2 DESCRIPTION OF THE SITE AND EXISTING ENVIRONMENT

2.1 Existing Site

2.1.1 Site Location

The Bord na Móna property, shown on Figure 1.1.1 and outlined in blue on the Ownership Plan Drawing No.3369-2401, is located within the County Kildare townlands of Drehid, Ballynamullagh, Kilmurry, Mulgeeth, Mucklon, Timahoe East, Timahoe West, Coolcarrigan, Corduff, Coolearagh West, Allenwood North, Killinagh Upper, Killinagh Lower, Ballynakill Upper, Ballynakill Lower, Drummond, Kilkeaskin, Loughnacush, and Parsonstown.

The site boundary or the activity boundary, outlined by the red line on Drawing No. 3369-2402, which is defined as the area in which all activities associated with the waste management facility will occur, is confined to the townlands of Parsonstown, Loughnacush, Kilkeaskin, Drummond, Timahoe West, Coolcarrigan, Killinagh Lower and Killinagh Upper. It should be noted that the activities associated with the waste management facility is confined to a landbank of 179ha. A private road has been constructed from the waste management facility to the R403 Regional Road to provide access for all traffic generated by the facility. This will result in a significant reduction in the potential impact on the local road network and settlements in the area.

Consent of copyright owner required for any other use. For inspection purposes only.

The access road is from the R403 Regional Road at Killinagh Upper (Grid Ref. E2729, N2281) and passes through the townlands of Killinagh Upper, Killinagh Lower, Coolcarrigan, Drummond and Kilkeaskin to access the waste management facility.

The village of Derrinturn is located approximately 2.6km west of the closest edge of the site activity boundary and Timahoe crossroads is located approximately 2.1km east of the closest edge of the site activity boundary.

The site boundary is located within a segment of land, which is bounded to the north by a county road L5025 with local county roads to the west (L5024), south (L1020) and east (L1019). An un-surfaced service road links the western part of the site boundary via a county road (L50222) to the R403 regional road approximately 1.5km southwest of Derrinturn village. The topographic landform within the site boundary consists of the flat lying to gently undulating topography of cut away peatland.

Figure 1.1.1, an extract from the *Discovery Series Map No 49*, shows the site location relative to a number of adjacent villages including Derrinturn, Timahoe, Coill Dubh and Allenwood at a scale of 1:100,000.

EPA Export 26-07-2013:00:53:27

The location of the site boundary relative to the regional roads R402 and R403 is also shown on Figure 1.1.1 and on Drawing No. 3369-2403.

For the purposes of clarification, Table 2.1.1 below indicates the area of the Bord na Móna property and the extent of the site boundary for the waste management facility, together with the various elements associated with the facility. These are also shown on Figure 1.1.1 and Drawing No. 3369-2402.

Table 2.1.1: Outline of Site Areas

Item	Area hectares (ha)
Bord na Móna Ownership Boundary ('Blue Line Boundary') (South Bog – 1,745 ha and North Bog – 799 ha)	2,544ha
Site/Activity Boundary ('Red Line Boundary') Which includes the various elements listed below	179ha
• Previously permitted landfill footprint	21.2 ha
• Proposed landfill extension	17.8ha
• Clay borrow area	10.0 ha
• Sand and gravel borrow area	12.7 ha
• Water settlement lagoons	0.9ha
• Hardstand areas for infrastructure and composting	1.2 ha
• Access road from Killinagh Upper to facility entrance	3.0ha
• Areas reserved for landscaping and maintaining buffers	112.2 ha

For inspection purposes only.
Consent of copyright owner required for any other use.

2.1.2 Proximity of Housing and Centres of Population

Housing in the immediate area of the proposed site comprises predominantly single dwellings with adjacent farmyards and new bungalows. Drawing No. 3369-2405 shows the outline of the landfill footprint, the landfill activity boundary, a 500m and a 1,000m radius from the landfill footprint.

As shown, the immediate area is reasonably sparsely populated. The nearest residential dwelling is located approximately 980m to the northeast of the proposed landfill extension. Planning permission has been granted for a dwelling house located approximately 942m to the northeast of the proposed landfill extension. The largest concentration of houses close to the proposed facility is to the west of the site in the village of Derrinturn.

There are no residences within a 500m radius of the previously permitted clay borrow area, with the nearest residential dwelling located approximately 800m to the northeast. A recently constructed residence is located 185m west of the previously permitted sand & gravel borrow area. The next nearest residential dwelling is located

EPA Export 26-07-2013:00:53:27

approximately 675m to the northwest of the footprint of the sand and gravel area.

2.1.3 Land Use

Land use on and adjacent to the site and existing permitted landfill facility is disused cutaway bogland used up to approximately eighteen years ago for production of sod peat for energy generation. Immediately adjacent to the site there are areas of land where turbary, commercial forestry and agricultural usage are evident.

2.1.4 Infrastructure

As part of the background information necessary to comply with the requirements of the EIS, an assessment of the existing traffic and infrastructure was undertaken and the findings of the study are outlined herein.

2.1.4.1 Location of the Drehid Waste Management Facility

The Drehid Waste Management Facility is located within the confines of the Timahoe Bog, which is owned by Bord na Móna. The site is accessible via a network of regional routes which in turn link with the National Primary Road / Motorway network. The R403 lies south, southwest and west of the site and joins the R402 at Carbury to the northwest of the site. The R402 connects to the N4/M4 (Dublin to Sligo/Galway) National Primary Road / Motorway, which is located some 8km to the north of the Facility. The R403 connects to the N7/M7 (Dublin to Limerick/Cork) National Primary Road / Motorway, which is located some 14km to the south of the Facility.

For inspection purposes only.
Consent of copyright owner required for any other use.

Access has been provided into the previously permitted Waste Management Facility from the R403 via a new site entrance and a dedicated 5km access road. The speed limit along the R403, in approaching this site access, is 80km/h. The R403 has an approximate carriageway width of 6.0m in the vicinity of the site access, which is an adequate width for 2 Heavy Goods Vehicles (HGVs) to pass one another with 1.0m clearance. A ghost island right turn lane junction has been provided at the site access and includes road markings. Through lanes have been constructed in each direction 3.0m wide and a right turning lane 3.0m wide has also been provided. Visibility of 4.5m x 160m is available at the site access junction.

Figure 4.9.1 in Section 4.9 herein shows the Facility in relation to the adjoining road network, including the national primary roads, regional and county roads and also the main towns and villages in the area.

EPA Export 26-07-2013:00:53:27

2.1.4.2 Existing Traffic Flows on the Adjoining Road Network

A series of traffic counts were carried out in the area in 2007, including a number of junctions along the R403 & R402, as shown on Figure 4.9.1 in Section 4.9 herein.

The most recent traffic count data for roads leading to the site was also sourced from Kildare County Council and the National Roads Authority. The location of these counts is also shown on Figure 4.9.1 herein.

The traffic volumes (as recorded) show decreasing AADTs as you move away from Allenwood, heading west on the R403 towards the site entrance. The estimated AADT on the R403 was 8,498 at junction 18, 6,815 at junction 17, and 5,079 at junction 16. The traffic volumes (as recorded) also show a significant decrease in the AADT figure between junction 10 at Carbury and junction 19 at the site entrance. The estimated AADT on the R403 was 9,361 at junction 10 and 5,844 at junction 19. The HGV content along the R403 for these traffic count locations (junctions 18, 17, 16, 10 & 19) ranged from 9 to 13%. An estimated HGV content of 11% of traffic passing the site entrance to the Drehid Waste Management Facility was recorded.

Table 4.9.1 in Section 4.9 herein provides details of the committed operational vehicle numbers previously permitted for the existing Drehid Waste Management Facility. These figures are based on the acceptance of 120,000 tonnes per annum for landfill and 25,000 tonnes per annum for composting at the Facility over a 20-year period.

For inspection purposes only.
Consent of copyright owner required for any other use.

2.1.5 Topography

A detailed topographical survey was carried out at the site in April/May 2003 and in October 2007 by Murphy Surveys Ltd. The final output of this survey for the proposed site is presented as a topographic contour map on Drawing No. 3369-2406.

The proposed site is situated in low-lying cutaway bogland with levels ranging from 84m to 86m OD. Whilst the topography throughout the site is relatively flat at 80 to 90m OD, screening of the site operations from the adjoining roads is provided by existing hedgerows and tree lines, which will be augmented by additional planting between the northern boundary of the landfill footprint and the County Road L5025 as per the previous planning permission. The remote nature of the previously permitted landfill footprint and the proposed landfill extension, lying 800m south of County road L5025 and over 2km from both county road L1910 and regional road R403, provides considerable separation distances between the landfill and adjacent roads.

These separation distances are enhanced by the growth of bog willow tree stands over several parts of the cutaway bogland and by dense hedgelines and commercial forestry to the east, south and west of the site. The previously permitted landfill footprint and the proposed landfill extension is situated in a flat area towards the

EPA Export 26-07-2013:00:53:27

northern portion of the site, as shown on Drawing No. 3369-2406. The low point of the previously permitted footprint is situated at the south of the footprint and is approximately 84m OD. The high point of the previously permitted footprint is at the north and west of the footprint and is of the order of 85-86m OD. The low point of the proposed extension footprint is situated at the north of the footprint and is approximately 83m OD. The high point of the proposed extension is at the south of the footprint and is of the order of 84m OD.

For inspection purposes only.
Consent of copyright owner required for any other use.

EPA Export 26-07-2013:00:53:27

2.2 Air

2.2.1 Dust

Waste management facilities can present a problem in relation to potential dust emissions. Dust monitoring was carried out in 2002/2003 as part of the baseline studies for the initial application, in July 2006 during the initial phases of construction and on a monthly basis since January 2007. The locations of all dust monitoring points are shown on Drawing 3369-2407. Dust monitoring has not been carried out at all nine locations during each monitoring event, as certain sites were inaccessible due to flooding or ongoing construction.

Dust monitoring reports can be found in Appendix 2.2.1

To determine total dust deposition, Bergerhoff gauges were used, as specified in the German Engineering Institute VDI 2119 document "Measurement of Dustfall Using the Bergerhoff Instrument (Standard Method)". The results are presented in Table 2.2.1 overleaf.

For inspection purposes only.
Consent of copyright owner required for any other use.

The Waste Licence limit for dust deposition is given as 350mg/m²/day as per schedule B1 of the Waste Licence.

Dust deposition rates exceeded the limits at two dust monitoring locations in July 2006; D3, (1,190mg/m²/day) and D4, (359 mg/m²/day). Dust monitoring station D3 is located in an isolated area of heather peatland, which also has *Alnus glutinosa,* (Common Alder), and *Betula spp,* (Birch) present. It was noted on collection of the sample at this location that there was a large amount of organic matter present, including algal growth, and catkins. This is also noted in laboratory records and it is felt that the large amount of organic matter present (and the difficulty encountered in removing it) contributed to the elevated results detected. Dust monitoring station D4 is located adjacent to where construction works were concentrated during the monitoring period, which may have contributed to the elevated dust concentrations at this point.

Dust deposition rates exceeded the limits at one dust monitoring location in January 2007. Dust monitoring station D6 is located directly adjacent to where construction of the new internal access road was taking place. These elevations were not reflected at the boundary monitoring stations.

Dust deposition rates at all other monitoring locations were within the licence limit of 350mg/m²/day.

EPA Export 26-07-2013:00:53:27

Table 2.2.1: Total Dust Levels measured on-site

Monitoring Location Number	Deposition Rate mg/m^2/day														
	Dec 2002	Feb 2003	July 2006	Jan 2007	Feb 2007	Mar 2007	Apr 2007	May 2007	June 2007	July 2007	Aug 2007	Sept 2007	Oct 2007	Nov 2007	Dec 2007
D1	60	-	135	65	117	51	*	65	*	168	131	19	35	35	***
D2	-	43	163	-	-	-	-	-	<3**	28	122	52	35	***	38
D3	52		1,190	-	-	-	-	-	-	-	-	-	-	-	-
D4	-	43	359	-	-	-	-	-	-	-	-	-	-	-	-
D5	-	-	*	-	29	68	65	112	23	66	140	<3	24	70	25
D6	-	-	101	640	*	91	47	88	23	108	117	70	18	194	56
D7	-	-	140	-	-	-	-	-	-	-	-	-	-	-	-
D8	-	-	-	29	53	79	188	*	*	187	66	216	53	65	38
D9	-	-	129	-	-	-	-	-	-	-	-	-	-	-	-

*Dust jar knocked over

**Sample was below the laboratory Limit of Detection of <3 mg/gauge

*** Invalid result as jar was tampered with

For inspection purposes only. Consent of copyright owner required for any other use.

EPA Export 26-07-2013:00:53:27

2.2.2 Noise

2.2.2.1 Introduction

TOBIN Consulting Engineers were commissioned by Bord na Móna to undertake the noise component of the Environmental Impact Assessment for the intensification and extension of the Drehid Waste Management Facility. To date five noise monitoring surveys have been undertaken at the waste management facility including:

- A baseline survey (2003);
- An annual survey (2006);
- An annual survey (2007);
- Survey in August 2007; and,
- Survey of new house to the east of the proposed site location in December 2007.

The main purpose of the five noise surveys undertaken was to:

- Establish the existing noise levels in the environs of the development;
- Assess the noise levels generated by the construction of the development; and:
- Specify appropriate ameliorative measures where deemed necessary.

Consent of copyright owner required for any other use.
For inspection purposes only.

2.2.2.2 Outline of Acoustics Terminology

Sound is produced by a mechanical disturbance emanating as a wave motion in air at a speed of about 330 metres per second (the speed of sound in air). Sound waves entering the ear evoke a physiological response, which causes nerve impulses to be transmitted to the brain. The brain interprets these impulses and perceives them as sound. This is characterised by its amplitude, measured in decibels (dB) and its frequency, measured in Hertz (Hz). Noise is unwanted or undesirable sound, it does not accumulate in the environment and is usually localised.

The Decibel Scale

The difficulty in assigning a unit of measurement to sound is the sensitivity of the human ear. Audible sound pressures range from the threshold of hearing and the threshold of pain, which corresponds to a ratio of 1:1,000,000. In order to cover this vast range a logarithmic unit: the decibel (dB) is used. The decibel scale corresponding to the threshold of hearing and the threshold of pain ranges from 0 to 140dB. A decibel is defined as ten times the base-ten logarithm of a power ratio.

EPA Export 26-07-2013:00:53:27

Table 2.2.2: The decibel scale with indicative noise examples

140dB	200Pa	Threshold of Pain
120dB	20Pa	Jet taking off
100dB	2Pa	Pneumatic Drill
80dB	0.2Pa	Heavy Truck
60dB	0.02	Business Office
40dB	0.002	Library
20dB	0.0002	Quiet Woodland
0dB	0.00002	Threshold of Hearing

Frequency

The size of the pressure fluctuation is measured using the Decibel, the rate of these fluctuations is measured by cycles per second or Hertz (Hz). Human ears are most sensitive to mid frequencies in the range between 500 Hz to 6kHz. Sounds with a frequency less that 20 Hz are generally not audible, this type of sound is said to be infrasonic. Above 20kHz sounds are generally inaudible and the sounds are described as ultrasonic.

For inspection purposes only.
Consent of copyright owner required for any other use.

'A' Weighting

Within that range the ear can tolerate low frequencies more than middle to high frequencies and one must ensure that any measurement device elicits a numerical value, which matches the ear's response. This is achieved by introducing an electronic filter (called an 'A' weighted filter) into the measuring system. This weighting characteristic provides good correlation with loudness and since its maximum lies in the frequency region where the ear is most sensitive, it takes into account the hearing damage potential of the noise. For this reason environmental noise levels are generally measured in terms of 'A' weighted decibels, dB(A).

A noise level in excess of 85 dB(A) gives a significant risk of hearing damage. A noise level increase of 3 dB(A) is barely perceptible, while an increase in noise level of 10 dB(A) is perceived as a twofold increase in 'loudness'.

Where noise levels vary in time, statistical analysis of the variation can be carried out. The results are usually stated in the form L_N (L for level), where N is the percentage of time a level is equalled or exceeded. Hence if L_{90} = 40 dB(A), the noise level exceeds 40 dB(A) for 90% of the time measured period i.e. background noise level is 40 dB(A).

In addition to the statistical units, the equivalent continuous level is also measured. The equivalent continuous level, L_{eq}, is measured in dB(A) and is a notional steady level that has the same sound energy as the real fluctuating sound over the same measurement period. It is measured using an integrating sound level meter (SLM).

EPA Export 26-07-2013:00:53:27

L_{eq} is often described as the total noise level for a specified period.

2.2.2.3 The Receiving Environment

During the initial baseline assessment in 2003 noise monitoring was carried out at 4 No. monitoring locations. Location N5 was included in the 2006 and 2007 surveys at the request of Kildare County Council, while location N6 was added due to the construction of a new house to the south west of the landfill footprint. The locations of the noise monitoring points are shown in Table 2.2.3 below and on Drawing No. 3369-2407.

Table 2.2.3: Noise monitoring locations

Noise Monitoring Point	Grid Reference	Location
N1	273095, 231446	Noise sensitive receptor located to the south west of the landfill footprint. The monitoring equipment was installed adjacent to a farmyard next to an occupied dwelling house.
N2	274374, 233202	This monitoring point is located within the site boundary to the north of the landfill footprint, close to nearest occupied dwelling along the L5025 road.
N3	274933, 232734	This monitoring point is located northeast of the landfill footprint.
N4	272974, 228094	This monitoring point is located to the southwest of the landfill footprint, along the R403 road at the entrance to the facility.
N5	275563, 230238	This monitoring point is located to the southeast of the facility boundary.
N6	273254, 231287	This noise sensitive receptor is located at a new build house, south of N2 on the L5025 road.

For inspection purposes only.
Consent of copyright owner required for any other use.

At each of the monitoring locations the following data was recorded:

$L(A)_{eq}$: Equivalent Continuous A-weighted Sound Level. The continuous steady noise level, which would have the same total A-weighted acoustic energy as the real fluctuating noise measured over the same period of time.

$L(A)_{10}$: The noise level that is equalled or exceeded for 10% of the measurement period; and

$L(A)_{90}$: The noise level that is equalled or exceeded for 90% of the measurement period.

At present there are no statutory limits for environmental noise levels, however, the

EPA Export 26-07-2013:00:53:27

EPA recommend that ideally, on sites of industrial nature or similar, if the total noise level from all sources is taken into account, the noise level at sensitive locations should be kept below an L(A)eq value of 55dB(A) by daytime (08.00 to 22.00) and 45 dB(A) at night-time (22.00 to 08.00).

The methodology and results of each of the five noise surveys are presented below.

Baseline Noise Survey Methodology 2003

Continuous noise measurements were taken at four locations N1, N2, N3 and N4 as shown on Drawing No. 3369-2407. Noise surveys were carried out on representative working days and weekend days between the Friday 9th and the Monday 12th May 2003 at one location (N1) and between the Thursday 22nd and 23rd May 2003 at two further locations (N2 & N3). Short term (over a two hour period) readings were taken on the 22nd January 2004 at noise location N4, which is at the entrance to the site on the R403.

Dwelling houses along the County Road (L5025), which runs to the north of the proposed site boundary, were approached to undertake baseline noise monitoring however the occupants declined to allow monitoring equipment to be left adjacent to their dwellings. All measurements were carried out in accordance with ISO1996, Part 1 (Description and Measurement of Environmental Noise - Part 1:Basic Quantities and Procedures).

For inspection purposes only.
Consent of copyright owner required for any other use.

Weather conditions during the continuous survey were suitable for noise assessment; being dry and calm for the most part. During the survey from the 9th to the 12th May 2003 at N1 wind speeds were low and suitable for noise assessment. The average wind speed measured over a 30 minute interval ranged from 2.09m/s to 5.14m/s over the period 22nd May to 23rd May 2003 at N2 and N3.

The environmental noise levels were determined using the A-weighted network and fast-response (time constant of 125mSec). A Larson Davis 870 precision Integrating Sound Level Analyser was used for the continuous noise survey at N2. A RM Young (model 530) wind monitor was used to record wind speed and direction data at this location. A Larson Davis 824 precision Integrating Sound Level Analyser was used for the continuous noise monitoring at noise measurements at N1 and N3. A Larson Davis 812 precision Integrating Sound Level Analyser was used for the 2-hour short-term noise measurements at N4. At each noise measurement point the Sound Level Meter (SLM) was mounted on a tripod so that the microphone was maintained at 1.5 metres above ground level and at least 3.5 metres from any potential noise reflecting surfaces. During the surveys at N1, N2 and N3 the equipment was unmanned. At N4 the monitor was manned and observations made.

EPA Export 26-07-2013:00:53:27

Baseline Noise Survey Results 2003

The noise survey carried out in May 2003 and January 2004 reflects the existing noise environment in the environs of the waste facility at this time. The surrounding area is rural in nature and there are no noise sensitive receptors within 1,000m of the landfill footprint.

A graph of the 4 day survey undertaken at noise monitoring location N1 is shown on Figure 2.2.1. All other noise monitoring at N2, N3 and N4 was undertaken over shorter timeframes and the noise levels recorded are listed in Table 2.2.4.

Table 2.2.4: Noise Monitoring Results

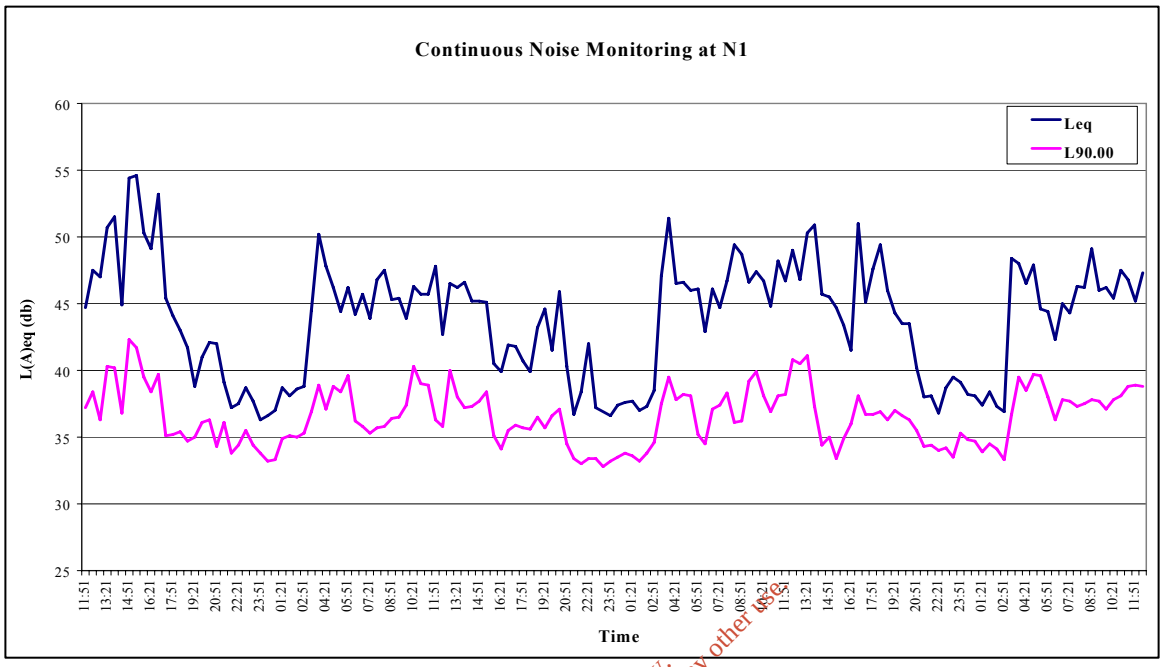
	L_{eq} (30 mins) dB(A)	L_{10} (30 mins) dB(A)	L_{90} (30 mins) dB(A)
DAYTIME (08.00 to 22.00)			
N1	45.2	47.6	37.0
N2	42.1	44.5	32.7
N3	50.0	53.6	37.3
N4	59.3	64.1	38.6
NIGHT TIME (22.00 to 08.00)			
N1	42.0	44.2	35.8
N2	36.8	39.3	29.0
N3	44.4	47.8	32.7

For inspection purposes only.
Consent of copyright owner required for any other use.

The dominant source of noise observed at N4 was derived from road traffic on the regional road the R403. Other sources include an over flying helicopter and a dog barking adjacent to the sound level meter.

EPA Export 26-07-2013:00:53:27

Figure 2.2.1: Graph of noise levels (Leq and L90)



Consent of copyright owner required for any other use.
For inspection purposes only.

Annual Survey Methodology 2006

In compliance with the requirements of Waste Licence Register No. W0201–01, Bord na Móna is required to carry out an annual assessment of ambient environmental noise levels. This noise assessment took place on the 28th August 2006 at five monitoring locations to assess daytime noise levels and on the 16th October 2006 to assess night time noise levels. On both monitoring occasions wind speed was less that 5 m/s.

The following equipment was employed during the acoustic assessments.

Bruel & Kjaer Real Time Noise Analyzer Type 2260 Observer with Sound Analysis Software BZ 7210:

Model No: 2260	Serial No. 2418359
Date of Certificate and Calibration	4th November 2005
Microphone Type: B&K 4936	Serial No: 2417709
Tripod	

The instrument was calibrated immediately before and after the measurement periods with no drift in calibration level noted.

All measurements were taken at 1.5m height above local ground level and 1-2 m away from reflecting surfaces. All noise measurements were sampled for the licence stipulated minimum time period of 30 minutes for daytime and 30 minutes for night

EPA Export 26-07-2013:00:53:27

time (15 minutes for boundary N2 /N3).

Annual Survey Results 2006

Table 2.2.5 represents the results of noise monitoring survey carried out at the Drehid Waste Management Facility during the day time period.

Table 2.2.5: Noise Measurement Results (Daytime) 28th August 2006

Location No.	Measurement Period (minutes)	Time	Leq dB(A)	L10 dB (A)	L90 dB (A)	Laf Max dB (A)
N1 (NSL)	30	12.15 – 12.45	38	43	33	49
N2	30	14.40 – 15.10	46	41	26	70
N3	30	14.02 – 14.32	31	34	25	48
N4	30	13.25 – 13.55	54	57	30	71
N5	30	15.30 – 16.00	38	41	32	47

Table 2.2.6 represents the results of noise monitoring survey carried out at the Facility during the night time period.

For inspection purposes only.
Consent of copyright owner required for any other use.

Table 2.2.6: Noise Measurement Results (Night time) 16th October 2006

Location No.	Measurement Period (minutes)	Time	Leq dB(A)
N1 (NSL)	30	22.43 – 23.13	32
N2	15	23.30 – 23.45	33
N3	15	23.50 –00.05	31
N4	30	22.05 – 22.35	56
N5	Not carried out following site access issues due to flooding and site inaccessibility		

Annual Noise Survey Methodology 2007

Noise monitoring was carried out on 22nd March 2007 during the day (for 30 minute intervals) at 4 boundary locations (N2, N3, N4, N5) and 1 Noise Sensitive Location (N1) (see Drawing No. 3369-2407). Weather conditions during monitoring were dry with a slight -moderate breeze. The recorded wind speed at nearest Synoptic Station (Casement) was 2.98 m/s on 22/03/07.).

All measurements were taken at 1.5m height above local ground level and 1-2 m away from reflecting surfaces. All acoustic instrumentation was calibrated before and after the survey period and no drift of calibration was observed (calibration level 114dB at 1000Hz).

EPA Export 26-07-2013:00:53:27

The following instrumentation was used in the environmental noise monitoring survey:

- One Larson Davis 824 Precision Integrating Sound Level Analyser/Data logger with Real-Time Frequency Analyser Facility
- Wind Shield Type: Larson Davis 2120 Windscreen
- Calibration Type: Larson Davis Precision Acoustic Calibrator Model CA200

Annual Survey Results 2007

Table 2.2.7 represents the results of noise monitoring survey carried out at the Drehid Waste Management Facility on the 22nd March 2007.

Table 2.2.7: Noise Monitoring Results- dB(A) and 30 minute intervals

Location	Date	Time	Leq	L_{10}	L_{90}	Comments
DAYTIME MONITORING						
N1	22nd March 2007	14.47	51.5	44.8	34.2	Dominant noise sources included facility construction activity to the northeast, site activity from the stud (Approx 300m west from N1) including a radio and constant birdsong. Distant traffic, a dog barking and a passing tractor also contributed to noise levels.
N2	22nd March 2007	13.43	39.9	42.3	32.0	Facility construction activities were not audible at this location. Dominant noise sources included distant traffic to the north west and frequent traffic passing along the L5025 road. Occasional dogs barking to north west also contributed to noise levels.
N3	22nd March 2007	13.01	40.4	41.1	32.6	Dominant noise sources included distant traffic to the north west and frequent traffic passing along the L5025 road. Constant bird song and a moderate breeze in surrounding vegetation also contributed to noise levels. Occasionally site activities were slightly audible to the southwest
N4	22nd March 2007	17.27	74.4	78.6	49.3	Dominant noise source at this location is passing vehicles on the R403 road. Constant birdsong and a passing helicopter also contributed to noise levels. Site construction activities were occasionally audible at N4.
N5	22nd March 2007	16.11	47.4	39.9	32.5	Dominant noise sources include distant traffic to the northeast and occasional site activity to the northwest. Constant bird song and a slight breeze in surrounding vegetation also contributed to noise levels.

For inspection purposes only.
Consent of copyright owner required for any other use.

EPA Export 26-07-2013:00:53:27

Noise Survey Methodology August 2007

Noise monitoring was carried out on 10th August 2007 during the day (for 30 minute intervals) at 4 boundary locations (N2, N3, N4, N5) and 1 Noise Sensitive Location (N1) (see Drawing No. 3369-2407). Weather conditions during monitoring were dry with a slight breeze. The recorded wind speed at nearest Synoptic Station (Casement) was 3.24 m/s on 10/08/07.).

All measurements were taken at 1.5m height above local ground level and 1-2 m away from reflecting surfaces.

All acoustic instrumentation was calibrated before and after the survey period and no drift of calibration was observed (calibration level 114dB at 1000Hz).

The following instrumentation was used in the environmental noise monitoring survey:

- One Larson Davis 824 Precision Integrating Sound Level Analyser/Data logger with Real-Time Frequency Analyser Facility
- Wind Shield Type: Larson Davis 2120 Windscreen.
- Calibration Type: Larson Davis Precision Acoustic Calibrator Model CA200.

For inspection purposes only.
Consent of copyright owner required for any other use.

EPA Export 26-07-2013:00:53:27

Noise Survey Results August 2007

Table 2.2.8: Noise Monitoring Results- August 2007

Location	Date	Time	Leq	L_{10}	L_{90}	Comments
DAYTIME MONITORING						
N1	10th August 2007	12.49	37.3	38.9	33.8	Facility construction activity was the dominant noise source, predominantly vehicle movement. Birdsong and passing aircraft also contributed to noise levels. Distant traffic to southwest was also occasionally audible.
N2	10th August 2007	11.46	36.0	38.0	32.4	Facility construction activities, distant traffic to the southwest and passing traffic along the L5025 road were the dominant noise sources at this location. Birdsong and a passing aircraft also contributed to noise levels.
N3	10th August 2007	11.07	40.3	47.7	34.7	Dominant noise sources included facility construction activities and a circling helicopter. Distant traffic to the southwest, birdsong and frequent traffic passing along the L5025 road also contributed to noise levels.
N4	10th August 2007	13.57	62.1	67.1	41.6	Dominant noise source at this location is passing vehicles on the R403 road. An engine from equipment draining an adjacent field was also audible. Vehicles entering / exiting the site and birdsong also contributed to noise levels at N4.
N5	10th August 2007	-	-	-	-	Not carried out due to site access issues. Location of N5 was flooded.

For inspection purposes only. Consent of copyright owner required for any other use.

EPA Export 26-07-2013:00:53:27

Noise Survey Methodology December 2007

Noise monitoring was carried out on 10th December 2007 during the day and night (for 30 minute intervals) at location N6 (see Drawing No. 3369-2407). Weather conditions during monitoring were dry with a slight breeze.

All measurements were taken at 1.5m height above local ground level and 1-2 m away from reflecting surfaces.

All acoustic instrumentation was calibrated before and after the survey period and no drift of calibration was observed (calibration level 114dB at 1000Hz).

The following instrumentation was used in the environmental noise monitoring survey:

- One Larson Davis 824 Precision Integrating Sound Level Analyser/Data logger with *Real-Time* Frequency Analyser Facility
- Wind Shield Type: Larson Davis 2120 Windscreen.
- Calibration Type: Larson Davis Precision Acoustic Calibrator Model CA200.

Noise Survey Results December 2007

Table 2.2.9: Noise Monitoring Results- December 2007

Location	Date	Time	Leq	L_{10}	L_{90}	Comments
DAYTIME MONITORING						
N6	10th December 2007	14:45	41.2	42.3	38.3	Mushroom facility and stud farm were dominant sources, traffic on adjacent roads audible. Birdsong and passing aircraft also contributed to noise levels. Foliage noise also audible.
NIGHT TIME MONITORING						
N6	10th December 2007	22:08	36.0	38.0	32.4	Mushroom facility was dominant source, traffic on adjacent roads audible. Birdsong and passing aircraft also contributed to noise levels. Foliage noise also audible. Helicopter circling overhead. Modified cars (large bore exhausts) racing on main road in distance.

For inspection purposes only.
Consent of copyright owner required for any other use.

EPA Export 26-07-2013:00:53:27

2.3 Climate

2.3.1 Introduction

In this section a general overview of the climate in the Kildare region and more specific meteorological data for the site is outlined.

2.3.2 General

Over the summer months the influence of anti-cyclonic weather conditions on the Western and Northwestern region results in dry continental air interspersed by the passage of Atlantic frontal systems. During much of the winter period, the climate is characterised by the passage of Atlantic low-pressure weather systems and associated frontal rain belts from the west. Occasionally the establishment of a high-pressure area or anticyclone over Ireland results in calm conditions and during the winter months these are characterised by clear skies and the formation of low-level temperature inversions with light wind conditions at night- time. If anticyclonic conditions become established for a few days or more during the summer months, high temperatures during the day might be recorded, especially at inland locations. Long spells of dry weather are relatively rare but should continental air masses or anticyclones persist over Ireland a period of drought conditions may occur which could last up to 2 or 3 weeks.

For inspection purposes only.
Consent of copyright owner required for any other use.

2.3.3 Weather observation stations.

Synoptic stations

Synoptic stations are those, which observe and record all the surface meteorological data. These observations include rainfall, temperature, wind speed and direction, relative humidity, solar radiation, clouds, atmospheric pressure, sunshine hours, evaporation and visibility. They report a mixture of snapshot hourly observations of the weather known as synoptic observations, and daily summaries of the weather known as climate observations.

There are 15 synoptic stations scattered throughout the country;

- Malin Head;
- Clones;
- Belmullet;
- Knock Airport;
- Claremorris;
- Mullingar;
- Dublin Airport;
- Birr;
- Shannon Airport;

EPA Export 26-07-2013:00:53:27

- Kilkenny;
- Valentia Observatory;
- Cork Airport;
- Casement Aerodrome, Baldonnel;
- Rosslare; and
- Clyone.

Rainfall Stations

In addition there are a number of rainfall measuring stations throughout the country. These stations measure the daily rainfall in (mm). A number of these will also measure additional parameters such as soil moisture, temperature, humidity, etc.

2.3.4 Rainfall

No meteorological weather stations are located within the site. In order to give reliable climatic data for an area a weather station should be within 10km of the site and be in operation for at least 30 years. The nearest station with a minimum of 30 years operation was identified at Lullymore, County Kildare (Grid Reference 271100, 228900), which is approximately 4km southwest of the site.

This station records rainfall measurements only. The nearest synoptic weather station of similar meteorological conditions (i.e. a weather station that includes wind speed and direction measuring equipment and evapotranspiration measuring equipment) with a minimum of 30 years operation was identified as Casement Aerodrome, County Dublin. Specifics of the stations relative to the site are outlined in the Table 2.3.1.

For inspection purposes only.
Consent of copyright owner required for any other use.

Table 2.3.1: Designated Meteorological Stations for the Drehid Site

Site	Meteorological Station
Drehid Site (85 m O.D.)	Casement Aerodrome (94m O.D) *c*. 35km northeast of site.
	Lullymore (84m O.D) *c*. 4 km southwest of site

The monthly and annual rainfall values for Lullymore Meteorological station are presented in Table 2.3.2 below.

Table 2.3.2: Monthly and Annual Rainfall Values (mm) for Lullymore (1945-1992)

Station	Ht. MOD	J	F	M	A	M	J	J	A	S	O	N	D	Annual (mm)
Lullymore	84	79	54	60	54	61	63	57	78	71	80	76	83	813

As can be seen from the above table, the annual rate of precipitation at Lullymore station is 813mm. According to Met Éireann, annual rainfall values increase by about

EPA Export 26-07-2013:00:53:28

200 to 300 mm per year for every 100m increase in altitude. The difference in height between the station and the site is small (approximately 9m) so that no adjustment was considered necessary.

At the site, almost 55% of the annual total is recorded during the winter period (Oct - March). This amount of precipitation (including snow) will normally be associated with more pro-longed Atlantic frontal weather depressions passing over the region compared to the summer.

2.3.5 Wind

The closest synoptic weather station with wind measurement equipment and in operation for at least 30 years is the Casement Aerodrome synoptic station. The wind rose for Casement Aerodrome shows that the prevailing winds are from the south and southwest, with lesser wind flows from the north and east (Appendix 2.3.1). Wind speed generally increases with increased elevation, however in this instance the difference is approximately 9m and so no adjustment is necessary.

For inspection purposes only.
Consent of copyright owner required for any other use.

2.3.6 Evapotranspiration

The nearest Meteorological Station with evapotranspiration measuring equipment is located at Casement Aerodrome (Baldonnel) synoptic station. Evapotranspiration is the return of water vapour to the atmosphere by evaporation from land and by the transpiration by plants, generally measured from a short-grass covered surface (such as a permanent pasture) adequately supplied with water. Evaporation is the return of water vapour to the atmosphere by evaporation from a free water surface such as a reservoir, lake, pool, or saturated soil. Evaporation is generally measured using a large pan of water, known as a "Class A Pan", fitted with a depth measuring gauge. The evapotranspiration figures for the Casement Aerodrome Synoptic Station are detailed in Table 2.3.3 below.

Table 2.3.3: Monthly and Annual Mean Values of Potential Evapotranspiration (mm) for Casement Aerodrome (1961-1990)

Month	J	F	M	A	M	J	J	A	S	O	N	D
Evapotranspiration (mm)	7.2	18.1	35.0	53.9	75.7	87	85.5	68.4	45.9	22.3	7.5	3.7

EPA Export 26-07-2013:00:53:28

In order to design a drainage management system for the waste management facility, the extreme rainfall return matrix for the Lullymore station was obtained from Met Éireann. A copy of the extreme rainfall return matrix is contained in Appendix 2.3.2 High rainfall values, which equate to significant return period and storm durations, were chosen in order to design the drainage system. These rainfall values were applied in order to design the settlement lagoons, in order to account for potential changes in rainfall intensity.

For inspection purposes only.
Consent of copyright owner required for any other use.

EPA Export 26-07-2013:00:53:28

2.4 Geology and Hydrogeology

2.4.1 Introduction

The site is located in a large Bord na Móna landbank in north County Kildare. The entire Bord na Móna landbank, comprising 2,544ha, is divided into a northern portion of 799ha and a southern portion of 1,745ha. The northern portion and southern portions of the Bord na Móna property are divided by the L5025 County Road, which crosses the narrowest section of the peat deposit.

The waste management facility under construction occupies approximately 179ha (including access road from the facility to the R403 at Killinagh Upper) and is located in the southern portion of the landbank. The site investigation baseline assessment concentrated on the characterisation of the soil and geology environment within the southern portion of the Bord na Móna property, although the literature review focused on a wider area.

The entire Bord na Móna landbank in this area has been utilised for the industrial harvesting of peat over an approximate 50 year period therefore the soil environment is characterised at its current state, which is significantly altered from its original setting.

For inspection purposes only.
Consent of copyright owner required for any other use.

The baseline assessment of the soils and geology is concerned with an appraisal and description of the deposits within the site. The information contained in this section has been divided into sub-sections, so as to describe the various aspects pertaining to soil and geology. The sub-terrain environment is described from the surface down, as this was considered the easiest method to describe and conceptualise the different layers occurring under the site. The groundwater movement through the various sub-terrain media is also described.

The existing geological environment at the site and surrounding areas is characterised as follows:

- Description of geological environment from literature review;
- Description of geological environment from site investigation data;
- Hydraulic testing and determination of composition of various geological strata;
- Assessment of aquifer potential of geological material;
- Determination of groundwater vulnerability;
- Details of groundwater abstraction points from the regional geological environment;
- Determination of the groundwater piezometry of the shallow subsoil groundwater and the deeper bedrock groundwater; and

EPA Export 26-07-2013:00:53:28

- Characterisation of groundwater transmitted and stored in geological environment.

The extent of investigation is considered to have adequately characterised the geological and hydrogeological setting of the site. Historical and recent information was available from a number of sources, with the majority of the published information available from the Geological Survey of Ireland (GSI).

Site specific data, regarding the geological setting of the site, was available from investigation undertaken by TES Consulting Engineers and by APEX Geoservices Ltd and from previous investigations undertaken by Fehily Timoney and Co. Ltd on behalf of Kildare County Council. Samples were submitted to Glover Site Investigation Ltd. laboratory for analysis to quantify the geological and hydrogeological characteristics of the various strata.

The information included in this section is considered to meet the data requirements specified in the Institute of Geologists of Ireland publication "A Guide to Geology in Environmental Impact Statements". The level of data gathered is considered to provide a good basis for characterising the site.

For inspection purposes only.
Consent of copyright owner required for any other use.

2.4.2 Historical & Recent Geological Information from Literature Review

Soil

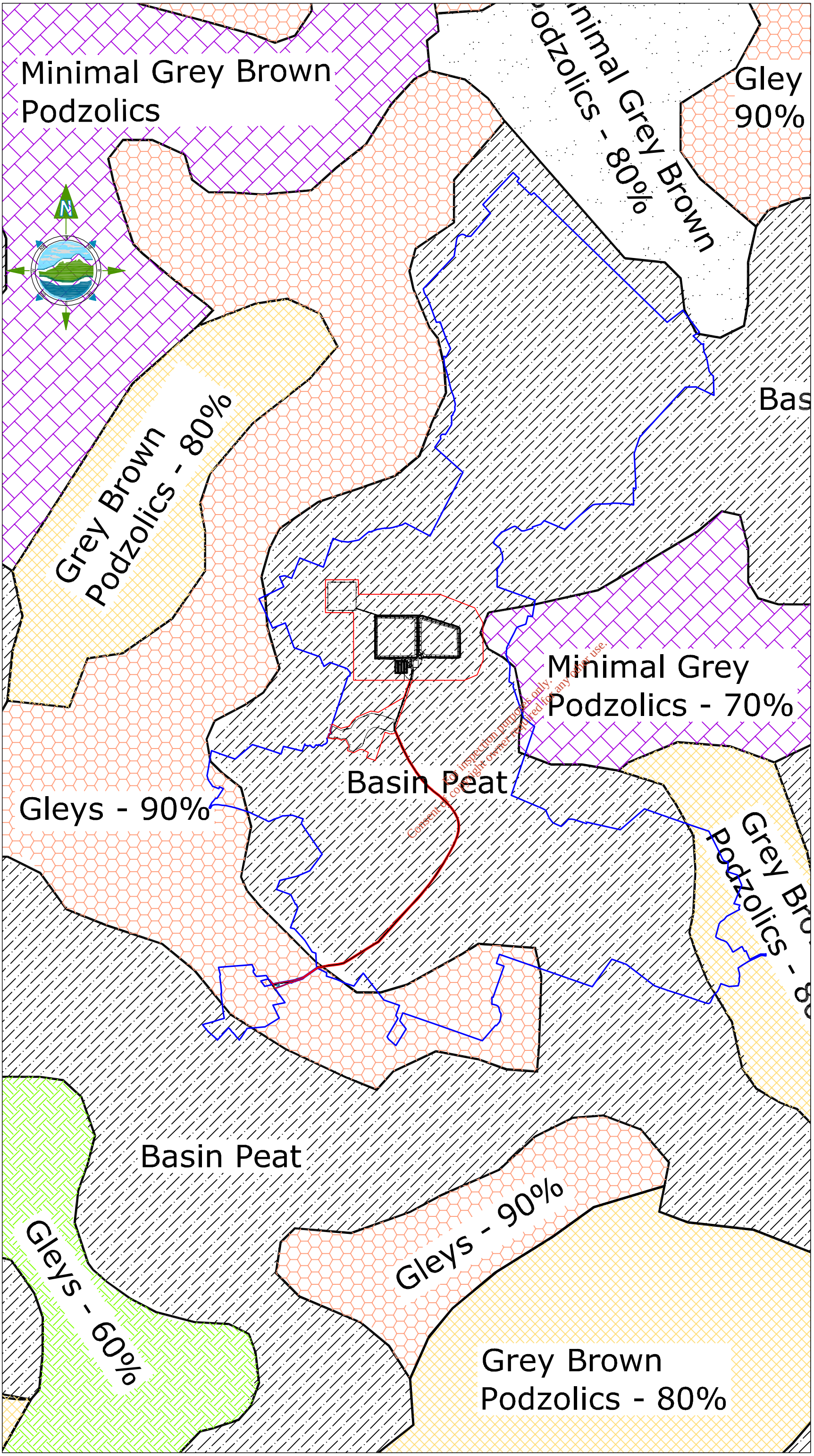
The distribution of soil types in the vicinity of the site is shown on Figure 2.4.1, which is an extract from the Soils Map of Ireland, prepared by the National Soil Survey (1980). The soil map indicates that the principal dominant soil within the site comprises basin peat deposits.

Quaternary Geology

The origin of the unconsolidated materials in this area is associated with the movement and deposition from the Irish Ice Sheet during the last Ice Age. The last Ice Age occurred during the Quaternary Period (1.6 million years to 10,000 years ago), which is the most recent period in the geological timeframe.

The Quaternary map (2004), produced by the GSI as part of the Groundwater Protection Scheme for County Kildare, indicates the all lands within the landfill activity boundary are covered with peat deposits (Figure 2.4.2). This is supported by the Teagasc Subsoil (Parent Material) dataset which is available on the GSI website. The freer draining lands on the verge of the applicant's property and underlying agricultural lands bordering the site are underlain by '*Till chiefly derived from Limestone*' (GSI website). This till is known to underlie the peat material within the site.

EPA Export 26-07-2013:00:53:28



GENERAL LEGEND

BORD NA MÓNA OWNERSHIP BOUNDARY

SITE ACTIVITY BOUNDARY

NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER TO BE INFORMED BY THE CONTRACTOR OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD
5. 6" OS SHEET NO'S: KILDARE 3, 4, 8, 9 & 13

400m 0 400m 800m 1200m

A	17-04-08	ISSUED FOR PLANNING	MN	PON
Issue	Date	Description	By	Chkd.

Client: BORD NA MÓNA

Project: INTENSIFICATION AND EXTENSION TO DREHID WASTE MANAGEMENT FACILITY

Title: REGIONAL SOIL TYPES

Scale @ A3: 1:40,000

Prepared by:	Checked:	Date:
M. Nolan	P. O'Neill	April 2008

Project Director: D. Grehan

TOBIN
Patrick J. Tobin & Co. Ltd.
Consulting, Civil and Structural Engineers,
Block 10-4, Blanchardstown Corporate Park,
Dublin 15, Ireland.
tel: +353-(0)1-8030406
fax:+353-(0)1-8030409
e-mail: info@tobin.ie
www.tobin.ie

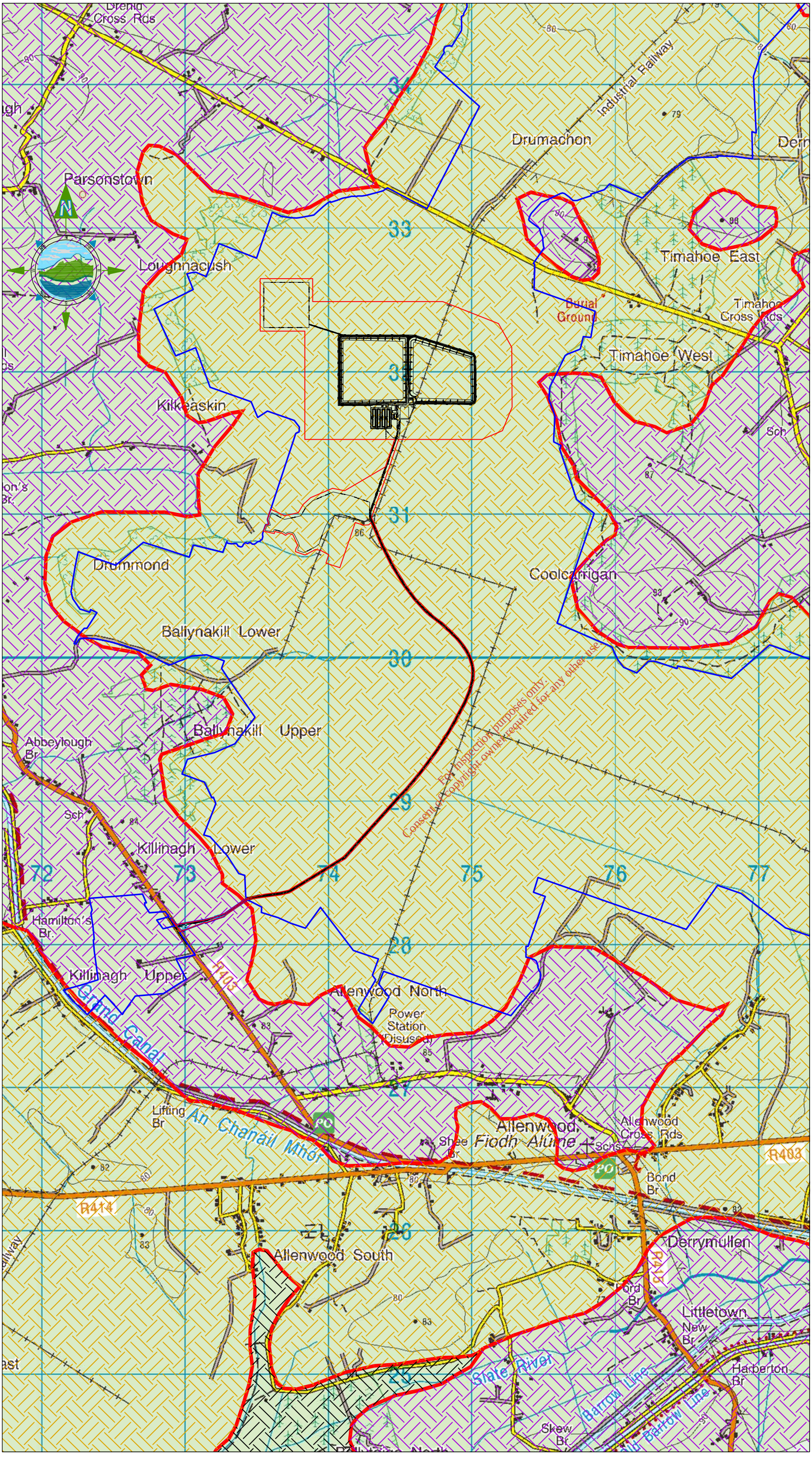
No part of this document may be reproduced or transmitted in any form or stored in any retrieval system of any nature without the written permission of Patrick J. Tobin & Co. Ltd. as copyright holder except as agreed for use on the project for which the document was originally issued.

Drawing No.: Figure 2.4.1

Issue: A

Ordnance Survey Ireland License No EN 0016008 ©Ordnance Survey Ireland and Government of Ireland

EPA Export 26-07-2013:00:53:28



For inspection purposes only.
Consent of copyright owner required for any other use.

GENERAL LEGEND

BORD NA MÓNA OWNERSHIP BOUNDARY

SITE ACTIVITY BOUNDARY

ALLUVIAL DEPOSITS

UNDIFERENCIATED

PEAT

N O T E S

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER TO BE INFORMED BY THE CONTRACTOR OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD
5. 6" OS SHEET NO'S: KILDARE 3, 4, 8, 9 & 13

250m 0 250m 500m 750m

A	17-04-08	ISSUED FOR PLANNING	MN	PON
Issue	Date	Description	By	Chkd.

Client: BORD NA MÓNA

Project: INTENSIFICATION AND EXTENSION TO DREHID WASTE MANAGEMENT FACILITY

Title: QUARTENARY DEPOSIT MAP

Scale @ A3: 1:25,000

Prepared by:	Checked:	Date:
M. Nolan	P. O'Neill	April 2008

Project Director: D. Grehan

TOBIN
Patrick J. Tobin & Co. Ltd.
Consulting, Civil and Structural Engineers,
Block 10-4, Blanchardstown Corporate Park,
Dublin 15, Ireland.
tel: +353-(0)1-8030406
fax:+353-(0)1-8030409
e-mail: info@tobin.ie
www.tobin.ie

No part of this document may be reproduced or transmitted in any form or stored in any retrieval system of any nature without the written permission of Patrick J. Tobin & Co. Ltd. as copyright holder except as agreed for use on the project for which the document was originally issued.

Drawing No.: Figure 2.4.2 Issue: A

Ordnance Survey Ireland License No EN 0016008 ©Ordnance Survey Ireland and Government of Ireland

EPA Export 26-07-2013:00:53:28

EPA Export 26-07-2013:00:53:28

128.300
GW7

< 60.00
BH8

35.000
6773

17.000
754

~15.50
BH9

24.000
GW6PW

12.000
GW1D

18.00
BH1

4.500
725

14.000
GW4D

24.500
724

15.500
781

17.500
780

12.000
779

9.000
GW3D

15.000
GW2D

For inspection purposes only.
Consent of copyright owner required for any other use.

GENERAL LEGEND

BORD NA MONA OWNERSHIP BOUNDARY

SITE ACTIVITY BOUNDARY

DEPTH TO BEDROCK AND BOREHOLE ID ~15.50 BH9

SOURCES OF INFORMATION:
GSI OPEN FLE RECORDS
FEHILY TIMONEY SITE INVESTIGATION
TES CONSULTING ENGINEERS SITE INVESTIGATION

NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER TO BE INFORMED BY THE CONTRACTOR OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD
5. 6" OS SHEET NO'S: KILDARE 3, 4, 8, 9 & 13

100m 0 100m 200m 300m

Issue	Date	Description	By	Chkd.
A	17-04-08	ISSUED FOR PLANNING	MN	PON

Client: BORD NA MÓNA

Project: EIS FOR EXTENSION TO DREHID WASTE MANAGEMENT FACILITY

Title: DEPTH TO BEDROCK

Scale @ A3: 1:10,000

Prepared by:	Checked:	Date:
M. Nolan	P. O'Neill	April 2008

Project Director: D. Grehan

TOBIN
Patrick J. Tobin & Co. Ltd.
Consulting, Civil and Structural Engineers,
Block 10-3, Blanchardstown Corporate Park,
Dublin 15, Ireland.
tel: +353-(0)1-8030406
fax:+353-(0)1-8030409
e-mail: Info@tobin.ie
www.tobin.ie

No part of this document may be reproduced or transmitted in any form or stored in any retrieval system of any nature without the written permission of Patrick J. Tobin & Co. Ltd. its copyright owner, except as agreed for use on the project for which the document was originally issued.

Drawing No.: Figure 2.4.3

Issue: A

Ordnance Survey Ireland License No EN 0016008 ©Ordnance Survey Ireland and Government of Ireland

EPA Export 26-07-2013:00:53:28

GENERAL LEGEND

BORD NA MONA OWNERSHIP BOUNDARY

SITE ACTIVITY BOUNDARY

STRATIGRAPHIC BOUNDARY

INFERRED FAULT

CD - CALP
(Dark grey to black limestone and shale)

AW - ALLENWOOD FORMATION
(Thick-bedded limestone, locally peloidal)

WA - WAULSORTIAN LIMESTONES
(Massive unbedded fine grained limestone)

BN - BOSTON HILL FORMATION
(Nodular & muddy limestone & shale)

Extract from GSI Sheet 16-Geology at Kildare -Wicklow (1995)

N O T E S

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING

2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE

3. ENGINEER TO BE INFORMED BY THE CONTRACTOR OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES

4. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

5. 6" OS SHEET NO'S: KILDARE 3, 4, 8, 9 & 13

200m 0 200m 400m 600m

Issue	Date	Description	By	Chkd.
A	17-04-08	ISSUED FOR PLANNING	MN	PON

Client: BORD NA MÓNA

Project: EIS FOR EXTENSION TO DREHID WASTE MANAGEMENT FACILITY

Title: REGIONAL BEDROCK GEOLOGY

Scale @ A3: 1:20,000

Prepared by: M. Nolan | Checked: P. O'Neill | Date: April 2008

Project Director: D. Grehan

TOBIN
Patrick J. Tobin & Co. Ltd.
Consulting, Civil and Structural Engineers,
Block 10-3, Blanchardstown Corporate Park,
Dublin 15, Ireland.
tel: +353-(0)1-8030406
fax:+353-(0)1-8030409
e-mail: info@tobin.ie
www.tobin.ie

No part of this document may be reproduced or transmitted in any form or stored in any retrieval system of any nature without the written permission of Patrick J. Tobin & Co. Ltd. All copyright notices must be agreed for use on the project for which the document was originally issued.

Drawing No.: Figure 2.4.4 | Issue: A

Ordnance Survey Ireland License No EN 0016008 ©Ordnance Survey Ireland and Government of Ireland

Reference to the 19th century, 6-inch to 1-mile scale, field sheets indicates that the till comprises Clay and Gravel, with sporadic isolated lenses of Sand and Gravel interbedded with the till. The field sheets do not record any rock outcrops in the vicinity of the applicant's property.

Information available from the GSI open file records indicates that a number of mineral exploration boreholes were drilled in this area and data on the depth to bedrock are available from these records. Depth to bedrock information in the environs of the site activity boundary from these GSI mineral exploration borehole records, are shown on Figure 2.4.3. These GSI records indicate that the Quaternary deposits are quite thick in this area with the depth to bedrock varying between 10m and 35m in the vicinity of the site.

Bedrock Geology

Reference to the most recently published geological map for this area, the 1:100,000 scale Sheet 16 – Geology of Kildare-Wicklow (GSI 1995), indicates that this area of County Kildare is underlain by Carboniferous aged (355million years to 290 million years ago) limestone deposits.

For inspection purposes only.
Consent of copyright owner required for any other use.

The Carboniferous bedrock forms low elevation ground and is covered by overburden deposits. Outcrops of Carboniferous bedrock are scarce in the vicinity of the site. The current understanding of the bedrock geology in this area is based on the extensive mineral exploration boreholes that have been drilled in this area.

Figure 2.4.4 is an extract from the GSI Sheet 16 publication and shows the lithological distribution in the vicinity of the site and the broader succession groups, which are described below.

The Carboniferous limestone succession underlying the site was deposited in a shallow water shelf environment, which is referred to as the 'Kildare Shelf' succession. The 'Kildare Shelf' succession is bound to the west by the 'Portarlington Trough' succession and to the north by the 'Dublin Basin' succession. The Portarlington Trough and the Dublin Basin successions are described as basin successions that were deposited in a deeper marine environment following erosion of the Kildare Shelf succession. The Kildare Shelf succession in the vicinity of the site, based on the geological map, comprises the Boston Hill Formation, the Waulsortian Limestone and the Allenwood Formation.

- The Boston Hill Formation comprises rather uniform, thick successions of nodular and diffusely bedded, argillaceous limestones (fine grained limestone, comprising predominantly clay minerals) and subordinate thin shales. The contact with the Waulsortian Limestone is gradational.

EPA Export 26-07-2013:00:53:28

- The Waulsortian Limestone consists mainly of pale grey biomicrite (a limestone consisting of skeletal debris and carbonate mud). The sediments commonly form individual and coalesced mounds with depositional dips of 30-40 degrees.
- The Allenwood Formation comprises peloidal and crinoidal limestone and minor oolite at the base with micrites and minor shales overlying and mainly pelsparite (limestone consisting of peloids and spary-calcite) at the top of the succession. The Edenderry Oolite Member, which is part of the Allenwood Formation, is not distinguished on all locations of the map due to its irregular distribution.
- The Dublin Basin depositional succession and the Portarlington Trough depositional succession are dominated by the Calp Limestones. The term 'Calp' is used to refer to the various basinal limestone and shales occurring in these successions. The Calp units generally consist of dark grey, fine grained, graded limestone with interbedded black shales. The variation in bed thickness, grain size, colour and proportion of shale is a feature of the depositional environment in which these sediments were deposited in the basin.
- The structural geology of the Carboniferous Limestones is poorly understood and any faults shown on the geological map are considered to be very tentative, as indicated by the Geological Survey of Ireland. The poorly understood tectonics is due to the poor control of the bedrock geology as a result of the lack of outcrop exposure.

For inspection purposes only.
Consent of copyright owner required for any other use.

2.4.3 Geological information gathered from Site-Specific Investigations

Nature and Extent of Peat Material

Visual assessment of the site indicates that peat deposits occur across the entire site. Peat is a soil that is made up of the partially decomposed remains of dead plants that have accumulated on top of each other in waterlogged conditions over thousands of years. Peat is brownish-black in colour and in its natural state is composed of 90-95% water and 5-10% solid organic material.

Industrial harvesting of the peat deposits has occurred in the past within the site. In order to allow for such harvesting of the peat a network of large drains was opened up across the bog to reduce the moisture content of the material, thus allowing the land to be traversed by specialist plant and machinery. The appearance of the bog is heavily influenced by the drainage network, which divides the bog into a number of compartments. The topography of the site is heavily influenced by the previous industrial activity, where the harvesting has resulted in a relatively flat relief across the site.

EPA Export 26-07-2013:00:53:28