

## RECEIVING ENVIRONMENT REPORT

### AIR ENVIRONMENT

#### Study Area

The application site lies in the townland of Usk, Co. Kildare, at a former sand and gravel pit which ceased operations in 2010. The site is located approximately 2.3km west of Dunlavin Co. Wicklow and 7km south of Kilcullen, Co. Kildare. It is accessed via local roads which run for approximately 2.9km from a junction with the R448 Regional Road (the former N9 National Primary Road).

The application site was previously developed as a sand and gravel pit, and it hosts features typical of an extractive operation including stockpiles and former silt storage / settlement areas. The proposed waste recovery facility is located entirely within the former extractive site, within the void created by sand and gravel extraction, and will re-use some of the pre-existing site infrastructure and services where possible to do so.

The lands surrounding the former pit principally comprise agricultural fields, with occasional interspersed (former) sand and gravel extraction sites. The application site is not subject to any statutory or non-statutory nature conservation designations. Residential property in the vicinity of application site is generally located along the local road network, both as isolated farmhouse structures and in small clusters.

#### Baseline Study Methodology

The application site and surrounding area fall into Air Quality Zone D, categorised as rural locations throughout Ireland. No routine monitoring for air pollutants regulated under the Air Quality Standards Regulations (S.I. No. 180 of 2011) is routinely undertaken in the vicinity of the site.

The closest air quality monitoring location to the proposed recovery facility, and in a similar Zone D area, is located in Emo, approximately 20km west of the application site. The closest PM<sub>10</sub> monitoring in Zone D is carried in Kilkitt, County Monaghan. As such, it is considered the most appropriate dataset available for assessment of relevant baseline concentrations in the study area.

For rural areas, such as those surrounding the application site, the primary source of deposited dust would be local agricultural or rural based activities. As there are no major sources of deposited dust in close proximity to the proposed development, baseline levels of particulates would therefore be expected to be low.

Baseline dust monitoring was undertaken in line with the 'Bergerhoff method' referred to in the TA Luft Air Quality Standard in order to establish baseline dust emission limits. The input of atmospheric borne particulate material collecting in a plastic bottle over a pre-determined measurement period (usually one month) is measured and the total amount of particulate (dust) matter collected is expressed in units of mg/m<sup>2</sup>/day.

Total Nitrogen NO<sub>x</sub> was carried out by diffusive sampling. The absorbing medium contains an oxidant, which transforms NO to NO<sub>2</sub>. The amount of NO<sub>x</sub> is trapped as total nitrite. Samplers are placed in a special shelter to protect them from rain and minimize the wind influence.

Sources of Information

A desk study was carried out to examine all relevant information relating to air quality conditions around the application site. Met Eireann, the National Meteorological Service data was consulted in relation to the climate / weather data in respect of the study area. Information published on the EPA website in respect of air quality was reviewed.

Information published on its website by the National Parks and Wildlife Service (NPWS) (part of the Department of the Environment, Community and Local Government, DoECLG), in respect of designated ecological sites, protected habitats and species was also reviewed, together with Ordnance Survey maps and aerial photography.

Meteorology : Dispersion of Emissions

The most important climatological parameters governing atmospheric dispersion of particles are:

- wind direction : this determines the broad transport of the emission and the sector of the compass into which the emission is dispersed; and
- wind speed : this will affect ground level emissions by increasing the initial dilution of particles in the emission. It will also affect the potential for dust entrainment.

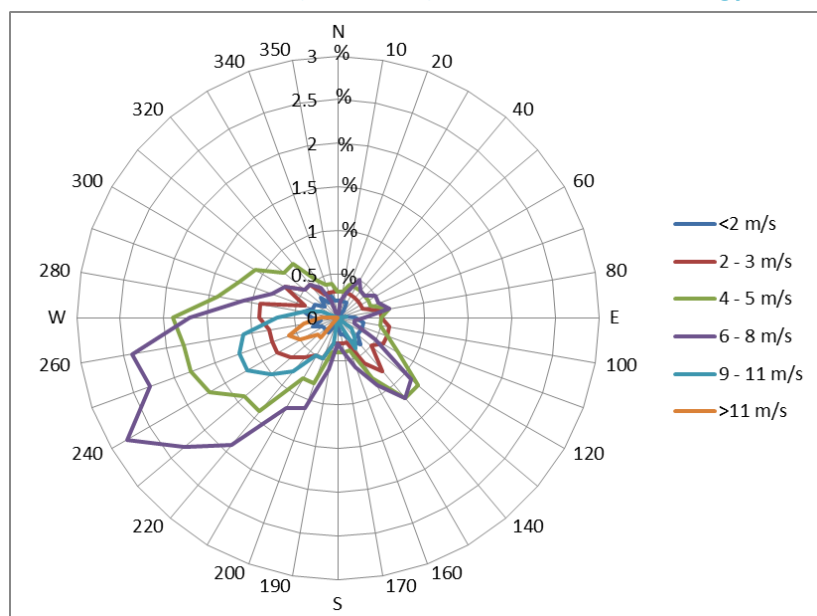
Rainfall is also an important climatological parameter in the generation of dust; sufficient amounts of rainfall can suppress dust at the source and eliminate the pathway to the receptor. Rainfall greater than 0.2mm per day is sufficient to suppress dust emissions.

Local Wind Speed and Direction

The closest weather station with sufficient records on wind direction and wind speed considered representative of conditions experienced at the application site is Baldonnell (Casement) Aerodrome Meteorological Station, located approximately 30 km to the northeast of the application site.

A windrose for the average conditions recorded at Baldonnell (Casement) Aerodrome, over a ten year period, is presented in Figure 1 overleaf. As can be seen, the predominant wind direction is from the southwestern quadrant.

Figure 1  
Windrose for Baldonnell (Casement) Aerodrome Meteorology Station



## Local Rainfall Data

Relevant rainfall data applicable to the site has been obtained from the Irish Meteorological Service website for the Baldonnel (Casement) Aerodrome station, approximately 30 km north-east of the application site. The annual average days with rainfall greater than 0.2 mm is 183 days per year. Natural dust suppression (from rainfall) is therefore considered to be effective for 50% of the year.

## Receiving Air Environment

### Dust

Dust deposition surveys were undertaken at and around the application site for a period from January 2018 to August 2018. The results of the dust deposition monitoring are presented in Table 1 below.

**Table 1**  
**Baseline Dust Deposition at Usk**

Date	Dust Deposition	
	D1 (mg/m <sup>2</sup> /day)	D2 (mg/m <sup>2</sup> /day)
30/01/18-20/03/18	<1	10
20/03/18 – 20/0/18	8	32
20/04/18 – 22/05/18	8	4
22/05/18 – 25/06/18	18	27
25/06/18 - 03/08/18	3	23

As will be noted, the recorded dust deposition rates at the application site at Usk over the monitoring period, which included extended dry periods over the relatively dry summer of 2018, are quite low and significantly below emission limit values (ELV's) of 350mg/m<sup>2</sup>/day guideline emission limit.

### Nitrogen Oxide

A nitrogen oxides survey was undertaken at the application site for the period from January 2018 to March 2018 and the results presented in Table 2 below:

**Table 2**  
**Background Nitrogen Oxides Concentrations**

Location	Date	Concentration µg/m <sup>3</sup>			
		NO	NO <sub>2</sub>	NO <sub>x</sub>	
AQ 1 (D1)	30/01/2018	20/03/2018	1.1	3.4	4.4

The recorded NO<sub>x</sub> concentrations monitored at the application site are noted to be significantly below the annual mean Air Quality Standards (AQS) of 40µg/m<sup>3</sup>.

## Particulates (PM<sub>10</sub>)

Recent annual mean concentrations monitored at Kilkitt, County Monaghan (published on the EPA website) are presented in Table 3 below.

**Table 3**  
**Background PM<sub>10</sub> Background Concentrations - Kilkitt**

Year	Annual Mean (µg/m <sup>3</sup> )	Number of Days >50µg/m <sup>3</sup>
2017	7.8	0
2016	8.1	0
2015	9	2

Table 3 indicates that PM<sub>10</sub> concentrations monitored at the Kilkitt monitoring site are below the annual mean Air Quality Standards (AQS) of 40µg/m<sup>3</sup> and comply with the requirement that a 24-hour mean of 50µg/m<sup>3</sup> should not be exceeded more than 35 times in a calendar year.

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## NOISE ENVIRONMENT

### Study Area

The application site lies in the townland of Usk, Co. Kildare, at a former sand and gravel pit which ceased operations in 2010. The site is located approximately 2.3km west of Dunlavin Co. Wicklow and 7km south of Kilcullen, Co. Kildare. It is accessed via local roads which run for approximately 2.9km from a junction with the R448 Regional Road (the former N9 National Primary Road).

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The lands surrounding the former pit principally comprise agricultural fields, with occasional interspersed (former) sand and gravel extraction sites. The application site is not subject to any statutory or non-statutory nature conservation designations. Residential property in the vicinity of application site is generally located along the local road network, both as isolated farmhouse structures and in small clusters.

### Sources of Information

Baseline information was gathered through a combination of desk-based study, site visit, and technical assessments consistent with current standard methodologies and published best practice guidelines, in order to provide relevant data to allow an assessment of likely significant effects of the proposed development on sensitive receptors within the zone of influence.

### Baseline Study Methodology

Environmental noise surveys were carried out to capture typical background noise levels at the noise-sensitive receptors closest to the application site. The methodology of the surveys and the results are set out below. The weather conditions during the survey periods were acceptable for noise monitoring, being generally dry with little or no wind.

The measurements were carried out using a Larson Davis 831 Type 1 sound level meter (serial number A0527). The sound level meter was calibrated before the measurements, and its calibration checked after, using a Larson Davis Cal200 field calibrator (serial number 6970). No calibration drifts were found to have occurred during surveys. All noise equipment had been calibrated to a traceable standard by UKAS (United Kingdom Accreditation Service) accredited laboratories within 12 months preceding the surveys.

At the measurement positions, the following noise level indices were recorded:

$L_{Aeq,T}$  is the A-weighted equivalent continuous noise level over the measurement period, and effectively represents an “average” value.

$L_{A90,T}$  is the A-weighted noise level exceeded for 90% of the measurement period. This parameter is often used to describe the background noise.

$L_{A10,T}$  is the A-weighted noise level exceeded for 10% of the measurement period. This parameter is often used to describe traffic noise.

Environmental noise surveys were undertaken by SLR Consulting Ireland staff at the nearest noise sensitive receptors to the application site on 30th January 2018. Noise measurements were undertaken over three, non-consecutive, 15-minute periods during the daytime (07:00 to 19:00).

The monitoring periods chosen are considered to give representative daytime noise levels at each noise sensitive location.

During the surveys, the sound level meter was located in free-field conditions (i.e. at least 3.5m from nearest vertical reflecting surface, with the microphone approximately 1.5m above ground level).

All noise levels are recorded in 'A-weighted' decibels, dB(A). A-weighting is the process by which noise levels are corrected to account for the non-linear frequency response of the human ear. All noise levels are quoted in dB(A) relative to a sound pressure of 20µPa.

## Field Survey / Monitoring

The noise monitoring locations used for the purposes of the baseline noise survey, shown in Figure 7-1-3-2A, comprise the following :

- BN1 to the north of the application site;
- BN2 to the north-east of the application site;
- BN3 to the east of the application site;

The baseline noise monitoring locations listed above are considered representative of the nearest noise sensitive locations (receptors) to the application site, as described below<sup>1</sup> :

- Location BN1 is considered representative of residential properties located to the north of application site, at the site entrance.
- Location BN2 is considered representative of the locations to the north-east of the application site.
- Location BN3 is considered representative of the residential properties located to the east of the application

## Receiving Noise Environment

Noise monitoring results for the baseline survey on are provided in Table 4 below.

**Table 4**  
**Summary of Measured Noise Levels, Free Field dB**

Location	Receptors	Period	Date	Time	L <sub>Aeq,T</sub>	L <sub>A90</sub>	L <sub>A10</sub>
BN1	R7,R10, R11,R12, R14, R15	Daytime	30/01/18	10:03-10:18	59.1	49.3	36.5
			30/01/18	11:16-11:31	61.8	59.5	37.0
			30/01/18	12:42-12:57	58.8	52.0	36.7
BN2	R16,R17,R18	Daytime	30/01/18	10:22-10:37	65.2	59.8	38.6
			30/01/18	12:03-12:18	59.9	58.3	41.3
			30/01/18	13:24-13:39	69.0	62.2	35.0
BN3	R24, R25, R26, R27	Daytime	30/01/18	10:41-10:56	55.1	55.8	34.1
			30/01/18	12:20-12:35	59.0	55.9	40.7
			30/01/18	13:42-13:57	56.2	55.3	40.3

<sup>1</sup> Note that noise levels were not taken at the exact locations of the noise sensitive properties as no access was made onto privately owned land.

At present the noise environment around the application site is dominated by road traffic noise emanating from the adjoining local road network. Locally, natural sounds such as farmyard animals or barking dogs, agriculture activities are also audible when traffic noise abates.

On the basis of the data presented in Table 4, it is concluded that all the locations may be designated as 'all other areas' in accordance with standards set out in the EPA's NG4 Guidance.

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## GROUND / GROUNDWATER ENVIRONMENT

### Study Area

The study area for the ground / groundwater baseline assessment report comprises three principal geographic areas:

- the proposed inert waste recovery facility;
- the immediate surrounding area within approximately 5km of the application site boundary.

### Sources of Information

The following sources of information were consulted in the preparation of the receiving environment baseline study for land (ground), soils and geology:

- Geological Survey of Ireland ([www.gsi.ie](http://www.gsi.ie));
- Teagasc soil and subsoil mapping for Irish Forestry Soils Project ([www.epa.ie](http://www.epa.ie));
- Irish Soils Information System ([www.teagasc.ie/soils](http://www.teagasc.ie/soils));
- Irish Geological Heritage Programme ([www.gsi.ie](http://www.gsi.ie));
- Ordnance Survey of Ireland ([www.osi.ie](http://www.osi.ie)); and

The following sources of information have been consulted in order to investigate the hydrogeology and hydrology of the area surrounding the application site:

- Environmental Protection Agency website ([www.epa.ie](http://www.epa.ie)) for maps and environmental data;
- Geological Survey of Ireland website ([www.gsi.ie](http://www.gsi.ie));
- Geology of Kildare-Wicklow, Sheet 16, (1995) 1:100,000 scale, Geological Survey of Ireland;
- Groundwater Protection Schemes ([www.gsi.ie](http://www.gsi.ie));
- Water Maps, Water Framework Directive online mapping ([www.wfdireland.ie](http://www.wfdireland.ie)); and
- Trial Pits and Borehole Logs.

A number of site visits were made in November 2018 and January 2019 for the purposes of arranging and overseeing groundwater monitoring well installation works, including well drilling and subsequent well development, monitoring of groundwater levels and collection of groundwater samples for laboratory analysis of groundwater quality.

Existing sumps / excavations and pit / quarry faces were inspected within the application site to obtain an indication of the local quaternary and bedrock geology. Inspections were also made of surface water features, former surface water management infrastructure and the site hydrogeological setting.

### Receiving Ground Environment

#### Land-Use

The application site is located within a former sand and gravel pit wherein soil cover and some underlying subsoil have previously been stripped or removed in order to facilitate the extraction of underlying natural aggregates for use in construction or in production of construction materials

The historical extraction of sand and gravel at the application site was a tied land-use activity being dependant on the local availability of aggregate reserves. The occurrence of the existing void space following completion of extraction activities and its availability for subsequent backfilling using excess / waste soil waste are interrelated or tied land uses.



### Soils Baseline

Teagasc soil mapping indicates that there are Rendzinas and Lithosols over much of the eastern part of the site and Lithosols and Regosols across the western part. Each of these soils types are shallow well drained soils that often form over calcareous limestone subsoil parent material and/or limestone bedrock. Soil mapping also indicates a small area of alluvial (river deposited) soil along the channel of the River Greese extending inside the eastern site boundary.

Lithosols are thin stony soils which typically comprise weathered rock fragments overlying bedrock and lack an underlying subsoil. Rendzinas are humus rich shallow stony soils which overlie solid or fragmented limestone bedrock. Regosols are shallow, well drained, weakly developed soils, often with a mineral topsoil.

Most of the soils at the site have previously been stripped to facilitate the extraction of the underlying natural sand and gravel / bedrock resource and are no longer in place over much of the application site. Any previously stripped topsoil present in isolated stockpiles around the site will be incorporated into the final landform following completion of backfilling and soil recovery activities.

### Subsoils Baseline

Published Teagasc subsoil mapping indicates that the eastern part of the application site is underlain by sand and gravels derived from carboniferous limestone, with some localised bedrock outcrop occurring across the area. The sand and gravel are understood to comprise glacial outwash deltaic deposits. Teagasc mapping also indicates that the western part of the application site is underlain by glacial till derived from Lower Palaeozoic Sandstone and Shale.

There is little extractable sand and gravel subsoil of economic value remaining across the eastern part of the site (at least above groundwater level), much of it having been extracted previously. It is unlikely that any significant depth of glacial till subsoil overlies bedrock at the western end of the site. Any which was present previously was stripped to facilitate rock extraction and is now stockpiled around the western perimeter of the application site.

Subsoil mapping also indicates a small area of alluvial (river deposited) subsoil along the channel of the River Greese extending inside the eastern site boundary.

Four groundwater monitoring wells were drilled at the application site to depths of 8m to 12m below existing ground level (bgl) . The boreholes encountered sand and gravel at all locations and monitoring installations made within this stratum. Gravelly clay was noted at 2 No. of the 4 No. boreholes. A 1m thick gravelly clay band was encountered at groundwater monitoring borehole BH02 at 2.5m depth. Gravelly clay was also encountered at BH04 at 9m depth. Drilling continued to 12m depth and continued through gravelly clay over this depth. As a consequence, the clay thickness at this location was not proven.

### Bedrock Geology Baseline

The bedrock geology map of Ireland published by the Geological Survey of Ireland indicates that the application site at Usk is underlain by the Carrighill Formation described as calcareous greywacke siltstone and shale. Geological mapping indicates that there are several geological faults, folds and other structural features in close proximity to the site. Face exposures developed in the rock in the north-eastern corner of the site indicate that the Carrighill Formation is heavily folded locally and dips steeply. The GSI karst database indicates that there are no karst features within the application site or elsewhere in the immediate vicinity thereof.

## *Geological Heritage Baseline*

The Geological Survey of Ireland (GSI) Irish Geological Heritage (IGH) Programme of audited sites was reviewed ([www.gsi.ie](http://www.gsi.ie)) to establish if any geological heritage issues were present at or around the former pit / application site at Usk. Kildare County Development Plan (2017-2023) was also reviewed to identify designated / prospective County Geological Sites. These reviews indicate there are no designated geological heritage sites at the application site or in the immediate vicinity thereof.

## **Receiving Groundwater Environment**

### *Hydrological Setting*

The application site at Usk is indicated to be close to the boundary between the Eastern River Basin District and the South Eastern River Basin District. The northern half of the existing pit is indicated to lie within the Kildoon River Sub-Basin and the southern half is in the Greese River Sub-Basin.

There are a number of surface water bodies within the application site. These are essentially groundwater ponds and were formed by former extraction operations, when excavations extended down to the groundwater table.

The closest surface water feature to the site is a surface water channel immediately beyond the eastern boundary of the application site, which is likely to be fed by groundwater flow beneath it. This is identified as the headwaters of the River Greese which flows in a southerly direction to its confluence with the River Barrow north of Carlow Town. The River Greese is not in a shellfish, salmonid, nutrient sensitive area or a Special Protection Area (SPA), nor is it designated a Special Area of Conservation (SAC) at the application site.

There are no direct discharges off-site to any surrounding watercourse, nor any abstractions therefrom. The River Greese along the eastern site boundary is classed as having 'Good' biological status and invertebrate status and is not considered to be at risk of deteriorating or being at less than 'Good' status in the future for c. 4km downstream of the site.

Flood mapping published by the Office of Public Works (OPW) indicates that the extent of the 100-year fluvial (river) flood event at the Dunlavin Marshes to the north of the site, does not extend across the local road onto the application site. Some pluvial (surface water) flooding may however arise at localised depressions within the application site.

### *Aquifer Characteristics*

The greywacke siltstone and shale bedrock (Carrighill Formation) underling the application site is classified by the GSI as a poor bedrock aquifer and generally unproductive. The sand and gravel deposits which occurs locally at and around the site is not classified as an aquifer by the GSI.

### *Groundwater Vulnerability*

The GSI has developed a groundwater vulnerability classification for Ireland. The groundwater vulnerability at a particular point can be determined based on the natural geological and hydrogeological characteristics at that point. The vulnerability therefore depends on the nature of the subsoils (permeability), the type of recharge (point or diffuse) and the thickness of the unsaturated zone (depth to groundwater).

Across the sand and gravel pit footprint, all overburden cover has been removed and sand and gravel is exposed. Aquifer vulnerability mapping published by the GSI indicates the vulnerability of the aquifer across the application site varies from Extreme (E) in the west and High (H) in the east.

This rating is indicative of the fact that the soils are well-drained and the subsoils consist of sands and gravels which are highly permeable. The high permeability of the sands and gravels means there is little protection to the aquifer from potential contamination by human activities at the ground surface.

### Rainfall and Climate Baseline

The Average Annual Rainfall (AAR) in the area around Usk is c. 929 mm/yr. for the period 1981-2010 (Met Éireann, 2016). The monthly average rainfall values for the period 1981-2010 are shown in Table 5 below.

**Table 5**  
**Monthly Rainfall Averages (mm) 1981-2010 for Usk**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	AAR
87	63	70	61	64	68	69	84	81	100	93	89	929

Mean annual Potential Evapotranspiration in the Kildare region is estimated to be c. 450 mm/yr. (Collins and Cummins, 1996). Recharge (P-PE) therefore is estimated to be c. 479 mm/yr.

### Recharge Mechanisms

Rainfall falling across the application area infiltrates into the ground where there is an unsaturated zone and percolates to the underlying groundwater system. There is no surface water management system at the existing site - incident rainfall percolates directly to the ground.

The GSI National Groundwater Recharge Map shows the average potential recharge in the vicinity of the application site is approximately 475mm/yr. Recharge mapping assumes a recharge coefficient of up to 85% (i.e. 85% of the effective rainfall would percolate to the water table as groundwater recharge), which would suggest an average groundwater recharge of 404 mm/year.

Across the existing worked out pit however, where soils and vegetation has been removed, there is currently no evapotranspiration occurring, and therefore it is likely that the majority of annual rainfall will recharge to the underlying sand and gravel stratum.

### Groundwater Levels and Flow

Four groundwater monitoring boreholes (BH01 to BH04) were installed in the underlying sand and gravel deposits across the application site around November 2018. The groundwater levels recorded in November 2018 and January 2019 are presented in Table 6 below :

**Table 6**  
**Groundwater Level Data for Usk (Sand and Gravel deposits)**

Borehole	Ground level (mOD)	12/11/2018		07/01/2019	
		Groundwater Level (m bgl)	Groundwater Level (mOD)	Groundwater Level (m bgl)	Groundwater Level (mOD)
BH01	128.069	7.79	120.279	5.4	122.669
BH02	123.004	3.25	119.754	2.57	120.434
BH03	121.285	1.58	119.705	0.81	120.475
BH04	133.774	Dry	Dry	8.49	125.284

Groundwater levels indicate that the groundwater flows broadly in an easterly direction in the sand and gravel deposits beneath the application site. There is no dewatering being undertaken at the application site and recorded groundwater levels are therefore deemed to be representative of natural, undisturbed groundwater level.

### Groundwater Quality

Groundwater samples were taken at three of the groundwater monitoring wells at the application site in November 2018, comprising one upgradient borehole (BH01) and two downgradient boreholes (BH02 and BH03). Each well was purged of three well volumes to remove the stagnant water in the well before samples were taken. Samples were then forwarded to an independent laboratory to test for standard inorganics and metals as well as a wider range of parameters including mineral oil, gasoline range organics and hydrocarbons. The laboratory results are presented in Table 7 below.

**Table 7**  
**Baseline Groundwater Quality Results (November 2018)**

Parameter	Unit	GW Threshold Values <sup>2</sup>	BH01	BH02	BH03
Ammoniacal Nitrogen as NH3	mg/l		<0.2	<0.2	<0.2
Ammoniacal Nitrogen as NH4	mg/l		<0.3	<0.3	<0.3
BOD	mg/l		<1.5	<1	<1
Chloride	mg/l	241.5	14	15.4	14.4
COD	mg/l		67.3	<7	13
Total Dissolved Solids	mg/l		470	297	265
Fluoride	mg/l		<0.5	<0.5	<0.5
Dissolved Oxygen	mg/l		9.33	9.97	10.7
pH	pH Units		7.16	7.7	7.61
Phosphate (Ortho as P)	mg/l		<0.02	<0.02	<0.02
Phosphate (Ortho as PO4)	mg/l		<0.05	<0.05	<0.05
Sulphate	mg/l	187.5	16.8	12.6	13.6
Surfactants, Anionic (MBAS)	mg/l		<0.05	<0.05	<0.05
Total Suspended solids	mg/l		2580	345	118
<b>Dissolved Metals</b>					
Antimony	µg/l		<1	<1	<1
Arsenic	µg/l	7.5	<0.5	<0.5	<0.5
Barium	µg/l		67.7	32.2	43.9
Cadmium	µg/l	3.75	<0.08	<0.08	<0.08
Chromium	µg/l	37.5	<1	<1	<1

<sup>2</sup> S.I. No. 9 of 2010. European Communities Environmental Objectives (Groundwater) Regulations, 2010.

Parameter	Unit	GW Threshold Values <sup>2</sup>	BH01	BH02	BH03
Copper	µg/l	1500	0.459	0.329	<0.3
Iron	mg/l		<19	<19	<19
Lead	µg/l	18.75	<0.2	0.221	<0.2
Magnesium	mg/l		9.63	8.62	9.72
Manganese	µg/l		<3	<3	<3
Mercury	µg/l	0.75	<0.01	<0.01	<0.01
Molybdenum	µg/l		<3	<3	<3
Nickel	µg/l	15	0.428	<0.4	<0.4
Selenium	µg/l		<1	<1	<1
Zinc	µg/l		3.93	8.64	2.79
<b>Mineral Oil / Oils &amp; Greases</b>					
Mineral oil >C10 C40 (aq)	µg/l		<b>120</b>	<100	<100
<b>Gasoline Range Organics (GRO)</b>					
EPH (C6-C10)	µg/l		<100	<100	<100
GRO >C10-C12	µg/l		<10	<10	<10
GRO >C5-C10	µg/l		<10	<10	<10
GRO >C6-C8	µg/l		<10	<10	<10
GRO >C8-C10	µg/l		<10	<10	<10
<b>EPH (Extractable Petroleum Hydrocarbons)</b>					
EPH Band >C12-C16 (aq)	µg/l		<100	<100	<100
EPH Band >C16-C21 (aq)	µg/l		<100	<100	<100
EPH Band >C21-C40 (aq)	µg/l		<b>263</b>	<100	<100
EPH Range >C10 - C40 (aq)	µg/l		<b>306</b>	<100	<100
<b>TPH Criteria Working Group (TPH CWG)</b>					
Total EPH (C6-C40) (aq)	µg/l		<b>306</b>	<100	<100

The groundwater quality results from the three sampled boreholes indicate that the groundwater in the sand and gravel deposits is generally of good quality with low ammonia, phosphate and metals. In borehole BH01, mineral oil and some (trace) hydrocarbons were recorded just above detection limits and are highlighted in bold in the table above. It is noted that Borehole BH01 is close to the site entrance and the former hardstand and weighbridge area where site HGV traffic movements would have been highest.

Additional detail on groundwater sampling and testing is provided in Chapter 7 of the EIAR which accompanies this waste licence application.

### *Groundwater Abstractions*

The GSI national well database ([www.gsi.ie](http://www.gsi.ie)) identifies a number of private boreholes in the vicinity of the application site.

The application site itself is not located within or adjacent to a groundwater supply source protection zone (SPZ). There are however two such zones within 10km radius of the site. The Usk / Gormanstown Source Protection Area is 0.87km<sup>2</sup> in areal extent and is located approximately 4.5km north-east of the site. The Lipstown / Narraghmore Source Protection Area is 3.41km<sup>2</sup> in areal extent and is located approximately 6.5km south-west of the site.

There are no recorded environmental pressures on the Kilcullen GWB, such as abstractions, agriculture, aquaculture, domestic waste water, forestry, etc. There are groundwater anthropogenic pressures on the sand and gravel aquifers close to the application site.

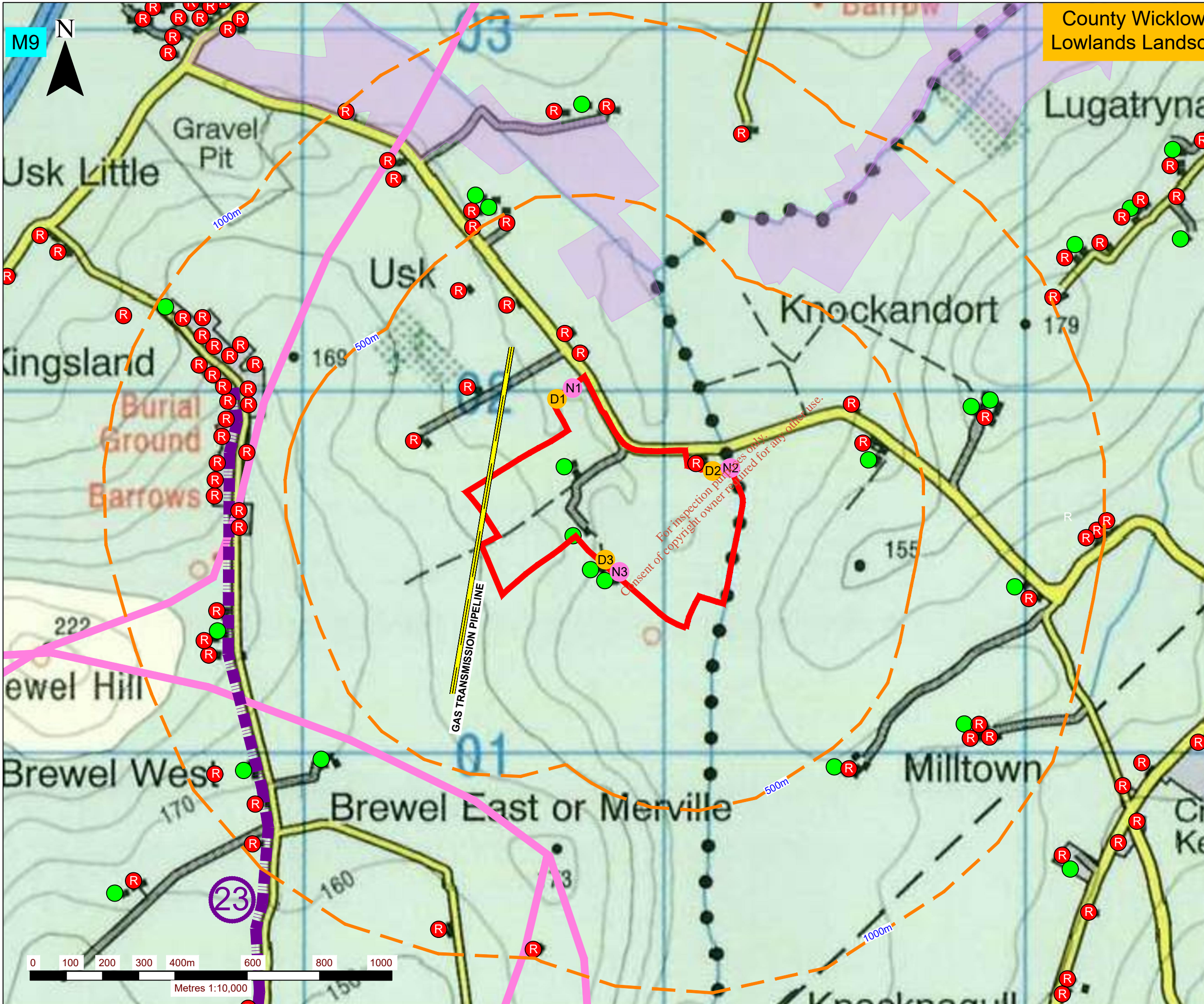
### *Water / Wastewater Utilities*

Potable water will be supplied to the application site from an existing water main which runs along the adjoining local road and is understood to be part of the Gormanstown Usk Group Water Scheme (GWS) operated by Kildare County Council. In addition to the existing potable water supply, surface water for wheelwashing and dust suppression activities may be sourced from on-site surface water ponds when required.

A new proprietary effluent treatment system (approved under Planning Ref. 19/949) will be installed and commissioned for the purposes of any future development at the application site. Wastewater from sinks and toilets at staff welfare facilities will initially be discharged to a Tricell Novo wastewater treatment system (or similar) and treated effluent will be discharged thereafter to the underlying ground via a sand polishing filter.

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**NOTES**

1. Extract from 1:50,000 Ordnance Survey Discovery Maps No. 55
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**LEGEND**

	PLANNING APPLICATION AREA (c. 26.6 Hectares)
	DISTANCE OFF-SET FROM PLANNING APPLICATION BOUNDARY
	RESIDENCE LOCATIONS
	AGRICULTURAL BUILDINGS
	PROPOSED NATURAL HERITAGE AREAS (pNHA)
	SCENIC ROUTES (KILDARE COUNTY DEVELOPMENT PLAN 2017-2023: CHAPTER 14.6)
	RIDGELINES (KILDARE COUNTY DEVELOPMENT PLAN 2017-2023: MAP 14.2)
	DUST MONITORING LOCATION
	NOISE MONITORING LOCATION

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**DUNLAVIN LAND RESTORATION LTD.  
WASTE LICENCE APPLICATION**

LANDS AT USK TOWNLAND,  
KILCULLEN, CO. KILDARE

**ENVIRONMENTAL MONITORING LOCATIONS**

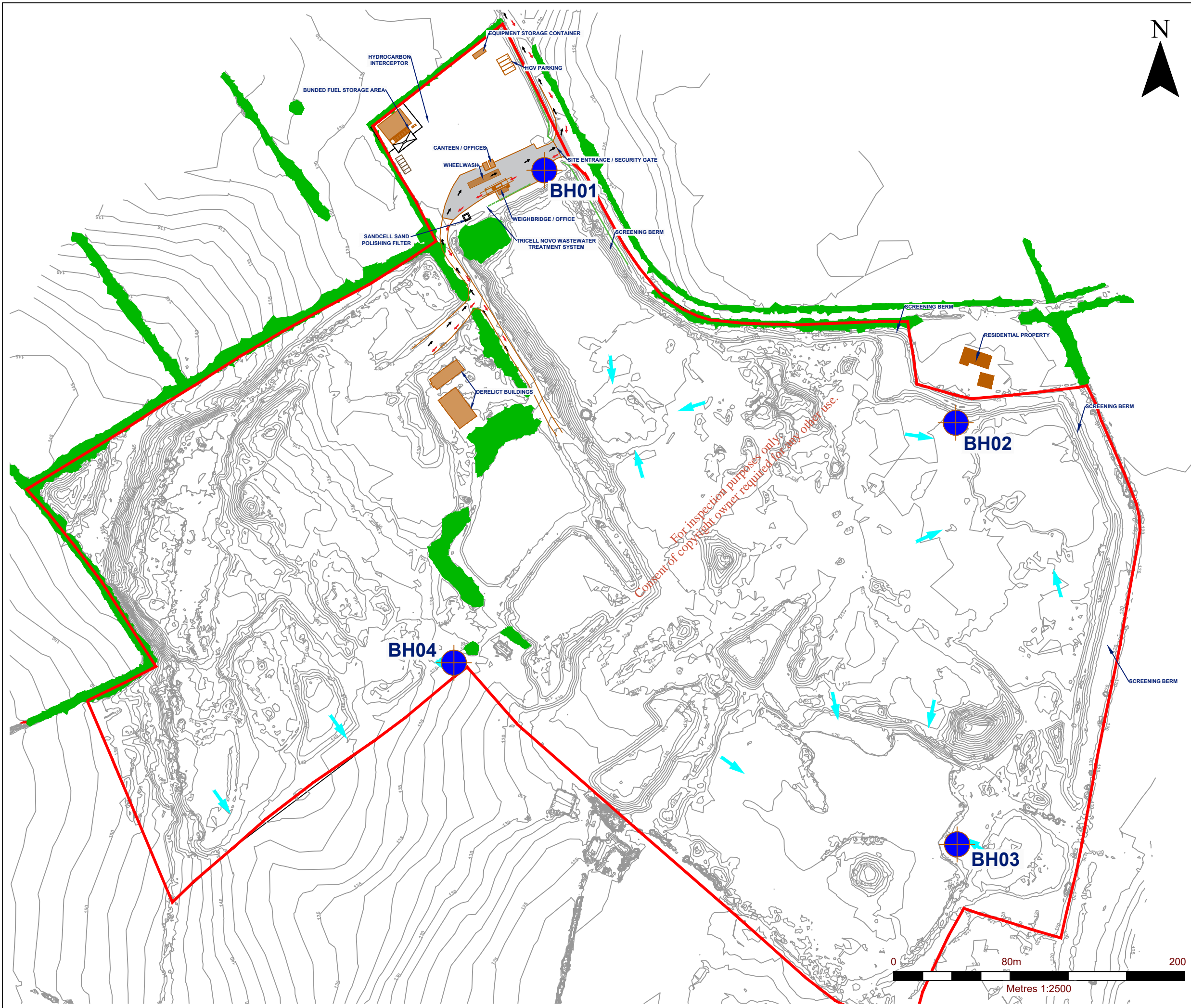
**FIGURE 7-1-3-2A**

Scale: 1:10,000 @ A3      Date: SEPTEMBER 2020

501.00507.00001.FIG\_7-1-3-2A.Environmental Monitoring Loc.dwg



501.00507.00001.FIG\_7-1-3-2B.Surface Water Management Plan.dwg



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**NOTES**

1. Extract from Map Scale 1:5,000 Ordnance Survey No. 3895 & 3837
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**LEGEND**

- PLANNING APPLICATION AREA (c. 26.6 Hectares)
- ↙ HGV TRAFFIC IN
- ↘ HGV TRAFFIC OUT
- VEGETATION
- EXISTING SURFACE WATER PONDS
- PAVED AREA
- BUILDINGS
- GROUNDWATER MONITORING WELL LOCATION

LOCATION EASTING NORTHING

GROUNDWATER	EASTING	NORTHING
BH01	684745	701970
BH02	685027	701796
BH03	685028	701507
BH04	684682	701631

*Orthomosaic produced from Aerial Photography flown January 2018 by SLR Consulting Ireland (IAA Permit No. 150052) [www.slrconsulting.com](http://www.slrconsulting.com) Tel. +353-1-2964667.*

*Orthomosaic produced using Ground Control Points; Related to Irish Transverse Mercator Coordinate System and OS Malin Head Level Datum.*

*The accuracy of the orthomosaics and the digital elevation models (DEM) strongly depends on the flight height, lighting conditions, availability of textures, image quality, overlap, and type of terrain. Contours / 3D data relates to the surface model and not terrain levels. Typical accuracies: E: 0.05 m; N: 0.05 m; Levels: 0.30 m. All Dimensions and Levels are to be checked on site.*

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**GROUNDWATER MONITORING LOCATIONS**

**FIGURE 7-1-3-2B**

Scale 1:2,500 @ A3	Date SEPTEMBER 2020
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