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BASELINE ASSESSMENT REPORT

ERAS ECO LTD.

FOXHOLE,

YOUGHAL,

COUNTY CORK

Prepared For: -

Eras Eco Ltd,
Foxhole,
Youghal,
County Cork

Prepared By: -

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August 2017

Project	Baseline Assessment Report Eras Eco Ltd Youghal			
Client	Eras Eco			
Report No	Date	Status	Prepared By	Reviewed By
	10/09/2016	Draft	Billy Hamilton MSc	Jim O'Callaghan MSc
	10/10/2016	Final		
	04/08/2017	Final Rev A	Conor McGrath MSc	

TABLE OF CONTENTS

1. INTRODUCTION

Eras Eco Ltd (Eras Eco) is Cork's leading sludge management company and has been operating its facility at Foxhole, Youghal since 2007. The facility operates under an Industrial Emissions Licence (W0211-01) (IED) issued by the Environmental Protection Agency (EPA) and planning permission granted by Cork County Council.

The licence authorises the acceptance and processing of Commercial and Industrial and Household waste, the drying and stabilisation of non-hazardous industrial sludge and sewage sludge and the treatment of landfill leachate. It is intended to install an anaerobic digestion plant to treat industrial wastewater sludges and other organic waste and use the biogas to generate electricity. This will require a review of the current licence.

An application for an IE 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), may require the preparation of a 'Baseline Report', the objective of which are to establish the status of soil and groundwater conditions at a site.

As the existing operations involve the storage and use of diesel, sulphuric acid, sodium hydroxide and sodium hypochlorite, all of which are classified as hazardous substances, a Baseline Report is required. Eras Eco appointed O'Callaghan Moran & Associates (OCM) to prepare the Baseline Report.

1.1 Methodology

OCM's assessment was based on reports on site investigations carried out in 2004 and 2007 before the installation was commissioned and information in the Environmental Impact Statement (EIS) prepared as part of a planning application for the development of the Anaerobic Digester (AD) plant. In addition, as requested by the Agency, soil samples were collected, analysed and the results compared to the typical ranges found in Irish soils as listed in the Agency's 'Towards Setting Environmental Quality Objectives for Soil *Developing a Soil Protection Strategy for Ireland.'*

2. STAGE 1 & 2 HAZARDOUS SUBSTANCE

2.1 Stage 1 Hazardous Substances Currently Used, Produced and Released

Current operations involve the storage and use of diesel, engine oil, hydraulic oil, sulphuric acid, sodium hydroxide, sodium hypochlorite, aluminium sulphate and lime. Although not accepted at present the current licence authorises the treatment of landfill leachate in the on-site process wastewater treatment plant.

2.2 Stage 2 Relevant Hazardous Substances

The hazardous substances of relevance to the baseline conditions are diesel, engine oil, hydraulic oil, sulphuric acid, sodium hydroxide, sodium hypochlorite and leachate. While lime and aluminium sulphate have hazardous properties, this is associated with their being classified as 'irritants' and they do not present a risk of soil or groundwater pollution. Aluminium sulphate is used as a flocculant in water treatment plants and lime is applied to farm land as a pH adjuster.

3. STAGE 3 SITE SPECIFIC POLLUTION POSSIBILITY

3.1 Installation Location

The installation occupies almost 1.6 hectares and is approximately 2km from Youghal, adjacent to the former Youghal Landfill. The site and the surrounding area are situated on low lying land reclaimed from the Blackwater Estuary which is known locally as Youghal Mudlands. The northern and western boundaries of the site are defined by a public access road and an adjacent development respectively. The lands to the south and west are undeveloped.

3.2 Installation Layout

The existing layout is shown on Drawing No 10P521-01. The proposed layout is shown on Drawing No 15-193-01. There are two main processing buildings (Building 1 and 2), offices, weighbridges, process wastewater treatment plant (WWTP), wheel wash, paved open yards and parking areas. The entire operational area is paved.

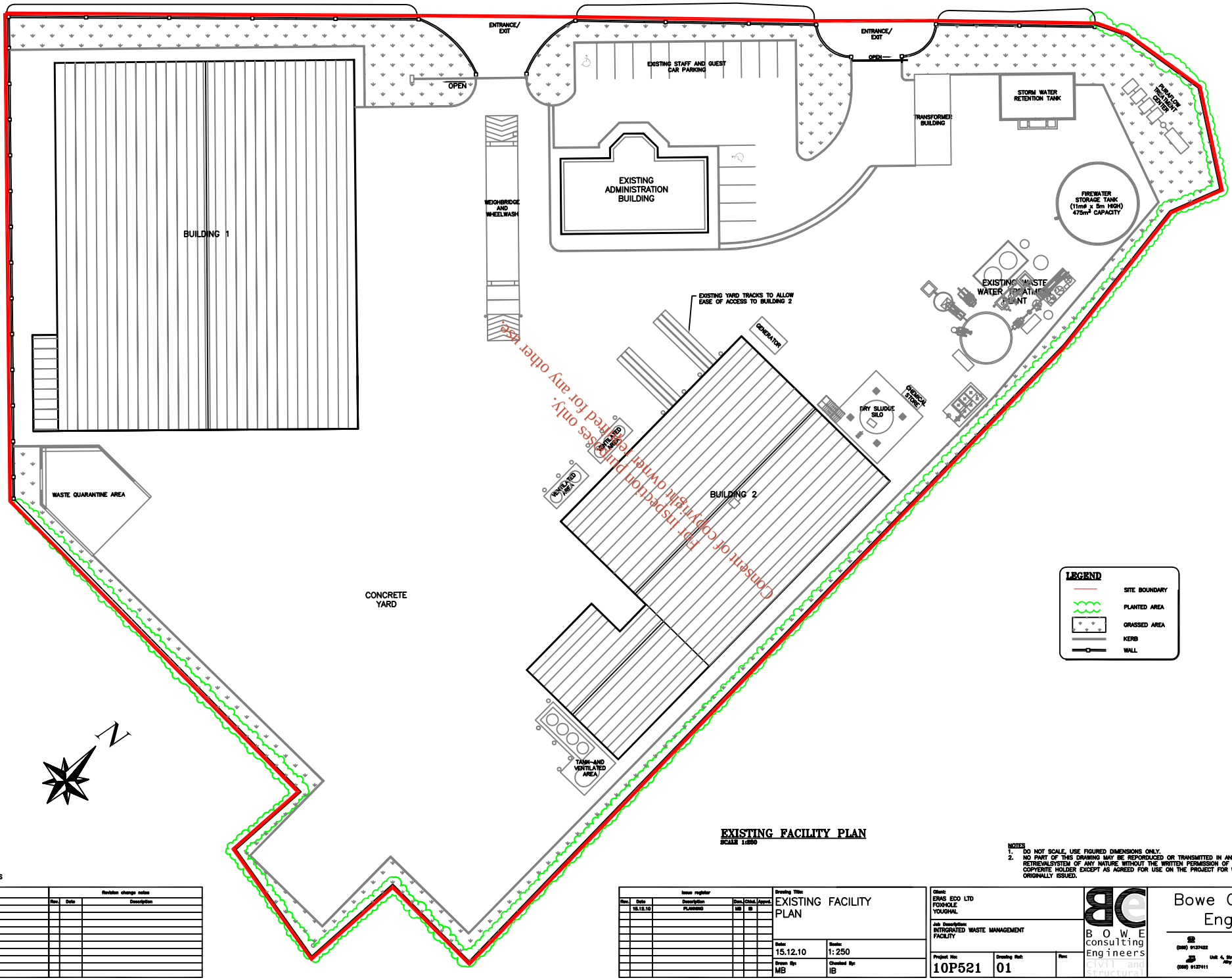
The new anaerobic digestion plant will consist of a feed hopper inside Building 1, two above ground digester tanks, each 2,208m^3, that will treat the sludge and produce a gas that will be used to generate electricity and heat in a new combined heat and power (CHP) plant. The CHP plant will be located to the west of the digesters and will include two gas engines and back-up flare. The digestate will be temporarily stored in a new storage tank (500m^3).

3.3 Installation Activities

The current licence authorises the acceptance of 110,000 tonnes of waste per year, which includes:

Commercial & Industrial Waste	70,000 tonnes
Non-Hazardous Sludge	30,000 tonnes
Landfill Leachate	10,000 tonnes

The sludge is treated in Building 2 where it is dried in a rotatory dryer using heat from a wood chip fired boiler. The sludge is off loaded into an underground concrete reception bin inside Building 2 and then transferred to the rotary dryer.



EXISTING FACILITY PLAN

SCALE 1:250

NOTES
1. DO NOT SCALE, USE FIGURED DIMENSIONS ONLY.
2. NO PART OF THIS DRAWING MAY BE REPRODUCED OR TRANSMITTED IN ANY FORM OR STORED IN ANY RETRIEVALSYSTEM OF ANY NATURE WITHOUT THE WRITTEN PERMISSION OF BOWE CONSULTING ENGINEERS AS COPYERITE HOLDER EXCEPT AS AGREED FOR USE ON THE PROJECT FOR WHICH THE DOCUMENT WAS ORIGINALLY ISSUED.

Referenced drawings		Revision change notes		
Dwg No.	Dwg Title	Rev.	Date	Description

Issue register					
Rev.	Date	Description	Drwn.	Chkd.	Apprd.
	15.12.10	PLANNING	MB	IB	

Drawing Title: EXISTING FACILITY PLAN

Date: 15.12.10 | Scale: 1:250

Drawn By: MB | Checked By: IB

Client: ERAS ECO LTD, FOXHOLE, YOUGHAL

Job Description: INTRGRATED WASTE MANAGEMENT FACILITY

Project No: 10P521 | Drawing Ref: 01 | Rev:

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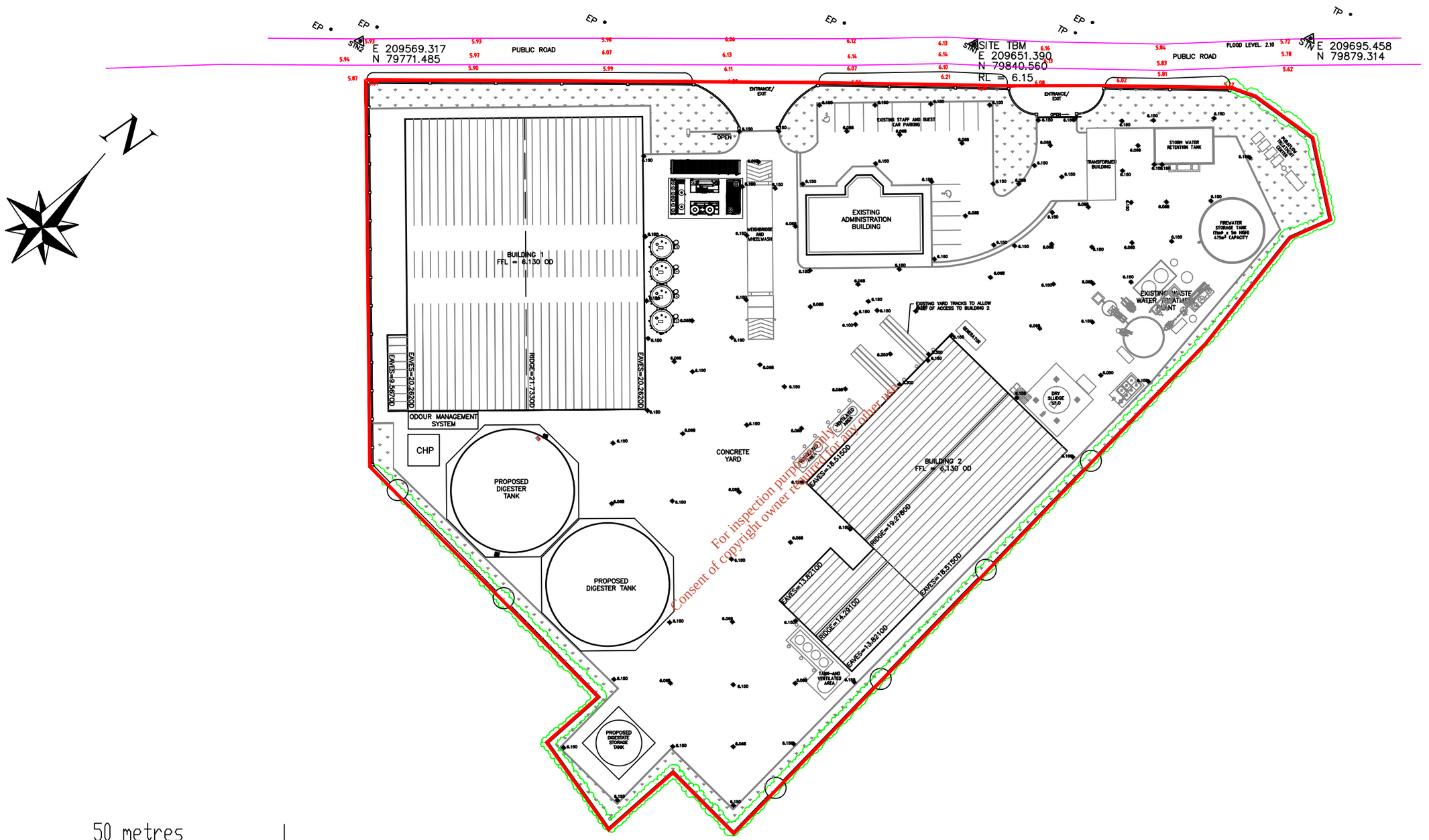

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DRAWING No.

15–193–01

TITLE

Proposed Site Layout

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Wood chip used to fuel the boiler is stored inside the building. The steam from the dryer is collected and condensed and treated in the on-site wastewater treatment plant. The air inside the building is also collected and treated in an odour control plant. The dried sludge is exported and used as a fuel.

Building 1 is used to store sludge awaiting treatment. The feed hopper for the AD digesters will be located inside the building along with six (6No) liquid waste storage tanks, two (2 No.) pasteuriser tanks and a digestate centrifuge.

From the reception area inside the Building 1 the sludge will be transferred by an enclosed conveyor to the two digesters, which will be heated to 37°C and continuously agitated. The process will produce a biogas containing approximately 65% methane and 35% carbon dioxide, which will then be treated and either used as a fuel in the CHP plant or exported to the national grid.

The digestate will either be directly land spread or dewatered in the centrifuge to produce a fibre 'cake' and a liquor. The fibre will be sent off-site for either application to land or composted while the liquor will either be recirculated in the AD plant or discharged to the Irish Water foul sewer.

The proposed changes will reduce the overall quantities of waste to 65,000 tonnes/year, which will include:

Commercial & Industrial and Household Waste	20,000 tonnes
Non-Hazardous Sludge	40,000 tonnes
Leachate from Landfills	5,000 tonnes

3.4 Surface Water Drainage

The surface water drainage system is shown on Drawing No. 15-193-02 RevB. Rainwater from roofs and non-waste storage hardstanding areas is collected in the drainage system serving the installation and passes through two silt/ oil interceptors (Class 1 and designed in accordance I.S. EN 858) into an underground stormwater retention tank.

Where possible the water is used on-site (wheel wash, the bio-filter, cooling water for the dry product and to backwash the WWTP filters) with the surplus water discharging to the Irish Water combined sewer via a non-return valve. The combined sewer discharges into the estuary.

3.5 Wastewater

Wastewater generated at the installation includes sanitary wastewater from the offices and process water from the sludge drying unit. The sanitary wastewater is initially treated in the proprietary treatment system (Puraflo©) in the north of the site before being discharge to waste water treatment plant.

Process wastewater comprising condensate from the rotary sludge drier and wash water from the wheel wash is treated in an on-site process waste water treatment plant (WWTP) comprising, pH adjustment, a balance tank, dissolved air floatation unit, carbon and sand filters, lamella settlement unit, hypochlorite treatment and a sludge storage tank. Currently the treated effluent is discharged to the Irish Water combined sewer that outfalls to the estuary.

3.6 Hazardous Substances Management

Diesel is stored in a plastic double skinned tank (2,600 litres) adjacent to the southern end of Building 2. The liquid sulphuric acid, sodium hypochlorite and sodium hydroxide are stored in four Intermediate Bulk Containers (IBC) in a bunded Chemstore adjacent to the process WWTP. The unit has a 1,200 litre polythene collection sump. Details of the design and retention capacities of the diesel storage tank and Chemstore are in Appendix 1. Leachate will be delivered in road tankers and pumped directly into the WWTP balance tank.

3.7 Bund and Pipeline Integrity Testing

Condition 6.14 of the current licence requires that all tanks and pipelines be impervious to the materials carried or stored in them and that they be subject to routine integrity tests to ensure they are fit for purpose. The most recent integrity tests have confirmed the pipelines tanks and bunds are in good condition.

3.8 Emergency Response

Eras Eco has prepared and implemented an Emergency Response Plan (ERP) to minimise the risk of accidents or incidents that could result in adverse environmental impacts. The ERP ensures a rapid response to any incident by trained staff so as to minimise the impact on the environment of any associated emissions.

4. SITE HISTORY

4.1 Sources

The site history was derived from the reports on site investigations carried out in 2004 and 2007 and the EIS prepared in 2010 as part of the application for planning permission to develop the AD plant.

4.2 History

The site was reclaimed from the 'Youghal Mudlands' and was initially used by Youghal Town Council to store diesel for vehicles operating on the adjacent Youghal Landfill. It is understood the above ground storage tanks were located in the vicinity of the entrance to the installation.

A site investigation was carried out in 2004 as part of a planning application for a waste facility, identified the presence of made ground at the site which included waste. A licence application was lodged in 2004 and in 2005 a second site investigation was carried out in response to a request from the Agency. The investigation was completed by SWS and their report is in Appendix 2.

The investigation comprised the excavation a series of trial pits across the site and the installation of two groundwater monitoring wells. The trial pits confirmed that the waste was not extensive across the site, but was confined to localised pockets and is generally of shallow depth (0.5 – 1.6 m). The waste, where encountered, was typically degraded domestic and builders' type wastes with plastics and ferrous objects being the only clearly identifiable features (Ref to photographs in Appendix 1 of the SWS Report). The report does not contain the results of any groundwater monitoring.

The Waste Licence was granted in November 2006 and the facility was constructed and commissioned in 2007. Condition 6.18.2 of the licence required remediation of hydrocarbon contamination in the soil and groundwater, with particular regard to the ground in, around, under and down hydraulic gradient of the area historically used for diesel storage.

In 2007, Eras Eco commissioned Minerex Environmental Ltd (MEL) to carry out a groundwater quality assessment to determine if there was any contamination in the groundwater in the former diesel storage area and if it had migrated from the area. A copy of the MEL report that describes the well installation and the groundwater quality monitoring is in Appendix 3 and the results are discussed in Section 5.

The MEL groundwater assessment report refers to a separate soil investigation carried out by MEL. It is understood that the report on the investigation was submitted to the Agency, but Eras Eco does not have a copy. It appears that remedial works involving the excavation and removal of impacted soils was carried out, as MEL refers to the presence of low levels of diesel range organics in stockpiled materials from the area of concern.

5. ENVIRONMENTAL SETTING

Information on the local and regional hydrology, geology and hydrogeology was derived from the reports on site investigations carried out in 2004 and 2007 and the description of the soils and geology in EIS prepared in 2010 as part of the application for planning permission to develop the AD plant (Appendix 4).

5.1 Hydrology

The site is located on reclaimed land to the west of the estuary of the Blackwater River. The Tourig River enters the Blackwater to the north of the site. A drainage ditch, which runs adjacent to the access road to the north-west of the site, receives run-off from the access road and from reclaimed land to the north-west. There are a number of other drains to the east and south-east of the site, all of which enter the estuary.

Rainwater run-off from roofs and non-waste storage paved areas is collected in the surface water drainage system and collected in the retention tank. Where possible the water is used on-site with the surplus water discharging to the estuary via the Irish Water combined sewer.

5.2 Geology

The soils comprise up to 3m of made ground, comprising gravelly clay soils with fragments of plastic (4-5%), wood (1%), glass (2%) and ceramics (2-3%). It is underlain by a stiff gravelly clay that is more than 14m thick. The bedrock underlying the site is Waulsortian Limestone, which consists of massive, unbedded mounds of calcareous deposits in the form of mudstones, wackestones and packstones.

5.3 Hydrogeology

The GSI has classified the bedrock that underlies the site as a Locally Important Karstified Aquifer. A search of the GSI karst database indicates that there are no karst features within the area of the site. A search of the GSI well database identified one well used for water supply located approximately 5km west of the site (i.e. up-gradient) and has a reported yield of 979m^3/d .

The aquifer vulnerability rating shown on the GSI Vulnerability Map is "High". However, the MEL site investigation completed in 2007 encountered up to 14m of gravelly clays beneath the site, giving a site specific vulnerability rating of Moderate.

MEL installed three groundwater monitoring wells (MW1 close to the southern site boundary and MW2 and MW3 in the north of the site). Each well contained two piezometers, one in the made ground and the other in the natural ground.

Water was not encountered in the piezometer in the 'made ground' at MW1, but was present in the other 'made ground' piezometers. MEL concluded that there was a perched water table in the made ground, but this was dependent on the permeability of the made ground and was not continuous across the site. The levels in the two of the piezometers in the natural ground (MW2 and MW3 in the north of the site) indicated confined conditions.

MEL, based on the level monitoring, concluded that the groundwater flow direction is to the south-east towards the estuary at low tide, but the direction could vary during high tide.

6. SITE CHARACTERISATION

6.1 Conceptual Site Model

The site is underlain by up to 3 m of 'made ground' comprising gravelly clay with fragments of plastic, wood, glass and ceramics. It is underlain by a stiff gravelly clay that is more than 14m thick. The bedrock underlying the site is Waulsortian Limestone, which is a Locally Important Karstified Aquifer. The aquifer vulnerability is Moderate.

There is a perched water table in the made ground, but this is not continuous across the site. Confined conditions occur in MW2 and MW3 in the north of the site. The groundwater flow direction is to the south-east towards the estuary at low tide, but the direction could vary during high tide.

The installation area is entirely covered by buildings or concrete paving. Rainwater run-off from building roofs and paved areas is directed to an underground retention tank and either used on site or discharged to the Irish Water combined sewer. Process waste water is treated in the on-site WWTP, with the treated effluent discharged to the Irish Water sewer. Sanitary wastewater is treated in the 'puraflo' system and the treated effluent discharges to the Irish Water combined sewer.

6.2 Groundwater Quality

Condition 6.18.2 of the current licence requires remediation of hydrocarbon contamination in the soil and groundwater, with particular regard to the ground in, around, under and down hydraulic gradient of the area historically used for diesel storage. In 2007 Eras Eco commissioned MEL to carry out a groundwater quality assessment to determine if there was any contamination in the groundwater in the former diesel storage area and if contamination had migrated from the area.

A copy of the MEL report that describes the well installation and the groundwater quality monitoring is in Appendix 3 and the results are in Table 6.1. The parameters include ones indicative of contamination by the hazardous substances that are and will be used at the installation (pH, sodium, sulphate, DRO, conductivity and chloride).

The current licence requires bi-annual monitoring in the three onsite wells. The results of the monitoring carried out in 2015 are in Table 6.2.

Table 6.1: Groundwater Monitoring Results 2007.

Parameter	Unit	MW1-P1	MW2-P1	MW2-P2	MW3-P1	MW3-P2
pH*	pH Units	5.64	6.81	7.48	7.2	6.88
Conductivity*	µS/cm	451	842	853	550	644
Arsenic	µg/l	5	5	4	4	4
Benzene	µg/l	<10	<10	<10	<10	<10
Cadmium (Dissolved)	µg/l	1.7	0.6	<0.4	<0.4	<0.478
Chloride	µg/l	78	182	137	43	57
Cobalt	µg/l	71	2	1	<1	<1
DRO	µg/l	<10	<10	<10	<10	<10
Ethylbenzene	mg/l	<10	<10	<10	<10	<10
Fluoride	µg/l	<0.1	0.3	0.7	<0.1	0.3
Iron (Dissolved)	mg/l	7.46	<0.002	<0.002	<0.002	<0.002
Manganese (Dissolved)	mg/l	2.77	2.34	0.164	0.048	0/151
Mineral Oil	µg/l	<10	<10	<10	<10	<10
Nitrate	mg/l	28.3	1.6	11.5	25.6	23.1
Orthophosphate	mg/l	0.05	0.12	0.11	0.08	0.08
PRO	µg/l	<10	<10	<10	22	<10
Sodium	mg/l	43	120	120	28.5	41
Sulphate	mg/l	37	69	248	22	40
SVOC	µg/l	<1	<1	<1	<1	<1
Toluene	µg/l	<10	<10	<10	<10	<10
VOC	µg/l	<1	<1	<1	<1	<1
Xylene	µg/l	<10	<10	<10	<10	<10

* Field Measurements

Table 6.2: Groundwater Monitoring Results Q 4 2015.

Parameter	Unit	MW1-P1	MW2-P1	MW2-P2	MW3-P1
pH*	pH Units	6.49	7.28	7.39	7.36
Conductivity*	uS/cm	857	789	536	672
COD	mg/l	119	<1	77	1
PRO	mg/l	<0.04	<0.01	<0.01	<0.01
DRO	mg/l	<0.04	<0.01	<0.01	<0.01
Nitrate	mg/l	<0.05	0.06	<0.5	23.6
Ammonia	mg/l	8.5	0.30	0.88	<0.1
Chloride	mg/l	36.1	22.4	66.5	38
Cadmium	mg/l	<0.0006	0.0015	<0.0006	<0.0006
Cobalt	mg/l	<0.002	0.005	0.05	<0.002
Iron	mg/l	26.4	3.1	48	0.486
Manganese	mg/l	7.08	1.4	2.79	0.03
Arsenic	mg/l	0.0094	0.0044	0.015	<0.001
VOC	mg/l	<0.001	<0.001	<0.001	<0.001

The results are considered to be indicative of the baseline groundwater quality.

6.3 Soil Quality

The MEL report (April 2007) refers to a separate soil investigation carried out by MEL. It is understood that the report on the investigation was submitted to the Agency, but Eras Eco does not have a copy.

Section 1.1.3 and 1.1.4 of the MEL report (April 2007) states that site investigations were carried out in 2004 and 2005; whilst they did not include chemical analysis of the soils they did refer to the detection of hydrocarbon odours in the area where the diesel tanks had been located.

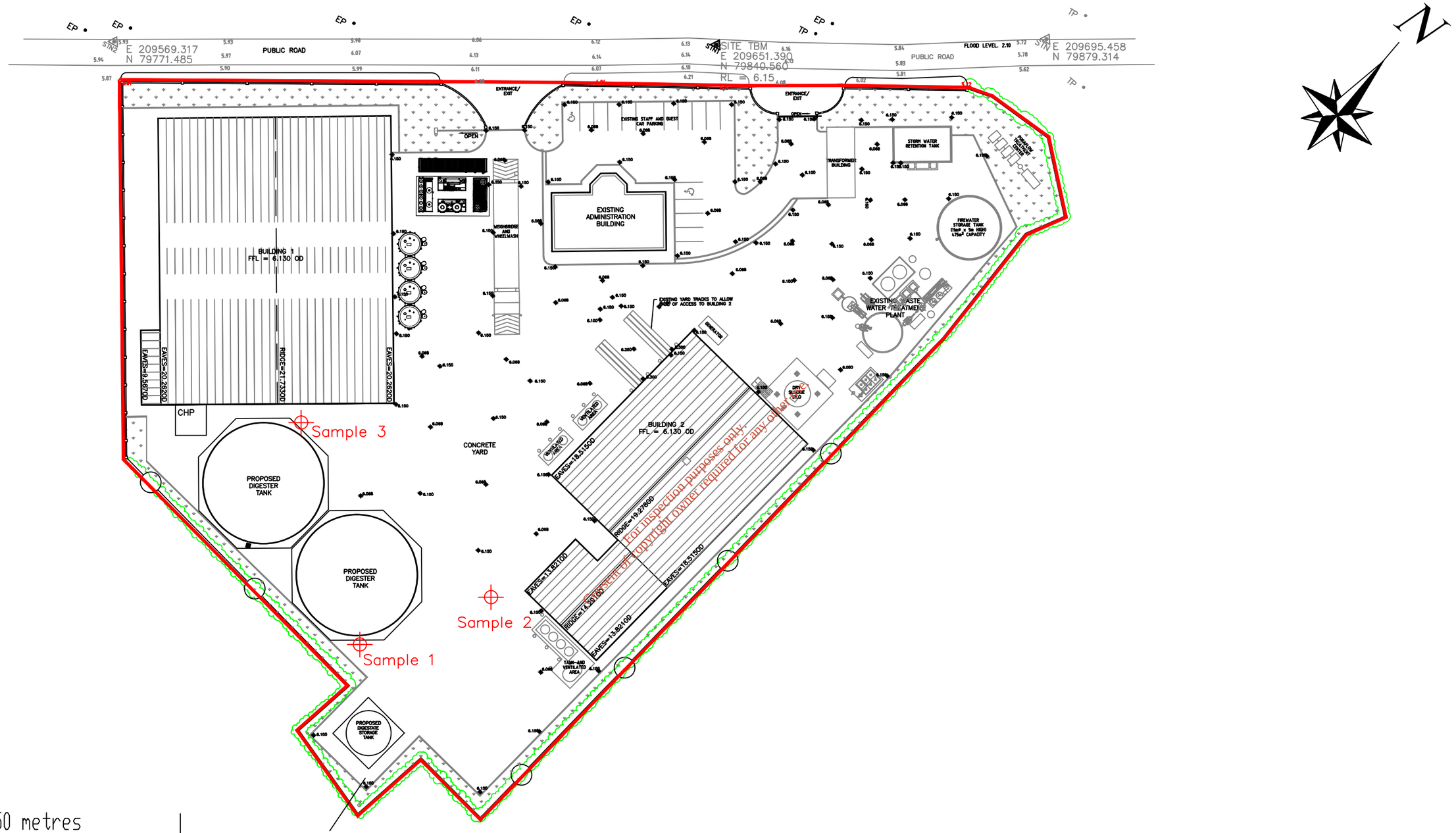
It appears that remedial works involving the excavation and removal of impacted soils was carried out, as MEL refers to the presence of low levels of DRO in stockpiled materials from the area of concern.

The Hydro-Environmental Services report in Appendix 3 of the EIS (copy in Appendix 3 of this report) refers to the MEL report on the soils assessment and describes the impacted area as measuring approximately 45m^2. It states that field screening using a Photo Ionization Detector (PID) did not identify the presence of volatile organic compound and no hydrocarbon odour was detected. The report further states that the laboratory analysis did not detect any hydrocarbons.

In July 2017 works had started on the construction of the AD plant in the south-west of the site. This involved the breaking out of the concrete slab for the installation of services. An OCM hydrogeologist visited the site on 13th July 2017 to inspect the excavations and to collect soil samples for laboratory analysis. The samples were collected from natural ground beneath the concreted slab, the samples which comprised of sandy soils at the locations shown on Figure 6.1.

The samples were placed in laboratory containers and stored in coolers prior to shipment to Jones Environmental Forensics. The samples were analysed for the suite of parameters as specified by the Agency. The analytical methods were all ISO/CEN approved and the method detection limits were below the relevant guidance/threshold values. The full laboratory reports are in Appendix 5 and the results are in Table 6.3.

The Table includes for comparative purposes the soil quality ranges listed in the Agency' *'Towards setting Environmental Quality Objectives for Soil'* Pesticides, hydrocarbons, polychlorinated biphenyl (PCB) and phenols were not detected. Trace levels of PAH were detected in one sample. The metal levels were all within the typical range of elements in non-polluted agricultural soil. The results are considered to be indicative of the baseline soil quality.



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Soil Sample Locations

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Table 6.3

Parameter	Unit	Sample 1	Sample 2	Sample 3	EPA Range
Made Ground/Natural Ground:		**Made Ground**	**Made Ground**	**Made Ground**	
Arsenic	mg/kg	13.4	18.7	17.1	1-50
Cadmium	mg/kg	0.1	<0.1	0.1	0.1-1
Chromium	mg/kg	50.9	51.3	50.6	5-250
Copper	mg/kg	20	26	31	2-100
Lead	mg/kg	27	22	40	2-80
Nickel	mg/kg	36.8	50.4	43.5	0.5-100
Selenium	mg/kg	<1	<1	<1	0.2-2
Zinc	mg/kg	101	95	199	10-200
Mercury	mg/kg	<0.1	<0.1	<0.1	0.03-0.8
Phenol	mg/kg	<0.15	<0.15	<0.15	NE
Chloride	mg/kg	20	14	50	NE
Sulphate	mg/kg	<10	<10	<10	NE
pH	pH units	8.47	9.92	8.62	NE
Benzene	mg/kg	<5	<5	<5	NE
Toluene	mg/kg	<5	<5	<5	NE
Ethylbenzene	mg/kg	<5	<5	<5	NE
m/p-Xylene	mg/kg	<5	<5	<5	NE
o-Xylene	mg/kg	<5	<5	<5	NE
Mineral Oil	mg/kg	<30	<30	<30	NE
Total PCB	mg/kg	<35	<35	<35	NE
Total PAH	mg/kg	0.15	<0.07	0.08	NE
TPH	mg/kg	<30	<30	<30	NE
Pesticides	mg/kg	<10	<10	<10	NE
Hexavalent Chromium	mg/kg	<0.3	<0.3	<0.3	NE
Cyanide	mg/kg	<0.5	<0.5	<0.5	NE
Sulphide	mg/kg	<10	<10	<10	NE
Thiocyanate	mg/kg	<0.6	<0.6	<0.6	NE

Notes
NE Not Established