



July 2013

## ANNUAL ENVIRONMENTAL REPORT 2012

# KTK Sand & Gravel, Ballymore Eustace, Co. Kildare W0156-01

**Submitted to:**

Mr Mervyn Ross  
General Manager  
KTK Sand & Gravel  
Ballymore Eustace  
Co. Kildare

REPORT



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## 1.0 REPORTING PERIOD

Waste activities commenced at the KTK Sand & Gravel Ltd, Ballymore Eustace Facility on 12 September 2003. The waste activities at the facility were suspended on 7 July 2004, and following a grant of planning permission from Kildare County Council, reopened in January 2005. The facility is currently in the closure phase and no new material has been accepted at the facility since the end of 2008.

The reporting period for this Annual Environmental Report (AER) is from 1 January 2012 to 31 December 2012.

## 2.0 SITE DESCRIPTION

The facility is operated by KTK Sand & Gravel Ltd (KTK S&G), and is located in Kimmeens, Ballymore Eustace West and Coghlanstown East in County Kildare (the Site).

Figure 4.1 Rev. R and Drawing 243, Rev. A: Current Conditions (Appendix A) depict the Site in its entirety.

### 2.1 Waste Management Activities carried out at the Site

Table 1 below lists the waste management activities that were carried out at the facility in accordance with Waste Licence Register No. W0156-01. No waste materials were received or recovered at the Site during 2012.

**Table 1: Licensed Waste Activities**

**Licensed waste recovery activities, in accordance with the Fourth Schedule of the Waste Management Act, 1996 to 2003**

<b>Class 3</b>	Recycling or reclamation of metals and metal compounds
<b>Class 4</b>	Recycling or reclamation of other inorganic materials
<b>Class 11</b>	Use of waste obtained from any activity referred to in a preceding paragraph of this Schedule
<b>Class 13</b>	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

### 2.2 Methods of Deposition of Waste

Historically, incoming lorries carrying waste proceeded to an on-site weighbridge where they were weighed. The drivers were requested to supply information for the load in compliance with the Waste Acceptance Procedures for the facility. The weighbridge operator would then enter the details into the weighbridge computer system.

The weighbridge operator or the facility manager then directed the driver to the appropriate location for recovery where the facility manager or other qualified site personnel further assessed all wastes, with regard to acceptability. If the waste was deemed unacceptable they were reloaded and sent off the facility.

### 2.3 Waste Sent Off-Site

There were no waste movement in or out of the facility during 2012.

### 2.4 Quantity of Non-Acceptable Waste

There were no waste movements in or out of the facility during 2012.



### 3.0 SUMMARY OF ENVIRONMENTAL MONITORING AND EMISSIONS DURING 2012

The monitoring and reporting requirements for KTK S&G are listed in Table 2 below.

**Table 2: Monitoring and Reporting Requirements at KTK S&G**

PARAMETER	MONITORING FREQUENCY (as per Schedule D of Waste Licence Register W0156-01)	PROPOSED MONITORING FREQUENCY <sup>(Note 1)</sup>
Dust	Quarterly	Bi-Annually
Noise	Annually	Annually
Surface Water	Quarterly to Bi-Annually	Bi-Annually
Groundwater	Quarterly to Annually	Bi-Annually
Meteorological	Daily	-

Note 1: The licensee submitted a proposed revised schedule for monitoring frequency to the Agency on 13 December 2010.

It is noted that Quarterly Monitoring comprising surface water and groundwater monitoring was carried out at one occasion during the reporting period (Q2 2012). No Noise or Dust Monitoring was carried out during 2012.

Figure 4.1 Rev. O (Appendix A) depicts all monitoring locations for the KTK S&G facility, and Table 3 presents the Grid Reference for each of the monitoring locations.



**Table 3: Environmental Monitoring Locations and Co-ordinates**

MEDIA	LOCATION	EASTINGS	NORTHINGS
<b>Dust</b>	D1	291878.5	210463.6
	D2	291848.0	210539.1
	D3	292361.1	210611.3
	D4	292519.0	210521.2
	D5	292483.0	210338.2
	D6	292315.7	210341.9
<b>Noise</b>	N1	291878.5	210463.6
	N2	291848.0	210539.1
	N3	292361.1	210611.3
	N4	292519.0	210521.2
	N5	292483.0	210338.2
	N6	292315.7	210341.9
	N7	292564.0	210267.2
	N8	291819.6	210335.3
	N9	292593.2	210256.3
<b>Groundwater Monitoring Boreholes</b>	GW1	292380.2	210585.3
	GW2	291941.5	210413.0
	GW3 *	292117.0	210457.9
	GW4	292290.4	210297.8
	GW5	292377.3	210559.7
	GW6	292365.8	210488.5
	GW7	292342.3	210385.7
<b>Surface Water</b>	SW1	292289.0	210383.2
	SW2	292169.1	210375.2
	SW3	292251.1	210611.6
<b>Private Well</b>	PW1	292251.1	210609.5

*Grey shading = Locations are approximate*

### 3.1 Atmospheric Dust Monitoring During 2012

Atmospheric dust monitoring was carried out at KTK S&G during 2012 on the following occasion:

Quarter 2 2012: 30 May 2012 to 29 June 2012

Table 4 and Figure 1 below detail the atmospheric dust results recorded during the reporting period. Full results are in Appendix D.



Table 4: Depositional Dust Quarterly Survey Results (in mg/m<sup>2</sup>/day) during 2012

Sampling Point	Q2 2012 (in mg/m <sup>2</sup> /day)
D1	162
D2	89
D3	237
D4	133
D5	83
D6	42
Average	124

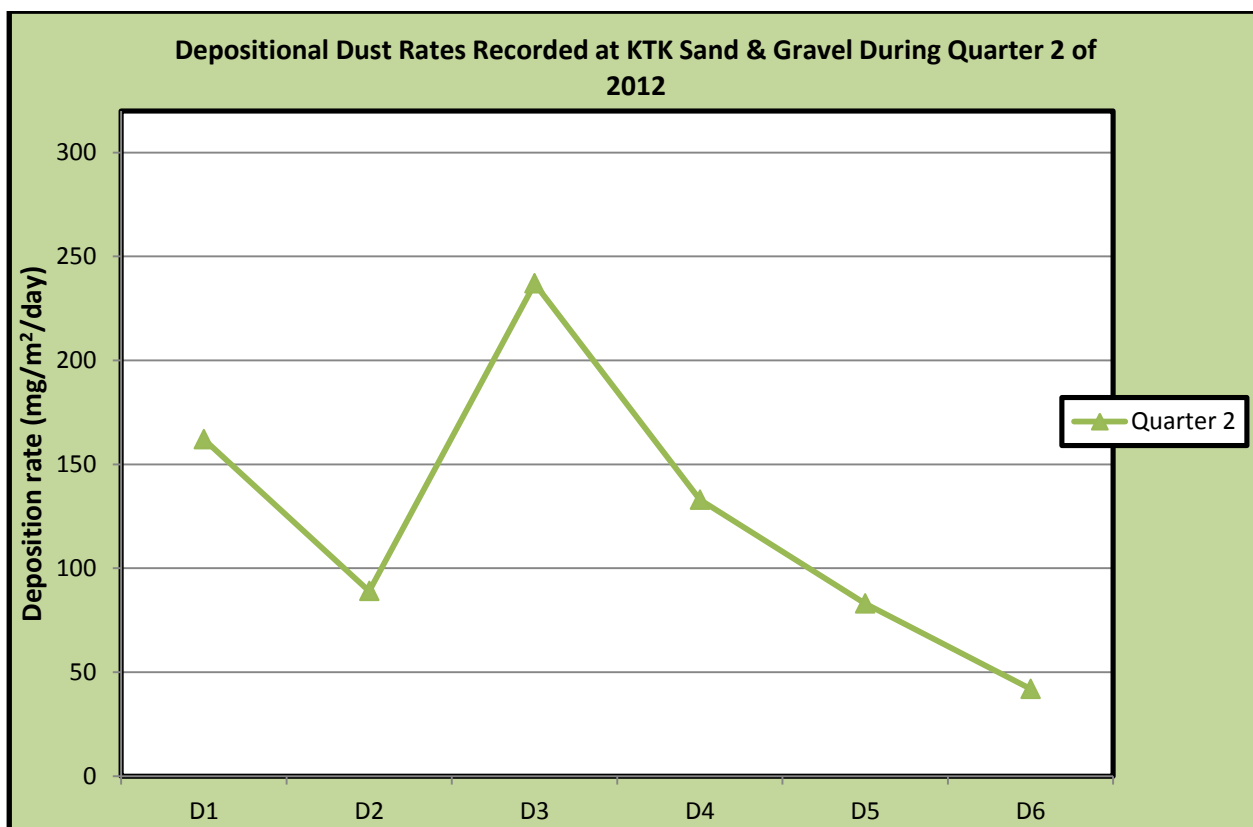


Figure 1: Depositional Dust Survey Results during Q2 of 2012

The licence limit for depositional dust is set at 350 mg/m<sup>2</sup>/day which is specified in Table C.2 of the licence. This limit value was not breached at any locations during the monitoring period. The average dust value recorded for the monitoring period was 124 mg/m<sup>2</sup>/day.

### 3.2 Environmental Noise Monitoring

Environmental noise monitoring was not carried during 2012 due to the facility being closed for waste acceptance and no works being carried out since late 2008.

### 4.0 GROUNDWATER MONITORING

Groundwater monitoring was conducted at nine locations during 2012 in accordance with Table D.1.1 and Section 4 “Environmental monitoring”, Figure 4.1 “Proposed Monitoring locations” of Volume I EIS dated





June 2001, and Figure 3.1.1 “Monitoring locations” in Appendix 9 Volume II of the application for the current licence. Co-ordinates for all monitoring locations are detailed in Table 5 with locations illustrated on Figure 4.1 Rev O in Appendix A.

**Table 5: Groundwater Monitoring Locations**

<b>MEDIA</b>	<b>LOCATION</b>	<b>EASTINGS</b>	<b>NORTHINGS</b>	<b>ELEVATION</b>
<b>Groundwater</b>	GW1	292380.2	210585.3	143.690
	GW2	291941.5	210413.0	134.760
	GW3	292117.0	210457.9	139.215
	GW4	292290.4	210297.8	119.130
	GW5	292377.3	210559.7	142.725
	GW6	292365.8	210488.5	139.307
	GW7	292342.3	210385.7	131.191
Private Well	PW1	292251.1	210609.5	-

## 4.1 Groundwater Levels

Groundwater levels were monitored once in 2012 in accordance with Table D.4.1 of Waste Licence Register No. W0156-01.

### 4.1.1 Methods of monitoring groundwater levels

Groundwater levels were measured using a standard dip-meter probe, which upon contact with water emits an audible signal. Measurements were made to the nearest centimetre relative to the top of the steel casing that protects each monitoring pipe.

### 4.1.2 Groundwater level results 2012

Groundwater levels at the Site were observed to fluctuate naturally during the reporting period. It is noted that the private well, PW1, is actually a small natural spring which represents very shallow groundwater. Groundwater level monitoring is not conducted at this location. The following table (Table 6) depicts Static Water Levels recorded during Quarter 2 of 2012.

**Table 6: Groundwater Levels at KTK Sand and Gravel during Quarter 2 of 2012**

<b>Borehole I.D.</b>	<b>TOC Elevation (mOD)</b>	<b>TOC/SWL Level Difference</b>	<b>SWL (mbtoc OD*)</b>
<b>GW1</b>	143.69	11.49	132.20
<b>GW2</b>	134.76	17.17	117.59
<b>GW3</b>	138.42	22.88	115.54
<b>GW4s</b>	119.13	0.86	118.27
<b>GW4d</b>	119.13	2.44	116.69
<b>GW5</b>	142.73	5.42	137.31
<b>GW6</b>	139.31	6.25	133.06
<b>GW7</b>	131.19	5.75	125.44

\* - SWL (mbtoc OD) – Static Water Level metres below top of casing Over Datum (Malin Head)

Figure 2 illustrates the annual water level data recorded from groundwater monitoring wells at the facility during 2012.

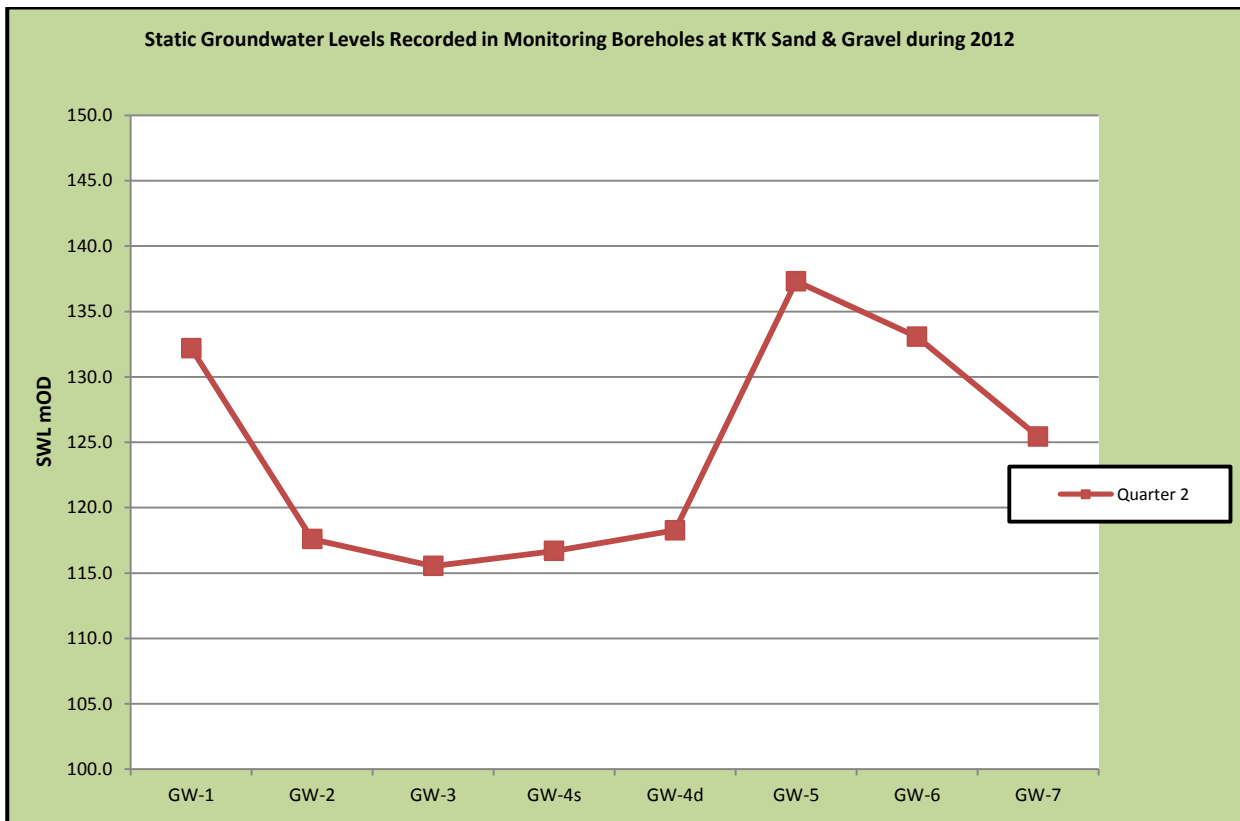


Figure 2: Static groundwater levels recorded in monitoring boreholes at KTK Sand & Gravel during 2012

## 4.2 Groundwater Quality

Analysis of groundwater quality at the facility was conducted in accordance with Schedule D.4 of licence W0156-01. Groundwater samples were collected by purging a minimum of three borehole volumes of water prior to sample collection.

This allows stagnant water to be removed and representative groundwater to be drawn into the hole. Dedicated sampling equipment was used to prevent cross contamination between sampling locations. Field measurements of temperature, pH and conductivity were recorded. Samples were decanted into laboratory designated containers and stored in cooler boxes to maintain a sample temperature of approximately 4.0°C. All samples were submitted to the laboratory within 24 hours of sampling.

### 4.2.1 Groundwater quality results

Groundwater quality was monitored once at nine locations during 2012, in accordance with Schedule D.1 of the license W0156-01. Results for Groundwater quality are available in Appendix B of this report.

A brief summary of any elevated parameters at each location as compared to the EPA's Interim Guideline Values (IGV) is given below in Section 4.3.



### 4.3 Discussion

A summary of the elevated parameters is given below.

- GW1:** During 2012, manganese and iron have been detected at concentrations above the EPA IGVs. However, these elevations are thought to be as a result of local geological conditions. The ammoniacal nitrogen concentration is slightly elevated at 0.1941 mg/l, above the IGV concentration of 0.15 mg/l in Q2;
- GW2:** All results were observed below EPA IGV concentrations;
- GW3:** Unable to purge the well as insufficient sample available in the well to purge correctly;
- GW4S:** All results were observed below EPA IGV concentrations;
- GW4D:** All results were observed below EPA IGV concentrations;
- GW5:** All results were observed below EPA IGV concentrations;
- GW6:** Unable to purge the well as insufficient sample available in the well to purge correctly;
- GW7:** All results were observed below EPA IGV concentrations; and
- PW1:** All results were observed below EPA IGV concentrations.

The groundwater results from the Quarter 2 of 2012 sampling round indicate that Manganese and Iron concentrations are elevated above the EPA IGV's of 0.05 mg/l and 0.2 mg/l respectively at GW1. GW1 also showed an elevated Ammoniacal Nitrogen concentration of 0.1941 mg/l as NH<sub>4</sub>, which is above the EPA IGV of 0.15 mg/l. It has been stated in the Interim Guideline Values that Manganese and Iron can be elevated in many locations in Ireland due to local geology. A section from the Interim Guideline Values publication is presented below verbatim. Looking at the historical values from GW1, it can be seen that the Iron value has fluctuated at this location since monitoring started in 2003. A section from the EPA Interim Guideline Values is presented below.

#### *"3.3.1 Background*

*"Because of the complex geology in Ireland, there is variable hydrochemistry depending on the aquifer type. The natural hydrochemistry of four different aquifer types in Ireland; limestone, sandstone, sand and gravels and volcanic aquifers have been compared to the interim guideline values for a selection of the 'Core Group' for which information was available. The comparison indicates that the analysis of natural groundwater generally complies with the interim guideline values (IGVs) for the 'Core Group' of parameters. There are some exceptions in that there are parameters such as Iron (Fe) and Manganese (Mn) that occur naturally in groundwater and may exceed the IGV in certain geological and geographical settings. The current IGVs (drinking water standard) for Iron and Manganese are set because of aesthetic and taste reasons and not for health reasons. The source of Iron in groundwater can either be natural or from pollution by organic wastes (Daly, D. 2001)."*

There are also two areas within the facility boundary where there are potentially indirect emissions to groundwater.

One source is at the surface water percolation area located at the end of the discharge pipe from the settling pond. The volume of discharge through the settling pond is from the catchment of the pond only. Thus the indirect discharge to groundwater from the area is small and not from the area of waste deposition.

Another possible source is in the area where inert soils have been deposited in the pit to reinstate it. The volume of indirect emissions from this source area cannot be readily quantified because it is relative to the area of the deposited material at any given time, the permeability of the inert material, the intensity of the rainfall and the topography of the surface of the deposited wastes. It is suggested that it is insignificant and not of concern.



#### 4.4 Annual Water Balance Calculation

The total catchment area is now approximately 130,000 m<sup>2</sup>. The annual water balance calculation estimates a net rainfall volume of 57,850 m<sup>3</sup> for the catchment area of the KTK S&G facility. Some of the net rainfall volume would have been absorbed by the deposited material, the remainder running off to the Site drainage system.

Table 7 gives a summary of the water balance calculations for 2012.

**Table 7: Annual Water Balance Calculation for KTK S&G for 2012**

	AREA (m <sup>2</sup> )	RAINFALL (m)	RAINFALL OVER LAND AREA (m <sup>3</sup> )	POTENTIAL EVAPO-TRANSPIRATION (m)	NET RAINFALL (m)	NET RAINFALL OVER LAND AREA (m <sup>3</sup> )
January	130,000	0.0632	8,216	0.0142	0.0490	6,370
February	130,000	0.0198	2,574	0.0177	0.0021	273
March	130,000	0.0275	3,575	0.0414	-0.0139	-1,807
April	130,000	0.0947	12,311	0.0453	0.0494	6,422
May	130,000	0.0640	8,320	0.0676	-0.0036	-468
June	130,000	0.1785	23,205	0.0688	0.1097	14,261
July	130,000	0.1027	13,351	0.0762	0.0265	3,445
August	130,000	0.0749	9,737	0.0645	0.0104	1,352
September	130,000	0.0896	11,648	0.0456	0.0440	5,720
October	130,000	0.0842	10,946	0.0218	0.0624	8,112
November	130,000	0.0798	10,374	0.0104	0.0694	9,022
December	130,000	0.0468	6,084	0.0072	0.0396	5,148
<b>Total</b>		<b>0.9257</b>	<b>120,341</b>	<b>0.4807</b>	<b>0.4450</b>	<b>57,850</b>

#### 5.0 SURFACE WATER MONITORING

Surface water monitoring was conducted at the facility in accordance with Schedule D.4 of Waste Licence Register No. W0156-01.

Surface water monitoring locations SW1, SW2, SW3 are detailed below in Table 8 with monitoring locations illustrated on Figure 4.1 Rev. R, (Appendix A). Monitoring of surface water at the facility during 2012 comprised regular visual inspections and sampling and analyses on one occasion. The results are discussed in more detail below.

**Table 8: Surface Water Monitoring Locations**

MEDIA	LOCATION	EASTINGS	NORTHINGS
Surface Water	SW1	292289.0	210383.2
	SW2	292169.1	210375.2
	SW3	292251.1	210611.6



## 5.1 Surface Water Sampling Methodology

Surface water monitoring was conducted during Quarter 2 of 2012 at the three locations detailed in Table 8. Surface water sampling involved the submergence of the designated sample container into the surface water body (SW2) as well as using dedicated bailers (SW1 and SW3). During submergence every effort was made to keep the container steady so as to prevent sediment disturbance. The surface water samples were analysed for parameters stipulated in Table D.4.1 Surface Water/Groundwater & Leachate of Waste Licence Register No. W0156-01. The scope of the laboratory analysis for surface water has been included in *Table D.4.1* of waste licence W0156-01. Table 9 below presents the field monitoring results. The complete set of chemical analysis data is presented in Appendix C.

**Table 9: Surface Water Field Measurements taken during Quarter 4 of 2011**

Parameter	Unit	SW1	SW2	SW3
Temperature	°C	13.9	12.5	14.4
Electrical Conductivity	µS/cm	829	737	386
pH	-	7.16	7.2	7.29

## 5.2 Discussion

The Electrical Conductivity values were well below the EPA EQS limit of 1,000 µS/cm with values of 829 µS/cm, 737 µS/cm and 386 µS/cm for locations SW1, SW2 and SW3 respectively. In general, the samples were slightly cloudy and did not have any odour.

Manganese concentrations were detected in samples taken from all SW monitoring locations. The levels detected ranged from 0.028 to 0.266 mg/l. The EQS for Manganese in surface water is 0.3 mg/l. All locations are below this value. Manganese concentrations have historically been elevated in the region.

As the facility is inactive and is not subject to agricultural run-off or other agricultural activity, it is suggested that the elevated Manganese concentrations found at some locations around the Site from time to time stem from a naturally occurring geological condition.

The Ammoniacal Nitrogen concentrations for the surface water samples are combined NH<sub>4</sub> and NH<sub>3</sub> concentrations, and so cannot be directly compared to the EQS limit of 0.02 mg/l NH<sub>3</sub>. Therefore these results are compared to the IGV limit of 0.15 mg/l as NH<sub>4</sub>. SW1 and SW2 have Ammoniacal Nitrogen concentrations below the IGV limit of 0.15 mg/l. SW3 has a concentration of 0.3106 mg/l as NH<sub>4</sub>, which is above the IGV limit.

All other parameters monitored during 2012 were found to be below EPA EQS guidance value levels.

## 6.0 RESOURCE AND ENERGY CONSUMPTION DURING THE REPORTING PERIOD

Details of the resource and energy consumption at KTK S&G during 2012 are presented in Table 10.



Table 10: Energy and Resource Consumption 2012

RESOURCE / ENERGY SOURCE	PERIOD	UNIT	ESTIMATED QUANTITY USED
Water	1 January 2012 - 31 December 2012	m <sup>3</sup>	10
Electricity	1 January 2012 - 31 December 2012	unit	11,465

## 7.0 WASTE RECOVERY PROGRESS AND ACHIEVEMENTS

The facility is closed since end of 2008. No waste recovery activity took place during 2012.

### 7.1 Site Restoration

Drawing 243 Rev A in Appendix A details the current topography of the Site. No activity took place during the reporting period. Drawing 243 Rev A is accurate as of May 2010.

## 8.0 REPORT ON DEVELOPMENT WORKS

No development works took place during 2012.

### 8.1 Planned Works for 2013

All proposed development works for 2013 are depicted in Table 11 below.

Table 11: Planned development works 2013

ITEM	WORKS
1	Completion of capping Phases 1 & 2.
2	Completion of capping Phase 3
3	Cessation of Licence works.

## 9.0 SCHEDULE OF OBJECTIVES AND TARGETS

A review of the schedule of objectives and targets will be undertaken annually and achievement of targets during the previous twelve months will be measured.

Overall responsibility for managing the Schedule of Objectives and Targets rests with the Facility Manager, Mr Mervyn Ross.

Golder Associates Ireland Limited have been engaged as consultants to advise on licence compliance matters, undertake environmental monitoring and prepare reports for the Agency as instructed by the licensee. They will undertake a number of tasks on behalf of the Licensee.



## 9.1 Schedule of Objectives and Targets for 2013

Table 12 below lists the planned Objectives and Targets to be undertaken during 2012.

Table 12: Schedule of Objectives and Targets for 2013

ITEM	OBJECTIVE	DATE	SUCCESS/FAILURE
1	Site Restoration	September 2010	On-going restoration, new target for completion – by end of 2013.
2	Licence Handover	June 2011	Revised target completion date – by end of 2013.

## 10.0 DESCRIPTION OF PROCEDURES DEVELOPED AT THE SITE DURING 2012

No new procedures were developed at the Site during the reporting period.

## 11.0 TANK, DRUM, BUND AND PIPELINE TESTING DURING THE REPORTING PERIOD

Currently all existing drums at the Site have been stored in a dedicated storage container adjacent to the quarantine area. The following materials are stored at the facility:

- Lube oils – Approximately 10 gallons;
- Weed killer – small quantities; and
- Liquid soap – small quantities.

## 12.0 REPORTED INCIDENTS AND COMPLAINTS SUMMARY

Condition 10.6 of Waste Licence Register No. W0156-01 requires a notification of the Agency in case an incident has, or may have, taken place at the facility. Incidents are described in Condition 1.6 of the Licence as follows:

- 3.1 *The following shall constitute an incident for the purposes of this licence:*
- a) *An emergency;*
  - b) *Any emission which does not comply with the requirements of this licence;*
  - c) *Any level specified in this licence which is attained or exceeded;*
  - d) *Any indication that environmental pollution has, or may have, taken place, and;*
  - e) *Rejection of any waste load at the facility*





The Licence sets Emission Limit Values (ELV) for noise emissions, dust deposition and surface water discharge.

There were no complaints received during the reporting period.

### 13.0 REVIEW OF NUISANCE CONTROLS

Licence Condition 7: Nuisance Control requires the licensee to ensure that vermin, birds, flies, mud, dust, litter and odours do not give rise to nuisance at the facility or in the immediate area of the facility. Further, the condition requires that any method used by the licensee to control any such nuisance shall not cause environmental pollution.

#### 13.1 Nuisances Caused by Vermin

Vermin have not been identified on the Site as a nuisance. If a vermin related problem does occur at the facility, a licensed pest controller for vermin will be employed. An updated Vermin Control Plan was submitted to the Agency for agreement on 15 March 2005. Vermin have never been identified on the Site as a nuisance.

#### 13.2 Nuisances Caused by Birds

Birds have not been identified on the Site as a nuisance. If a bird related problem does occur at the facility, a licensed pest controller for birds will be employed.

#### 13.3 Nuisances Caused by Mud and Dust

Monitoring for dust emissions on the Site are carried out quarterly as requested in Licence Schedule D: Monitoring. A quarterly report is prepared and sent to the Agency. The internal roads and public roads in the vicinity of the facility are swept clean regularly.

#### 13.4 Nuisances Caused by Odours

Odours have not been identified on the Site as a nuisance.

### 14.0 FINANCIAL PROVISIONS

The Waste Licence holder was charged €6342.48 in 2012 by the Environmental Protection Agency for the services they provide in relation to overseeing the Waste Licence.

As requested by the Agency in correspondence dated 5 August 2005 (Your Ref. No.: 156-1/RF01DM) the licensee submitted an assessment for the Agency which included an initial screening and operational risk assessment of the facility.

On the basis of the above mentioned risk assessment the facility is to be classified as a Low Risk facility. Consequently, Section 4.2 of the Guidance document (Guidance Documents and Assessment Tools on Environmental Liabilities Risk Assessment and Residuals Management Plans incorporating Financial Provision Assessment (EPA Contract OEE-04-03) states that for Low Risk facilities there is no requirement for a detailed environmental liabilities risk assessment to be undertaken.

Further to Condition 12.2.1, cost estimates have been made for the potential environmental liability during operation and decommissioning. To cover any environmental pollution events and pursuant to Condition 12.2.2, the Licensee has taken out an Environmental Site Liability Insurance Policy with XL Europe Ltd for €2,000,000 against Environmental Pollution.





## 15.0 MANAGEMENT AND STAFFING STRUCTURE

The current staff structure at KTK S&G is presented below in Table 13.

**Table 13: Staff Structure at KTK S&G**

NAME	POSITION
Mr Kevin Keenan	Managing Director
Mr Mervyn Ross	Facility Manager
Ms Pauline McNally	Office Manager

### 15.1 Staff Training

Table 14 below indicates the status of training of the management and staff during the reporting period.

**Table 14: Staff Training Records**

TRAINING COURSE	MANAGING DIRECTOR Mr Kevin Keenan	FACILITY MANAGER Mr Mervyn Ross	OFFICE MANAGER Ms Pauline McNally
Contractors Plant Operation (FÁS)	X		
Waste Management Course (FÁS)		X	
Health and Safety for Management		X	
Occupational First Aid Course (NIFAST)			
Safe Pass (FÁS)	X	X	X
Manual Handling Course		X	
Loading Shovel Operation	X	X	
Safety Awareness		X	
Fire Fighting		X	

## 16.0 PROGRAM FOR PUBLIC INFORMATION

A Communications Programme was developed for the Site in June 2003. The specific objectives of this programme are as follows:

- To ensure that the general public is aware of how to contact site and company management;
- To encourage liaison between KTK S&G, local residents and those who may be affected by the Site's operations;
- To make available Environmental Performance Data relating to the KTK S&G Ballymore Eustace facility at all reasonable times; and



- The communications programme focuses on ensuring that the general public knows how to access relevant information, facilitate personal contact with site management and facilitate site visits.

Any complaints regarding the facility operation of the facility can be forwarded to the facility manager who will log them. The facility manager or the managing director of the company will address the complaints.

## **17.0 POLLUTION EMISSION TRANSFER REGISTER (PRTR)**

Following detailed correspondence and clarification with the Agency in relation to the requirement for a PRTR at KTK S&G, it was confirmed by the Agency on 26 January 2009 that as a result of the inert nature of the facility, a PRTR is not required. The licence requirement has been removed from Waste Licence W0156-01 and a confirmation email was issued from the Agency on the same date.



## Report Signature Page

Mark Butler  
Project Scientist

Thomas Vainio-Mattila  
Senior Consultant

MB/TVM/aw

19 July 2013

Registered in Ireland Registration No. 297875  
Town Centre House, Dublin Road, Naas, Co. Kildare, Ireland  
Directors: M. Gilligan, A. Harris (British)  
VAT No.: 8297875W



# APPENDIX A

Drawing 4.1 Rev R - Environmental Monitoring Locations and  
Drawing 243 Rev A detailing the current site topography

**LEGEND**

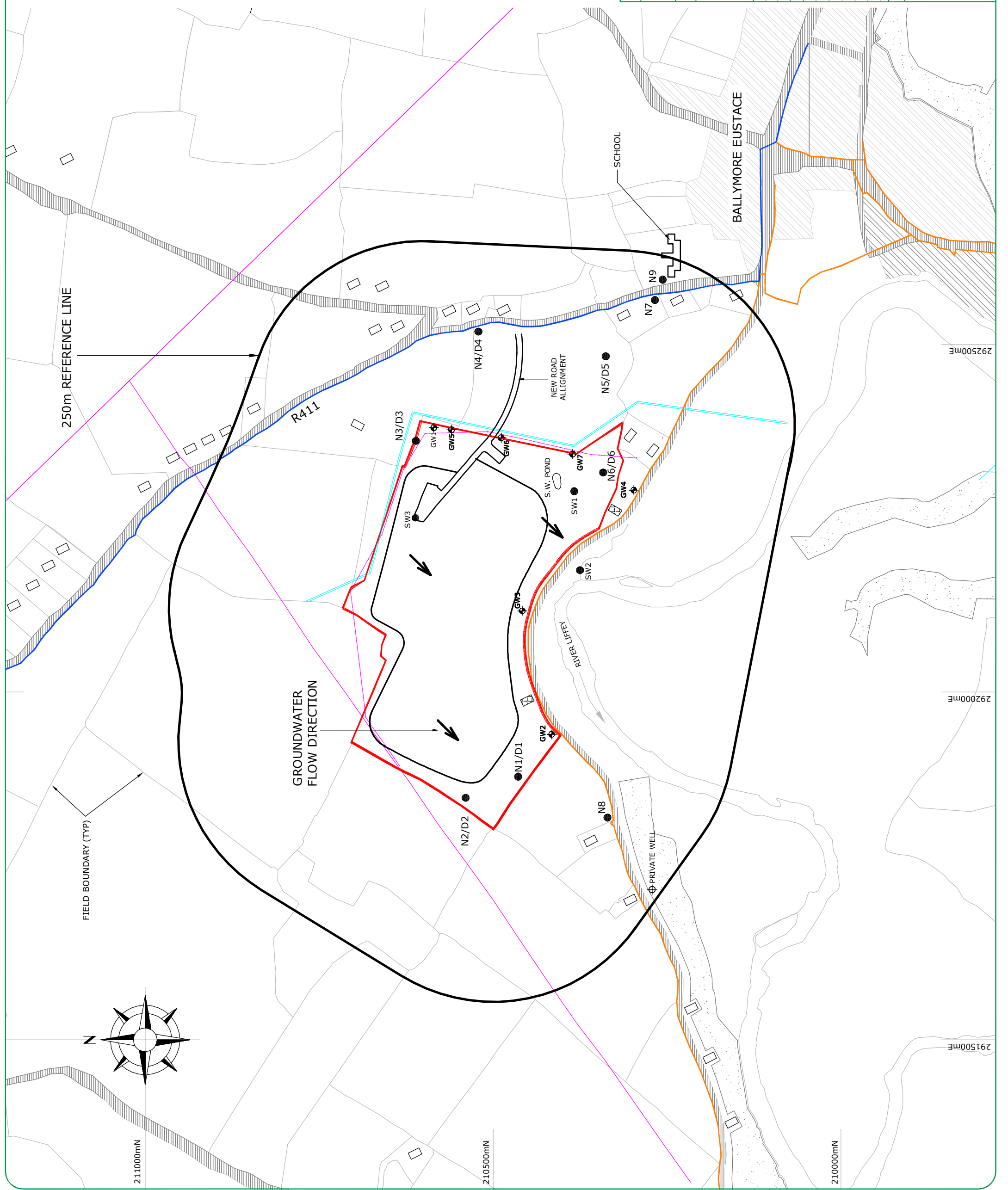
- FORESTRY
- BUILT UP AREA
- DWELLING
- DERELICT DWELLING
- ROAD
- WASTE LICENCE BOUNDARY
- POWER LINE
- DUBLIN CORPORATION WATER MAIN
- 15" w/m
- 4" PVC w/m

- GROUNDWATER MONITORING BOREHOLES
- NOISE MONITORING LOCATIONS
- DUST MONITORING LOCATIONS
- SURFACE WATER MONITORING LOCATIONS

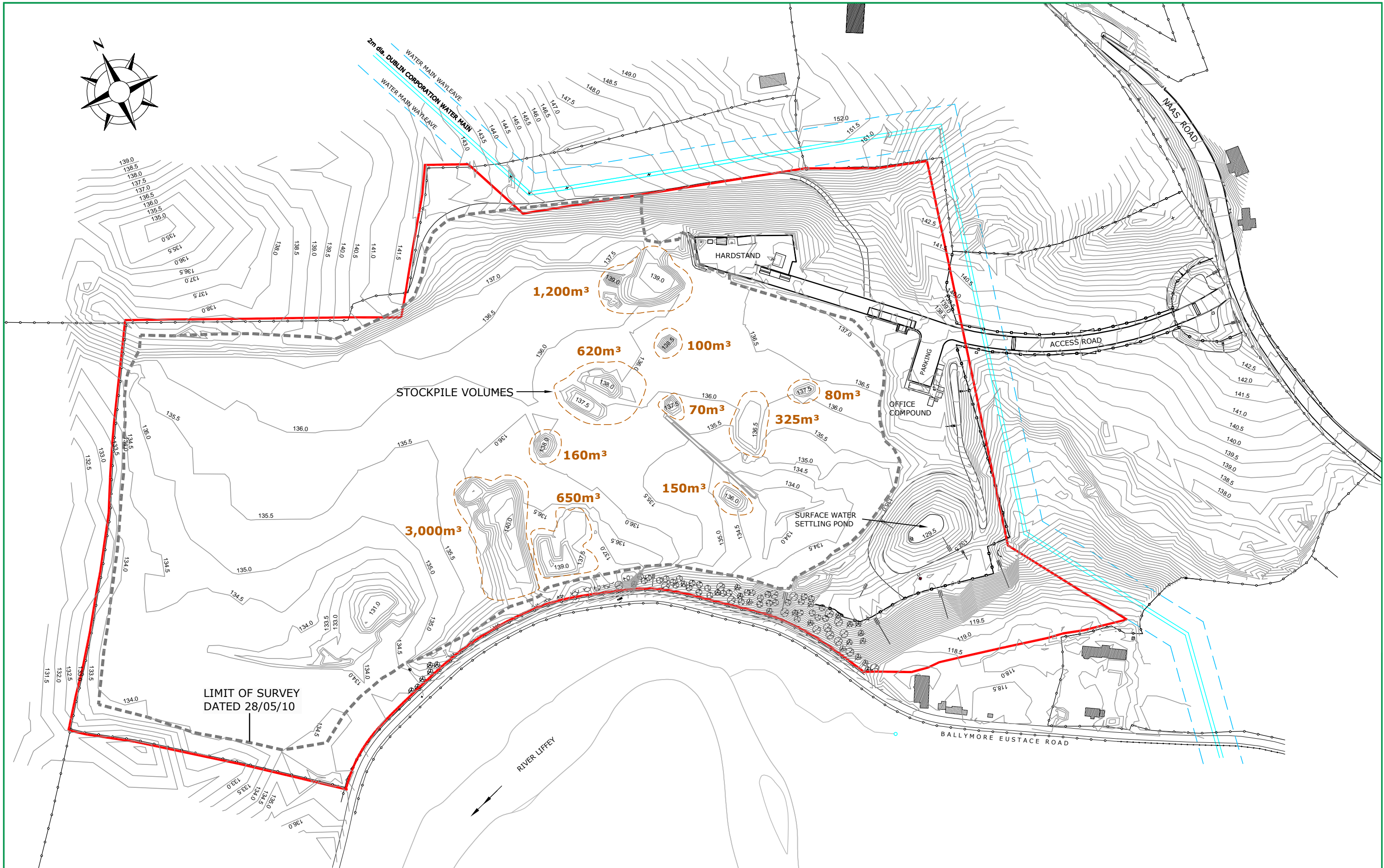
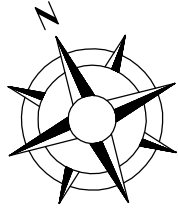
**NOTES**


- SW1 = Discharge from surface water pond
- SW2 = Stream
- SW3 = Discharge from Class 1 Bypass Separator

Project		KTK SAND & GRAVEL Ltd.	
Location		WASTE LICENCE W0156-01	
Title		WASTE LICENCE W0156-01 MONITORING LOCATIONS	
Project No.	08507190004	Engineer	GP
File No.	4.1	Reviewed by	GP
Created by	CC	Figure No.	4.1
ISSUE TO EPA		10/01/09	L
ISSUE TO EPA		JUN '09	M
ISSUE TO EPA		JAN '10	N
ISSUE TO EPA		MAY '10	O
ISSUE TO CLIENT		NOV. '10	P
ISSUE TO CLIENT		JAN. '11	Q
ISSUE TO CLIENT		July '11	R
Description	1:2500 A1	Date	JULY 2011
Scale	1:5000 A3		







 <p><b>Golder Associates</b> TOWN CENTRE HOUSE, DUBLIN ROAD, NAAS, CO. KILDARE TEL.: 045 874411 - FAX: 045 874549 - www.golder.com</p>	<p>Client: <b>KTK SAND &amp; GRAVEL Ltd.</b></p>	<p>Project number 067.194.12</p>	<p>Created by POB</p>	<p>Issue to ISSUE TO CLIENT</p>	<p>Date May '10</p>	<p>Revision A</p>	<p>Title: SITE CONDITIONS CURRENT TO SURVEY DATED 28/05/10</p>	<p>Drawing <b>243</b></p>
	<p>Location: BALLYMORE EUSTACE</p>	<p>File Location CAD\DRAWINGS\KTK S&amp;G\02.076\WASTE LICENCE\243</p>	<p>Engineer CC</p>	<p>Reviewed by TVM</p>	<p>Scale 1:1,000 A1 1:2,000 A3</p>			



# APPENDIX B

## Groundwater Quality Results

MONITORING WELL GW1: Chemical Analysis of Groundwater.			
PARAMETERS	UNIT	Quarter 2 2012	EPA IGV
DATE OF SAMPLE	-	20/06/2012	
<b>FIELD ANALYSIS</b>			
<i>General Water Quality Parameters</i>			
Colour	-	Brown	No Abnormal Change
Conductivity	µS/cm	627	1000 µS/cm
Odour	-	Slight Odour	-
pH	pH Units	6.84	≥6.5 and 9.5≤
Dissolved oxygen	mg/l	-	No Abnormal Change
Temperature	deg C	11.9	25°C
<b>LABORATORY ANALYSIS</b>			
<i>General Water Quality Parameters</i>			
pH	pH Units	7.95	≥6.5 and 9.5≤
Conductivity @ 25°C	µS/cm	539	1000 µS/cm
Dissolved Oxygen	O <sub>2</sub> mg/l	10	No Abnormal Change
Total Alkalinity	mg/l as CaCO <sub>3</sub>	204	No Abnormal Change
Total Oxidised Nitrogen	mg/l	1.4	No Abnormal Change
Total Solids	mg/l	-	1000 mg/l
Total Organic Carbon	C <sub>org</sub> mg/l	<2	No Abnormal Change
<i>Inorganics</i>			
Ammoniacal Nitrogen as NH <sub>4</sub>	NH <sub>4</sub> mg/l	0.1941	0.15 mg/l NH <sub>4</sub>
Calcium	Ca mg/l	96	200 mg/l
Chloride	Cl mg/l	10.8	30 mg/l
Total Phosphorous	P mg/l	<5	-
Ortho Phosphate	PO <sub>4</sub> mg/l	<0.06	0.03 mg/l
Potassium	K mg/l	2.2	5 mg/l
Sodium	Na mg/l	12	150 mg/l
Sulphate	SO <sub>4</sub> mg/l	14.97	200 mg/l
<i>Metals</i>			
Boron	B mg/l	-	1.0 mg/l
Iron	Fe mg/l	0.279	0.2 mg/l
Lead	Pb mg/l	-	0.01 mg/l
Magnesium	Mg mg/l	-	50 mg/l
Manganese	Mn mg/l	0.617	0.05 mg/l
Zinc	Zn mg/l	-	0.1 mg/l
<i>Bacteria</i>			
Faecal Coliforms	cfu/100ml	-	0 Counts per 100ml
Total Coliforms	cfu/100ml	-	0 Counts per 100ml
<b>LEGEND</b>			
bdl = below detection limit			
<* = Less Than Limit of Detection			



MONITORING WELL GW2: Chemical Analysis of Groundwater.			
PARAMETERS	UNIT	Quarter 2 2012	EPA IGV
DATE OF SAMPLE	-	20/06/2012	
<b>FIELD ANALYSIS</b>			
<i>General Water Quality Parameters</i>			
Colour	-	Clear	No Abnormal Change
Conductivity	µS/cm	743	1000 µS/cm
Odour	-	Slight odour	-
pH	pH Units	6.82	≥6.5 and 9.5≤
Dissolved oxygen	mg/l	-	
Temperature	deg C	12.7	25°C
<b>LABORATORY ANALYSIS</b>			
<i>General Water Quality Parameters</i>			
pH	pH Units	7.81	≥6.5 and 9.5≤
Conductivity @ 25°C	µS/cm	689	1000 µS/cm
Dissolved Oxygen	O <sub>2</sub> mg/l	7	No Abnormal Change
Total Alkalinity	mg/l as CaCO <sub>3</sub>	248	No Abnormal Change
Total Oxidised Nitrogen	N mg/l	1.9	No Abnormal Change
Total Solids	mg/l	-	1000 mg/l
Total Organic Carbon	C <sub>org</sub> mg/l	<2	No Abnormal Change
<i>Inorganics</i>			
Ammoniacal Nitrogen as NH <sub>4</sub>	NH <sub>4</sub> mg/l	<0.03	0.15 mg/l NH <sub>4</sub>
Calcium	Ca mg/l	126.1	200 mg/l
Chloride	Cl mg/l	11.1	30 mg/l
Total Phosphorous	P mg/l	0.009	-
Ortho Phosphate	PO <sub>4</sub> mg/l	<0.06	0.03 mg/l
Potassium	K mg/l	1.1	5 mg/l
Sodium	Na mg/l	8.6	150 mg/l
Sulphate	SO <sub>4</sub> mg/l	16.12	200 mg/l
<i>Metals</i>			
Boron	B mg/l	-	1.0 mg/l
Iron	Fe mg/l	0.021	0.2 mg/l
Lead	Pb mg/l	-	0.01 mg/l
Magnesium	Mg mg/l	-	50 mg/l
Manganese	Mn mg/l	<0.002	0.05 mg/l
Zinc	Zn mg/l	-	0.1 mg/l
<i>Bacteria</i>			
Faecal Coliforms	cfu/100ml	-	0 Counts per 100ml
Total Coliforms	cfu/100ml	-	0 Counts per 100ml
<b>LEGEND</b>			
bdl = below detection limit			
<* = Less Than Limit of Detection			

MONITORING WELL GW4d: Chemical Analysis of Groundwater.			
PARAMETERS	UNIT	Quarter 2 2012	EPA IGV
DATE OF SAMPLE	-	20/06/2012	
<b>FIELD ANALYSIS</b>			
<i>General Water Quality Parameters</i>			
Colour	-	Slight silty brown	No Abnormal Change
Conductivity	µS/cm	761	1000 µS/cm
Odour	-	None	-
pH	pH Units	7.25	≥6.5 and 9.5≤
Dissolved oxygen	mg/l		-
Temperature	deg C	12.8	25°C
<b>LABORATORY ANALYSIS</b>			
<i>General Water Quality Parameters</i>			
pH	pH Units	7.82	≥6.5 and 9.5≤
Conductivity @ 25°C	µS/cm	690	1000 µS/cm
Dissolved Oxygen	O <sub>2</sub> mg/l	7	No Abnormal Change
Total Alkalinity	mg/l as CaCO <sub>3</sub>	250	No Abnormal Change
Total Oxidised Nitrogen	N mg/l	2.5	No Abnormal Change
Total Solids	mg/l	-	1000 mg/l
Total Organic Carbon	C <sub>org</sub> mg/l	3.00	No Abnormal Change
<i>Inorganics</i>			
Ammoniacal Nitrogen as NH <sub>4</sub>	NH <sub>4</sub> mg/l	0.0544	0.15 mg/l NH <sub>4</sub>
Calcium	Ca mg/l	129.3	200 mg/l
Chloride	Cl mg/l	16.3	30 mg/l
Total Phosphorous	P mg/l	0.007	-
Ortho Phosphate	PO <sub>4</sub> mg/l	<0.06	0.03 mg/l
Potassium	K mg/l	0.7	5 mg/l
Sodium	Na mg/l	8.5	150 mg/l
Sulphate	SO <sub>4</sub> mg/l	11.74	200 mg/l
<i>Metals</i>			
Boron	B mg/l	-	1.0 mg/l
Iron	Fe mg/l	0.049	0.2 mg/l
Magnesium	Mg mg/l	-	50 mg/l
Lead	Pb mg/l	-	0.01 mg/l
Manganese	Mn mg/l	0.006	0.05 mg/l
Zinc	Zn mg/l	-	0.1 mg/l
<i>Bacteria</i>			
Faecal Coliforms	cfu/100ml	-	0 Counts per 100ml
Total Coliforms	cfu/100ml	-	0 Counts per 100ml
<b>LEGEND</b>			
bdl = below detection limit			
<* = Less Than Limit of Detection			

MONITORING WELL GW4s: Chemical Analysis of Groundwater.			
PARAMETERS	UNIT	Quarter 2 2012	EPA IGV
DATE OF SAMPLE	-	20/06/2012	
<b>FIELD ANALYSIS</b>			
<i>General Water Quality Parameters</i>			
Colour	-	Slightly silty	No Abnormal Change
Conductivity	µS/cm	752	1000 µS/cm
Odour	-	Slight odour	-
pH	pH Units	7.19	≥6.5 and 9.5≤
Dissolved oxygen	mg/l	-	-
Temperature	deg C	12.4	25°C
<b>LABORATORY ANALYSIS</b>			
<i>General Water Quality Parameters</i>			
pH	pH Units	7.86	≥6.5 and 9.5≤
Conductivity @ 25°C	µS/cm	602	1000 µS/cm
Dissolved Oxygen	O <sub>2</sub> mg/l	9.0	No Abnormal Change
Total Oxidised Nitrogen	N mg/l	3.2	No Abnormal Change
Total Solids	mg/l	-	1000 mg/l
Total Organic Carbon	C <sub>org</sub> mg/l	2.00	No Abnormal Change
<i>Inorganics</i>			
Ammoniacal Nitrogen as NH <sub>4</sub>	NH <sub>4</sub> mg/l	<0.03	0.15 mg/l NH <sub>4</sub>
Calcium	Ca mg/l	134.5	200 mg/l
Chloride	Cl mg/l	11.6	30 mg/l
Total Phosphorous	P mg/l	<0.005	-
Ortho Phosphate	PO <sub>4</sub> mg/l	<0.06	0.03 mg/l
Potassium	K mg/l	0.7	5 mg/l
Sodium	Na mg/l	8.6	150 mg/l
Sulphate	SO <sub>4</sub> mg/l	10.69	200 mg/l
<i>Metals</i>			
Boron	B mg/l*	-	1.0 mg/l
Cadmium	Cd mg/l	-	0.005 mg/l
Chromium (Total)	Cr mg/l	-	0.03 mg/l
Copper	Cu mg/l	-	0.03 mg/l
Cyanide (Total)	Cn mg/l	-	0.01 mg/l
Iron	Fe mg/l	0.038	0.2 mg/l
Magnesium	Mg mg/l	-	50 mg/l
Lead	Pb mg/l	-	0.01 mg/l
Manganese	Mn mg/l	<0.002	0.05 mg/l
<i>Bacteria</i>			
Faecal Coliforms	cfu/100ml	-	0 Counts per 100ml
Total Coliforms	cfu/100ml	-	0 Counts per 100ml
<i>List I/II</i>			
<b>LEGEND</b>			
bdl = below detection limit			
<* = Less Than Limit of Detection			

MONITORING WELL GW5: Chemical Analysis of Groundwater.			
PARAMETERS	UNIT	Quarter 2 2012	EPA IGV
DATE OF SAMPLE	-	20/06/2012	
<b>FIELD ANALYSIS</b>			
<b>General Water Quality Parameters</b>			
Colour	-	Cloudy	No Abnormal Change
Conductivity	µS/cm	778	1000 µS/cm
Odour	-	No odour	-
pH	pH Units	7.61	≥6.5 and 9.5≤
Dissolved oxygen	mg/l	-	-
Temperature	deg C	12.40	25°C
<b>LABORATORY ANALYSIS</b>			
<b>General Water Quality Parameters</b>			
pH	pH Units	7.61	≥6.5 and 9.5≤
Conductivity @ 25°C	µS/cm	739	1000 µS/cm
Dissolved Oxygen	µS/cm	9	No Abnormal Change
Total Alkalinity	mg/l as CaCO <sub>3</sub>	240	No Abnormal Change
Total Oxidised Nitrogen	N mg/l	2.4	No Abnormal Change
Total Solids	mg/l	-	1000 mg/l
Total Organic Carbon	C <sub>org</sub> mg/l	2.00	No Abnormal Change
<b>Inorganics</b>			
Ammoniacal Nitrogen as NH <sub>4</sub>	NH <sub>4</sub> mg/l	<0.03	0.15 mg/l NH <sub>4</sub>
Calcium	Ca mg/l	144.9	200 mg/l
Chloride	Cl mg/l	11.5	30 mg/l
Total Phosphorous	P mg/l	<0.005	-
Ortho Phosphate	PO <sub>4</sub> mg/l	<0.06	0.03 mg/l
Potassium	K mg/l	2.5	5 mg/l
Sodium	Na mg/l	7.4	150 mg/l
Sulphate	SO <sub>4</sub> mg/l	5.13	200 mg/l
<b>Metals</b>			
Boron	B mg/l	-	1.0 mg/l
Iron	Fe mg/l	0.033	0.2 mg/l
Magnesium	Mg mg/l	-	50 mg/l
Lead	Pb mg/l	-	0.01 mg/l
Manganese	Mn mg/l	<0.002	0.05 mg/l
Zinc	Zn mg/l	-	0.1 mg/l
<b>Bacteria</b>			
Faecal Coliforms	cfu/100ml	-	0 Counts per 100ml
Total Coliforms	cfu/100ml	-	0 Counts per 100ml
<b>LEGEND</b>			
bdl = below detection limit			
<* = Less Than Limit of Detection			

**MONITORING WELL GW7: Chemical Analysis of Groundwater.**

PARAMETERS	UNIT	Quarter 2	EPA IGV
DATE OF SAMPLE	-	20/06/2012	

**FIELD ANALYSIS**

**General Water Quality Parameters**

Colour	µS/cm	Slight Brown	No Abnormal Change
Conductivity	µS/cm	629	1000 µS/cm
Dissolved Oxygen	mg/l	-	-
Odour	-	No odour	-
pH	pH Units	6.97	≥6.5 and 9.5≤
Temperature	deg C	12.7	25 °C

**LABORATORY ANALYSIS**

**General Water Quality Parameters**

pH	µS/cm	7.63	≥6.5 and 9.5≤
Conductivity @ 25°C	µS/cm	819	1000 µS/cm
Dissolved Oxygen	O <sub>2</sub> mg/l	7	No Abnormal Change
Total Alkalinity	CaCO <sub>3</sub> mg/l	272	No Abnormal Change
Total Oxidised Nitrogen	N mg/l	0.7	No Abnormal Change
Total Solids	mg/l	-	1000 mg/l
Total Organic Carbon	C <sub>org</sub> mg/l	2	No Abnormal Change

**Inorganics**

Ammoniacal Nitrogen as NH <sub>4</sub>	NH <sub>4</sub> mg/l	0.031	0.15 mg/l NH <sub>4</sub>
Calcium	Ca mg/l	169.2	200 mg/l
Chloride	Cl mg/l	7.1	30 mg/l
Total Phosphorous	P µg/l	-	-
Ortho Phosphate	PO <sub>4</sub> mg/l	<0.06	0.03 mg/l
Potassium	K mg/l	3	5 mg/l
Sodium	Na mg/l	6.4	150 mg/l
Sulphate	SO <sub>4</sub> mg/l	24.70	200 mg/l

**Metals**

Boron	B mg/l	-	1.0 mg/l
Lead	Pb mg/l	-	0.01 mg/l
Iron	Fe mg/l	0.022	0.2 mg/l
Magnesium	Mg mg/l	-	50 mg/l
Manganese	Mn mg/l	<0.002	0.05 mg/l
Zinc	Zn mg/l	-	0.1 mg/l

**Bacteria**

Faecal Coliforms	cfu/100ml	-	0 Counts per 100ml
Total Coliforms	cfu/100ml	-	0 Counts per 100ml

**LEGEND**

bdl = below detection limit

<\* = Less Than Limit of Detection

MONITORING WELL PW1: Chemical Analysis of Groundwater.			
PARAMETERS	UNIT	Quarter 2 2012	EPA IGV
DATE OF SAMPLE	-	20/06/2012	
<b>FIELD ANALYSIS</b>			
<b>General Water Quality Parameters</b>		<b>µS/cm</b>	
Colour	-	Clear	No Abnormal Change
Conductivity	µS/cm	780	1000 µS/cm
Odour	-	None	-
pH	pH Units	6.97	≥6.5 and 9.5≤
Dissolved oxygen	mg/l	-	-
Temperature	deg C	12.2	25 °C
<b>LABORATORY ANALYSIS</b>			
<b>General Water Quality Parameters</b>			
pH	µS/cm	7.69	≥6.5 and 9.5≤
Conductivity @ 25°C	µS/cm	744	1000 µS/cm
Dissolved Oxygen	O <sub>2</sub> mg/l	10	No Abnormal Change
Total Alkalinity	CaCO <sub>3</sub> mg/l	258	No Abnormal Change
Total Oxidised Nitrogen	N mg/l	<0.03	No Abnormal Change
Total Solids	mg/l	0.008	1000 mg/l
Total Organic Carbon	C <sub>org</sub> mg/l	<2	No Abnormal Change
<b>Inorganics</b>			
Ammoniacal Nitrogen as NH <sub>4</sub>	NH <sub>4</sub> mg/l	<0.03	0.15 mg/l NH <sub>4</sub>
Calcium	Ca mg/l	143.7	200 mg/l
Chloride	Cl mg/l	13.9	30 mg/l
Total Phosphorous	P mg/l	-	-
Potassium	K mg/l	3.2	5 mg/l
Ortho Phosphate	PO <sub>4</sub> mg/l	<0.06	0.03 mg/l
Sodium	Na mg/l	9	150 mg/l
Sulphate	SO <sub>4</sub> mg/l	9.7	200 mg/l
<b>Metals</b>			
Boron	B mg/l	-	1.0 mg/l
Lead	Pb mg/l	-	0.01 mg/l
Iron	Fe mg/l	0.025	0.2 mg/l
Manganese	Mn mg/l	0.004	0.05 mg/l
Magnesium	Mg mg/l	-	50 mg/l
Zinc	Zn mg/l	-	0.1 mg/l
<b>Bacteria</b>			
Faecal Coliforms	cfu/100ml	-	0 Counts per 100ml
Total Coliforms	cfu/100ml	-	0 Counts per 100ml
<b>LEGEND</b>			
bdl = below detection limit			
<* = Less Than Limit of Detection			



# APPENDIX C

## Surface Water Quality Results

**MONITORING LOCATION SW1: Chemical Analysis of Surface Water.**

PARAMETERS	UNIT	Quarter 2 2012	EPA EQS's
DATE OF SAMPLE	-	20/06/2012	

**FIELD ANALYSIS**

**General Water Quality Parameters**

Colour	-	Slightly cloudy	-
Conductivity	µS/cm	829	1,000 µS/cm
Dissolved Oxygen	O <sub>2</sub> mg/l	-	-
Odour	-	None	-
pH	pH Units	7.16	-
Temperature	°C	13.9	-

**LABORATORY ANALYSIS**

**General Water Quality Parameters**

Conductivity @ 25°C	µS/cm	750	1,000 µS/cm
Dissolved Oxygen	O <sub>2</sub> mg/l	11	-
pH	pH Units	8.1	-
Total Suspended Solids	TSS mg/l	23	1000 mg/l
Total Alkalinity	CaCO <sub>3</sub> mg/l	286	-
Total Phosphorus	P mg/l	0.014	-
COD	mg/l O <sub>2</sub>	8	-
BOD	mg/l O <sub>2</sub>	<1	-

***Inorganics***

Ammoniacal Nitrogen	N mg/l	<0.03	0.02 NH <sub>3</sub>
Calcium	Ca mg/l	145.7	-
Chloride	Cl mg/l	8.8	250 mg/l
Phosphorous	P mg/l	14	-
Sodium	Na mg/l	9	-
Sulphate	SO <sub>4</sub> mg/l	47.88	200 mg/l
Ortho phosphate	mg/l	<0.06	-

***Metals***

Magnesium	Mg mg/l	-	-
Manganese	Mn mg/l	0.029	0.3 mg/l

**LEGEND**

- = No data reported or no analyses conducted

< = Less Than

NDP = No Determination Possible



MONITORING LOCATION SW2: Chemical Analysis of Surface Water.			
PARAMETERS	UNIT	Quarter 2 2012	EPA EQS's
DATE OF SAMPLE	-	20/06/2012	
<b>FIELD ANALYSIS</b>			
<b>General Water Quality Parameters</b>			
Colour	-	-	-
Conductivity	µS/cm	737	1,000 µS/cm
Dissolved oxygen	O <sub>2</sub> mg/l	-	-
Odour	-	None	-
pH	pH Units	7.20	-
Temperature	°C	12.5	-
<b>LABORATORY ANALYSIS</b>			
<b>General Water Quality Parameters</b>			
Conductivity @ 25°C	µS/cm	684	1,000 µS/cm
Dissolved Oxygen	O <sub>2</sub> mg/l	11	-
pH	pH Units	8.04	-
Total Suspended Solids	TSS mg/l	<10	1000 mg/l
Total Alkalinity	CaCO <sub>3</sub> mg/l	274	-
Total Phosphorus	P mg/l	0.028	-
COD	mg/l O <sub>2</sub>	<1	-
BOD	mg/l O <sub>2</sub>	<7	-
<b>Inorganics</b>			
Ammoniacal Nitrogen	N mg/l	<0.03	0.02 NH <sub>3</sub>
Calcium	Ca mg/l	122.6	-
Chloride	Cl mg/l	12.1	250 mg/l
Sodium	Na mg/l	9.1	-
Sulphate	SO <sub>4</sub> mg/l	13.98	200 mg/l
Ortho phosphate	mg/l	<0.03	-
<b>Metals</b>			
Magnesium	Mg mg/l	-	-
Manganese	Mn mg/l	0.028	0.3 mg/l

#### LEGEND

- = No data reported or no analyses conducted

< = Less Than

NDP = No Determination Possible

**MONITORING LOCATION SW3: Chemical Analysis of Surface Water.**

PARAMETERS	UNIT	Quarter 2 2012	EPA EQS's
DATE OF SAMPLE	-	20/06/2012	

**FIELD ANALYSIS**

**General Water Quality Parameters**

Colour	-	Slightly Cloudy	-
Conductivity	µS/cm	386	1,000 µS/cm
Dissolved oxygen	O <sub>2</sub> mg/l	-	-
Odour	-	None	-
pH	pH Units	7.29	-
Temperature	°C	14.4	-

**LABORATORY ANALYSIS**

**General Water Quality Parameters**

Conductivity @ 25°C	µS/cm	364	1,000 µS/cm
Dissolved Oxygen	O <sub>2</sub> mg/l	10	-
pH	pH Units	8.47	-
Total Suspended Solids	TSS mg/l	10	1000 mg/l
Total Alkalinity	P mg/l	190	-
Total Phosphorus	P mg/l	0.04	-
COD	mg/l O <sub>2</sub>	13	-
BOD	mg/l O <sub>2</sub>	1	-

***Inorganics***

Ammoniacal Nitrogen	N mg/l	0.3106	0.02 NH <sub>3</sub>
Calcium	Ca mg/l	65.9	-
Chloride	Cl mg/l	3.2	250 mg/l
Sodium	Na mg/l	4	-
Sulphate	SO <sub>4</sub> mg/l	5.45	200 mg/l
Ortho phosphate	mg/l	<0.06	-

***Metals***

Magnesium	Mg mg/l	-	-
Manganese	Mn mg/l	0.266	0.3 mg/l

**LEGEND**

- = No data reported or no analyses conducted

< = Less Than

NDP = No Determination Possible



# APPENDIX D

## Atmospheric Dust Monitoring Results



<b>Customer Name:</b>	Mark Butler	<b>Date Sampled:</b>	29/06/2012
<b>Company Name:</b>	Golder and Associates	<b>Date Received:</b>	29/06/2012
<b>Company Address:</b>	Town Centre House	<b>Date Analysed:</b>	29/06/2012
	Naas		
	Co Kildare	<b>Sample Location:</b>	KTK Sand And Gravel
		<b>Sample Type:</b>	Dust Jars D1 – D6
<b>Purchase Order No:</b>	5071-001073	<b>Grab/Composite:</b>	Composite
<b>Sample IDs:</b>	<b>E0527 E0528 E0529 E0530 E0531 E0532</b>	<b>Page:</b>	1 of 2

## TEST REPORT

### **E0527 – D1**

<b>Parameter</b>	<b>Result</b>	<b>Units</b>	<b>Method</b>
Bergerhoff Dust Method	162	mg/m <sup>2</sup> /day	SOP030

### **E0528 – D2**

<b>Parameter</b>	<b>Result</b>	<b>Units</b>	<b>Method</b>
Bergerhoff Dust Method	89	mg/m <sup>2</sup> /day	SOP030

### **E0529– D3**

<b>Parameter</b>	<b>Result</b>	<b>Units</b>	<b>Method</b>
Bergerhoff Dust Method	237	mg/m <sup>2</sup> /day	SOP030

### **E0530 – D4**

<b>Parameter</b>	<b>Result</b>	<b>Units</b>	<b>Method</b>
Bergerhoff Dust Method	133	mg/m <sup>2</sup> /day	SOP030

### **E0531 – D5**

<b>Parameter</b>	<b>Result</b>	<b>Units</b>	<b>Method</b>
Bergerhoff Dust Method	83	mg/m <sup>2</sup> /day	SOP030

Registered Office:  
Unit D1  
M4 Business Park  
Celbridge, Co. Kildare

VAT No:  
9672901T  
CN: 449199

Tel: 01-6275656  
[www.emeraldenvironmental.ie](http://www.emeraldenvironmental.ie)  
info@emeraldenvironmental.ie

#### **ISF048(B) – Test Report**

Issue: B  
Issue Date: 03/10/11  
Authorised By: Raymond Murphy



<b>Customer Name:</b>	Mark Butler	<b>Date Sampled:</b>	29/06/2012
<b>Company Name:</b>	Golder and Associates	<b>Date Received:</b>	29/06/2012
<b>Company Address:</b>	Town Centre House	<b>Date Analysed:</b>	29/06/2012
	Naas		
	Co Kildare	<b>Sample Location:</b>	KTK Sand and Gravel
		<b>Sample Type:</b>	Dust Jars 1-6
<b>Purchase Order No:</b>	5071-001073	<b>Grab/Composite:</b>	Composite
<b>Sample IDs:</b>	<b>E0527 E0528 E0529 E0530 E0531 E0532</b>	<b>Page:</b>	2 of 2

**E0532 – D6**

Parameter	Result	Units	Method
Bergerhoff Dust Method	42	mg/m <sup>2</sup> /day	SOP030

<b>Comments:</b>	None
------------------	------

Signed: Raymond Murphy

Date: 09/07/2012

Raymond Murphy – Quality Manager

The above results relate only to the sample(s) tested

This report shall not be reproduced unless all data is included and by agreement with Emerald Environmental Services.

Registered Office:  
Unit D1  
M4 Business Park  
Celbridge, Co. Kildare

VAT No:  
9672901T  
CN: 449199

Tel: 01-6275656  
[www.emeraldenvironmental.ie](http://www.emeraldenvironmental.ie)  
[info@emeraldenvironmental.ie](mailto:info@emeraldenvironmental.ie)

**ISF048(B) – Test Report**

Issue: B  
Issue Date: 03/10/11  
Authorised By: Raymond Murphy

At Golder Associates we strive to be the most respected global group of companies specialising in ground engineering and environmental services. Employee owned since our formation in 1960, we have created a unique culture with pride in ownership, resulting in long-term organisational stability. Golder professionals take the time to build an understanding of client needs and of the specific environments in which they operate. We continue to expand our technical capabilities and have experienced steady growth with employees now operating from offices located throughout Africa, Asia, Australasia, Europe, North America and South America.

Africa	+ 27 11 254 4800
Asia	+ 852 2562 3658
Australasia	+ 61 3 8862 3500
Europe	+ 356 21 42 30 20
North America	+ 1 800 275 3281
South America	+ 55 21 3095 9500

[solutions@golder.com](mailto:solutions@golder.com)  
[www.golder.com](http://www.golder.com)

**Golder Associates Ireland Limited**  
**Town Centre House**  
**Dublin Road**  
**Naas**  
**Co. Kildare**  
**Ireland**  
**T: +353 45 87 4411**

