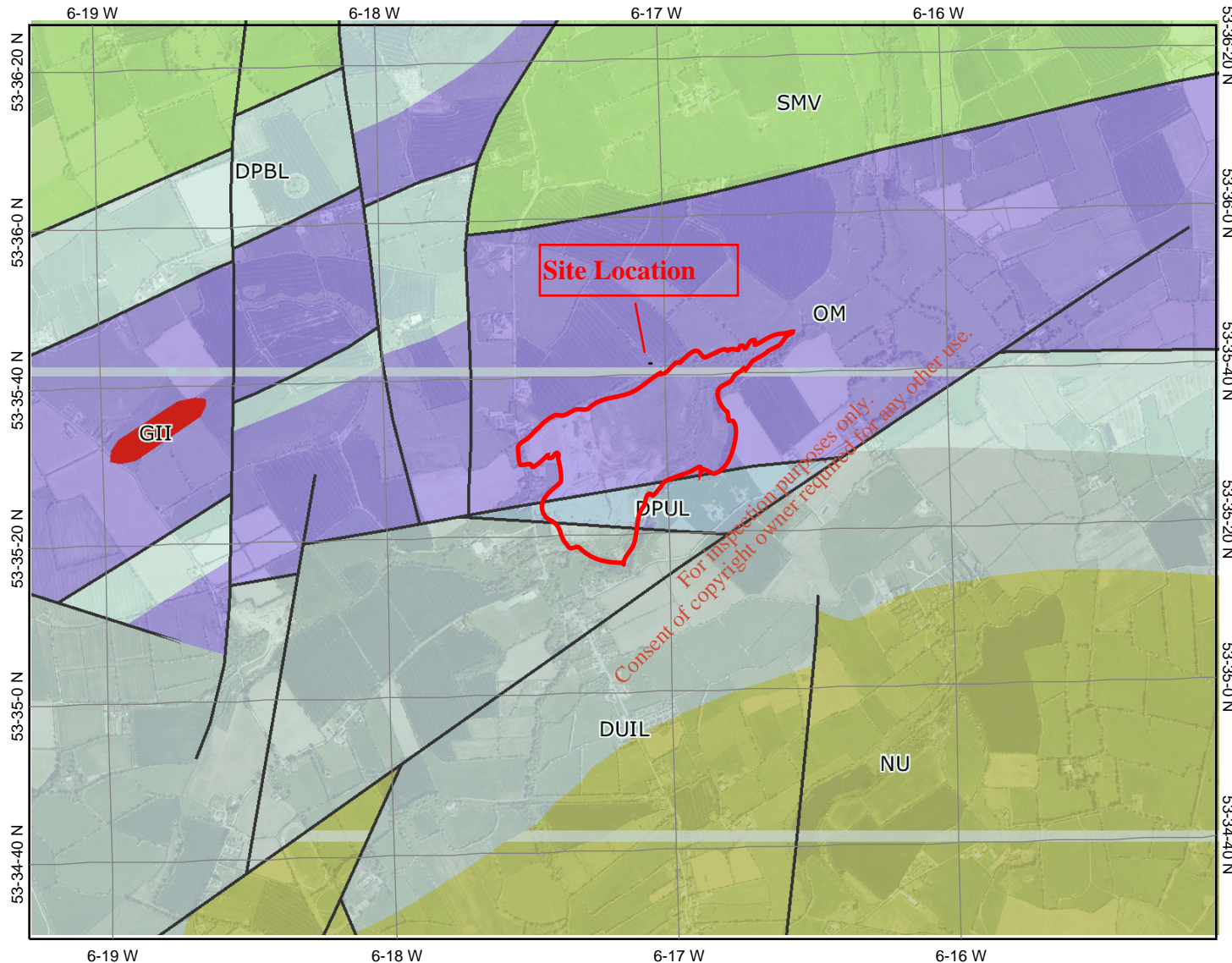
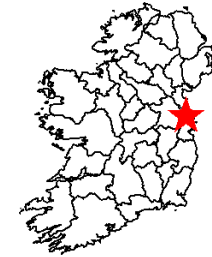


## APPENDIX B

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# Clashford Recovery Facility - Bedrock Type Map -Figure 1



Site Location

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## Legend

- Bedrock Faults 100k
- National Draft Generalised Bedrock Map**
- BV - Basalts and other Volcanic rocks
- CM - Cambrian Metasediments
- DDL - Dinantian Dolomitised Limestones
- DESSL - Dinantian early Sandstones, Shales and Limestones
- DKS - Devonian Kiltorcan type Sandstones
- DLIL - Dinantian Lower Impure Limestones
- DMSC - Dinantian Mudstones and Sandstones Cork Group
- MSSL - Dinantian Mixed Sandstones, Shales and Limestones
- DORS - Devonian Old Red Sandstones
- DPBL - Dinantian Pure Bedded Limestones
- DPUL - Dinantian Pure Unbedded Limestones
- DS - Dinantian Sandstones
- DSL - Dinantian Shales and Limestones
- DUIL - Dinantian Upper Impure Limestones
- GII - Granites and other Igneous Intrusive rocks
- NSA - Namurian Sandstones
- NSH - Namurian Shales
- NU - Namurian Undifferentiated
- OM - Ordovician Metasediments
- OV - Ordovician Volcanics
- PM - Precambrian Marbles
- PQGS - Precambrian Quartzites, Gneisses and Schists
- PTMG - Permo Triassic Mudstones and Gypsum
- PTS - Permo Triassic Sandstones



Map center: 313481, 261462

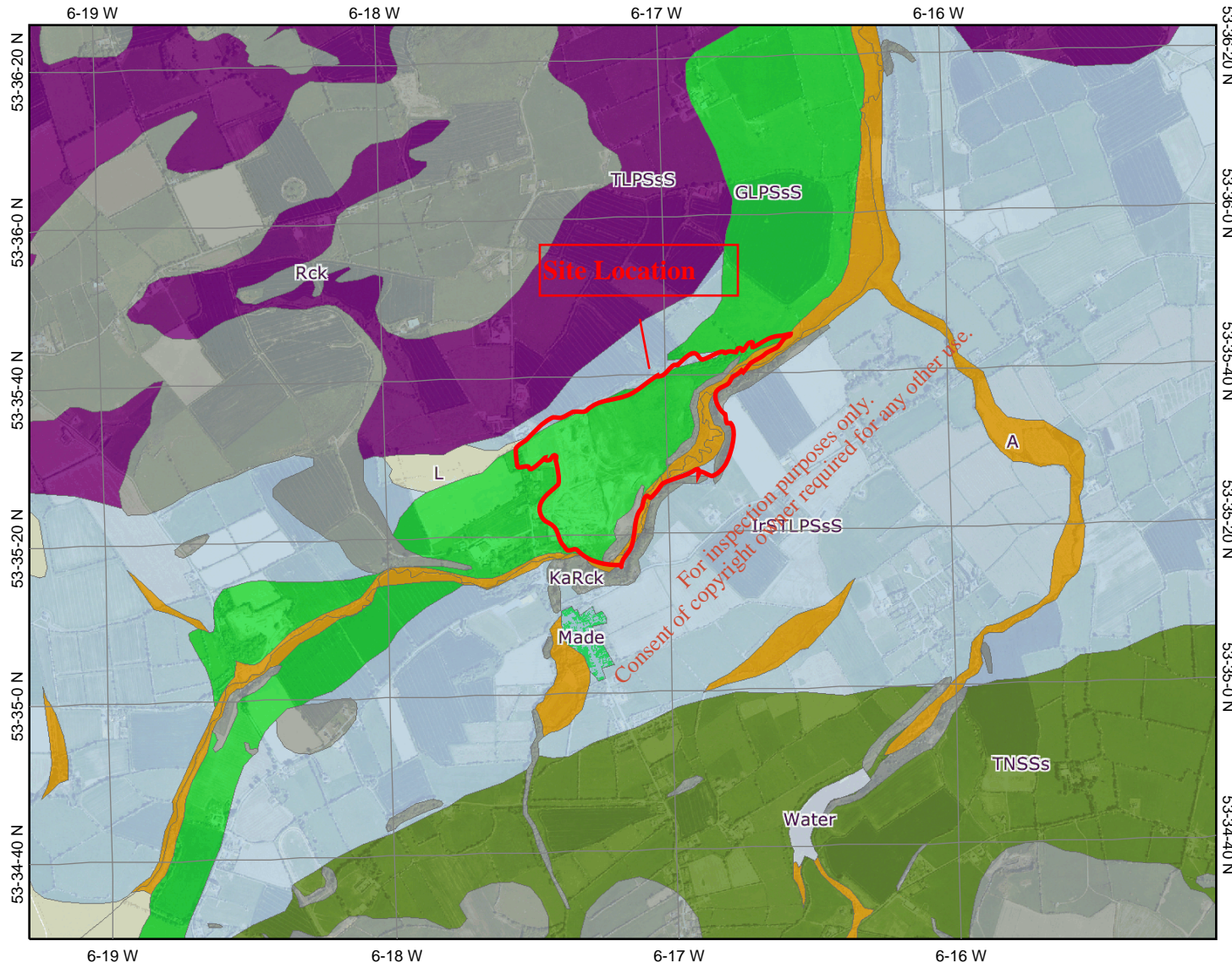
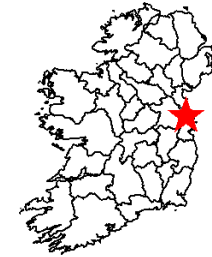
Scale: 1:25,000

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Snapshot Date: 19-Dec-2008



# Clashford Recovery Facility - Subsoils Map - Figure 2



Map center: 313481, 261462

- ### Legend
- #### Eastern RBD Subsoils
- Alluvium
  - Beach sands and gravels
  - Bedrock outcrop and subcrop
  - Esker sands and gravels
  - Glaciofluvial sands and gravels
  - Irish Sea till
  - Lake sediments
  - Made ground
  - Marine/estuarine silts and clays
  - Marsh
  - Peat
  - Scree
  - Till derived chiefly from Cambrian sandstones and shales
  - Till derived chiefly from Devonian sandstones
  - Till derived chiefly from Lower Palaeozoic rocks
  - Till derived chiefly from Namurian rocks
  - Till derived chiefly from basic igneous rocks
  - Till derived chiefly from cherts
  - Till derived chiefly from granite
  - Till derived chiefly from limestone
  - Till derived chiefly from metamorphic rocks
  - Water
  - Windblown sands

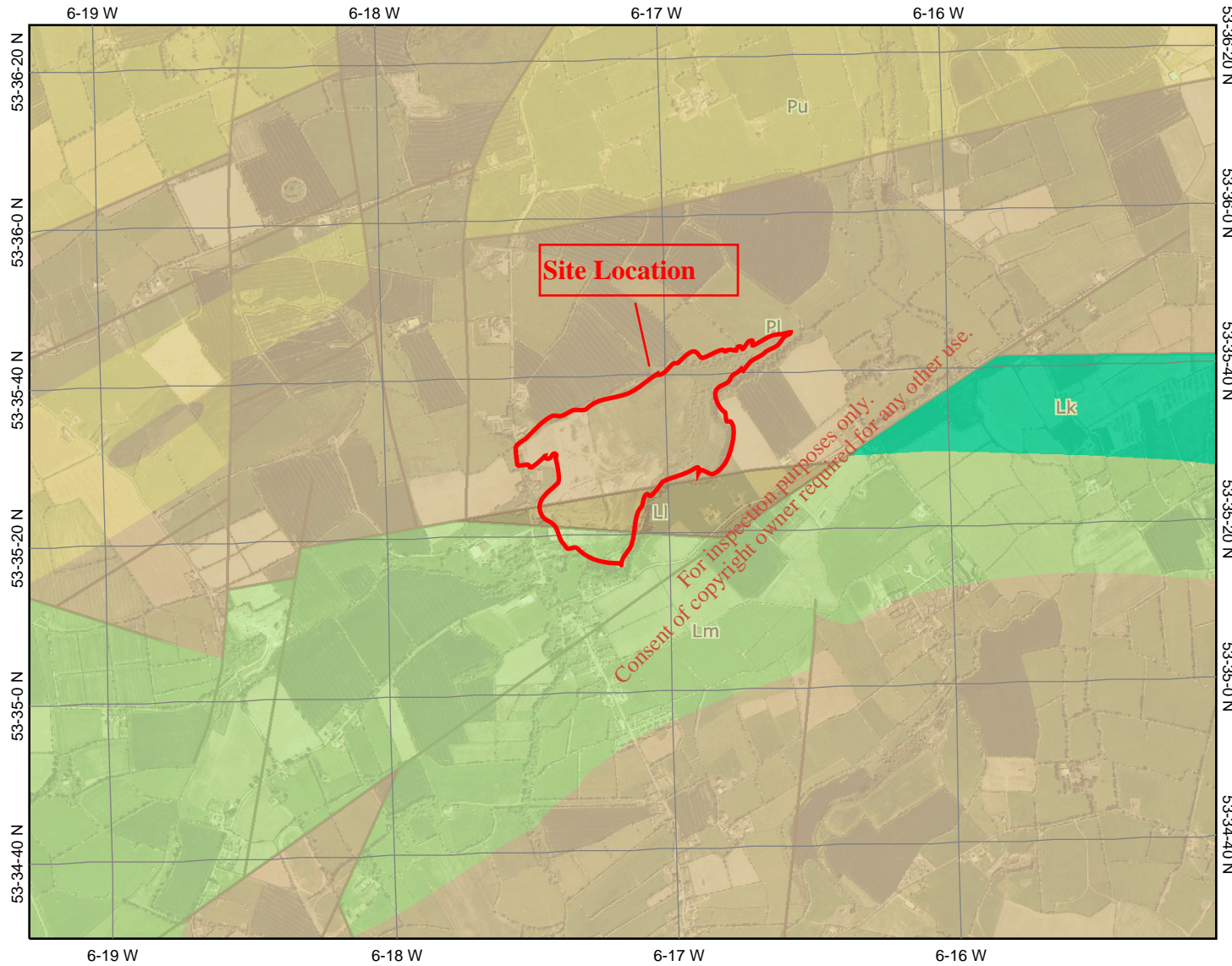
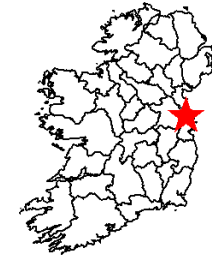
Scale: 1:25,000

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Snapshot Date: 19-Dec-2008



# Clashford Recovery Facility - Aquifer Type Map - Figure 3



### Legend

#### National Draft Bedrock Aquifer Map

- Rf - Regionally Important Aquifer - Fissured bedrock
- Rk - Regionally Important Aquifer - Karstified
- Rkd - Regionally Important Aquifer - Karstified (diffuse)
- Rkc - Regionally Important Aquifer - Karstified (conduit)
- Lm - Locally Important Aquifer - Bedrock which is Generally Moderately Productive
- Lk - Locally Important Aquifer - Karstified
- LI - Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones
- PI - Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones
- Pu - Poor Aquifer - Bedrock which is Generally Unproductive
- Unclassified

#### National Draft Gravel Aquifer Map

- Rg - Regionally important, extensive sand/gravels aquifers
- Lg - Locally important, sand/gravel aquifers
- No gravels present
- Not Mapped

Bedrock Faults 100k

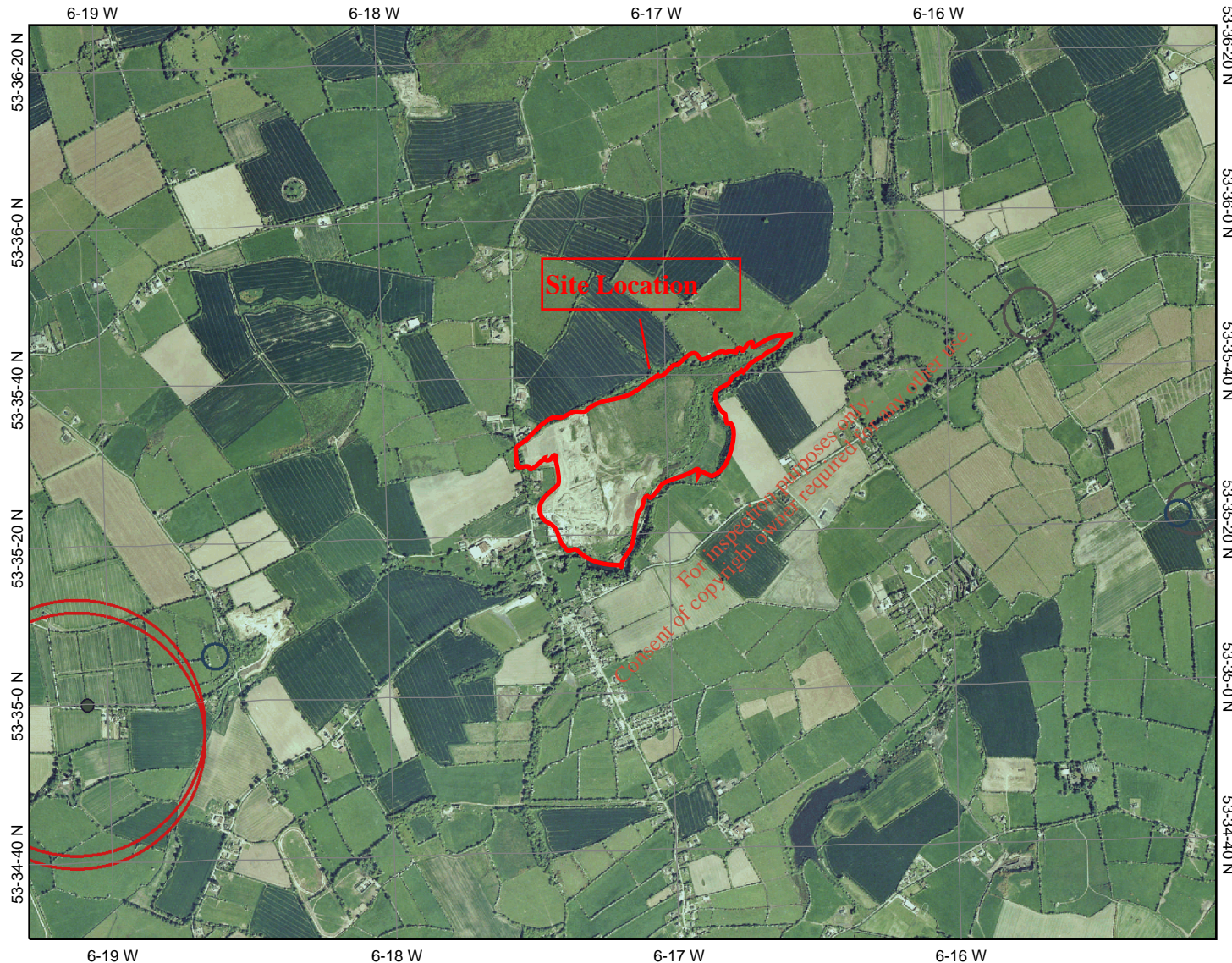
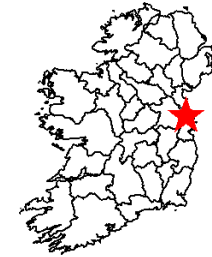
Scale: 1:25,000

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Snapshot Date: 19-Dec-2008



# Clashford Recovery Facility - Well Location Map -Figure 4



**Legend**

- Wells Accuracy within 10m to 50m
- Wells Accuracy within 100m
- Wells Accuracy within 200m
- Wells Accuracy within 500m
- Wells Accuracy within 1km



Map center: 313481, 261462

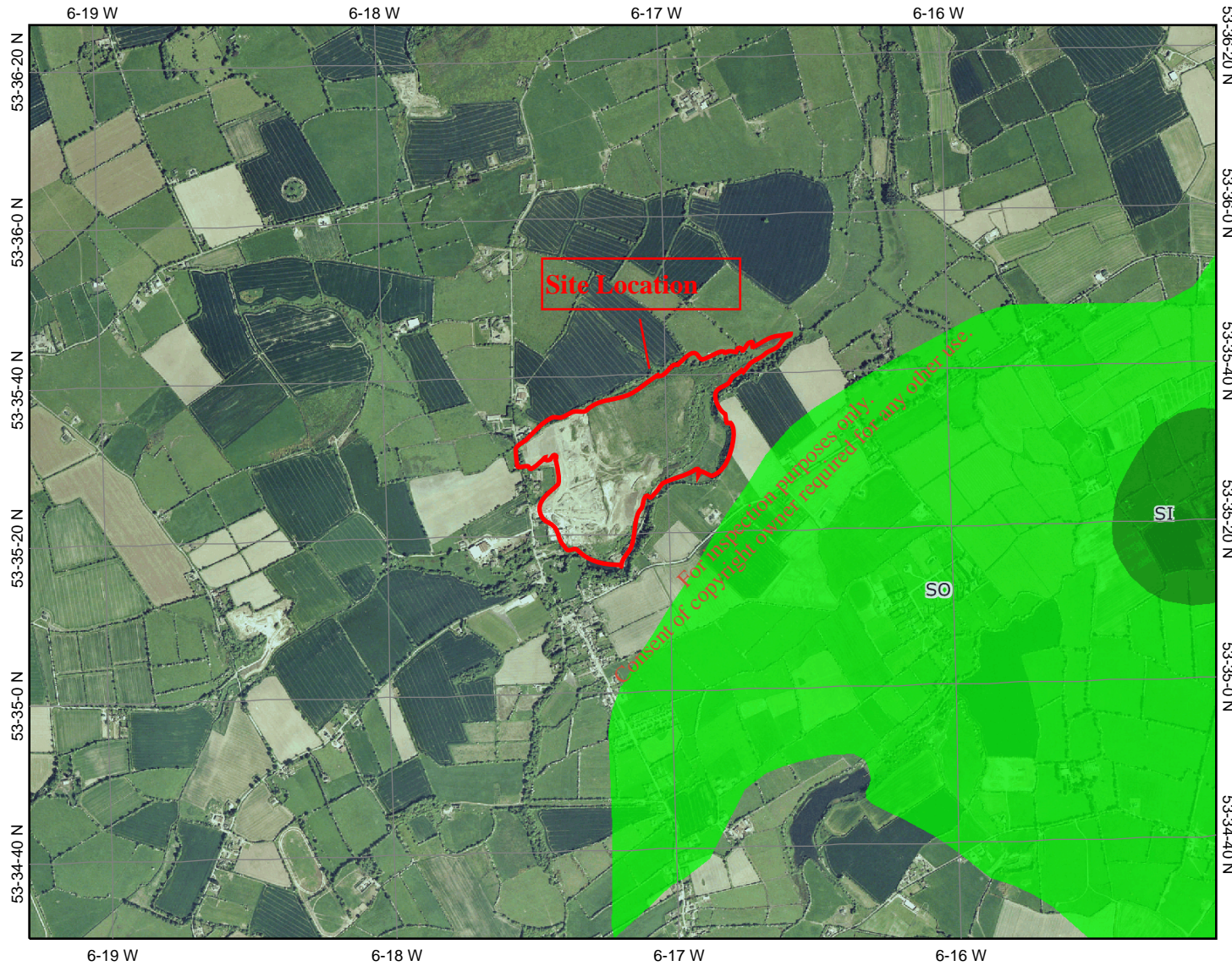
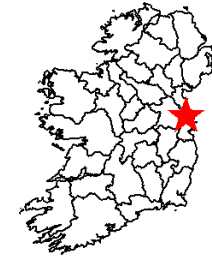
Scale: 1:25,000

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Snapshot Date: 19-Dec-2008



# Clashford Recovery Facility - SPA Map - Figure 5



**Legend**

**Source Protection Area**

- SI - Inner Protection Area
- SO - Outer Protection Area

**Scale: 1:25,000**



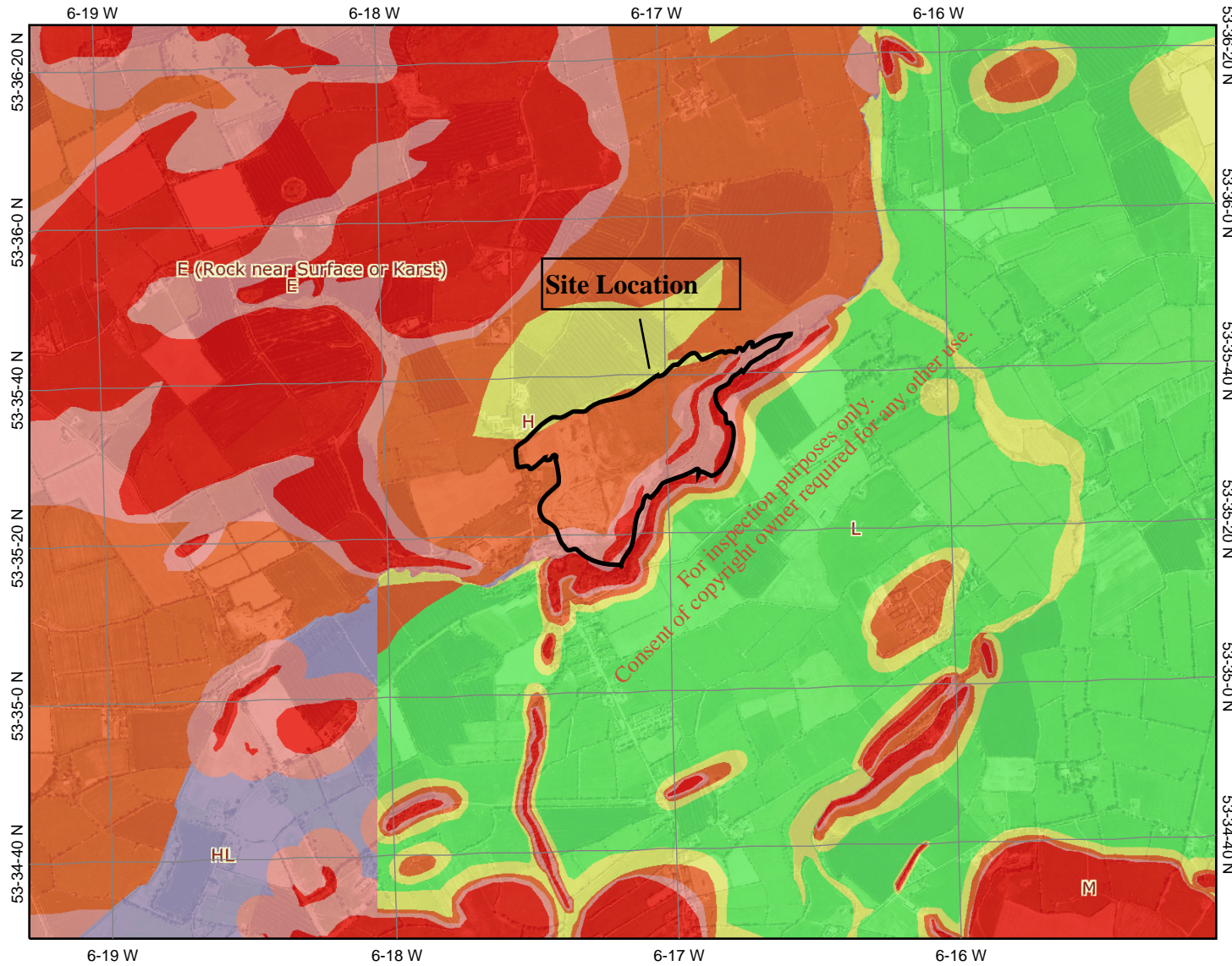
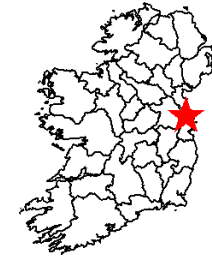
Map center: 313481, 261462

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Snapshot Date: 19-Dec-2008



# Clashford Recovery Facility - Vulnerability Map - Figure 6



**Legend**

**Eastern Interim Vulnerability**

- E (Rock near Surface or Karst)
- E - Extreme
- H - High
- M - Moderate
- L - Low
- HL - High to Low. Only an interim study took place.
- Water



Map center: 313481, 261462

Scale: 1:25,000

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Snapshot Date: 19-Dec-2008

## APPENDIX C

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T.E. LABORATORIES LIMITED

Trading as

**TelLab** 

Tullow Industrial Estate, Tullow, Co. Carlow  
Phone: 059-9152881 Fax: 059-9152886

**CERTIFICATE OF ANALYSIS**

Page 1 of 2

<b>Project Description:</b>	Analysis of Aqueous Sample		
<b>Attention:</b>	Mr.Shane Ryan	<b>Lab ID:</b>	77766
<b>Address:</b>	I.E. Consulting Innovation Centre RTC Campus Carlow	<b>Date Sampled:</b>	08.01.2009
<b>Certificate No:</b>	L/09/0205	<b>Date Rec'd:</b>	08.01.2009
<b>Issue Date:</b>	30.01.2009	<b>Our Ref:</b>	WS-23403

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**Project Summary:** One sample was analysed for a range of determinands.  
Please see page 2 for results. Terms & Conditions and methods used are outlined in the attached appendix.

**No. of Pages:** Results page 2

**Mr. Mark Bowkett**  
Chief Executive

**Ms Breda Moore**  
Technical Manager

**ANALYSIS OF AQUEOUS SAMPLE.**

Date Sampled:08.01.2009  
 Date Received: 08.01.2009  
 Date Analysis Commenced: 08.01.2009  
 Our Ref:WS-23403  
 Certificate No: L/09/0205

	Sample ID	GW1	GW Interim Guideline Value mg/l
Determinand	Lab ID	77766	
Alkalinity	n/a	230	no abnormal change
Ammoniacal Nitrogen	n/a	<0.08	0.15
Arsenic(ug/l)	++	0.6	0.01
Barium(ug/l)	++	29	0.1
Boron	++	0.03	1.0
Cadmium(ug/l)#	**	<0.10	0.005
Calcium	**	67	200
Chloride	**	19	30
Chromium (ug/l)#	**	<1	0.03
Conductivity(uS/cm @ 20°C)	**	417	1000
Copper	**	<0.05	0.03
Cyanide	n/a	<0.01	0.01
Dissolved Oxygen	n/a	5.8	no abnormal change
Fluoride	**	0.11	1
Iron#	**	0.13	0.2
Lead(ug/l)	**	<2	0.01
Magnesium	**	13	50
Manganese#	**	0.03	0.05
Mercury(ug/l)	++	<0.05	0.001
Nickel(ug/l)	++	5	0.02
Nitrate	**	0.8	25
Nitrite	**	<0.2	0.1
pH	**	7.5	>=6.5 and <=9.5
Phosphate	**	<1	0.03
Phosphorus	n/a	<0.05	
Potassium	**	2	5
Residue on Evaporation @ 180°C	n/a	235	
Selenium(ug/l)	++	1.2	
Silver	++	<0.01	
Sodium	**	20	150
Sulphate	**	16	200
Temperature	n/a	not recorded	25
TOC	n/a	1.2	no abnormal change
TON	n/a	<0.24	no abnormal change
Total phenols	n/a	<0.05	
Zinc#	**	0.02	0.1
Total Coliforms(cfu/100ml)	n/a	>100	0 counts per 100ml
Faecal Coliforms(cfu/100ml)	n/a	0	0 counts per 100ml

Results expressed as mg/l (ppm)  
 unless stated otherwise

\*\* = INAB Accredited Tests    ++ = Subcontracted Tests    n/a = Non-INAB Accredited Tests

The above results relate only to the sample tested  
 This report should not be regenerated except in full and with the consent of T.E. Laboratories Ltd.

# Analysis of metals are performed on the filtered sample



T.E. LABORATORIES LIMITED  
Trading as

**TelLab** 

Tullow Industrial Estate, Tullow, Co. Carlow  
Phone: 059-9152881 Fax: 059-9152886

**CERTIFICATE OF ANALYSIS**

Page 1 of 2

**Project Description:** Analysis of Aqueous Sample

**Attention:** Mr. Shane Ryan

**Lab ID:** 77881-77883

**Company:** Geotechnical & Environmental Services Ltd.

**Date Sampled:** 13.01.2009

**Address:** Innovation Centre,  
RTC Campus,  
Carlow

**Certificate No:** L/09/0256

**Date Rec'd:** 13.01.2009

**Issue Date:** 04.02.2009

**Our Ref:** WS-23444, 153842

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**Project Summary:**

Three samples were analysed for a range of determinands.  
Please see page 2 for results. Terms & Conditions and methods  
used are outlined in the attached appendix.

**No. of Pages:**

Results page 2

**Mr Mark Bowkett**  
Chief Executive

**Ms Breda Moore**  
Technical Manager

**ANALYSIS OF AQUEOUS SAMPLE.**

Date Sampled :13.01.2009  
 Date Received: 13.01.2009  
 Date Analysis Commenced: 13.01.2009  
 Our Ref.: WS-23444, 153842  
 Certificate No: L/09/0256  
 Your Ref.: Clashford

DETERMINAND	Sample ID	Clashford			EQSs Surface Water mg/l
	Lab ID	Upstream 77883	Discharge 77881	Downstream 77882	
Alkalinity	n/a	220	165	220	/
Ammoniacal Nitrogen	n/a	<0.08	0.31	<0.08	<b>0.02 NH3</b>
Arsenic(ug/l)	++	1.0	5.1	1.5	<b>0.025</b>
Barium(ug/l)	++	34	37	34	<b>0.1</b>
Boron	++	0.05	0.06	0.05	<b>2.0</b>
Cadmium(ug/l)	**	0.27	0.28	<0.1	<b>0.005</b>
Calcium	**	94	109	96	
Chloride	**	31	64	34	<b>250</b>
Chromium(ug/l)	**	<1	1.9	<1	<b>0.03</b>
Conductivity (uS/cm @ 20°C)	**	506	692	529	<b>1000</b>
Copper	**	<0.05	<0.05	<0.05	<b>0.03</b>
Cyanide	n/a	<0.01	<0.01	<0.01	<b>0.01</b>
Dissolved Oxygen	n/a	11.5	11.3	11.7	
Fluoride	**	<0.1	0.25	<0.1	<b>5</b>
Iron#	**	0.18	0.37	0.23	<b>1.0</b>
Lead(ug/l)	**	<2	4.0	<2	<b>0.01</b>
Magnesium	**	8	10	8	
Manganese#	**	0.06	0.08	0.06	<b>0.3</b>
Mercury (ug/l)	**	<0.05	<0.05	<0.05	<b>0.001</b>
Nickel#	**	<0.10	<0.10	<0.10	<b>0.05</b>
Nitrate	**	25	2	23	<b>50</b>
Nitrite	**	<0.2	<0.2	<0.2	<b>0.2</b>
pH	**	7.9	7.8	7.9	
Phosphate (low Level)	n/a	0.08	0.11	0.10	
Phosphorus	n/a	0.09	0.27	0.07	
Potassium	**	2	7	3	
Residue on Evaporation @ 180°C	n/a	340	508	318	
Selenium(ug/l)	++	1.5	2.0	1.6	
Silver	++	<0.01	0.02	0.01	
Sodium	**	14	44	17	
Sulphate	**	27	151	41	<b>200</b>
Temperature	n/a	not recorded	not recorded	not recorded	
TOC	n/a	3.6	6.6	4.0	
TON	**	5.8	0.51	5.2	
Total Phenols by colourimetry	n/a	<0.05	<0.05	<0.05	
Zinc#	**	0.18	0.03	0.01	<b>0.1</b>
Faecal Coliforms (cfu/100ml)	n/a	>100	18	>100	
Total Coliforms (cfu/100ml)	n/a	>100	>100	>100	

Concentrations are expressed as mg/l (ppm)  
 unless otherwise specified.

\*\* = INAB Accredited Tests    ++ = Subcontracted Tests    n/a = Non-INAB Accredited Tests  
 # Analysis of metals are performed on the filtered sample

The above results relate only to the sample tested  
 This report should not be regenerated except in full and with the consent of T.E. Laboratories Ltd.

### Table I.1(i) Ambient SURFACE WATER QUALITY

(Sheet 1 of 2) Monitoring Point/ Grid Reference: SW1, SW2, SW3 (Refer to Attachment I.2.1 for Results)

Parameter	Results (mg/l)		Sampling method <sup>2</sup> (grab, drift etc.)	Normal Analytical Range <sup>2</sup>	Analysis method / technique
	Date	Date			
pH					
Electrical conductivity EC					
Ammoniacal nitrogen NH <sub>4</sub> -N					
Chemical oxygen demand					
Biochemical oxygen demand					
Dissolved oxygen DO					
Calcium Ca					
Cadmium Cd					
Chromium Cr					
Chloride Cl					
Copper Cu					
Iron Fe					
Lead Pb					
Magnesium Mg					
Manganese Mn					
Mercury Hg					

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## Surface Water Quality (Sheet 2 of 2)

(Refer to Attachment I.2.1 for Results)

Parameter	Results (mg/l)				Sampling method (grab, drift etc.)	Normal Analytical Range	Analysis method / technique
	Date	Date	Date	Date			
	Nickel Ni						
Potassium K							
Sodium Na							
Sulphate SO <sub>4</sub>							
Zinc Zn							
Total alkalinity (as CaCO <sub>3</sub> )							
Total organic carbon TOC							
Total oxidised nitrogen TON							
Nitrite NO <sub>2</sub>							
Nitrate NO <sub>3</sub>							
Faecal coliforms ( /100mls)							
Total coliforms ( /100mls)							
Phosphate PO <sub>4</sub>							

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### **I.3 Assessment of Impact of Sewage Discharge.**

There is no discharge from the site to any sewer system in the area. The site is serviced by an existing toilet facility, septic tank and percolation area.

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#### **I.4 Assessment of impact of ground/groundwater emissions**

It is envisaged that the inert materials used for the restoration of the site will not cause a pollution risk to the ground/groundwater in the area of the site.

A detailed hydrogeological risk assessment was commissioned in support of this application. A copy of the hydrogeological risk assessment prepared by IE Consulting/GES Ltd is attached (Refer to Attachment I.2.1 above). This report addresses both surface and groundwater issues pertaining to the site.

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**Table I.4(i) GROUNDWATER QUALITY**

(Sheet 1 of 2) Monitoring Point/ Grid Reference: GW1, GW2, GW3 (Refer to Attachment I.2.1 for Results)

Parameter	Results (mg/l)			Sampling method (composite etc.)	Normal Analytical Range	Analysis method / technique
	Date	Date	Date			
pH						
Temperature						
Electrical conductivity EC						
Ammoniacal nitrogen NH <sub>4</sub> -N						
Dissolved oxygen DO						
Residue on evaporation (180°C)						
Calcium Ca						
Cadmium Cd						
Chromium Cr						
Chloride Cl						
Copper Cu						
Cyanide Cn, total						
Iron Fe						
Lead Pb						
Magnesium Mg						
Manganese Mn						
Mercury Hg						
Nickel Ni						
Potassium K						
Sodium Na						

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**GROUNDWATER QUALITY (SHEET 2 OF 2)**

**(REFER TO ATTACHMENT I.2.1 FOR RESULTS)**

Parameter	Results (mg/l)			Sampling method (composite, dipper etc.)	Normal Analytical Range	Analysis method / technique
	Date	Date	Date			
Phosphate PO <sub>4</sub>						
Sulphate SO <sub>4</sub>						
Zinc Zn						
Total alkalinity (as CaCO <sub>3</sub> )						
Total organic carbon TOC						
Total oxidised nitrogen TON						
Arsenic As						
Barium Ba						
Boron B						
Fluoride F						
Phenol						
Phosphorus P						
Selenium Se						
Silver Ag						
Nitrite NO <sub>2</sub>						
Nitrate NO <sub>3</sub>						
Faecal coliforms ( /100mls)						
Total coliforms ( /100mls)						
Water level (m OD)						

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