.

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.

3.0 GROUNDWATER

3.1 Groundwater Level

Groundwater level monitoring was carried out at four existing 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 below.

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

Well No.	Ground Level mOD	Groundwater level mOD
GW1 (PBH 2a)	168.75	155.59
GW2 (PBH 1a)	157.5	143.74
GW3 (PBH3)	160.5	144.04
Well 1	153.0	148.95
Well 2	163.8	152.68

3.2 Groundwater Quality

Groundwater quality monitoring was undertaken at 5 No. groundwater wells, identified as GW1 (PBH2a), GW2 (PBH1A), GW3 (PBH3) (all monitoring wells); Well 1 (a domestic supply well) and Well 2. Well locations are indicated on Figure 2. Monitoring of physical parameters (visual inspection, pH, electrical conductivity, and dissolved oxygen) was undertaken using a YSI Instruments multiparameter probe. Samples were taken for chemical quality testing and sent to ALcontrol Laboratories,

All monitored wells were pumped out using a Waterra plastic tubing fitted with foot valve and Waterra Pump. Field parameters measured during the pumping 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 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 10.3 mg/l in GW1 (PBH2a) to 21 mg/l in Well 1. Measured Sulphate values range from for 7.1 mg/l in GW1 (PBH 2a) to 70.7 mg/l in Well 2 for Sulphate. There was a exceedance of the environmental quality standard for ammoniacal nitrogen at location Well 1. The recorded ammoniacal nitrogen concentration of 0.573 mg/l in Well 1 exceeded the threshold limit of 0.175 mg/l for general quality of groundwater in groundwater body.

Interpreting the groundwater levels and groundwater flow around the site location could be indicative of sewage contamination from septic tanks of nearby dwellings and/or slurry spreading.

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.

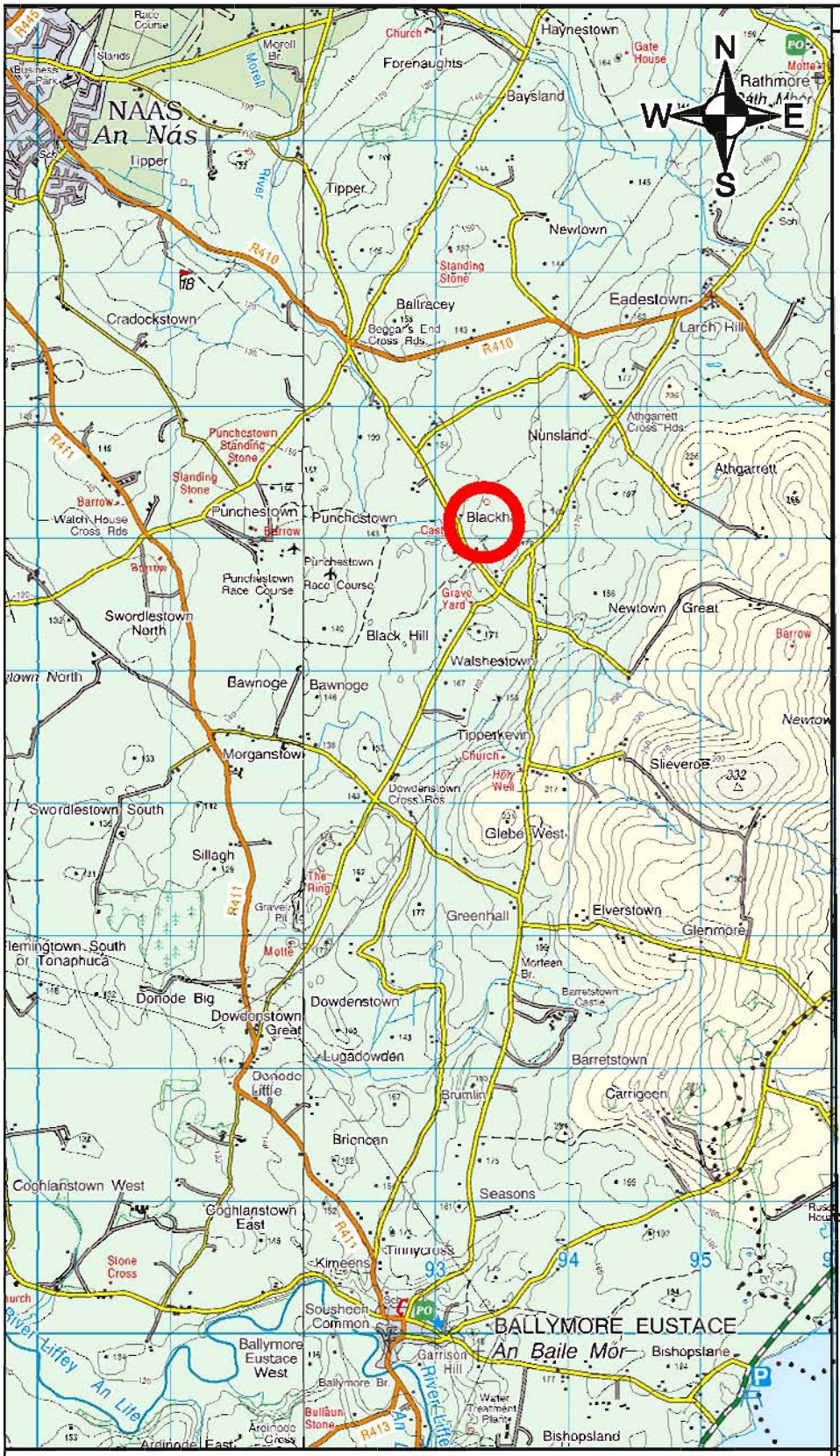
5.0 REFERENCES

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



0 500 1000 1500 2000m 3000 4000 5000

Metres
1:50,000

LEGEND

SITE LOCATION

1. Extract from 1:50,000 O.S. Discovery Series Map No. 56

2. Ordnance Survey Ireland Licence No. SU 00007012 (c) Ordnance Survey Ireland & Government of Ireland

SLR CONSULTING IRELAND
7 DUNDRUM BUSINESS PARK
WINDY ARBOUR
DUBLIN 14
T: +353-1-2964667
F: +353-1-2964676
www.slrconsulting.com

JOHN BEHAN LAND RESTORATION

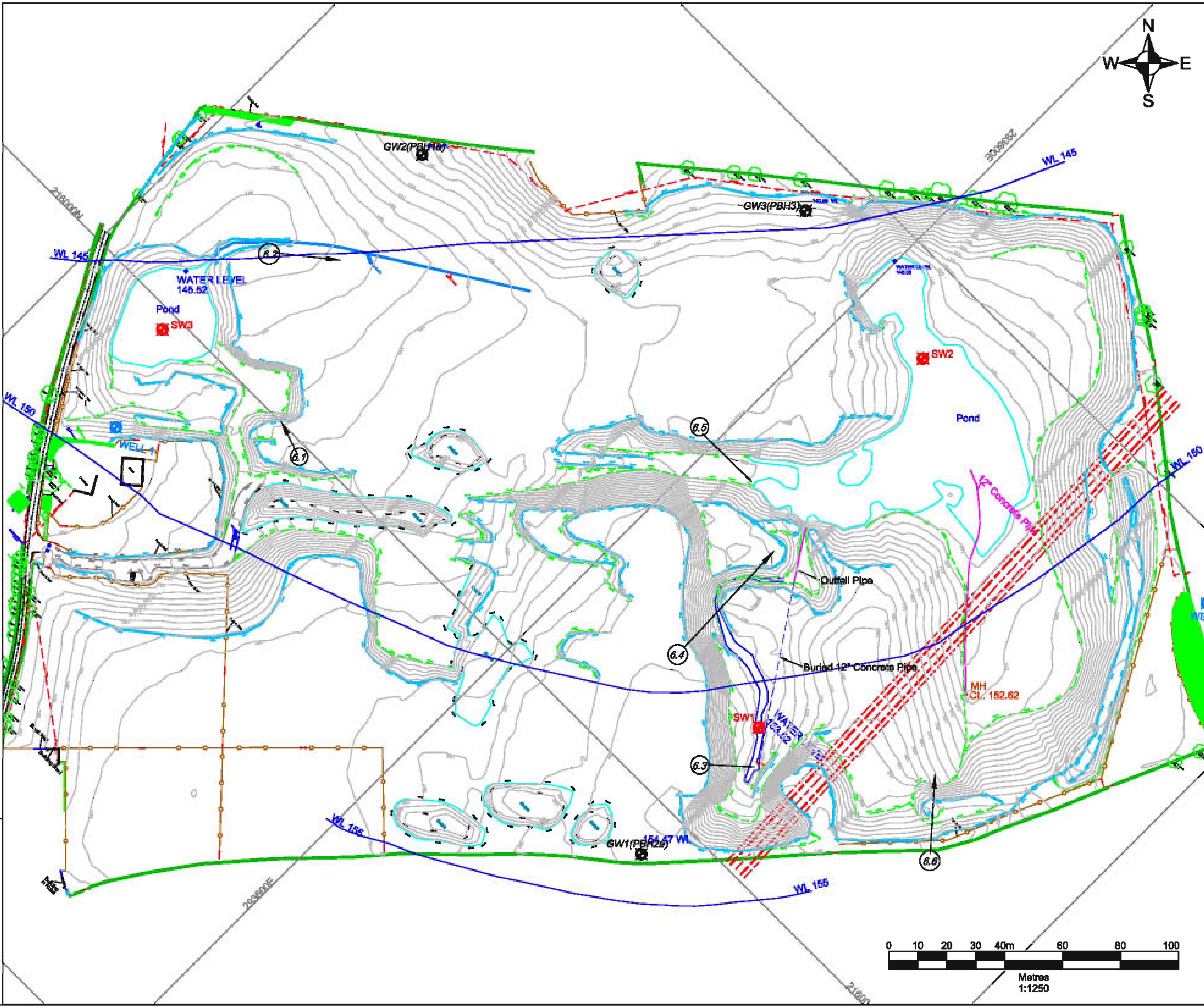
BLACKHALL, PUNCHESTOWN, NAAS, CO. KILDARE

SITE LOCATION PLAN

FIGURE 1

Scale	Date
1:50,000	February 2012

00004.00014.0.7.001.0 Site Location.dwg



LEGEND

1. Survey Provided By Erkina Surveys Ref : 0941-1 Rev.0 Dated 22-08-07

2. Ordnance Survey Ireland Licence No. SU 0000709 (c) Ordnance Survey Ireland & Government of Ireland

GATE

DECIDUOUS TREE

MANHOLE (SEWER)

FENCE

2007 BOREHOLE / MONITORING WELL

BUILDING

ESB / EIRCOM POLE & CABLE

EMBANKMENT

TREES

DITCHLINE

GROUNDWATER MONITORING WELL

SURFACE WATER MONITORING WELL

GROUND CONTOURS

GROUND WATER LEVELS

SLR CONSULTING IRELAND
7 DUNDRUM BUSINESS PARK
WINDY ARBOUR
DUBLIN 14
T: +353-1-2964667
F: +353-1-2964676
www.slrconsulting.com

JOHN BEHAN LAND RESTORATION

BLACKHALL, PUNCHESTOWN
NAAS, CO. KILDARE

SITE LAYOUT PLAN

FIGURE 2

Scale	Date
1:1,250	February 2012

Appendix A
Surface Water Chemical Test Results

Date	06-Jun-12
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
06-Jun-12	SW2	5653831	Water	24 May 2012	18.12	8.38	0.444	12.53	132.70	13.1	18.9	0.0435
06-Jun-12	SW3	5653832	Water	24 May 2012	19.63	8.45	0.591	9.19	101.10	16.5	113	0.0769

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

Appendix B
Ground Water Chemical Test Results

SLR											Date	06-Jun-12	
											Sheet:	1 of 1	
											By:	AB	
Project Name:		Groundwater Monitoring									***Ground Water Chemical Test***		
Location:		Behans Land Restoration Blackhall, Naas, County Kildare											
Date	**Location**	**LAB ID**	**Sample Type**	**Sample Date**	**GWL (m b.g.l)**	**Temperature**	**pH**	**Electrical conductivity**	**Dissolved Oxygen**	**Dissolved Oxygen**	**Chloride as Cl**	**Sulphate as SO4**	**Ammoniacal Nitrogen as N**
Unit						$T^{O}C$		$mScm^{-1}$	mg/l	%	mg/l	mg/l	mg/l
Screening Value*								1.875			187.5	187.5	0.175
Detection Limits											<2	<2	0.01
06-Jun-12	GW1 (PBH2a)	5653826	Water	24 May 2012	13.55	9.85	6.97	0.513	15.27	134.9	10.3	7.1	0.0504
06-Jun-12	GW2 (PBH1a)	5653827	Water	24 May 2012	13.84	11.73	6.93	0.597	8.83	81.7	14.5	25.7	0.053
06-Jun-12	GW3 (PBH3)	5653828	Water	24 May 2012	16.65	11.23	7.01	0.577	12.97	110.8	14.1	16.2	0.0318
06-Jun-12	Well 1	5653829	Water	24 May 2012	4.2	11.34	6.91	0.760	7.32	68.4	21	13.8	0.573
06-Jun-12	Well 2	5657781	Water	24 May 2012	11.29	10.82	6.82	0.758	13.4	120.2	15.4	70.7	0.0722

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

Appendix C
Copy of Certified Results

ALcontrol Laboratories

Unit 18A
Rosemount Business Park
Ballycoolin
Dublin 11
Tel : (0035) 3188 29893

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

Attention: Aldona Binchy

CERTIFICATE OF ANALYSIS

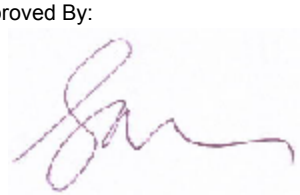
Date:	11 June 2012
Customer:	D_SLRCON_DUB
Sample Delivery Group (SDG):	120528-35
Your Reference:	501.00004.00015
Location:	Behan
Report No:	183786

We received 7 samples on Friday May 25, 2012 and 7 of these samples were scheduled for analysis which was completed on Monday June 11, 2012. 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

CERTIFICATE OF ANALYSIS

SDG:	120528-35	**Location:**	Behan	**Order Number:**	1708
Job:	D_SLRCON_DUB-6	**Customer:**	SLR Consulting Ireland	**Report Number:**	183786
Client Reference:	501.00004.00015	**Attention:**	Aldona Binchy	**Superseded Report:**	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
5653826	GW1			24/05/2012
5653827	GW2			24/05/2012
5653828	GW3			24/05/2012
5653831	SW2			24/05/2012
5653832	SW3			24/05/2012
5653829	WELL 1			24/05/2012
5657781	WELL 2			24/05/2012

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

CERTIFICATE OF ANALYSIS

SDG:	120528-35	**Location:**	Behan	**Order Number:**	1708
Job:	D_SLRCON_DUB-6	**Customer:**	SLR Consulting Ireland	**Report Number:**	183786
Client Reference:	501.00004.00015	**Attention:**	Aldona Binchy	**Superseded Report:**	

LIQUID

Results Legend

X **Test**

N **No Determination Possible**

			Lab Sample No(s)	Customer Sample Reference	AGS Reference	Depth (m)	Container
			5653826	GW1			1plastic (ALE221)
			5653829	WELL 1			H2SO4 (ALE244)
			5653827	GW2			1plastic (ALE221)
			5653831	SW2			H2SO4 (ALE244)
			5657781	WELL 2			1plastic (ALE221)
			5653828	GW3			H2SO4 (ALE244)
			5653832	SW3			1plastic (ALE221)
Ammonium Low	All	NDPs: 0 Tests: 5		X	X	X	X
Anions by Kone (w)	All	NDPs: 0 Tests: 7	X	X	X	X	X

CERTIFICATE OF ANALYSIS

SDG:	120528-35	**Location:**	Behan	**Order Number:**	1708
Job:	D_SLRCON_DUB-6	**Customer:**	SLR Consulting Ireland	**Report Number:**	183786
Client Reference:	501.00004.00015	**Attention:**	Aldona Binchy	**Superseded Report:**	

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
§	Deviating sample.
aq	Aqueous / settled sample.
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
(F)	Trigger breach confirmed

Component	LOD/Units	Method	Customer Sample R	GW1	GW2	GW3	SW2	SW3	WELL 1
			Depth (m)	.	.	.	.	.	.
			Sample Type	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)
			Date Sampled	24/05/2012	24/05/2012	24/05/2012	24/05/2012	24/05/2012	24/05/2012
			Sample Time	.	.	.	.	.	.
			Date Received	25/05/2012	25/05/2012	25/05/2012	25/05/2012	25/05/2012	25/05/2012
			SDG Ref	120528-35	120528-35	120528-35	120528-35	120528-35	120528-35
			Lab Sample No.(s)	5653826	5653827	5653828	5653831	5653832	5653829
			AGS Reference						
Ammoniacal Nitrogen as N (low level)	<0.01 mg/l	TM099		0.0504 #	0.053 #	0.0318 #	0.0435 #	0.0769 #	0.573 #
Sulphate	<2 mg/l	TM184		7.1 #	25.7 #	16.2 #	18.9 #	113 #	13.8 #
Chloride	<2 mg/l	TM184		10.3 #	14.5 #	14.1 #	13.1 #	16.5 #	21 #

CERTIFICATE OF ANALYSIS

SDG:	120528-35	**Location:**	Behan	**Order Number:**	1708
Job:	D_SLRCON_DUB-6	**Customer:**	SLR Consulting Ireland	**Report Number:**	183786
Client Reference:	501.00004.00015	**Attention:**	Aldona Binchy	**Superseded Report:**	

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
§	Deviating sample.
aq	Aqueous / settled sample.
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
(F)	Trigger breach confirmed

Component	LOD/Units	Method	Customer Sample R	WELL 2
			Depth (m)	.
			Sample Type	Water(GW/SW)
			Date Sampled	24/05/2012
			Sample Time	.
			Date Received	25/05/2012
			SDG Ref	120528-35
			Lab Sample No.(s)	5657781
			AGS Reference	
Ammoniacal Nitrogen as N (low level)	<0.01 mg/l	TM099		0.0722 #
Sulphate	<2 mg/l	TM184		70.7 #
Chloride	<2 mg/l	TM184		15.4 #

CERTIFICATE OF ANALYSIS

SDG:	120528-35	**Location:**	Behan	**Order Number:**	1708
Job:	D_SLRCON_DUB-6	**Customer:**	SLR Consulting Ireland	**Report Number:**	183786
Client Reference:	501.00004.00015	**Attention:**	Aldona Binchy	**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.

CERTIFICATE OF ANALYSIS

SDG:	120528-35	**Location:**	Behan	**Order Number:**	1708
Job:	D_SLRCON_DUB-6	**Customer:**	SLR Consulting Ireland	**Report Number:**	183786
Client Reference:	501.00004.00015	**Attention:**	Aldona Binchy	**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	5653826	5653827	5653828	5653831	5653832	5653829	5657781
Customer Sample Ref.	GW1	GW2	GW3	SW2	SW3	WELL 1	WELL 2
AGS Ref.							
Depth							
Type	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID
Ammonium Low	06-Jun-2012	06-Jun-2012	06-Jun-2012	06-Jun-2012	06-Jun-2012	06-Jun-2012	11-Jun-2012
Anions by Kone (w)	30-May-2012	06-Jun-2012	06-Jun-2012	06-Jun-2012	06-Jun-2012	06-Jun-2012	06-Jun-2012

SDG:	120528-35	**Location:**	Behan	**Order Number:**	1708
Job:	D_SLRCON_DUB-6	**Customer:**	SLR Consulting Ireland	**Report Number:**	183786
Client Reference:	501.00004.00015	**Attention:**	Aldona Binchy	**Superseded Report:**	

Appendix

1. Results are expressed on a dry weight basis (dried at 35ºC) 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 2 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. 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 for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **Surrogate recoveries** -Most of our organic methods include surrogates, the recovery of which is monitored and reported. For EPH, MO, PAH, GRO and VOCs on soils the result is not surrogate corrected, but a percentage recovery is quoted. Acceptable limits for most organic methods are 70 -130 %.

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 Dimethyphenol, 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 all leachate preparations (NRA, DIN, TCLP, BSEN 12457-1, 2, 3) volatile loss may occur, as we do not employ zero headspace extraction.

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.

SOLID MATRICES EXTRACTION SUMMARY

ANALYSIS	D&C OR WET	EXTRACTION SOLVENT	EXTRACTION METHOD	ANALYSIS
SOLVENT EXTRACTABLE MATTER	D&C	DCM	SOXTHERM	GRAVIMETRIC
CYCLOHEXANE EXT. MATTER	D&C	CYCLOHEXANE	SOXTHERM	GRAVIMETRIC
ELEMENTAL SULPHUR	D&C	DCM	SOXTHERM	HPLC
PHENOLS BY GCMS	WET	DCM	SOXTHERM	GC-MS
HERBICIDES	D&C	HEXANE:ACETONE	SOXTHERM	GC-MS
PESTICIDES	D&C	HEXANE:ACETONE	SOXTHERM	GC-MS
EPH (DRO)	D&C	HEXANE:ACETONE	END OVER END	GC-FID
EPH (MIN OIL)	D&C	HEXANE:ACETONE	END OVER END	GC-FID
EPH (CLEANED UP)	D&C	HEXANE:ACETONE	END OVER END	GC-FID
EPH CWG BY GC	D&C	HEXANE:ACETONE	END OVER END	GC-FID
PCB AROCLOR 1254 / PCB CON	D&C	HEXANE:ACETONE	END OVER END	GC-MS
POLYAROMATIC HYDROCARBONS (MS)	WET	HEXANE:ACETONE	MICROWAVE TM218.	GC-MS
>C6-C40	WET	HEXANE:ACETONE	SHAKER	GC-FID
POLYAROMATIC HYDROCARBONS RAPID GC	WET	HEXANE:ACETONE	SHAKER	GC-FID
SEMI VOLATILE ORGANIC COMPOUNDS	WET	DCM:ACETONE	SONICATE	GC-MS

LIQUID MATRICES EXTRACTION SUMMARY

ANALYSIS	EXTRACTION SOLVENT	EXTRACTION METHOD	ANALYSIS
PAH MS	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC MS
EPH	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
EPH CWG	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
MINERAL OIL	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
PCB 7 CONGENERS	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC MS
PCB AROCLOR 1254	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC MS
SVOC	DCM	LIQUID/LIQUID SHAKE	GC MS
FREE SULPHUR	DCM	SOLID PHASE EXTRACTION	HPLC
PESTOCP/OPP	DCM	LIQUID/LIQUID SHAKE	GC MS
TRIAZINE HERBS	DCM	LIQUID/LIQUID SHAKE	GC MS
PHENOLS MS	ACETONE	SOLID PHASE EXTRACTION	GC MS
TPH by INFRARED (IR)	TCE	STIRRED EXTRACTION (STIR-BAR)	IR
MINERAL OIL by IR	TCE	STIRRED EXTRACTION (STIR-BAR)	IR
GLYCOLS	NONE	DIRECT INJECTION	GC FID

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials or those identified as potentially asbestos containing during sample description 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 September 2012

January 2013
SLR Ref: 501.00004.00017. Rev0

SLR Consulting Ireland, 7 Dundrum Business Park, Windy Arbour, Dublin 14, Ireland
T +353 1 296 4667 F +353 1 296 4676 W www.slrconsulting.com

CONTENTS

TABLES

FIGURES

APPENDICES

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 25th September 2012. 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 Q3

Surface water quality monitoring was undertaken in two ponds: SW2 located in the north-eastern sector of the site and SW3 located at the south-western 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 multiparameter probe. Samples were taken for chemical quality testing and sent to ALcontrol Laboratories.

Recorded pH values in the surface water ponds were between 7.63 in SW2 and 7.55 in SW3. Recorded Dissolved Oxygen (DO) values were between 10.33 mg/l at SW2 and 7.76 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 0.305 $mScm^{-1}$ in SW2 to 0.471 $mScm^{-1}$ 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.

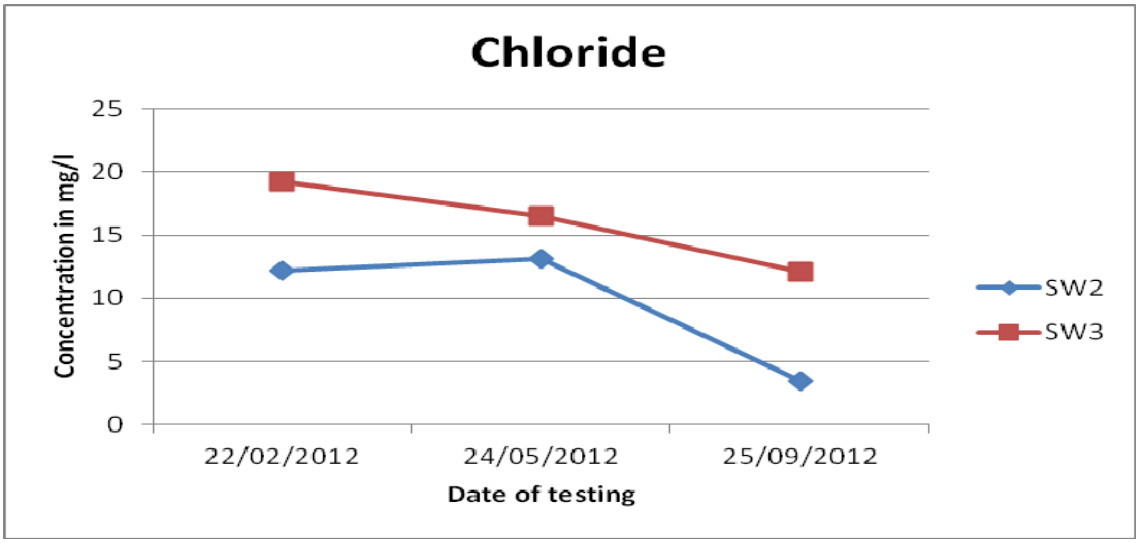
Water level in both ponds was relatively high at the time of sampling.

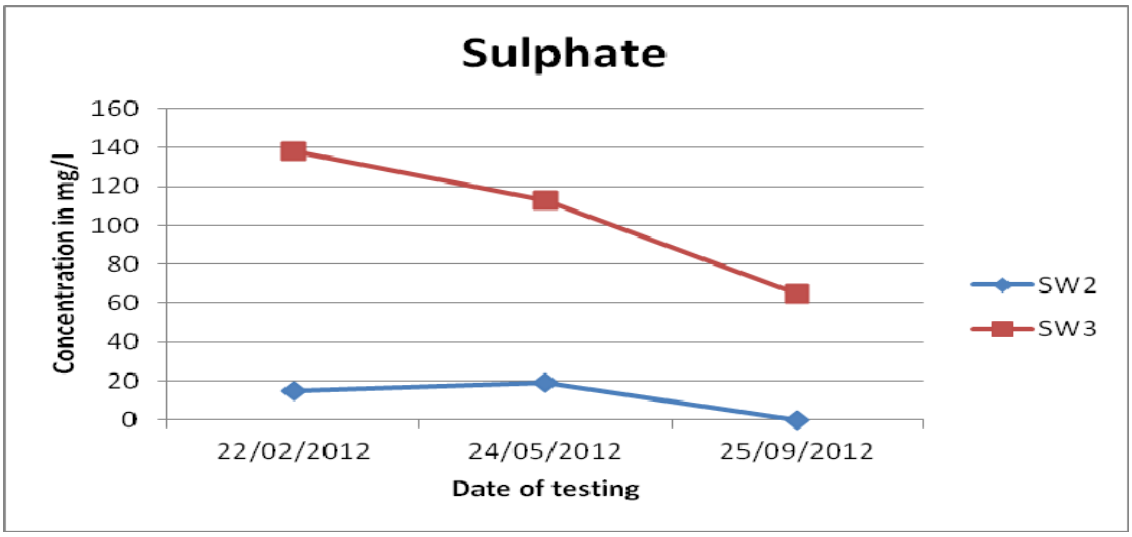
Results of surface water quality tests screened against the Surface Waters Regulations 2009 are presented in the Appendix A of this report and a copy of the certified test results is presented in Appendix C

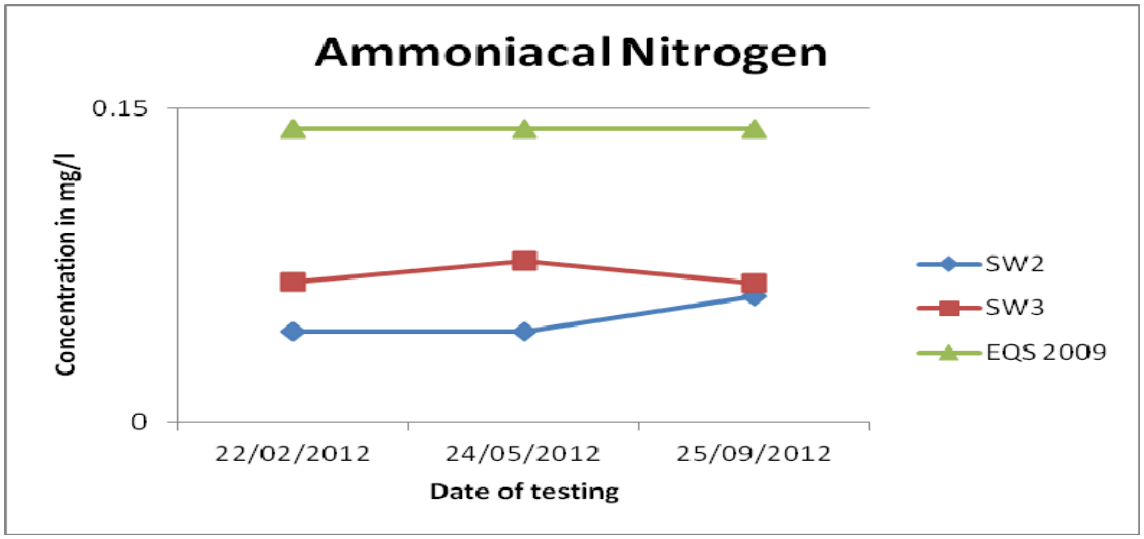
All tested parameters are within the quality standard limits for surface waters (European Communities Environmental Objectives (Surface Water) Regulations 2009.

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.


Chloride
Concentration in mg/l
25
20
15
10
5
0
22/02/2012
24/05/2012
25/09/2012
Date of testing
SW2
SW3


Sulphate
Concentration in mg/l
160
140
120
100
80
60
40
20
0
22/02/2012
24/05/2012
25/09/2012
Date of testing
SW2
SW3



3.0 GROUNDWATER

3.1 Groundwater Level

Groundwater level monitoring was carried out at four existing 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 below.

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

Well No.	Ground Level mOD	Groundwater level mOD
GW1 (PBH 2a)	168.75	155.09
GW2 (PBH 1a)	157.5	143.37
GW3 (PBH3)	160.5	143.88
Well 1	153.0	148.58
Well 2	163.8	152.13

3.2 Groundwater Quality Q3

Groundwater quality monitoring was undertaken at 5 No. groundwater wells, identified as GW1 (PBH2a), GW2 (PBH1A), GW3 (PBH3) (all monitoring wells); Well 1 (a domestic supply well) and Well 2. Well locations are indicated on Figure 2. Monitoring of physical parameters (visual inspection, pH, electrical conductivity, and dissolved oxygen) was undertaken using a YSI Instruments multiparameter probe. Samples were taken for chemical quality testing and sent to ALcontrol Laboratories,

All monitored wells were pumped out using a Waterra plastic tubing fitted with foot valve and Waterra Pump. Field parameters measured during the pumping were monitored to ensure

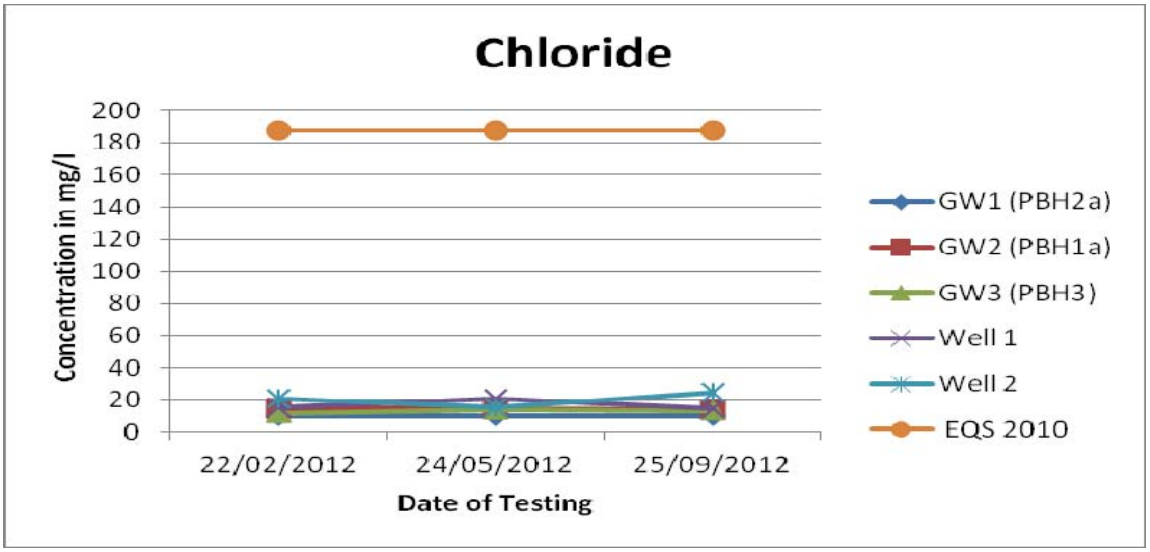
that all standing water in monitoring boreholes was removed and fresh groundwater samples were obtained.

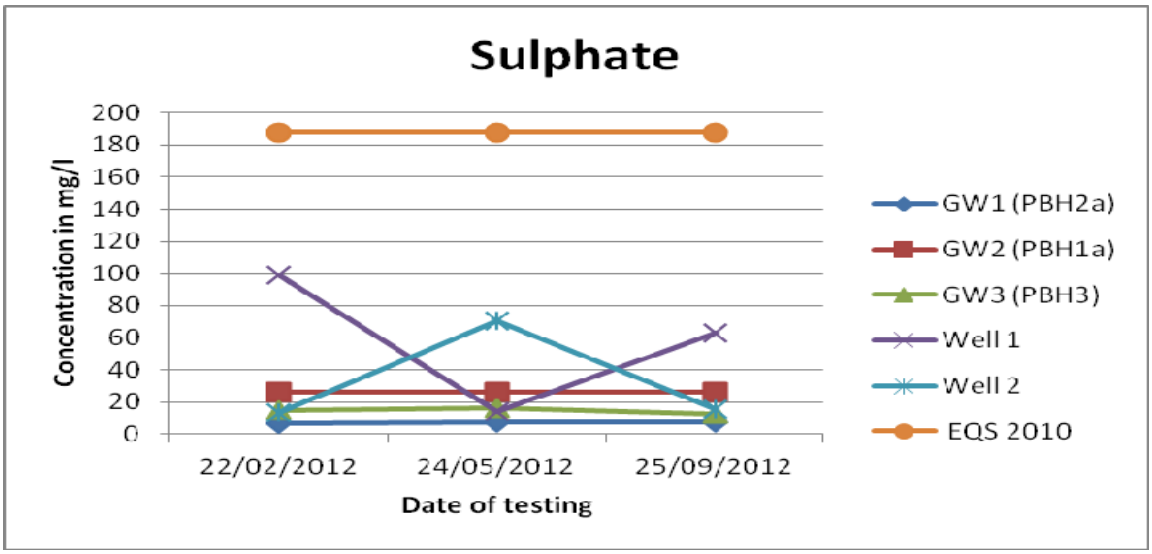
Laboratory test data screened against the water quality threshold limits set in the Groundwater Regulations 2010 is presented in Appendix B of this report. Certified quality results are presented in Appendix C of this Report.

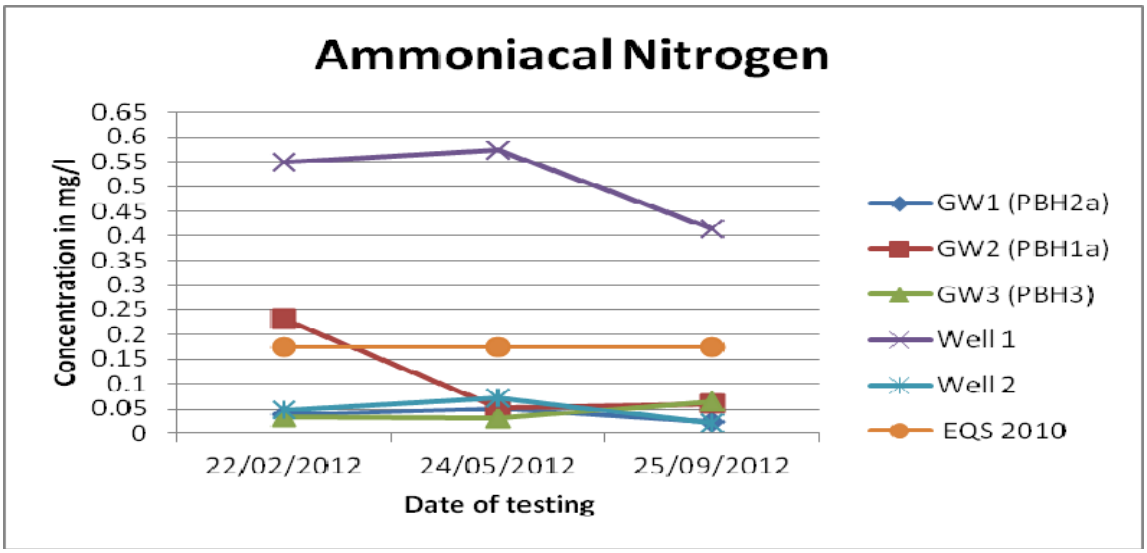
Measured Chloride values range from 10.3 mg/l in GW1 (PBH2a) to 24.4 mg/l in Well 2. Measured Sulphate values range from for 7.4 mg/l in GW1 (PBH 2a) to 63.1 mg/l in Well 2 for Sulphate. There was a exceedance of the environmental quality standard for ammoniacal nitrogen at location Well 1. The recorded ammoniacal nitrogen concentration of 0.415 mg/l in Well 1 exceeded the threshold limit of 0.175 mg/l for general quality of groundwater in groundwater body. Interpreting the groundwater levels and groundwater flow around the site location could be indicative of sewage contamination from septic tanks of nearby dwellings and/or slurry spreading.

3.3 Variation and trends in Surface 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.







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.

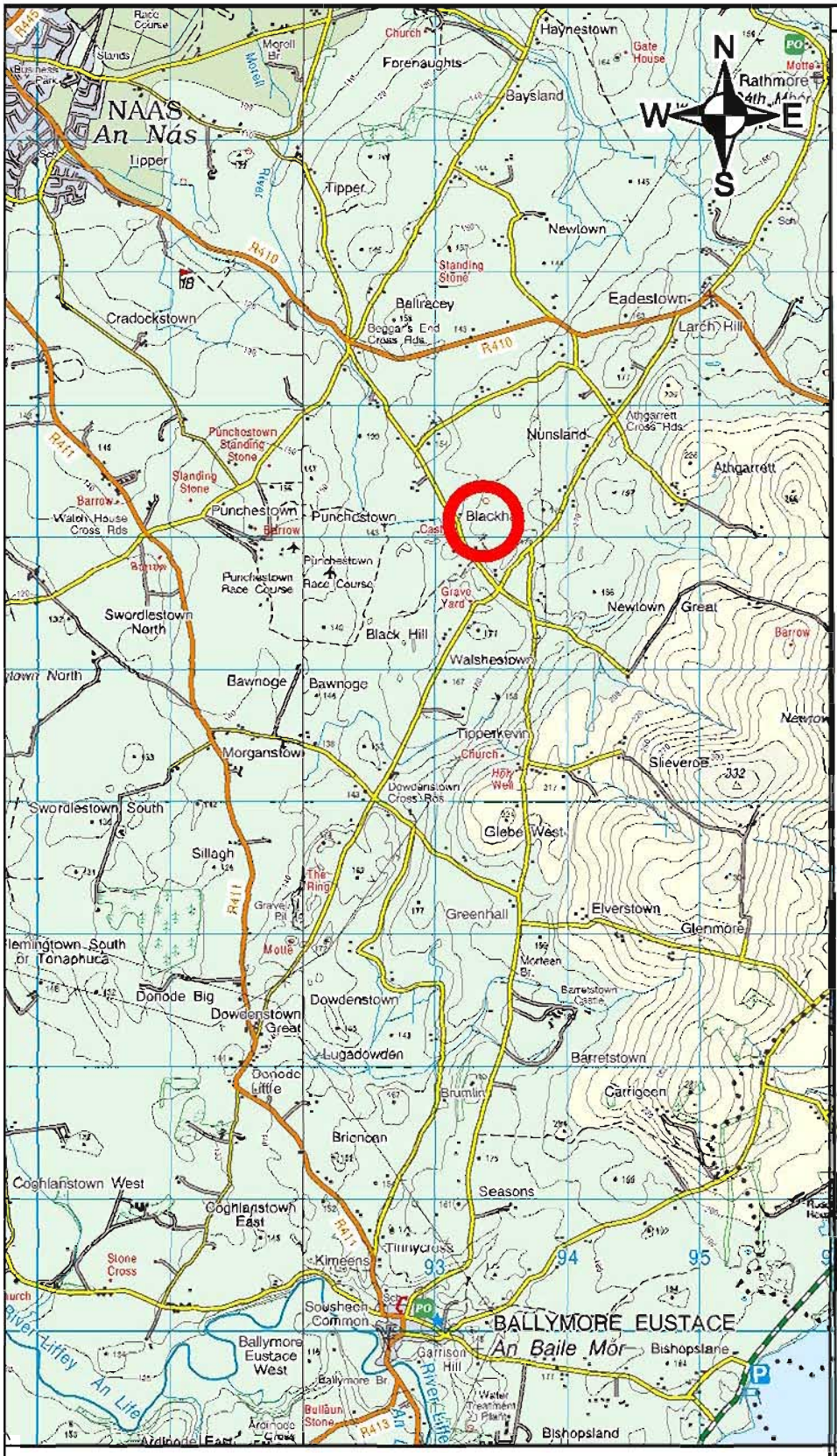
5.0 REFERENCES

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



LEGEND

SITE LOCATION

1. Extract from 1:50,000 O.S. Discovery Series Map No. 56

2. Ordnance Survey Ireland Licence No. SU 00007013(c) Ordnance Survey Ireland & Government of Ireland

0 500 1000 1500 2000m 3000 4000 5000

Metres
1:50,000

SLR CONSULTING IRELAND
7 DUNDRUM BUSINESS PARK
WINDY ARBOUR
DUBLIN 14
T: +353-1-2964667
F: +353-1-2964678
www.slrconsulting.com

JOHN BEHAN LAND RESTORATION

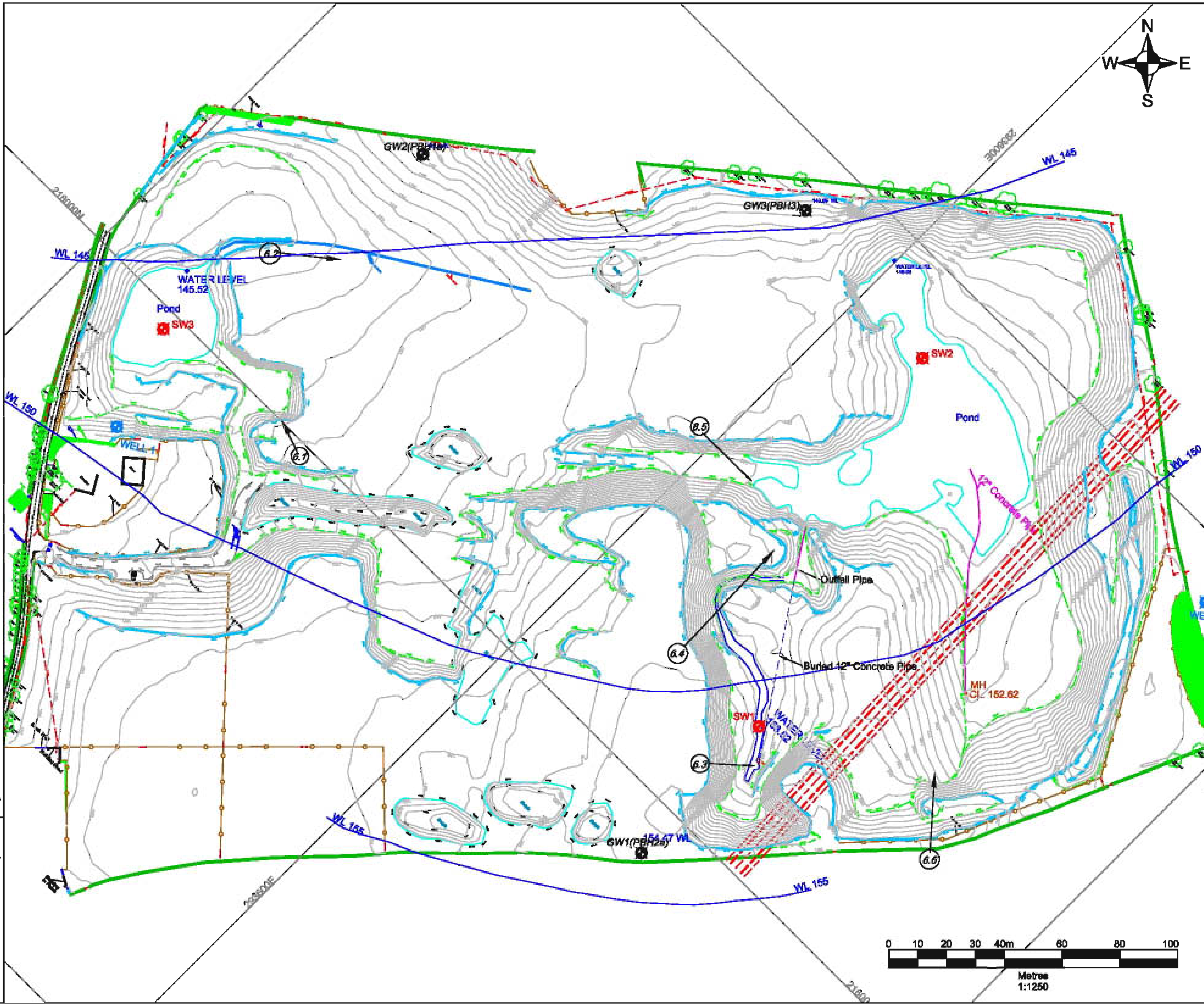
BLACKHALL, PUNCHESTOWN, NAAS, CO. KILDARE

SITE LOCATION PLAN

FIGURE 1

Scale	Date
1:50,000	January 2013

00004.00017.0.7.001.0 Site Location.dwg



LEGEND

1. Survey Provided By Erkina Surveys Ref : 0941-1 Rev.0 Dated 22-08-07

2. Ordnance Survey Ireland Licence No. SU 0000709 (c) Ordnance Survey Ireland & Government of Ireland

GATE

DECIDUOUS TREE

MANHOLE (SEWER)

FENCE

2007 BOREHOLE / MONITORING WELL

BUILDING

ESB / EIRCOM POLE & CABLE

EMBANKMENT

TREES

DITCHLINE

GROUNDWATER MONITORING WELL

SURFACE WATER MONITORING WELL

155 GROUND CONTOURS

155 GROUND WATER LEVELS

SLR CONSULTING IRELAND
7 DUNDRUM BUSINESS PARK
WINDY ARBOUR
DUBLIN 14
T: +353-1-2964667
F: +353-1-2964676
www.slrconsulting.com

JOHN BEHAN LAND RESTORATION

BLACKHALL, PUNCHESTOWN
NAAS, CO. KILDARE

SITE LAYOUT PLAN

FIGURE 2

Scale 1:1,250

Date January 2013

Appendix A
Surface Water Chemical Test Results

Date	25-Oct-12
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					**$T^{O}C$**		**$mScm^{-1}$**	**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
25-Oct-12	SW2	6249008	Water	25 September 2012	10.22	7.63	0.305	10.33	93.3	3.4	<2	0.0603
25-Oct-12	SW3	6249011	Water	25 September 2012	11	7.55	0.471	7.76	71.2	12.1	64.8	0.0664

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

Appendix B
Ground Water Chemical Test Results

SLR												Date	25-Oct-12	
												Sheet:	1 of 1	
												By:	AB	
Project Name:		Groundwater Monitoring										***Ground Water Chemical Test***		
Location:		Behans Land Restoration Blackhall, Naas, County Kildare												
Date	**Location**	**LAB ID**	**Sample Type**	**Sample Date**	**GWL (m b.g.l)**	**Temperature**	**pH**	**Electrical conductivity**	**Dissolved Oxygen**	**Dissolved Oxygen**	**Chloride as Cl**	**Sulphate as SO4**	**Ammoniacal Nitrogen as N**	
Unit						$T^{O}C$		$mScm^{-1}$	mg/l	%	mg/l	mg/l	mg/l	
Screening Value*								1.875			187.5	187.5	0.175	
Detection Limits											<2	<2	0.01	
25-Oct-12	GW1 (PBH2a)	6248997	Water	25 September 2012	13.66	9.95	6.93	0.460	9.02	81.7	10.3	7.4	0.0227	
25-Oct-12	GW2 (PBH1a)	6248999	Water	25 September 2012	14.13	10.65	6.97	0.528	4.31	44.2	14.2	26.3	0.0614	
25-Oct-12	GW3 (PBH3)	6249001	Water	25 September 2012	16.62	11.92	6.95	0.535	7.87	73.1	13.3	12.2	0.0662	
25-Oct-12	Well 1	6249002	Water	25 September 2012	4.42	12.75	6.95	0.729	7.26	70.8	14.5	63.1	0.415	
25-Oct-12	Well 2	6249005	Water	25 September 2012	11.67	10.17	6.6	0.755	8.43	75.6	24.4	15.4	0.0207	

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

Appendix C
Copy of Certified Results

ALcontrol Laboratories

Unit 18A
Rosemount Business Park
Ballycoolin
Dublin 11
Tel : (0035) 3188 29893

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

Attention: Aldona Binchy

CERTIFICATE OF ANALYSIS

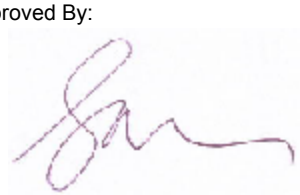
Date:	04 October 2012
Customer:	D_SLRCON_DUB
Sample Delivery Group (SDG):	120927-58
Your Reference:	501.20004.00017
Location:	Blackhall
Report No:	196688

We received 7 samples on Wednesday September 26, 2012 and 7 of these samples were scheduled for analysis which was completed on Thursday October 04, 2012. 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

CERTIFICATE OF ANALYSIS

SDG:	120927-58	**Location:**	Blackhall	**Order Number:**	1804
Job:	D_SLRCON_DUB-82	**Customer:**	SLR Consulting Ireland	**Report Number:**	196688
Client Reference:	501.20004.00017	**Attention:**	Aldona Binchy	**Superseded Report:**	

LIQUID

Results Legend

X **Test**

N **No Determination Possible**

			Lab Sample No(s)	Customer Sample Reference	AGS Reference	Depth (m)	Container
			6249002	WELL 1		0.00 - 0.00	1plastic (ALE221)
							H2SO4 (ALE244)
			6249008	SW2		0.00 - 0.00	1plastic (ALE221)
							H2SO4 (ALE244)
			6249005	WELL 2		0.00 - 0.00	1plastic (ALE221)
							H2SO4 (ALE244)
			6249011	SW3		0.00 - 0.00	1plastic (ALE221)
							H2SO4 (ALE244)
			6248997	GW1 (PBH2a)		0.00 - 0.00	1plastic (ALE221)
							H2SO4 (ALE244)
			6248999	GW2 (PBH1a)		0.00 - 0.00	1plastic (ALE221)
							H2SO4 (ALE244)
			6249001	GW3 (PBH3)		0.00 - 0.00	1plastic (ALE221)
							H2SO4 (ALE244)
Ammonium Low	All	NDPs: 0 Tests: 7		X		X	X	X	X	X	X	X	X	X
Anions by Kone (w)	All	NDPs: 0 Tests: 7	X		X		X	X	X	X	X	X	X	

CERTIFICATE OF ANALYSIS

SDG:	120927-58	**Location:**	Blackhall	**Order Number:**	1804
Job:	D_SLRCON_DUB-82	**Customer:**	SLR Consulting Ireland	**Report Number:**	196688
Client Reference:	501.20004.00017	**Attention:**	Aldona Binchy	**Superseded Report:**	

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
§	Deviating sample.
aq	Aqueous / settled sample.
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
(F)	Trigger breach confirmed

Component	LOD/Units	Method	Customer Sample R	GW3 (PBH3)	GW1 (PBH2a)	GW2 (PBH1a)	SW2	SW3	WELL 1
			Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
			Sample Type	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)
			Date Sampled	25/09/2012	25/09/2012	25/09/2012	25/09/2012	25/09/2012	25/09/2012
			Sample Time	.	.	.	.	.	.
			Date Received	26/09/2012	26/09/2012	26/09/2012	26/09/2012	26/09/2012	26/09/2012
			SDG Ref	120927-58	120927-58	120927-58	120927-58	120927-58	120927-58
			Lab Sample No.(s)	6249001	6248997	6248999	6249008	6249011	6249002
			AGS Reference						
Ammoniacal Nitrogen as N (low level)	<0.01 mg/l	TM099		0.0662 #	0.0277 #	0.0614 #	0.0603 #	0.0664 #	0.415 #
Sulphate	<2 mg/l	TM184		12.2 #	7.4 #	26.3 #	<2 #	64.8 #	63.1 #
Chloride	<2 mg/l	TM184		13.3 #	10.3 #	14.2 #	3.4 #	12.1 #	14.5 #

CERTIFICATE OF ANALYSIS

SDG:	120927-58	**Location:**	Blackhall	**Order Number:**	1804
Job:	D_SLRCON_DUB-82	**Customer:**	SLR Consulting Ireland	**Report Number:**	196688
Client Reference:	501.20004.00017	**Attention:**	Aldona Binchy	**Superseded Report:**	

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
§	Deviating sample.
aq	Aqueous / settled sample.
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
(F)	Trigger breach confirmed

Component	LOD/Units	Method	Customer Sample R	Depth (m)	Sample Type	Date Sampled	Sample Time	Date Received	SDG Ref	Lab Sample No.(s)	AGS Reference
			WELL 2	0.00 - 0.00	Water(GW/SW)	25/09/2012	.	26/09/2012	120927-58	6249005	
Ammoniacal Nitrogen as N (low level)	<0.01 mg/l	TM099	0.0207 #								
Sulphate	<2 mg/l	TM184	15.4 #								
Chloride	<2 mg/l	TM184	24.4 #								

CERTIFICATE OF ANALYSIS

SDG:	120927-58	**Location:**	Blackhall	**Order Number:**	1804
Job:	D_SLRCON_DUB-82	**Customer:**	SLR Consulting Ireland	**Report Number:**	196688
Client Reference:	501.20004.00017	**Attention:**	Aldona Binchy	**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.

CERTIFICATE OF ANALYSIS

SDG:	120927-58	**Location:**	Blackhall	**Order Number:**	1804
Job:	D_SLRCON_DUB-82	**Customer:**	SLR Consulting Ireland	**Report Number:**	196688
Client Reference:	501.20004.00017	**Attention:**	Aldona Binchy	**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	6249001	6248997	6248999	6249008	6249011	6249002	6249005
Customer Sample Ref.	GW3 (PBH3)	GW1 (PBH2a)	GW2 (PBH1a)	SW2	SW3	WELL 1	WELL 2
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
Type	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID
Ammonium Low	04-Oct-2012	04-Oct-2012	04-Oct-2012	04-Oct-2012	04-Oct-2012	04-Oct-2012	04-Oct-2012
Anions by Kone (w)	04-Oct-2012	04-Oct-2012	04-Oct-2012	04-Oct-2012	04-Oct-2012	04-Oct-2012	04-Oct-2012

SDG:	120927-58	**Location:**	Blackhall	**Order Number:**	1804
Job:	D_SLRCON_DUB-82	**Customer:**	SLR Consulting Ireland	**Report Number:**	196688
Client Reference:	501.20004.00017	**Attention:**	Aldona Binchy	**Superseded Report:**	

Appendix

1. Results are expressed on a dry weight basis (dried at 35ºC) for all soil analyses except for the following: NRA and CEN Leach tests, flash point, 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 2 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. 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 for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **Surrogate recoveries** -Most of our organic methods include surrogates, the recovery of which is monitored and reported. For EPH, MO, PAH, GRO and VOCs on soils the result is not surrogate corrected, but a percentage recovery is quoted. Acceptable limits for most organic methods are 70 -130 %.

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 Dimethyphenol, 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 all leachate preparations (NRA, DIN, TCLP, BSEN 12457-1, 2, 3) volatile loss may occur, as we do not employ zero headspace extraction.

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.

SOLID MATRICES EXTRACTION SUMMARY

ANALYSIS	D&C OR WET	EXTRACTION SOLVENT	EXTRACTION METHOD	ANALYSIS
SOLVENT EXTRACTABLE MATTER	D&C	DCM	SOXTHERM	GRAVIMETRIC
CYCLOHEXANE EXT. MATTER	D&C	CYCLOHEXANE	SOXTHERM	GRAVIMETRIC
ELEMENTAL SULPHUR	D&C	DCM	SOXTHERM	HPLC
PHENOLS BY GCMS	WET	DCM	SOXTHERM	GC-MS
HERBICIDES	D&C	HEXANE:ACETONE	SOXTHERM	GC-MS
PESTICIDES	D&C	HEXANE:ACETONE	SOXTHERM	GC-MS
EPH (DRO)	D&C	HEXANE:ACETONE	END OVER END	GC-FID
EPH (MIN OIL)	D&C	HEXANE:ACETONE	END OVER END	GC-FID
EPH (CLEANED UP)	D&C	HEXANE:ACETONE	END OVER END	GC-FID
EPH CWG BY GC	D&C	HEXANE:ACETONE	END OVER END	GC-FID
PCB AROCLOR 1254 / PCB CON	D&C	HEXANE:ACETONE	END OVER END	GC-MS
POLYAROMATIC HYDROCARBONS (MS)	WET	HEXANE:ACETONE	MICROWAVE TM218.	GC-MS
>C6-C40	WET	HEXANE:ACETONE	SHAKER	GC-FID
POLYAROMATIC HYDROCARBONS RAPID GC	WET	HEXANE:ACETONE	SHAKER	GC-FID
SEMI VOLATILE ORGANIC COMPOUNDS	WET	DCM:ACETONE	SONICATE	GC-MS

LIQUID MATRICES EXTRACTION SUMMARY

ANALYSIS	EXTRACTION SOLVENT	EXTRACTION METHOD	ANALYSIS
PAH MS	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC MS
EPH	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
EPH CWG	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
MINERAL OIL	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
PCB 7 CONGENERS	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC MS
PCB AROCLOR 1254	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC MS
SVOC	DCM	LIQUID/LIQUID SHAKE	GC MS
FREE SULPHUR	DCM	SOLID PHASE EXTRACTION	HPLC
PESTOCP/OPP	DCM	LIQUID/LIQUID SHAKE	GC MS
TRIAZINE HERBS	DCM	LIQUID/LIQUID SHAKE	GC MS
PHENOLS MS	ACETONE	SOLID PHASE EXTRACTION	GC MS
TPH by INFRARED (IR)	TCE	STIRRED EXTRACTION (STIR-BAR)	IR
MINERAL OIL by IR	TCE	STIRRED EXTRACTION (STIR-BAR)	IR
GLYCOLS	NONE	DIRECT INJECTION	GC FID

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials or those identified as potentially asbestos containing during sample description 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 December 2012

January 2013
SLR Ref: 501.00004.00019. Rev0

SLR Consulting Ireland, 7 Dundrum Business Park, Windy Arbour, Dublin 14, Ireland
T +353 1 296 4667 F +353 1 296 4676 W www.slrconsulting.com

CONTENTS

TABLES

FIGURES

APPENDICES

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 6th December 2012. 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 annual basis. Monitoring point locations are shown on Figure 2.

2.0 SURFACE WATER QUALITY

2.1 Surface Water Quality Q4

Surface water quality monitoring was undertaken in two ponds: SW2 located in the north-eastern sector of the site and SW3 located at the south-western 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 multiparameter probe. Samples were taken for chemical quality testing and sent to ALcontrol Laboratories.

Recorded pH values in the surface water ponds were between 8.11 in SW2 and 8.13 in SW3. Recorded Dissolved Oxygen (DO) values were between 11.93 mg/l at SW2 and 11.93 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 0.327 $mScm^{-1}$ in SW2 to 0.315 $mScm^{-1}$ 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.

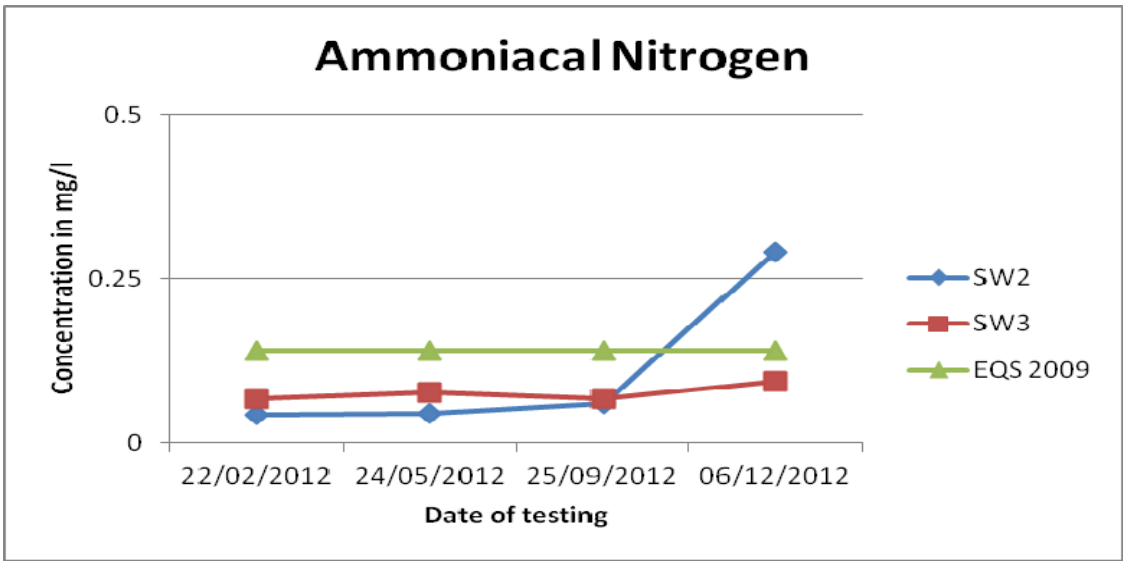
Water level in both ponds was relatively high at the time of sampling.

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.

The laboratory analysis recorded VOC Benzene concentration of 0.00208 mg/l and 0.00193 mg/l in SW2 and SW3 respectively and SVOC (n-dibutyl phathalate) concentration of 0.00111 mg/l in SW3.

Benzene is identified as priority substance under the European Communities Environmental Objectives (Surface Water) Regulations 2009 (SI. 272 of 2009). The recorded concentration



3.0 GROUNDWATER

3.1 Groundwater Level

Groundwater level monitoring was carried out at four existing 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 below.

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

Well No.	Ground Level mOD	Groundwater level mOD
GW1	168.75	155.7
GW2	157.5	143.05
GW3	160.5	143.98
Well 1	153.0	148.93
Well 2	163.8	153.35

3.2 Groundwater Quality Q4

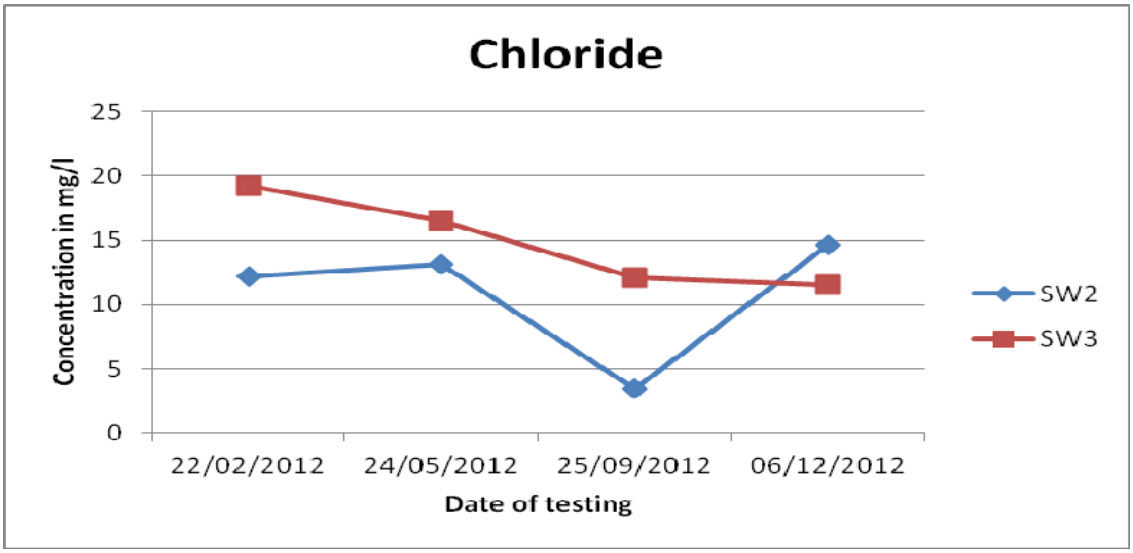
Groundwater quality monitoring was undertaken at 5 No. groundwater wells, identified as GW1, GW2, GW3 (all monitoring wells); Well 1 (a domestic supply well) and Well 2. Well locations are indicated on Figure 2. Monitoring of physical parameters (visual inspection, pH, electrical conductivity, and dissolved oxygen) was undertaken using a YSI Instruments multiparameter probe. Samples were taken for chemical quality testing and sent to ALcontrol Laboratories,

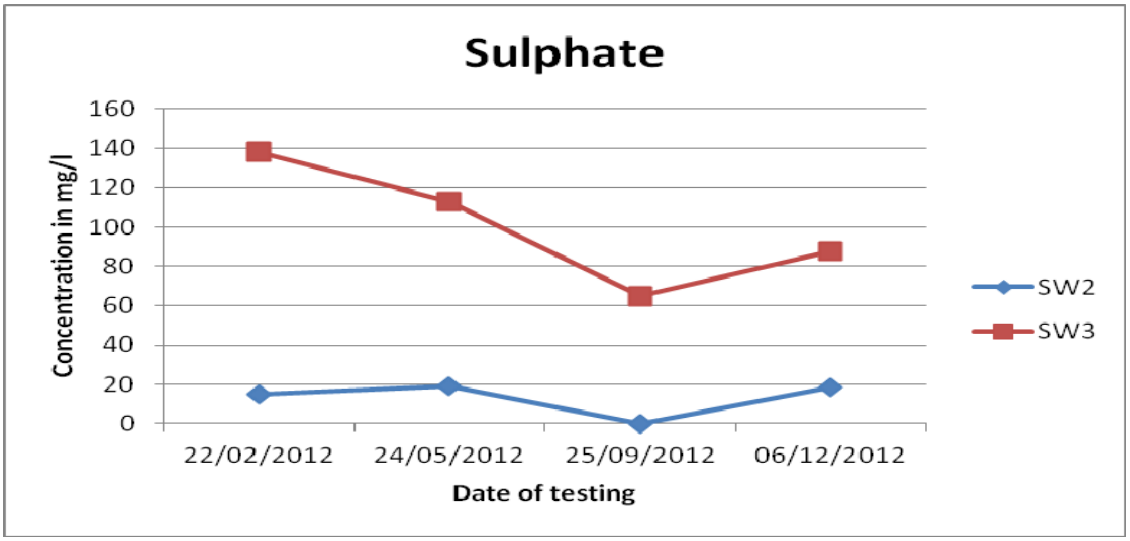
at this site in Q4 of 2012 was below the MAC- EQS set by table 11 in Schedule 6 of those regulations of 0.05 mg/l. No equivalent MAC-EQS is provided for n-dibutyl phathalate.

Notwithstanding this it is recommended that those locations are tested for these water quality parameters in next 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.





All monitored wells were pumped out using a Waterra plastic tubing fitted with foot valve and Waterra Pump. Field parameters measured during the pumping 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 9.5 mg/l in GW1 to 21.3 mg/l in Well 2. Measured Sulphate values range from for 7 mg/l in GW1 to 88 mg/l in Well 1 for Sulphate. There was a exceedance of the environmental quality standard for ammoniacal nitrogen at location Well 1. The recorded ammoniacal nitrogen concentration of 0.408 mg/l in Well 1 exceeded the threshold limit of 0.175 mg/l for general quality of groundwater in groundwater body. Interpreting the groundwater levels and groundwater flow around the site location could be indicative of sewage contamination from septic tanks of nearby dwellings and/or slurry spreading.

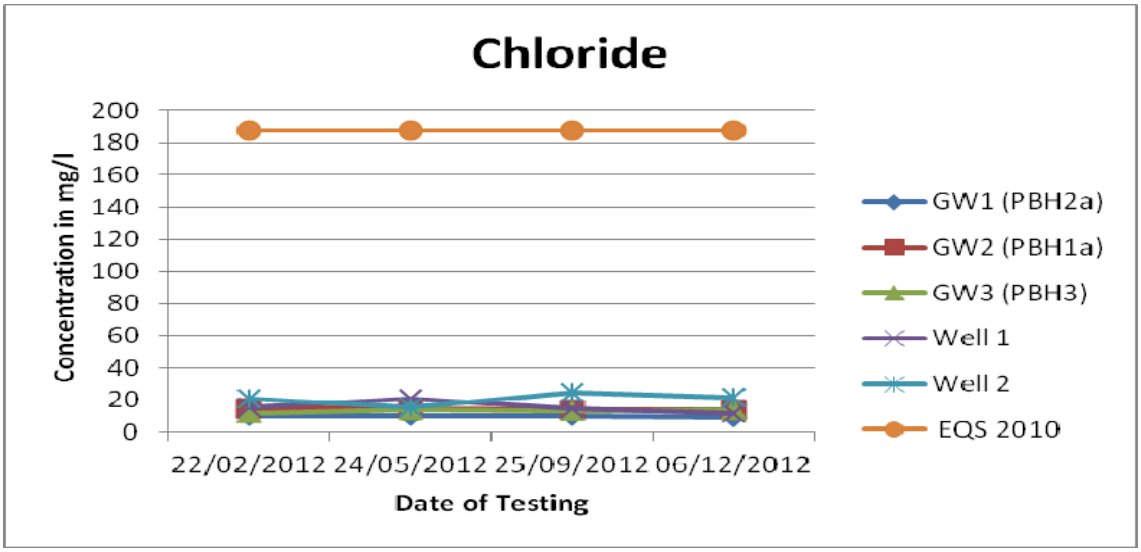
The laboratory analysis recorded carbon disulphide concentration of 0.00114 mg/l and Benzene concentration of 0.00133 mg/ in Well 2, The recorded concentration of benzene at this location in Q4 of 2012 was above overall threshold value range (0.00075 mg/l) set by Schedule 5 of European Communities Environmental Objectives (Groundwater) Regulations 2010, no equivalent threshold value is provided for carbon disulphide.

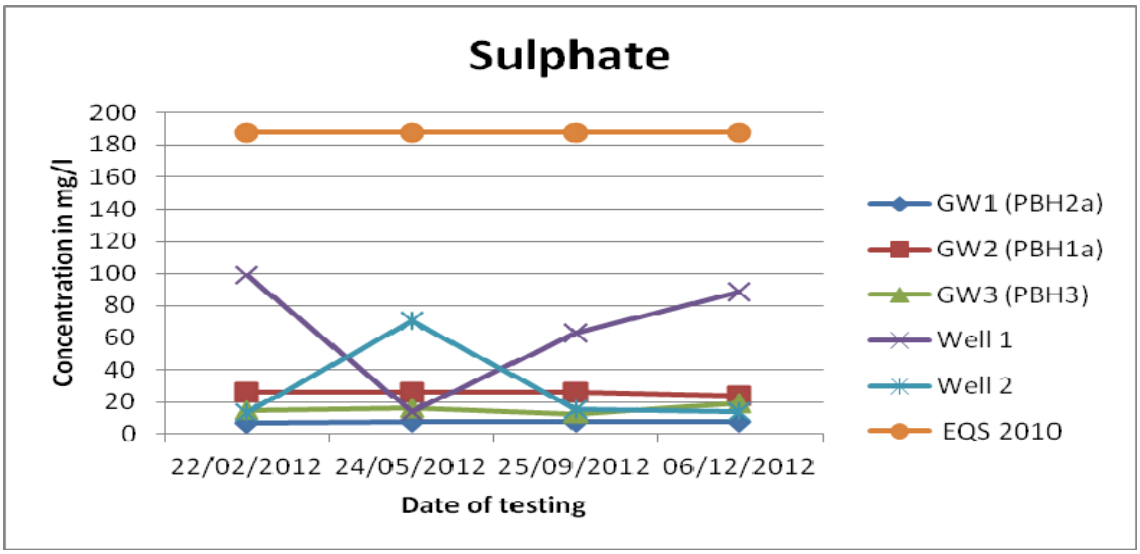
In this round of monitoring ammoniacal nitrogen and benzene exceeded groundwater quality standard; all other tested parameters are within the quality standard limits for groundwater (European Communities Environmental Objectives (Groundwater) Regulations 2010.

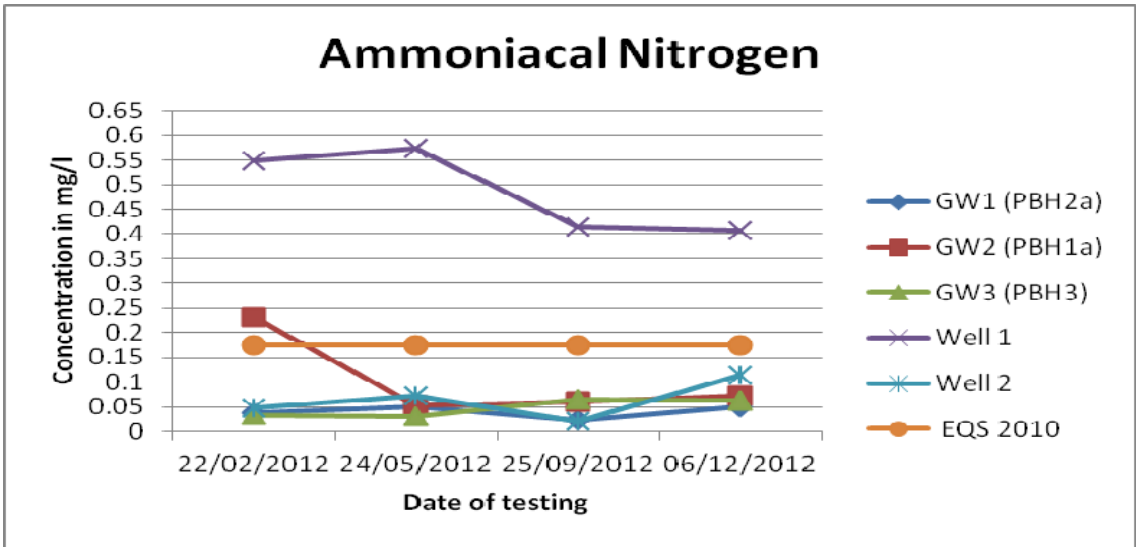
In the view of the marginal benzene exceddance it is recommended that Well 2 is tested for these parameters in next round of sampling.

3.3 Variation and trends in Surface 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.







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.

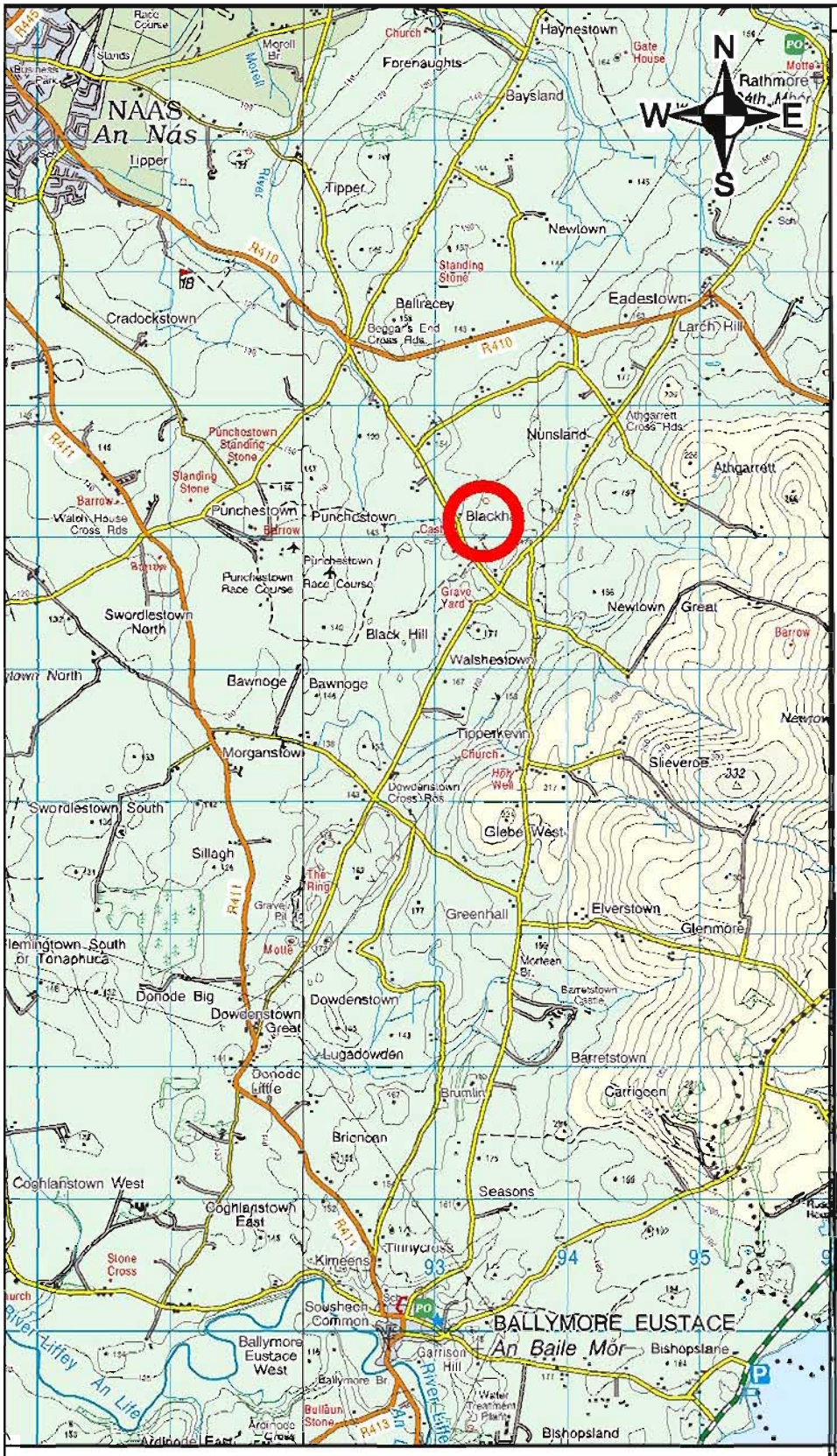
5.0 REFERENCES

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



LEGEND

SITE LOCATION

1. Extract from 1:50,000 O.S. Discovery Series Map No. 56

2. Ordnance Survey Ireland Licence No. SU 00007013(c) Ordnance Survey Ireland & Government of Ireland

0 500 1000 1500 2000m 3000 4000 5000

Metres
1:50,000

SLR CONSULTING IRELAND
7 DUNDRUM BUSINESS PARK
WINDY ARBOUR
DUBLIN 14
T: +353-1-2964667
F: +353-1-2964678
www.slrconsulting.com

JOHN BEHAN LAND RESTORATION

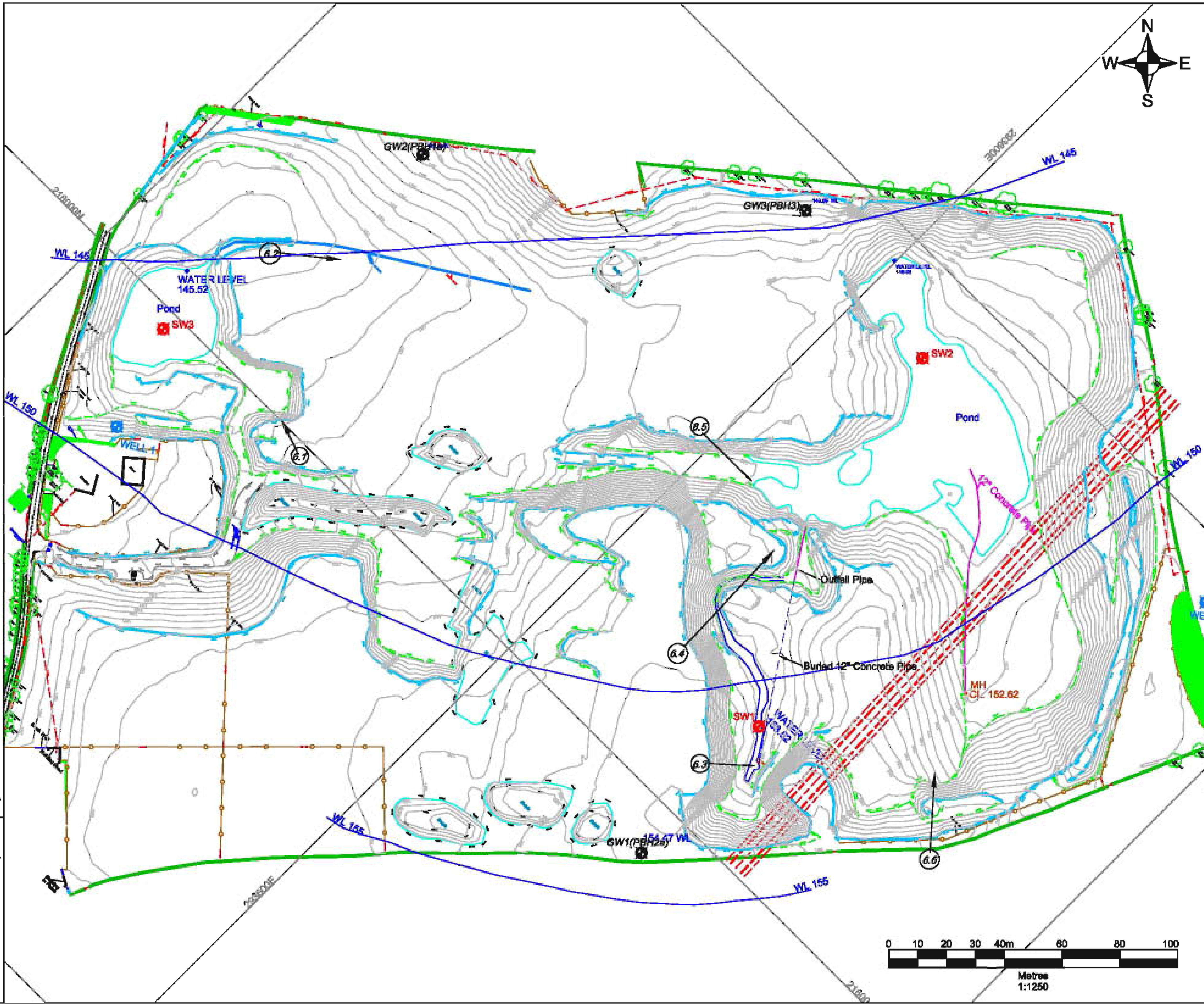
BLACKHALL, PUNCHESTOWN, NAAS, CO. KILDARE

SITE LOCATION PLAN

FIGURE 1

Scale	Date
1:50,000	January 2013

00004.00017.0.7.001.0 Site Location.dwg



LEGEND

1. Survey Provided By Erkina Surveys Ref : 0941-1 Rev.0 Dated 22-08-07

2. Ordnance Survey Ireland Licence No. SU 0000709 (c) Ordnance Survey Ireland & Government of Ireland

- GATE
- DECIDUOUS TREE
- MANHOLE (SEWER)
- FENCE
- 2007 BOREHOLE / MONITORING WELL
- BUILDING
- ESB / EIRCOM POLE & CABLE
- EMBANKMENT
- TREES
- DITCHLINE
- GROUNDWATER MONITORING WELL
- SURFACE WATER MONITORING WELL
- 155 GROUND CONTOURS
- 155 GROUND WATER LEVELS

SLR

SLR CONSULTING IRELAND
7 DUNDRUM BUSINESS PARK
WINDY ARBOUR
DUBLIN 14
T: +353-1-2964667
F: +353-1-2964676
www.slrconsulting.com

JOHN BEHAN LAND RESTORATION

BLACKHALL, PUNCHESTOWN
NAAS, CO. KILDARE

SITE LAYOUT PLAN

FIGURE 2

Scale	Date
1:1,250	January 2013

Appendix A
Surface Water Chemical Test Results

SLR											Date Sheet: By:	09-Jan-13 1 of 6 AB	
Project Name: ***Location:***		Surface Water Monitoring 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					**$T^{O}C$**		**$mScm^{-1}$**	**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	
06-Dec-12	SW2	6632010	Water	06 December 2012	4.3	8.11	0.327	11.93	96.6	14.6	18.4	0.29	
06-Dec-12	SW3	6632011	Water	06 December 2012	2.1	8.13	0.315	11.39	88.29	11.5	87.7	0.0942	

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

SLR											Date	09-Jan-13	
											Sheet:	2 of 6	
											By:	AB	
Project Name:		Surface Water Monitoring									***Surface Water Chemical Test Results***		
Location:		Behans Land Restoration Blackhall, Naas, County Kildare											
Date	**Location**	**Lab ID**	**Sample Type**	**Sample Date**	**Total Suspended Solids**	**Total Dissolved Solids**	**Total Hardness**	**Total Alkalinity**	**Aluminium**	**Antymony**	**Arsenic**	**Barium**	
Unit					**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	
Screening Value*													
Detection Limits					<2	<5	<1	<2	<0.0029	<0.00016	<0.00012	<0.00003	
06-Dec-12	SW2	6632010	Water	06 December 2012	2	365	268	245	0.0029	<0.00016	0.000876	0.0412	
06-Dec-12	SW3	6632011	Water	06 December 2012	3.5	380	264	180	0.00654	<0.00016	0.00182	0.027	

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

Date	09-Jan-13
Sheet:	3 of 6
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	Beryllium	Boron	Cadmium	Chromium	Cobalt	Cooper	Lead	Manganese
Unit					**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**
Screening Value*												
Detection Limits					<0.00007	<0.009	<0.0001	<0.00022	<0.00006	<0.00085	<0.00002	<0.00001
06-Dec-12	SW2	6632010	Water	06 December 2012	<0.00007	0.0155	<0.0001	0.00162	0.00086	<0.00085	<0.00002	0.000089
06-Dec-12	SW3	6632011	Water	06 December 2012	<0.00007	0.0312	<0.0001	0.00333	0.00019	0.00252	0.000237	0.00538

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

SLR											Date		09-Jan-13
											Sheet:		4 of 6
											By:		AB
Project Name:		Surface Water Monitoring									***Surface Water Chemical Test Results***		
Location:		Behans Land Restoration Blackhall, Naas, County Kildare											
Date	**Location**	**Lab ID**	**Sample Type**	**Sample Date**	**Molybdenum**	**Nickel**	**Selenium**	**Strontium**	**Thallium**	**Tin**	**Vanadium**	**Zinc**	
Unit					**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	
Screening Value*													
Detection Limits					<0.00024	<0.00015	<0.00039	<0.00005	<0.00096	<0.00036	<0.00024	<0.00041	
06-Dec-12	SW2	6632010	Water	06 December 2012	0.00431	0.000758	0.00883	0.236	<0.00096	<0.00036	0.000391	0.000497	
06-Dec-12	SW3	6632011	Water	06 December 2012	0.00253	0.00323	0.00055	0.346	<0.00096	<0.00036	0.00156	0.00402	

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

SLR											Date		09-Jan-13
											Sheet:		5 of 6
											By:		AB
Project Name:		Surface Water Monitoring									***Surface Water Chemical Test Results***		
Location:		Behans Land Restoration Blackhall, Naas, County Kildare											
Date	**Location**	**Lab ID**	**Sample Type**	**Sample Date**	**Mercury**	**EPH Range >C10-C40**	**Phosphate**	**Nitrate**	**Calcium**	**Sodium**	**Magnesium**	**Potassium**	
Unit					**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	
Screening Value*							High status ≤ 0.025 (mean) or ≤ 0.045 (95%ile) Good Status ≤ 0.035 (mean) or ≤ 0.075 (95%ile)						
Detection Limits					<0.00001	<0.01	<0.05 as PO4	<0.3	<0.012	<0.076	<0.036	<2.335	
06-Dec-12	SW2	6632010	Water	06 December 2012	<0.00001	<0.01	<0.016 as P	11.7	92.6	9.51	8.78	<2.34	
06-Dec-12	SW3	6632011	Water	06 December 2012	<0.00001	<0.01	<0.016 as P	1.36	94.9	12.1	6.44	6.17	

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

SLR											Date	09-Jan-13	
											Sheet:	6 of 6	
											By:	AB	
Project Name:		Surface Water Monitoring									***Surface Water Chemical Test Results***		
Location:		Behans Land Restoration Blackhall, Naas, County Kildare											
Date	**Location**	**Lab ID**	**Sample Type**	**Sample Date**	**Iron**	**Silver**	**Total PAH (16)**	**SVOC**	**SVOC n-Dibutyl phathalate**	**VOC**	**(VOC) Benzene**		
Unit					**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**		
Screening Value*											0.05		
Detection Limits					<0.019	<0.0015	<0.000247	<0.001	<0.001	<0.001	<0.001		
06-Dec-12	SW2	6632010	Water	06 December 2012	<0.019	<0.0015	<0.000247	<0.001	<0.001	<0.001	0.00208		
06-Dec-12	SW3	6632011	Water	06 December 2012	<0.019	<0.0015	<0.000247	<0.001	0.00111	<0.001	0.00193		

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

Appendix B
Ground Water Chemical Test Results

SLR										Date Sheet: By:	09-Jan-13 1 of 6 AB		
Project Name: ***Location:***		Groundwater Monitoring Behans Land Restoration Blackhall, Naas, County Kildare								***Groundwater 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					**$T^{O}C$**		**$mScm^{-1}$**	**mg/l**	**%**	**mg/l**	**mg/l**	**mg/l**	
Screening Value*							1.875			187.5	187.5	0.175	
Detection Limits										<2	<2	<0.01	
06-Dec-12	GW1	6632004	Water	06 December 2012	10.04	7.34	0.354	6.76	60.8	9.5	7	0.05	
06-Dec-12	GW2	6632005	Water	06 December 2012	9.6	7.7	0.403	4.83	46.6	14.2	23.7	0.0723	
06-Dec-12	GW3	6632006	Water	06 December 2012	6.6	7.66	0.327	8.86	71.9	13.8	19.6	0.0626	
06-Dec-12	Well 1	6632007	Water	06 December 2012	10.5	7.65	0.525	6.95	64.5	11.6	88.3	0.408	
06-Dec-12	Well 2	663200409	Water	06 December 2012	10.86	7.18	0.536	6.67	50.3	21.3	14	0.113	

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

SLR

Date 09-Jan-13
Sheet: 2 of 6
By: AB

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

Groundwater Chemical Test Results

Date	Location	Lab ID	Sample Type	Sample Date	Total Suspended Solids	Total Dissolved Solids	Total Hardness	Total Alkalinity	Aluminium	Antymony	Arsenic	Barium
Unit					**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**
Screening Value*									0.150		0.0075	
Detection Limits					<2	<5	<1	<2	<0.0029	<0.00016	<0.00012	<0.00003
06-Dec-12	GW1	6632004	Water	06 December 2012	19	341	276	245	<0.0029	<0.00016	0.000678	0.0317
06-Dec-12	GW2	6632005	Water	06 December 2012	180	394	293	275	<0.0029	0.00185	0.000962	0.074
06-Dec-12	GW3	6632006	Water	06 December 2012	248	369	278	275	<0.0029	0.00683	0.000947	0.0396
06-Dec-12	Well 1	6632007	Water	06 December 2012	5	377	286	175	0.00473	0.000265	0.00236	0.0252
06-Dec-12	Well 2	663200409	Water	06 December 2012	150	516	399	365	<0.0029	<0.00016	0.00105	0.0554

*SI No. 9 of 2010 European Communities Environmental Objectives (Ground water) Regulations, 20

Date	09-Jan-13
Sheet:	3 of 6
By:	AB

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

Groundwater Chemical Test Results

Date	Location	Lab ID	Sample Type	Sample Date	Beryllium	Boron	Cadmium	Chromium	Cobalt	Cooper	Lead	Manganese
Unit					**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**
Screening Value*						0.750	0.00375	0.0375		1.5	0.01875	
Detection Limits					<0.00007	<0.009	<0.0001	<0.00022	<0.00006	<0.00085	<0.00002	<0.00001
06-Dec-12	GW1	6632004	Water	06 December 2012	<0.00007	0.0146	<0.0001	0.00161	0.00009	<0.00085	<0.00002	0.000121
06-Dec-12	GW2	6632005	Water	06 December 2012	<0.00007	0.0144	<0.0001	0.00187	0.000115	<0.00085	0.000036	0.106
06-Dec-12	GW3	6632006	Water	06 December 2012	<0.00007	0.0175	<0.0001	0.00153	0.000097	<0.00085	0.000059	0.000168
06-Dec-12	Well 1	6632007	Water	06 December 2012	<0.00007	0.0335	<0.0001	0.00179	0.00019	<0.00085	0.000114	0.00474
06-Dec-12	Well 2	663200409	Water	06 December 2012	<0.00007	0.0193	<0.0001	0.00263	0.00010	<0.00085	0.000031	0.0001

*SI No. 9 of 2010 European Communities Environmental Objectives (Ground water) Regulations, 20

SLR

Date 09-Jan-13
Sheet: 4 of 6
By: AB

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

Groundwater Chemical Test Results

Date	Location	Lab ID	Sample Type	Sample Date	Molybdenum	Nickel	Selenium	Strontium	Thallium	Tin	Vanadium	Zinc
Unit					**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**
Screening Value*						0.015						
Detection Limits					<0.00024	<0.00015	<0.00039	<0.00005	<0.00096	<0.00036	<0.00024	<0.00041
06-Dec-12	GW1	6632004	Water	06 December 2012	0.000437	0.000563	0.00716	0.182	<0.00096	<0.00036	0.000408	<0.00041
06-Dec-12	GW2	6632005	Water	06 December 2012	0.00127	0.000825	0.00584	0.224	<0.00096	0.000832	0.000422	0.00445
06-Dec-12	GW3	6632006	Water	06 December 2012	0.00217	0.000797	0.00614	0.228	<0.00096	0.00236	0.000418	<0.00041
06-Dec-12	Well 1	6632007	Water	06 December 2012	0.0024	0.00217	0.00914	0.324	<0.00096	<0.00036	0.00105	0.00142
06-Dec-12	Well 2	663200409	Water	06 December 2012	<0.00024	0.000949	0.0137	0.276	<0.00096	<0.00036	0.000656	<0.00041

*SI No. 9 of 2010 European Communities Environmental Objectives (Ground water) Regulations, 20

SLR										Date	09-Jan-13		
										Sheet:	5 of 6		
										By:	AB		
Project Name:		Groundwater Monitoring								***Groundwater Chemical Test Results***			
Location:		Behans Land Restoration Blackhall, Naas, County Kildare											
Date	**Location**	**Lab ID**	**Sample Type**	**Sample Date**	**Mercury**	**EPH Range >C10-C40**	**Phosphate as PO4**	**Nitrate as NO3**	**Calcium**	**Sodium**	**Magnesium**	**Potassium**
Unit					**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**
Screening Value*					0.00075			37.5		187.5		
Detection Limits					<0.00001	<0.01	<0.05	<0.3	<0.012	<0.076	<0.036	<2.34
06-Dec-12	GW1	6632004	Water	06 December 2012	<0.00001	<0.01	<0.05	7.75	94.9	7.16	9.32	<2.34
06-Dec-12	GW2	6632005	Water	06 December 2012	<0.00001	<0.01	<0.05	10	99.4	10.1	10.70	<2.34
06-Dec-12	GW3	6632006	Water	06 December 2012	<0.00001	<0.01	<0.05	12.9	95.7	9.1	9.45	<2.34
06-Dec-12	Well 1	6632007	Water	06 December 2012	<0.00001	<0.01	<0.05	0.613	103	13.3	6.82	6.76
06-Dec-12	Well 2	663200409	Water	06 December 2012	<0.00001	<0.01	<0.05	22.1	127	10.8	19.9	<2.34

*SI No. 9 of 2010 European Communities Environmental Objectives (Ground water) Regulations, 20

SLR

Date 09-Jan-13
Sheet: 6 of 6
By: AB

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

Groundwater Chemical Test Results

Date	Location	Lab ID	Sample Type	Sample Date	Iron	Silver	Total PAH (16)	SVOC	VOC	VOC Carbon disulphide	VOC Benzene	
Unit					**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	
Screening Value*											0.00075	
Detection Limits					<0.019	<0.0015	<0.000247	<0.001	<0.001	<0.001	<0.001	
06-Dec-12	GW1	6632004	Water	06 December 2012	<0.019	<0.0015	<0.000247	<0.001	<0.001			
06-Dec-12	GW2	6632005	Water	06 December 2012	<0.019	<0.0015	<0.000247	<0.001	<0.001			
06-Dec-12	GW3	6632006	Water	06 December 2012	<0.019	<0.0015	<0.000247	<0.001	<0.001			
06-Dec-12	Well 1	6632007	Water	06 December 2012	<0.019	<0.0015	<0.000247	<0.001	<0.001			
06-Dec-12	Well 2	663200409	Water	06 December 2012	<0.019	<0.0015	<0.000247	<0.001	<0.001	0.00114	0.00133	

*SI No. 9 of 2010 European Communities Environmental Objectives (Ground water) Regulations, 20

Appendix C
Copy of Certified Results

ALcontrol Laboratories

Unit 18A
Rosemount Business Park
Ballycoolin
Dublin 11
Tel : (0035) 3188 29893

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

Attention: Aldona Binchy

CERTIFICATE OF ANALYSIS

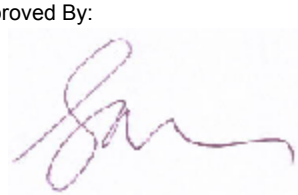
Date:	17 December 2012
Customer:	D_SLRCON_DUB
Sample Delivery Group (SDG):	121208-85
Your Reference:	501.00004.00019
Location:	John Behan
Report No:	205968

We received 7 samples on Friday December 07, 2012 and 7 of these samples were scheduled for analysis which was completed on Monday December 17, 2012. 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

CERTIFICATE OF ANALYSIS

SDG:	121208-85	**Location:**	John Behan	**Order Number:**	1874
Job:	D_SLRCON_DUB-73	**Customer:**	SLR Consulting Ireland	**Report Number:**	205968
Client Reference:	501.00004.00019	**Attention:**	Aldona Binchy	**Superseded Report:**	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
6632004	GW1			06/12/2012
6632005	GW2			06/12/2012
6632006	GW3			06/12/2012
6632010	SW2			06/12/2012
6632011	SW3			06/12/2012
6632007	WELL1			06/12/2012
6632009	WELL2			06/12/2012

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

CERTIFICATE OF ANALYSIS

SDG:	121208-85	**Location:**	John Behan	**Order Number:**	1874
Job:	D_SLRCON_DUB-73	**Customer:**	SLR Consulting Ireland	**Report Number:**	205968
Client Reference:	501.00004.00019	**Attention:**	Aldona Binchy	**Superseded Report:**	

LIQUID

Results Legend

- X — Test
- N — No Determination Possible

Lab Sample No(s)			6632004				6632005				6632006				6632010				6632011				6632007				6632009			
Customer Sample Reference			GW1				GW2				GW3				SW2				SW3				WELL1				WELL2			
AGS Reference																														
Depth (m)																														
Container			1l green glass bottle	1lplastic (ALE221)	H2SO4 (ALE244)	Vial (ALE297)	1l green glass bottle	1lplastic (ALE221)	H2SO4 (ALE244)	Vial (ALE297)	1l green glass bottle	1lplastic (ALE221)	H2SO4 (ALE244)	Vial (ALE297)	1l green glass bottle	1lplastic (ALE221)	H2SO4 (ALE244)	Vial (ALE297)	1l green glass bottle	1lplastic (ALE221)	H2SO4 (ALE244)	Vial (ALE297)	1l green glass bottle	1lplastic (ALE221)	H2SO4 (ALE244)	Vial (ALE297)	1l green glass bottle	1lplastic (ALE221)	H2SO4 (ALE244)	Vial (ALE297)
Alkalinity as CaCO3	All	NDPs: 0 Tests: 7		X				X				X				X				X				X				X		
Ammonium Low	All	NDPs: 0 Tests: 7			X				X				X				X				X				X				X	
Anions by Kone (w)	All	NDPs: 0 Tests: 7		X				X				X				X				X				X				X		
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 7		X				X				X				X				X				X				X		
Dissolved W, Nb and Zr by ICP-MS	All	NDPs: 0 Tests: 7		X				X				X				X				X				X				X		
EPH (DRO) (C10-C40) Aqueous (W)	All	NDPs: 0 Tests: 7	X				X				X				X				X				X				X			
Mercury Dissolved	All	NDPs: 0 Tests: 7	X				X				X				X				X				X				X			
Metals by iCap-OES Dissolved (W)	All	NDPs: 0 Tests: 7		X				X				X				X				X				X				X		
PAH Spec MS - Aqueous (W)	All	NDPs: 0 Tests: 7	X				X				X				X				X				X				X			
Suspended Solids	All	NDPs: 0 Tests: 7		X				X				X				X				X				X				X		
SVOC MS (W) - Aqueous	All	NDPs: 0 Tests: 7	X				X				X				X				X				X				X			
Total Dissolved Solids	All	NDPs: 0 Tests: 7		X				X				X				X				X				X				X		
VOC MS (W)	All	NDPs: 0 Tests: 7				X				X				X				X				X				X				X

CERTIFICATE OF ANALYSIS

SDG:	121208-85	**Location:**	John Behan	**Order Number:**	1874
Job:	D_SLRCON_DUB-73	**Customer:**	SLR Consulting Ireland	**Report Number:**	205968
Client Reference:	501.00004.00019	**Attention:**	Aldona Binchy	**Superseded Report:**	

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
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
(F)	Trigger breach confirmed
1-4&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	GW1	GW2	GW3	SW2	SW3	WELL1
			Depth (m)	.	.	.	.	.	.
			Sample Type	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)
			Date Sampled	06/12/2012	06/12/2012	06/12/2012	06/12/2012	06/12/2012	06/12/2012
			Sample Time	.	.	.	.	.	.
			Date Received	07/12/2012	07/12/2012	07/12/2012	07/12/2012	07/12/2012	07/12/2012
			SDG Ref	121208-85	121208-85	121208-85	121208-85	121208-85	121208-85
			Lab Sample No.(s)	6632004	6632005	6632006	6632010	6632011	6632007
			AGS Reference						
Suspended solids, Total	<2 mg/l	TM022		19 #	180 #	248 #	2 #	3.5 #	5 #
Alkalinity, Total as CaCO3	<2 mg/l	TM043		245 #	275 #	275 #	245 #	180 #	175 #
Ammoniacal Nitrogen as N (low level)	<0.01 mg/l	TM099		0.05 #	0.0723 #	0.0626 #	0.29 #	0.0942 #	0.408 #
Dissolved solids, Total (meter)	<5 mg/l	TM123		341 #	394 #	369 #	365 #	380 #	377 #
Aluminium (diss.filt)	<2.9 µg/l	TM152		<2.9 #	<2.9 #	<2.9 #	<2.9 #	6.54 #	4.73 #
Antimony (diss.filt)	<0.16 µg/l	TM152		<0.16 #	1.85 #	6.83 #	<0.16 #	<0.16 #	0.265 #
Arsenic (diss.filt)	<0.12 µg/l	TM152		0.678 #	0.962 #	0.947 #	0.873 #	1.82 #	2.36 #
Barium (diss.filt)	<0.03 µg/l	TM152		31.7 #	74 #	39.6 #	41.2 #	27 #	25.2 #
Beryllium (diss.filt)	<0.07 µg/l	TM152		<0.07 #	<0.07 #	<0.07 #	<0.07 #	<0.07 #	<0.07 #
Boron (diss.filt)	<9.4 µg/l	TM152		14.6 #	14.4 #	17.5 #	15.5 #	31.2 #	33.5 #
Cadmium (diss.filt)	<0.1 µg/l	TM152		<0.1 #	<0.1 #	<0.1 #	<0.1 #	<0.1 #	<0.1 #
Chromium (diss.filt)	<0.22 µg/l	TM152		1.61 #	1.87 #	1.53 #	1.62 #	3.33 #	1.79 #
Cobalt (diss.filt)	<0.06 µg/l	TM152		0.09 #	0.115 #	0.097 #	0.086 #	0.194 #	0.189 #
Copper (diss.filt)	<0.85 µg/l	TM152		<0.85 #	<0.85 #	<0.85 #	<0.85 #	2.52 #	2.36 #
Lead (diss.filt)	<0.02 µg/l	TM152		<0.02 #	0.036 #	0.059 #	<0.02 #	0.237 #	0.114 #
Manganese (diss.filt)	<0.04 µg/l	TM152		0.121 #	106 #	0.168 #	0.089 #	5.38 #	4.74 #
Molybdenum (diss.filt)	<0.24 µg/l	TM152		0.437 #	1.27 #	2.17 #	0.431 #	2.53 #	2.4 #
Nickel (diss.filt)	<0.15 µg/l	TM152		0.563 #	0.825 #	0.797 #	0.758 #	3.23 #	2.17 #
Selenium (diss.filt)	<0.39 µg/l	TM152		7.16 #	5.84 #	6.14 #	8.83 #	0.55 #	9.14 #
Strontium (diss.filt)	<0.05 µg/l	TM152		182 #	224 #	228 #	236 #	346 #	324 #
Thallium (diss.filt)	<0.96 µg/l	TM152		<0.96	<0.96	<0.96	<0.96	<0.96	<0.96
Tin (diss.filt)	<0.36 µg/l	TM152		<0.36 #	0.832 #	2.36 #	<0.36 #	<0.36 #	<0.36 #
Vanadium (diss.filt)	<0.24 µg/l	TM152		0.408 #	0.422 #	0.418 #	0.391 #	1.56 #	1.05 #
Zinc (diss.filt)	<0.41 µg/l	TM152		<0.41 #	4.45 #	<0.41 #	0.497 #	4.02 #	1.42 #
EPH Range >C10 - C40 (aq)	<46 µg/l	TM172		<46 #	<46 #	<46 #	<46 #	<46 #	<46 #
EPH Band >C10-C12 (aq)	<10 µg/l	TM172		<10	<10	<10	<10	<10	<10
EPH Band >C12-C16 (aq)	<10 µg/l	TM172		<10	<10	<10	<10	<10	<10
EPH Band >C16-C21 (aq)	<10 µg/l	TM172		<10	<10	<10	<10	<10	<10
EPH Band >C21-C28 (aq)	<10 µg/l	TM172		<10	<10	<10	<10	<10	<10
EPH Band >C35-C40 (aq)	<10 µg/l	TM172		<10	<10	<10	<10	<10	<10
EPH Band >C28-C35 (aq)	<10 µg/l	TM172		<10	<10	<10	<10	<10	<10
Mercury (diss.filt)	<0.01 µg/l	TM183		<0.01 #	<0.01 #	<0.01 #	<0.01 #	<0.01 #	<0.01 #

CERTIFICATE OF ANALYSIS

SDG:	121208-85	**Location:**	John Behan	**Order Number:**	1874
Job:	D_SLRCON_DUB-73	**Customer:**	SLR Consulting Ireland	**Report Number:**	205968
Client Reference:	501.00004.00019	**Attention:**	Aldona Binchy	**Superseded Report:**	

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
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
(F)	Trigger breach confirmed
1-4&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	GW1	GW2	GW3	SW2	SW3	WELL1
			Depth (m)	.	.	.	.	.	.
			Sample Type	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)
			Date Sampled	06/12/2012	06/12/2012	06/12/2012	06/12/2012	06/12/2012	06/12/2012
			Sample Time	.	.	.	.	.	.
			Date Received	07/12/2012	07/12/2012	07/12/2012	07/12/2012	07/12/2012	07/12/2012
			SDG Ref	121208-85	121208-85	121208-85	121208-85	121208-85	121208-85
			Lab Sample No.(s)	6632004	6632005	6632006	6632010	6632011	6632007
			AGS Reference						
Sulphate	<2 mg/l	TM184		7 #	23.7 #	19.6 #	18.4 #	87.7 #	88.3 #
Chloride	<2 mg/l	TM184		9.5 #	14.2 #	13.8 #	14.6 #	11.5 #	11.6 #
Phosphate (ortho) as PO4	<0.05 mg/l	TM184		0.053 #	<0.05 #	<0.05 #	<0.05 #	<0.05 #	0.063 #
Nitrate as NO3	<0.3 mg/l	TM184		7.75 #	10 #	12.9 #	11.7 #	1.36 #	0.613 #
Calcium (diss.filt)	<0.012 mg/l	TM228		94.9 #	99.4 #	95.7 #	92.6 #	94.9 #	103 #
Sodium (diss.filt)	<0.076 mg/l	TM228		7.16 #	10.1 #	9.13 #	9.51 #	12.1 #	13.3 #
Magnesium (diss.filt)	<0.036 mg/l	TM228		9.32 #	10.7 #	9.45 #	8.78 #	6.44 #	6.82 #
Potassium (diss.filt)	<2.335 mg/l	TM228		<2.34 #	<2.34 #	<2.34 #	<2.34 #	6.17 #	6.76 #
Iron (diss.filt)	<0.019 mg/l	TM228		<0.019 #	<0.019 #	<0.019 #	<0.019 #	<0.019 #	<0.019 #
Hardness, Total as CaCO3	<1 mg/l	TM228		276 #	293 #	278 #	268 #	264 #	286 #
Silver (diss.filt)	<1.5 µg/l	TM283		<1.5 #	<1.5 #	<1.5 #	<1.5 #	<1.5 #	<1.5 #

CERTIFICATE OF ANALYSIS

SDG:	121208-85	**Location:**	John Behan	**Order Number:**	1874
Job:	D_SLRCON_DUB-73	**Customer:**	SLR Consulting Ireland	**Report Number:**	205968
Client Reference:	501.00004.00019	**Attention:**	Aldona Binchy	**Superseded Report:**	

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
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
(F)	Trigger breach confirmed
1-4&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	
			Depth (m)	.
			Sample Type	Water(GW/SW)
			Date Sampled	06/12/2012
			Sample Time	.
			Date Received	07/12/2012
			SDG Ref	121208-85
			Lab Sample No.(s)	6632009
			AGS Reference	
Suspended solids, Total	<2 mg/l	TM022	150 #	
Alkalinity, Total as CaCO3	<2 mg/l	TM043	365 #	
Ammoniacal Nitrogen as N (low level)	<0.01 mg/l	TM099	0.113 #	
Dissolved solids, Total (meter)	<5 mg/l	TM123	516 #	
Aluminium (diss.filt)	<2.9 µg/l	TM152	<2.9 #	
Antimony (diss.filt)	<0.16 µg/l	TM152	<0.16 #	
Arsenic (diss.filt)	<0.12 µg/l	TM152	1.05 #	
Barium (diss.filt)	<0.03 µg/l	TM152	55.4 #	
Beryllium (diss.filt)	<0.07 µg/l	TM152	<0.07 #	
Boron (diss.filt)	<9.4 µg/l	TM152	19.3 #	
Cadmium (diss.filt)	<0.1 µg/l	TM152	<0.1 #	
Chromium (diss.filt)	<0.22 µg/l	TM152	2.63 #	
Cobalt (diss.filt)	<0.06 µg/l	TM152	0.103 #	
Copper (diss.filt)	<0.85 µg/l	TM152	<0.85 #	
Lead (diss.filt)	<0.02 µg/l	TM152	0.031 #	
Manganese (diss.filt)	<0.04 µg/l	TM152	0.1 #	
Molybdenum (diss.filt)	<0.24 µg/l	TM152	<0.24 #	
Nickel (diss.filt)	<0.15 µg/l	TM152	0.949 #	
Selenium (diss.filt)	<0.39 µg/l	TM152	13.7 #	
Strontium (diss.filt)	<0.05 µg/l	TM152	276 #	
Thallium (diss.filt)	<0.96 µg/l	TM152	<0.96	
Tin (diss.filt)	<0.36 µg/l	TM152	<0.36 #	
Vanadium (diss.filt)	<0.24 µg/l	TM152	0.656 #	
Zinc (diss.filt)	<0.41 µg/l	TM152	<0.41 #	
EPH Range >C10 - C40 (aq)	<46 µg/l	TM172	<46 #	
EPH Band >C10-C12 (aq)	<10 µg/l	TM172	<10	
EPH Band >C12-C16 (aq)	<10 µg/l	TM172	<10	
EPH Band >C16-C21 (aq)	<10 µg/l	TM172	<10	
EPH Band >C21-C28 (aq)	<10 µg/l	TM172	<10	
EPH Band >C35-C40 (aq)	<10 µg/l	TM172	<10	
EPH Band >C28-C35 (aq)	<10 µg/l	TM172	<10	
Mercury (diss.filt)	<0.01 µg/l	TM183	<0.01 #	

CERTIFICATE OF ANALYSIS

SDG:	121208-85	**Location:**	John Behan	**Order Number:**	1874
Job:	D_SLRCON_DUB-73	**Customer:**	SLR Consulting Ireland	**Report Number:**	205968
Client Reference:	501.00004.00019	**Attention:**	Aldona Binchy	**Superseded Report:**	

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
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
(F)	Trigger breach confirmed
1-4&+§@	Sample deviation (see appendix)

Customer Sample R	WELL2							
Depth (m)	.							
Sample Type	Water(GW/SW)							
Date Sampled	06/12/2012							
Sample Time	.							
Date Received	07/12/2012							
SDG Ref	121208-85							
Lab Sample No.(s)	6632009							
AGS Reference								
Component	**LOD/Units**	**Method**						
Sulphate	<2 mg/l	TM184	14 #					
Chloride	<2 mg/l	TM184	21.3 #					
Phosphate (ortho) as PO4	<0.05 mg/l	TM184	<0.05 #					
Nitrate as NO3	<0.3 mg/l	TM184	22.1 #					
Calcium (diss.filt)	<0.012 mg/l	TM228	127 #					
Sodium (diss.filt)	<0.076 mg/l	TM228	10.8 #					
Magnesium (diss.filt)	<0.036 mg/l	TM228	19.9 #					
Potassium (diss.filt)	<2.335 mg/l	TM228	<2.34 #					
Iron (diss.filt)	<0.019 mg/l	TM228	<0.019 #					
Hardness, Total as CaCO3	<1 mg/l	TM228	399 #					
Silver (diss.filt)	<1.5 µg/l	TM283	<1.5 #					

CERTIFICATE OF ANALYSIS

SDG:	121208-85	**Location:**	John Behan	**Order Number:**	1874
Job:	D_SLRCON_DUB-73	**Customer:**	SLR Consulting Ireland	**Report Number:**	205968
Client Reference:	501.00004.00019	**Attention:**	Aldona Binchy	**Superseded Report:**	

PAH Spec MS - Aqueous (W)

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
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
(F)	Trigger breach confirmed
1-4&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	GW1	GW2	GW3	SW2	SW3	WELL1
			Depth (m)	.	.	.	.	.	.
			Sample Type	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)
			Date Sampled	06/12/2012	06/12/2012	06/12/2012	06/12/2012	06/12/2012	06/12/2012
			Sample Time	.	.	.	.	.	.
			Date Received	07/12/2012	07/12/2012	07/12/2012	07/12/2012	07/12/2012	07/12/2012
			SDG Ref	121208-85	121208-85	121208-85	121208-85	121208-85	121208-85
			Lab Sample No.(s)	6632004	6632005	6632006	6632010	6632011	6632007
			AGS Reference						
PAH, Total Detected USEPA 16 (aq)	<0.247 µg/l	TM178		<0.247	<0.247	<0.247	<0.247	<0.247	<0.247

CERTIFICATE OF ANALYSIS

SDG:	121208-85	**Location:**	John Behan	**Order Number:**	1874
Job:	D_SLRCON_DUB-73	**Customer:**	SLR Consulting Ireland	**Report Number:**	205968
Client Reference:	501.00004.00019	**Attention:**	Aldona Binchy	**Superseded Report:**	

PAH Spec MS - Aqueous (W)

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
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
(F)	Trigger breach confirmed
1-4&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	
			WELL2	
		Depth (m)	.	
		Sample Type	Water(GW/SW)	
		Date Sampled	06/12/2012	
		Sample Time	.	
		Date Received	07/12/2012	
		SDG Ref	121208-85	
		Lab Sample No.(s)	6632009	
		AGS Reference		
PAH, Total Detected USEPA 16 (aq)	<0.247 µg/l	TM178	<0.247	

CERTIFICATE OF ANALYSIS

SDG:	121208-85	**Location:**	John Behan	**Order Number:**	1874
Job:	D_SLRCON_DUB-73	**Customer:**	SLR Consulting Ireland	**Report Number:**	205968
Client Reference:	501.00004.00019	**Attention:**	Aldona Binchy	**Superseded Report:**	

SVOC MS (W) - Aqueous

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
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
(F)	Trigger breach confirmed
1-4&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	GW1	GW2	GW3	SW2	SW3	WELL1
			Depth (m)	.	.	.	.	.	.
			Sample Type	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)
			Date Sampled	06/12/2012	06/12/2012	06/12/2012	06/12/2012	06/12/2012	06/12/2012
			Sample Time	.	.	.	.	.	.
			Date Received	07/12/2012	07/12/2012	07/12/2012	07/12/2012	07/12/2012	07/12/2012
			SDG Ref	121208-85	121208-85	121208-85	121208-85	121208-85	121208-85
			Lab Sample No.(s)	6632004	6632005	6632006	6632010	6632011	6632007
			AGS Reference						
1,2,4-Trichlorobenzene (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1
1,4-Dichlorobenzene (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1
2,4,5-Trichlorophenol (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1
2,4,6-Trichlorophenol (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1
2,4-Dichlorophenol (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1
2,4-Dimethylphenol (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1
2,4-Dinitrotoluene (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1
2,6-Dinitrotoluene (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1
2-Chloronaphthalene (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1
2-Chlorophenol (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1
2-Methylnaphthalene (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1
2-Methylphenol (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1
2-Nitroaniline (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1
2-Nitrophenol (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1
3-Nitroaniline (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1
4-Bromophenylphenylether (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1
4-Chloro-3-methylphenol (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1
4-Chloroaniline (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1
4-Chlorophenylphenylether (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1
4-Methylphenol (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1
4-Nitrophenol (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1
4-Nitroaniline (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1
Azobenzene (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1
bis(2-Chloroethyl)ether (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1
bis(2-Chloroethoxy)methane (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1
bis(2-Ethylhexyl) phthalate (aq)	<2 µg/l	TM176		<2	<2	<2	<2	<2	<2
Butylbenzyl phthalate (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1
Carbazole (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1
Dibenzofuran (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1
n-Dibutyl phthalate (aq)	<1 µg/l	TM176		<1	<1	<1	<1	1.11	<1

CERTIFICATE OF ANALYSIS

SDG:	121208-85	**Location:**	John Behan	**Order Number:**	1874
Job:	D_SLRCON_DUB-73	**Customer:**	SLR Consulting Ireland	**Report Number:**	205968
Client Reference:	501.00004.00019	**Attention:**	Aldona Binchy	**Superseded Report:**	

SVOC MS (W) - Aqueous

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
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
(F)	Trigger breach confirmed
1-4&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	GW1	GW2	GW3	SW2	SW3	WELL1
			Depth (m)	.	.	.	.	.	.
			Sample Type	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)
			Date Sampled	06/12/2012	06/12/2012	06/12/2012	06/12/2012	06/12/2012	06/12/2012
			Sample Time	.	.	.	.	.	.
			Date Received	07/12/2012	07/12/2012	07/12/2012	07/12/2012	07/12/2012	07/12/2012
			SDG Ref	121208-85	121208-85	121208-85	121208-85	121208-85	121208-85
			Lab Sample No.(s)	6632004	6632005	6632006	6632010	6632011	6632007
			AGS Reference						
Diethyl phthalate (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1
Dimethyl phthalate (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1
n-Dioctyl phthalate (aq)	<5 µg/l	TM176		<5	<5	<5	<5	<5	<5
Hexachlorobenzene (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1
Hexachlorobutadiene (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1
Pentachlorophenol (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1
Phenol (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1
n-Nitroso-n-dipropylamine (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1
Hexachloroethane (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1
Nitrobenzene (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1
Isophorone (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1
Hexachlorocyclopentadiene (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1
Indeno(1,2,3-cd)pyrene (aq)	<1 µg/l	TM176		<1	<1	<1	<1	<1	<1

CERTIFICATE OF ANALYSIS

SDG:	121208-85	**Location:**	John Behan	**Order Number:**	1874
Job:	D_SLRCON_DUB-73	**Customer:**	SLR Consulting Ireland	**Report Number:**	205968
Client Reference:	501.00004.00019	**Attention:**	Aldona Binchy	**Superseded Report:**	

SVOC MS (W) - Aqueous

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
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
(F)	Trigger breach confirmed
1-4&+§@	Sample deviation (see appendix)

Customer Sample R	WELL2
Depth (m)	.
Sample Type	Water(GW/SW)
Date Sampled	06/12/2012
Sample Time	.
Date Received	07/12/2012
SDG Ref	121208-85
Lab Sample No.(s)	6632009
AGS Reference	

Component	LOD/Units	Method	
1,2,4-Trichlorobenzene (aq)	<1 µg/l	TM176	<1
1,2-Dichlorobenzene (aq)	<1 µg/l	TM176	<1
1,3-Dichlorobenzene (aq)	<1 µg/l	TM176	<1
1,4-Dichlorobenzene (aq)	<1 µg/l	TM176	<1
2,4,5-Trichlorophenol (aq)	<1 µg/l	TM176	<1
2,4,6-Trichlorophenol (aq)	<1 µg/l	TM176	<1
2,4-Dichlorophenol (aq)	<1 µg/l	TM176	<1
2,4-Dimethylphenol (aq)	<1 µg/l	TM176	<1
2,4-Dinitrotoluene (aq)	<1 µg/l	TM176	<1
2,6-Dinitrotoluene (aq)	<1 µg/l	TM176	<1
2-Chloronaphthalene (aq)	<1 µg/l	TM176	<1
2-Chlorophenol (aq)	<1 µg/l	TM176	<1
2-Methylnaphthalene (aq)	<1 µg/l	TM176	<1
2-Methylphenol (aq)	<1 µg/l	TM176	<1
2-Nitroaniline (aq)	<1 µg/l	TM176	<1
2-Nitrophenol (aq)	<1 µg/l	TM176	<1
3-Nitroaniline (aq)	<1 µg/l	TM176	<1
4-Bromophenylphenylether (aq)	<1 µg/l	TM176	<1
4-Chloro-3-methylphenol (aq)	<1 µg/l	TM176	<1
4-Chloroaniline (aq)	<1 µg/l	TM176	<1
4-Chlorophenylphenylether (aq)	<1 µg/l	TM176	<1
4-Methylphenol (aq)	<1 µg/l	TM176	<1
4-Nitrophenol (aq)	<1 µg/l	TM176	<1
4-Nitroaniline (aq)	<1 µg/l	TM176	<1
Azobenzene (aq)	<1 µg/l	TM176	<1
bis(2-Chloroethyl)ether (aq)	<1 µg/l	TM176	<1
bis(2-Chloroethoxy)methane (aq)	<1 µg/l	TM176	<1
bis(2-Ethylhexyl) phthalate (aq)	<2 µg/l	TM176	<2
Butylbenzyl phthalate (aq)	<1 µg/l	TM176	<1
Carbazole (aq)	<1 µg/l	TM176	<1
Dibenzofuran (aq)	<1 µg/l	TM176	<1
n-Dibutyl phthalate (aq)	<1 µg/l	TM176	<1

CERTIFICATE OF ANALYSIS

SDG:	121208-85	**Location:**	John Behan	**Order Number:**	1874
Job:	D_SLRCON_DUB-73	**Customer:**	SLR Consulting Ireland	**Report Number:**	205968
Client Reference:	501.00004.00019	**Attention:**	Aldona Binchy	**Superseded Report:**	

SVOC MS (W) - Aqueous

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
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
(F)	Trigger breach confirmed
1-4&+§@	Sample deviation (see appendix)

Customer Sample R	WELL2
Depth (m)	.
Sample Type	Water(GW/SW)
Date Sampled	06/12/2012
Sample Time	.
Date Received	07/12/2012
SDG Ref	121208-85
Lab Sample No.(s)	6632009
AGS Reference	

Component	LOD/Units	Method	
Diethyl phthalate (aq)	<1 µg/l	TM176	<1
Dimethyl phthalate (aq)	<1 µg/l	TM176	<1
n-Dioctyl phthalate (aq)	<5 µg/l	TM176	<5
Hexachlorobenzene (aq)	<1 µg/l	TM176	<1
Hexachlorobutadiene (aq)	<1 µg/l	TM176	<1
Pentachlorophenol (aq)	<1 µg/l	TM176	<1
Phenol (aq)	<1 µg/l	TM176	<1
n-Nitroso-n-dipropylamine (aq)	<1 µg/l	TM176	<1
Hexachloroethane (aq)	<1 µg/l	TM176	<1
Nitrobenzene (aq)	<1 µg/l	TM176	<1
Isophorone (aq)	<1 µg/l	TM176	<1
Hexachlorocyclopentadiene (aq)	<1 µg/l	TM176	<1
Indeno(1,2,3-cd)pyrene (aq)	<1 µg/l	TM176	<1

CERTIFICATE OF ANALYSIS

SDG:	121208-85	**Location:**	John Behan	**Order Number:**	1874
Job:	D_SLRCON_DUB-73	**Customer:**	SLR Consulting Ireland	**Report Number:**	205968
Client Reference:	501.00004.00019	**Attention:**	Aldona Binchy	**Superseded Report:**	

VOC MS (W)

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
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
(F)	Trigger breach confirmed
1-4&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	GW1	GW2	GW3	SW2	SW3	WELL1
			Depth (m)	.	.	.	.	.	.
			Sample Type	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)
			Date Sampled	06/12/2012	06/12/2012	06/12/2012	06/12/2012	06/12/2012	06/12/2012
			Sample Time	.	.	.	.	.	.
			Date Received	07/12/2012	07/12/2012	07/12/2012	07/12/2012	07/12/2012	07/12/2012
			SDG Ref	121208-85	121208-85	121208-85	121208-85	121208-85	121208-85
			Lab Sample No.(s)	6632004	6632005	6632006	6632010	6632011	6632007
			AGS Reference						
Dibromofluoromethane**	%	TM208		105	119	130	119	117	116
Toluene-d8**	%	TM208		99.3	100	102	101	100	101
4-Bromofluorobenzene**	%	TM208		102	103	103	102	101	102
Dichlorodifluoromethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Chloromethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Vinyl chloride	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Bromomethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Chloroethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Trichlorofluoromethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,1-Dichloroethene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Carbon disulphide	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Dichloromethane	<3 µg/l	TM208		<3 #	<3 #	<3 #	<3 #	<3 #	<3 #
Methyl tertiary butyl ether (MTBE)	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
trans-1,2-Dichloroethene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,1-Dichloroethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
cis-1,2-Dichloroethene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
2,2-Dichloropropane	<1 µg/l	TM208		<1	<1	<1	<1	<1	<1
Bromochloromethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Chloroform	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,1,1-Trichloroethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,1-Dichloropropene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Carbontetrachloride	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,2-Dichloroethane	<1 µg/l	TM208		<1	<1	<1	<1	<1	<1
Benzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	2.08 #	1.93 #	<1 #
Trichloroethene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,2-Dichloropropane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Dibromomethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Bromodichloromethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
cis-1,3-Dichloropropene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Toluene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
trans-1,3-Dichloropropene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,1,2-Trichloroethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #

CERTIFICATE OF ANALYSIS

SDG:	121208-85	**Location:**	John Behan	**Order Number:**	1874
Job:	D_SLRCON_DUB-73	**Customer:**	SLR Consulting Ireland	**Report Number:**	205968
Client Reference:	501.00004.00019	**Attention:**	Aldona Binchy	**Superseded Report:**	

VOC MS (W)

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
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
(F)	Trigger breach confirmed
1-4&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	GW1	GW2	GW3	SW2	SW3	WELL1
			Depth (m)	.	.	.	.	.	.
			Sample Type	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)
			Date Sampled	06/12/2012	06/12/2012	06/12/2012	06/12/2012	06/12/2012	06/12/2012
			Sample Time	.	.	.	.	.	.
			Date Received	07/12/2012	07/12/2012	07/12/2012	07/12/2012	07/12/2012	07/12/2012
			SDG Ref	121208-85	121208-85	121208-85	121208-85	121208-85	121208-85
			Lab Sample No.(s)	6632004	6632005	6632006	6632010	6632011	6632007
			AGS Reference						
1,3-Dichloropropane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Tetrachloroethene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Dibromochloromethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,2-Dibromoethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Chlorobenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,1,1,2-Tetrachloroethane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Ethylbenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
m,p-Xylene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
o-Xylene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Styrene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Bromoform	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Isopropylbenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,1,2,2-Tetrachloroethane	<1 µg/l	TM208		<1	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Bromobenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Propylbenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
2-Chlorotoluene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,3,5-Trimethylbenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
4-Chlorotoluene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
tert-Butylbenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,2,4-Trimethylbenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
sec-Butylbenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
4-iso-Propyltoluene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,3-Dichlorobenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,4-Dichlorobenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
n-Butylbenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,2-Dichlorobenzene	<1 µg/l	TM208		<1	<1	<1	<1	<1	<1
1,2-Dibromo-3-chloropropane	<1 µg/l	TM208		<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Hexachlorobutadiene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
tert-Amyl methyl ether (TAME)	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Naphthalene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #

CERTIFICATE OF ANALYSIS

SDG:	121208-85	**Location:**	John Behan	**Order Number:**	1874
Job:	D_SLRCON_DUB-73	**Customer:**	SLR Consulting Ireland	**Report Number:**	205968
Client Reference:	501.00004.00019	**Attention:**	Aldona Binchy	**Superseded Report:**	

VOC MS (W)

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
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
(F)	Trigger breach confirmed
1-4&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	GW1	GW2	GW3	SW2	SW3	WELL1
			Depth (m)	.	.	.	.	.	.
			Sample Type	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)
			Date Sampled	06/12/2012	06/12/2012	06/12/2012	06/12/2012	06/12/2012	06/12/2012
			Sample Time	.	.	.	.	.	.
			Date Received	07/12/2012	07/12/2012	07/12/2012	07/12/2012	07/12/2012	07/12/2012
			SDG Ref	121208-85	121208-85	121208-85	121208-85	121208-85	121208-85
			Lab Sample No.(s)	6632004	6632005	6632006	6632010	6632011	6632007
			AGS Reference						
1,2,3-Trichlorobenzene	<1 µg/l	TM208		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
1,3,5-Trichlorobenzene	<1 µg/l	TM208		<1	<1	<1	<1	<1	<1

CERTIFICATE OF ANALYSIS

SDG:	121208-85	**Location:**	John Behan	**Order Number:**	1874
Job:	D_SLRCON_DUB-73	**Customer:**	SLR Consulting Ireland	**Report Number:**	205968
Client Reference:	501.00004.00019	**Attention:**	Aldona Binchy	**Superseded Report:**	

VOC MS (W)

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
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
(F)	Trigger breach confirmed
1-4&+§@	Sample deviation (see appendix)

Customer Sample R	WELL2
Depth (m)	.
Sample Type	Water(GW/SW)
Date Sampled	06/12/2012
Sample Time	.
Date Received	07/12/2012
SDG Ref	121208-85
Lab Sample No.(s)	6632009
AGS Reference	

Component	LOD/Units	Method	
Dibromofluoromethane**	%	TM208	119
Toluene-d8**	%	TM208	101
4-Bromofluorobenzene**	%	TM208	101
Dichlorodifluoromethane	<1 µg/l	TM208	<1 #
Chloromethane	<1 µg/l	TM208	<1 #
Vinyl chloride	<1 µg/l	TM208	<1 #
Bromomethane	<1 µg/l	TM208	<1 #
Chloroethane	<1 µg/l	TM208	<1 #
Trichlorofluoromethane	<1 µg/l	TM208	<1 #
1,1-Dichloroethene	<1 µg/l	TM208	<1 #
Carbon disulphide	<1 µg/l	TM208	1.14 #
Dichloromethane	<3 µg/l	TM208	<3 #
Methyl tertiary butyl ether (MTBE)	<1 µg/l	TM208	<1 #
trans-1,2-Dichloroethene	<1 µg/l	TM208	<1 #
1,1-Dichloroethane	<1 µg/l	TM208	<1 #
cis-1,2-Dichloroethene	<1 µg/l	TM208	<1 #
2,2-Dichloropropane	<1 µg/l	TM208	<1
Bromochloromethane	<1 µg/l	TM208	<1 #
Chloroform	<1 µg/l	TM208	<1 #
1,1,1-Trichloroethane	<1 µg/l	TM208	<1 #
1,1-Dichloropropene	<1 µg/l	TM208	<1 #
Carbontetrachloride	<1 µg/l	TM208	<1 #
1,2-Dichloroethane	<1 µg/l	TM208	<1
Benzene	<1 µg/l	TM208	1.33 #
Trichloroethene	<1 µg/l	TM208	<1 #
1,2-Dichloropropane	<1 µg/l	TM208	<1 #
Dibromomethane	<1 µg/l	TM208	<1 #
Bromodichloromethane	<1 µg/l	TM208	<1 #
cis-1,3-Dichloropropene	<1 µg/l	TM208	<1 #
Toluene	<1 µg/l	TM208	<1 #
trans-1,3-Dichloropropene	<1 µg/l	TM208	<1 #
1,1,2-Trichloroethane	<1 µg/l	TM208	<1 #

CERTIFICATE OF ANALYSIS

SDG:	121208-85	**Location:**	John Behan	**Order Number:**	1874
Job:	D_SLRCON_DUB-73	**Customer:**	SLR Consulting Ireland	**Report Number:**	205968
Client Reference:	501.00004.00019	**Attention:**	Aldona Binchy	**Superseded Report:**	

VOC MS (W)

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
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
(F)	Trigger breach confirmed
1-4&+§@	Sample deviation (see appendix)

Customer Sample R			WELL2
Depth (m)			.
Sample Type			Water(GW/SW)
Date Sampled			06/12/2012
Sample Time			.
Date Received			07/12/2012
SDG Ref			121208-85
Lab Sample No.(s)			6632009
AGS Reference			
Component	**LOD/Units**	**Method**	
1,3-Dichloropropane	<1 µg/l	TM208	<1 #
Tetrachloroethene	<1 µg/l	TM208	<1 #
Dibromochloromethane	<1 µg/l	TM208	<1 #
1,2-Dibromoethane	<1 µg/l	TM208	<1 #
Chlorobenzene	<1 µg/l	TM208	<1 #
1,1,1,2-Tetrachloroethane	<1 µg/l	TM208	<1 #
Ethylbenzene	<1 µg/l	TM208	<1 #
m,p-Xylene	<1 µg/l	TM208	<1 #
o-Xylene	<1 µg/l	TM208	<1 #
Styrene	<1 µg/l	TM208	<1 #
Bromoform	<1 µg/l	TM208	<1 #
Isopropylbenzene	<1 µg/l	TM208	<1 #
1,1,2,2-Tetrachloroethane	<1 µg/l	TM208	<1
1,2,3-Trichloropropane	<1 µg/l	TM208	<1 #
Bromobenzene	<1 µg/l	TM208	<1 #
Propylbenzene	<1 µg/l	TM208	<1 #
2-Chlorotoluene	<1 µg/l	TM208	<1 #
1,3,5-Trimethylbenzene	<1 µg/l	TM208	<1 #
4-Chlorotoluene	<1 µg/l	TM208	<1 #
tert-Butylbenzene	<1 µg/l	TM208	<1 #
1,2,4-Trimethylbenzene	<1 µg/l	TM208	<1 #
sec-Butylbenzene	<1 µg/l	TM208	<1 #
4-iso-Propyltoluene	<1 µg/l	TM208	<1 #
1,3-Dichlorobenzene	<1 µg/l	TM208	<1 #
1,4-Dichlorobenzene	<1 µg/l	TM208	<1 #
n-Butylbenzene	<1 µg/l	TM208	<1 #
1,2-Dichlorobenzene	<1 µg/l	TM208	<1
1,2-Dibromo-3-chloropropane	<1 µg/l	TM208	<1
1,2,4-Trichlorobenzene	<1 µg/l	TM208	<1 #
Hexachlorobutadiene	<1 µg/l	TM208	<1 #
tert-Amyl methyl ether (TAME)	<1 µg/l	TM208	<1 #
Naphthalene	<1 µg/l	TM208	<1 #

CERTIFICATE OF ANALYSIS

SDG:	121208-85	**Location:**	John Behan	**Order Number:**	1874
Job:	D_SLRCON_DUB-73	**Customer:**	SLR Consulting Ireland	**Report Number:**	205968
Client Reference:	501.00004.00019	**Attention:**	Aldona Binchy	**Superseded Report:**	

VOC MS (W)

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
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
(F)	Trigger breach confirmed
1-4&+§@	Sample deviation (see appendix)

Customer Sample R			WELL2
Depth (m)			.
Sample Type			Water(GW/SW)
Date Sampled			06/12/2012
Sample Time			.
Date Received			07/12/2012
SDG Ref			121208-85
Lab Sample No.(s)			6632009
AGS Reference			
Component	**LOD/Units**	**Method**	
1,2,3-Trichlorobenzene	<1 µg/l	TM208	<1 #
1,3,5-Trichlorobenzene	<1 µg/l	TM208	<1

CERTIFICATE OF ANALYSIS

SDG:	121208-85	**Location:**	John Behan	**Order Number:**	1874
Job:	D_SLRCON_DUB-73	**Customer:**	SLR Consulting Ireland	**Report Number:**	205968
Client Reference:	501.00004.00019	**Attention:**	Aldona Binchy	**Superseded Report:**	

Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample [1]	Surrogate Corrected
TM022	Method 2540D, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part120 1981;BS EN 872	Determination of total suspended solids in waters		
TM043	Method 2320B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part109 1984	Determination of alkalinity in aqueous samples		
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		
TM123	BS 2690: Part 121:1981	The Determination of Total Dissolved Solids in Water		
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS		
TM172	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	EPH in Waters		
TM176	EPA 8270D Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	Determination of SVOCs in Water by GCMS		
TM178	Modified: US EPA Method 8100	Determination of Polynuclear Aromatic Hydrocarbons (PAH) by GC-MS in Waters		
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		
TM208	Modified: US EPA Method 8260b & 624	Determination of Volatile Organic Compounds by Headspace / GC-MS in Waters		
TM228	US EPA Method 6010B	Determination of Major Cations in Water by iCap 6500 Duo ICP-OES		
TM283		Determination of Dissolved Niobium, Tungsten, and Zirconium in Water Matrices by ICP-MS		

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

CERTIFICATE OF ANALYSIS

SDG:	121208-85	**Location:**	John Behan	**Order Number:**	1874
Job:	D_SLRCON_DUB-73	**Customer:**	SLR Consulting Ireland	**Report Number:**	205968
Client Reference:	501.00004.00019	**Attention:**	Aldona Binchy	**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	6632004	6632005	6632006	6632010	6632011	6632007	6632009
Customer Sample Ref.	GW1	GW2	GW3	SW2	SW3	WELL1	WELL2
AGS Ref.							
Depth							
Type	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID
Alkalinity as CaCO3	11-Dec-2012	11-Dec-2012	11-Dec-2012	11-Dec-2012	13-Dec-2012	11-Dec-2012	11-Dec-2012
Ammonium Low	17-Dec-2012	17-Dec-2012	17-Dec-2012	17-Dec-2012	17-Dec-2012	17-Dec-2012	17-Dec-2012
Anions by Kone (w)	15-Dec-2012	15-Dec-2012	14-Dec-2012	15-Dec-2012	14-Dec-2012	15-Dec-2012	15-Dec-2012
Dissolved Metals by ICP-MS	12-Dec-2012	12-Dec-2012	12-Dec-2012	12-Dec-2012	13-Dec-2012	12-Dec-2012	12-Dec-2012
Dissolved W, Nb and Zr by ICP-MS	14-Dec-2012	14-Dec-2012	14-Dec-2012	14-Dec-2012	14-Dec-2012	14-Dec-2012	14-Dec-2012
EPH (DRO) (C10-C40) Aqueous (W)	17-Dec-2012	17-Dec-2012	17-Dec-2012	17-Dec-2012	17-Dec-2012	17-Dec-2012	17-Dec-2012
Mercury Dissolved	14-Dec-2012	14-Dec-2012	14-Dec-2012	14-Dec-2012	14-Dec-2012	14-Dec-2012	14-Dec-2012
Metals by iCap-OES Dissolved (W)	12-Dec-2012	12-Dec-2012	12-Dec-2012	12-Dec-2012	17-Dec-2012	12-Dec-2012	12-Dec-2012
Nitrite by Kone (w)	12-Dec-2012	12-Dec-2012	12-Dec-2012	12-Dec-2012	13-Dec-2012	12-Dec-2012	12-Dec-2012
PAH Spec MS - Aqueous (W)	17-Dec-2012	17-Dec-2012	17-Dec-2012	17-Dec-2012	17-Dec-2012	17-Dec-2012	17-Dec-2012
Suspended Solids	11-Dec-2012	11-Dec-2012	11-Dec-2012	11-Dec-2012	13-Dec-2012	11-Dec-2012	11-Dec-2012
SVOC MS (W) - Aqueous	17-Dec-2012	17-Dec-2012	17-Dec-2012	17-Dec-2012	17-Dec-2012	17-Dec-2012	17-Dec-2012
Total Dissolved Solids	12-Dec-2012	12-Dec-2012	12-Dec-2012	12-Dec-2012	13-Dec-2012	12-Dec-2012	12-Dec-2012
VOC MS (W)	15-Dec-2012	15-Dec-2012	15-Dec-2012	15-Dec-2012	15-Dec-2012	15-Dec-2012	15-Dec-2012

SDG:	121208-85	**Location:**	John Behan	**Order Number:**	1874
Job:	D_SLRCON_DUB-73	**Customer:**	SLR Consulting Ireland	**Report Number:**	205968
Client Reference:	501.00004.00019	**Attention:**	Aldona Binchy	**Superseded Report:**	

Appendix
General

1. Results are expressed on a dry weight basis (dried at 35ºC) 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 2 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. 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 for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **Surrogate recoveries** -Most of our organic methods include surrogates, the recovery of which is monitored and reported. For EPH, MO, PAH, GRO and VOCs on soils the result is not surrogate corrected, but a percentage recovery is quoted. Acceptable limits for most organic methods are 70 -130 %.

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 Dimethyphenol, 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 all leachate preparations (NRA, DIN, TCLP, BSEN 12457-1, 2, 3) volatile loss may occur, as we do not employ zero headspace extraction.

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.

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**
§	**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

Noise & Dust Monitoring Report
W0247-01

November 2012
SLR Ref: 501.00004.00018. Rev0

SLR Consulting Ireland, 7 Dundrum Business Park, Windy Arbour, Dublin 14, Ireland
T : +353 1 296 4667 F : +353 1 296 4676 www.slrconsulting.com

CONTENTS

TABLES

FIGURES

1.0 INTRODUCTION

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

The development is located on in 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."

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

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: Dust Monitoring Results Summary and Discussion
- Section 7: 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 (2003) Environmental Noise Survey Guidance.

Aldona has over 7 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 31st October 2012.

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:

31st October 2012: Overcast ,Cloud over 95 %, Temp 6^0,
Wind speed 0.0 – 0.5 m/sec, Wind direction: SW.

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. "

4.2 Dust

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

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 4.2.1).

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 (as a rule, one month is 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 will be analysed for insoluble dry residue using gravimetric techniques, results for each sample is expressed in terms of mg/m^2/ day (milligrams per square meter per day).

4.2.1 Equipment

Bergerhoff Deposit Dust Gauge:

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

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

4.2.2 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).

4.2.3 Limits

Schedule B.4 and Schedule C of the Waste Licence (No. W0247-01) sets out the following limits:

'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.

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. 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 Noise Locations, free-field, dB,

Location	Date	Time	Measured Noise Levels – dB(A)		
			$L_{Aeq,T}$	$L_{A10,T}$	$L_{A90,T}$
N1	31/10/12	12:49-13:19	48.4	52.8	35.3
N2	31/10/12	12:04-12:34	51.7	43.3	30.0
N3	31/10/12	11:32-12:02	54.6	46.3	28.7

N1

The noise monitoring location N1 is positioned on the side of the local road at 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 traffic on the local road; natural noises such as the breeze through the trees and birds singing. Site activities barely audible at this location.

N2

The noise monitoring location N2 is positioned on the side of the local lane at the residence to south-east of site entrance. At the time of survey noise levels at this location were influenced by natural noises such as the breeze through the trees and birds singing. Site activities barely audible at this location.

N3

The noise monitoring location N3 is 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, natural noises such as the breeze through the trees and birds singing, dogs barking, site activities audible at this location.

5.2 Tonal Analysis Results

British Standard 7445:1991 – Description and measurement of environmental noise gives guidance on tonality, and suggests that where a single 1/3rd-octave band level is at least 5 dB higher than the level in both of the two adjacent bands, then tonal character may be

present. There were no observed changes in activity at the site during the monitoring periods.

On examination of the 1/3 Octave Band Noise Spectra recorded on 31st October 2012, no tonal components were identified within the measured range (6.3 Hz to 20 kHz) at any of the monitoring locations (See Figure 3, Figure 4 and Figure 5 below). The broader peak at location N2 around 50 Hz and 1.6 kHz ; N3 around 50 Hz and 63 Hz would not be judged as tonal.

ISO 1996-2 'Acoustics – Description and measurement of environmental noise – Part 2: Acquisition of data pertinent to land use' states

'If tonal components are clearly audible and their presence can be detected by a one-third octave analysis, the adjustment may be 5 to 6 dB. If the components are only just detectable by the observer and demonstrated by narrow-band analysis, an adjustment of 2 to 3 dB may be appropriate'.

In this instance, the observer did not detect any tonal or impulsive components and no tonal components were identified by one-third octave analysis. In such circumstances no adjustment of the measured noise levels is warranted.

Figure 3
N1 1/3rdOctave Band Analysis

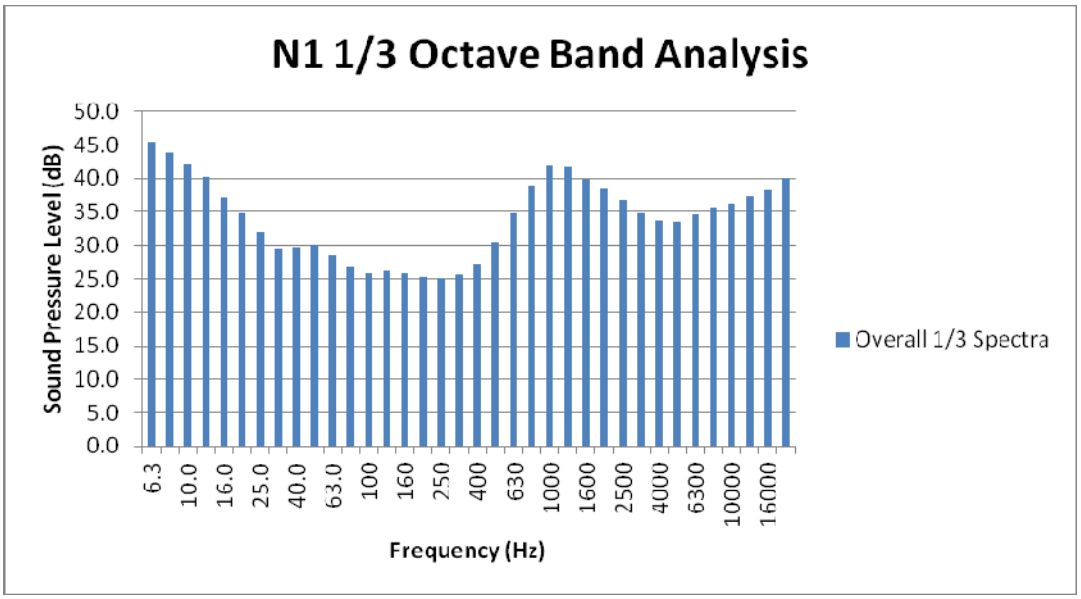


Figure 4
N2 1/3rd Octave Band Analysis

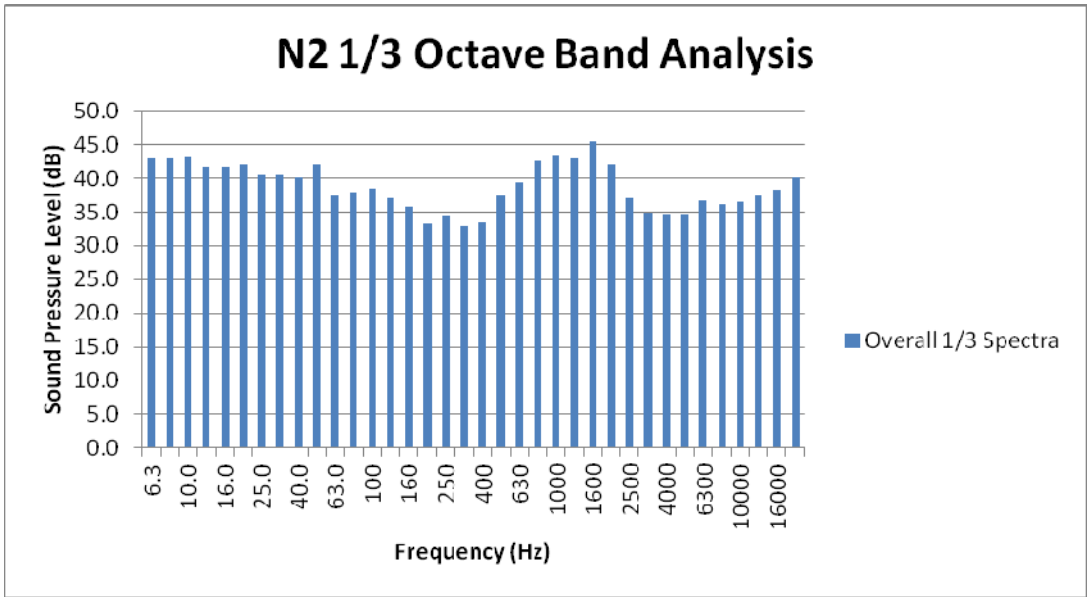
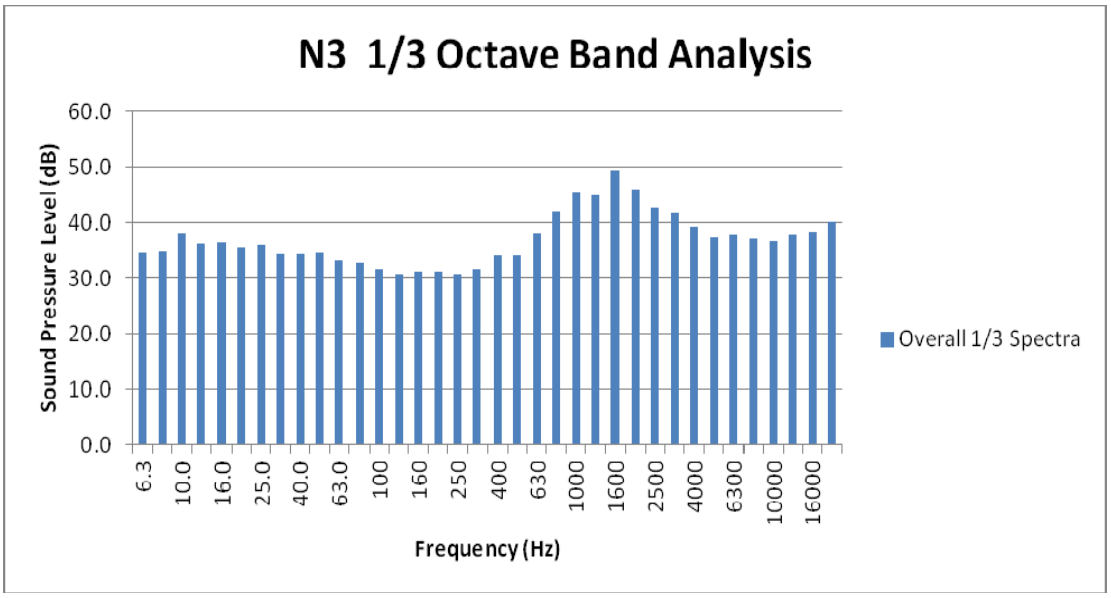


Figure 5
N3 1/3rd Octave Band Analysis



5.3 Assessment

Noise levels at N1, N2 and N3 comply with noise emission limits set out by its Waste Licence.

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 (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).

6.0 DUST MONITORING RESULTS SUMARRY AND DISCUSSION

6.1 Dust Results

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

Table 2
Dust Monitoring Results

Period		Deposition (mg/m²/day)		
From	To	D1	D2	D3
25/9/12	31/10/12	131	1	<1

6.2 Assessment

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

6.3 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 found that the measured dust deposition levels are in compliance with the limits set out by its Waste Licence.

7.0 CLOSURE

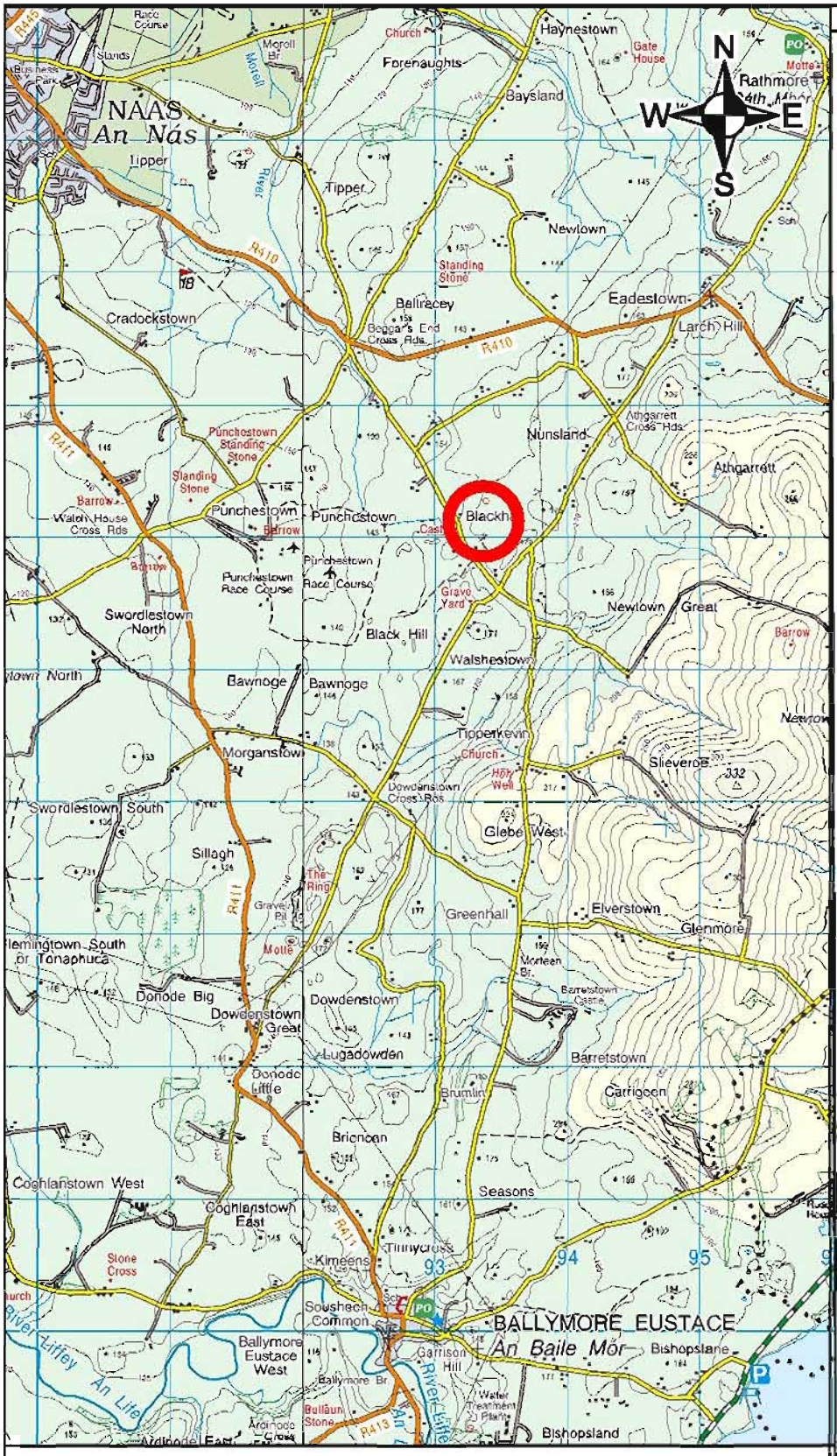
This report has been prepared by SLR Consulting Ireland with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the Client. Information reported herein is based on the interpretation of data collected and has been accepted in good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



LEGEND

SITE LOCATION

1. Extract from 1:50,000 O.S. Discovery Series Map No. 56

2. Ordnance Survey Ireland Licence No. SU 00007011 (c) Ordnance Survey Ireland & Government of Ireland

0 500 1000 1500 2000m 3000 4000 5000

Metres
1:50,000

SLR CONSULTING IRELAND
7 DUNDRUM BUSINESS PARK
WINDY ARBOUR
DUBLIN 14
T: +353-1-2964667
F: +353-1-2964678
www.slrconsulting.com

JOHN BEHAN LAND RESTORATION

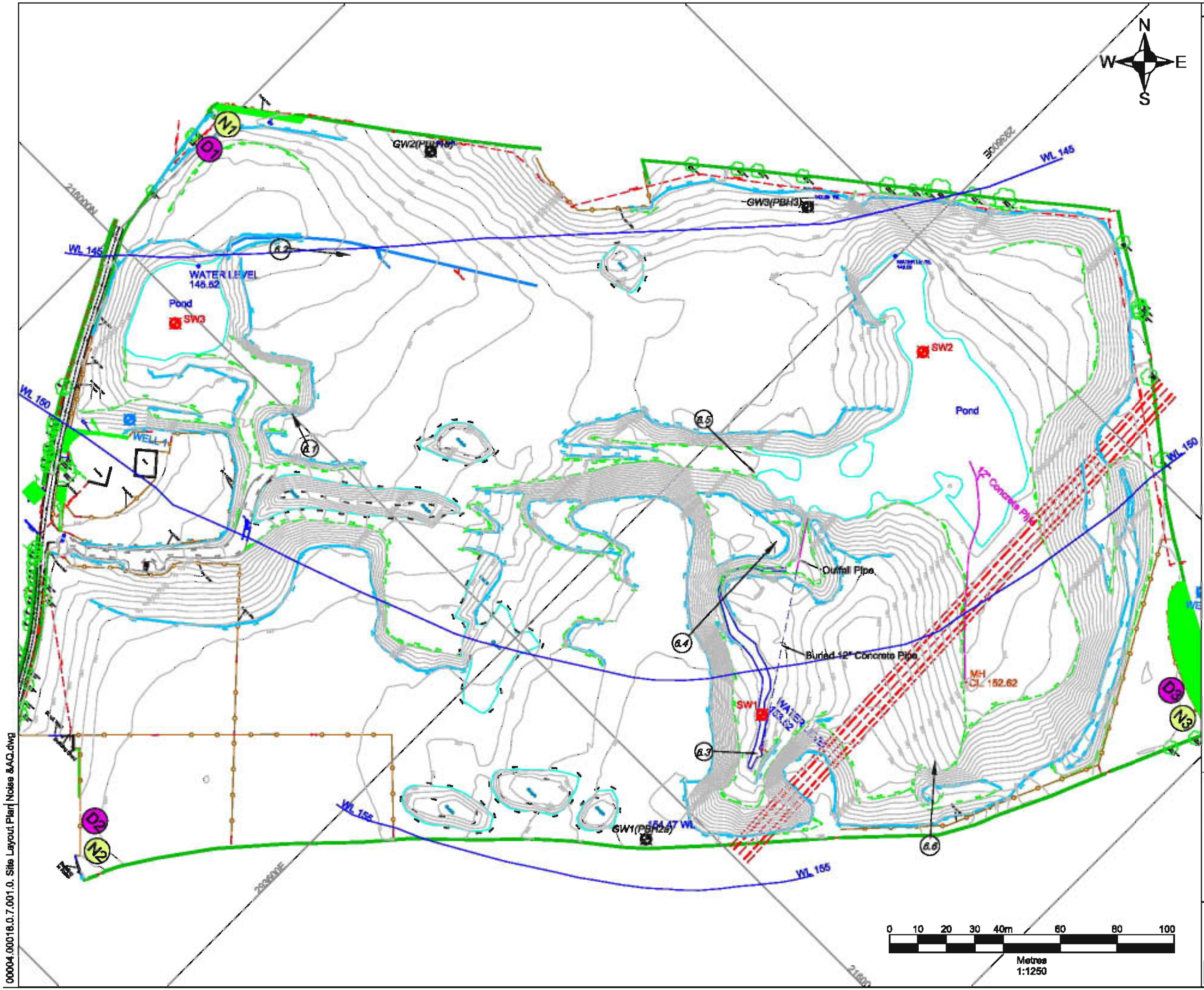
BLACKHALL, PUNCHESTOWN, NAAS, CO. KILDARE

SITE LOCATION PLAN

FIGURE 1

Scale	Date
1:50,000	November 2012

00004.00018.0.7.001.0 Site Location.dwg



LEGEND

1. Survey Provided By Erkina Surveys Ref : 0941-1 Rev.0 Dated 22-08-07

2. Ordnance Survey Ireland Licence No. SU 0000709 (c) Ordnance Survey Ireland & Government of Ireland

- GATE
- DECIDUOUS TREE
- MANHOLE (SEWER)
- FENCE
- 2007 BOREHOLE / MONITORING WELL
- BUILDING
- ESB / EIRCOM POLE & CABLE
- EMBANKMENT
- TREES
- DITCHLINE
- GROUNDWATER MONITORING WELL
- SURFACE WATER MONITORING WELL
- NOISE MONITORING LOCATION
- DUST MONITORING LOCATION

SLR CONSULTING IRELAND
7 DUNDRUM BUSINESS PARK
WINDY ARBOUR
DUBLIN 14
T: +353-1-2964667
F: +353-1-2964678
www.slrconsulting.com

JOHN BEHAN LAND RESTORATION

BLACKHALL, PUNCHESTOWN
NAAS, CO. KILDARE

SITE LAYOUT PLAN

FIGURE 2

Scale	Date
1:1,250	November 2012

00004.00018.0.7.001.0. Site Layout Plan Noise &AQ.dwg