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Ms Noeleen Keavey
Office of Climate Licensing and Resource,
Environmental Inspection Agency,
PO Box 3000,
Johnstown Castle Estate,
County Wexford.

4 September 2015

Re; Application for Waste Licence (W0-140-04) Nurendale Limited, Panda Waste Services, Beauparc, Co Meath

Dear Ms Keavey,

I refer to the Agency's letter dated the 06th July 2015 in accordance with Regulation 10(2)(b)(ii) of the EPA (Industrial Emissions)(Licensing) Regulations 2013. The requested information is set out herein.

1. Please provide the following:

   i. A map which indicates the position at which the site notice dated 12th May 2015 was displayed. [Regulation 9(4)(d)(ii)]

   Two site notices were erected at the same locations as the original notices. The locations are shown on Drawing No. 2009-101-101 in Attachment 1.

2. Please provide the information below in order to fully address the requirements of Regulation 9(2):

   ii. A copy of grant of permission for Planning File Reference Number SA140011.

   A copy of the grant of permission is in Attachment 2.

   iii. A statement as to whether an EIS was submitted with the following planning applications or written confirmation from the Planning Authority that an EIA was not required, by or under the Act of 2000, for Planning File Reference Numbers: 014304, SA30347 and SA140429.

   An EIS was submitted with planning application 01/4304. An EIS was not submitted with planning application SA/30347, but was submitted with the application to revise the Waste Licence. An EIS was not submitted with planning application SA140429.

3. *It has been confirmed that it is no longer intended to operate the Wright tunnels and the associated biofilter. It has also been confirmed that the waste processing equipment was relocated from Building 1 to Building 3.*

   - *Please confirm when you propose to decommission the Wright Tunnels and the associated biofilter.*

   While it is no longer intended to operate the Wright Tunnels and the associated biofilters it is not intended to decommission them.

   - *Clarify what activities are proposed to take place in Building 1.*

   Building 1 is used to manufacture Solid Recovered Fuel (SRF).

4. *Clarify when the integrated constructed wetland is proposed to be operational.*

   The wetland was installed in July/August 2015 and has been planted. The wetland will not be used for treatment purposes until the vegetation has been established and the system is confirmed fit for purpose by the installer. It is expected that this will be sometime in late 2015 or early spring 2016.

5. *In the correspondence received on the 12th May 2015 it was confirmed that the hazardous substances diesel and gas oil will be used at the installation.*

   - *Please state whether these hazardous substances are relevant hazardous substances.*

   These substances are relevant hazardous substances.

   - *Provide a baseline report prepared in accordance with the Communication from the Commission – European Commission Guidance concerning baseline reports under Article 22(2) of Directive 2010/75/EU on industrial emissions (2014/C136/03)*

   A baseline report is in Attachment 3.

6. *An assessment of the proposed activates in relation to the BAT Conclusions outlined in the Waste Treatments Industries BREF and the Emissions from Storage BREF has been provided.*

   Please provide a similar assessment in relation to the BAT Conclusions outline the Reference Document on Best Available Techniques for Energy Efficiency (February 2009) using the 'Conclusions on BAT' form available on the Agency's website.

The assessment is in Attachment 4

Cont'd

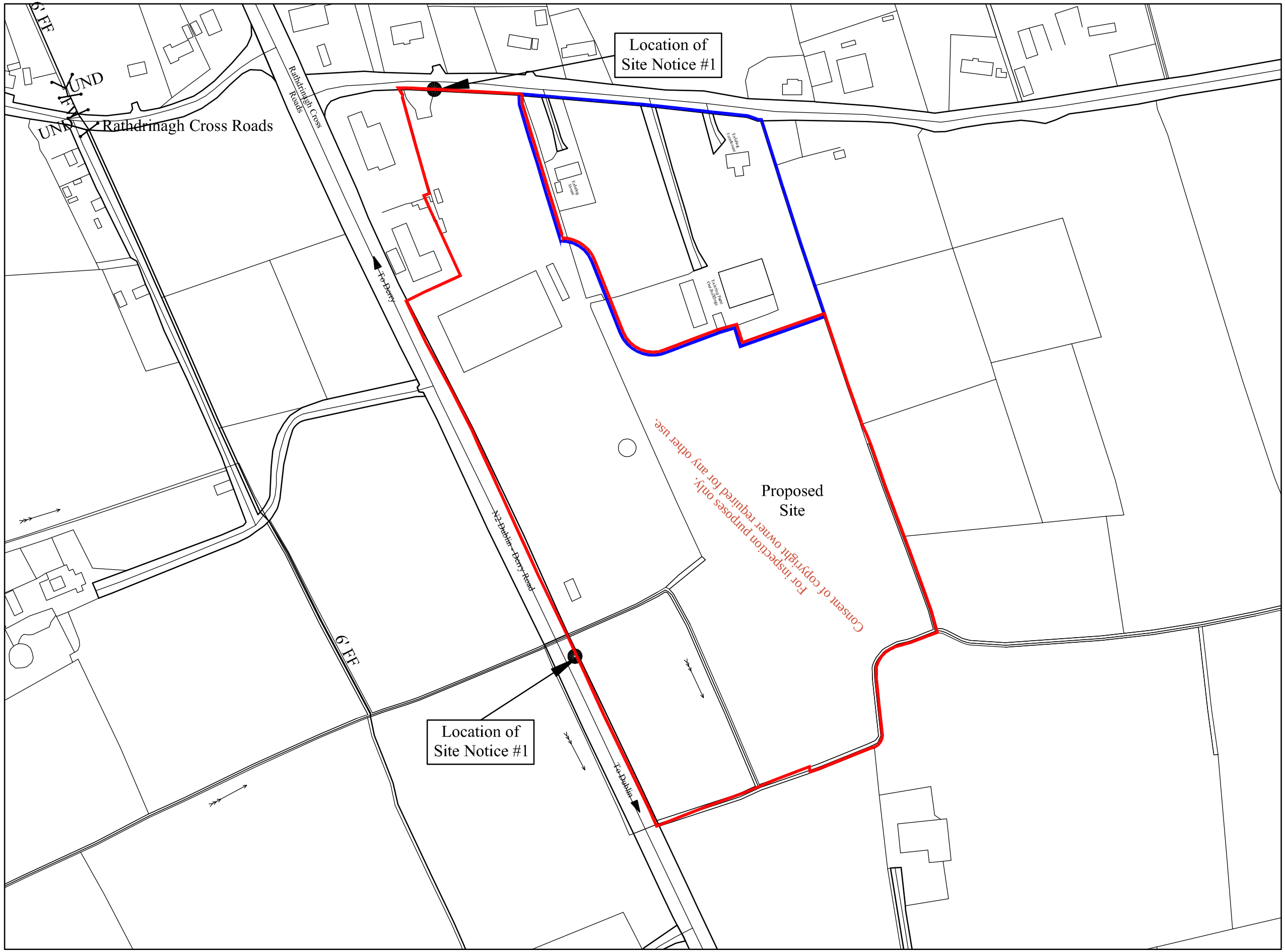
In addition to the above please also provide an updated non-technical summary to reflect the information provided in your reply.

The revised non-technical summary is in Attachment 5.

Yours Sincerely

Jim O' Callaghan

ATTACHMENT 1



N

ITM Centre Pt. Coords:

697366,769251

Map Series:

1:5000
2441

Revision Date 31-Jul-2004
Survey Date 31-Jul-2000
Levelled Date

GAP architects
53A Carndonagh Park, Donaghmede, Dublin 13
Telephone +353 (0)1 847 5505 Fax +353 (0)1 847 5504

Nurendale Ltd., (PANDA Waste),
Rathdrinagh, Beauparc, Navan, Co. Meath.

Job. Phase IV, Recycling Facility

Title Site Location Map

Scale 1:2500
Date Sept 2009
Drawn Stephen Hill
Drg. No. 2009-101-101

ATTACHMENT 2

MEATH COUNTY COUNCIL

MANAGER'S ORDER

Manager's Order No: S217/14

Reference Number: SA/140011

Subject: Decision under Planning and Development Act 2000 – 2013

Name of Applicant: Nurendale Ltd.,
Address: Rathdrinagh
Beauparc
Navan
Co. Meath

Nature of Application: EXTENTION OF DURATION OF PLANNING PERMISSION REF. NO. SA/900875 - extension of our existing Materials Recovery Facility and will comprise the construction of one building (12,183m2) ridge height 10.72, to house a waste anaerobic digestion and composting system and a technical services office, 2 No. above ground 6m high steel process wastewater storage tanks (154m2 and 78.5m2) and 2 No. above ground 6m high concrete process wastewater storage tanks (eqach 61.4m2) located in a 2.5m high bunded area, air treatment biofilter with 15m stack, an internal access road to existing Materials Recovery Facility, paved yards, oil interceptor, surface warer percolation area and landscaping. The development is an activity that will require a Waste Licence from the Environmental Protection Agency

Location of Development: Rathdrinagh, Beauparc, Navan, Co. Meath,

Recommendation: **Grant** EXTENTION OF DURATION for the above mentioned development up to the 21/10/2019.

ORDER:

Being satisfied that all requirements relating to the application have been complied with and considering the proper Planning and Development of the County Meath Health District and having regard to the provisions in the Development Plan for the area, IT IS HEREBY DECIDED in pursuance of the above Act to **GRANT** EXTENTION OF DURATION for the said development in accordance with documents submitted, this permission shall now expire on 21/10/2019.

Signed: _____
Manager

Date: 26.02.2014

ATTACHMENT 3

Unit 15
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Cork

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ENVIRONMENTAL MANAGEMENT FOR BUSINESS

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BASELINE ASSESSMENT REPORT

PANDA WASTE SERVICES

WASTE RECYCLING FACILITY

BEAUPARC

MEATH

WASTE LICENCE NO. W?

Prepared For: -

Nurendale T/A Panda Waste Services.
Finglas,
Dublin 11

Prepared By: -

O' Callaghan Moran & Associates,
Unit 15,
Melbourne Business Park,
Model Farm Road,
Cork

September 2015

Project	Baseline Assessment Report Panda Waste Services Beauparc.
Client	Panda Waste Services W0140-04

Report No	Date	Status	Prepared By	Reviewed By
091380610	04/09/2015	Final	Barry Sexton MSc	Jim O'Callaghan MSc

TABLE OF CONTENTS

1. INTRODUCTION

Nurendale, trading as Panda Waste Services (PANDA), has applied to the Environmental Protection Agency (Agency) for a review of the Waste Licence at its Beauparc Facility. The proposed new activities fall under Class 11 4 (b)(ii) of the New First Schedule of the EPA Act 1992 to 2013. As this Class is one to which the Industrial Emissions Directive applies the Agency has determined that an Industrial Emissions (IE) Licence is required.

In the case of an application for an IED licence for an activity that involves the use, production or release of relevant hazardous substances (as defined in Section 3 of the EPA Act 1992 as amended), provide a baseline report in accordance with section 86B of the EPA Act 1992 as amended. The purpose of the report is to determine the state of soil and groundwater contamination at the site. As the existing facility operations involve the storage and use of diesel and gas oil, both of which are classified as relevant hazardous substances, the Agency has requested that a baseline report be prepared.

PANDA appointed O'Callaghan Moran & Associates (OCM) to prepare the baseline report. OCM is an environmental consultancy, established in 1997, which provides environmental services to private and public sectors. OCM has been involved in the completion of environmental site investigation and risk assessments for Waste Licensed and Integrated Pollution Prevention Control licensed facilities since 1997.

1.1 Methodology

OCM's assessment was based on the Environmental Liabilities Risk Assessment completed in 2015 and a site investigation carried out in August 2015 that included the installation of soil borings and groundwater monitoring wells and the collection and analysis of soil and groundwater samples.

2. CURRENT USE

2.1 Facility Location

The site is located on the N-2 Dublin Derry roadway approximately 5km to the south of Slane Village. The facility is bordered to the west by the N2 and to the north by the Knockcommon Road.

2.2 Facility Layout

The current operational area occupies 4.7 hectares. The majority of the site is either paved (35,000m^2), or occupied by buildings (10,000m^2). There are three main waste processing buildings (Buildings 1-2,800m^2, Building 2-2,600m^2 and Building 3-4,208m^2), a skip repair building, a weighbridge an associated office and an administration building.

In addition to the buildings, there is an external C&D processing area, the two Wright Tunnels, three above ground oil storage tanks, an above ground water reservoir, underground surface water holding tanks, underground wastewater holding tanks and a constructed wetland that will treat rainwater run-off from the operational yards.

It is proposed to expand the facility into an area adjoining the eastern site boundary, which encompasses 3.2ha. The overall development will include:

- Construction of Building 4 (12,183m^2) to the east of Buildings 2 and 3;
- Construction of 2 No above ground steel process wastewater storage tanks (154m^2 and 78.5m^2) and 2 No above ground concrete process wastewater storage tanks (each 61.45m^2);
- Provision of an access road from the existing facility and hardstanding areas (3,350m^2) for vehicle manoeuvring;
- Installation of a Combined Heat and Power Plant, with associated stacks (2No) and 1 No gas flare;
- Provision of odour control abatement bio-filter on the roof of Building 4 and carbon filter adjacent to Building 3;
- Provision of biomass furnace in Building 3 and rotary drier that will provide heat to dry the RDF and also serve as part of the odour abatement system;
- In addition, the proposed development will include concrete paving surrounding the proposed new structures and an extension to the surface water drainage system and other ancillary works.

2.3 Inventory of Relevant Hazardous Substances

Diesel and gas oil are stored in above ground tanks (59,000 litres and 14,000 litres respectively) in dedicated structure at the eastern boundary, close to Building 1. The tanks are provided with individual bunds, each of which has a minimum capacity of 110% of the volume of the tank. The bunds are subject to routine integrity testing, as required by the Licence conditions and are structurally sound.

3. PAST USE

3.1 Site History

Waste activities began in the northern area of the site (approximately 3.4ha) in the early 1990's. Prior to this, the site was undeveloped and used for agricultural purposes (pasture). The initial waste activities involved the acceptance and transfer of Construction & Demolition (C&D), Commercial & Industrial (C&I) and Municipal Solid Wastes (MSW).

The original Waste Licence was issued in July 2001 (W0140-01) and allowed the acceptance of 45,000 tonnes of non-hazardous waste annually. In April 2005 a revised Licence (W0140-02) was granted approving the expansion of the facility to allow the acceptance of 165,000 tonnes of waste types per annum, to operate an MSW drying system, construct Building 2 and install ancillary infrastructure including paved areas and drainage.

In March 2009 a revised Licence (W140-03) was granted that authorised an increase in the licensed area, the construction of Building 3 and the Skip Repair Building and an increase in the waste inputs to 250,000 tonnes per annum. Building 3 and the Skip Repair Building were subsequently constructed.

In September 2009, Panda applied to revise Licence to extend the licence area and construct a new building (Building 4), which will house a combined Anaerobic Digestion (AD) and Composting system.

3.2 Incident History

In June 2012 there was a fire in Building 3. The emergency response plan was activated and the fire services were called to the site. The fire was contained to Building 3 and the while residents in nearby houses were evacuated, the incident did not result in any significant environmental liabilities. Fire water run-off was contained within the site and subsequently removed for off-site treatment. Building 3 was severely damaged, but was refurbished and waste activities restarted in the building in 2013.

4. ENVIRONMENTAL SETTING

4.1 Site Location

The site is located on the N-2 Dublin Derry roadway approximately 5km to the south of Slane Village. The facility is bordered to the west by the N2 and to the north by the Knockcommon Road.

4.2 Surrounding Land Use

Surrounding land use is predominantly agriculture, however there are some commercial units to the west. There are nine residential dwellings with 0.5km of the site along Knockcommon Road, with a further thirteen residences within 0.5km, along the N2 and Senchelstown Road.

4.3 Hydrology

A land drain that runs along the southern boundary connects to an unnamed tributary of the Roughgrange River. The Roughgrange is a tributary of the River Boyne, which it joins approximately 3km downstream from the site.

A second drain that runs along the southern boundary, parallel to the N2, originally entered the site and flowed southwest beneath the footprint of Building 3 to join the drain on the southern boundary. As part of the emergency response measures implemented to combat the fire in Building 3 in 2012, this drain was diverted and now runs along the western boundary to a new connection point with the drain on the southern boundary.

4.4 Geology & Hydrogeology

The description of the site geology and hydrogeology is based on a review of databases maintained by the Geological Survey of Ireland (GSI) and Teagasc, data derived from the logs of two on-site abstraction wells and site investigation carried out in 2009 and 2015.

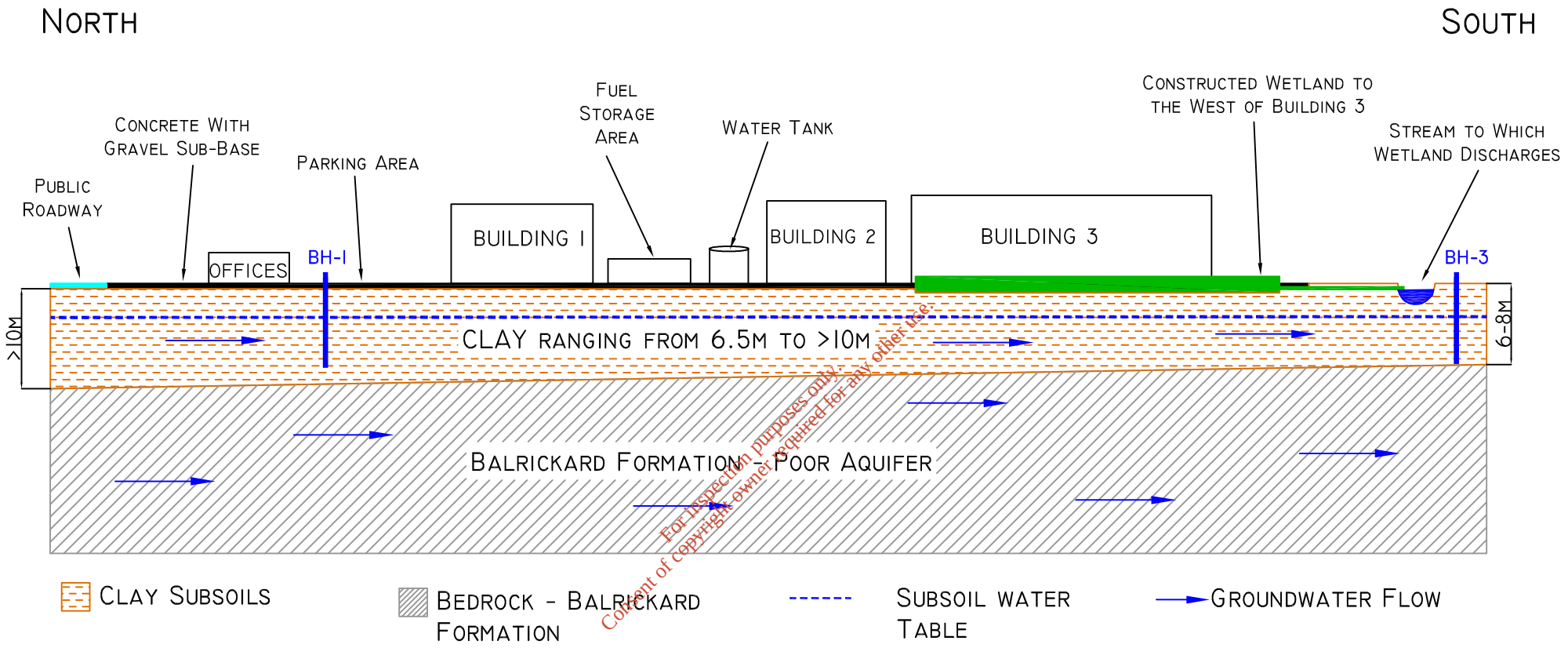
The soil maps prepared by Teagasc indicates that the subsoil type is a till derived from Namurian Shales and Sandstones (TNSSs). The site investigations confirmed the subsoils comprise a brown clay to approximately 1m, which is underlain by a grey/black clay. The site investigations established the subsoils range from 6.5m in the southern part of the site to >10m in the north of the site.

The site is underlain by the Balrickard Formation, which is described by the GSI as coarse sandstone and is classified as a bedrock aquifer that is generally unproductive except for local zones (Pl). The direction of groundwater flow is from north to south.

The aquifer beneath the site is part of the Donore Groundwater Body (IE_EA_G_021). The condition of a groundwater Water Body is defined by its chemical and quantitative status, whichever is worse, and groundwater quality is ranked in one of two status classes: Good or Poor. The Donore Water Body is categorised as being of 'Good' status.

4.5 Conceptual Site Model

A Conceptual Site Model (CSM) is shown on Figure 4.1. The model is based on the available information on the topography, geology and hydrogeology.



O' Callaghan Moran & Associates.
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email : info@ocallaghanmoran.com

CLIENT
NURENDALE T/A PANDA WASTE SERVICE

TITLE
CONCEPTUAL SITE MODEL

details

Drawing No.
4.1

SCALE
NTS

REV.
A

5. SITE CHARACTERISATION

5.1 Soils Assessment

5.1.1 *Soil Sample Locations*

Six soil borings (SB-1 to SB-6) were installed at the locations shown on Figure 5.1. The locations were determined by the need to establish soil conditions in the operational area, including areas where the hazardous substances are stored, and in the proposed extension area.

As the extension area adjoins the operational area and the land use is similar to that in the operational area before it was developed, it is reasonable to assume that the ground conditions in both plots are similar. SB-1 and SB-2 were in the footprint of the proposed Building No. 4. SB-3 to SB-5 were adjacent to the existing oil storage area, while SB-6 was directly to the south of the constructed wetland.

5.1.2 *Soil Boring Installation*

The borings were drilled using a track mounted DANDO Terrier Drilling 2202 drive sampling rig. This rig utilises a hydraulic hammer to drive 1 m tubes into the ground and retrieve 1 m length soil core in a dedicated plastic liner, which minimises the risk of cross contamination both within the hole and between borings. The installation of the borings was supervised by an OCM geologist and logged in accordance with BS5930. The logs are in Appendix 1.

5.1.3 *Soil Sampling and Analysis*

The soil cores recovered from the borings were visually assessed and field screened for the presence of Volatile Organic Compounds (VOC) using a photoionization detector (PID). The field screening did not identify the presence of any contamination. Soil samples were collected from each boring at 0.5m in accordance with OCM's sampling protocols, a copy of which is in Appendix 2.

The samples were sent to Jones Environmental Forensics Laboratory in the UK, who have accreditation for the range of tests conducted. The analysis included extractable petroleum hydrocarbons (EPH), benzene, toluene, ethylbenzene, xylene and methyl *tert*-butyl ether (MTBE). This parameter range was based on the storage and use of diesel and gas oil at the site. The laboratory methodologies were all ISO/CEN approved. The laboratory test report in in Appendix 3 and the results are presented in Table 5.1.

Table 5.1 Subsoils Analysis

Sample ID	Units	SB-1	SB-2	SB-3	SB-4	SB-5	SB-6
Depth		**0.50**	**0.50**	**0.50**	**0.50**	**0.50**	**0.50**
Sample Date		**18/08/15**	**18/08/15**	**18/08/15**	**18/08/15**	**18/08/15**	**18/08/15**
Aliphatics							
>C5-C6 #	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
>C6-C8 #	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
>C8-C10	mg/kg	<0.1	<0.1	0.3	<0.1	<0.1	<0.1
>C10-C12 #	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
>C12-C16 #	mg/kg	<4	<4	<4	<4	<4	<4
>C16-C21 #	mg/kg	<7	<7	<7	<7	<7	<7
>C21-C35 #	mg/kg	<7	<7	<7	<7	<7	<7
Total aliphatics C5-35	mg/kg	<19	<19	<19	<19	<19	<19
Aromatics							
>C5-EC7	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
>EC7-EC8	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
>EC8-EC10 #	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
>EC10-EC12	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
>EC12-EC16	mg/kg	<4	<4	<4	<4	<4	<4
>EC16-EC21	mg/kg	<7	<7	<7	<7	<7	<7
>EC21-EC35	mg/kg	<7	<7	<7	<7	<7	<7
Total aromatics C5-35	mg/kg	<19	<19	<19	<19	<19	<19
Total aliphatics and aromatics(C5-35)	mg/kg	<38	<38	<38	<38	<38	<38
MTBE #	µg/kg	<5	<5	<5	<5	<5	<5
Benzene #	µg/kg	<5	<5	<5	<5	<5	<5
Toluene #	µg/kg	<5	<5	23	<5	<5	<5
Ethylbenzene #	µg/kg	<5	<5	22	<5	<5	<5
m/p-Xylene #	µg/kg	<5	<5	36	<5	<5	<5
o-Xylene #	µg/kg	<5	<5	23	<5	<5	<5

Trace levels of toluene, ethylbenzene and xylene were detected in the sample collected in BS-3. EPH, benzene, toluene, ethylbenzene, xylene and MTBE were not detected in any of the remaining samples.

5.2 Groundwater Assessment

5.2.1 *Well Locations*

Three groundwater wells (MW-1, MW-2 and MW-3) were installed at the locations shown on Figure 5.1 to establish groundwater quality up and down gradient of the operational area. MW-1 is in the north of the site up gradient of all waste activities. MW-2 is directly south of Building 3. MW-3down gradient of the proposed building number 4.

5.2.2 *Well Installation*

The wells were installed by Ground Investigations Ireland Ltd (GII) using a rotary percussive drill rig under the supervision of an OCM geologist, who logged the boreholes in accordance with BS5930. The well logs are in Appendix 1. The objective was to assess the water quality in the uppermost water bearing formation and the target depth was 10 metres below ground level (mbgl), or the top of the bedrock, whichever was encountered first.

5.2.3 *Well Construction Details*

MW-1

The boring extended to 10 mbgl. The subsoils comprised slightly gravelly slightly sandy clay with occasional boulders. There were no notable inflows of water during drilling. After reaching the target depth, drilling stopped and the water inflow rate was checked. Approximately 1m of water entered the hole within ten minutes..

A slotted well pipe was installed from 10mbgl to 1.5mbgl, with a solid section extending from. 1.5mbgl to ground level. Gravel was inserted between 10mbgl and 1mbgl. A bentonite seal was placed between 1mbgl and ground level to prevent the entry of surface water. The well was fitted with a upright steel head.

MW-2

The boring extended to a depth of 9.5mbgl. Very broken and weathered rock or boulders were encountered at approximately 8.0mbgl. The subsoils comprised slightly gravelly slightly sandy clay with occasional boulders. A large borehole was encountered between 1m and 2m. There was a slight inflow of water at 7.5mbgl.

A slotted well pipe was installed from 9.5 mbgl to 1.5mbgl, with a solid section extending from. 1.5mbgl to ground level. Gravel was inserted between 10mbgl and 1mbgl. A bentonite seal was placed between 1mbgl and ground level to prevent the entry of surface water. The well was fitted with a upright steel head.

MW-3

The boring extended to a depth of 7 metres below ground level (mbgl). Very broken and weathered rock was encountered at approximately 6.5mbgl. The subsoils comprised slightly gravelly slightly sandy clay with occasional boulders. A large borehole was encountered between 1.5mbgl and 2.5mbgl. There was a slight inflow of water at 5.5mbgl.

A slotted well pipe was installed from 7 mbgl to 1.5mbgl, with a solid section extending from. 1.5mbgl to ground level. Gravel was inserted between 10mbgl and 1mbgl. A bentonite seal was placed between 1mbgl and ground level to prevent the entry of surface water. The well was fitted with a upright steel head.

5.2.4 *Groundwater Sampling and Analysis*

Following the installation of the wells the water level was allowed to equilibrate. The groundwater samples were collected on the 25th August 2015. After measuring the water levels, the wells were purged using a battery operated submersible pump to remove any stagnant water and to ensure that the groundwater sampled was representative of the formation.

The pH and temperature were measured using a Hanna Instruments combined pH, Electrical Conductivity, dissolved oxygen and temperature probe. All field equipment was calibrated and tested prior to the sampling programme. The field monitoring results are in Table5.2.

Table 5.2 Field Measurements 25th August 2015

Sample Location	Water Level mBTOC	pH (pH Units)	Electrical Conductivity (µS/cm)	Temperature (^{O}C)	Odour	Colour
MW-1	1.87	8.00	454	13.6	None	Cloudy
MW-2	5.68	8.24	482	11.8	None	Cloudy
MW-3	2.02	8.04	491	10.9	None	Cloudy

The samples were placed in laboratory prepared containers, stored in a cooler, and sent for analyses to Jones Environmental Forensics laboratory. The samples were analysed for (EPH), benzene, toluene, ethylbenzene, xylene MTBE, sodium, potassium, chloride, sulphate, manganese, ammonia.

The methodologies used by the laboratory were ISO/CEN approved or equivalent and the method detection limits (MDL) were all below relevant limits and comparative guidance values. The laboratory report is in Appendix 3 and the results are presented in Table 5.3.

For comparative purposes the Table includes the Interim Guideline Values (IGV) for groundwater published by the EPA and the Threshold Values (TV) for groundwater quality introduced by the European Communities Environmental Objectives (Groundwater) Regulations 2010 SI. No 9 of 2010.

The IGV represent typical background or unpolluted conditions; however levels higher than the IGV can occur naturally, depending on the local geological and hydrogeological conditions. While the TVs are more appropriate for large scale abstraction wells used for potable supply, they can be used to assess the significance of contamination where present in groundwater. Because not all parameters monitored have assigned Threshold Values, the relevant IGV continue to be used for comparative purposes.

Table 5.3 Groundwater Analysis August 2015

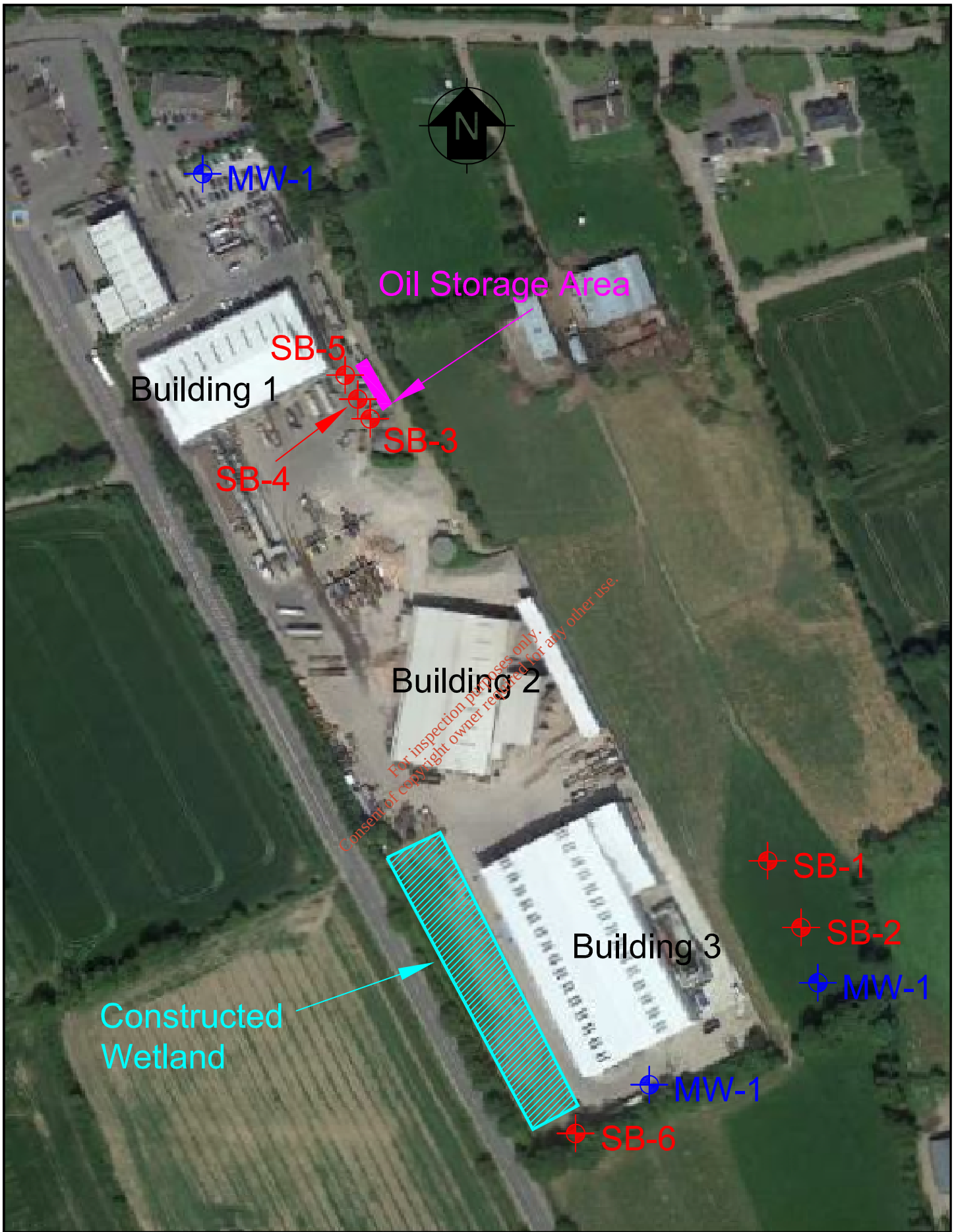
		MW1	MW2	MW3	IGV	GTV
Parameter	**Unit**	**25/08/15**	**25/08/15**	**25/08/15**		
Manganese	mg/l	0.091	0.080	0.096	50	-
Potassium	mg/l	2.9	2.9	3.0	5	-
Sodium	mg/l	16.5	34.7	31.8	150	150
Sulphate	mg/l	32.31	37.01	42.49	200	187.51
Chloride	mg/l	17.8	16.7	18.5	30	24-187.5
Ammoniacal Nitrogen	mg/l	0.15	0.49	0.26	0.15	0.065-0.175
Aliphatics						
>C5-C6	mg/l	<0.005	<0.005	<0.005	0.01	-
>C6-C8	mg/l	<0.005	<0.005	<0.005	0.01	-
>C8-C10	mg/l	<0.005	<0.005	<0.005	0.01	-
>C10-C12	mg/l	<0.005	<0.005	<0.005	0.01	-
>C12-C16	mg/l	<0.01	<0.01	<0.01	0.01	-
>C16-C21	mg/l	<0.01	<0.01	<0.01	0.01	-
>C21-C35	mg/l	0.51	<0.01	<0.01	0.01	-
Total aliphatics C5-35	mg/l	0.51	<0.01	<0.01	0.01	-
Aromatics						
>C5-EC7	mg/l	<0.005	<0.005	<0.005	0.01	-
>EC7-EC8	mg/l	<0.005	<0.005	<0.005	0.01	-
>EC8-EC10	mg/l	<0.005	<0.005	<0.005	0.01	-
>EC10-EC12	mg/l	<0.005	<0.005	<0.005	0.01	-
>EC12-EC16	mg/l	<0.01	<0.01	<0.01	0.01	-
>EC16-EC21	mg/l	<0.01	<0.01	<0.01	0.01	-
>EC21-EC35	mg/l	<0.01	<0.01	<0.01	0.01	-
Total aromatics C5-35	mg/l	<0.01	<0.01	<0.01	0.01	-
Total aliphatics and aromatics(C5-35)	mg/l	0.51	<0.01	<0.01	0.01	-
VOCs						
MTBE	µg/l	<5	<5	<5	30	-
Benzene	µg/l	<5	<5	<5	1	0.75
Toluene	µg/l	<5	<5	<5	10	-
Ethylbenzene	µg/l	<5	<5	<5	10	-
m/p-Xylene	µg/l	<5	<5	<5	10	-
o-Xylene	µg/l	<5	<5	<5	10	-

Sodium, manganese, potassium, sulphate and chloride were detected in all wells but at levels below both the IGV and GTV for each parameter. Ammonia was detected in all of the wells and in MW-2 and MW-3 the levels exceeded the TV.

BTEX compounds were not detected in any of the wells. EPH was detected in the up gradient well (MW-1), where aliphatic compounds (C21 and C35) were 0.51mg/l. This is greater than the IGV of 0.1mg/l. EPH was not detected in the two down gradient wells MW-2 and MW-3.

5.3 Baseline Conditions

The data in Table 5.1 reflects the baseline conditions for the relevant hazardous substances in the soils. The aliphatic, aromatic and VOC results in Table 5.3 represent the baseline conditions for the relevant hazardous substances in groundwater.



O' Callaghan Moran & Associates.
Unit 15, Melbourne Business Park,
Model Farm Road, Cork
Tel. (021) 4345366
email : info@ocallaghanmoran.com

CLIENT: NURENDALE T/A PANDA WASTE SERVICE

DETAILS:

Figure No. 5.1

TITLE: 2015 SITE INVESTIGATION LOCATIONS

SCALE: NTS

REV.: A

APPENDIX 1

O'Callaghan Moran & Associates
Phone: 021 4345366

Borehole I.D. MW-1

Project: 09-138-06

Client: Panda Waste Services

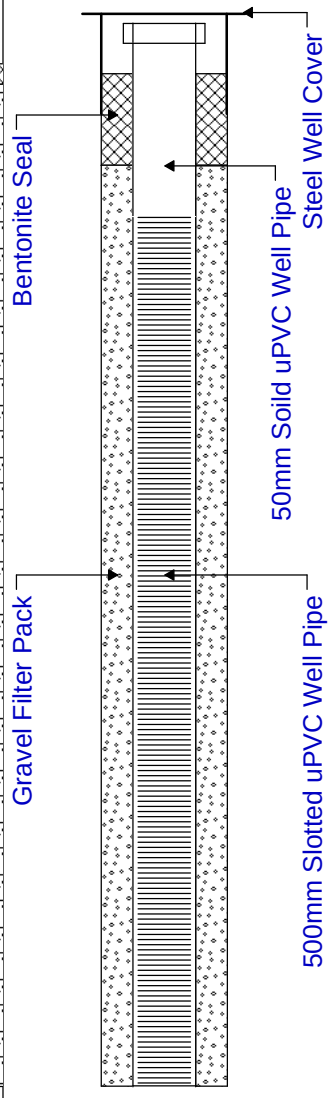
Location: Beaupark, Co. Meath

Borehole Depth: 10m

SWL (m): 1.87m

Borehole Type: Monitoring Well

Depth (m)	Lithology Description	Lithology	Well Construction Details
0	Ground Surface		
0	***Concrete*** Concrete		
1	***Clay*** Stiff brown to grey slightly sandy slightly gravelly clay with cobbles and boulders.		
2	No inflowof water noted during drilling. 1m of water entered hole after ten minutes of drilling stopping.		
10			



Drilling Contractor: Ground Investigations Ireland

Hole Size: 150mm

Drill Method: Air Rotary

Geologist: B. Sexton

Drill Date: 18/08/2015

Sheet: 1 of 1

O'Callaghan Moran & Associates
Phone: 021 4345366

Borehole I.D. MW-2

Project: 09-138-06

Client: Panda Waste Services

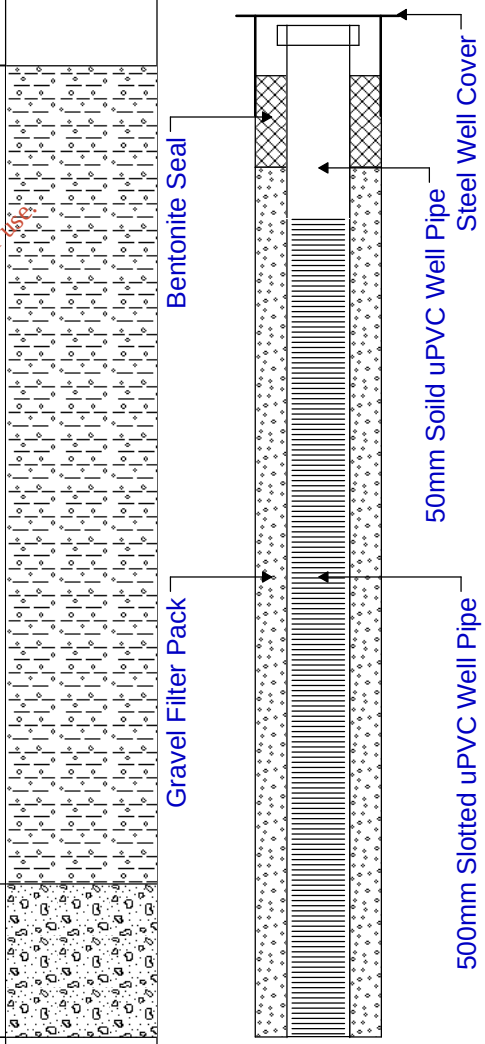
Location: Beaupark, Co. Meath

Borehole Depth: 9.5m

SWL (m): 5.68m

Borehole Type: Monitoring Well

Depth (m)	Lithology Description	Lithology	Well Construction Details
0	Ground Surface		
	Clay Stiff brown to grey slightly sandy slightly gravelly clay with cobbles and boulders. Slight water inflow at 7.5m.		
8	***Weathered Rock*** Very broken and weathered rock and cobbles in a clay matrix.		
9.5			



Drilling Contractor: Ground Investigations Ireland

Hole Size: 150mm

Drill Method: Air Rotary

Geologist: B. Sexton

Drill Date: 17/08/2015

Sheet: 1 of 1

O'Callaghan Moran & Associates
Phone: 021 4345366

Borehole I.D. MW-3

Project: 09-138-06

Client: Panda Waste Services

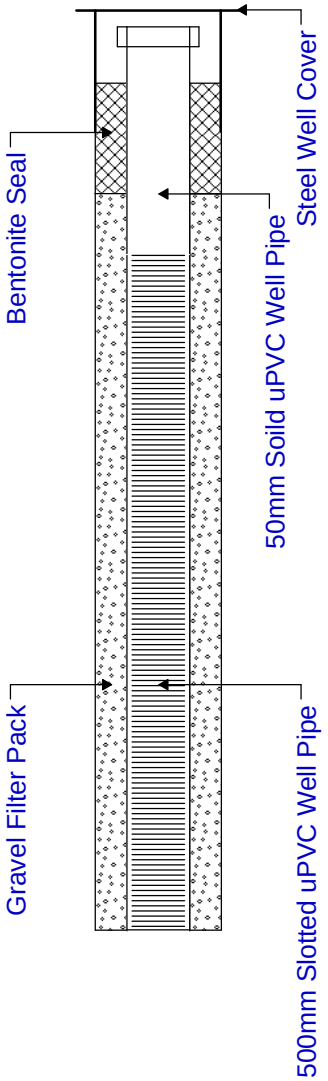
Location: Beaupark, Co. Meath

Borehole Depth: 7m

SWL (m): 2.02m

Borehole Type: Monitoring Well

Depth (m)	Lithology Description	Lithology	Well Construction Details
0	Ground Surface		
	Clay Stiff brown to grey slightly sandy slightly gravelly clay with cobbles and boulders.		
1	Slight water inflow at 5.5m.		
2			
3			
4			
5			
6			
7	***Weathered Rock*** Very broken and weathered rock and cobbles in a clay matrix.		
8			
9			



Drilling Contractor: Ground Investigations Ireland

Hole Size: 150mm

Drill Method: Air Rotary

Geologist: B. Sexton

Drill Date: 18/08/2015

Sheet: 1 of 1

O'Callaghan Moran & Associates
Phone: 021 4345366

Soil Boring Number: SB-1

Project: 09-138-06
Completion Depth: 17/08/2015
Client: Panda Waste Services
Groundwater entry: -
Location: Beaupark, Co. Meath
SWL (m): -

Depth (m)	Lithology Description	Lithology	Soil Sample Depth (m)	PID Readings (ppm)
0	Ground Surface			
	Topsoil Brown sandy clay.			
	Clay Stiff grey/brown slightly sandy slightly gravelly clay with orange mottling.		0.5m	2ppm
1			1m	10ppm
	Clay Very stiff grey slightly gravelly clay.		1.5m	0ppm
2				

Excavation Method: Dando Terrier Drill Rig
Geologist: B. Sexton

Excavation Date: 17/08/2015
Sheet: 1 of 1

O'Callaghan Moran & Associates
Phone: 021 4345366

Soil Boring Number: SB-2

Project: 09-138-06

Client: Panda Waste Services

Location: Beaupark, Co. Meath

Completion Depth: 17/08/2015

Groundwater entry: -

SWL (m): -

Depth (m)	Lithology Description	Lithology	Soil Sample Depth (m)	PID Readings (ppm)
0	Ground Surface			
	Topsoil Brown sandy clay.			
	Clay Stiff grey/brown slightly sandy slightly gravelly clay with orange mottling.		0.5m	0ppm
1	***Clay*** Very stiff grey slightly gravelly clay.		1m	0ppm
			1.5m	13ppm
2				

Excavation Method: Dando Terrier Drill Rig

Geologist: B. Sexton

Excavation Date: 17/08/2015

Sheet: 1 of 1

O'Callaghan Moran & Associates
Phone: 021 4345366

Soil Boring Number: SB-3

Project: 09-138-06
Completion Depth: 17/08/2015
Client: Panda Waste Services
Groundwater entry: -
Location: Beaupark, Co. Meath
SWL (m): -

Depth (m)	Lithology Description	Lithology	Soil Sample Depth (m)	PID Readings (ppm)
0	Ground Surface			
	Concrete Concrete			
	Fill Gravel Fill.			
	Clay Stiff grey/brown slightly sandy slightly gravelly clay. Wood fragment between 0.25m and 0.5m. Possible reworked natural soil between 0.5m and 0.5m.		0.5m	16ppm
1			1m	0ppm
	Clay Very stiff grey slightly gravelly clay.		1.5m	0ppm
2				

Excavation Method: Dando Terrier Drill Rig
Geologist: B. Sexton

Excavation Date: 17/08/2015
Sheet: 1 of 1

O'Callaghan Moran & Associates
Phone: 021 4345366

Soil Boring Number: SB-4

Project: 09-138-06
Client: Panda Waste Services
Location: Beaupark, Co. Meath

Completion Depth: 17/08/2015
Groundwater entry: -
SWL (m): -

Depth (m)	Lithology Description	Lithology	Soil Sample Depth (m)	PID Readings (ppm)
0	Ground Surface			
	Concrete Concrete			
	Fill Gravel Fill.			
	Clay Stiff grey/brown slightly sandy slightly gravelly clay.		0.5m	16ppm
1			1m	13ppm
	Clay Very stiff grey slightly gravelly clay.		1.5m	0ppm
2				

Excavation Method: Dando Terrier Drill Rig
Geologist: B. Sexton

Excavation Date: 17/08/2015
Sheet: 1 of 1

O'Callaghan Moran & Associates
Phone: 021 4345366

Soil Boring Number: SB-5

Project: 09-138-06

Client: Panda Waste Services

Location: Beaupark, Co. Meath

Completion Depth: 17/08/2015

Groundwater entry: -

SWL (m): -

Depth (m)	Lithology Description	Lithology	Soil Sample Depth (m)	PID Readings (ppm)
0	Ground Surface			
	Concrete Concrete			
	Fill Gravel Fill.			
	Fill Fill comprising grey gravelly clay wiht red brick.		0.5m	19ppm
	Clay Very stiff grey slightly gravelly clay.		1m	0ppm
1			1.5m	0ppm
2				

Excavation Method: Dando Terrier Drill Rig

Geologist: B. Sexton

Excavation Date: 17/08/2015

Sheet: 1 of 1

O'Callaghan Moran & Associates
Phone: 021 4345366

Soil Boring Number: SB-6

Project: 09-138-06

Client: Panda Waste Services

Location: Beaupark, Co. Meath

Completion Depth: 17/08/2015

Groundwater entry: -

SWL (m): -

Depth (m)	Lithology Description	Lithology	Soil Sample Depth (m)	PID Readings (ppm)
0	Ground Surface			
	Gravel Gravel fill.			
	Clay Very stiff grey slightly gravelly clay. Refusal at 1.1m - possible boulder/cobble.		0.5m	0ppm
1			1m	0ppm
2				

Excavation Method: Dando Terrier Drill Rig

Geologist: B. Sexton

Excavation Date: 17/08/2015

Sheet: 1 of 1

APPENDIX 2

STANDARD OPERATING PROCEDURE

SOIL SAMPLING

The soil sampling technique described below will be followed to ensure that soil samples are representative of the environment which they are intended to characterise.

1.0 SAMPLING

(A) Locate the soil sampling station in accordance with the workplan which will specify the number and type of samples to be taken. Place a wooden stake into the ground one metre from the sample location and record sample location on the stake.

(B) Record the location in the field logbook and, if possible, photograph the location.

(C) Collect soil samples from the depth specified in the workplan and record the depth in the field notebook. Describe the colour and texture of each sample and record in notebook.

(D) Wear appropriate level of protection when taking samples (gloves, safety glasses, hard hat etc.) as specified in the workplan. Collect soil samples as specified in the workplan using decontaminated stainless steel trowel, soil corer, or similar device. Collect discrete soil samples from each station.

(E) If required by the workplan, composite discreet soil samples by placing equal volumes of soil into the container and mixing thoroughly to a homogenous mixture. Samples may be hand picked, if necessary, to remove larger materials, such as leaves, sticks, gravel, rocks etc., if specified in the workplan. Record in notebook the nature of any materials removed from soil samples.

(F) Deposit each soil sampled into a (clean, pre-washed) container. At the time of collection, the sample bottle will be filled to the top with soil sample.

(G) Fill out labels with waterproof ink and attach to the sample container. The following information will be recorded on each sample label: -

- Client/Site Name
- Date Collected
- Time Collected
- Analysis
- Preservative
- Sample Identification Number

(H) Decontaminate sampling equipment as described below unless otherwise specified in the site workplan. When using stainless steel sampling equipment: -

- wash with non-phosphate detergent in potable water,
- rinse sequentially in potable water, methanol, acetone, methanol and D1 water and;
- allow to air dry in a containment free area.

(I) Wrap the decontaminated sampling equipment in aluminium foil which has been decontaminated in accordance with Section H.

2.0 FIELD DOCUMENTATION

Record sample information in the field notebook. Provide a complete description of the sample location, and a photograph, if necessary. Describe the soil appearance, especially if the presence of oil or an odour is noted. Document the sample bottle lot numbers in the field notebook. Record weather conditions at the time of sampling. The Field Team Leader will initial the logbook entries for correctness.

3.0 FIELD QA/QC SAMPLES

See the separate SOP on Field QA/QC samples for appropriateness and preparation of D1 Water Field Blanks, Cross-contamination Field Blanks, Trip Blanks and Field Duplicate Samples.

4.0 PACKAGING AND TRANSPORT

Check to be sure that all necessary information is on the sample container label. Complete the chain-of custody form. Package, label and transport the samples to the testing laboratory in accordance with requirements for packing, shipping and labelling environmental samples.

END.

STANDARD OPERATING PROCEDURE

GROUNDWATER SAMPLING

The primary objective of groundwater sampling is to establish groundwater quality and evaluate whether the potential contaminant sources at a site have impacted the groundwater in the underlying aquifer. The additional objective is to measure hydraulic gradient, or slope, of the water table to evaluate the direction of groundwater flow.

The purpose of this procedure is to ensure that representative samples of groundwater are collected and documented using consistent methods to ensure sample integrity.

1.0 SAMPLING PROCEDURES

1.1 Well Operating and Purging Procedures

All groundwater sampling will be conducted after the installed and developed wells have been allowed to equilibrate for at least 2 to 3 days. A Field Data Sheet for Well Sampling will be completed for each well.

Groundwater sampling teams will use to following procedure for approaching, opening, purging and sampling all wells, unless directed otherwise by a site specific workplan.

1) Prior to placing any equipment into the well, decontaminate the sampling equipment according to standard decontamination protocol.

2) Ensure you have a working FID/PID, a well key, and a depth-to-water meter.

3) Unlock and open the well cap just enough to insert the probe of the PID/FID. Take and record a reading. A decision to upgrade PPE may be necessary based on the FID/PID readings in the breathing zone.

4) Where practical, the surface water column will be visually examined for the presence of hydrocarbons, if present or suspected, the thickness of the hydrocarbon layer will be measured using an oil/water interface probe prior to taking the depth-to-water measurement.

5) Insert the water level probe into the well and measure and record the static water level to the nearest 0.01 m with respect to the established survey point on top of the well casing.

6) Decontaminate the water level probe with DDI water (Do not rinse with any solvents unless product was encountered).

7) Calculate and record the minimum volume of water to be purged according to the following conversion factors: -

1 well volume	=	water column in metres x litres/linear metre
50mm casing	=	2.0 LPM
100mm casing	=	8.1 LPM
150mm casing	=	18.2 LPM
200mm casing	=	32.4 LPM

8) Purge the well of at least 3 casing volumes by pumping or bailing with a decontaminated submersible pump or PVC bailer equipped with a bottom filling check valve (if the purge volume is low, generally less than 100 litres, the sampling team might find it more efficient to purge with a bailer than a pump). Use a graduated bucket to track the amount of water removed from the well. Periodically determine the pH, temperature and specific conductance of the purged water. Continue purging until the well has been completely evacuated or until the pH and specific conductance measurements have stabilised for at least one well volume. Wells that become dewatered before producing three casing volumes will be sampled as soon as practical once they recover sufficiently.

9) Dispose of purge water collected in the graduated bucket by pouring onto the ground at a distance of 50 to 60 metres from the vicinity of the well. If the water is known or suspected to be significantly contaminated, it may be necessary to store the purge water in a secure container, such as a drum, pending proper disposal.

10) Be aware and record any unusual occurrence during purging such as cascading (a shallow water entry zone that trickles into the borehole).

1.2 Field Parameter Measurement

Measurements of field parameters of pH, temperature and electrical conductivity are collected and organic vapour screening is conducted while the well is purged. To facilitate the collection of basic field parameters, the field team needs to: -

- Purge three well volumes of water from the well and measure field parameters for each well volume removed.

- Collection of water samples should take place after stabilisation of the following parameters: -

  - Temperature $^{+}$/- 1^{o}C
  - pH (meter or paper) $^{+}$/- 0.2 units
  - Specific conductivity $^{+}$/- 5%

- If the aforementioned parameters do not stabilise within three purge volumes, the well will be purged up to a maximum of six borehole volumes unless two consecutive sets of stabilised parameters are obtained.

- Note any observations in the field logbook.

1.3 Collection of Water Samples

All samples or chemical analysis will be placed in laboratory prepared bottles. The types of sample containers and preservative required for each type of analysis are described in the workplan. If required, preservatives will be placed in the sample containers prior to collecting the samples.

The following procedure will be used to sample a well: -

1) After the well has been purged and allowed to recover, sample the well using a properly decontaminated or dedicated disposable bailer. Gently lower the bailer into the water column. Allow the bailer to sink and fill with a minimum of surface disturbance.

2) Slowly raise the bailer out of the well. Do not allow the bailer line to contact the ground, either by coiling it on a clean plastic sheet or by looping it from arm to arm as the line is extracted from the well.

3) Samples will be collected for VOCs analysis immediately after purging is complete and before other samples are collected. Pour the samples slowly into the laboratory prepared 40 ml glass vial. Overfill each vial slightly to eliminate air bubbles, a convex meniscus should be present at the top of the vial. Ensure that the Teflon liner of the septum cap is facing inward and that no bubbles are entrapped. After capping securely, turn bottle upside-down, tap it against your other hand, and observe sample water for bubbles. If bubbles are observed, remove the cap, overfill the vial and reseal. Repeat this step for each vial until the samples with no bubbles are obtained.

4) Place a label on the container and enter the following information: -

   Client/Site Name
   Date Collected
   Time Collected
   Analysis
   Preservative
   Sample Identification Number

5) Record pertinent information in the field logbook and on the Field Data Sheet for Well Sampling. Complete chain-of-custody form.

6) Place custody seals on the container caps. As soon as possible, place sample containers in a cooler with ice packs and maintain at 4^{o}C until extraction. Surround the bottles with appropriate packaging.

7) Obtain the semi-volatile compound/pesticides/PCBs sample(s) by transferring the water to a laboratory prepared 1000 ml amber glass bottle with Teflon-lined cap. Fill the bottle to the bottom of the neck and follow steps 4, 5 and 6 above.

8) Dissolved metals (if necessary) requires the team to filter the sample water through a .45 micron filter. The water is collected in a 1 litre, unpreserved, plastic or glass bottle with HNO_3 preservative. Filtering must be done within 15 minutes of sample collection.

9) Obtain the total metals sample by directly transferring the water from the bailer into a laboratory prepared 1000 ml plastic or glass bottle with HNO_3 preservative.

10) Be sure the pH of the metals sampled is less than 2 by pouring off an aliquot in a clean jar and testing for pH using litmus paper. Dispose of this water and rinse the jar.

11) Collect and prepare Field QA/QC samples in accordance with separate SOP.

12) Be sure to record all data required on the Field Data Sheet or Well Sampling and appropriate entries into the field logbook.

13) Secure the well cap and replace the locking cover.

14) Decontaminate all sampling equipment according to procedure.

15) Decontaminate submersible pumps as follows: -

Scrub pump and cord in a tub of appropriate detergent and potable water
Pump at least 80 litres of soapy water through pump
Rinse with potable water
Pump at least 80 litres of rinse water through the pump
Rinse with DI water before lowering pump into the next well.

END.

APPENDIX 3

Jones Environmental Laboratory

Registered Address : Unit 3 Deeside Point, Zone 3, Deeside Industrial Park, Deeside, CH5 2UA. UK

Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

Tel: +44 (0) 1244 833780
Fax: +44 (0) 1244 833781

O'Callaghan Moran & Associates
Unit 15
Melbourne Business Park
Model Farm
Cork
Ireland

4225

Attention :	Barry Sexton
Date :	2nd September, 2015
Your reference :	15-138-3
Our reference :	Test Report 15/11738 Batch 1
Location :	
Date samples received :	21st August, 2015
Status :	Final report
Issue :	1

Seventeen samples were received for analysis on 21st August, 2015 of which six were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

Phil Sommerton BSc
Project Manager

Client Name: O'Callaghan Moran & Associates
Reference: 15-138-3
Location:
Contact: Barry Sexton
JE Job No.: 15/11738

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-2	7-8	13-14	19-20	25-26	31-32					LOD/LOR	Units	Method No.
Sample ID	SB-1	SB-2	SB-3	SB-4	SB-5	SB-6							
Depth	0.50	0.50	0.50	0.50	0.50	0.50							
COC No / misc													
Containers	V J	V J	V J	V J	V J	V J							
Sample Date	18/08/2015	18/08/2015	18/08/2015	18/08/2015	18/08/2015	18/08/2015							
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil							
Batch Number	1	1	1	1	1	1							
Date of Receipt	21/08/2015	21/08/2015	21/08/2015	21/08/2015	21/08/2015	21/08/2015							
TPH CWG													
Aliphatics													
>C5-C6 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					<0.1	mg/kg	TM36/PM12
>C6-C8 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1	<0.1	0.3	<0.1	<0.1	<0.1					<0.1	mg/kg	TM36/PM12
>C10-C12 #	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2					<0.2	mg/kg	TM5/PM16
>C12-C16 #	<4	<4	<4	<4	<4	<4					<4	mg/kg	TM5/PM16
>C16-C21 #	<7	<7	<7	<7	<7	<7					<7	mg/kg	TM5/PM16
>C21-C35 #	<7	<7	<7	<7	<7	<7					<7	mg/kg	TM5/PM16
Total aliphatics C5-35	<19	<19	<19	<19	<19	<19					<19	mg/kg	TM5/TM36/PM12/PM16
Aromatics													
>C5-EC7	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					<0.1	mg/kg	TM36/PM12
>EC7-EC8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					<0.1	mg/kg	TM36/PM12
>EC8-EC10 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1					<0.1	mg/kg	TM36/PM12
>EC10-EC12	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2					<0.2	mg/kg	TM5/PM16
>EC12-EC16	<4	<4	<4	<4	<4	<4					<4	mg/kg	TM5/PM16
>EC16-EC21	<7	<7	<7	<7	<7	<7					<7	mg/kg	TM5/PM16
>EC21-EC35	<7	<7	<7	<7	<7	<7					<7	mg/kg	TM5/PM16
Total aromatics C5-35	<19	<19	<19	<19	<19	<19					<19	mg/kg	TM5/TM36/PM12/PM16
Total aliphatics and aromatics(C5-35)	<38	<38	<38	<38	<38	<38					<38	mg/kg	TM5/TM36/PM12/PM16
MTBE #	<5	<5	<5	<5	<5	<5					<5	ug/kg	TM31/PM12
Benzene #	<5	<5	<5	<5	<5	<5					<5	ug/kg	TM31/PM12
Toluene #	<5	<5	23	<5	<5	<5					<5	ug/kg	TM31/PM12
Ethylbenzene #	<5	<5	22	<5	<5	<5					<5	ug/kg	TM31/PM12
m/p-Xylene #	<5	<5	36	<5	<5	<5					<5	ug/kg	TM31/PM12
o-Xylene #	<5	<5	23	<5	<5	<5					<5	ug/kg	TM31/PM12
Natural Moisture Content	16.6	15.5	35.0	19.4	9.6	3.9					<0.1	%	PM4/PM0

Client Name: O'Callaghan Moran & Associates

Matrix : Solid

Reference: 15-138-3

Location:

Contact: Barry Sexton

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
15/11738	1	SB-1	0.50	1-2	GRO	Solid Samples were received at a temperature above 9°C.
15/11738	1	SB-2	0.50	7-8	GRO	Solid Samples were received at a temperature above 9°C.
15/11738	1	SB-3	0.50	13-14	GRO	Solid Samples were received at a temperature above 9°C.
15/11738	1	SB-4	0.50	19-20	GRO	Solid Samples were received at a temperature above 9°C.
15/11738	1	SB-5	0.50	25-26	GRO	Solid Samples were received at a temperature above 9°C.
15/11738	1	SB-6	0.50	31-32	GRO	Solid Samples were received at a temperature above 9°C.

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.

Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 15/11738

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 (UKAS) accreditation applies to surface water and groundwater and one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS) accredited - UK.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to a Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

JE Job No: 15/11738

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.				
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	TM005: Modified USEPA 8015B. Determination of solvent Extractable Petroleum Hydrocarbons (EPH) including column fractionation in the carbon range of C10-35 into aliphatic and aromatic fractions by GC-FID. TM036: Modified USEPA 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C5-10 by headspace GC-FID.	PM12/PM16	CWG GC-FID			AR	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes

Jones Environmental Laboratory

Registered Address : Unit 3 Deeside Point, Zone 3, Deeside Industrial Park, Deeside, CH5 2UA. UK

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O'Callaghan Moran & Associates
Unit 15
Melbourne Business Park
Model Farm
Cork
Ireland

4225

Attention :	Barry Sexton
Date :	3rd September, 2015
Your reference :	15-138-03
Our reference :	Test Report 15/11922 Batch 1
Location :	Panda Beaupark
Date samples received :	26th August, 2015
Status :	Final report
Issue :	1

Three samples were received for analysis on 26th August, 2015 of which three were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

Phil Sommerton BSc
Project Manager

Client Name: O'Callaghan Moran & Associates
Reference: 15-138-03
Location: Panda Beaupark
Contact: Barry Sexton
JE Job No.: 15/11922

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
H=H_2SO_4, Z=ZnAc, N=NaOH, HN=$HN0_3$

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-5	6-10	11-15								LOD/LOR	Units	Method No.
Sample ID	MW1	MW2	MW3										
Depth													
COC No / misc													
Containers	V H P G	V H P G	V H P G										
Sample Date	25/08/2015	25/08/2015	25/08/2015										
Sample Type	Ground Water	Ground Water	Ground Water										
Batch Number	1	1	1										
Date of Receipt	26/08/2015	26/08/2015	26/08/2015										
Dissolved Manganese #	91	80	96								<2	ug/l	TM30/PM14
Dissolved Potassium #	2.9	2.9	3.0								<0.1	mg/l	TM30/PM14
Dissolved Sodium #	16.5	34.7	31.8								<0.1	mg/l	TM30/PM14
TPH CWG													
Aliphatics													
>C5-C6 #	<5	<5	<5								<5	ug/l	TM36/PM12
>C6-C8 #	<5	<5	<5								<5	ug/l	TM36/PM12
>C8-C10 #	<5	<5	<5								<5	ug/l	TM36/PM12
>C10-C12 #	<5	<5	<5								<5	ug/l	TM5/PM30
>C12-C16 #	<10	<10	<10								<10	ug/l	TM5/PM30
>C16-C21 #	<10	<10	<10								<10	ug/l	TM5/PM30
>C21-C35 #	510	<10	<10								<10	ug/l	TM5/PM30
Total aliphatics C5-35 #	510	<10	<10								<10	ug/l	TM5/TM36/PM30
Aromatics													
>C5-EC7 #	<5	<5	<5								<5	ug/l	TM36/PM12
>EC7-EC8 #	<5	<5	<5								<5	ug/l	TM36/PM12
>EC8-EC10 #	<5	<5	<5								<5	ug/l	TM36/PM12
>EC10-EC12 #	<5	<5	<5								<5	ug/l	TM5/PM30
>EC12-EC16 #	<10	<10	<10								<10	ug/l	TM5/PM30
>EC16-EC21 #	<10	<10	<10								<10	ug/l	TM5/PM30
>EC21-EC35 #	<10	<10	<10								<10	ug/l	TM5/PM30
Total aromatics C5-35 #	<10	<10	<10								<10	ug/l	TM5/PM30
Total aliphatics and aromatics(C5-35) #	510	<10	<10								<10	ug/l	TM5/TM36/PM30
MTBE #	<5	<5	<5								<5	ug/l	TM36/PM12
Benzene #	<5	<5	<5								<5	ug/l	TM36/PM12
Toluene #	<5	<5	<5								<5	ug/l	TM36/PM12
Ethylbenzene #	<5	<5	<5								<5	ug/l	TM36/PM12
m/p-Xylene #	<5	<5	<5								<5	ug/l	TM36/PM12
o-Xylene #	<5	<5	<5								<5	ug/l	TM36/PM12
Sulphate #	32.31	37.01	42.49								<0.05	mg/l	TM38/PM0
Chloride #	17.8	16.7	18.5								<0.3	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH3 #	0.15	0.49	0.26								<0.03	mg/l	TM38/PM0

Client Name: O'Callaghan Moran & Associates

Matrix : Liquid

Reference: 15-138-03

Location: Panda Beaupark

Contact: Barry Sexton

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
15/11922	1					Liquid Samples were received at a temperature above 9°C.

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.

Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 15/11922

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 (UKAS) accreditation applies to surface water and groundwater and one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

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JE Job No: 15/11922

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5/TM36	TM005: Modified USEPA 8015B. Determination of solvent Extractable Petroleum Hydrocarbons (EPH) including column fractionation in the carbon range of C10-35 into aliphatic and aromatic fractions by GC-FID. TM036: Modified USEPA 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C5-10 by headspace GC-FID.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7	PM14	Analysis of waters and leachates for metals by ICP OES. Samples are filtered for dissolved metals and acidified if required.	Yes			
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.	Yes			

ATTACHMENT 4

Title of Document Energy Efficiency (2009)			
		Applicability	**In place / Proposed**

BAT 1	BAT is to implement and adhere to an energy efficiency management system (ENEMS) appropriate to the local circumstances.	Applicable	**In place**
BAT 2	BAT is to continuously minimise the environmental impact of an installation by planning actions and investments on an integrated basis and for the short, medium and long term, considering the cost-benefits and cross-media effects.	Applicable	**In place**.
BAT 3	BAT is to identify the aspects of an installation that influence energy efficiency by carrying out an audit. It is important that an audit is coherent with a systems approach (see BAT 7).	Applicable	**In place/Proposed.** Nurendale conducted an energy audit of the facility in 2012.
BAT 4	*When carrying out an audit, BAT is to ensure that the audit identifies the following aspects;*	Applicable	**In place/Proposed**. Refer to BAT 3.
a)	energy use and type in the installation and its component systems and processes.		
b)	energy-using equipment, and the type and quantity of energy used in the installation.		
c)	possibilities to minimise energy use, such as: • controlling/reducing operating times, e.g. switching off when not in use (e.g. • ensuring insulation is optimised, • optimising utilities, associated systems, processes and equipment).		

Title of Document Energy Efficiency (2009)			
		Applicability	**In place / Proposed**
d)	possibilities to use alternative sources or use of energy that is more efficient, in particular energy surplus from other processes and/or systems.		
e)	possibilities to apply energy surplus to other processes and/or systems.		
f)	possibilities to upgrade heat quality.		
BAT 5	BAT is to use appropriate tools or methodologies to assist with identifying and quantifying energy optimisation.	Applicable	**In place/Proposed**. The energy audit completed in 2012 and future audits will follow best practice.
BAT 6	BAT is to identify opportunities to optimise energy recovery within the installation, between systems within the installation (see BAT 7) and/or with a third party.	Applicable	**In place**. The energy audit identified actions that have the potential to optimise energy recovery.
BAT 7	BAT is to optimise energy efficiency by taking a systems approach to energy management in the installation. Systems to be considered as a whole include: process units heating systems such as: steam hot water cooling and vacuum motor driven systems such as: compressed air pumping lighting drying, separation and concentration	Applicable	**In place**. The energy audit identified the energy systems that were in place at the time.

Title of Document Energy Efficiency (2009)			
		Applicability	**In place / Proposed**

BAT 8	*BAT is to establish energy efficiency indicators by carrying out all of the following*	Applicable	**In Place/Proposed.** The energy audit identified the existing indicators of energy efficiency. It will be an objective of the next audit to identify the boundaries associated with the indicators and installation specific causes of variation in efficiencies.
a)	Identifying suitable energy efficiency indicators for the installation, and where necessary, individual processes, systems and/or units, and measure their change over time or after the implementation of energy efficiency measures.		
b)	Identifying and recording appropriate boundaries associated with the indicators.		
c)	Identifying and recording factors that can cause variation in the energy efficiency of the relevant process, systems and/or units.		
BAT 9	BAT is to carry out systematic and regular comparisons with sector, national or regional benchmarks, where validated data are available.	Applicable	**In place**.
BAT 10	*BAT is to optimise energy efficiency when planning a new installation, unit or system or a significant upgrade by considering all of the following*	Applicable	**In place**. EED is central to all new equipment procurement/upgrade.
a)	The energy efficient design (EED) should be initiated at the early stages of the conceptual design/basic design phase, even though the planned investments may not be well-defined. The EED should also be taken into account in the tendering process.		

Title of Document Energy Efficiency (2009)			
		Applicability	**In place / Proposed**
b)	The development and/or selection of energy efficient technologies.		
c)	Additional data collection may need to be carried out as part of the design project or separately to supplement existing data or fill gaps in knowledge.		
d)	The EED work should be carried out by an energy expert.		.
e)	The initial mapping of energy consumption should also address which parties in the project organisations influence the future energy consumption, and should optimise the energy efficiency design of the future plant with them. For example, the staff in the (existing) installation who may be responsible for specifying design parameters.		
BAT 11	BAT is to seek to optimise the use of energy between more than one process or system within the installation or with a third party.	Not Applicable	Given the nature of the energy systems at the installation there is no opportunity to optimise the use of energy between systems or with third parties.
BAT 12	BAT is to maintain the impetus of the energy efficiency programme by using a variety of techniques.	Applicable	**Proposed:** The next energy audit report will include recommendation on ensuring energy efficiency programmes are maintained.
BAT 13	*BAT is to maintain expertise in energy efficiency and energy-using systems by using techniques such as:*	Applicable	**In Place**
a)	Recruitment of skilled staff and/or training of staff. Training can be delivered by in-house staff, by external experts, by formal courses or by self-study/development.		
b)	Taking staff off-line periodically to perform fixed term/specific investigations (in their original installation or in others.		

Title of Document Energy Efficiency (2009)			
		Applicability	**In place / Proposed**

c)	Sharing in-house resources between sites.		
d)	Use of appropriately skilled consultants for fixed term investigations.		
e)	Outsourcing specialist systems and/or functions		
BAT 14	*BAT is to ensure that the effective control of processes is implemented by techniques such as:*	Applicable	**In Place**.
a)	Having systems in place to ensure that procedures are known, understood and complied with.		
b)	Ensuring that the key performance parameters are identified, optimised for energy efficiency and monitored.		.
c)	Documenting or recording these parameters.		
BAT 15	*BAT is to carry out maintenance at installations to optimise energy efficiency by applying all of the following:*	Applicable	**In Place/Proposed.** Nurendale has a preventative maintenance programme in place.
a)	Clearly allocating responsibility for the planning and execution of maintenance.		
b)	Establishing a structured programme for maintenance based on technical descriptions of the equipment, norms, etc. as well as any equipment failures and consequences. Some maintenance activities may be best scheduled for plant shutdown periods.		
c)	Supporting the maintenance programme by appropriate record keeping systems and diagnostic testing.		
d)	Identifying from routine maintenance, breakdowns and/or abnormalities possible losses in energy efficiency, or		

Title of Document Energy Efficiency (2009)			
		Applicability	**In place / Proposed**

	where energy efficiency could be improved.		
e)	Identifying leaks, broken equipment, worn bearings, etc. that affect or control energy usage, and rectifying them at the earliest opportunity.		
BAT 16	BAT is to establish and maintain documented procedures to monitor and measure, on a regular basis, the key characteristics of operations and activities that can have a significant impact on energy efficiency.	Applicable	**Proposed.** Nurendale will prepare an Energy and Resource Management Procedure, which will take into account the need to monitor and measure all of the key characteristics of the installation's activities that have as significant impact on energy efficiency. These characteristics will be identified in the report on the next energy audit (Ref BAT 3).
BAT 17	Combustion.	Applicable	**Proposed.** Biomass furnace
BAT 18	Steam Systems.	Not Applicable	No steam systems at the installation.
BAT19	Heat Recovery.	Not Applicable	**Proposed;** heat from biomass furnace will be used in the SRF manufacturing process.
BAT 20	Cogeneration.	Not Applicable?	No cogeneration systems at the installation
BAT 21	BAT is to increase the power factor according to the requirements of the local electricity distributor by using techniques such as those in Table 4.3, according to applicability.	Applicable	**In Place/Proposed.** Power factor correction has been applied at the existing plant
BAT 22	BAT is to check the power supply for harmonics and apply filters, if required.	Applicable	**Proposed**. Nurendale will engage an electrical engineer to review energy management systems at the installation, which will address the efficiency of electric motors.
BAT 23	BAT is to optimise the power supply efficiency by using techniques such as those in Table 4.4, according to applicability.	Applicable	**Proposed.** Nurendale will engage an electrical engineer to review energy management systems at the installation, which will address the efficiency of electric motors.

Title of Document Energy Efficiency (2009)			
		Applicability	**In place / Proposed**

BAT 24	*BAT is to optimise electric motors in the following order;*	Applicable	**Proposed. *Nurendale*** will engage an electrical engineer to review energy management systems at the installation, which will address the efficiency of electric motors.
1	Optimise the entire system the motor(s) is part of.		
2	Optimise the motor(s) in the system according to the newly-determined load requirements, by applying one or more of the techniques in Table 4.5,		
3	When the energy-using systems have been optimised, then optimise the remaining (non-optimised) motors according to Table 4.5.		
BAT 25	BAT is to optimise compressed air systems (CAS) using the techniques such as those in Table 4.6, according to applicability.	Applicable	**Proposed.** The CAS system will be assessed in the next energy audit to identify opportunities for optimisation.
BAT 26	BAT is to optimise pumping systems by using the techniques in Table 4.7, according to applicability.	Not Applicable	Wastes are not pumped
BAT 27	Heating, Ventilation and Air Conditioning	Applicable	**Proposed**; Air extraction system on Building 3 will be assessed in the next energy audit.
BAT 28	BAT is to optimise artificial lighting systems by using the techniques such as those in Table 4.9 according to applicability.	Applicable	**In place**. The energy audit completed in 2012 assessed energy usage in the lighting system.
BAT 29	Drying, Separation and Concentration.	Applicable	**Proposed**: All motors powering the equipment used to manufacture the SRF/RDF will be subject to EED and will be included in future energy audits.

ATTACHMENT 5

1. NON TECHNICAL SUMMARY

Introduction

Nurendale, trading as Panda Waste Services (PANDA) is applying to the Environmental Protection Agency (Agency) for a review of the current Waste Licence (Reg. No. W0140-03) for its waste processing facility at Beauparc, Navan, County Meath. The objectives of the review are: -

- To extend the licence area to include a new building (Building 4), which will house a biological treatment system. The system, which is a combination of anaerobic digestion and composting, will treat organic waste to produce compost. Gases produced during the digestion stage will be used as a fuel to generate electricity and heat, which will be used at the facility and sold to electricity supply companies;

- To expand the processing of household and commercial waste to recover materials, for example paper and plastic, that can be used as a fuel, for example in cement manufacturing. These materials are called Refuse Derived Fuel (RDF);

- To amend Condition 1.5.3 of the current licence to allow the continuous operation of the biological treatment and RDF manufacturing systems;

- To amend Condition 8.6 to allow the continued operation of the construction and demolition waste processing plant in a dedicated open area.

As the installation will have the capacity to biologically treat more than 75 tonnes of waste/day and pre-treat more than 75 tonnes/day of waste for in incineration, it will require an Industrial Emissions Licence to operate. The classes and nature of the industrial emissions directive activities in accordance with the First Schedule to the Act of 1992 are:

11.1 The recovery or disposal of waste in a facility, within the meaning of the Act of 1996, which facility is connected or associated with another activity specified in this Schedule in respect of which a licence or revised licence under Part IV is in force or in respect of which a licence under the said Part is or will be required.

11.4.(b) Recovery, or a mix of recovery and disposal, of non-hazardous waste with a capacity exceeding 75 tonnes per day involving one or more of the following activities, (other than activities to which the Urban Waste Water Treatment Regulations 2001 (S.I. No. 254 of 2001) apply):

(i) biological treatment

(ii) pre-treatment of waste for incineration or co-incineration;

PANDA has obtained planning permission from Meath County Council for the development. An Environmental Impact Statement (EIS) was submitted to the Council and a copy of the EIS is included in this application

The design and method of operation at both the existing facility and proposed development are based on the requirements of the Best Available Techniques for the Waste Treatment Industries 2006 (BREF), which specifies the Best Available Techniques (BAT) for Waste Management Facilities; and BREF for Storage and the BREF for Energy Efficiency.

The emission limit values were determined by those set in the existing Licence, which comply with BAT, and an assessment of the impacts of the new emission sources, which include air emissions and noise.

The EC (Control of Major Accident Hazards involving Dangerous Substances) Regulations 2006 do not apply.

The Installation

The current planning permission and Waste Licence allow PANDA to take in and process up to 250,000 tonnes of non-hazardous waste annually. The wastes are collected from households, businesses and construction sites and are processed in three main buildings (Buildings 1, 2 and 3).

The processing includes sorting the wastes to pick out the clean paper, cardboard, plastics, wood, metals, organics, rubble, soil and stones that can either be recycled or used to manufacture refuse derived fuel. The remaining mixed materials, for example dirty paper and organic residues that are not suitable for recycling, can be treated in the compost tunnels before going to landfill.

Currently approximately 100 people are based at the facility. These comprise a Facility Manager, weighbridge clerk, machine operators, general operatives, collection vehicle drivers and customer service personnel. The current operational hours are 8am to 8pm Monday to Friday and 8am to 4pm on Saturday.

Proposed Development

PANDA has looked at ways to reduce the amount of waste going to landfill so as to keep the costs to its customers as low as possible. The two best options are to expand the composting operation (biological treatment) for the food stuff and to improve the quality of the refuse derived fuel. This will not involve changing either the type or the amount of waste taken in, but will require the construction of a new building (Building 4). Recycled aggregate will be used in the construction works. Planning permission has been granted for the development.

Biological Treatment

The expansion of the composting system will involve the use of what is called a 'dry fermentation anaerobic digestion' plant at the initial stage of the process. This type of system is ideal for the types of waste PANDA accepts and is fully proven and safe.

It will consist of a series of fully enclosed tanks, called digesters, in which the wastes will be placed. The oxygen in the air in the digesters will be used up by the microbes in the waste to produce anaerobic (no oxygen) conditions. The microbes will break down the waste and, in the process, produce a number of different gases (biogas). The most common gas will be methane, which is the 'natural gas' supplied by Bord Gais. The biogas will be cleaned (scrubbed) to remove contamination and used as a fuel in new electricity generators, which will connect to the national grid.

While methane gas is explosive and can pose a risk of explosion when present in the air at certain levels, as is the case with natural gas used in homes, the dry fermentation process is designed to minimise the risk of this occurring. The design of the plant will be based on a rigorous hazard assessment including design and operational controls on the gas collection and ventilation systems, explosion protection, fire safety and lightning protection.

The digesters will reduce the amount of organic matter in the wastes, and convert it to biogas. The waste will then be moved to the composting area, where they will be composted in fully enclosed containers called tunnels. Unlike anaerobic digestion, the compost process requires oxygen and air will be pumped into the tunnels to ensure that oxygen levels are kept at the level needed to complete the composting.

The composting tunnels, which are no longer operational and will not be used in the future, are provided with an odour control system that draws air from the tunnels into a bio-filter, where the substances that form the odours are removed. This type of system has proven very effective in controlling odours and bio-filters units are in operation at more than 15 other composting plants around the county. A similar system will be provided to treat the air inside the anaerobic digestion and composting building.

When the composting process is complete, the material will be pasteurised by raising and maintaining the temperature to a level that kill the microbes. The compost will be sold to farmers, market gardeners, landscape contractors and the general public.

Pasteurisation is required in the composting process to meet the requirements of the Department of Agriculture Fisheries and Marine for the treatment of wastes containing residues of meat and fish (Animal By-Products) so as to avoid the spread of animal diseases, for example mad cow disease and foot and mouth.

The Department has issued guidelines on how anaerobic digestion and composting plants must be designed and operated. The proposed design fully complies with the Departments guidance. Furthermore, approval must be obtained from the Department before the process can start. Once it is operational vets from the Department will also carry out inspections of the plant to ensure that it is operating properly. These inspections will be entirely separate from those carried out by the EPA.

Manufacture of Fuel

The remaining mixed wastes that are not suitable for recycling will be turned into a fuel, called refuse derived fuel RDF or Solid Recovered Fuel (SRF) which can be used in industrial plants in Ireland and abroad, for example cement making plants.

The mixed waste contains a lot of water and needs to be dried to improve its value as a fuel. This will be done using heat from a new furnace. It had been intended to use LPG (liquefied petroleum gas) as a fuel, but this was not the best environmental option because it is a fossil fuel and produces greenhouse gases that contribute to global warming.

A better environmental alternative is to use wood (biomass), as a fuel. Wood is a renewable source of energy and will help PANDA reduce its greenhouse gas emissions from fossil fuels. Waste plastic, paper, cardboard etc. will not be burned in the furnace and the EPA will not approve such use.

The mixed waste will be placed inside a drying drum and the temperature raised using heat from furnace. The air inside the building and the steam from the dryer will contain odours. The air and steam will be sucked into pipes by fans and drawn into the furnace. The temperature of the furnace is designed to ensure that all the odour causing substances are destroyed.

It had been proposed to use a Regenerative Thermal Oxidiser (RTO), operating independently of the furnace to treat the steam from the dryer. However the RTO is fuelled by LPG and if it broke down the production of the RDF would have to stop. The biomass furnace is designed to achieve the same temperatures (800^0C to 850^0C) and same level of treatment performance as the RTO.

As a back-up measure for when the furnace is shut down for maintenance, the odorous air in the building will be treated in carbon filter unit. These units are commonly used in industries that use or manufacture odorous chemicals.

Environmental Conditions

The facility is bordered to the west by the N2 and to the north by the Knockcommon Road. Surrounding land use is predominantly agriculture, however there are some commercial units to the west. There are nine residential dwellings with 0.5km of the site along Knockcommon Road, with a further thirteen residences within 0.5km, along the N2 and Senchelstown Road.

Hydrology

The ground slopes from north to south and there is a land drain along the southern site boundary that flows from west to east and joins an unnamed third order stream, which is a tributary of the River Boyne. This stream enters the Boyne at Roughgrange, approximately four kilometres northeast of the facility.

The facility is in the catchment of the River Boyne and is in the Boyne Lower Water Management Unit (WMU) as designated in the ERBD Management Plan prepared under the

EU Water Framework Directive (WFD). The WMU comprises a number of different Water Bodies and the site is in the Rathdrinagh Upper Water Body.

The ERBD Plan contains reports on the 'Status' of each water body. Status means the condition of the water in a watercourse and is defined by its ecological status and chemical status, whichever is worse. Waters are ranked in one of five status classes, High, Good, Moderate, Poor and Bad.

The WFD requires measures to ensure waters achieve at least 'Good Status' by 2015, and that their current 'Status' does not deteriorate. Where necessary, for example in heavily impacted or modified watercourses, extended deadlines (2021 and 2027) can be set for achieving the following objectives:-

- Prevent Deterioration
- Restore Good Status
- Reduce Chemical Pollution
- Achieve Protected Areas Objectives

The objectives for particular watercourses are based on Pressure and Impact Assessments of human activity, including point and diffuse emissions, landuse (e.g. peat harvesting, quarrying, industrial and residential use) and morphological conditions (e.g. river depth and width, structure and substrate of river bed) on surface waters to identify those water bodies that are 'At Risk' of failing to meet the WFD objectives.

'At Risk' does not necessarily mean that the water bodies have already been adversely impacted, but that there is a likelihood that a water body will fail to meet its objectives unless appropriate management action is taken.

The Rathdrinagh Upper Water Body is ranked as being of Moderate Status based on the overall ecological status and is 'Probably At Risk' of not achieving its Objective of 'Restoring Good Status' by 2027.

Geology & Hydrogeology.

The description of the site geology and hydrogeology is based on a review of databases maintained by the Geological Survey of Ireland (GSI) and Teagasc, data derived from investigations carried out in 2009 and 2015 and the construction logs of two on-site groundwater wells.

The soil maps prepared by Teagasc indicates that the subsoil type is a till derived from Namurian Shales and Sandstones (TNSSs). The site investigation confirmed the subsoils comprise a brown clay to approximately 1m, which is underlain by a grey/black clay that ranges in depth from 6.5 to more than 10m.

The site is underlain by the Balrickard Formation, which is described by the GSI as coarse sandstone, shale. It is classified by the GSI as a bedrock aquifer that is generally unproductive except for local zones (Pl). The subsoils are the single most important natural feature influencing groundwater vulnerability. The Vulnerability Map for Meath indicates that the

vulnerability at the site is Low, which is supported by the available data on the thickness of the subsoils (10m).

Soil & Groundwater Quality

The aquifer beneath the site is part of the Donore Groundwater Body (GWB) as designated in the ERBD Plan. The condition of a GWB is defined by its chemical and quantitative status, whichever is worse, and groundwater quality is ranked in one of two status classes: Good or Poor. The Donore GWB is categorised as being of 'Good' status and is 'Probably Not At Risk' of retaining this status. A Baseline Report that describes the existing soil and groundwater conditions has been prepared.

Designated Sites

There is no Natura 2000 Site immediately adjacent to the site. The closest Natura 2000 Site is The River Boyne and River Blackwater Special Area of Conservation (SAC) and Special Protection Area (SPA) which is 3km to the north. In addition, there are two Natural Heritage Areas (NHA) within 2.5km of the site.

Nature of the Emissions and Assessment of Impact

The actual and potential emissions from the site are:

Rainwater run-off from the yards and building roofs.

Sanitary wastewater and wastewater from the biological treatment process.

Noise from plant and equipment used to process the wastes; delivery/collection vehicles and odour control fans.

Dust from waste processing and vehicle movements on yards during dry weather.

Odours from the processing of the household and residual food waste.

Vehicle exhaust gases from the delivery and collection vehicles.

Surface Water

Rainwater falling on the existing concrete yards is collected in an underground tank and stored before being sent off-site for treatment at a local authority owned sewage treatment plant. Treatment is required because rainfall on concrete yards where vehicles travel and park can become contaminated with silt and small quantities of oil that may leak from vehicle oil sumps.

PANDA has approval to change the drainage system to channel the water from the existing yards to a new reed bed that will be located beside Building 3. The reed bed will remove contaminants that may have been picked up by the rainwater and the treated water will

discharge into a drain along the southern site boundary. This drain is a tributary of the River Boyne, which is 3km from the site.

Rainwater from the roof of the new building will be collected in a tank and used for spraying the yards to keep dust down. The rainwater from the new yards will pass through silt traps and oil interceptors, which will reduce the contamination to acceptable levels, before going to a new soakaway.

Wastewater

Water from the canteen and the toilets is collected and initially treated in an on-site wastewater treatment plant before being sent to a local authority owned sewerage treatment plant. The water used clean the floors of the buildings and the water from truck wash is collected in an underground tank and also sent to a local authority owned sewage treatment.

The biological treatment process will produce wastewater and all of this will be collected in drains inside the new building and pumped to new storage tanks. The tanks will be fully enclosed by walls designed to trap any spills or leaks that may happen. The design and construction of the tanks and containing walls will be approved by the EPA.

Much of the wastewater will be reused in the process, but any that cannot, will be sent to the Irish Water treatment plant.

Groundwater

The only emission to ground will be the rainwater run-off from the new concrete yards. The rainwater will pass through silt traps and an oil interceptor before it enters the soakaway.

Dust

The main source dust emissions with the potential to cause a nuisance are vehicle movements over the concrete yards in dry weather and the Construction and Demolition Waste processing area. The proposed new waste activities will be carried out inside the new building, which will effectively prevent dust causing a nuisance.

Odours

The odour management measures, which include a negative air pressure system inside Buildings 3 and 4 and the collection and treatment of odorous air in a combination of biofilters, carbon filters and the biomass furnace will ensure that smells from the new activities will not cause a nuisance. Odour surveys carried out by the EPA have confirmed that the site is not a source of obnoxious odours.

Noise

The noise sources include the waste processing equipment operating inside the main buildings the C&D processing plant and truck and car movements. The noise monitoring carried out by both PANDA and the EPA has consistently shown noise from the site is not causing a nuisance.

Vermin and Pests

Birds, rats and flies can be attracted to sites where there is available food. The waste accepted at the site include waste accepted at the site includes foodstuffs. All such wastes are and will continue to be processed and stored inside the buildings. This has already been effective in preventing bird attraction. A pest and vermin contractor is used to control flies and rodents.

Proposed technology and other techniques to prevent or eliminate, or where this is not practicable, limit, reduce or abate emissions from the installation

The design and method of operation of both the existing facility and proposed development are based on the requirements of the Waste Treatment Industries 2006 (BREF), which specifies the BAT for Waste Management Facilities, the BAT for Storage, and the Agency's Final Draft BAT Guidance on Best Available Techniques for the Waste Sector: Materials Recovery and Transfer.

Condition 2 of the current Waste Licence requires PANDA to develop and implement an Environmental Management System for the facility, which is consistent with the requirements of both Agency's BAT Guidance Note and the BREFs. It requires PANDA to prepare operational control procedures for all waste activities and ensure that facility staff are provided with the appropriate skills and training to perform their assigned functions.

The Licence conditions require the implementation of the control measures specified in the BREF in so far as they apply to non-hazardous solid waste processing and the prevention of soil contamination. The conditions also specify the relevant control techniques referenced in the Agency's BAT Guidance

The proposed changes take into consideration the requirements of the BREFs and the Agency's BAT Guidance. In particular;

- The collection and treatment of odorous air from the buildings which will handle the household residual and food waste. This will be achieved by a combination of building design and construction; provision of a negative air system, and the treatment of the odorous air in appropriately designed and operated treatment plant.

- For the preparation of waste for use of a solid waste fuel BAT requires the development of a close relationship with the solid fuel user to ensure user in order that a proper transfer of the knowledge of the waste fuel composition is carried out; have a quality assurance system to guarantee the characteristics of the waste fuel produced, and to manufacture different type of waste fuels according to the type of user (e.g. cement kilns, power plants).

- For the preparation of a solid fuel from non-hazardous waste it is BAT to visually inspect the incoming waste to sort out the bulky metallic or non-metallic parts; use

magnetic ferrous and non-ferrous metal separators and use a combination of shredder systems and pelletisers suitable for the preparation of the specified size waste fuel.

Measures to Comply with Waste Management Hierarchy

The existing facility is designed and operated to maximise the recovery of recyclables from the incoming wastes. The proposed changes are consistent with the Waste Hierarchy as the production of SRF/RDF using non-recyclable materials will gain the maximum value from the waste.

Abnormal Operating Conditions

PANDA has prepared and adopted an Accident Prevention Policy (APP) and Emergency Response Procedures (ERP). The APP addresses all potential hazards, with particular reference to the prevention of accidents that may cause damage to the environment. The ERP identifies all potential hazards at the site that may cause damage to the environment and also specifies roles, responsibilities and actions required to deal quickly and efficiently with all foreseeable major incidents and to minimise environmental impacts.

Avoidance of the Risk of Environmental Pollution due to Closure of the Facility

PANDA has prepared an Environmental Liability Risk Assessment (ELRA) and Decommissioning Management Plan (DMP) for the facility, which includes the proposed development.

Environmental Monitoring:

Environmental monitoring will be carried out in accordance with the licence conditions. The monitoring will includes noise, dust, surface water and odours.

Measures to Comply with an Environmental Quality Standard

The emission limit values proposed in the application and those that will be set by the EPA in the new licence are and will be based on achieving compliance with the relevant EQS

Measures to comply with Council Directive 80/68/EEC and 2006/118/EC in relation to the protection of groundwater.

The only discharge to ground will be rainfall run-off. The site is designed to prevent accidental emissions to ground.

The Main Alternatives to the Proposed Technology, Techniques and Measures

Alternative Sites

The site is suitable for the proposed biological treatment and the expansion of the existing RDF/SRF manufacturing process and an agreement to acquire the lands on which Building 4 will be constructed has been reached with the land owner. The only alternative to the proposed

development would be to construct a new waste management facility to house the biological treatment plant and the relocated RDF/SRF manufacturing line.

This would require the acquisition of land, the construction of two new waste processing buildings and supporting infrastructure (offices, maintenance workshops, weighbridge) and the provision of new site services (surface water, foul water, power, water supply, security etc). The development of a new facility offers no environmental advantages compared to extending the existing operations.

Alternative Site Layout & Processes

PANDA carried out extensive research on a range of waste treatment technologies that could achieve its objectives of reducing to a minimum the materials that are consigned to landfill and replacing non-renewable energy sources. These technologies included stand-alone AD, pyrolysis, stand-alone composting and the manufacture of bio-diesel from recovered plastics.

While pyrolysis and the manufacture of bio-diesel are technically proven, they are complex processes and, based on international experience, there are doubts over their long term commercial viability, particularly the manufacture of bio-diesel which relies on government subsidies.

While standalone AD and composting of MSW have been proven commercially viable, each has drawbacks. Standalone AD generates liquid and solid residues that must be disposed of, typically by application to agricultural lands, which requires the availability of suitable land banks. Although composting can produce a high quality end product that is suitable for agricultural and horticultural use, it does not allow the exploitation of the energy value of the waste.

Therefore, the proposed combined AD/composting process allows the recovery of the maximum value from the waste, while minimising the generation of residual wastes that require disposal/further treatment.