

Roadstone Dublin Ltd.

Inert Waste Recovery Facilities Fassaroe, Bray, Co. Wicklow

Factual Report On Trial Pit Excavations and Soil Chemical Testing

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January 2009



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1 INTRODUCTION

This factual report was prepared for Roadstone Dublin Ltd. by SLR Consulting Ireland (formerly John Barnett and Associates Ltd.) and presents the findings of trial pit excavations undertaken by our staff at Roadstone Dublin's existing landholding at Fassaroe.

1.1 Purpose of Site Investigations

The purpose of site investigations was to determine the shallow geology at the site for the preparation of a waste licence for the recovery of construction and demolition waste material at the three sites. The trial pits allowed the existing shallow subsoil geology to be described and also samples of soil to be taken for chemical analysis in order to characterise the existing soils at the site. Two samples were taken at each site for chemical analysis.

1.2 Site Description

The site at Fassaroe, Co. Wicklow is located approximately 2km to the west of Bray town on the western side of the N11 National Primary Road, see Figure 1. The site is an existing sand and gravel pit which has been partially worked out and now comprises a readymix plant, a paving and stone retail centre and a permitted aggregate recycling facility, see Figure 4 for site layout details. The proposed waste licence recovery facility covers an area of c. 10ha. and is in the north eastern corner of the site, see Figure 8.

2 REGIONAL GEOLOGY

2.1 Quaternary Subsoil Geology

The available Teagasc (2004) subsoil mapping indicates that the site at Fassaroe is located entirely within an area of Carboniferous limestone sand and gravel. Sand and gravel material has been excavated at the existing quarry within the site. Exposures in the quarry indicate that the sand and gravel material extends to approximately 3m thickness in the northern part of the existing quarry and up to 10m in thickness in the eastern part of the quarry.

2.2 Solid Geology

The site at Fassaroe is underlain by Ordovician greywacke and tuff from the Glencullen Formation and Ordovician slate, phyllite and schist from the Maulin formation. No bedrock is exposed in the existing sand and gravel pit quarry and none was exposed in any of the trial pits excavated at the site.

3 GROUND INVESTIGATION - TRIAL PIT SURVEYS

A series of trial pit surveys were undertaken at Fassaroe during the week beginning 10 November 2008. The objective of the trial pit survey was to:

- i. identify the nature of the soils and subsoils at the site;
- ii. identify, as far as possible, the depth to bedrock;
- iii. obtain subsoil samples for chemical analysis to establish baseline subsoil quality; and
- iv. establish the depth to groundwater (where encountered).

A total of five trial pits were conducted at Fassaroe, trial pits FTP1, FTP2, FTP3, FTP6 and FTP7 as indicated on Figure 2. Trial pits FTP4 and FTP5 were attempted in the settlement pond, as also indicated on Figure 2, however it was not possible to excavate them due to the weak and saturated nature of the silt material in the ponds

Trial pits FTP1 and FTP2 were conducted on the floor of the existing aggregate recycling area. Trial pits FTP1 encountered 1.9m of Made Ground comprising recycled aggregate material overlying glacial till material, while trial pit FTP2 encountered 0.3m of Made Ground comprising recycled aggregate material overlying sand.

Trial pit FTP3 was conducted on the floor of the worked out pit and encountered 4.3m of glacial till material.

Trial pits FTP6 and FTP7 were conducted to the east of the worked out quarry area, as shown on Figure 2. Trial pit FTP6 encountered 3.2m of glacial till material, while trial pit FTP7 encountered 2.7m of glacial till material overlying sand material.

Soil samples were taken from all pits and two of these, from trial pits FTP2 and FTP6 were forwarded to a test laboratory for soil quality analysis. Results of these analyses are presented in Section 4 of this report.

Trial pit logs and photographs of trial pit excavations at Fassaroe are provided in Appendix A.

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4 LABORATORY TEST DATA

Soil chemical test results from two samples taken from trial pits FTP2 and FTP6 are shown in Table 1 below:

Parameter	Unit	Detection Limit	Leaching Limit Value (10l/kg)*	FTP2.	FTP6.
				B06456-S016 10/11/2008	B06456-S017 10/11/2008
Total Dissolved Solids (CEN 10:1 Leachate)	mg/kg	<350	4,000	1080	1240
Natural Moisture Content	%	<0.1		10.1	13.7
Fluoride as F (CEN 10:1 Leachate)	mg/kg	<1	10	4	5
Chloride as Cl (CEN 10:1 Leachate)	mg/kg	<10	800	16	34
Sulphate (CEN 10:1 Leachate)	mg/kg	<30	1000	85	55
Antimony as Sb (Low CEN 10:1 Leach)	mg/kg	<0.01	0.06	<0.01	<0.01
Arsenic as As (Low CEN 10:1 Leach)	mg/kg	<0.01	0.5	0.01	<0.01
Barium as Ba (Low CEN 10:1 Leach)	mg/kg	<0.01	20	1.77	1.86
Cadmium as Cd (Low CEN 10:1 Leach)	mg/kg	<0.004	0.04	<0.004	<0.004
Chromium as Cr (Low CEN 10:1 Leach)	mg/kg	<0.01	0.5	0.04	0.01
Copper as Cu (Low CEN 10:1 Leach)	mg/kg	<0.01	2	0.23	0.29
Lead as Pb (Low CEN 10:1 Leach)	mg/kg	<0.01	0.5	<0.01	<0.01
Molybdenum Mo (Low CEN 10:1 Leach)	mg/kg	<0.01	0.5	0.02	0.03
Mercury as Hg (Low CEN 10:1 Leach)	mg/kg	<0.0005	0.01	<0.0005	<0.0005
Nickel as Ni (Low CEN 10:1 Leach)	mg/kg	<0.01	0.4	<0.01	<0.01
Selenium as Se (Low CEN 10:1 Leach)	mg/kg	<0.01	0.1	<0.01	<0.01
Zinc as Zn (Low CEN 10:1 Leach)	mg/kg	<0.01	4	0.02	0.05
Coronene	mg/kg	<0.001		0.034	<0.001
PCB Total of 7 Congeners	mg/kg	<0.001	1	<0.001	<0.001
Total Phenols in CEN 10:1 Leach	mg/kg	<0.1		<0.1	<0.1
Mineral Oil by GC	mg/kg	<1	500	<1	<1
Petrol Range Organics C5-C9	mg/kg	<0.01		<0.01	<0.01
Petrol Range Organics C10+	mg/kg	<0.01		<0.01	<0.01
Benzene	mg/kg	<0.01	6	<0.01	<0.01
Toluene	mg/kg	<0.01	6	<0.01	<0.01
Ethylbenzene	mg/kg	<0.01	6	<0.01	<0.01
Total Xylene	mg/kg	<0.01	6	<0.01	<0.01
Total 17 EPA PAHs	mg/kg	<0.001	2	1.248	<0.001
Total 6 EPA PAHs	mg/kg	<1.6		<1.6	<1.6
Dissolved Organic Carbon (CEN 10:1 Leachate)	mg/kg	<20	500	54	40
Total Organic Carbon	%	<0.2%	30000	0.6	0.5

* Section 2.1.2.1 'Establishing criteria and procedures for the acceptance of waste at Landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC'.

Table 1 Fassaroe Trial Pit Soil Chemical Test Results.

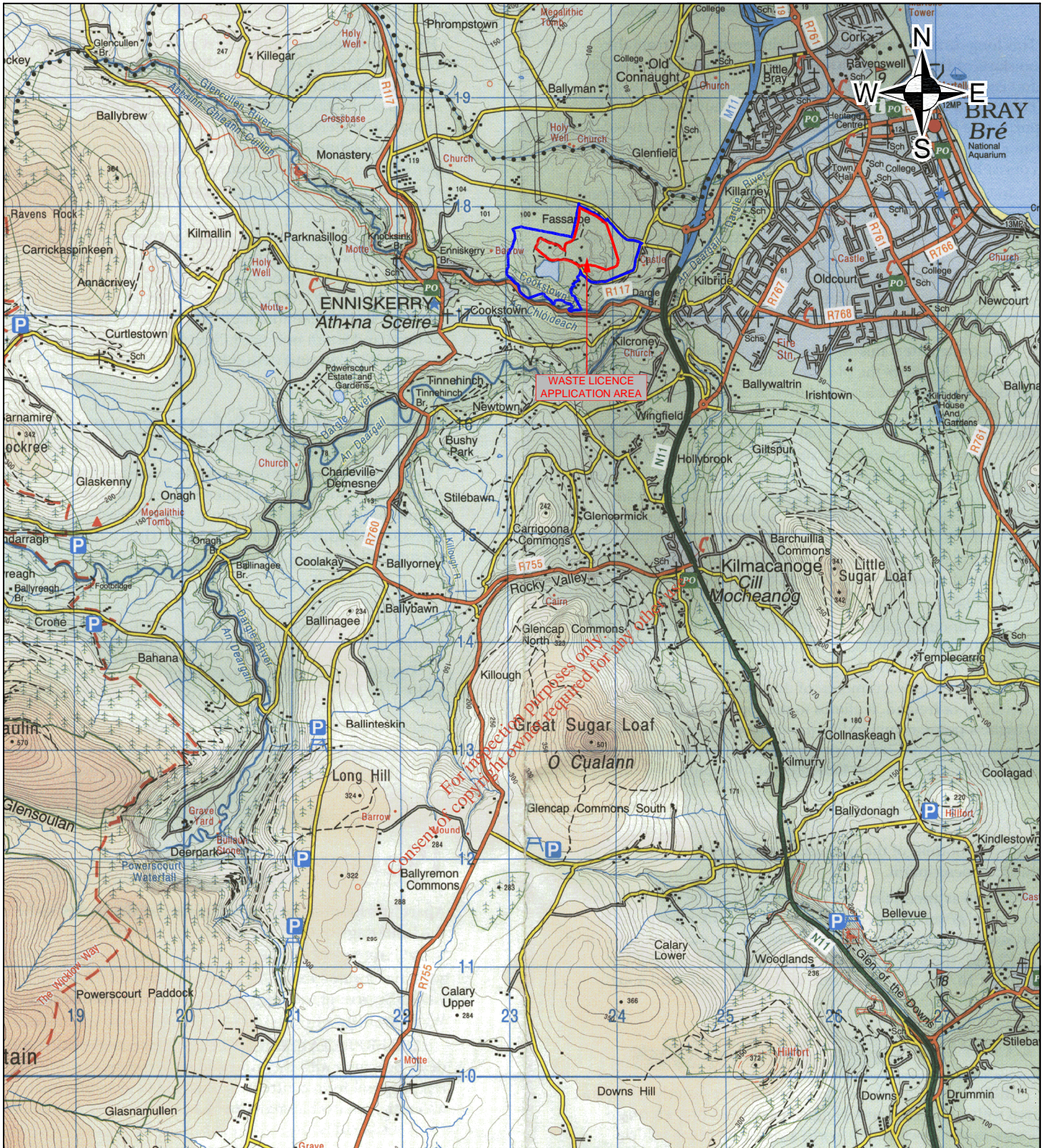
The soil chemical test results from trial pits FTP2 and FTP6 indicate that contaminant levels in the laboratory derived soil leachate are below limits set for waste acceptance at inert landfill facilities set by EU Council Decision 2003/33/EC dated 19th December 2002 establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to the Directive 1999/31/EC'.

There are slightly elevated levels of Total 17 EPA PAH's in the soil sample from trial pit FTP2, located beneath the aggregate recycling area. Test values however are below the upper threshold limit of 2 mg/kg set by the EPA for acceptance of soils at inert landfill facilities.

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FIGURES

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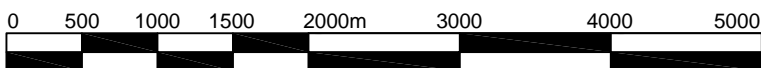


LEGEND

- Applicants Land Interest (c. 65.1 ha)
- Waste Licence Application Area (c. 21.4 ha)

NOTES

1. Extract from Ordnance Survey Discovery Map No. 50
2. Ordnance Survey Ireland Licence No. SU 0000709 (c)
Ordnance Survey Ireland / Government of Ireland



Metres
1:50,000

0050 000719 FIG 1 SITE LOCATION



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7 DUNDRUM BUSINESS PARK
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ROADSTONE DUBLIN LTD.
WASTE LICENCE APPLICATION
FASSAROE WASTE RECOVERY FACILITY
FASSAROE, BRAY, CO. WICKLOW
SITE LOCATION MAP

FIGURE 1

Scale
1:50,000 @ A4

Date
APRIL 2009

NOTES
 1. Based on OSI 6inch sheet no. 21
 2. Ordnance Survey Ireland Licence no. SU 0000709
 (c) Ordnance Survey of Ireland & Government of Ireland

LEGEND

	Applicant's Land Interest (c. 65.1 ha)
	Waste Licence Application Area (c. 21.4 ha)
	Borehole Location
	Trial Pit Locations
	Internal Unpaved Road
	Internal Paved Road
	Building
	Cross Sections

roadstone
 ROADSTONE DUBLIN LTD.
 FORTUNESTOWN
 TALLAGHT
 DUBLIN 24

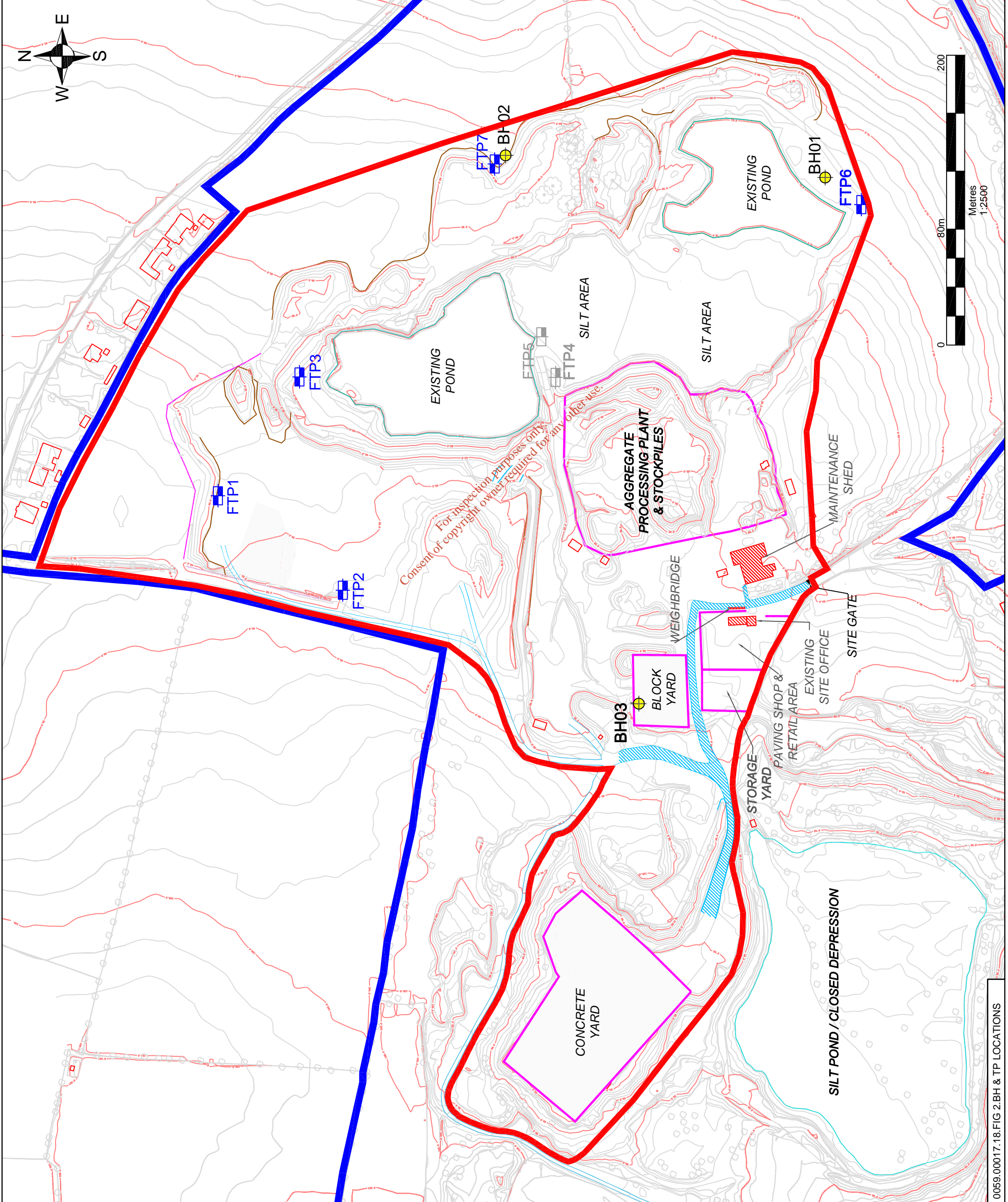
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 SLR CONSULTING IRELAND
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ROADSTONE DUBLIN LTD.
 WASTE LICENCE APPLICATION
 FASSAROE WASTE RECOVERY FACILITY
 FASSAROE, BRAY, CO. WICKLOW

BH AND TP LOCATIONS

FIGURE 2

Scale 1:2,500 @ A3 Date APRIL 2009



0059.00017.18.FIG 2.BH & TP LOCATIONS

APPENDICES

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Appendix A
Fassaroe Trial Pit Logs and Photographs

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Co-ords: 32375E - 21788N
Level: -

Date
10/11/2008

Project Name: RDL Fassaroe/Belgard/Milverton

Dimensions: 4.00

Scale
1:25

Location:



Logged By
PG

Client: Roadstone Dublin Ltd.

SLR Project No. 501-059-021

Samples & In Situ Testing				Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Waterstrike	Results				
1				1			Cobbly GRAVEL crushed recycled aggregate, including peices of paving brick. (MADE GROUND)
2				1.90	2		Gravelly CLAY/SILT (BOULDER CLAY)
3				3	3		
4				4.20	4		
Trialpit Complete at 4.20 m							

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Remarks:

Groundwater: None

Stability: Pit sides stable

Shoring: None

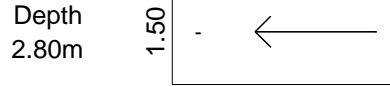
FTP1

Project Name: RDL Fassaroe/Belgard/Milverton

Dimensions: 4.00

Scale
1:25

Location:



Logged By
PG

Client: Roadstone Dublin Ltd.

SLR Project No. 501-059-021

Samples & In Situ Testing				Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Waterstrike	Results				
				0.30			Grey cobbly GRAVEL - recycled crushed aggregates (MADE GROUND)
				0.60			Brown sandy GRAVEL (FLUVIOGLACIAL DEPOSIT)
				2.80			Light brown SAND (FLUVIOGLACIAL DEPOSIT)
<p>Trialpit Complete at 2.80 m</p>							

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Remarks:

Groundwater: None

Stability: Pit sides Stable

Shoring: None

FTP2



SLR Consulting Ireland

Unit 7, Dundrum Business Pk.,
 Windy Arbour, Dublin 14, Ireland.
 Tel: +353 1 2964667 Fax: +353 1 2964676
 www.slrconsulting.com

Trialpit No
FTP3
 Sheet 1 of 1

Co-ords: 323833E - 217827N
 Level: -

Date
 10/11/2008

Project Name: RDL Fassaroe/Belgard/Milverton

Dimensions: 4.00

Scale
 1:25

Location:



Logged By
 PG

Client: Roadstone Dublin Ltd.

SLR Project No. 501-059-021

Samples & In Situ Testing				Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Waterstrike	Results				
1				1			light brown silty sandy gravelly CLAY (BOULDER CLAY)
2				2			
3				3			
4				4			
				4.30			Trialpit Complete at 4.30 m

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Remarks:

Groundwater: None

Stability: Pit sides unstable, some collapsing

Shoring: None

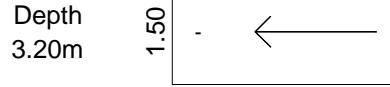
FTP3

Project Name: RDL Fassaroe/Belgard/Milverton

Dimensions: 4.00

Scale
1:25

Location:



Logged By
PG

Client: Roadstone Dublin Ltd.

SLR Project No. 501-059-021

Samples & In Situ Testing				Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Waterstrike	Results				
				0.30			TOPSOIL (TOPSOIL)
							Dark brown slightly sandy gravelly CLAY (BOULDER CLAY)
1				1			
2				2			
3				3			
				3.20			Trialpit Complete at 3.20 m
4				4			

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Remarks:

Groundwater: None


Stability: Pit sides stable

Shoring: None

FTP6

<p>Project Name: Fassaroe Ground Investigation. Location: Fassaroe, Co. Wicklow Date: 10/11/2008</p>	<p>Trial Pit No. FTP1</p>
	
	
<p>Remarks: Refer to Figure 2 for trial pit locations Refer to Appendix A for trial pit logs.</p>	<p>FTP1</p>

<p>Project Name: Fassaroe Ground Investigation. Location: Fassaroe, Co. Wicklow Date: 10/11/2008</p>	<p>Trial Pit No. FTP2</p>
	
	
<p>Remarks: Refer to Figure 2 for trial pit locations Refer to Appendix A for trial pit logs.</p>	<p>FTP2</p>

<p>Project Name: Fassaroe Ground Investigation. Location: Fassaroe, Co. Wicklow Date: 10/11/2008</p>	<p>Trial Pit No. FTP3</p>
	
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<p>Remarks: Refer to Figure 2 for trial pit locations Refer to Appendix A for trial pit logs.</p>	<p>FTP3</p>

<p>Project Name: Fassaroe Ground Investigation. Location: Fassaroe, Co. Wicklow Date: 10/11/2008</p>	<p>Trial Pit No. FTP6</p>
	
	
<p>Remarks: Refer to Figure 2 for trial pit locations Refer to Appendix A for trial pit logs.</p>	<p>FTP6</p>

<p>Project Name: Fassaroe Ground Investigation. Location: Fassaroe, Co. Wicklow Date: 10/11/2008</p>	<p>Trial Pit No. FTP7</p>
	
	
<p>Remarks: Refer to Figure 2 for trial pit locations Refer to Appendix A for trial pit logs.</p>	<p>FTP7</p>

Appendix B

**ALcontrol Soil Chemical Test Results
Fassaroe ALcontrol B06456/01**

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CERTIFICATE OF ANALYSIS

Client: SLR Consulting Ltd.
Treenwood House
Rowden Lane
Bradford On Avon
Wiltshire
BA15 2AU

Attention: Ann McCormack

Date: 24 November, 2008

Our Reference: 08-B06456/01

Your Reference: 501-059-021

Location: RDL-Fassaroe

A total of 2 samples was received for analysis on Monday, 10 November 2008. Accredited laboratory tests are defined in the log sheet, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation. We are pleased to enclose our final report, it was a pleasure to be of service to you, and we look forward to our continuing association.

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

Signed

Dylan Halpin

Lorraine McNamara

Dylan Halpin
Team Leader Project Co-ordination

Lorraine McNamara
General Manager

Compiled By

Mark Butler



ALcontrol Laboratories Ireland

Test Schedule

Ref Number: 08-B06456/01

Sample Type: SOIL

Client: SLR Consulting Ltd.

Location: RDL-Fassaroe

Date of Receipt: 10/11/2008

Client Contact: Ann McCormack

Client Ref: 501-059-021

UKAS Accredited [Testing Laboratory] No. 1291	Detection Method													
	CV AA	ELTRA	GC	GC	GC	GC	GC	GC	GC	GC	GC	GCMS	GCMS	GCMS
ALcontrol Reference														
	Dissolved Mercury Low CEN 10:1 Leachate			✓										
	Total Organic Carbon	X			✓									
	Benzene			✓										
	Ethylbenzene			✓										
	Petrol Range Organics C5-C9			✓										
	Petrol Range Organics C10-12			✓										
	Toluene			✓										
	Total Xylene			✓										
	Mineral Oil by GC													
	PCB Congener 101													
	PCB Congener 118													
	PCB Congener 138													
	PCB Congener 153													
	PCB Congener 180													
08-B06456-S0016-A01	FTP2	10/11/2008	Plastic tub											
08-B06456-S0016-A12	FTP2	10/11/2008	Non-Alcetra Glass Jar											
08-B06456-S0016-A18	FTP2	10/11/2008	Volatile Vial											
08-B06456-S0017-A01	FTP6	10/11/2008	Plastic tub											
08-B06456-S0017-A13	FTP6	10/11/2008	Non-Alcetra Glass Jar											
08-B06456-S0017-A18	FTP6	10/11/2008	Volatile Vial											

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Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

ALcontrol Laboratories Ireland

Test Schedule Summary

Ref Number: **08-B06456/01**
 Client: SLR Consulting Ltd.
 Date of Receipt: 10/11/2008

Sample Type: **SOIL**
 Location: RDL-Fassaroe
 Client Contact: Ann McCormack
 Client Ref: 501-059-021

* SUBCONTRACTED TO OTHER LABORATORY / ** SAMPLES ANALYSED AT THE CHESTER LABORATORY

SCHEDULE	METHOD	TEST NAME	TOTAL
X	CEN 10:1 Leach	CEN 10:1 Leachate Test	2
X	CV AA	Dissolved Mercury Low Level in CEN 10:1 Leachate	2
X	ELTRA	Total Organic Carbon	2
X	GC	BTEX by GC FID	2
X	GC	PRO & BTEX	2
X	GC FID/CALC	Mineral Oil by GC	2
X	GCMS	Coronene	2
X	GCMS	PAH EPA (16)	2
X	GCMS	PAH Total (17) GCMS (Solid)	2
X	GCMS	PAH Total (6) GCMS <1.6mg/kg (Solid)	2
X	GCMS	PCB 7 Congeners	2
X	GRAVIMETRIC	Natural Moisture Content	2
X	GRAVIMETRIC	Total Dissolved Solids Gravimetric CEN 10:1	2
X	HPLC	Total Phenols by HPLC in CEN 10:1 Leachate	2
X	ICP MS	Dissolved Antimony Low CEN 10:1 Leach	2
X	ICP MS	Dissolved Arsenic Low CEN 10:1 Leach	2
X	ICP MS	Dissolved Barium Low CEN 10:1 Leach	2
X	ICP MS	Dissolved Cadmium Low CEN 10:1 Leach	2
X	ICP MS	Dissolved Chromium Low CEN 10:1 Leach	2
X	ICP MS	Dissolved Copper Low CEN 10:1 Leach	2
X	ICP MS	Dissolved Lead Low CEN 10:1 Leach	2
X	ICP MS	Dissolved Molybdenum Low CEN 10:1 Leach	2
X	ICP MS	Dissolved Nickel Low CEN 10:1 Leach	2
X	ICP MS	Dissolved Selenium Low CEN 10:1 Leach	2
X	ICP MS	Dissolved Zinc Low CEN 10:1 Leach	2
X	IR	Dissolved Organic Carbon in CEN 10:1 Leachate	2
X	KONE	Chloride in CEN 10:1 Leachate	2
X	KONE	Fluoride in CEN 10:1 Leachate	2
X	KONE	Sulphate in CEN 10:1 Leachate	2

APPENDIX

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APPENDIX

1. Results are expressed as mg/kg dry weight (dried at 30°C) on all soil analyses except for the following: NRA Leach tests, flash point, and ammoniacal N₂ by the BRE method, VOC, PRO, Cyanide, Acid Soluble Sulphide, TPH by IR, OFGs and SEM.
2. Samples will be run in duplicate upon request, but an additional charge may be incurred.
3. A sub sample of all samples received will be retained free of charge for one month for soils and one month for waters (sample size permitting), but may then be discarded 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.
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 Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.
6. When requested, an asbestos screen is done in-house on soils and if no fibres are found will be reported as NFD – no fibres detected. If fibres are detected, then identification and quantification is carried out by ALcontrol Technichem or Alcontrol Shutlers in the UK. If a sample is suspected of containing asbestos, then drying and crushing will be suspended on that sample until the asbestos results are known. If asbestos is present, then no analysis requiring dry sample are undertaken.
7. If no separate volatile sample is supplied by the client, the integrity of the data may be compromised if the laboratory is required to create a sub-sample from the bulk sample – similarly, if a headspace is present in the volatile sample.
8. NDP – No Determination Possible due to insufficient/unsuitable sample.
9. Metals in water are performed on a filtered sample, and therefore represent dissolved metals – total metals must be requested separately.
10. A table containing the date of analysis for each parameter is not routinely included with the report, but is available upon request.

Last updated February 2005