HALSTON

SUSTAINABLE BIO-ENERGY LIMITED

BIOGAS PLANT
GORT
COUNTY GALWAY

ENVIRONMENTAL IMPACT ASSESSMENT REPORT (EIAR)

(VOLUME 3)

NOVEMBER 2019

Document Control

Client:	Sustainable Bio-Energy Limited
Project Name	Sustainable Bio-Energy Limited Biogas Plant, Gort, County Galway.
Project Ref. No.	SEP-0251

Document Checking:

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Reviewed By:	William Dwyer	Signed:

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APPENDIX 1.1

Correspondence with Irish Water

Grealish Glynn & Associates
1 The Punchbowl
Ennis Road
Gort
Co Galway

Uisce Éireann
Bosca OP 6000
Baile Átha Cliath 1
Éire

Irish Water
PO Box 6000
Dublin 1
Ireland

T: +353 1 89 25000
F: +353 1 89 25001
www.water.ie

24th January 2018

Dear Sir/Madam,

Re: Customer Reference No 1821196782 pre-connection enquiry - Subject to contract | Contract denied
Connection for Bioenergy Industrial Development

Irish Water has reviewed your pre-connection enquiry in relation to
water and wastewater connections at Kinincha Road, Kinincha, Gort, Galway
Based upon the details you have provided with your pre-connection enquiry and on the capacity currently available as assessed by Irish Water, we wish to advise you that, subject to a valid connection agreement being put in place and conditions outlined below, your proposed connection to the Irish Water network can be facilitated.

The pre connection enquiry submission received indicates that an domestic type effluent is proposed to be discharged to the Irish Water wastewater network via a pumping station and rising main. Your foul drainage connection design should allow for a gravity network for as long as levels will permit to reduce the rising main distance. A pumping station and rising main connection can be facilitated subject to the condition that the effluent retention time in the rising main and pumping station is not greater than 12 hours. This is a requirement to ensure that septicity is prevented at the discharge manhole to the IW network. You will require to provide details of the gravity network and pumping station/rising main design at connection application stage and to provide detail on how Irish Water's requirements in relation to effluent retention times are met.

A water supply demand of 0.042 l/sec has been indicated in the pre connection enquiry submission received. A watermain connection can be facilitated to the Irish Water 100mm diameter network at a point approximately 100m from the development. The confirmation of feasibility to connect to the Irish Water infrastructure does not extend to your fire flow requirements. To guarantee a flow to meet the Fire Authority requirements you should provide adequate fire storage capacity within your development.

All infrastructure should be designed and installed in accordance with the Irish Water Codes of Practice and Standard Details.

The diversions unit of Irish Water Connections & Developer Services can be contacted for feasibility feedback on the altering of any Irish Water assets. The diversion team can be contacted at diversions@water.ie. You should include details of your proposed development as well as the approximate location of any IW assets.

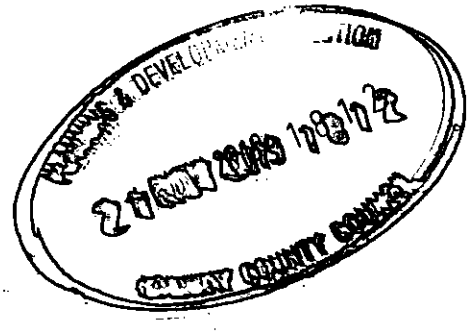
You are advised that this correspondence does not constitute an offer in whole or in part to provide a connection to any Irish Water infrastructure and is provided subject to a connection agreement being signed at a later date.

A connection agreement can be applied for by completing the connection application form available at **www.water.ie/connections**. Irish Water's current charges for water and wastewater connections are set out in the Water Charges Plan as approved by the Commission for Utility Regulation.

If you have any further questions, please contact James O Malley from the design team at jomalley@water.ie. For further information, visit **www.water.ie/connections**

Yours sincerely,

Maria O'Dwyer
Connections and Developer Services

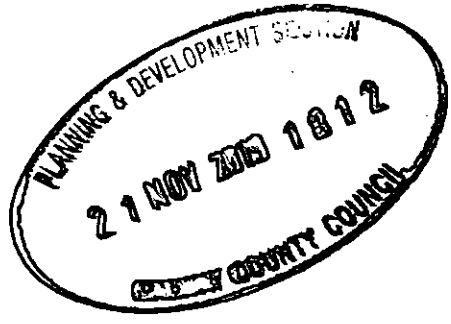


APPENDIX 1.2

Land Owner Consent Letters

APPENDIX 2.1

Letters of Support



Civil Engineering
College of Engineering & Informatics
National University of Ireland, Galway
University Road, Galway, Ireland

18 July, 2019

To whom it may concern,

I am very pleased to know that Sustainable Bio-Energy Limited plans to construct a 7.5 MW anaerobic digestion biogas plant in Gort, Co Galway. I have worked in this area for more than 10 years, focusing on anaerobic co-digestion of pig manure with grass silage or with food wastes. Having an anaerobic digestion plant in Gort, Co. Galway, close to NUI Galway, would benefit our research with easy access to operational data, plant operation expertise, sample collection and data analysis. It would also benefit our teaching by hosting our undergraduate and postgraduate students' placement and site visit, and hosting demonstration workshops to the public.

I attended a farmer meeting in Drumandoora, Co. Clare on the 7th June, 2019 and gave a short talk on the concept of anaerobic digestion, the use of digestate as an organic fertiliser and my on-going research topics. I was quite impressed with the enthusiasm of the farmers.

If you need more information, please do not hesitate to let me know.

Yours sincerely,

Xinmin Zhan

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Professor, Civil Engineering
National University of Ireland Galway
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E-mail: xinmin.zhan@nuigalway.ie

teagasc
AGRICULTURE AND FOOD DEVELOPMENT AUTHORITY

Seirbhísí Comhairleacha agus Oiliúna
AN LÁR
Co. Longfort
Advisory and Training Services
TOWN CENTRE
Longford
Tel: 043-334 1021 Fax: 043-334 1025

30/08/2019

Mr. Hugh McGinley
The Haw
Lifford
Co Donegal

RE: Proposed Biogas plant at Gort Co. Galway

To whom it may concern,

Teagasc is the agriculture and food development authority in Ireland. Its mission is to support science-based innovation in the agri-food sector and the broader bioeconomy that will underpin profitability, competitiveness and sustainability. Since the mid-nineties, Teagasc has actively promoted and facilitated the development of renewable energy through the on-going provision of research, advisory, technical and organisational support.

The Renewable Energy Directive (2009) requires Ireland to produce 16% of our Total Final Consumption of energy from renewables by 2020. We are currently at 10.8% and will not meet our target based on SEAI scenario analysis. The Irish government and the EU have made clear their wish to promote the use of increasing amounts of renewable energy. They have set overall targets for renewable energy production with specific targets for heat (12% substitution). Our targets for heat transport and electricity are the worst performing figures in Europe.

Teagasc hereby confirms its support in the development of a biogas plant at Gort in Co. Galway. We see this project as being important to assist in meeting our future energy requirements as biogas is a renewable energy, which can be used for the production of electric power and heat, and after purification also into biomethane.

We expect this project:

- Will bring about greater economic activity within the region as a result of increased demand for grass from the hard pressed beef sectorial areas by proving a land-use alternative.
- Will reduce energy related emissions through the use of animal manures which will be de-gassed thereby using the methane gas for energy production. It will capture CO2 which will be recycled for food grade applications.
- Will improve fuel security in the region and help create additional jobs in rural areas.
- Will assist in improving access to biomass resource
- Will provide a high quality fertiliser which can replace chemical fertilisers.
- Will help the biodiversity of the area and native populations through the proposed grass clover and wildflower mix proposed.

This innovative project is an important example for proving a technology and will play a small part in the decarbonising of our future energy supply.

This letter does not imply any obligation of a financial nature but reflects our support for this proposal.

Name: Barry Caslin

Position: Teagasc, Energy & Rural Development Bioenergy Specialist

PLANNING & DEVELOPMENT SECTION
21 NOV 2019 1812
GALWAY COUNTY COUNCIL

APPENDIX 4.1

Construction Environmental Management Plan

CLIENT: Sustainable Bio-Energy Ltd

PROJECT: Proposed Biogas Plant Development at Kinincha Road, Gort, Co Galway

Prepared by: Halston

Date: September 2019

Halston Environmental & Planning Limited
IHub Building, Westport Road, Castlebar Co. Mayo, Ireland F23 K162 (Company Registration No. 588685)

Document Control

Client:	Sustainable Bio-Energy Ltd
Project Name	Proposed Biogas Plant Development, Gort Co Galway
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Author:	William Dwyer	Signed:
Checked by:	Colm Staunton	Signed:

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TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

1 INTRODUCTION

Sustainable Bio-Energy Ltd (the Applicant) have submitted a planning application to Galway County Council in September 2019 for development works associated with the construction of a biogas plant at Gort, Co Galway. In support of this planning application the Applicant has prepared this outline Construction Environmental Management Plan (CEMP) which also incorporates the Construction Waste Management Plan and Incident Response Plan.

1.1 PURPOSE AND OBJECTIVE

This plan outlines the approach to environmental and waste management throughout the construction works of the proposed development and associated activities with the primary aim of reducing any adverse impacts from construction on the environment and improving the overall environmental performance of the appointed construction contractor.

The purpose of this Plan is:

- To help ensure compliance with legal and contract requirements
- To control and where possible minimise, the environmental impacts of the construction works
- To minimise the risk of causing pollution or a nuisance and associated costs and delays.

This CEMP is a live document and contents will be communicated to all site personnel and reviewed every month. This document should be read in conjunction with the mitigation measures expressed in the HALSTON Environmental Impact Assessment Report (EIAR) document. The identification and control of environmental aspects are further examined as part of this document (Outline CEMP). As part of Contract CEMP works, the environmental aspects and control measures should be further reviewed and prioritised.

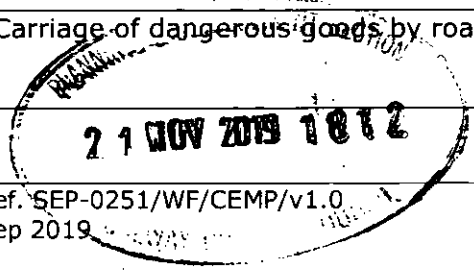
2 RELEVANT LEGISLATION

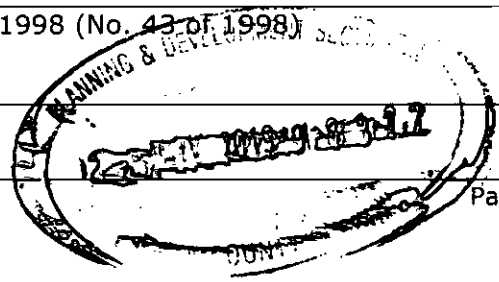
The main Legal and Other Requirements are as follows:

Table 2.1 Relevant Legislation

General Legal & Regulatory Requirements
Protection of the Environment Act 2003.
European Communities Environmental Liabilities Regulations 2008 (S.I. 547 of 2008) 2011 Amendment Regulations (S.I. 307 of 2011) & 2015 Amendment Regulations (S.I 293 of 2015)
European Union (labelling of tyres)(Fuel Efficiency) Regulations – 2012 (S.I. No. 342 of 2012)
Access to Information on the Environment Regulations 2007 to 2011 (S.I. No. 133 of 2007 & S.I. no. 662 of 2011) and Guidance Document May 2013.
EU Construction Products Regulations 2013 (S.I No. 225 of 2013)
Waste Management Legal & Regulatory Requirements
Public Health Ireland Act 1878 As Amended by the Public Health Amendment Act, 1907
Local Government Sanitary Services Act 1948 (Act No. 3 of 1948), Local Government Sanitary Services Act 1962 (Act No. 26 of 1962)
Litter Pollution Act, 1997 (ACT/97/12) to 2003. Litter Pollution Act, 1997 (Commencement) Order, 1997 (S.I. No. 97/213) Litter Pollution Regulations 1999 (S.I. No. 359 of 1999) & part 4 of Protection of the Environment Act 2003 (27 of 2003) Litter Pollution (Increased Notice Payment) Order 2007 SI 558 of 2007.
The Waste Management Acts, 1996 - 2001 The Waste Management Act 1996 as amended by the Waste Management (Amendment) Act 2001 and subsequent amendment Regulations.
Waste Management (Registration of Sewage Sludge Facility) Regulations 2010 (S.I. No. 32/2010)
European Union Packaging Regulations 2014 (S.I 282 of 2014)
European Communities (Waste Electrical and Electronic Equipment) Regulations 2011 (S.I. 355 of 2011), European Communities (Waste Electrical and Electronic Equipment) (Amendment) Regulations 2011 (S.I. 397 of 2011) & Amendment Regulations 2013 (S.I 32 of 2013)
Waste Management (Facility Permit and Registration) Regulations 2007, Waste Management (Facility Permit & Registration) (Amendment) Regulations 2008, Waste Management (Facility Permit & Registration) (Amendment) Regulations 2014 (S.I 320 of 2014) Amendment Regulations 2015 (S.I 198 of 2015)

Waste Management (Collection Permit) Regulations 2007, Waste Management (Collection Permits) (Amendment) Regulations 2008 & Amendment Regulations 2015 (S.I 197 of 2015) & Amended Regulations 2016 (S.I 24/2016)
Waste Management (Licensing) Regulations 2000 (S.I No. 185 of 2000), (Article 3 & 4 & 1st Schedule only) Waste Management (Licensing) Regulations 2004 (S.I 395 of 2004) and Waste Management (Licensing) (Amendment) Regulations (S.I. No. 350 of 2010)
Waste Management (Miscellaneous Provisions) Regulations, 1998 (S.I 164 of 1998)
Waste Management (Landfill Levy) Regulations 2008 (S.I. No. 199 of 2008), 2009 Amendment Regulations (S.I. No 550 of 2009), 2010 Amendment Regulations (S.I No. 31 of 2010), 2011 Amendment Regulations (S.I. 434 of 2011), 2012 Amendment Regulations (S.I. 221 of 2012), 2013 Amendment Regulations (S.I 194 of 2013) & Waste Management Landfill Levy Regulations 2015 (S.I 189 of 2015)
Waste Management (Hazardous Waste) Regulations, 1998 & Waste Management (Hazardous Waste) (Amendment) Regulations, 2000.
Waste Management Shipment of Waste Regulations 2007. (S.I. 419 of 2007).
European Communities (Shipments of Hazardous Waste Exclusively within Ireland) Regulations 2011 (S.I. No 324 of 2011)
Waste Management (Tyres and Waste Tyres) Regulations 2007.
European Union Batteries and Accumulators Regulations 2014, (S.I. 383 of 2014) & Amendment Regulations 2014 (S.I. 349 of 2014) & Amendment Regulations 2015 (S.I 347 of 2015).
Waste Management (Registration of Brokers and Dealers) Regulations 2008, (SI No. 113 of 2008)
Waste Management (Prohibition of Material Disposal by burning) Regulations 2009. (S.I. 286 of 2009).
Environment (Miscellaneous Provisions) Act 2015 (No. 29 of 2015)
European Union End-of-Life Vehicles Regulations 2014, (S.I. 281 of 2014)
European Waste Catalogue (EWC) and Hazardous Waste List 2002.
Waste Management (Food Waste) Regulations 2009, (S.I. No 508 of 2009) & Amendment Regulations 2015 (S.I 430 of 2015)
Protection of the Environment Act 2003.
European Communities Environmental Liabilities Regulations 2008 (S.I. 547 of 2008), 2011 Amendment Regulations (S.I. 307 of 2011) & 2015 Amendment Regulations (S.I 293 of 2015)
European Union (Properties of Waste which Render it Hazardous) Regulations 2015
Carriage of dangerous goods by road Act 1998 (No. 43 of 1998)





Water Management Legal & Regulatory Requirements
Local Government (Water Pollution) Act 1977 as amended by Local Government (Water Pollution) (Amendment) Act 1990 and the Local Government (Water Pollution) Regulations 1978-1999 (S.I. No. 78/108), (S.I. No. 92/271), (S.I. No. 96/184), (S.I. No.99/42)
The Fisheries (Consolidation) Acts 1959-2001.
Water Policy Regulations (S.I. No. 722 of 2003) & amendment Regulations 2005 (S.I No. 413 of 2005), 2008 (S.I No. 219 of 2008), 2010 (S.I. No. 93 of 2010) and Amendment (No. 2) Regulations, (S.I. 326 of 2010) & EU Water Policy Regulations 2014 (S.I 350 of 2014)
Water Framework Directive (2000/60/EC).
European Communities Environmental Objectives (Groundwater) Regulations 2010 (S.I. No. 9 of 2010) Amendment Regulations 2011 (S.I. 389 of 2011), Amendment Regulations 2012 (S.I. 149 of 2012)
Water Conservation Regulations 2008 (S.I. 527 of 2008)
Environmental Objectives (Surface Water) Regulations 2009, (S.I. 272 of 2009), Amendment Regulations 2012 (S.I. 327 of 2012) & 2015 Amendment Regulations (S.I 386 of 2015)
Quality of Bathing Waters Regulations 1992, (S.I. No. 155 of 1992)
Bathing Water Quality Regulations 2008, (S.I. No. 79 of 2008) and Amendment Regulations 2011 (S.I 351 of 2011)
Quality of Bathing Waters Regulations 1992, (S.I. No. 155 of 1992)
European Communities (Drinking Water) Regulations 2014, (S.I. No. 122 of 2014)
European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988)
European Communities (Good Agricultural Practice for Protection of Waters) (Amendment) Regulations 2011 (S.I. No. 125/2011) & 2014 (S.I. No. 31/2014)
European Communities (Arterial Drainage) Regulations 2009 (S.I. No. 388 of 2009)
European Union (Environmental Impact Assessment) (Arterial Drainage) Regulations 2012
Water Services Act 2007, (No. 30 of 2007) and subsequent Commencement Orders 2008, 2009 & 2013
Water Services Act No 2 of 2012 & Commencement Order 2012 (S.I No 219 of 2012).
European Communities (Foreshore) Regulations 2009 (S.I. No. 404 of 2009)
The Foreshore Acts 1933 to 2009 (as amended)
Waste Water Discharge (Authorisation) Regulations 2007, (S.I. No. 684 of 2007) & Amendment Regulations 2010 (S.I. No. 231 of 2010)

Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites (www.fisheriesireland.ie/Fisheries-management/fisheries-management.html)
Eastern Region Fisheries Board (ERFB) Fisheries Protection Guidelines.
Urban Waste Water Treatment (Amendment) Regulations, 2010 (S.I. No. 48/2010)
Noise Legal & Regulatory Requirements
Environmental Protection Agency Act 1992 (Noise) Regulations, 1994 (S.I. 174 of 1994).
Environmental Noise Regulations 2006 (S.I. 140 of 2006).
European Communities (Noise Emission by Equipment for use Outdoors) Regulations, 2001 (S.I No. 632 of 2001) & Amendment Regulations 2006 (S.I No. 241 of 2006)
European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Amendment Regulations 1996 (S.I No. 359 of 1996)
Local Government (Planning and Development) Act 1963 (No. 28 of 1963)
BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1 Noise and Part 2 Vibration
Air Legal & Regulatory Requirements
Air Pollution Act, 1987
Air Pollution Act, 1987 (Air Quality Standards) Regulations, 1987
Air Quality Standards Regulations 2011 (S.I. No 180 of 2011).
Air Pollution Act, 1987 (Emission Limit Values for use of Asbestos) Regulations, 1990, (S.I. No. 28 of 1990)
EC (Control of Emissions of Gaseous & Particulate Pollutants from Non-Road Mobile Machinery) Regulations 2007, (S.I. No.147 of 2007), 2011 Amendment Regulations (S.I. 263 of 2011), 2012 Amendment Regulations (S.I. 407 of 2012) & 2013 Amendment Regulations (S.I No 417 of 2013).
The EU Regulation 2037/2000 (CFC`s, HCFC`s, Halons) - Ozone Depleting Substances
Control of Substances that Deplete the Ozone Layer Regulations 2006 (S.I. No 281 of 2006) & 2011 (S.I. 465 of 2011)
EU F Gas Regulations 2015 (S.I. 517 of 2015)
Ecological & Archaeological Legal & Regulatory Requirements
Wildlife Act, 1976 to 2010 as amended
Wildlife Act, 1976 (Protection Of Wild Animals) Regulations, 1990 S.I. No. 112/1990
Birds Directive 2009/147/EC
European Communities Conservation of Wild Bird Regulations 1985 to 2010
Noxious Weed Act 1936
Natural Heritage Area Orders 2005 - 2007

Flora (Protection) Order, 2015 (S.I. No 356 of 2015)
Habitats Directive 92/43/EEC (as amended)
The Forestry Act, 1946-2009
European Communities (Birds and Natural Habitats) Regulations 2011 & 2015 Amendment Regulations (S.I 430 of 2015)
The National Monuments Acts 1930 As Amended
European Union (Environmental Impact Assessment and Habitats) (Section 181 of the Planning and Development Act 2000) Regulations 2013.

Should this document further develop to contract stage, The following documents should be reviewed and associated requirements applicable to this contract be included within this Plan:

- Tender/contract documents
- Site Investigation
- Planning Application Documents (EIAR) and Planning Permission Conditions

2.1 WASTE MANAGEMENT CONTEXT

The most recent Irish waste management policy, A Resource Opportunity – Waste Management Policy in Ireland (DoECLG, 2012), supports the prioritisation of the waste hierarchy (Figure 2.1) and identified specific producer responsibilities for construction and demolition projects as a key area for exploration.

The Connacht Ulster Region is a new region in terms of managing wastes. It is one of three regional groups of authorities assembled in Ireland for the purpose of managing wastes. The region stretches from Galway to Donegal and to Monaghan in the north east and in total consists of nine local authorities. The first waste plan to cover the geographical area is the "Connacht-Ulster Regional Waste Management Plan 2015-2021". The plan provides the strategic framework for the prevention and management of waste in the region in a safe and sustainable manner. The strategic approach of the Regional Waste Management Plan places a stronger emphasis on preventing wastes and material reuse activities and to view waste streams as valuable material /resources.

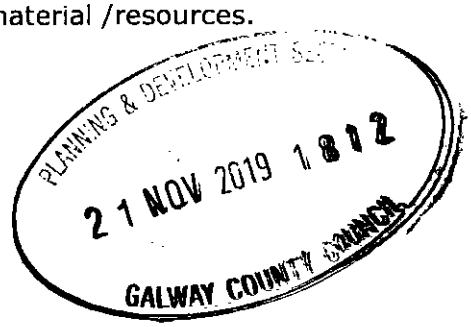
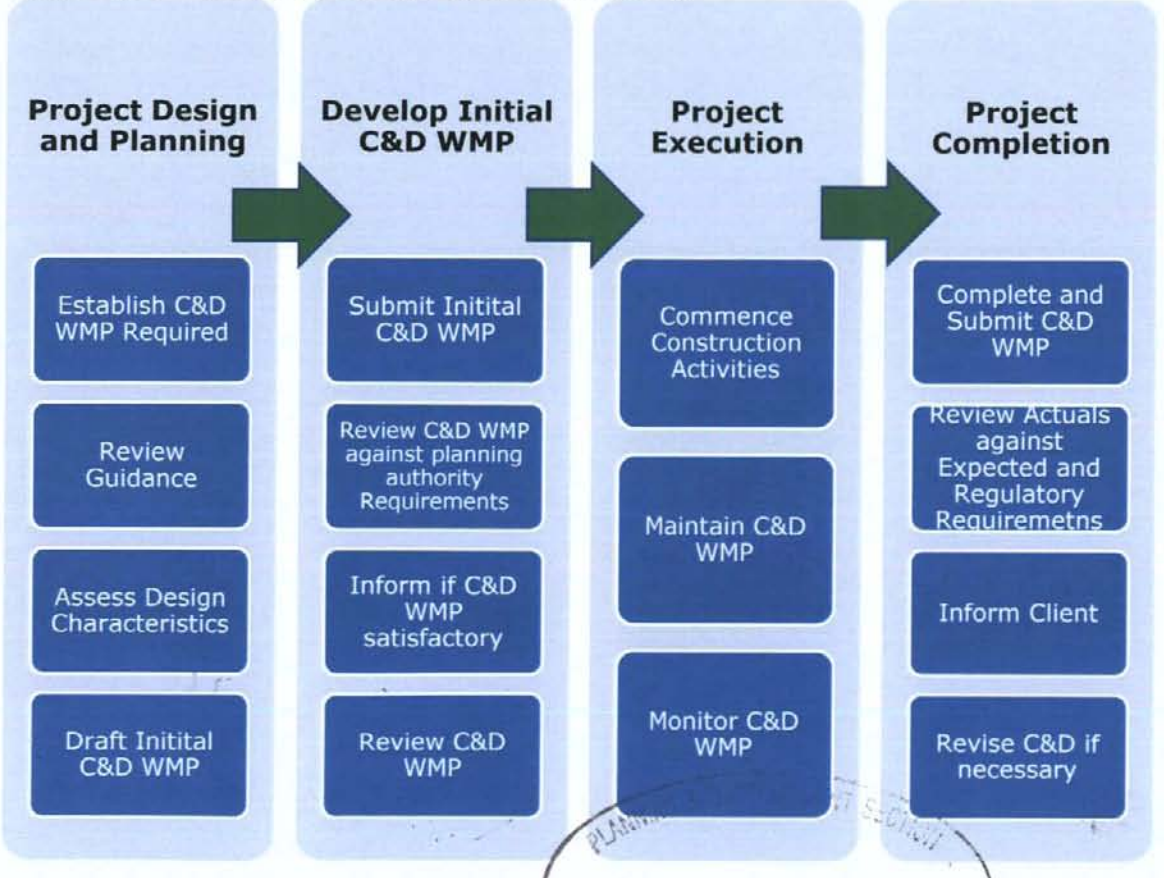


Figure 1.1 EU and National Waste Hierarchy

Waste management on construction sites is an iterative and step-by step process and accordingly the C&D WMP will be considered as a live document which requires inputs and updates over the entire construction phase.

Figure 1.2 EU and National Waste Hierarchy



The Connacht-Ulster Regional Waste Management Plan has a target that 70% of all construction and demolition wastes (excluding soil and stones) is reused /recycled.

The Galway County Development Plan 2018-2024 prescribes a number of policies under environmental protection and waste management. The plan is subject to all legislative, national and regional documents and objectives in the implementation of waste management including the Connaught-Ulster Regional Waste Management Plan 2015-2021. Of relevance to the development proposal and waste management during the lifecycle (construction to decommissioning) of the project are:

WES-P-4: It is a policy of the Council to protect the environment from adverse impact through directing and controlling development, enforcement, licensing and direct intervention.

WES-P-5: It is a policy of the Council to prevent and minimise waste, to encourage and support material sorting and recycling, and to ensure that waste is managed and treated without causing environmental pollution.

3 SITE DETAILS

The proposed development site is approximately 22.2 acres (9 hectares) and is located on lands adjacent to the northern boundary of Gort town in the townlands of Ballynamantin, Kinincha and Glenbrack. The site was selected as the preferred site for the development following a pre-planning meeting with Galway County Council and preparation of an alternatives site selection assessment study. Key criteria which were considered in the selection of the preferred site and these included the following:

1. National, regional and local planning policy;
2. The environmental setting including its; proximity to protected sites; surface waters, groundwater, flood affected area, ecological, landscape, cultural heritage;
3. The distance of the boundary to residential and recreation areas, waterways, other agricultural activities and urban sites and areas of high residential density;
4. 4. Proximity and access to infrastructure; including roads, services and feedstock sources;
5. Availability of sites of sufficient area to accommodate the development proposal and ownership rights;
6. The feedstocks and the treatment technology used;

The current site, described as improved grassland (pastures), is used for agricultural (grazing) and equine related purposes.

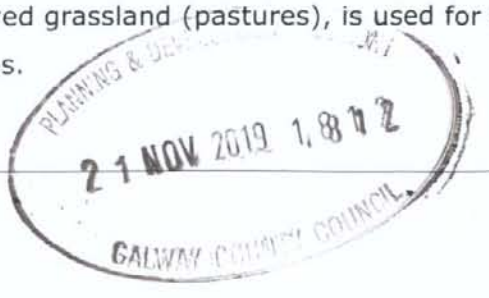
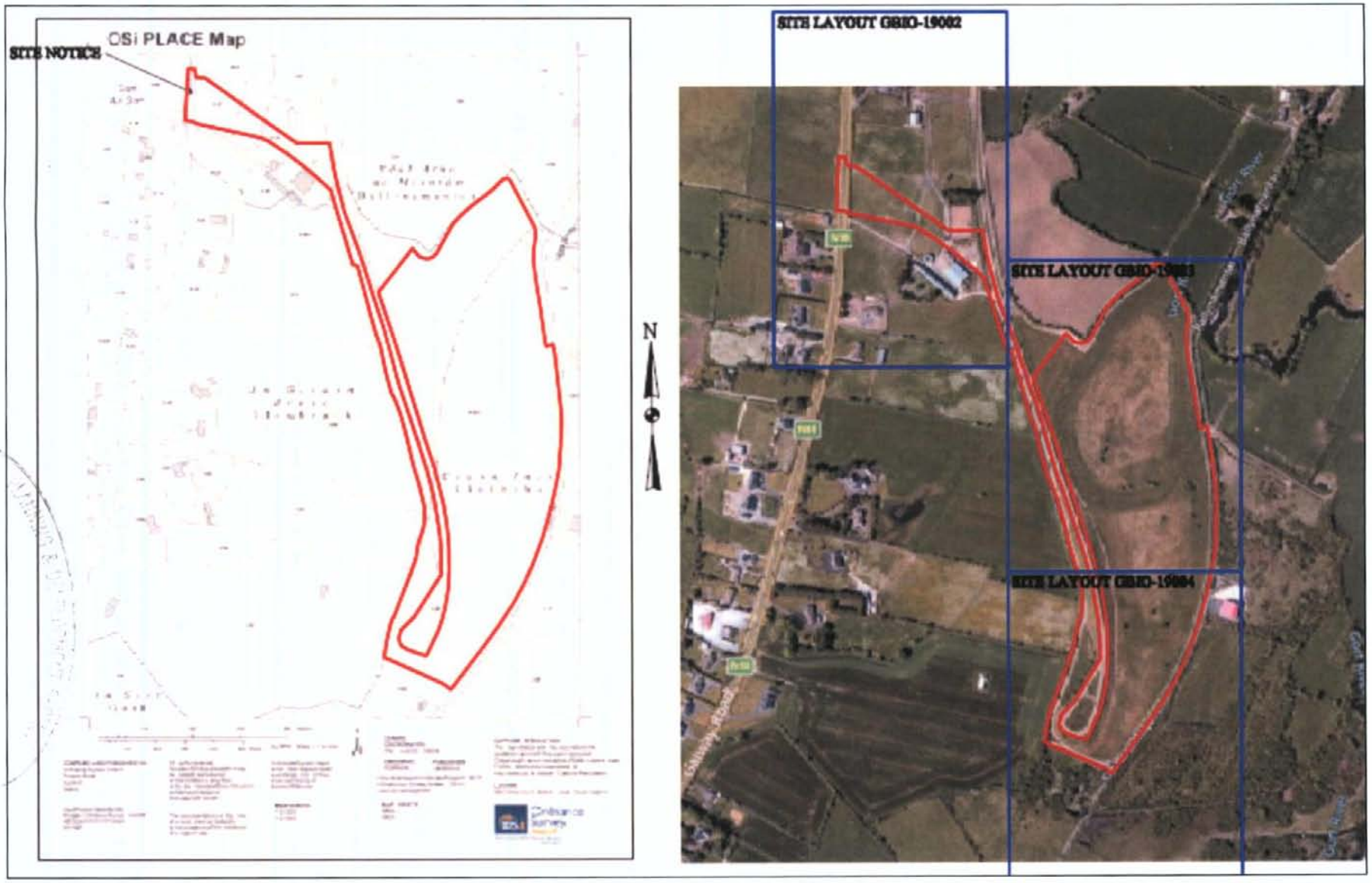


Figure 3.1 Site Location Map



4 PROJECT DESCRIPTION

The proposed development will comprise construction of a commercial biogas plant which will transform naturally occurring organic wastes into renewable energy (biomethane) and organic fertiliser /soil improver (digestate).

The proposed site layout is shown below in Figure 4. The proposed biogas plant will be capable of accepting up to 90,000 tonnes of non-hazardous biodegradable feedstock per annum and will process both liquid and solid biodegradable wastes from agricultural and non-agricultural sources. Solid and liquid feedstocks will be delivered by heavy goods vehicles (HGVs) from off-site sources. The biodegradable feedstocks will comprise material from a wide range of sources. This will include agricultural wastes such as animal manure /dung and slurries, food wastes, catering wastes, vegetable and fruit residues, agricultural by-products and organic farm-based wastes.

An analysis of available and suitable feedstocks was undertaken and it was concluded that there are sufficient feedstocks to supply up to 90,000 tonnes of organic feedstocks to the proposed biogas facility annually. Digestate storage facilities have been included within the scheme to cater for the closed spreading season. Digestate produced at the plant can be substituted for several categories of mineral fertiliser and presents an environmentally friendly alternative to the agriculture, landscaping and horticulture industries.

The main processing elements of the biogas plant will be constructed within a fully bunded outer structure. Within this, the digesters and digestate storage tanks (tank farm) will be constructed within a purpose built concrete bund which will provide for 25% of the total volume of substances stored within the tank farm bund. The process is a closed-loop process and effluents generated will be contained and collected and reused in the process. A tree planted /grassed soil berm will be constructed along the eastern boundary of the site to provide for screening of the development.

The main elements of the plant are as follows:

- Main Site Entrance;
- Weighbridge;
- Office and Control Room Building;
- Feedstock Reception Building containing feedstock reception area, processing plant and pasteurisation equipment;
- Odour Control unit
- Process drainage and effluent storage tank;
- Eight Digesters with domes covers;
- Four Digestate Storage Tanks with domes covers;

- Pump Houses;
- Gas Purification and Bottling Plant;
- Carbon Dioxide Compression Building;
- Gas Flare and gas booster station;
- Combined Heat and Power (CHP) plant;
- Standby Boilers;
- Storm Water Drainage;
- Foul Effluent Drainage; and
- Lighting Fencing and Security Gates

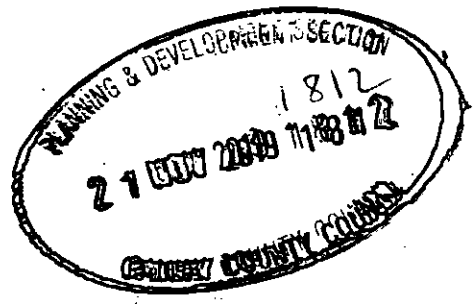
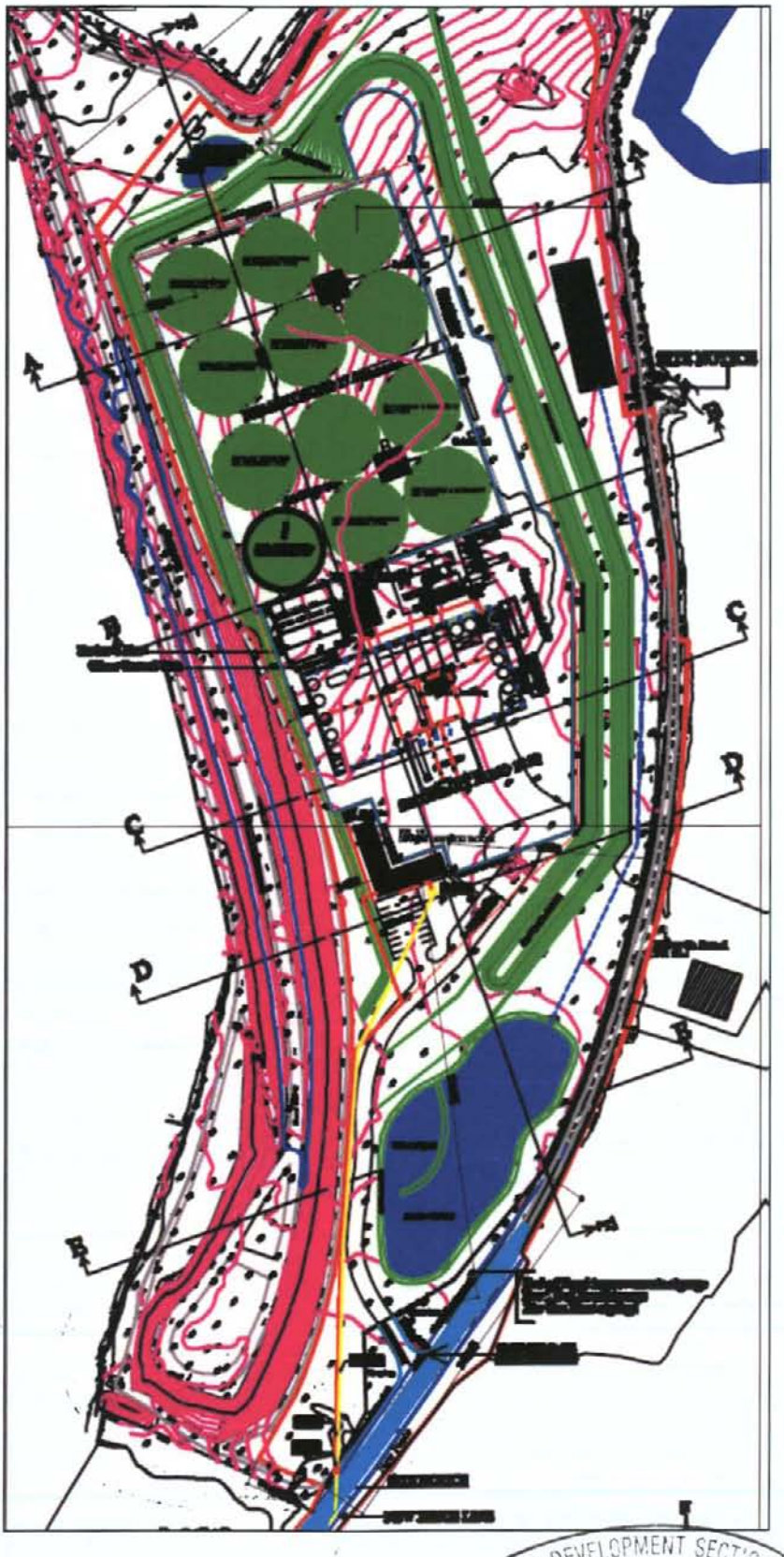


Figure 4.1 Proposed Site Layout



5 CONSTRUCTION WORKS

5.1 OVERVIEW

The development is likely to occur over an estimated 12-month period, during which time construction activities will have the potential to impact the existing environment. After the estimated 12-month construction period, it is expected that new infrastructure and processes will be commissioned and capable of operating as designed. The specific details of the construction programme are not currently known as such this programme will be developed by the main contractor. It is therefore difficult to assess the staffing and delivery levels for the development. However, it is considered that the design and proposed layout of the facility has developed sufficiently to discuss the potential environmental impacts of proposed construction methods. An estimate of construction traffic volumes has been made for a site of this size and typical works associated with a development of this type are described.

The timing of the commencement of construction is subject to planning, design, tendering and ecological constraints. It would be expected, that any works associated with site clearance and removal of soils will be seasonally limited to mitigate against any adverse ecological affects. The impact of construction activities on Biodiversity and Roads and Traffic are assessed in Sections 6 and 10 of the EIAR, respectively. Mitigation measures as outlined in the EIAR should be included in the Contract CEMP.

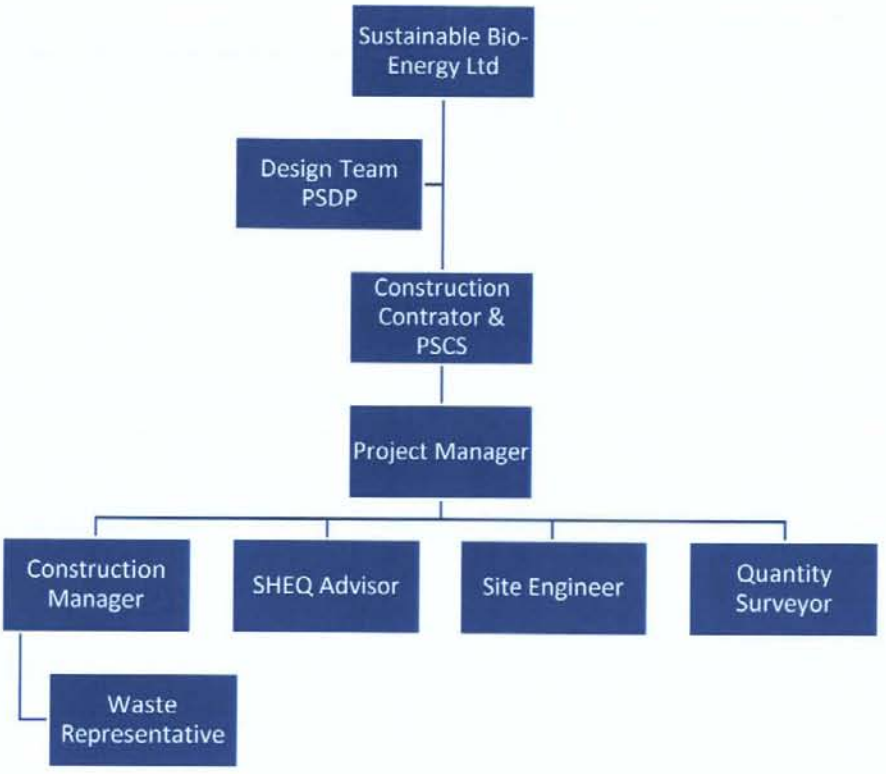
5.2 ORGANISATIONAL STRUCTURE AND RESPONSIBILITIES

The construction project will be managed by a main contractor. A Project Manager will be appointed by the main contractor who will have responsibility for coordinating and managing good environmental and health and safety practices during construction.

The Project Manager shall maintain monthly environmental programmes to ensure that construction activities on this contract are planned and managed in accordance with the environmental requirements stipulated by the Client.

An outlined organisation structure is provided in Figure 5.1. This structure will be further defined by the appointed contractor and will include the names of the assigned personnel with the appropriate responsibility and reporting structure reflected.

Figure 5.1 Outline Organisation Structure



5.3 CONTACTS

5.3.1 Primary Contacts

Table 5.1 Primary Contacts

Title	Name	Phone	Email
Project Manager			
Construction Manager			
SHEQ Advisor			
Site Engineer			
Quantity Surveyor			
Waste Representative			

5.3.2 Third Party Contacts

Table 5.2 Third Party Contacts

Organisation	Position	Name	Phone	Email
Galway County Council				
Inland Fisheries Ireland				
Loughs Agency				
Environmental Protection Agency (EPA)				
National Parks and Wildlife Services (NPWS)				
Health and Safety Authority (HSA)				
Emergency Services				
Other				

The **Construction Manager** will:

- Provide information on contract requirements, including scope of works and forecast of waste quantities to SHEQ Advisor following contract award and prior to start of works on site and also when any changes occur.
- Nominate the following as required: Waste Rep, person to undertake weekly Site Compound checks, person to check drip trays and bunds and person to supervise refuelling of tanks and bowsers, person to complete Watercourse Monitoring Booklet (where applicable), person to complete Pumping and Dewatering Booklet (where applicable).
- Ensure a forecast of waste types, quantities and disposal routes is produced before works start on site.
- Ensure required consents are obtained before associated works start.
- Ensure environmental waste minimisation and environmental mitigation measures are incorporated into design, construction method and/ or materials employed, where possible.
- Ensure environmental and waste requirements are included on Requisitions and in Subcontracts and Orders.
- Ensure a current version of the Contract Organisation Chart is displayed on site notice boards and individuals with environmental responsibilities are named on the Authorised Signatures List where appropriate.
- Ensure oil, including diesel, is stored in properly bunded tanks/ bunded mobile bowsers/ drip trays.
- Report Incidents in accordance with the reporting system.
- Report Non-conformances via the non-conformance tool.
- Report Incidents and Non-conformances to the SHEQ Advisor as soon as possible.
- Ensure the SHEQ Advisor is informed of environmental complaints.
- Liaise with Statutory Authorities and Client as required and ensure records of communication (including verbal) are kept. Ensure Statutory Authorities are always accompanied on site (preferably by the Project Manager and the SHEQ Advisor).
- Notify the Environmental Health Officer of any particularly noisy works or any works outside the contract hours before construction begins.
- Ensure all residents are notified of noisy works before they begin.
- Ensure environmental performance including review of Incidents and Non-conformances, Waste arisings and any Contract Objectives and Targets are included as part of Contract Review Meetings.

- Approve the Contract Environmental Management Plan and ensure employees and subcontractors implement the environmental controls.
- Ensure employees and subcontractors receive Induction Training (including environment) and Tool Box Talks as appropriate.
- Ensure staff needed for audits are available when required.
- Ensure actions resulting from Corrective Action Requests and Observations raised during audits are completed by the deadlines and signed off copies of Corrective Action Requests are forwarded to the relevant SHEQ Advisor.

The **SHEQ Advisor** will:

- Ensure the implementation of the Environmental Management System, and associated documentation on a daily basis.
- Address day to day environmental matters and communicate with construction management team
- Obtain environmental regulatory consents/permits as required (e.g. EPA, Galway County Council, Inland Fisheries, Loughs Agency & NPWS).
- Report Environmental Incidents to the Statutory Authorities if necessary.
- Log and monitor Environmental Incidents and Non-conformances.
- Disseminate information including changes to legislation, to relevant employees.
- Identify employees that require environmental training, provide training and maintain training records.
- Provide advice and deal with queries and correspondence on environmental issues.
- Identify significant environmental impacts for contracts and help set-up contracts and site compounds to include necessary controls.
- Identify any environmental consents that are required and ensure they are obtained.
- Produce the Contract Environmental Management Plan and / or Site-Specific Information.
- Produce/ maintain or ensure production/ maintenance of all aspects of Site Waste Management Plan
- Monitor waste quantities and verify & validate the waste records obtained from site.
- Undertake contract environmental inspections to ensure controls are in place and working.
- Monitor progress in closing out Corrective Action Requests and Observations raised during audits.
- Agree process for regular reporting to senior management on the Contract.
- Ensure all environmental records are kept and readily available.

- Obtain prior agreement from site management in writing for any deviations from assigned Procedures (e.g. use of client procedures or forms).

Quantity Surveyor will:

- Check with the Environment Agency that Waste Carriers are registered and Waste Management Sites are licensed before subcontracts or orders are placed.
- Ensure environmental and waste requirements are included on Requisitions/ Subcontracts or Orders.
- Reconcile waste invoice against Waste Transfer Notes/ Consignment Notes and tip receipts before authorising payment.
- Monitor waste quantities and costs and provide information to assist in the production of Site Waste Management Plan Reports.

Waste Rep will:

- Arrange for collection of waste.
- Keep an up-to-date record of waste removed from Site
- Confirm with SHESQ Advisor that Waste Collection Permits/ Waste Facility Licenses are valid and either keep a record of confirmation or obtain copies for site files
- Complete and sign Waste Transfer Notes/ Hazardous Waste Consignment Notes. Give copies to Drivers, send top copy to invoicing and keep photocopy on file.
- If hazardous waste is being removed, complete and retain a copy of the Waste Transfer Form.
- Ensure waste storage/ segregation/ recycling activities are correctly implemented and appropriate waste records and statistics are maintained.

Subcontract Buyers will:

- If a subcontractor is to act as a Waste Carrier and dispose of waste provide details of their Waste Collection Permit and the intended disposal sites Waste Licence to SHEQ Advisor before placing subcontract.
- Include environmental and waste requirements in subcontracts.

Drivers will:

- Inform the Waste Rep. what waste they are removing and where it is being taken prior to removing any waste from site.

- Collect Waste Transfer Note/ Consignment Note from Waste Rep when collecting waste.
- Only take waste to a licensed Waste Management Site as instructed by the Waste Rep/ SHESQ Advisor.
- Get Waste Management Site to sign Waste Transfer Note/ Consignment Note and give to SHESQ Advisor along with all associated receipts.

All Construction Staff will:

- If there is an incident, stop work, contain it and report it to the Site Manager.
- Contact the Waste Rep when waste needs to be removed.
- Pass any queries or correspondence on environmental issues to SHESQ Advisor.
- Work in accordance with Group SHESQ Procedures, Contract Environmental Management Plan and Method Statements.

5.4 TRAINING

Environmental awareness training on this project will include:

- Induction Training
- Tool Box Talks
- Communication/ Briefing Sessions

Environmental awareness training included at induction shall cover the following basic elements:

- The SHEQ Policy
- Overview of applicable environmental legal and regulatory requirements
- The Construction Environmental Management Plan including works specific environmental aspects and impacts
- The Environmental Emergency response training including Spill Control & Spill Kits.
- The Construction Waste Management Plan
- Water Pollution Prevention
- Environmentally sensitive areas
- Wildlife/ Invasive Plants
- Dust management controls
- Noise and vibration Controls
- Material Storage and Refuelling
- Responding to communications/complaints received by the public.
- Reporting an Environmental Incident

- Other matters of environmental interest

The Environmental Advisor shall retain details and records of all training provided. Additional environmental training shall be provided as required by the Environmental Advisor or environmental experts.

Contract specific information will be displayed on notice boards and briefed to all staff. Site-specific Environmental Do's & Don'ts, which list the key controls specified in this Plan, will be issued to site operatives and subcontractors.

Training will be provided in accordance with the Core Skills Matrix. A Training Attendance Form will be completed for each training session and an Environmental Training Matrix will be maintained.

5.5 COMMUNICATION

5.5.1 Internal

Environmental issues will be reviewed at the monthly Contract Review meeting, in accordance with the appointed contractor's management system. The issues covered will include:

- Compliance contractor management system and any contract specific environmental requirements.
- Legal compliance e.g. consent requirements
- Environmental Incidents & Non-conformances
- Audit Corrective Action Requests to ensure actions are completed by deadlines.

5.5.2 External

The Project Manager (in conjunction with the SHEQ Advisor) will be responsible for receiving, documenting and responding to any environmental communication from third parties. All verbal communication from third parties will be logged in the contract Communication Log in accordance with the agreed Communication Plan.

The SHEQ Adviser will meet as required and as agreed with the client, with statutory agencies, e.g. Environmental Protection Agency, local authority (Galway County Council) Environmental Health Officers, Inland Fisheries Ireland, NPWS, other Stakeholders (Gardai, local business owners, landowners) and the local community to ensure works are carried out with minimal environmental disturbance.

Complaints from the public will be logged on a Complaint Record form and a recorded on the Complaint Register.

5.6 DOCUMENT CONTROL

All environmental documents will be controlled by the Appointed Contractor Procedures /Method Statements.

5.7 DESIGN

Environmental impacts of design will be managed in accordance with the Appointed Contractor Procedures /Method Statements. This involves including Environmental Design Aims in the Design Brief and monitoring these through the Design Review meetings.

5.8 CONTRACT CHECKS AND INSPECTIONS

The following inspections will be undertaken:

- Supervisor Weekly Checklist
- SHEQ Monthly Inspection
- Management Tours

5.9 RECORDS

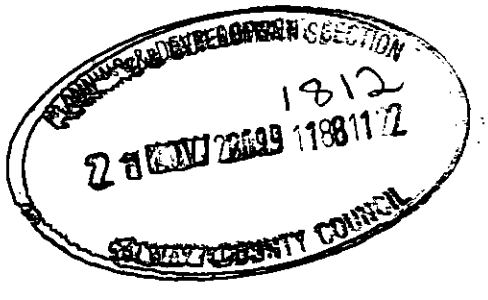
Records will be maintained in accordance with the Appointed Contractor Procedures.

5.10 AUDITS

Internal audit of this contract will be undertaken in accordance with the Appointed Contractor Procedures.

5.11 MANAGEMENT REVIEW

A Contract Management Review will be undertaken every 3 months. Management reviews will be undertaken in accordance with the Appointed Contractor Procedures.



5.12 SCHEDULE AND WORKING HOURS

It is envisaged that construction of the development proposal is likely to occur over an estimated 12-month period with commissioning and testing will be undertaken in the 8-week period after this.

Table 5.3 Proposed Construction Works Schedule

Phase	Details	Time
1	Site Evaluation	2-4 weeks
2	Site Preparation and Clearance	1 month (4 weeks)
3	Civil and Structural Works	6 months (26 weeks)
4	Mechanical and Electrical Installation	4 months (16 weeks)
5	Commissioning and Testing	1-2 months (up to 8 weeks)

Subject to agreement with the planning authority, it is anticipated that the following times will constitute the standard working hours on the construction site.

- Monday to Friday 07:00 to 19:00
- Saturday 08:00 to 16:00
- Sunday No Work
- Public Holidays No Work

Working hours may vary slightly depending on weather conditions and daylight hours during winter months. Heavy construction activities will be avoided where possible outside the normal working hours outlined above.

5.12.1 Accommodation /Facilities

The relevant statutory requirements will be provided for all workers on the construction site and will be provided in a secure compound including:

- Canteen facilities and drinking water supply
- Toilet, wash up and locker facilities and hot water
- Drying room
- Car parking for workers
- First Aid Office
- Site Engineers & Resident Engineers offices
- Site offices for Contractors

6 CONTROLS AND MITIGATION MEASURES

Controls specified in this section are designed to:

- Meet legal and contract requirements
- Limit the identified significant impacts
- Deal with unexpected environmental issues

Environmental controls (e.g. consent conditions) that are more specific to certain activities will be discussed and agreed in advance with the Project Manager and the appropriate public bodies including local authorities and the Environment Agency. The controls will then be included in site specific Method Statements in accordance with the Group Procedure – Preparation and Issue of Method Statements Risk Assessments.

6.1 SUBCONTRACTORS

Subcontractors will be appointed in accordance with the Appointed Contractor (Main Contractor) Procurement Policy Procedures:

Subcontractors are required to work in accordance with this Construction Environmental Management Plan and Method Statements.

The subcontractors to be used on this contract are detailed in the table below

Table 6.1 Subcontractors

Subcontractor (name)	Scope of Works	Main Activities	Environmental Controls
TBC	Earthworks, Drainage & Services	Bulk excavation, filling, installation of drainage & site services	Subcontractor's Method Statement's environmental controls reviewed by Main Contractor
TBC	Concrete Works	Construction of concrete foundation and concrete structures (tanks)	Subcontractor's Method Statement's environmental controls reviewed by Main Contractor
TBC	Mechanical Works	Installation of modular equipment and process pipework	Subcontractor's Method Statement's environmental controls reviewed by Main Contractor
TBC	Electrical Works	Installation of SCADA and process electrical works	Subcontractor's Method Statement's environmental controls reviewed by Main Contractor

TBC	Testing & Commissioning	Testing & Commissioning of the process	Subcontractor's Method Statement's environmental controls reviewed by Main Contractor
TBC	Site Fencing	Installation of Permanent boundary fence	Subcontractor's Method Statement's environmental controls reviewed by Main Contractor
TBC	Landscaping	Hard & Soft Landscaping of the site	Subcontractor's Method Statement's environmental controls reviewed by Main Contractor
TBC	Waste Disposal & Difficult waste disposal	Skip Supply Waste Removal/ Disposal	Duty of Care Waste Collection Permit
TBC	Dust Monitoring	Set up dust deposition jars Collection of the dust deposition jars and lab analysis (if required)	Subcontractor's Method Statement's environmental controls reviewed by Main Contractor
TBC	Noise Monitoring	Set up noise monitors at agreed locations (if required)	Subcontractor's Method Statement's environmental controls reviewed by Main Contractor
TBC	Site Compound	Installation, maintenance & removal of temporary site compound & security	Subcontractor's Method Statement's environmental controls reviewed by Main Contractor

The above is a non-exclusive list of the main subcontracted works.

6.2 RESOURCE USE

Measures to reduce resource usage during the planning and operational phases of the works will include the actions given in the table below.

Table 6.2 Management of Resources

TASK	RESPONSIBILITY
Fuel Combustion (Transport/Plant)	
Collect data on quantities of diesel/ petrol used in vehicles and plant.	Project Manager/ SHEQ Advisor/ Manager
Collect data on quantities of gas oil used.	Project Manager/ SHEQ Advisor/ Manager
Collect data on modes of transport to and from work and business miles travelled.	Project Manager/ SHESQ Advisor/ Manager
Explore options to reduce the amount of car travel to and from work and minimise the adverse environmental effects of business-related travel.	Project Manager/ SHEQ Advisor/ Manager
Promote good practise by encouraging use of sustainable modes of transport and where feasible use minibuses/ vans to transport staff.	Project Manager/ SHEQ Advisor/ Manager
Promote fuel efficiency and good driving practices	Project Manager/ SHEQ Advisor/ Manager
Ensure the correct vehicle, plant & equipment is provided and used for the work being undertaken. I.e. do not select equipment that is over-powered for the task being carried out.	Project Manager/ SHEQ Advisor/ Manager
Ensure vehicles, mobile plant, generators and other equipment are serviced regularly to maintain their efficiency.	Foreman
Switch off vehicles and other mobile plant when not in use.	All staff
Electricity	
Minimise the use of generators to provide electricity. Wherever possible connect to mains electricity as soon as possible.	Project Manager
Collect data on quantities of directly purchased electricity.	Project Manager/ SHEQ Advisor/ Manager

TASK	RESPONSIBILITY
Install energy efficient devices/ renewable energy where reasonably practicable e.g. Infrared sensors linked to lighting, air conditioning and heating controls.	Project Manager
Promoting energy efficiency with all staff. Identifying where energy savings can be made and implement them. E.g. turning off computers/ photocopiers when not in use.	SHEQ Advisor/ Manager
Water	
Measure per capita water use in the site offices.	Project Manager/ SHEQ Advisor/ Manager
Install water efficient devices in washrooms e.g. push taps, flow regulator/ restrictors, low flush toilets, cistern devices e.g. hippo, save-a-flush to reduce flush volumes	Project Manager
Promoting water efficiency with all staff and encourage good behaviour. e.g. maintaining hoses, pipes and water using equipment in good condition and checking for leaks regularly	SHEQ Advisor/ Manager
Fit trigger nozzles on hosepipes and flow restrictors and automatic shut off devices to hoses and water supply pipes where appropriate	Foreman
Use recycled or grey water for damping down dust where possible	Foreman
Use scrappers to clean up mud rather than washing down with water	Foreman
Waste	
Minimise waste by ensuring materials are stored properly and used efficiently.	Project Manager/ Foreman
Consider waste when purchasing materials. Where possible/ practicable select materials that can be re-used or recycled.	Project Manager
Recycle and reuse materials where possible.	Project Manager/ SHEQ Advisor/ Manager
Collect data on quantities of waste produced and percentage recycled (diverted from landfill).	Project Manager/ SHEQ Advisor/ Manager
Materials	
Procure materials from certified sources.	Project Manager/ Buying Department

TASK	RESPONSIBILITY
Designing out unsustainable materials where possible and minimising waste.	Designers
Specifying materials/ products that have less impact on the environment.	Designers
Specifying the use of peat free product for landscaping.	Project Manager
Procure recycled materials where possible.	Project Manager/ Buying Department
Introduce a *'take-back policy'* on suppliers, so where possible, no delivery will leave the site without taking associated waste and packaging with them.	Project Manager/ Buying Department

Note: Reducing resource usage by minimising wastage and preventing pollution is also addressed under the other sub-headings in this section of the Plan.

6.3 WASTE MANAGEMENT

All waste arising on the Contract, including that generated by sub-contractors will be managed in accordance with the *Appointed Contractors Procedures /Method Statements*; The principle of "Duty of Care", as set out in the Waste Management Acts, 1996–2011, will apply, whereby the waste producer is responsible for all waste from generation to recovery or disposal.

A separate Site Waste Management Plan (Attachment A) has been produced detailing how waste will be managed on this contract. The Construction Waste Management Plan describes the controls and processes that will be used to manage materials effectively and reduce the amount of waste disposed of to landfill by identifying opportunities to reduce, re-use and recycle.

Waste quantities and management options will be identified prior to works commencing on site and recorded on a Waste Forecast.

Throughout the course of the Contract, whenever waste is removed from site, information on the identity of the person removing the waste, the type and quantity of the waste and the site the where waste is being taken to will be recorded using a Waste Transfer Note or Hazardous Waste Consignment Note and/ or summarised on the Record of Waste Movements.

Actual waste quantities and disposal routes will be reviewed periodically and summarised in a *Waste Report*. This review will monitor performance against the Contract Waste

Forecast and identify opportunities for improvement. The review will be discussed at the Progress Meetings.

Upon completion of the works the total waste produced on the Contract, the costs associated with its disposal, the disposal locations and the percentage recycled will be summarised on the *Contract Waste Report*. The Report includes a review of performance and any recommendations for waste management on future contracts.

A copy of the Construction Waste Management Plan comprising the Waste Forecast, the Quarterly Waste Returns Contract Waste Report will be retained at the site offices for three years after completion of the works.

6.3.1 Waste Controls

The following environmental controls and monitoring activities will be implemented on site:

Table 6.3 Waste Controls

TASK	RESPONSIBILITY
Ensure all waste disposal is arranged via the Waste Rep.	Project Manager/ SHEQ Advisor/ Manager
Where possible waste will be retained and reused on site to reduced traffic movements.	All staff
Plan to segregate waste as far as technically, environmentally and economically practicable into reusable and recyclable waste.	Project Manager/ SHEQ Advisor/ Manager
Introduce a '*take-back policy*' on suppliers, so where possible, no delivery will leave the site without taking associated waste and packaging with them.	Project Manager/ Buying Department
Ensure that copies of the following are retained on site: • Evidence of all relevant Waste Collection Permits. • All relevant Waste Management Licences / Exemption Certificates. • Waste Transfer Notes and Consignment Notes. • Site Waste Management Plan/ Hazardous Waste Register.	SHEQ Advisor/ Manager/ Waste Rep.
Do not accept damaged skips/ waste containers on to site	Foreman/ Waste Rep.

TASK	RESPONSIBILITY
Locate skips/ waste containers away from drains, watercourses and heavily trafficked areas.	Foreman/ Waste Rep.
Ensure hazardous waste containers are covered and located on hardstanding.	Foreman/ Waste Rep.
Locate non-hazardous skips/ waste containers on hardstanding if possible.	Foreman/ Waste Rep.
Ensure that waste is segregated and placed in the right skip/bin	Foreman/ Waste Rep.
Ensure all waste is stored securely so that it cannot escape (wind/ vermin).	Foreman/ Waste Rep.
Remove waste, disused materials, packaging and other debris at frequent intervals to ensure the site is kept clean and tidy.	Foreman/ Waste Rep.
Ensure all hazardous waste containers are covered.	Foreman/ Waste Rep.
Ensure all skips and bins are labelled with their contents (incl. EWC Code).	Foreman/ Waste Rep.
Place the correct waste in the correct skip.	All staff
Report skips that are leaking or overfull to your supervisor.	All staff
Report fly-tipping to the Foreman/ SHEQ Advisor/ Manager	All staff
Eliminate unnecessary wastage by: • storing materials neatly on flat solid ground to avoid damage and loss; • keeping materials in their packaging for as long as possible to protect them from damage; • protecting materials from the weather to avoid loss from exposure to the elements; • ensuring existing material containers are empty before opening new ones; and • keeping significant off-cuts for use elsewhere.	Foreman/ All staff

Should any contaminated land be encountered it will be stockpiled separately; covered to prevent wind or water spreading contaminants to the wider environment; tested, at a UKAS accredited laboratory and sent for remediation/ disposed of in accordance with 'Duty of Care'.

Other aspects of waste management such as inspections and waste training requirements are addressed in the relevant sections elsewhere in this CEMP.

6.4 FUEL AND OIL STORAGE

Fuel and oils will be stored in a manner to minimise the risk of pollution or ecological damage during fuel handling. The implementation of good fuel management practices and increased environmental awareness can significantly reduce the risk of environmental pollution or impact of ecological damage. Any waste oils or hydraulic fluids will be collected, stored in appropriate containers and disposed of offsite in an appropriate manner.

Secondary containment will be provided for all oil and diesel tanks:

- For a single tank, the secondary containment will be at least 110% of the maximum storage capacity
- For two or more tanks in one secondary containment system, the secondary containment will be at least 110% of the biggest tank's maximum storage capacity or 25% of the total maximum storage capacity of all the tanks, whichever is the greatest.

The types of fuel and oil that will be stored on this contract and how and where they will be stored are given in the table below:

Table 6.4 Fuel and Oil Storage

Type of Material	How and Where it will be stored
Diesel	• To be stored in bunded tanks or bowsers. • Fuel tanks and mobile bowsers must be kept locked when not in use and overnight. • Where a bulk tank is used, a 130-litre spill kit will be stored near the bunded area. • Metal jerry cans are to be used for hand carrying of fuel around the site. • Where practicable, only restricted hand carrying of fuel should be allowed on the site. • Metal jerry cans must be stored in a bund or drip tray when not in use. In vans /vehicles: • To be stored secure & upright in jerry cans (25 litres or less)

Type of Material	How and Where it will be stored
Oil	• To be stored in original container or in an appropriate container designed for the storage of oils. • Bowsers should be stored within site security compounds when not in operation. • Any tanks or drums should be stored in a secure container or compound, which should be kept locked when not in use. • Metal jerry cans are to be used for hand carrying of oil around the site. • Where practicable, only restricted hand carrying of fuel should be allowed on the site. • Metal jerry cans must be stored in a bund or drip tray when not in use. • The refuel of mobile plant will be undertaken well away from any drains or water bodies • A suitable spill kit or absorbent materials to be held in the vicinity

All refuelling and lubrication of equipment will take place on sealed and bunded surfaces within this area in order to avoid the potential for accidental spillage of hydrocarbons.

6.5 MATERIALS STORAGE

Materials and waste will be stored in a manner that minimises risk to the environment and reduces the potential for wastage due to exposure to the elements or damage. The types of potentially polluting materials associated with these works and how and where they will be stored is given in the table below:

Table 6.5 Material Storage

Type of Material	How and Where it will be stored
Topsoil	• To be stored beside the works to a height of no more than 3m. • Do not compact. • To be stored separately from subsoil. • Topsoil must be stored at least 3 metres away from any trees and hedgerows.
Subsoil	• To be stored beside the works to a height of no more than 5m. • Do not over compact. • To be stored separately from topsoil. • Subsoil must be stored at least 3 metres away from any trees and hedgerows.
Sand / Stone	• To be stockpiled in the allocated lay down area in the site compound in a way to minimise dust and wastage.
Cement	• To be stored in the original packaging on pallets inside the COSHH stores. • If cement is to be stored outside temporarily it should be stored off the ground on pallets, away from sensitive or heavily trafficked areas and covered with tarpaulin.
Other bagged materials	• To be stored inside a container where practicable otherwise off the ground on pallets and protected from the weather.
Chemicals, Bitumen, Paints, Solvents, Grease	• To be stored in the original packaging inside a drip tray. All chemicals should be stored appropriately in the COSHH stores. • Consult the MSDS or COSHH sheets for details of particular storage requirements.
Batteries / fluorescent light tubes	• In a leak proof container within a designated covered storage area.
Contaminated Material	• To be stockpiled separately in a quarantined area, clearly marked and sealed off.

Type of Material	How and Where it will be stored
Empty drums / containers	• To be stored in a designated area prior to disposal. • Away from sensitive boundaries and watercourses • Screening from external receptors, if possible
Inert waste	• To be kept separate from non-hazardous and hazardous waste in a clearly designated area, in a labelled skip located on hardstanding where possible.
Non-Hazardous waste	• To be kept separately from inert and hazardous waste. • To be segregated into its component streams where technically, environmentally and economically practicable. • To be kept in clearly labelled containers/ skips. • Containers/ skips to be in good condition, covered and located on hardstanding • Containers/ skips to be located away from sensitive
Hazardous waste	• To be kept separately from inert and non-hazardous waste. • To be segregated into its component streams and kept in clearly labelled containers/ skips. • Containers/ skip to be in good condition, covered and located on hardstanding • Containers/ skips to be located away from sensitive boundaries and watercourses • Containers/ skips to be screened from external receptors if possible.

6.6 WATER

The site is located in the Western River basin district and the Galway Bay South East Catchment. This catchment includes the area drained by all streams entering tidal water in Galway Bay between Black Head and Renmore Point, Galway, draining a total area of 1,270km2. The Cannahowna (Gort) River flows north on the eastern side of Gort and to the east of the site before it discharges to the Kilchreest River. The Kilchreest River discharges into Coole Lough which is located approximately 2km west /north-west of the site. Waters from Coole Lough drain, via a series of turloughs and underground pathways, to Corranroe Bay (south of Kinvara), approximately 10km north-west of the site.

Figure 6.1 Drawing illustrating location of receiving watercourses

6.6.1 Control of Construction Site Surface Water Runoff Quality

The early establishment of temporary drainage facilities will manage the risk of impacts on watercourses on and adjacent to the site during construction. In addition, construction operations will adopt best working practices.

The drainage proposals will be developed further prior to the commencement of construction however, any such improvements will be in line with the principles and mitigation presented in the EIAR and with conditions which be attached to planning. The protection of the watercourses within and surrounding the site and downstream

catchments that they feed is of utmost importance in considering the most appropriate drainage proposals for the site of the proposed development.

During the construction activities there will be a requirement for diverting rainwater away from the construction areas. Water will be filtered and treated to prevent sediment from entering ditches and water streams. There will be no direct discharges to any natural watercourses, with all drainage waters being managed using settlement /siltation ponds and dispersed as overland flows. Check dams will be added to an artificial drains created to control flows and sediment loads in artificial drains. The drainage proposals will be developed further prior to the commencement of construction. The following sections give an outline of drainage management arrangements in terms of pre-construction, construction and operational phases of the Proposed Development

As part of detailed design and in advance of any construction activities, a construction site drainage plan will be developed to assist with micro siting of proposed drainage controls. Artificial drains will be excavated and settlement ponds constructed to eliminate any suspended solids within surface water running off the site. Drainage infrastructure will include:

- Interceptor drains will be maintained up-gradient of all proposed infrastructure to collect clean surface runoff, in order to minimise the amount of runoff reaching areas where suspended sediment could become entrained.
- Swales/road side drains will be maintained to intercept and collect runoff from access roads and hardstanding areas of the site, likely to have entrained suspended sediment and channel it to settlement ponds for sediment settling;
- Check dams will be maintained at regular intervals along interceptor drains and swales/roadside drains in order to reduce flow velocities and therefore minimise erosion within the system during storm rainfall events; and,
- Settlement ponds, emplaced downstream of swales and roadside drains, will buffer volumes of runoff discharging from the drainage system during periods of high rainfall, thus reducing the hydraulic loading to watercourses. The settlement ponds will be sized according to the size of the area they will be receiving water from but will be sufficiently large to accommodate peak flows storm events. Inspection and maintenance of all settlement ponds will be ongoing through the construction period. Best practice and practical experience on other similar projects suggests that in addition to the drainage plans that are included in the EIAR, there are additional site based decisions and plans that can only be made in the field through interaction between the Site Construction Manager and Environmental Advisors (hydrologist). In relation to decisions that are made on site it is important to stress

that these will be implemented in line with the associated drainage controls and mitigation measures in Section 8 of the EIAR and to ensure protection of all watercourses.

Good housekeeping and facility management during the construction period will ensure that there will be no negative environmental impacts from the construction of the proposed facility. Sedimentation presentation controls include the following:

- Minimisation of exposed ground and soil stockpiles, through careful earthworks design.
- Minimising the time that ground is exposed and excavations are open through careful construction programming.
- Stockpiles will be located away from watercourses, limited in height to 3m (topsoil) and the surface smoothed.
- Silt fences will be placed around the stockpiles where required to limit the potential for rainfall to wash fines into the drainage system. These comprise a technical filter fabric positioned as a fence around the exposed soil and sediment to catch fines within the runoff and reduce the input of fine sediment to the drainage system. Stockpiles which may be present for some time will be covered or seeded.
- Areas around infrastructure will be landscaped, and restored with topsoil and revegetated as soon as possible.
- Location of construction activities away from water courses as far as possible.
- Track drainage, designed to prevent the interception of large volumes of water, will be porous and act as soakaways thereby minimising any direct discharge to watercourses.
- Wheel washing activities will be conducted in designated areas, with runoff waters being conducted to soakaways constructed according to best practice.
- Use of buffer zones, silt traps and settlement ponds to avoid sediment reaching watercourses.
- As and when necessary all groundwater will be pumped or will flow to a secure sediment pond on site. This pond will be of sufficient size in order to allow ample retention time for any solids to settle. If required as a precautionary measure absorbent pads or booms will be placed at the entry and exit of this pond. The pond will be located in a secure area and will only be accessed by the relevant personnel.
- Any mechanically propelled pumps will be located a safe distance from the water source in order to eliminate the potential of oils entering the water. All pumps will rest on drip trays of sufficient size.

- Prior to pumping any water from source, it will be visually assessed taking into account sediment content, clarity/colour, and evidence of any oils, solvents, etc. If there is any evidence of contaminants in the water absorbent pads or booms will be placed at the entry and exit of this pond.
- After sufficient retention time in the holding pond the water will either flow or be pumped to the land drains. Throughout the course of any discharge regular visual checks will be carried out, again taking into account any suspended solids, clarity, oil presence, etc.
- Monitoring of water discharges from the site will be undertaken as needed and as required by the consenting process.

  If there is a risk that contaminated groundwater may be present this must be fully evaluated in advance of excavation and pumping.
- For large excavations, the runoff from soil at temporary storage locations will be directed through appropriate sediment/silt control measures.
- In addition to soil excavation, the site works may require exposure of large areas of soil. Run-off water from such areas will be collected by temporary drainage and passed through settlement tanks or lagoons before discharging to surface water via an interceptor. Where soil is to be placed for landscaping purposes, the final formation face will be covered by a covering appropriate to facilitate plant growth and minimize erosion.

6.6.1.1 Cementitious Products

The following mitigation measures are proposed to avoid release of cement leachate from the site:

- No batching of wet-cement products will occur on site;
- Supply of ready-mixed wet concrete products where possible or emplacement of pre-cast elements,
- No washing out of any plant used in concrete transport or concreting operations will be allowed on-site;
- Where concrete is delivered on site, only chute cleaning will be permitted, using the smallest volume of water possible. No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be allowed.
- Use weather forecasting to plan dry days for pouring concrete;
- Ensure pour site is free of standing water and plastic covers will be ready in case of sudden rainfall event;

- A 20m buffer distance to nearby water courses will be emplaced for the duration of the construction works to prevent accidental run-off.

6.6.2 Water Pollution Prevention Controls

The following controls shall be put in place on this project.

Table 6.6 Water Pollution Prevention Controls

TASK	RESPONSIBILITY
General:	
No in-stream works will be carried out	
Works will be carried out in accordance with IFI guidelines for the protection of watercourses and other specific recommendations made by the IFI	Foreman/ All staff
Silt fences will be placed along the course of the stream flowing through the woodland to the north as a precautionary measure	Foreman
No machinery will enter the local streams. Any temporary crossing for machinery will be approved by IFI /Loughs Agency	Project Manager/ Foreman
Drip trays must be placed under all mobile plant & equipment.	Foreman
All practicable measures will be taken to prevent the deposition of silt or other material in, and the pollution of any existing watercourse, borehole, aquifer or catchment area, arising from the operations	All staff
Oils and diesels must be stored on drip trays (incl. when in vans).	Foreman
Containers will be properly secured to prevent unauthorised access and misuse. An effective spillage procedure will be put in place with all staff properly briefed.	Foreman/ All staff
Spill kits will be present in all plant machinery	Foreman/ All staff
Oil booms and oil soakage pads will be kept on site to deal with any accidental spillage.	Foreman/ All staff
Silt curtains will be available at the site to be placed in the stream downstream from the works if excess turbidity (suspended solid concentrations >25 mg/l or increase in background concentrations) is measured in the watercourse downstream of the site. Placement of silt curtains in the stream will be subject to approval from the IFI /Loughs Agency.	All staff

TASK	RESPONSIBILITY
Locate plant, equipment as far away as possible from drains.	Foreman
All refuelling and lubrication of equipment will take place on sealed and bunded surfaces within this area in order to avoid the potential for accidental spillage of hydrocarbons.	Foreman
Regularly check the plant, equipment & vehicles for leaks.	All Staff
Stand small plant that is leaking in drip trays.	All Staff
If plant & equipment is leaking report to your Supervisor.	Foreman
Arrange for leaking plant to be taken out of service and maintained.	Project Manager
A petrol interceptor will be installed to ensure no accidental spillages of fuel will enter the surface water system.	Construction Manager/ Foreman
Dewatering (Excavations & Groundwater):	
Check for underground services before starting to excavate.	Project Manager/ Construction Manager
Never pump silty water into a watercourse.	All Staff
Do not disturb water in excavations to prevent stirring up silt.	All Staff
Use the lowest corner of the excavation as a pump sump.	All Staff
Position the pump off the bottom of the excavation.	All Staff
Remove light contamination with absorbent pads from your spill kit.	All Staff
Store water heavily contaminated with oil in containers & tanker off-site.	Project Manager/ Foreman

TASK	RESPONSIBILITY
When disposing of silty water from pumping out excavations/ dewatering: • All construction works requiring discharge of water from any excavation or area of water which may have come in contact with concrete or cementitious material shall require a Permit to Pump. • All water must be tested for pH readings by contractors for values between 6-9, and discharging water must go through a series of filtration systems before final discharge • Pump via a silt sock/ settlement tank/ lagoon (with sufficient retention time to settle any silt) *Note:* It is recommended the SHEQ Advisor/ Manager is contacted for advice first.	Project Manager/ Foreman
Dewatering (Structures):	
When disposing of water from pumping water out of built structures such as tanks, etc.: • All construction works requiring discharge of water from any excavation or area of water which may have come in contact with concrete or cementitious material shall require a Permit to Pump. • All water must be tested for pH readings by contractors for values between 6-9, and discharging water must go through a series of filtration systems before final discharge. • Check water for signs of contamination prior to pumping. • Obtain permission from EPA/ Local Authority and discharge to surface watercourse/ surface water drain. *Note:* It is recommended the SHEQ Advisor/ Manager is contacted for advice first.	Project Manager/ SHEQ Advisor/ Manager
Never dewater from structures, particularly to a surface watercourse/ surface water drain without first testing the water quality.	All Staff

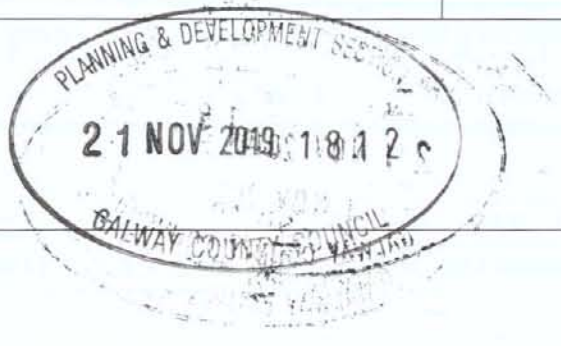
TASK	RESPONSIBILITY
Surface water runoff quality will be controlled by construction of a settlement pond with filter material near the scour point. The settlement pond will be kept for the duration of the construction phase. All water discharged in this way will be monitored to ensure the quality is acceptable and will not impact on local watercourses.	Project Manager/ Foreman
Never dewater from concrete structures without first testing the pH	All Staff
When working near a watercourse:	
Never pump silty water into the watercourse.	All Staff
Keep all materials, plant & equipment over 10m away from the watercourse.	All Staff
Do not re-fuel within 10m of a watercourse or 50m of a borehole without the prior agreement with regulatory authority	All Staff
Prevent vehicles & plant from entering the watercourse.	Foreman
Where possible, place a boom across the watercourse directly downstream of where you are working.	Foreman
No fuel storage will be allowed in areas prone to temporary flooding.	Foreman/ All Staff
Keep a spill kit at every works location.	All Staff.
When concreting:	
Allocate a designated wash-out area.	SHEQ Advisor/ Manager/ Foreman
Only wash-out concrete in the designated wash-out area.	All Staff.
Concrete will be brought to site ready-mixed or batched within the site compound area.	Project Manager/ Foreman
Raw or uncured waste concrete will be disposed of by removal from the site to a licenced waste facility	Foreman/ All staff
When a consent has been obtained:	
Forward a copy of the Consent to the Project Manager.	SHEQ Advisor/ Manager/ Client (if applicable)
Inform the Site Agent / Team Leader of the consent conditions and any required controls.	SHEQ Advisor/ Manager
Follow the additional controls as required.	Construction Manager/ Foreman

6.6.3 Water Quality Monitoring and Management

The water monitoring that will be undertaken on this contract is given in the table below:

Table 6.7 Water Quality Monitoring & Management

TASK	RESPONSIBILITY
When working near a watercourse:	
Check the watercourse twice daily for: • Change in water colour. • Change in water transparency. • Oily sheen on water surface. • Scums & foams. • Dead / decaying plants, animals & fish.	SHEQ Advisor/ Manager/ Foreman/ Nominated Person
Turbidity will be monitored using a portable meter to ensure that the level of suspended solids does not exceed 25mg/l	Nominated person/SHEQ Advisor
Keep a record of these checks in the Sampling Register.	Appointed Person(s)/ ECoW
When working near roadside gullies:	
Ensure gullies/ drains are kept free from ingress of stone, spoil, tarmac and other material by checking daily.	Foreman
When dewatering:	
All staff to receive Tool Box Talk on pumping before the dewatering activities begin.	SHEQ Advisor/ Manager/ Foreman
Ensure suitable discharge filter media is provided with each pump.	Project Manager/ Foreman
Nominate someone to check the dewatering activity	Project Manager/ Foreman
Check the water being discharged every 30 minutes for evidence of silt or other contaminants.	Nominated Person
Record these checks in the Pumping & Dewatering Monitoring Booklet – detailing the date, time, who checked it, and a description of the water (clear, no signs of silt etc.).	Nominated Person
If the water being discharged is silty or looks contaminated in any way - STOP pumping immediately and contact the SHEQ Advisor/ Manager.	Nominated Person



6.7 NOISE

6.7.1 Noise Controls

Noise will be minimised and managed in accordance with the controls specified in the EIAR (Section 11)

Proposed contract working hours are Monday to Friday 07.00 to 19.00 and 08:00 to 16:00 on Saturdays. The site will be closed on Sundays. Controls that will be in place on this project are given in the table below.

Table 6.8 Noise Controls

TASK	RESPONSIBILITY
No working outside contract hours without consent from the Project Manager.	All Staff
Notify the Environmental Health Officer of any particularly noisy works or any works outside the contract hours before construction begins.	Project Manager/ SHEQ Advisor/ Manager
Do not plan noisy activities first thing in the morning or last thing at night in consideration of local residents.	Project Manager/ Foreman
Where possible, locate accesses away from public areas.	Project Manager/ Foreman
Ensure all deliveries to site are within the specified working hours	Project Manager/ Foreman
Locate stationary plant and equipment as far away as possible from sensitive receptors and away from walls. Orientate away from receptor.	Project Manager/ Foreman
Provide acoustic housing around noisy equipment or equipment that is required to run continuously.	Project Manager/ Foreman
Use noise screens/ blankets, housings and temporary stockpiles to screen noise.	Project Manager/ Foreman
Make sure plant such as Generators, Pumps and Compressors are CE marked and marked with the sound power level,	Project Manager/ Foreman
Ensure plant is well maintained. Arrange for any excessively noisy plant & equipment to be removed from site for maintenance.	Project Manager/ Foreman
When working at night, ensure silenced generators are used.	Project Manager/ Foreman
Break out hard material using hydraulic nibbler and bursters and diamond stitch drilling or sawing. Minimise use of percussive methods.	Project Manager/ Foreman

TASK	RESPONSIBILITY
Use electrically powered plant rather than diesel if possible.	Project Manager/ Foreman
Minimise noisy assembly practices – fabricate off site where possible.	Project Manager/ Foreman
Report any excessively noisy plant & equipment to your Supervisor.	All Staff
Keep doors on plant & equipment closed.	All Staff
Switch off engines on plant & equipment when not in use.	All Staff
Avoid excessive revving of all vehicles.	All Staff

6.7.2 Noise Monitoring

Noise monitoring will be undertaken to ensure compliance with required limits. Noise monitoring will be undertaken routinely during the construction phase of the development. Additionally, a Type 1 portable noise meter will be available for use on site.

The Noise monitoring to be undertaken is given in the table below

Table 6.9 Noise Monitoring

TASK	RESPONSIBILITY
Prior to work starting on site nearby noise sensitive receptors will be identified and noise monitoring carried out to establish baseline levels.	SHEQ Advisor/ Manager
Noise monitoring will be undertaken at the site boundaries and 1m from the façade of sensitive receptors to confirm compliance with contract/ consent requirements.	SHEQ Advisor

6.8 AIR

As part of the air quality control measure a Dust Management Plan (DMP) will be developed and implemented.

The appointed contractor will carry out dust monitoring along the site perimeter to confirm that the dust levels do not exceed 350mg/m^2/day average over 30 days in accordance with TA LUFT VDI Method (Bergerhoff Gauge). Dust gauges will be put in place at a number of locations (4No.) and the samples analysed at an accredited laboratory.

Controls that will be in place on this contract are detailed in table below.

Table 6.10 Noise Monitoring

TASK	RESPONSIBILITY
General Activities:	
Ensure, when possible, that all vapour and odour generating processes are kept away from receptors.	Project Manager/ Foreman
Site and shape stockpiles to minimise potential for dust generation.	All Staff
Protect very fine or dry material from the wind.	All Staff
Mix grout in enclosed / shielded area.	All Staff
Keep drop heights into hoppers and lorries to a minimum.	All Staff
Make sure exhausts do not discharge directly at the ground.	All Staff
No burning on site.	All Staff
Provide dust screens to shield residential and other sensitive areas.	Project Manager/ Foreman
Haul Roads & Traffic:	
Enforce an on-site speed limit of 10 km/h on surfaced roads. Have sign posts indicating these speed limits.	Foreman
Ensure vehicles do not queue at the site entrance.	Project Manager/ Foreman/Drivers
Sheet vehicles carrying spoil to prevent dust nuisance and cross contamination.	Project Manager/ Foreman/Drivers
Check site accesses and local roads daily for mud and arrange for it to be cleaned up immediately.	Foreman
Provide wheel washing facilities at the entrance to the extension construction site lands to remove mud from haulage vehicles and to ensure mud is not transferred onto the surrounding road network (detergents will not be used and washes will incorporate appropriate containment systems).	Project Manager
Provide a road sweeper for use on public roads used by site traffic.	Project Manager
Plant, Equipment, Vehicles:	
Turn off engines when not in use. If any plant or equipment is emitting black / heavy smoke, cease use and send for servicing.	All Staff/ Foreman

6.9 WILDLIFE & ECOLOGY

There are no designated conservation areas within the proposed development site. Therefore, the proposed development site does not directly impact on any Special Area of

Conservation (SAC), Natural Heritage Area (NHA), Special Protection Area (SPA), National Park or Nature Reserve.

Control measures associated with the potential impact on water quality are dealt with under the Water Quality Section of the CEMP.

6.9.1 Consents

No specific consents are required for the project works, but shall be reviewed as part of Contract CEMP preparation works.

6.9.2 Biodiversity Protection Measures

Wildlife will be protected in accordance with the controls specified in the Environmental Handbook. Mitigation measures that will be in place on this contract are given in the table below.

Table 6.11 Biodiversity

TASK	RESPONSIBILITY
General:	
Ensure all staff are aware of any conditions/ requirements attached to consents/ licences and of the controls detailed below.	Project Manager/ SHEQ Advisor
If any wildlife is found unexpectedly (e.g. reptiles, badgers or bats), contact your SHESQ Advisor.	All Staff
Implement controls as instructed by the SHEQ Advisor.	Project Manager/ Foreman
Nesting Birds:	
Check the site for nesting birds (including ground nesting birds). Make a record of this survey.	Project Manager/ Foreman
If any nesting birds are found, fence off the area and inform all staff of their location. Do NOT conduct works in this area.	Project Manager/ Foreman
Check trees for nesting birds before removing them or trimming any branches	All Staff
Do not disturb any nesting birds.	All Staff
When working near trees:	
Inform the SHEQ Advisor so that the council may be contacted to ensure there are no Tree Preservation Orders in the area.	Project Manager/ Foreman
Do not damage or interfere with any tree or hedge unless permission has been obtained from the Local Authority.	All Staff

TASK	RESPONSIBILITY
Ensure where practicable young trees are relocated rather than removed	Project Manager/ Foreman
If trees that are suitable as bat roosts are to be removed arrange for inspection by a bat license holder.	Project Manager/ SHEQ Advisor/ Manager/
If bats are present obtain a derogation licence prior to felling and supervise the work.	Specialist/ SHEQ Advisor
Undertake any pruning, crown lifting or removal of trees at an appropriate time of year (i.e. outside the bird-breeding season, which is March to August). Employ specialist contractors to carry out all tree cutting/surgery.	Project Manager/ SHEQ Advisor/ All Staff
Only remove the minimum of branches to allow access.	All Staff
Where branches must be lopped, make a clean cut above a joint.	All Staff
Ensure all site staff are briefed regarding the NJUG Guidelines on working in close proximity to trees and that the guidelines are implemented on site.	Project Manager/ SHEQ Advisor/ Manager/
Work as far away from the trees as possible. Where trees are in close proximity to the works set up protection zones around the trees to prevent damage to their branch and root system.	Project Manager/ Foreman
Ensure the tree protection zone is cordoned off and if possible is large enough to prevent access under the canopy of the tree.	Project Manager/ Foreman
Do not lean any materials up against tree trunks.	All Staff
If excavation under the canopy is required: • Hand-dig around tree roots • Retain as many roots as possible • If a root must be severed, make sure it is a clean cut • If roots are to be left exposed overnight cover with damp sacking	All Staff
Invasive Plants:	

TASK	RESPONSIBILITY
No invasive species were identified as part of EIA survey works undertaken in support of the planning application. Howver in accordance with best practice, invasive plant species is included as a task. *Invasive and Non-native Flora.* Japanese knotweed (*Fallopia japonica*) and Rhododendron (*Rhododendron ponticum*) have been recorded from within a 2km radius of the proposed development site, according to the NBDC data online. Should any of these plants be found in the general vicinity of the development site, please contact your SHEQ Advisor/ Manager for instructions on how to proceed.	Project Manager
If invasive plants are identified, contact specialist contractor to remove the plant off site in a safe manner in accordance with the relevant legal and other requirements.	SHEQ Advisor
Implement controls as instructed by the SHESQ Advisor/ Manager.	Project Manager/ Foreman

6.10 ARCHAEOLOGY AND HERITAGE

There are no previously recorded archaeological sites located within the immediate vicinity of the proposed development area and no adverse impacts are predicted upon the archaeological resource as a result of the proposed development.

No materials assets including features of architectural, archaeological or cultural heritage were identified in the three previous applications for the biogas facility (Refer to EIAR) There is no evidence that there are any material assets within or adjoining the parts of the site that were not included in the 2014 permission i.e. the extended yard area (again see Chapter 2.0). The 2014 permission was subject to a condition (number 15) requiring, amongst other things, pre-development testing by a suitably qualified archaeologist and the submission of a written report to the Planning Authority. Depending on the content of the report, monitoring may be required and the Department of Arts, Heritage and the Gaeltacht will advise on relevant matters. It was considered that these measures would equally and appropriately prevent adverse impact on any material asset that may be within the site. When the biogas facility was constructed no man-made heritage, features were uncovered but this condition would remain appropriate so far as it relates to land required to be developed for the extended area proposed which lay outside of this red line.

Consequently, no further assessment is deemed necessary to be commented on in this EIAR as far as the proposed development is concerned.

6.10.1 Archaeology and Heritage Consents

No consents or licences are required for the contract works. However, this shall be reviewed as part of Contract CEMP works.

6.10.2 Archaeology and Heritage Protection Measures

No further archaeological or architectural mitigation is deemed necessary. However, this shall be reviewed as part of Contract CEMP works.

6.10.3 Record of Protected Structures

Not Applicable

6.11 SITE COMPOUND

The location of the Site Compound will be within the footprint of the extension development lands and accessed by the private laneway before approaching the weighbridge.

TASK	RESPONSIBILITY
Before site set up works begin photograph the condition of the site compound area (to help avoid erroneous claims after the works have been completed).	Project Manager/ Foreman
Provide perimeter fencing /hoarding at any location such that the environment in the area is not blighted by the construction site.	Project Manager
Provide signage with out of hours contact details.	Project Manager
Ensure that perimeter fencing /hoarding are regularly checked and kept free damage.	Foreman
Position site lighting to prevent intrusion /nuisance to neighbouring properties	Project Manager
Locate temporary site toilets/ waste skips away from site neighbours.	Project Manager
Ensure that the sites are kept clean, tidy and safe.	Project Manager
Store plant, equipment & materials at least 10m away from drains.	Project Manager/ Foreman
Keep cabins/containers locked outside working hours	Foreman
Provide site drainage/ dewatering arrangements that comply with the requirements of any trade effluent/ discharge consents	Project Manager/ Foreman
Prevent materials, waste, and dust from blowing around.	Foreman

TASK	RESPONSIBILITY
Allocate a person to supervise all fuel deliveries.	Project Manager/ Foreman
Display a notice giving details of safe delivery and storage procedures.	SHEQ Advisor/ Manager
Supervise all deliveries at all times.	Nominated person
Check level in tank prior to delivery to prevent overfilling.	Nominated person
Check delivery before discharge to ensure the correct fuel is being delivered.	Nominated person
Ensure that valve on bunded tank is closed and kept locked when not in use	All staff
Only re-fuel in designated areas within the site compound, using drip trays.	All staff
Ensure that hose is kept within bund at all times	All staff
Never leave a vehicle/ plant unattended during re-fuelling.	All staff
Ensure any emergency vehicle maintenance is carried out using drip trays.	Fitters/ Foreman
Appoint a member of staff to be responsible for liaising with local groups	Project Manager
Consult with local resident groups about planned activities that may cause a nuisance, e.g. rock breaking, major deliveries etc.	Appointed person/Liaison Officer

6.12 EMERGENCY PREPAREDNESS/ENVIRONMENTAL INCIDENTS

An Emergency Response Plan (ERP) is presented in this section of the CEMP. It provides details of procedures to be adopted in the event of an emergency in terms of site health and safety and environmental protection.

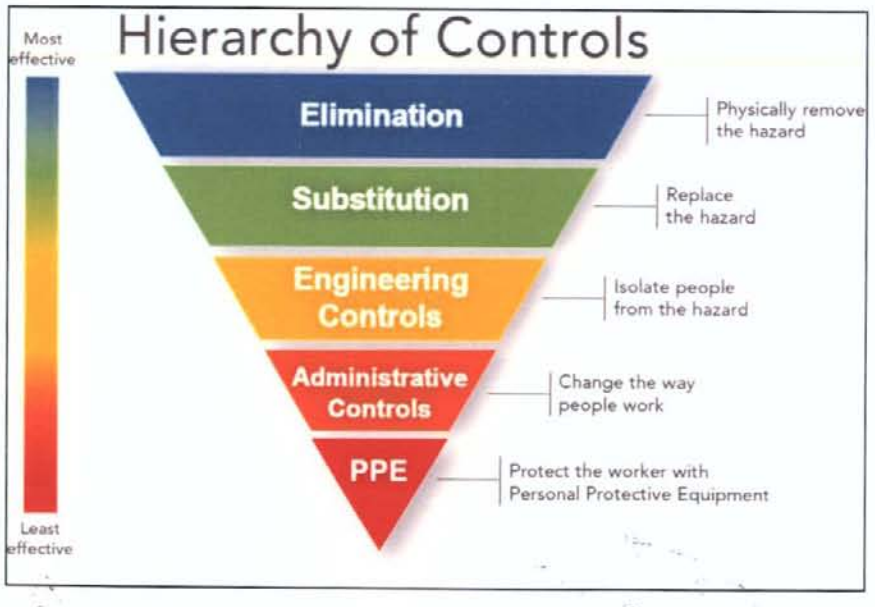
Environmental incidents have the potential to adversely affect the appointed contractor through potential prosecution, blight to a site, contractual issues, public relations issues, through to increased costs for clean-up / management fees and delays to the build programme. The reporting of environmental incidents is vital in order to ensure they are dealt with correctly, adverse effects negated or minimised and that valuable lessons are learnt. Where environmental incidents are reported, actions can be formally completed that ensure control measures are put in place to avoid any future recurrence on site and, where relevant, across the company as a whole.

Emergency response scenarios have been identified by Sustainable Bio-Energy Ltd as part of the implementation of the IMS and the controls for prevention and management of these scenarios are documented in the "*Emergency Preparedness and Response Plan*". The purpose of this plan is to identify the potential emergencies and the measures that are in place to prevent the emergency or procedure to follow should the emergency occur. Emergency scenarios include:

- Fire
- Gas Release
- Gas Explosion
- Major Spillage
- Minor Spillage
- Personnel Injury
- Adverse, Severe Weather Conditions
- Road Traffic Collision
- Mechanical Entrapment

For each scenario, actions and environmental controls are prescribed in accordance with the hierarchy of controls. The effectiveness of actions and controls are considered during internal audits, at monthly operations meetings, quarterly management meetings and at the Management Review.

Figure 6.3 Hierarchy of Controls



It provides details of procedures to be adopted in the event of an emergency. The site ERP includes details on the response required and the responsibilities of all personnel in the event of an emergency. The ERP will require updating and submissions from the

contractor/PSCS and suppliers as the project progresses. Where approved subcontractors on site are governed by their own emergency response procedure, a bridging arrangement will be adopted to allow for inclusion of the sub-contractor's ERP within this within this document. This is a working document that will requires updating and review throughout the various stages of the project.

The *Emergency Preparedness and Response Plan* contains the following detail which should be considered as part of finalisation of the development of the Outline CEMP to Contract CEMP:

Figure 6.4 Emergency Preparedness and Response Plan Contents

Table of Contents

In relation to the proposed construction project, the Emergency and Preparedness Response Plan will include the following:

- Roles Responsibilities;
- Definitions;
- Pollution Prevention;
- Environmental Incident Action;
- Notification;
- Review and Reporting;

- Fire;
- Evacuation;
- Periodic Testing;
- Spill Kits.

6.12.1 Roles and Responsibilities

The chain of command during an emergency response sets out who is responsible for coordinating the response. The Site Manager, will lead the emergency response which makes him/her responsible for activating and coordinating the emergency response procedure. The other site personnel who can be identified at this time who will be delegated responsibilities during the emergency response is the SHEQ manager. In a situation where the Site Manager is unavailable or incapable of coordinating the emergency response, the responsibility will be transferred to the SHEQ manager

6.12.2 Initial Steps

In order to establish the type and scale of potential emergencies that may occur, the following hazards have been identified as being potential situations that may require an emergency response in the event of an occurrence.

Table 6.12 Hazards associated with emergency situations

Hazard	Emergency Situation
Construction Vehicles: Dump trucks, tractors, excavators, cranes etc	Collision or overturn which has resulted in operator or third-party injury.
Abrasive wheels/Portable Tools	Entanglement, amputation or electrical shock associated with portable tools
Contact with services	Electrical shock or gas leak associated with an accidental breach of underground services
Fire	Injury to operative through exposure to fire
Falls from heights including falls from scaffold towers, scissor lifts and ladders	Injury to operative after a fall from a height
Sickness	Illness unrelated to site activities of an operative e.g. heart attack, loss of consciousness, seizure

In the event of an emergency situation associated with, but not restricted to, the hazards outlined in the above table, the Site Manager will carry out the following:

- Establish the scale of the emergency situation and identify the number of personnel, if any, have been injured or are at risk of injury.
- Where necessary, sound the emergency siren/fog horn that activates an emergency evacuation on the site.
- Make safe the area if possible and ensure that there is no identifiable risk exists with regard to dealing with the situation e.g. if a machine has turned over, ensure that it is in a safe position so as not to endanger others before assisting the injured.
  ♣ Contact the required emergency services or delegate the task to someone if he is unable to do so. If delegating the task, ensure that they follow the procedures for contacting the emergency services.
- Take any further steps that are deemed necessary to make safe or contain the emergency incident e.g. cordon off an area where an incident associated with electrical issues has occurred.
- Contact any regulatory body or service provider as required e.g. ESB Networks, Galway County Council, Fire Brigade,
- Contact the next of kin of any injured personnel where appropriate.

6.12.3 Pollution Prevention;

The first priority is to prevent pollution occurring, in this regard, similar steps should be taken to managing the environment on site. In particular:

- Preplanning (e.g. Storage Bunding, Consent Licenses, Drainage Plan)
- Hazard identification and risk assessment
- Protective and preventative pollution measures incorporated in to the Environmental Management Plan (EMP), Method Statements and systems of work.
- Emergency planning e.g. procedures, spill kits etc.
- Information, instruction and training
- Inspection, supervision
- Performance auditing
- Review

6.12.4 Environmental Incidents /Non-Conformances

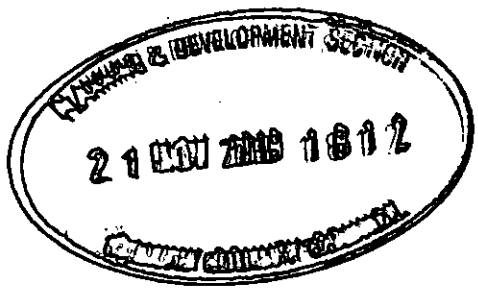
For the purposes of the CEMP, environmental incidents/ non-conformances are defined as follows:

- **Environmental Incident:** a failure to implement adequate environmental controls that has resulted in pollution of water, air or land, damage to wildlife and ecosystems (habitats) or nuisance to a local community.
- **Environmental Near Miss:** something that occurs that has the potential to cause an environmental incident but didn't.
- **Environmental Non-conformance:** a failure to implement environmental controls associated with planning conditions.
- **Complaint:** A significant grievance, dissatisfaction or accusation made by a client, member of the public or other third party relating to activities being completed by the appointed contractor

6.12.4.1 Types of Environmental Incident

To help with trend analysis incidents should be classified according to the type of incident. Incidents can usually be classified under one of the ten types listed below. However, this is not a definitive list and a different classification can be used if the incident does not fit within one of these.

- Air
- Archaeology & Heritage
- Contaminated Land
- Ecology
- Groundwater
- Noise & Vibration
- Oils & Chemicals
- Surface Water
- Traffic
- Waste



6.12.5 Notification

6.12.5.1 Response to an incident or imminent threat of an incident

All employees will be instructed to bring any environmental incidents they identify to the immediate attention of the Project /Site Manager, after first taking what steps they can to contain/ remediate the incident (without putting the health and safety of themselves or others at risk). If appropriate/ necessary the Project Manager/ SHEQ Manager will also inform the Client/ Statutory Authorities and liaise with their personnel in investigations, assessments and the implementation of appropriate corrective and preventive actions. Incident reports shall be completed within 1 day of occurrence. investigations shall be

closed out within two weeks of occurrence. For more severe incidents, a full investigation report shall be carried out.

6.12.5.2 Emergency Communications Procedure

In the event of requiring the assistance of the emergency services the following steps should be taken:

- Stay calm. It's important to take a deep breath and not get excited. Any situation that requires 999/112 is, by definition, is an emergency. The dispatcher or call-taker knows that and will try to move things along quickly, but under control.
- Know the location of the emergency and the number you are calling from. This may be asked and answered a couple of times but don't get frustrated. Even though many emergency call centres have enhanced capabilities meaning they are able to see your location on the computer screen they are still required to confirm the information. If for any reason you are disconnected, at least emergency crews will know where to go and how to call you back.
- Wait for the call-taker to ask questions, then answer clearly and calmly. If you are in danger of assault, the dispatcher or call-taker will still need you to answer quietly, mostly "yes" and "no" questions.
- If you reach a recording, listen to what it says. If the recording says your call cannot be completed, hang up and try again. If the recording says all call takers are busy, WAIT. When the next call-taker or dispatcher is available to take the call, it will transfer you.
- Let the call-taker guide the conversation. He or she is typing the information into a computer and may seem to be taking forever. There's a good chance, however, that emergency services are already being sent while you are still on the line.
- Follow all directions. In some cases, the call-taker will give you directions. Listen carefully, follow each step exactly and ask for clarification if you don't understand.
- Keep your eyes open. You may be asked to describe victims, suspects, vehicles, or other parts of the scene.
- Do not hang up the call until directed to do so by the call taker.

Table 6.12 Emergency Contacts List

Contact	Telephone No.
Emergency Services – Ambulance, Fire, Gardaí	999/112
EPA Regional Inspectorate Castlebar	094 9048400
Gardaí Gort	091 636 400

Gardai Galway	091 538 000
Galway Fire Brigade	091 509 070
University Hospital Galway	091 524 222
Environmental Protection Agency	053 91 60600
Health & Safety Authority	01 614 7000
Department Of Agriculture	1890 200 510
ESB Networks	1850 372 757
Galway County Council	091 509 000
Loughs Agency	0044 (0) 28 71 342100
Inland Fisheries	071 9851435

6.12.5.3 Reporting of Accidents and Dangerous Occurrences

Health and Safety Authority

Accidents and dangerous occurrences must be reported to the HSA in accordance with the Safety, Health and Welfare at Work (Reporting of Accidents and Dangerous Occurrences) Regulations 2016 (S.I. No. 370 of 2016).

The key points in relation to reporting of accidents and dangerous occurrences are:

- Only fatal and non-fatal injuries are reportable. Diseases, occupational illnesses or any impairments of mental condition are not reportable.
- Fatal accidents must be reported immediately to the Authority or Gardaí. Subsequently, the formal report should be submitted to the Authority within five working days of the death.
- Injuries to any employee as a result of an accident while at work where the injury results in the employee being unable to carry out their normal work duties for more than three consecutive days, excluding the day of the accident, must be reported to the Authority.
- Non-fatal accidents or dangerous occurrences should be reported to the Authority within ten working days of the event.
- Accidents to a person who is not your employee and is not at work but is injured by a work activity resulting in the person being taken to a hospital or medical facility must be reported.

A 'dangerous occurrence' means an occurrence arising from work activities in a place of work that causes or results in –

- The collapse, overturning, failure, explosion, bursting, electrical short circuit discharge or overload, or malfunction of any work equipment,

- The collapse or partial collapse of any building or structure under construction or in use as a place of work,
- The uncontrolled or accidental release, theescape or the ignition of any substance,
- A fire involving any substance, or
- Any unintentional ignition or explosion of explosives, as may be prescribed.

The prescribed dangerous occurrences which must be reported to the Authority are listed in Schedule 15 of Safety, Health and Welfare at Work (Reporting of Accidents and Dangerous Occurrences) Regulations 2016 (S.I. No. 370 of 2016)

6.12.6 Review and Reporting

The cause of any incident shall be determined by those involved when the incident or emergency occurred and those involved in the clean-up procedure. The appropriate corrective actions shall be implemented as soon as possible on detection of the incident. All incidents must be reported and documented on a site register. Where there has been direct damage to the environment it may be necessary to report this to the Regulator (e.g. Environmental Protection Agency /Local Authority). If direct damage has occurred the Construction Site Manager shall also be informed as soon as an incident has occurred.

6.12.7 Site Evacuation /Fire Drill

A site evacuation/fire drill procedure will provide basis for carrying out the immediate evacuation of all site personnel in the event of an emergency. The following steps will be taken:

- Notification of the emergency situation. Provision of a siren or fog horn to notify all personnel of an emergency situation.
- An assembly point will be designated in the construction compound area and will be marked with a sign. All site personnel will assemble at this point.
- A roll call will be carried out by the Site Manager to account for all personnel on site.
- Once all personnel have been accounted for the Site Manager will decide the next course of action which be determined by the situation that exists at that time. The Site Manager will advise all personnel accordingly. All personnel will be made aware of the evacuation procedure during site induction. The Fire Services Acts of 1981 and 2003 require the holding of fire safety evacuation drills at specified intervals and the keeping of records of such drills. Cognisance, integration and knowledge of emergency procedures associated with the existing biogas plant will be undertaken as part of Contract CEMP development works.

6.12.8 Periodic Testing

It is the responsibility of the Construction Site Manager or nominated SHEQ advisor to ensure that the emergency procedure is periodically tested to ensure it is effective. Frequency for testing should be determined by the level of risk for a particular project, however, it is recommended that this be carried out at least once every six months or once during the project lifetime where project duration is less than one year.

The test should be logged as good practice. The test should be reviewed to determine the effectiveness of the procedure and the need to amend the requirements if necessary.

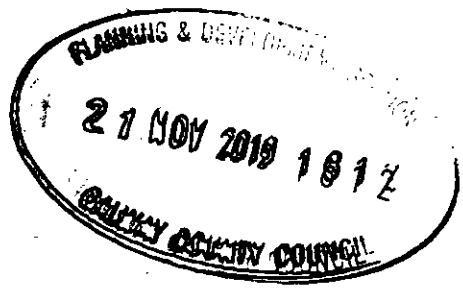
6.12.9 Spill Kits

Sufficient types and quantities of spill response equipment should be available on site and should be kept where spills may occur. The quantity of spill response equipment should be sufficient to contain any likely spill that may occur on site. Types of spill equipment suitable for containing spills arising from different types of pollutants are provided below:

Table 6.13 Spill Kit Types

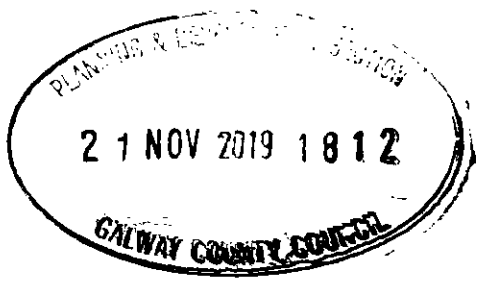
	Pollutants				
Spill on Ground	**Concrete Cement**	**Paints**	**Oils**	**Silt**	**Detergents**
Sand	✓	✓	✓	X	✓
Straw Bales	X	X	✓	✓	X

APPENDICES



APPENDIX A

Construction Waste Management Plan



Construction Waste Management Plan

Introduction

The following matrix[1] (Table 6.1) was developed by Halston and is used to provide indicative construction and demolition (C&D) waste management complexity scoring. The matrix uses six key metrics to assess how likely the project is to require a high level of regulatory attention and the level of detail which should be contained in the C&D WMP. The overall score for the project is calculated by adding the individual score for each of the metrics. The level of detail which should be contained in the C&D WMP is appropriate to the rating of the site:

- No requirement for C&D WMP's are those with score of up to 6
- Standard C&D WMP's are those with score of 7 -15
- Detailed C&D WMP's are those with a score of >15

Table 1 Matrix to Estimate Site C&D WMP Complexity

	Metric	Score 1	Score 2	Score 3	Score 4
1	Do works involve infrastructural demolition works and /or is there potential ground contamination	Greenfield – undeveloped site	Existing buildings on site –non-industrial /commercial use or agricultural	Former light Industrial brownfield Use – potential for ground contamination	Former heavy industrial brownfield site with known ground contamination
2	Site Setting and Environmental Sensitivity including invasive species	Low	Medium	High	Very High
3	Duration of Construction Phase	<3 months	3-12 months	12 months – 2 years	>2 years
4	Expected Volume of Waste (export)	<100m^3	100-500m^3	500 – 1,000m^3	>1,000m^3
5	Floor Area	<125m^2	125-1,250m^2	>1,250m^2	
6	Estimated Cost of Project	<€300,000	€300,000 – €1,000,000	€1,000,000 – €10,000,000	>€10,000,000

[1] Matrix adapted from WG (Welsh Government), 2013. Waste (Wales) Measure 2010: Site Waste Management Plans Consultation Document and consideration of Irish Waste Regulations and Best Practice Guidance

Table 2 Matrix Score Assigned to Project

Metric	Answer	Score	Overall Score
Do works involve infrastructural demolition works and /or is there potential ground contamination	Yes, ground contamination unlikely.	2	17 (Detailed C&D WMP)
Site Setting and Environmental Sensitivity	High	3	
Duration of Construction Phase	<12 months	4	
Expected Volume of Waste (export off-site)	<100m^3	1	
Floor Area	>1,250m^2	4	
Estimated Cost of Project	€1M-€10M -	3	

As can be seen in Table 2, the proposed development characteristics resulted in a score of 17; a detailed C&D WMP requirement. Outline details in respect of this is provided below.

Waste Classification

The EPA and the Connaught-Ulster Regional Waste Management Plan 2015-2021 defines Construction and Demolition (C&D) waste as "*...all waste that arises from construction and demolition activities including excavated soil from contaminated sites....listed in Chapter 17 of the European Waste Catalogue (EWC)*"[2].

If demolition waste is generated as part of the proposed development works it will involve careful decommission and removal of all plant and structures at the site (to provide for extension to the feedstock reception building and office building).

Other anticipated wastes which will be generated on site include soils, blocks; concrete and reinforced concrete; timber; metal sheeting, steel, bituminous materials such as bitumen macadam and asphalt; paving slabs; kerbs; used shuttering; scrap metal, scrap pipes and other plastics; canteen and office waste; lubricating oil, hydraulic oil, scrap parts and other fluids generated from equipment maintenance; sewage from construction phase site toilets. The expected primary non-hazardous and hazardous waste streams that will be generated during construction activities are classified in accordance with the European Waste Catalogue in Table 3 below.

Table 3 EWC Classification of Wastes

Waste Description	EWC Code

[2] It is worth noting, however, that the C&D W stream can overlap into other EWC chapters (Chapters 8, 15 and 20)

Waste plastics	02 01 04
Soil and Stone	17 05 04
Concrete	17 05 07
Wood	17 02 01
Bituminous mixtures	17 03 02
Gypsum	17 08 02
Iron and steel	17 04 05
Insulation materials	17 06 04
Mixed construction and demolition wastes other than those mentioned in 17 09 01, 17 09 02 and 17 09 03	17 09 04
Canteen waste	20 03 01

Construction Site Waste Management

Roles and Responsibilities

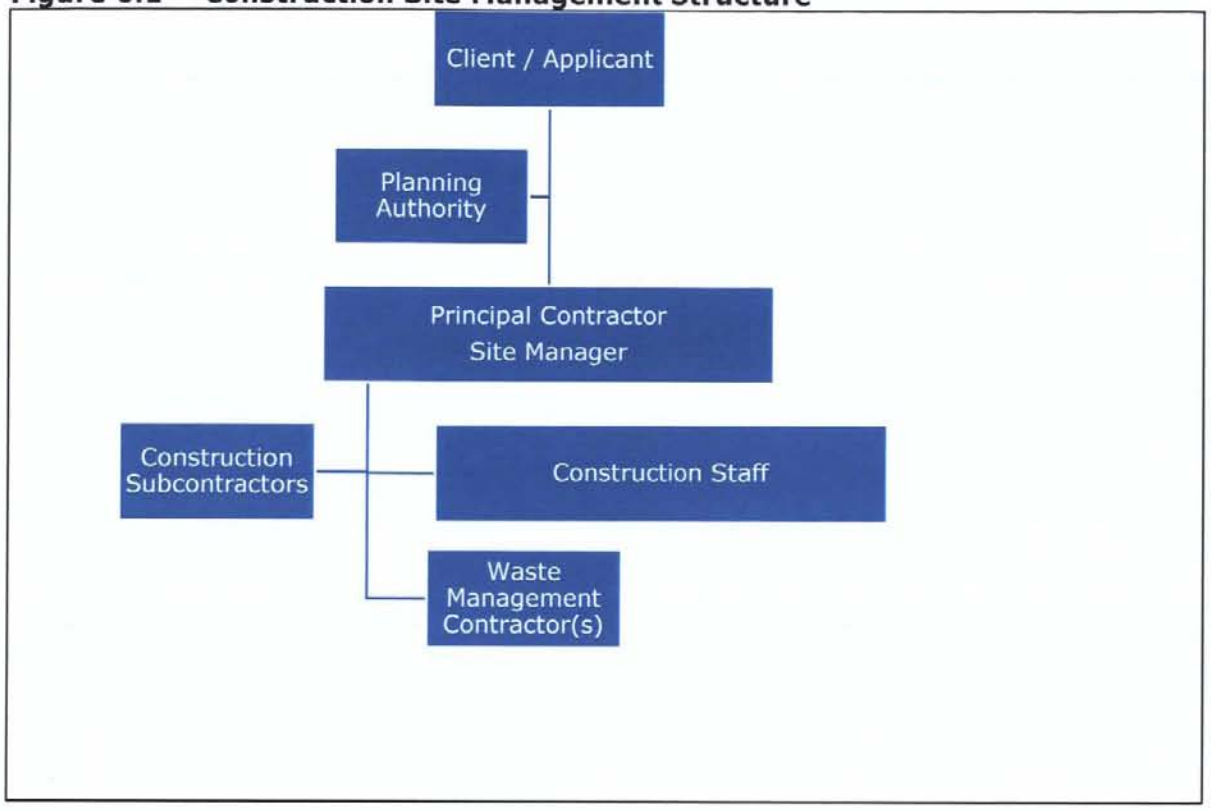
Both the applicant and principal contractor have roles and responsibilities in relation to the C&D WMP. The Appointed Contractor will be responsible for most aspects of the Construction Waste from the date of the contract.

The Site Construction Manager will be designated as the Responsible Person and have overall responsibility for the implementation of the on-site C&D WMP. The site manager will be assigned the authority to instruct all site personnel to comply with the specific provisions of the C&D WMP. At the operational level, a nominated Environmental Representative from each sub-contractor company on the site will be assigned the direct responsibility to ensure that the discrete operations stated in the overall construction plan are performed on an on-going basis. Figure 6.1 below provides a management structure for the construction site.

Table 6.4 Roles and Responsibilities

Description of Duty	Client	Principal Contractor
Ensure that from the start of the Project, an approach to waste management is taken that complies with all relevant waste regulations Produce and submit a C&D WMP that meets Roscommon Co. Co. requirements and industry guidance	✓	
Give reasonable directions to any contractor so far as is necessary to enable the Principal Contractor to comply with his duties under these Regulations.	✓	✓
Make and maintain arrangements to record waste arisings within the Project.		✓
Communicate the C&D WMP to all those affected by it, including workers on site and any subcontractors, and undertake monitoring checks to ensure that it is implemented.		✓
Receive and record waste carrier registration details and waste transfer notes in the C&D WMP to ensure that waste removed from the site is transferred to the prescribed destination and is managed in accordance with applicable waste management legislation		✓
Ensure so far as is reasonably practicable that every worker carrying out the construction work is provided with (i) suitable site induction; and (ii) any further information and training which the worker needs for the particular work to be carried out within the terms of the C&D WMP		✓
View, revise and update the C&D WMP as and when necessary, ensuring that any changes in roles and responsibilities are clearly communicated to those affected	✓	✓
Take reasonable steps to ensure that sufficient site security measures are put in place at the site to prevent any illegal disposal of waste	✓	✓
Inform the Client on the requirements of a construction waste management plan to ensure that Client is aware of obligations to meet under regulations (applies to Principal Contractors where appointed).		✓

Figure 6.1 Construction Site Management Structure



Designated skips and receptacles will be provided on site for all recyclable wastes. The appointed waste contractor will collect and transfer the recyclable wastes as skips are filled. The non-recyclable waste will be transferred by an authorised waste collector to licensed facilities (e.g. canteen waste, general waste). Numerous licensed waste contractors are available in the area and will be obtained from the waste management authority listing.

A successful C&D WMP is largely dependent on how readily it can be integrated in to normal site operations by site manager. The C&D WMP will be implemented to compliment site construction activities and will be promoted by raising awareness and its importance via site inductions, site training, toolbox talks, etc.

Demolition Waste Generation

The majority of the C&D waste will be clean, inert material and it is proposed to reuse it for construction purposes where possible. Excess inert C&D waste will be exported off site for recycling (where possible) or for use as fill material in an authorised waste permit site. demolition will involve removal of the roofing materials and segregation for recovery /recycling. Concrete waste from the walls of the structure is suitable for use as fill material due to its inert composition. Construction Waste Generation

During construction activities, it is expected that construction waste will be produced from surplus materials such as broken or off-cuts of timber, plasterboard, concrete, glass, packaging waste, steel etc.

Soils, Subsoils and Bedrock

Following a review of data relating to ground conditions in the general area of the site it is expected that some bedrock will be encountered on site. A key aspect in the design stage of the project was to aim to eliminate the off-site disposal of excavated materials wherever possible and to reduce the potential for landscape and visual effects.

Construction activities during the construction phase have the potential to release contaminants to the surface waters via drainage channels, specifically silt /sediment, concrete /grouting materials, foul effluent and oils. However, these impacts can be controlled and mitigated and considered as imperceptible negative temporary impacts on the basis that construction mitigation measures are carried out as outlined below.

- Prior to commencement of construction, the outline CEMP will be further development and submitted to the planning authority for agreement.
- Planned construction works will be carried out with the least feasible disturbance of soils. It is proposed that no excavated soil materials (spoil) will be exported off site and will be bermed along the eastern development boundary. Soil stripping and site levelling works will be confined to the site itself. Low lying areas of the site will be filled and levelled with the spoil material. Timetabling of vegetation removal, topsoil stripping and the development of earthworks on-site will fully consider seasonal, ecological and hydrological constraints.
- An accident management plan will be developed to provide spill response procedures, emergency contact details in addition to equipment inventories and their location. All staff will be made aware of this document, and its content, during site induction and it will be available in the site office. Staff will be trained in the implementation of the Plan and the use of any spill control equipment as necessary.
- A drainage plan will be prepared for the construction programme and showing proposed sediment traps and monitoring /discharge control points. The plan will include use of settlement features and traps.
- Concrete will be mixed off–site and imported to the site. The pouring of concrete will take place within a designated area to prevent concrete runoff into the soil / groundwater media.
- Wash down and washout of concrete transporting vehicles will take place at an appropriate facility offsite.

- Good housekeeping (daily site clean-ups, use of disposal bins, etc.) on the project site, and the proper use, storage and disposal of many substances used on construction sites, such as lubricants, fuels and oils and their containers can prevent soil contamination.
- Pollution of aquatic systems during the construction phase will be reduced by the implementation of the following best practice mitigation measures. Due cognisance is paid to the following guidance documents for construction work on or near water;
    - IFI (2016) Guidelines on protection of fisheries during construction works in and adjacent to waters - Guidance for consultants and contractors;
    - CIRIA (2004) – Guideline Document C697 The SUDS Manual;
    - CIRIA (2004)– Guideline Document C624 Development and flood risk - guidance for the construction industry;
    - CIRIA (2006) Control of water pollution from linear construction projects. Site guide;
    - SEPA (2010) Engineering in the water environment good practice guide sediment management;
    - SEPA (2009) Engineering in the Water Environment Good Practice Guide: Temporary Construction Methods; and,
    - SEPA (2017) Works and maintenance in or near water. GPP 5.
- All chemical and fuel fill points and hoses will be contained within bunded areas. Adequate protection measures will be put in place to ensure that all hydrocarbons used during the construction phase are appropriately handled, stored and disposed of in accordance with recognised standards as prescribed out by the EPA.
- Foul drainage from all site offices and construction facilities will be contained and disposed of in an appropriate manner to prevent pollution of local watercourses in accordance with the relevant statutory regulations.
- Routine monitoring of water quality will be carried out at appropriate locations during construction. Parameters to be monitored should include pH, total suspended solids, BOD and COD.

It is not expected that any contaminated material will be encountered during the construction works due to the history of the site (greenfield). However, in this unlikely instance, the material will be segregated, classified and suitably disposed of under waste permit to a waste licensed facility following notification to the Council. This highly unlikely event would increase the off-site disposal rates.

Plastic

As plastic is now considered a highly recyclable material, much of the plastic generated during construction will be diverted from landfill and recycled. The plastic will be segregated at source and kept as clean as possible and stored in a dedicated skip.

Timber /Wood

There will be timber waste generated from the construction work as off-cuts or damaged pieces of timber from building construction. Timber that is uncontaminated (free from paints, preservatives, glues etc.) will be recycled. Again, designated signed areas will be used for segregation and collection on site. A permitted contractor will be used to transfer the material to a waste licensed facility for recovery /recycling (e.g. energy use, wood chips, etc.).

Scrap Metal

Steel is a highly recyclable material and there are numerous companies that will accept waste steel and other scrap metals. A segregated skip will be available for steel/metal storage on-site pending recycling.

Cardboard Packaging

Cardboard packaging will be flattered and placed in a covered skip to prevent it getting wet prior to its recovery off site.

Plasterboard

Waste gypsum can be recycled into new plasterboard. A skip will be provided for the separate collection of waste plasterboard and collected as necessary.

Hazardous Wastes

On-site storage of any hazardous wastes produced will be minimised with off-site removal organised on a regular basis. Appropriate storage of all hazardous wastes on-site will be undertaken including bunding of fuels, lubricants etc. to minimise exposure and risk to human beings and environmental receptors. Segregated hazardous wastes (such as waste oils) will be recovered wherever possible and failing this, disposed of appropriately.

Canteen and General Waste

Regular housekeeping of the temporary canteen/W/C areas will be carried out. Removal of domestic waste from the construction compound will be carried out by a permitted waste contractor. Any temporary W/C utilities used on site during the construction phase will be maintained by an approved and permitted contractor.

There will be a general skip or receptacle for C&D waste not suitable for reuse or recovery. This skip will include general wet waste (mixed food waste and food packaging), contaminated cardboard, contaminated plastic etc. Workers on the site will be encouraged to recycle as much municipal waste as possible and segregated bins will be provided. Prior to removal, the municipal waste receptacle will be examined to confirm not cross contamination has occurred.

Tracking and Documentation

The site manager will maintain a copy of all waste collection permits in the construction site office. A record of all imported material (such as clean fill material such as broken rock, clause 804 gravel, etc.) will also be kept on file. If waste is being transported to another site, a copy of the waste permit or EPA waste licence will be kept on file at the site construction office. It is not expected that any waste will be produced on site that will require transfrontier shipping documentation (TFS). If this instance arises this will be arranged via the national competent authority; Dublin City Council is designated as the National Competent Authority for the export, import and transit of waste shipments under S.I. No. 419 of 2007 Waste Management (Shipments of Waste) Regulations, 2007.

Estimated Cost of Waste Management

The cost associated with waste management for the site will be further developed and incorporated into the CEMP (containing Construction Waste Management Plan) by the construction site manager once construction contracts have been put in place and appointments made. Estimated waste totals will initially be calculated during costing of the project and these will be comparted against actual waste total as construction on the project progresses. The CEMP will be updated with this information when available will be inputted to the CEMP and a summary overview will be available.

Training of construction staff in relation to the CEMP will be the responsibility of the site manager. A copy of the CEMP will be made available to all personnel on site. All site personnel and sub-contractors will be instructed about the objectives of the CEMP and informed of the responsibilities which fall upon them as a consequence of its provisions.

Where source segregation, selective demolition and material reuse techniques apply, each member of staff will be given instructions on how to comply with the CEMP. Signage will be designed to reinforce the key messages within the CEMP and will be displayed prominently for the benefit of site staff.

Record Keeping and Waste Audits

Records will be kept for each waste material which leaves the site, wither for reuse on another site, recovery, recycling or disposal. A system will be put in place to record the construction waste arising on-site.

The waste manager or delegate will record the following:

- Waste taken off-site for reuse.
- Waste taken off-site for recovery.
- Waste taken off-site for recycling.
- Waste taken off-site for disposal.
- Waste (soil & stone) accepted on-site for recovery.

For each movement of waste off-site, a signed waste collection docket will be obtained by the waste manager (or delegate) from the contractor. This will be carried out for each material type. This system will also be linked with the delivery records. A signed waste acceptance docket will be issued for each movement of waste on-site.

Waste Audits

The site manager will be responsible for conducting waste audits at the site during the construction of the development. The site manager will arrange for full details of all arisings, movements and treatment of construction and demolition waste discards to be recorded during the construction stage of the project. Each consignment of C&D waste taken from the site will be subject to documentation to ensure full traceability of the material to its final destination.

Review of Records and Identification of Corrective Actions

A review of all the records for the waste generated and transported off-site, as well as waste accepted, will be undertaken mid-way through the C&D phase. If waste movements are not accounted for, the reasons for this will be established in order to see if and why the record keeping system has not been maintained. Each material type will be examined in order to see where the largest percentage waste generation is occurring. The waste management methods for each material type will be reviewed in order to highlight how

the waste reduction targets can be achieved. Waste management costs will also be reviewed.

Consultation with Relevant Authorities

The site manager will consult and respond to any planning requirements of Galway County Council during the construction phase of the project. The Council will also be consulted to discuss all available all available waste reduction, re-use and recycling opportunities are identified and utilised.

Post-Construction

Within three months of all construction works being completed, a final version of the CEMP (including construction waste management plan) will be completed and made available to the planning authority for inspection. The report will summarise the outcomes of waste management processes adopted and the total recycling/reuse/recovery figures for the development.

APPENDIX 6.1

Consultations

Ms. Shona Symon
Assistant Hydrogeologist
WYG
1 Locksley Business Park
Montgomery Road
Belfast BT6 9UP
By Email: shona.symon@wyg.com

AIE Request Reference **AIE OCCS 2018 01**

12th February 2018

Dear Ms. Symon

I refer to the request which you made under the European Communities (Access to Information on the Environment) Regulations 2007 to 2014 for information held by the Environmental Protection Agency:

> *WYG have been commissioned to undertake a desk study for a site located at Kinincha Road, Gort, Co. Galway at ITM grid reference 545442 703348 (site map attached)*
>
> *We would be grateful if you could provide us with the following information;*

- *Groundwater quality (within 2km of the site)*
- *Surface water Quality and monitoring points (within 2km of the site)*
- *Contaminated Land (within 2km of the site)*
- *Abstractions (Groundwater and Surface Water within 2km of the site)*
- *Consented discharges (within 2km of the site)*
- *Reported pollution incidents (within 2km of the site)*

I made a final decision to **grant** your request on 12th February 2018. If you have any queries regarding this correspondence, you can contact me by telephone at +353 539160675.

You have sought access to information by means of email and I consider this an appropriate form of access in this case. Accordingly, please see information provided to you below:

Groundwater quality (within 2km of the site)

https://gis.epa.ie/EPAMaps/

- See Ground Waterbody WFD Status 2010-2015, Groundwater Quality Status: 2010-2015

Surface water Quality and monitoring points (within 2km of the site)

http://gis.epa.ie/GetData/Download - Water quality and monitoring

Contaminated Land (within 2km of the site)
You can check if there are any EPA licensed facilities within 2k of the relevant area on the EPA website (My Local Environment) http://gis.epa.ie/myenvironment#/search. You can then access the licensing/enforcement files for the particular EPA licensed site regarding any contamination/incidents.

Abstractions (Groundwater and Surface Water within 2km of the site)
https://gis.epa.ie/EPAMaps/

- Waterbodies have been identified where abstraction is a suspected significant pressure – see River Abstraction Pressures: Lake & TRaC Abstractions Pressures: Groundwater Abstractions Pressures

There are 5 abstractions within 2km. One relates to Coole group Water scheme (total abstraction 6.3m3/d) and 4 relate to the Gort Public Supply (total abstraction 260m3/d).

Coole GWS	Groundwater Borehole	Easting: 144596 Northing:204596	6.3m3/day
Gort Public Supply	Surface water abstraction	Easting: 144935 Northing 201306	A portion of 260 m3/day
Gort Public Supply	Groundwater Borehole	Easting: 145469 Northing:201409	A portion of 260 m3/day
Gort Public Supply	Groundwater Borehole	Easting: 145510 Northing:201507	A portion of 260 m3/day
Gort Public Supply	Groundwater Borehole	Easting: 145680 Northing:201596	A portion of 260 m3/day

Consented discharges (within 2km of the site)
You may access EPA consented discharges on the EPA website via the following search engines:

- http://gis.epa.ie/GetData/Download: EPA Licensed facilities https://www.epa.ie/licensing/ - will give you access to licensing/enforcement files.

Reported pollution incidents (within 2km of the site)
You can check if there are any EPA licensed facilities within 2k of the relevant area on the EPA website (My Local Environment) http://gis.epa.ie/myenvironment#/search. You can then access the licensing/enforcement files for the particular EPA licensed site regarding pollution incidents.

Notwithstanding the information above, it may be helpful to you to consult the following website in the first instance https://data.gov.ie where you will also find the datasets available at the "gis" links provided to you above.

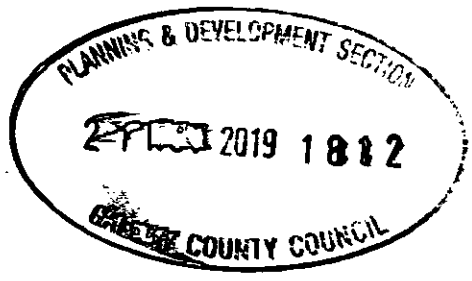
Please see EPA website for information regarding how to access enforcement files on any EPA licensed site https://www.epa.ie/enforcement/how/info/

I am to advise that, for non-EPA permitted sites in the area concerned, you should direct your request to the relevant local authority.

Yours sincerely,

Ana Bolger

Ana Bolger
AIE Officer
Office of Communications & Corporate Services



Áras an Chontae,
Cnoc na Radharc, Gaillimh.
H91 H6KX.

Áras an Chontae,
Prospect Hill, Galway.
H91 H6KX.

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www.galway.ie

@GalwayCoCo
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(091) 509 225
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Clár na dToghthóirí
Register of Electors
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electors@galwaycoco.ie

Seirbhísí Uisce
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Pobal & Fiontar
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Leabharlann
Library
(091) 562 471
info@galwaylibrary.ie

Comhairle Chontae na Gaillimhe
Galway County Council

20th February 2018.

Shona Symon,
Assistant Hydrogeologist,
WYG,
1 Locksley Business Park,
Montgomery Road,
Belfast BT6 9UP.

PLANNING & DEVELOPMENT SECTION
21 NOV 2019 1812
GALWAY COUNTY COUNCIL

ACCESS TO INFORMATION ON THE ENVIRONMENT REQUEST

A Chara,

I refer to your request under European Communities (Access to information on the Environment) Regulations 2007-2011 received on 29th January 2018.

In accordance with Article 7 of the said Regulations I now inform you that I, Enda Moloney, Administrative Officer, Water services section have on this day 20th February 2018 made a decision on your request. My decision is to grant you access to the information held in the Water Services section set out as follow:

Groundwater quality (within 2km of site):
I'm attaching water quality reports for raw water quality for two sampling points – no.s 2 and 4 on the attached map.

Surface Water Quality and monitoring (within 2km of site):
I cannot locate any information within the Water Services Section pertinent to this item.

Contaminated Land (within 2km of site):
I cannot locate any information within the Water Services Section pertinent to this item.

Abstractions (Groundwater and Surface Water within 2km of site):
I'm attaching map showing 3 abstractions known to the Water Services Section as follows :

1. Coole Group Water Scheme Borehole
2. Gort Public Water Supply River Extraction
4. Gort Public Water Supply Borehole

WYG BELFAST
Date 23 FEB 2018
No.
Act

Consented Discharges (within 2km of site):
On the attached map at No. 3 shows the location of the discharge known to the Water Services Section as follows : Gort Wastewater treatment Plant and the plant discharges to the Gort River to the east of the plant.

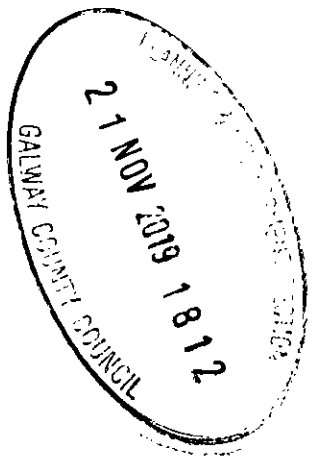
Reported Pollution Incidents :
I cannot locate any information within the Water Services Section pertinent to this item.

I am to advise you that if you wish to appeal this decision, you can do so by writing to the Director of Services, Corporate Services Section, Galway County Council, Áras an Chontae, Prospect Hill, Galway seeking an internal review of the matter. Please refer to this decision in your letter.
You must make your appeal within one month of receiving this letter, but the making of a late appeal may be permitted in appropriate circumstances. The appeal will involve a complete reconsideration of the matter by a member of staff in this Authority who is unconnected with the original decision and whose rank is the same as, or higher than, that of the original decision maker. A decision will be communicated to you within one month from receipt of the request for an internal review.

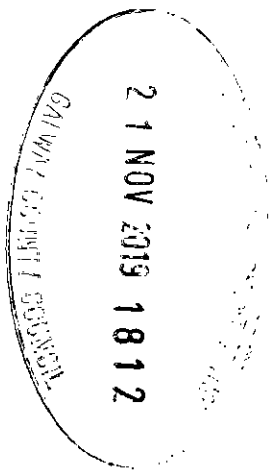
Mise le meas,

E. Moloney,
Water Services Section.

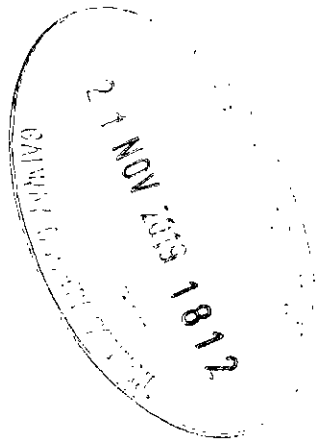
Archived	Category	Entity	Entity Referenc	Station	Station Referen	Station Easting	Station Northin	Laboratory	River Basin Dist	Water Manage	Water Body	Sample Templa	Sample Referer
Yes	Raw Water Mo	Gort		Gort Raw Water				CLS	-	-	-	Operational Mo	693385
Yes	Raw Water Mo	Gort		Gort Raw Water				CLS	-	-	-	Operational Mo	707068
Yes	Raw Water Mo	Gort		Gort Raw Water				CLS	-	-	-	Operational Mo	723413
Yes	Raw Water Mo	Gort		Gort Raw Water				CLS	-	-	-	Operational Mo	768108
Yes	Raw Water Mo	Gort		Gort Raw Water				CLS	-	-	-	Operational Mo	776517
Yes	Raw Water Mo	Gort		Gort Raw Water				CLS	-	-	-	Operational Mo	783274
Yes	Raw Water Mo	Gort		Gort Raw Water				CLS	-	-	-	Operational Mo	795707
Yes	Raw Water Mo	Gort		Gort Raw Water				CLS	-	-	-	Operational Mo	805486
Yes	Raw Water Mo	Gort		Gort Raw Water				CLS	-	-	-	Operational Mo	812230
Yes	Raw Water Mo	Gort		Gort Raw Water				CLS	-	-	-	Operational Mo	820825
Yes	Raw Water Mo	Gort		Gort Raw Water				CLS	-	-	-	Operational Mo	827249



Parameter	Temperature	pH	Alkalinity	Chloride	Hardness CaCO	Iron	Manganese
Max.	--	--	--	--	--	--	--
Min.	--	--	--	--	--	--	--
Test Method	--	--	--	--	--	--	--
Sample Date	Sample Time	Sample Metho	Sampled By	Reason	Comments	Analyst Conclu	Degrees C	pH units	mg/l	mg/l	mg/l	µg/l	µg/l
27-July-2016	10:01	Grab	Sarah Cassidy	Investigative	303310	-	18	7.3	75.8	15.8	77.8	171	27
19-Sep-2016	12:55	Grab	Sarah Cassidy	Investigative	308463	-	15.1	7.2	79.7	14.6	87.4	422	29
17-Nov-2016	12:24	Grab	Sarah Cassidy	Investigative	315357	-	8.9	7.1	83.8	15.6	102	426	37
23-May-2017	08:00	Grab	Sarah Cassidy	Investigative	329898	-		7.4	93.8				
22-June-2017	10:32	Grab	Sarah Cassidy	Investigative	332406	-		7.2	95.4				
17-July-2017	13:00	Grab	Sarah Cassidy	Investigative	334725	-		7.3	87.7				
22-Aug-2017	12:32	Grab	Sarah Cassidy	Investigative	340127	-		7	109				
25-Sep-2017	12:07	Grab	Sarah Cassidy	Investigative	343227	-		7.1					
19-Oct-2017	11:30	Grab	Sarah Cassidy	Investigative	345398	-		7					
16-Nov-2017	12:20	Grab	Sarah Cassidy	Investigative	348202	-		7.2					
11-Dec-2017	09:10	Grab	Sarah Cassidy	Investigative	350497	-		7					



Total Organic C	Turbidity	Conductivity @	Free Chlorine	Ammonium NH	Nitrate NO3	Nitrite NO2	Total Dissolved	UV Transmittan	Pesticides Tota	2,4-D Acid Herb	Calcium	Aluminium	Chlorophyll A
--	--	--	--	--	--	--	--	100	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--	--
mg/l	NTU	µS/cm	mg/l	mg/l	mg/l	mg/l	mg/l	%	µg/l	µg/l	mg/l	µg/l	µg/l
10.5	0.8	210	< 0.05	< 0.01	2.26	< 0.017	106	35.6	< 0.007	< 0.007	71	31	< 1
13.4	1	193	0.09	0.078	0.732	< 0.017	104	18.1	< 0.03	< 0.02	62.9	51	< 1
14.7	2.1	221	0.11	< 0.01	2.26	< 0.017	110	18.5	0.09	< 0.02	62.4	69	1.07
8.22	0.9							37.2					
8.78	0.4							35.1					
8.47	0.8							36.7					
11.7	1.3							27					
13.9	0.7							21.6					
15.63	2							17.5					
15	1.08							16.6					
13.6	2.1							17.7					



Dissolved Organ	UV Absorbance	Metaldehyde	Glyphosate	2,3,6-TBA	Trich	Dichlorprop-p	Bentazone	Bromoxynil	Clopyralid	MCPA	MCPP	Mecoprop	Triclopyr	Cypermethrin	Dichlobenil
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--	--	--	--	--		--	--	--	--	--	--	--	--	--	--
mg/l	Abs./m	µg/l	µg/l	µg/l		µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l
10.2	0.376	< 0.005	< 0.003	< 0.006		< 0.005	< 0.002	< 0.006	< 0.005	< 0.004	< 0.003	< 0.007	< 0.001	< 0.001	
12.6	0.653	< 0.005	< 0.003	< 0.025		< 0.015	< 0.01	< 0.02	< 0.03	< 0.015	< 0.01	< 0.03	< 0.001	< 0.001	
14.4	0.564	< 0.025	< 0.003	< 0.025		< 0.015	< 0.01	< 0.02	< 0.03	0.078	0.012	< 0.03	< 0.001	< 0.001	

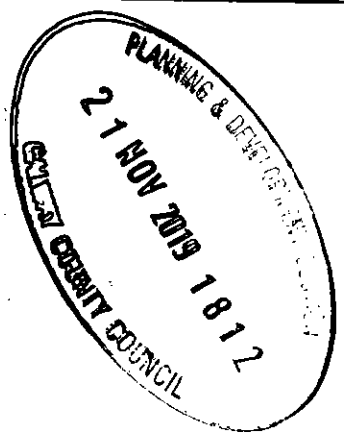
trans-Permeth	Diflufenican	Diuron	Isoproturon	Linuron	Pendimethalin	Propyzamide	Simazine	Magnesium	SUVA Specific U	Chlorfenvinpho	Atrazine	Colour (True)	Colour (Apparc
--	--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--	--
µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	mg/l	L/mg-m	µg/l	µg/l	Pt-Co	Pt-Co
< 0.001	< 0.005	< 0.005	< 0.005	< 0.005	< 0.003	< 0.005	< 0.005	13	3.69	< 0.002	< 0.005		
< 0.002	< 0.002	< 0.003	< 0.002	< 0.003	< 0.002	< 0.002	< 0.003	12.4	5.18	< 0.002	< 0.002		
< 0.002	< 0.002	< 0.003	< 0.002	< 0.007	< 0.003	< 0.005	< 0.001	12.4	3.92	< 0.002	< 0.001		
												83.3	
												83.1	
												68.3	
												120	
													151
													166
													179
													184

Alkalinity CaCO3
--
--
--
mg/l
76.1
103
79
88.5

Archived	Category	Entity	Entity Referenc	Station	Station Referen	Station Easting	Station Northin	Laboratory	River Basin Dist	Water Manage	Water Body	Sample Templa	Sample Referer
Yes	Raw Water Mo	Gort		Cannahowna River				EPA - Castlebar	Eastern RBD	-	-	Routine Monitc	2901225
Yes	Raw Water Mo	Gort		Cannahowna River				EPA - Castlebar	Eastern RBD	-	-	Routine Monitc	2902530
Yes	Raw Water Mo	Gort		Cannahowna River				EPA - Castlebar	Eastern RBD	-	-	Routine Monitc	2903753
Yes	Raw Water Mo	Gort		Cannahowna River				EPA - Castlebar	Eastern RBD	-	-	Routine Monitc	1000072
Yes	Raw Water Mo	Gort		Cannahowna River				EPA - Castlebar	Eastern RBD	-	-	Routine Monitc	1000983
Yes	Raw Water Mo	Gort		Cannahowna River				EPA - Castlebar	Eastern RBD	-	-	Investigative M	1003356
Yes	Raw Water Mo	Gort		Cannahowna River				EPA - Castlebar	Eastern RBD	-	-	Routine Monitc	1004224
Yes	Raw Water Mo	Gort		Cannahowna River				EPA - Castlebar	Eastern RBD	-	-	Routine Monitc	1100281
Yes	Raw Water Mo	Gort		Cannahowna River				EPA - Castlebar	Eastern RBD	-	-	Routine Monitc	1101190
Yes	Raw Water Mo	Gort		Cannahowna River				EPA - Castlebar	Eastern RBD	-	-	Routine Monitc	1103265
Yes	Raw Water Mo	Gort		Cannahowna River				EPA - Castlebar	Eastern RBD	-	-	Investigative M	1104975
Yes	Raw Water Mo	Gort		Cannahowna River				EPA - Castlebar	Eastern RBD	-	-	Routine Monitc	1200332
Yes	Raw Water Mo	Gort		Cannahowna River				EPA - Castlebar	Eastern RBD	-	-	Routine Monitc	1201251
Yes	Raw Water Mo	Gort		Cannahowna River				EPA - Castlebar	Eastern RBD	-	-	Investigative M	1203568
Yes	Raw Water Mo	Gort		Cannahowna River				EPA - Castlebar	Eastern RBD	-	-	Routine Monitc	1204494
Yes	Raw Water Mo	Gort		Cannahowna River				EPA - Castlebar	Eastern RBD	-	-	Routine Monitc	1205281
Yes	Raw Water Mo	Gort		Cannahowna River				EPA - Castlebar	Eastern RBD	-	-	Investigative M	1300342
Yes	Raw Water Mo	Gort		Cannahowna River				EPA - Castlebar	Eastern RBD	-	-	Investigative M	1301572
Yes	Raw Water Mo	Gort		Cannahowna River				EPA - Castlebar	Eastern RBD	-	-	Investigative M	1304014
Yes	Raw Water Mo	Gort		Cannahowna River				EPA - Castlebar	Eastern RBD	-	-	Investigative M	1305285
Yes	Raw Water Mo	Gort		Cannahowna River				EPA	Eastern RBD	-	-	Investigative M	1433071
Yes	Raw Water Mo	Gort		Cannahowna River				EPA	Eastern RBD	-	-	Investigative M	1433236
Yes	Raw Water Mo	Gort		Cannahowna River				EPA	Eastern RBD	-	-	Investigative M	1434438
Yes	Raw Water Mo	Gort		Cannahowna River				EPA - Castlebar	Eastern RBD	-	-	Investigative M	1435533
Yes	Raw Water Mo	Gort		Cannahowna River				EPA - Castlebar	Eastern RBD	-	-	Investigative M	1530396
Yes	Raw Water Mo	Gort		Cannahowna River				EPA - Castlebar	Eastern RBD	-	-		1531878
Yes	Raw Water Mo	Gort		Cannahowna River				EPA - Castlebar	Eastern RBD	-	-		1535418

Parameter	Temperature	pH	Alkalinity	Ammonia N	Arsenic	Barium	Biological Oxyg
Max.	Varies	Varies	--	Varies	Varies	Varies	Varies
Min.	--	Varies	--	--	--	--	--
Test Method	--	--	--	--	--	--	--
Sample Date	Sample Time	Sample Method	Sampled By	Reason	Comments	Analyst Conclus	Degrees C	pH units	mg/l	mg/l	µg/l	µg/l	mg/l
29-Apr-2009	12:20	Grab	EPA Lab Castlet	Operational		-	11.3	7.4	46	< 0.03	< 1	< 50	< 1
28-July-2009	12:20	Grab	EPA Lab Castlet	Operational		-	17.3	7.5	57	< 0.03	< 1	< 50	< 1
20-Oct-2009	12:20	Grab	EPA Lab Castlet	Operational		-	13.5	7.6	60	< 0.03	< 1	< 50	1.3
20-Jan-2010	13:20	Grab	EPA Lab Castlet	Investigative		-	4.4	7.8	51	0.04	< 1	< 50	1
30-Mar-2010	14:10	Grab	EPA Lab Castlet	Investigative		-	7.1	7.5	69	< 0.03	< 1	< 50	1.7
9-Sep-2010	11:35	Grab	EPA Lab Castlet	Investigative		-	16.9	7.8	58	< 0.03	< 0.5	< 50	< 1
23-Nov-2010	11:50	Grab	EPA Lab Castlet	Investigative		-	6.5	7.8	46	0.04	< 0.5	< 50	< 1
19-Jan-2011	12:45	Grab	EPA Lab Castlet	Investigative		-	4.6	7.9	49	0.05	< 0.5	< 50	1
28-Mar-2011	12:20	Grab	EPA Lab Castlet	Investigative		-	9.6	7.6	56	< 0.03	< 0.5	< 50	< 1
18-Aug-2011	13:05	Grab	EPA Lab Castlet	Investigative		-	17.2	7.8	48	< 0.03	< 0.5	37	< 1
30-Nov-2011	14:30	Grab	EPA Lab Castlet	Investigative		-	8.5	7.4	51	< 0.03	< 0.5	39	
18-Jan-2012	12:05	Grab	Cathal Ruane	Investigative		-	8.4	7.5	46	< 0.03	< 0.5	39	< 1
26-Mar-2012	13:20	Grab	Wayne Egan	Investigative		-	12.2	7.7	38	< 0.03	< 0.5	38	< 1
16-Aug-2012	11:25	Grab	Cathal Ruane	Investigative		-	18.6	7.4	58	< 0.03	< 0.5	41	1
2-Oct-2012	13:35	Grab	Cathal Ruane	Investigative		-	12.9	7.4	68	< 0.03	< 0.5	38	< 1
14-Nov-2012	12:45	Grab	Wayne Egan	Investigative		-	9.8	7.4	49	< 0.03	< 0.5	32	< 1
17-Jan-2013	12:10	Grab	Wayne Egan	Investigative		-	7.2	7.5	60	< 0.03	< 0.5	34	< 1
25-Mar-2013	11:25	Grab	Cathal Ruane	Investigative		-	5.9	7.7	56	< 0.03	< 0.5	35	< 1
25-July-2013	12:30	Grab	Wayne Egan	Investigative		-	20.3	7.6	82	< 0.03	< 0.5	41	< 1
1-Oct-2013	10:55	Grab	Cathal Ruane	Investigative		-	16.2	7.7	60	0.09	< 0.5	37	< 1
7-July-2014	14:00	Grab	Wayne Egan	Investigative		-	18.5	7.8	70	< 0.02	0.3	40.79	1.2
15-July-2014	14:10	Grab	Cathal Ruane	Investigative		-	17.6	7.6	76	< 0.02	< 1	41	< 1
11-Sep-2014	12:40	Grab	Wayne Egan	Investigative		-	17.7	7.4	54	< 0.02			< 1
11-Nov-2014	12:50	Grab	Cathal Ruane	Investigative		-	9.4	7.4	45	0.022	< 1	46	< 1
22-Jan-2015	12:50	Grab	Wayne Egan	Investigative		-	5	7.3	69	< 0.02	< 1	39	< 1
5-May-2015	12:10	Grab	Cathal Ruane	Investigative		-	12.6	7.7	51	< 0.02	< 1	42	< 1
19-Nov-2015	13:35	Grab	Wayne Egan	Investigative		-	9.8	7.2	45	0.032	< 1	43	< 1

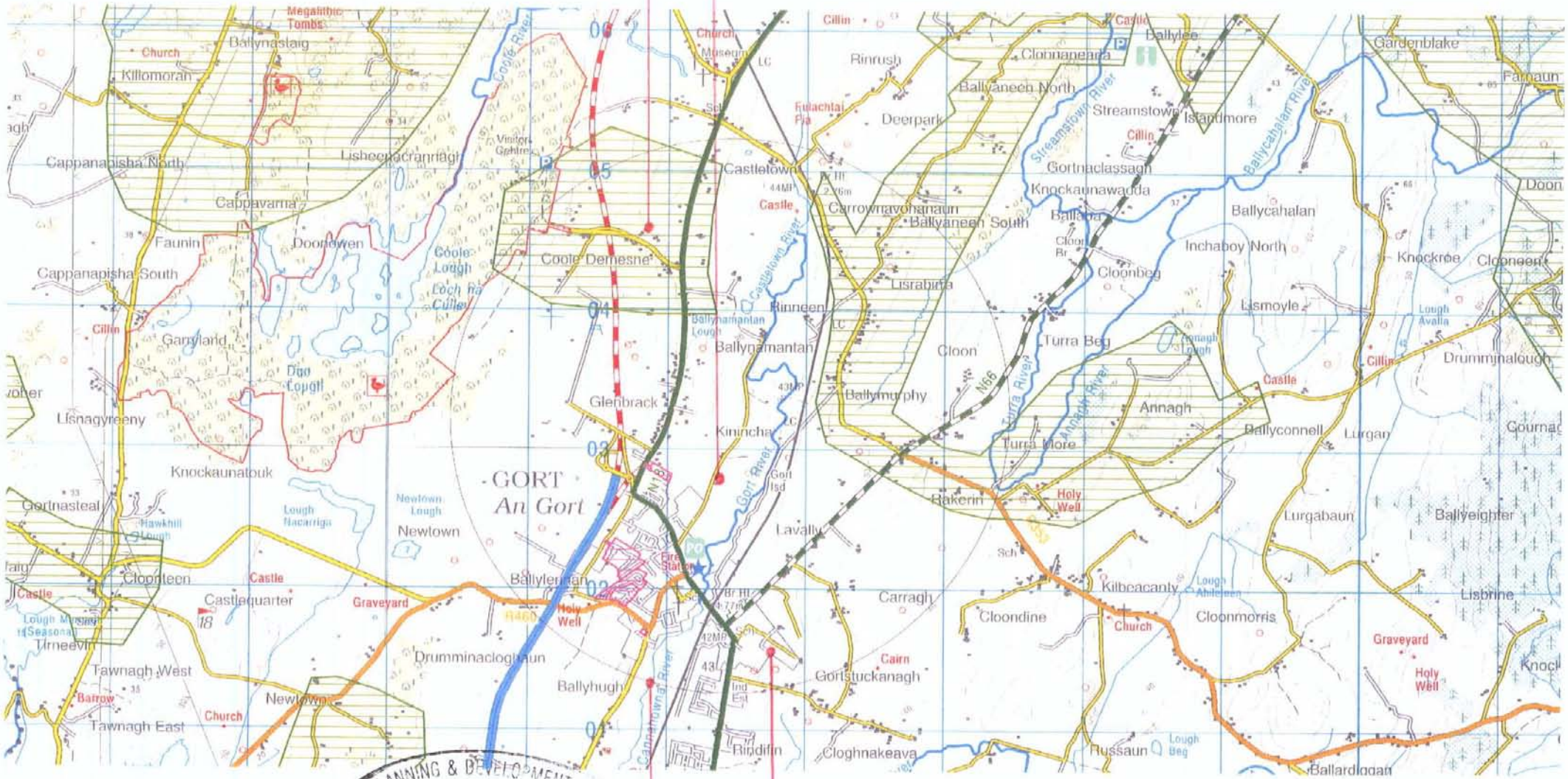
Boron	Cadmium	Chloride	Chromium	COD Chemical	Coliform Bacter	Colour (True)	Conductivity @	Copper	Dissolved Oxyg	E.Coli	Fluoride	Hardness CaCO	Iron
1000	Varies	Varies	Varies	Varies	Varies	Varies	Varies	Varies	--	Varies	Varies	--	Varies
--	--	--	--	--	--	--	--	--	Varies	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--	--
µg/l	µg/l	mg/l	µg/l	mg/l	MPN/100mls	Hazen	µS/cm	µg/l	% Sat.	MPN/100mls	mg/l	mg/l	µg/l
< 50	< 0.1	16	< 1	30	387	*110*	161	2	91	*150*	0.04	63	*384*
< 50	< 0.1	14	2	*43*	*575*	*92*	159	< 1	91	57	0.03	72	*308*
< 50	< 0.1	13	< 1	*50*	*1553*	*149*	171	< 1	93	49	0.03	74	*510*
< 50	0.12	13	< 1	< 25	*649*	*113*	146	6	98	*387*	0.04	62	*523*
< 10	< 0.1	13	< 1	27	225	*102*	187	1	91	98	0.03	82	*399*
< 10	< 0.1	11	< 0.5	38	980	*66*	153	1	91	326	0.04	60	166
< 10	< 0.1	15	< 0.5	*43*	130	*140*	151	1	89	13	0.04	57	*400*
< 10	< 0.1	15	< 0.5	*57*	365	*120*	154	1	86	31	0.04	62	*463*
< 10	< 0.1	15	< 0.5	36	*687*	*113*	179	< 1	96	24	0.04	72	*258*
< 10	< 0.1	13	< 0.5	*42*	411	*79*	152	0.9	93	61	< 0.03	60	*246*
13	< 0.1	15	0.6	*154*	613	*179*	159	0.8	92	62	< 0.03	61	*592*
< 10	< 0.1	20	0.9	36	141	*48*	178	0.6	93	28	< 0.03	64	*467*
< 10	< 0.1	17	< 0.5	40	50	*135*	140	0.9	104	4	0.04	46	*453*
12	< 0.1	11	< 0.5	*55*	860	*188*	156	1	85	156	< 0.03	69	*523*
< 10	< 0.1	12	< 0.5	*47*	*2723*	*170*	174	0.9	87	*336*	0.04	81	*595*
< 10	< 0.1	12	0.8	*48*	*770*	*141*	159	0.6	94	64	0.04	72	*254*
< 10	< 0.1	14	< 0.5	*45*	548	*145*	182	0.9	96	35	0.04	72	*447*
< 10	< 0.1	20	< 0.5	32	411	*86*	191	0.9	100	40	< 0.03	71	*369*
< 10	< 0.1	19	< 0.5	< 25	361	*37*	228	< 0.5	85	2613	0.05	87	102
< 10	< 0.1	17	< 0.5	24	6489	*52*	187	1.2	91		< 0.03	70	103
12.04	0.01	38	0.25	32	3130	*57*	285	0.97	98		0.06	95	102.3
< 10	< 0.02	23	< 1	23	1483	*56*	235	< 1	104		0.06	87	97
		19		29	613	*73*	193		98		< 0.2	69	
	0.02	18	< 1	*45*	328	*133*	191	< 1	*54*		< 0.2	63	*340*
	0.03	20	< 1	40	194	*142*	220	1.2	95		< 0.2	78	*370*
	< 0.02	24	< 1	23	1046	63	190	< 1	97		< 0.2	64	210
	0.02	18	< 1	70	2753	165	164	1	85		< 0.2	59	490



Lead	Manganese	Nitrite N	Odour (D)	Ortho-Phospha	Selenium	Sulphate	Suspended Soli	Total Organic C	Total Oxidised I	Turbidity	Zinc	Aluminium	Boron
Varies	Varies	--	--	Varies	Varies	Varies	Varies	--	Varies	Varies	Varies	200	--
--	--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--	--
µg/l	µg/l	mg/l	Descriptive	mg/l	µg/l	mg/l	mg/l	mg/l	mg/l	NTU	µg/l	µg/l	mg/l
1	*83*	< 0.005		0.014	< 1	3.5	< 8	13	< 0.4	*1.8*	4		
< 1	*60*	< 0.005		0.013	< 1	3.2	< 8		< 0.4	*1.6*	2		
< 1	*200*	< 0.005		0.013	< 1	5.5	26	19	< 0.4	*2.6*	2		
1	*64*	< 0.005	nd	0.019	< 1	3.3	< 8	13	< 0.4	*4.2*	6		
< 1	*110*	< 0.005	nd	0.022	< 1	4	< 8	11	< 0.4	*5.3*	4		
< 0.5	*56*	< 0.005	nd	0.015	< 0.5	5.2	< 8	13	< 0.4	*1.1*	2		
< 1	*54*	< 0.005	nd	0.017	< 0.5	5.1	< 8	16	< 0.4	*2.3*	5		
1	41	< 0.005	nd	0.021	< 0.5	5.1	< 8	15	< 0.4	*5.4*	3		
< 1	29	< 0.005	nd	0.018	< 0.5	4.8	< 8	12	< 0.4	0.9	43		
< 0.5	*63*	< 0.005	nd	0.012	< 0.5	3	< 8	15	< 0.4	*1.5*	2.3	49	
1.1	*130*	< 0.005	nd	0.023	< 0.5	2.9	< 8	19	< 0.4	*2.8*	3.4		
0.9	*56*	< 0.005	nd	0.019	< 0.5	3.6	< 8	14	< 0.4	*2*	2.6		
0.6	49	< 0.005	nd	< 0.012	< 0.5	2.9	< 8	15	< 0.4	*1.5*	2.1		
0.5	*74*	< 0.005	nd	< 0.012	< 0.5	2.3	< 8	19	< 0.4	*2.4*	1.9		
0.5	*52*	< 0.005	nd	< 0.012	< 0.5	2.3	< 8	19	< 0.4	*2*	1.7		
< 0.5	4	< 0.005	nd	< 0.012	< 0.5	2.6	< 8	16	< 0.4	*1.9*	< 0.5		
0.8	46	< 0.005	nd	< 0.012	< 0.5	5.3	< 8	< 2	< 0.4	*1.6*	4.7		
0.7	*56*	< 0.005	nd	< 0.012	< 0.5	3.6	< 8	13	0.5	*1.6*	2.5		
< 0.5	43	< 0.005	nd	< 0.012	< 0.5	4.2	< 8	9	< 0.4	1	0.9		
< 0.5	16	< 0.005	nd	0.013	< 0.5	4.1	< 4	11	0.4	*1.4*	4.2		
0.19	35.61	< 0.004	nd	< 0.01	0.06	7.3	< 4	13	< 0.2	0.7	12.08		
< 1	31	< 0.004	nd	< 0.01	< 1	3.8	< 4	9	< 0.2	< 0.5	1.7		
		< 0.004	nd	< 0.01		4	< 4	12	< 0.2	0.7			
< 1	50	< 0.004	nd	< 0.01	< 1	7	< 4	16	< 0.2	*1.4*	3		12
1.2	41	< 0.004	nd	< 0.01	< 1	6	< 4	15	0.66	*2.7*	15		< 10
< 1	49	< 0.004	nd	< 0.01	< 1	3	< 4	11	< 0.2	0.9	5.9		< 10
< 1	41	< 0.004	nd	< 0.01	< 1	4	< 4	21	< 0.2	1.6	3.7		10

Sodium	Faecal Coliform	Calcium	Dissolved Organ	Magnesium	Nickel	Potassium	Antimony	Tin	Vanadium	Beryllium	Cobalt	Molybdenum	Thorium
200	--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--	--	--	--	--
mg/l	MPN/100mls	mg/l	mg/l	mg/l	µg/l	mg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l
			12										
			18										
			13										
8.1		20		2.4	0.6	1.1	< 0.5	< 1	< 0.5	< 0.5	< 0.5	< 0.5	< 0.1
	2613												
	726												
	308												
	111												
	31												
	59												
	168												
	15												

Uranium	Strontium
µg/l	µg/l
0.2	36.5



APPENDIX 6.2

Consultations

1 Trial Pit Log

1.1 Location 1 - Proposed soakaway location

Date: 06/02/2018

Carried out by: Leanne Leonard

Rock encountered (Y/N): N

Water table encountered (Y/N): N

Depth (m bgl)	Description of strata	Photograph(s)
0.00 - 0.75	Topsoil - Dry, dark brown	
0.75 - 2.50	Loose brown/grey sandy soil - Large boulders present	 
2.50 - 3.00	Loose, moist grey sand - Large boulders present	 

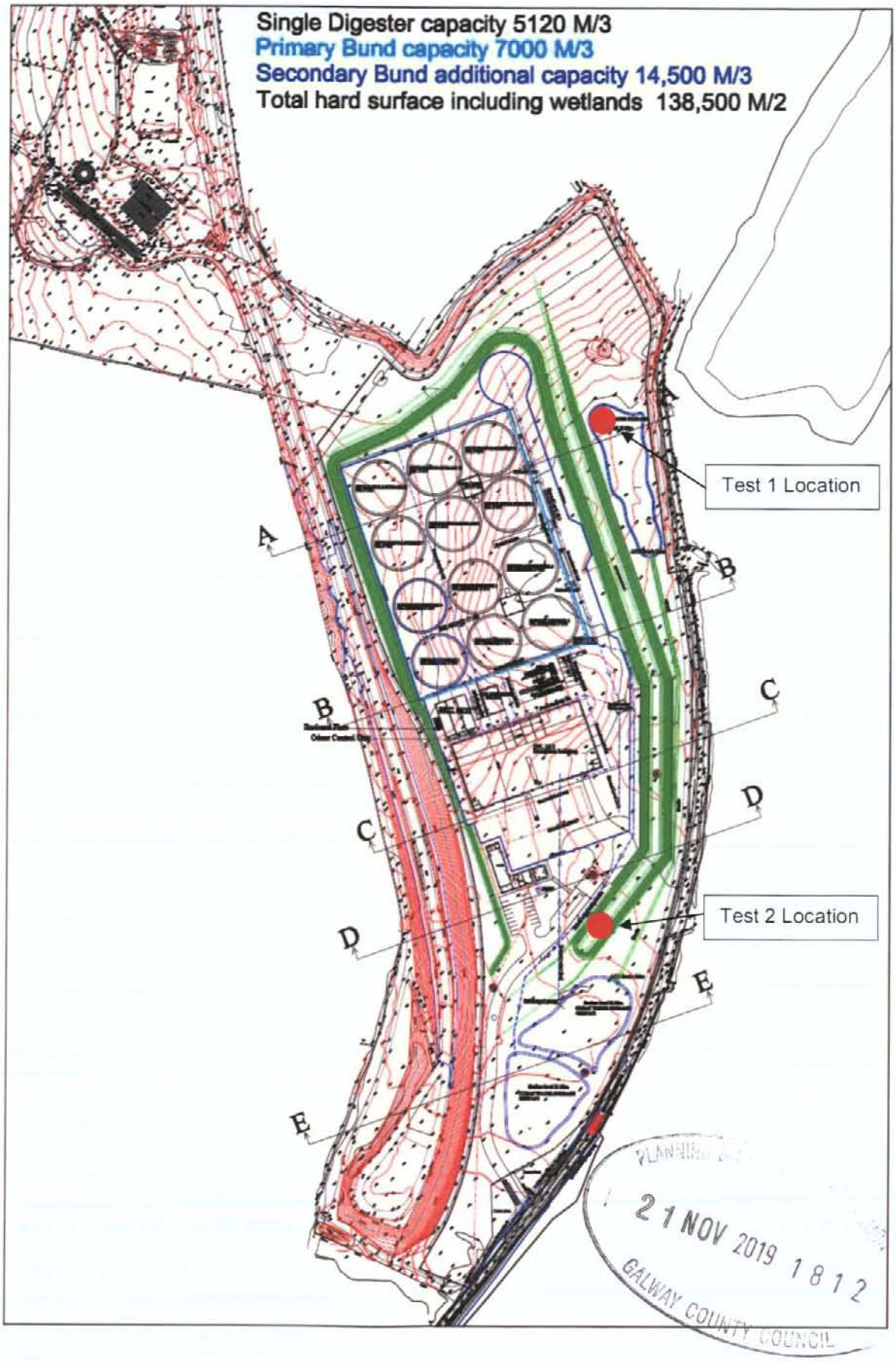
1.2 Location 2 - Between proposed southern attenuation ponds and bend in swale

Date: 06/02/2018 Rock encountered (Y/N): Y

Carried out by: Leanne Leonard Water table encountered (Y/N): N

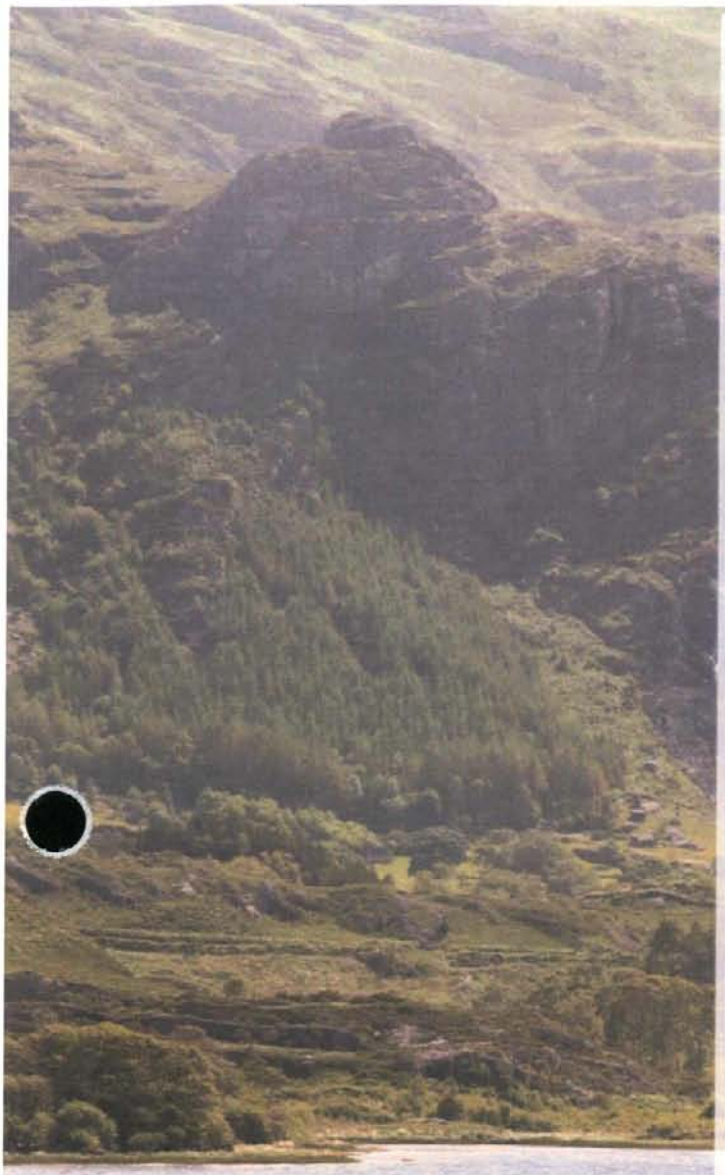
Depth (m bgl)	Description of strata	Photograph(s)
0.00 - 0.30	Topsoil - Dry, dark brown	
0.30 - 1.20	Sandy clay - Dry, grey/brown,	
1.20	Rock (refusal)	

A Appendix - Percolation test locations



APPENDIX 7.1

Flood Risk Assessment



JBA consulting

Biogas Plant, Gort, Galway Flood Risk Assessment

Technical Report

November 2019

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Revision History

Revision Ref / Date Issued	Amendments	Issued to
V1.0 / February 2018	Initial Issue	Halston Environmental & Planning Ltd.
V2.0 / April 2018	Minor text	Halston Environmental & Planning Ltd
V3.0 / April 2018	Minor text/figure	Halston Environmental & Planning Ltd
V4.0 / November 2019	Layout change	Halston Environmental & Planning Ltd

Contract

This report describes work commissioned by Halston Environmental & Planning Ltd., by an email dated 28/11/2017. Halston Environmental' s representative for the contract was Colm Staunton, Director. Ross Bryant and Leanne Leonard of JBA Consulting carried out this work.

Prepared by ..... Leanne Leonard BEng
Engineer

Reviewed by ..... Ross Bryant BSc MSc CEnv MCIWEM C.WEM
Principal Analyst

Purpose

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JBA Consulting has no liability regarding the use of this report except to Halston Environmental & Planning Ltd.

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JBA is aiming to reduce its per capita carbon emissions.

Contents

List of Figures

Abbreviations

AEP	Annual Exceedance Probability
CFRAM	Catchment Flood Risk Assessment and Management
DoEHLG	Department of the Environment, Heritage and Local Government
EPA	Environmental Protection Agency
FRA	Flood Risk Assessment
GSI	Geological Survey of Ireland
ICPSS	Irish Coastal Protection Strategy Study
mbgl	Metres below ground level
mOD	Meters above Ordnance Datum
OPW	Office of Public Works
PFRA	Preliminary Flood Risk Assessment
SFRA	Strategic Flood Risk Assessment
SI	Site Investigation

1 Introduction

1.1 Terms of Reference

JBA Consulting was appointed by Halston Environmental & Planning to prepare a Flood Risk Assessment (FRA) for the development of a site located in Gort, Co. Galway. The report was prepared in response to a request for a Flood Risk Assessment.

1.2 Flood Risk Assessment Aims and Objections

This study is being completed to inform the future development of the site as it relates to flood risk. It aims to identify, quantify and communicate to Planning Authority officials and other stakeholders the risk of flooding to land, property and people and the measures that would be recommended to manage the risk.

The objectives of this FRA are to:

- Identify potential sources of flood risk;
- Confirm the level of flood risk and identify key hydraulic features;
- Assess the impact that the proposed development has on flood risk;
- Develop appropriate flood risk mitigation and management measures which will allow for the long-term development of the site.

Recommendations for development have been provided in the context of the OPW / DECLG planning guidance, "The Planning System and Flood Risk Management". A review of the likely effects of climate change, and the long term impacts this may have on any development has also been undertaken.

For general information on flooding, the definition of flood risk, flood zones and other terms see 'Understanding Flood Risk' in Appendix A.

1.3 Development Proposal

The client is applying for planning permission for the development of a biogas plant. The development will include construction of twelve no. digester tanks, a feedstock reception building, an office and control room building, process drainage and effluent storage tank, a pump house, a gas purification bottling plant, a CO2 compression building, a gas flare and gas booster station, a control building, a combined heat and power building, a boiler house, a 6m high embankment, an access road, parking facilities, storm water attenuation basins and connection to existing foul water drainage system. The main elements of the biogas plant will be constructed within a fully contained bunded structure. The digesters and digestate storage tanks will also be located within a purpose built concrete bund. Existing site levels in certain areas of the site will be lowered to suitable position some components of the development. The proposed site layout is shown in B.

It is proposed that all process wastewater will be recycled to the process, and foul water from canteens will be discharged to the existing foul sewer. Storm water from clean areas and dirty areas will be separated on site. The clean stormwater will be collected and retained on site in two lagoons. An overflow will travel via a swale to an infiltration basin to the north-east of the site. The water in the lagoons will be re-used in the process. It is proposed that the storm water in this structure may also be used for fire fighting requirements. A petrol interceptor will be installed in the drainage network.

1.4 Report Structure

Section 2 of this report gives an overview of the study location and associated watercourses. Section 3 contains background information and initial assessment of flood risk. Site-specific mitigation measures are outlined in Section 4, while the Justification Test is provided in Section 5. Conclusions are outlined in Section 6.

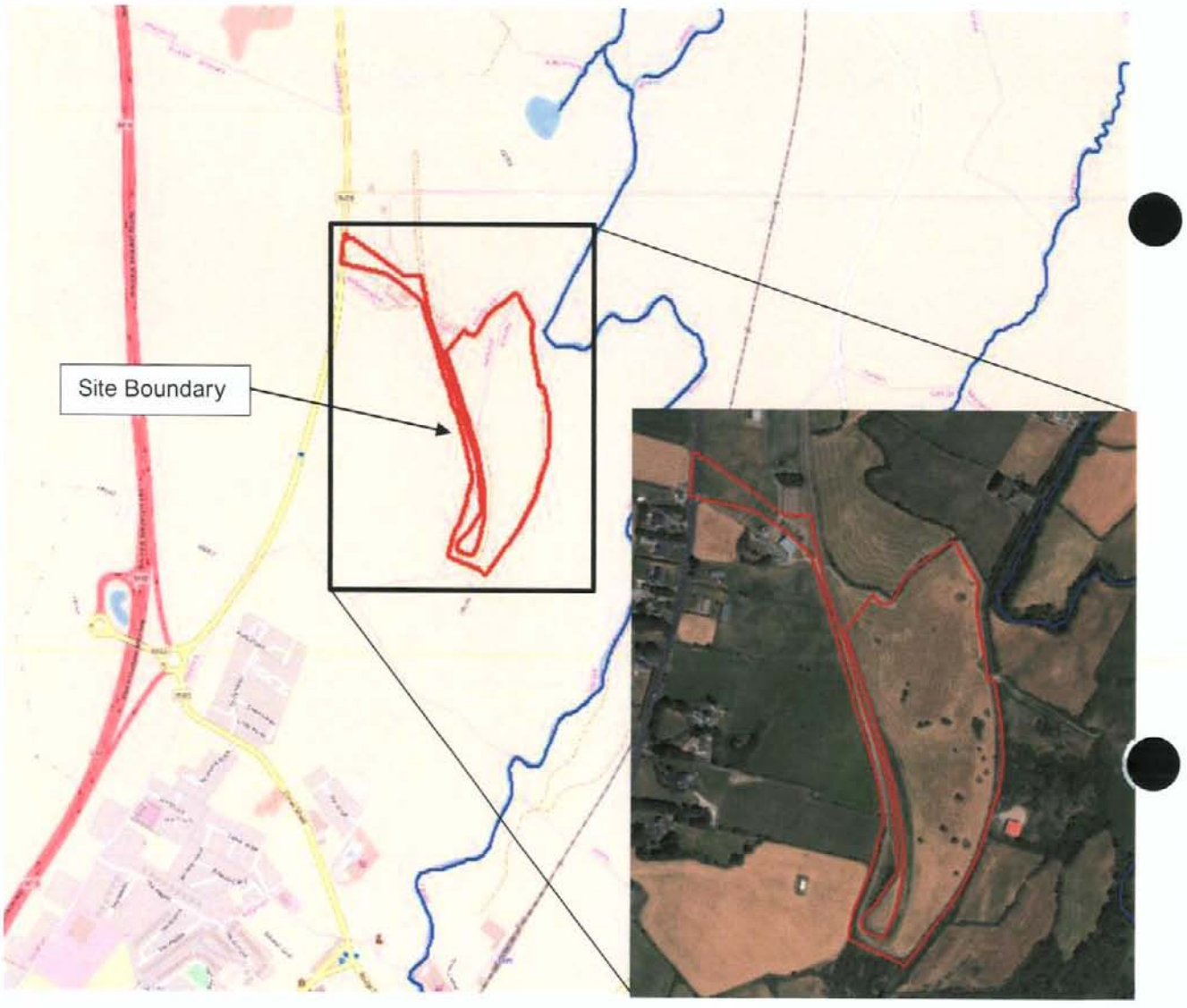
2 Site Background

This section describes the proposed biogas plant site in Gort, Co. Galway, including watercourses, geology and wider geographical area.

2.1 Location

The proposed development site is located to the north of Gort on the Kinincha Road, refer to Figure 2-1. The site is undeveloped and surrounded by green fields. The Gort River is located to the east of the site. Access will be provided via the Kinincha Road.

Figure 2-1: Site Location (Source: openstreetmap and Esri DigitalGlobe)

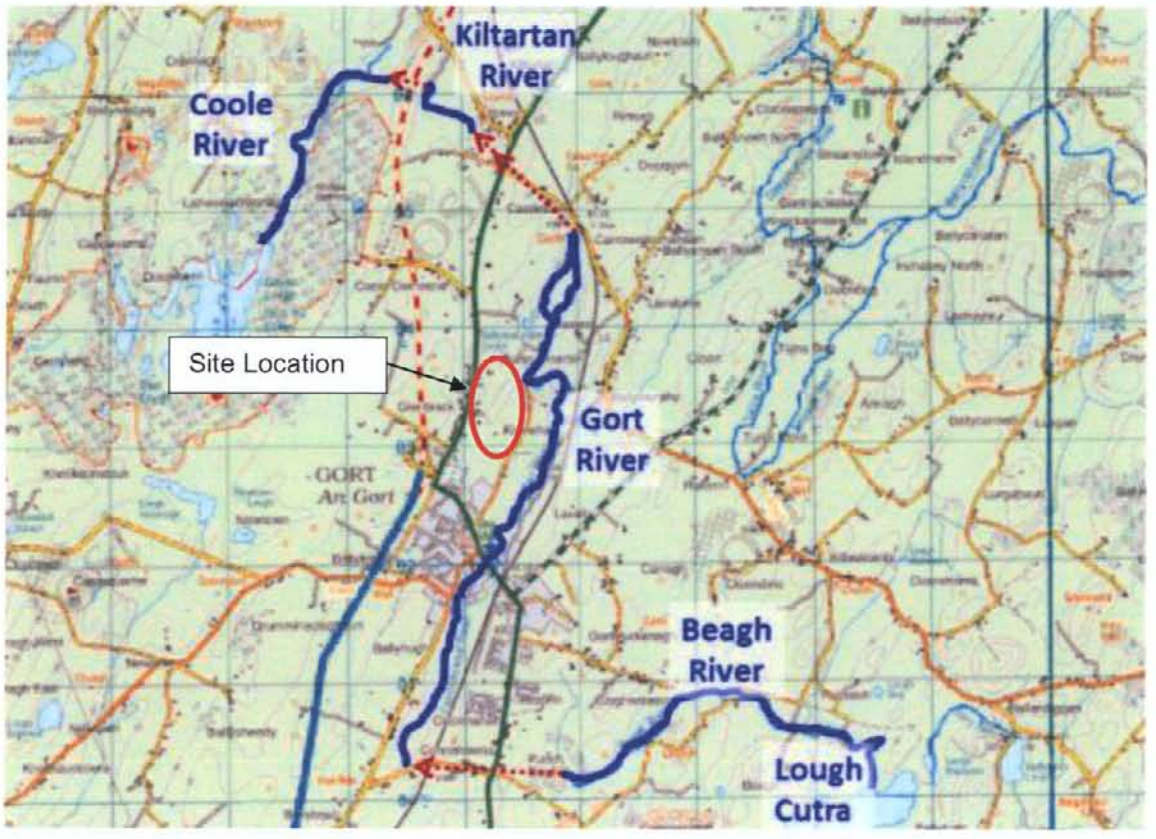


2.2 Watercourses

The Gort River is the main hydrological feature in the area which is located directly to the east of the site. The river rises in the Slieve Aughty mountains as the Owendalulleegh river. This river enters Lough Cutra and then leaves it as the Beagh river, which disappears underground in an area known as the Punchbowl. Once it rises it is called the Cannahowna river, which flows through Gort and Kinincha into Castletown, where it once again disappears underground. It returns to the surface in Kiltartan and flows for 600m before returning underground for a third time at Coole Ridge. It rises in Coole and flows as the Coole River into Coole Lake and makes its way to sea underground for a length of c. 8-11km. This flow path is illustrated in Figure 2-2 below [1].

1 https://southgalwayfloods.wordpress.com/2016/01/12/why-hasnt-gort-town-flooded-this-year/

Figure 2-2: Gort River flow path (Source: South Galway Floods - Wordpress.com[1])



2.3 Local Site and Topography

Figure 2-4 below shows the topography of the area. From this it can be seen that there is a high point at the north-west of the site and a gradual slope to the south-east.

There is a walkway along the eastern border of the site, at roughly the same ground levels as the Kinincha Road. There is a slight embankment, c. 1 - 2m high, up to the site from this walkway for a length of approximately 150m at the north-east of the site.

The survey confirms that site levels are at a maximum at the north-west of the site at c. 27.5m. The lowest site levels are shown to be at centre of the eastern border of the site at c. 18.30m. There is a steep bank adjacent to majority of the length of the western border of the site.

Figure 2-3 Embankment from walkway (Source Google street view)

Figure 2-4 Site Topography

2.4 Site Geology & Hydrogeology

Further detail on the soils/geology/hydrogeology can be found in the Gavin & Doherty Geosolutions (GDG) Hydrogeological Risk Assessment Report and the EIAR Soil & Geology Chapter. The report presents a detailed understanding of the site and wider area they confirm that the site has karstified bedrock across the southern and central sections of the site.

3 Flood Risk Identification

An assessment of the potential for and scale of flood risk at the site is conducted using historical and predictive information. This identifies any sources of potential flood risk to the site and reviews historic flood information. The findings from the flood risk identification stage of the assessment are provided in the following sections.

3.1 Flood History

A number of sources of flood information were reviewed to establish any recorded flood history at, or near the site. This includes the OPW's website, www.floodmaps.ie and general internet searches.

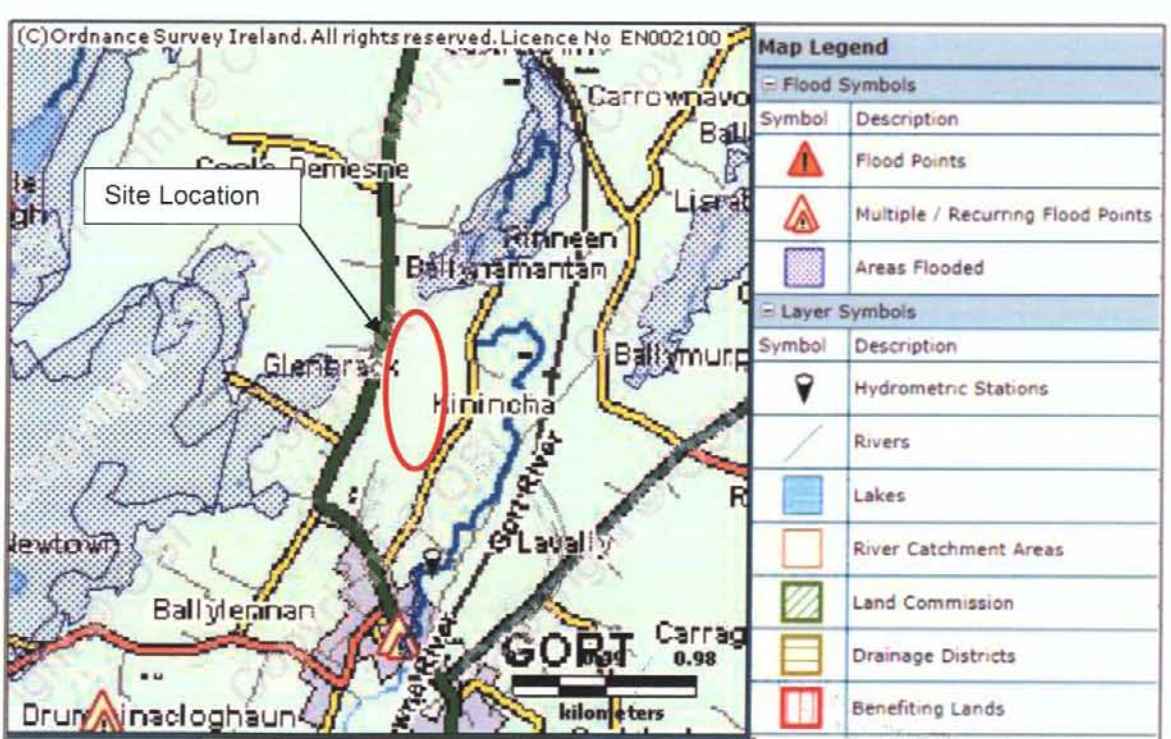
3.1.1 Floodmaps.ie

The OPW host a National Flood hazard mapping website, www.floodmaps.ie, which highlights areas at risk of flooding through the collection of recorded data and observed flood events. See Figure 3-1 for historic flood events in the area.

The floodmaps.ie website contains no information about historic flooding within the site or surrounding area. However, the following flooding events have been identified within the wider area of the site, which are as follows;

- January 1924 - Cannahowna, Gort village
- 1959 - Flooding in Gort
- February 1990 - Flooding in Gort town centre
- December 1994 - Gort town centre - Flood event that lasted five days
- January 1995 - Gort town centre - Flood event that lasted five days
- February 1996 - Cannahowna, Gort village

Figure 3-1: Floodmaps.ie

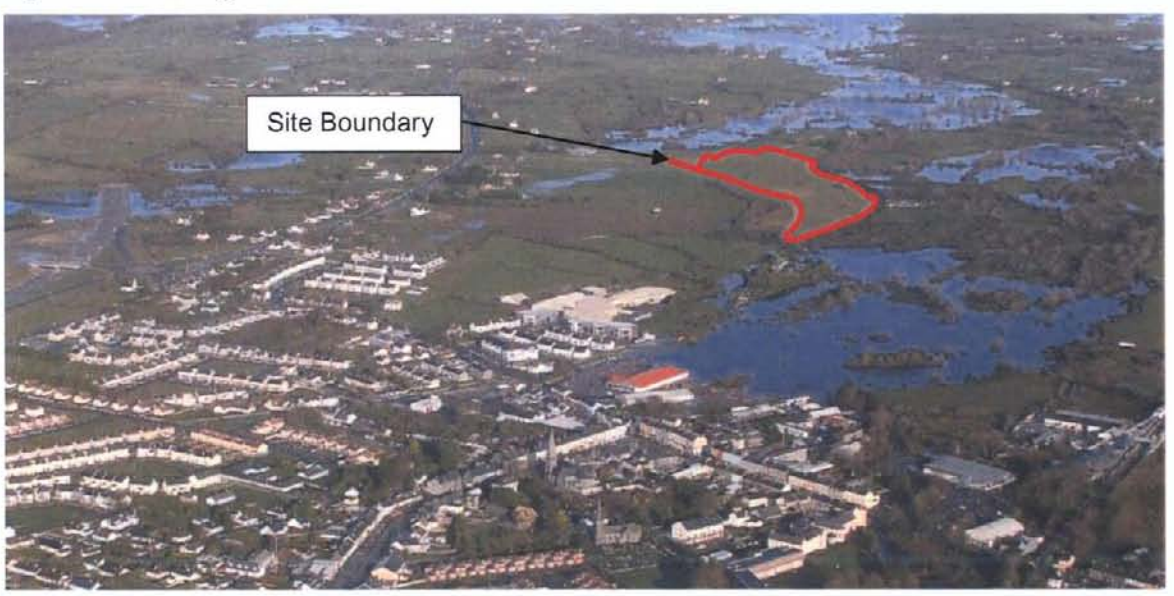


3.1.2 Internet Search

An internet search was conducted to gather information about whether the site was affected by flooding previously. No flooding incidents were recorded at the site. However, there were numerous reports of flooding in the Gort area. These include:

- 29 December 2015 - Flooding due to Storm Frank [2].
- 2 January 2016 - Up to twelve homes in the Gort area were flooded and many side roads were impassable [3].
- November 2009 - Flooding on Crowe Street, Gort [4]. This flooding is shown in Figure 3-2 below.
- Approximately 2.6km downstream, historic flooding is noted at the N18 in Kiltartan where flows have been noted as overtopping the road. This occurred in November 2009. Remedial works have now been undertaken to increase the capacity of flow that can pass under the N18 in Kiltartan.

Figure 3-2 Flooding in Gort - November 2009 [5]



3.2 Predictive Flood Mapping

The subject area has been a subject of three predicative flood mapping or modelling studies and other related studies and plans:

- OPW Preliminary Flood Risk Analysis (PFRA);
- Western Catchment Flood Risk Assessment and Management Study;
- Gort Strategic Flood Risk Assessment.

The level of detail presented by each method varies according to the quality of the information used and the approaches involved. The CFRAM is the most detailed assessment of flood extent and supersedes the fluvial flood outlines presented by the OPW PFRA and Gort SFRA studies.

3.2.1 OPW Preliminary Flood Risk Analysis

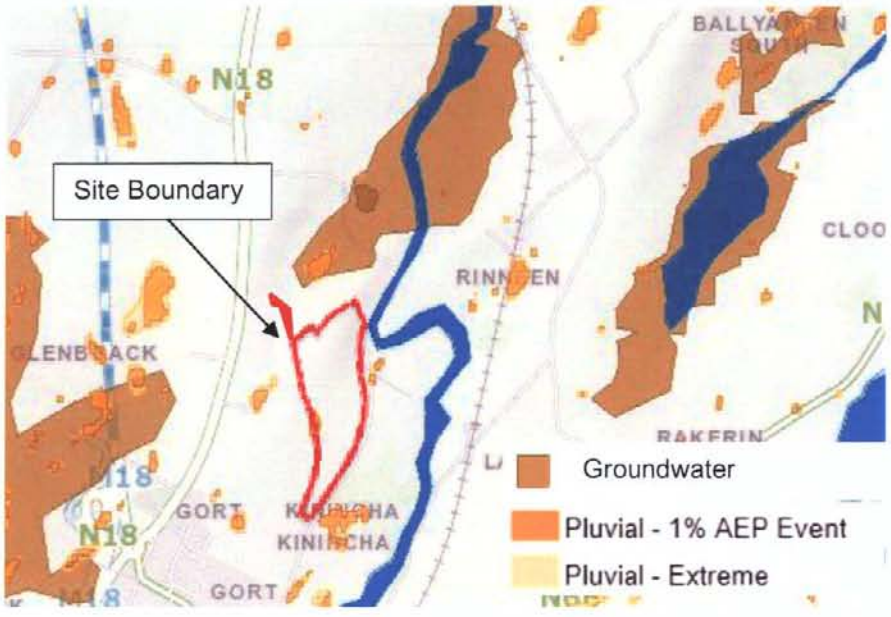
The preliminary Flood Risk Assessment (PFRA) is a requirement of the EU Flood Directive (2007/60/EC). One of the PFRA deliverables is flood probability mapping for various sources: pluvial (surface water), groundwater, fluvial and tidal. The PFRA is a preliminary or 'indicative' assessment and analysis has been undertaken to identify areas potentially prone to flooding. The OPW PFRA study has largely been superseded by the CFRAM programme however, it does

2 http://www.breakingnews.ie/ireland/south-galway-flood-areas-described-as-disaster-zone-713424.html
3 http://galwaybayfm.ie/more-homes-flooded-in-gort/
4 https://www.irishtimes.com/news/flooding-worst-affected-areas-1.849461
5 https://southgalwayfloods.wordpress.com/2016/01/12/why-hasnt-gort-town-flooded-this-year/

provide valuable information regarding pluvial and groundwater flooding. See Figure 3-3 for OPW PFRA flood extents at the site and surrounding area.

Review of the OPW PFRA study highlights no groundwater or fluvial flooding at the proposed site. However, the OPW PFRA study does indicate possible 1% AEP event pluvial flooding at one point of the western boundary of the site.

Figure 3-3: OPW PFRA Pluvial and Groundwater Flood Map (Source: myplan.ie)



3.2.2 Western CFRAM

The primary source of data with which to identify flood risk is the Western Catchment Flood Risk Assessment and Management Study (Western CFRAM Study). This study involved detailed hydraulic modelling of rivers in most of County Galway, County Mayo, County Sligo and some of County Leitrim.

3.2.3 Fluvial Flooding

Figure 3-4 shows that the upstream flood waters to the south do not enter the site. However, the Western CFRAM Study mapping did not extend downstream, to the north of the site. The nearest node to the site is 29GORT00118, which is c. 370m to the east.

It should be noted that the hydraulic model that underpins the mapping extends further north than the flood mapping. When considering the potential impact of the new culverts at Kiltartan the CFRAM Hydraulic Modelling Report[6] notes the following:

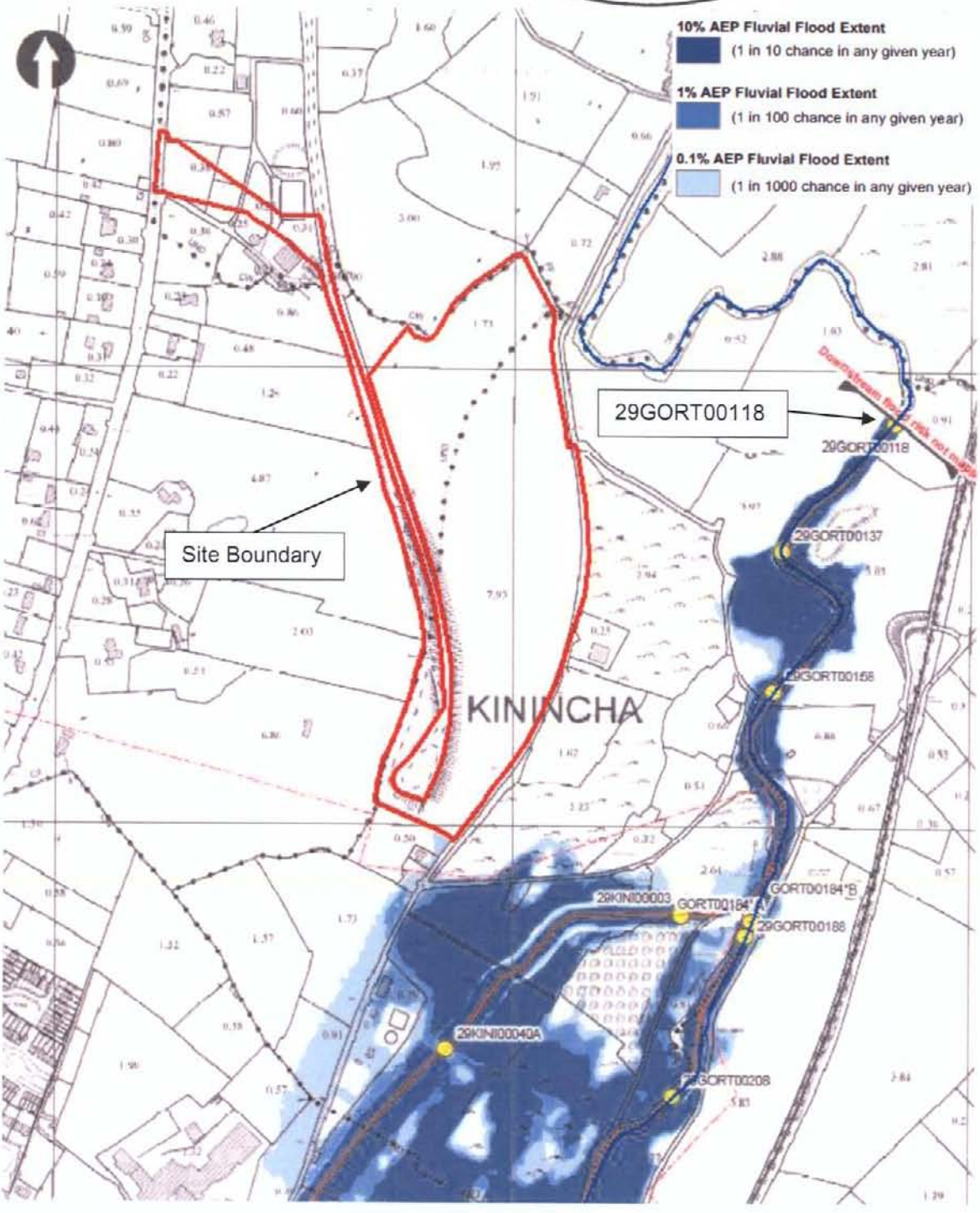
- ***The downstream boundary for this model has been set as a level observed during the 2009 flood event at the N18 crossing at Kiltartan. The level to the east of the N18 was approximately 18mAOD[7]. This is well downstream of the modelled downstream boundary but gives a much elevated level to that achieved using a normal depth boundary. This level does not significantly influence the model in the key areas of interest as they are above the imposed boundary level.***

As a result of the detail confirmed in the bullet points above it is possible to conclude that the water levels predicted at the subject site are conservative and may be slightly lower if a revised downstream boundary was used.

6 WCFRAM UoM 29 - Galway Bay Hydraulic Modelling Report Vol 2b - Gort v4, http://www.westcframstudy.ie/media/7269/WCFRAM%20UoM%2029%20-%20Galway%20Bay%20Hydraulic%20Modelling%20Report%20Vol%202b%20-%20Gort%20v4.pdf

7 Assessment of Groundwater flooding risks posed by Turloughs: Site assessment report - Gort Lowlands, Co. Galway. Dr. Owen Naughton, Trinity College Dublin, April 2013. Prepared for the Office of Public Works.

Figure 3-4 Fluvial CFRAM Flood Extent Map



3.3 Sources of Flooding

The initial stage of a Flood Risk Assessment requires the identification and consideration of probable sources of flooding. Following the initial phase of this Flood Risk Assessment, it is possible to summarise the level of potential risk posed by each source of flooding. The flood sources are described below.

3.3.1 Fluvial

The main flood study undertaken for the area is the Western CFRAM study which incorporated detailed hydraulic modelling of the Gort River and used a downstream boundary level that was taken from a historic flood level on the N18 in Kiltartan. The results are therefore conservative and confirm that the site is predominantly located within Flood Zone C and is at low risk of fluvial flooding.

however the mapping terminated upstream of the site. As such it is not possible to confirm the flood (and therefore risk) to the northern section of the site without further analysis, this is discussed in Section 4.1.

3.3.2 Pluvial

Pluvial, or surface water, flooding is the result of rainfall-generated flows that arise before run-off can enter a watercourse or sewer. It is usually associated with high intensity rainfall. Flood risk from pluvial sources exists in all areas. Adequate storm water drainage systems will minimise the pluvial flood risk.

The OPW PFRA mapping suggests that one point along the western boundary of the site is potentially at risk from pluvial flooding. However, the topographic survey of the site indicates that the site slopes from west to east and the lowest point is located at the centre of the eastern boundary. Therefore it is unlikely that ponding will occur.

3.3.3 Groundwater

Groundwater flooding results from high sub-surface water levels that impact upper levels of the soil strata and overland areas that are usually dry. A full review of groundwater risk has been undertaken by GDG, it confirms there is no historic or predicted groundwater flooding on the site, however geophysical surveying has identified karstified bedrock across the southern and central sections of the site. The report goes on to present a series of mitigation recommendations to mitigate risk. The report is provided as part of the wider planning submission.

4 Flood Risk Assessment

Fluvial flood risk is investigated by the Western CFRAM, however the mapping finishes upstream of the site. Some further work on extrapolation of river levels has been completed below in Section 4.1. Pluvial flood risk is low given the natural slope and potential for runoff to simply be conveyed off site rather than pond within any low spots. Once the site is developed surface water will be managed by a surface water management plan and further discussion is provided in Section 4.2.3. Residual risk is discussed in Section 4.3.

The Hydrogeological Risk Assessment by GDG has identified karstified bedrock across the southern and central sections of the site. A separate mitigation strategy is provided by GDG under the Hydrogeological Risk Assessment. Table 7-1 from the GDG report refers.

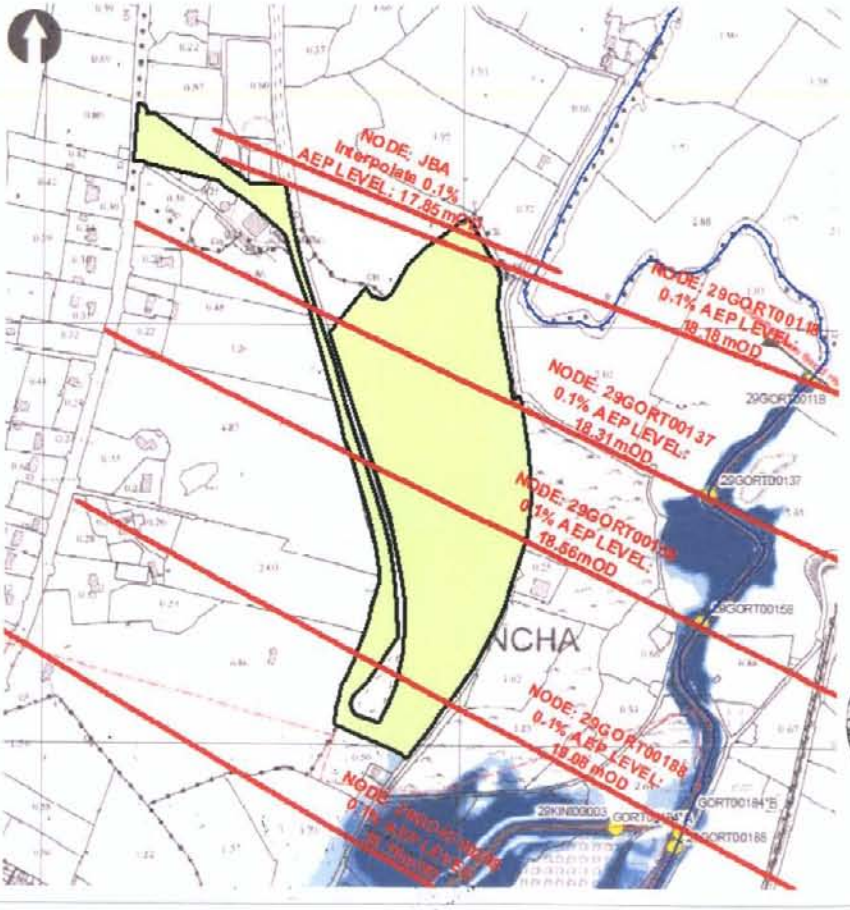
4.1 Fluvial Flood Risk Analysis

Although the CFRAM modelling terminated upstream of the site further work has been completed to extrapolate water levels at the downstream corner of the site (labelled as 'JBA Interpolate'). The gradient of the water surface and flood levels are tabulated below in Table 4-1, a site schematic is presented in Figure 4-1.

Table 4-1 Estimated flood levels at the site

Modelled Water Level (m OD)									
Node point	1% AEP water level (m)	0.1% AEP water level (m)	US Chainage (m)	DS Chainage (m)	Distance (m)	1% ΔH (m)	0.1% ΔH (m)	1% slope (1 in . .)	0.1% slope (1 in . .)
29GORT00227	19.28	19.73	2301	2113					
29GORT00208	19.25	19.7	2113	1914	188	0.03	0.03	6267	6267
29GORT00188	18.7	19.08	1914	1617	199	0.55	0.62	362	321
29GORT00158	18.3	18.56	1617	1402	297	0.4	0.52	743	571
29GORT00137	18.15	18.31	1402	1214	215	0.15	0.25	1433	860
29GORT00118	18.08	18.18	1214	595	188	0.07	0.13	2686	1446
JBA Interpolate	17.81	17.85	595		619	0.27	0.33	2298	1893

Figure 4-1 Estimated Flood Levels and Site Layout Schematic



The lowest site level adjacent to the Gort River is in excess of 19mAOD and therefore over 1m above the estimated probable flood levels for Flood Zone A and B (1% and 0.1% AEP). To add further conservatism, if the water level from the downstream node in the CFRAM model is used (29GORT00118) then the minimum site level is still >0.9m above the 1% AEP flood level.

Using the predicted information from the CFRAM and estimated probable flood levels extended across the development site in Figure 4-1 it is can be confirmed that the site is located in Flood Zone C, at low risk of fluvial flooding. As stated previously, the CFRAM modelling is based on a conservative downstream boundary condition. The results are indicative of a condition whereby the relief measures under the N18 are not functioning and therefore is representative of the residual risk (a condition where the relief measures are not functioning).

4.2 Mitigation

Whilst the site is located in Flood Zone C, the development proposal includes the installation of a high level embankment and excavation behind the embankment to a level of 17mAOD (bunded). The bunded level is below the predicted flood levels contained within Table 4-1 and as such it is likely that the site would become vulnerable to high groundwater levels associated with the high river levels.

The main focus of the mitigation strategy for the site is therefore to prevent the seepage and ingress of water up through the bund during flood events whilst managing the surface water generated by the hardstanding areas.

4.2.1 Site layout and bund design

The principal elements of the plant will be contained within bunded structures (primary and secondary) at circa 17mAOD, these areas are located behind an embankment with a top level that exceeds 25mAOD. Design levels are provided in the Site Section included in Appendix B.

The embankment is located entirely in Flood Zone C and is not in contact with ay flood waters. Its primary function is to provide visual shielding rather than act as a flood defence.

The concrete bund is the critical piece of infrastructure that will ensure the site is mitigated against the upwelling of high groundwater levels related to the fluvial flood levels on the Gort River.

The bund should be capable of withstanding the uplift pressure from the groundwater and should have a top height in excess of that quoted in Table 4-2 below. The levels are based on advice from The Planning System and Flood Risk Management Guidelines which typically suggest that defence levels should be above the 1% AEP flood level plus climate change and freeboard. To allow for climate change it is suggested that this level should be greater than the 0.1% AEP plus a 300mm freeboard.

The Site Layout drawing in Appendix B confirms the secondary bund height is 19.1mOD and this extends across the nodes 29GORT00118 to a short distance upstream of 29GORT00158. As can be seen by cross referencing with the schematic in Figure 4-1 and viewing Table 4-2, the top level of the bund is located above the minimum recommended level at all points.

Table 4-2 Minimum top of Bund

Node point	1% AEP water level (mAOD)	0.1% AEP water level (mAOD)	Minimum top of bund (mAOD)
29GORT00227	19.28	19.73	20.03
29GORT00208	19.25	19.7	20.00
29GORT00188	18.7	19.08	19.38
29GORT00158	**18.3**	**18.56**	**18.86**
29GORT00137	**18.15**	**18.31**	**18.61**
29GORT00118	**18.08**	**18.18**	**18.48**
JBA Interpolate	17.81	17.85	18.15

Further note is made of the steep side slopes in the west of the development which represent a cutting of circa 10m from existing levels. It is possible that there could be ingress of surface water (and interflow/throughflow) along the cutting sides and this water will also need to be collected and discharged. This will be discussed under the surface water design in Section 4.2.3.

In addition, all buildings located within and outside the secondary bund have FFLs set at a minimum of 1.2m above the 17mOD bund level, therefore reducing the risk of surface water ponding/flooding.

4.2.2 Access & Egress

Access to the site is within Flood Zone C and is not impacted by floodwater from fluvial, pluvial or groundwater sources.

4.2.3 Surface Water Strategy

A summary of the strategy is provided below, full details are available in the JBA Stormwater Report. Site drainage will generally be collected by a series of STORMDRAIN channels strategically located throughout the site. These will convey surface water from hardstanding areas within the bund, the car park and also the access road from the most elevated point (c. 100m from the entrance) to the bund. STORMDRAIN channel units will also be provided within the digester bund. These channels will drain to a two-day storage tank to the rear of the reception building. From here stormwater can be extracted for processing of feedstock within the reception building.

An overflow from the two-day storage tank into an adjacent stormwater pumping station will pump excess stormwater to a storage/attenuation pond located towards the southern end of the site which will provide c. 9 days storage (2954 m^3). During times of dry weather when there is no rainfall to naturally recharge the two-day storage tank, a gravity sewer with a penstock arrangement will convey water back to the storage tank for re-use in the process. Attenuation storage for rainfall events of up to 1 in 100 year return period will also be provided within this pond. Should a 1 in 100 year storm event occur and coincide with the storage pond being full to the design level, an overflow will carry excess flows to an infiltration basin at the northeast of the site via an infiltration trench containing a perforated pipe. Road drainage from the high point in the access road to the entrance will be provided by means of gulleys to an infiltration trench with conveyance towards the proposed infiltration basin. Flows to the infiltration basin will be limited to 4 l/s/ha (15.4 l/s). However, flows are unlikely to reach the infiltration basin given the storage provided within the attenuation pond and the permeability of the underlying subgrade.

All water generated within the reception building, either from the processing units or vehicle washdown will be drained and stored in process effluent storage tanks to the rear of the reception building to be recycled and used for subsequent processing of feedstock. The drainage is designed such that no drainage internal to the reception building will be conveyed to the storage pond to the southern end of the site.

Although the firefighting ring main will be connected to the Gort watermain, it is proposed to provide fire-fighting storage by way of an open 400m^3 pond towards the northern end of the site as a back-up in case there are any issues with pressure or supply in the public mains.

4.3 Residual Risk/Flood Mechanism

Residual risks are defined as risks that remain after all risk avoidance, substitution and mitigation measures have been taken. The flood risk assessment identifies two main sources of residual risk to the proposed development, which are as follows:

- Climate change - The effects of climate change will result in increased flows to river channels. Climate change therefore can increase the flood risk to an area. The 0.1% AEP levels can be taken to represent the 1% AEP flows plus climate change. Using the estimated 0.1% AEP flows, the site would not be affected by increased flows from the Gort River due to the top level of the tanking/bund that encloses the site. All building FFLs within the secondary bund are located 1.2m above the base of the bund to manage surface water exceedance and those buildings outside the bund are set to 19.2mOD, above the minimum recommended top of bund level.
- Failure of stormwater systems - Failure of the designed stormwater system could provide a potential flood risk to the development. Such failure may be one of the pumping stations breaking down, or an electricity outage rendering all of the pumps out of action. To reduce the risk of flooding in such an event, an overflow will carry excess flows to an infiltration

basin at the northeast of the site via an infiltration trench containing a perforated pipe. All buildings within the secondary bund are FFLs 1.2m above the base level of the bund. In addition to this appropriate maintenance and management of the stormwater systems and drainage infrastructure will minimise the risk of an operation failure at the site.

5 Conclusion

JBA Consulting has undertaken a Flood Risk Assessment for a proposed biogas plant development located to the north of Gort in Co. Galway. The proposed works involve the construction of twelve no. digester tanks, a feedstock reception building, an office and control room building, process drainage and effluent storage tank, a pump house, a gas purification bottling plant, a CO_2 compression building, a gas flare and gas booster station, a control building, a combined heat and power building, a boiler house, a 6m high embankment, an access road, parking facilities, storm water attenuation basins and connection to existing foul water drainage system. The site is currently greenfield, with the proposed development located mainly to the north of the site.

Using the predicted information from the CFRAM and estimated probable flood levels extended across the development (see Figure 4-1) it can be confirmed that the site is located in Flood Zone C, at low risk of fluvial flooding. However, the development proposal includes the installation of a high level embankment and excavation behind the embankment to a level of 17mAOD (bunded). The bunded level is below the predicted flood levels (see Table 4-1) and as such it is likely that the site would become vulnerable to high groundwater levels associated with the high river levels if not appropriately mitigated.

The main focus of the mitigation strategy for the site has therefore been to prevent the seepage and ingress of water up through the bund during flood events whilst managing the surface water generated by the hardstanding areas.

The concrete bund is the critical piece of infrastructure that will ensure the site is mitigated against the upwelling of high groundwater levels related to the fluvial flood levels on the Gort River. This has resulted in a bund top level of 19.1mOD and any buildings outside of the bund being raised to 19.2mOD. These levels offer protection against maximum estimated flood levels including the impacts of climate change.

The surface water management strategy has been comprehensively designed to manage the risk of pluvial/surface water flooding. Details are summarised within Section 4.2.3 and includes a robust approach to storage and discharge of surface water flow volumes. Care has been taken to include elements of SuDS and the system has been designed for exceedance/management of residual risk.

As a result of the above details the Flood Risk Assessment has been undertaken in accordance with 'The Planning System and Flood Risk Management' guidelines and we can confirm that the development resides in Flood Zone C and is in agreement with the core principles contained within.

Appendices

A Understanding Flood Risk

Flood risk is generally accepted to be a combination of the likelihood (or probability) of flooding and the potential consequences arising. Flood risk can be expressed in terms of the following relationship:

Flood Risk = Probability of Flooding x Consequences of Flooding

A.1 Probability of Flooding

The likelihood or probability of a flood event (whether tidal or fluvial) is classified by its Annual Exceedance Probability (AEP) or return period (in years). A 1% AEP flood has a 1 in 100 chance of occurring in any given year.

In this report, flood frequency will primarily be expressed in terms of AEP, which is the inverse of the return period, as shown in the table below and explained above. This can be helpful when presenting results to members of the public who may associate the concept of return period with a regular occurrence rather than an average recurrence interval, and is the terminology which will be used throughout this report.

Table: Conversion between return periods and annual exceedance probabilities

Return period (years)	Annual exceedance probability (%)
2	50
10	10
50	2
100	1
200	0.5
1000	0.1

A.2 Flood Zones

Flood Zones are geographical areas illustrating the probability of flooding. For the purposes of the Planning Guidelines, there are 3 types or levels of flood zones, A, B and C.

Zone	Description
Flood Zone A	Where the probability of flooding is highest; greater than 1% (1 in 100) from river flooding or 0.5% (1 in 200) for coastal/tidal flooding.
Flood Zone B	Moderate probability of flooding; between 1% and 0.1% from rivers and between 0.5% and 0.1% from coastal/tidal.
Flood Zone C	Lowest probability of flooding; less than 0.1% from both rivers and coastal/tidal.

It is important to note that the definition of the flood zones is based on an undefended scenario and does not take into account the presence of flood protection structures such as flood walls or embankments. This is to allow for the fact that there is a residual risk of flooding behind the defences due to overtopping or breach and that there may be no guarantee that the defences will be maintained in perpetuity.

Indicative Flood Zones (OPW & DoEHLG 2009

A.3 Consequence of Flooding

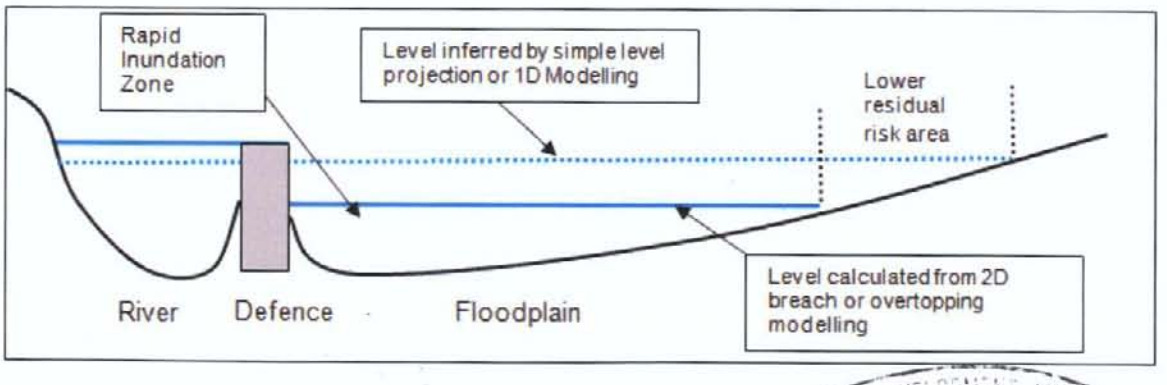
Consequences of flooding depend on the hazards caused by flooding (depth of water, speed of flow, rate of onset, duration, wave-action effects, water quality) and the vulnerability of receptors (type of development, nature, e.g. age-structure, of the population, presence and reliability of mitigation measures etc.).

The 'Planning System and Flood Risk Management' provides three vulnerability categories, based on the type of development, which are detailed in Table 3.1 of the Guidelines, and are summarised as:

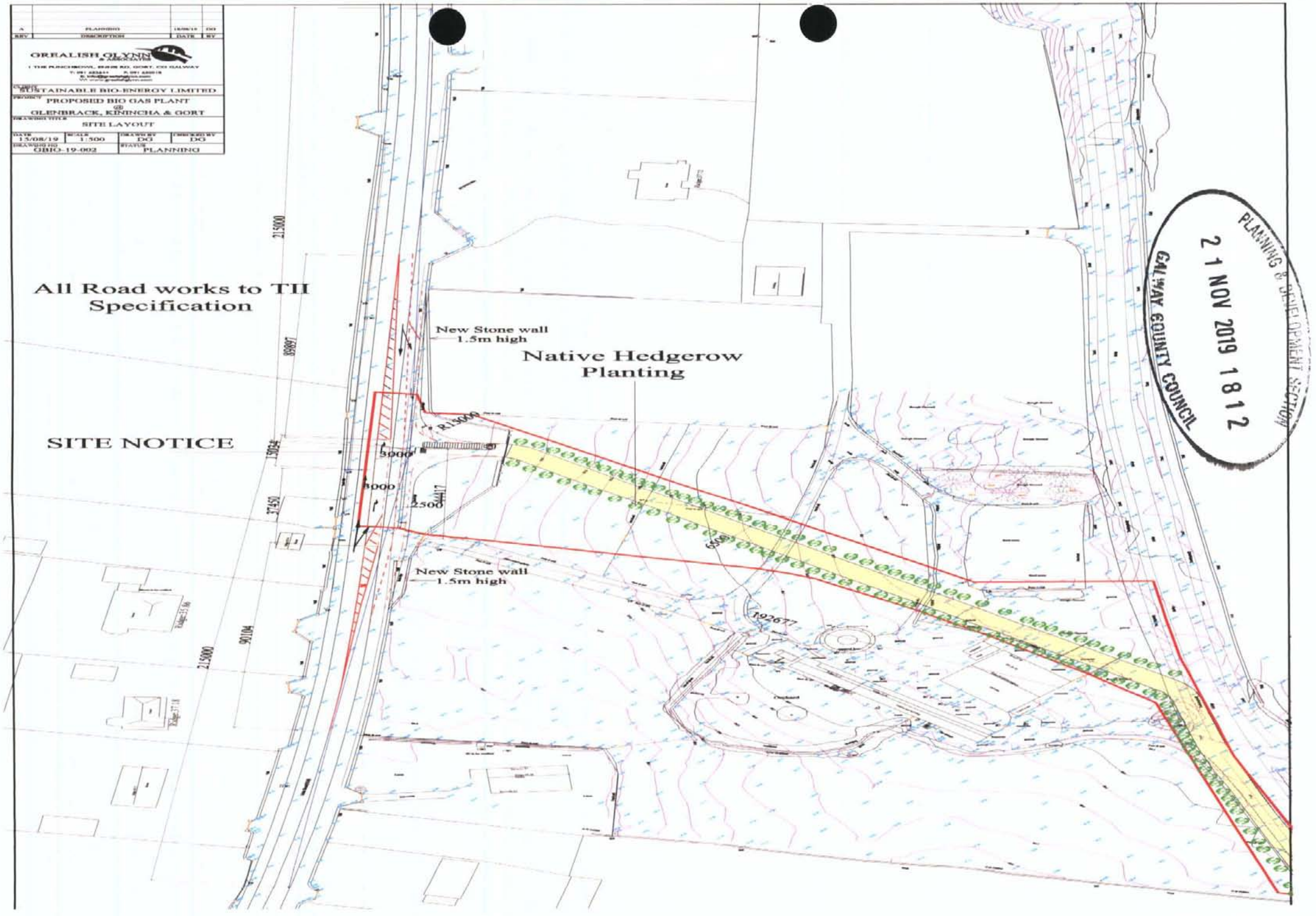
- Highly vulnerable, including residential properties, essential infrastructure and emergency service facilities;
- Less vulnerable, such as retail and commercial and local transport infrastructure;
- Water compatible, including open space, outdoor recreation and associated essential infrastructure, such as changing rooms.

A.4 Residual Risk

The presence of flood defences, by their very nature, hinder the movement of flood water across the floodplain and prevent flooding unless river levels rise above the defence crest level or a breach occurs. This is known as residual risk.



B Site Layout


A PLANNING 15/08/19 DG
REV DESCRIPTION DATE BY
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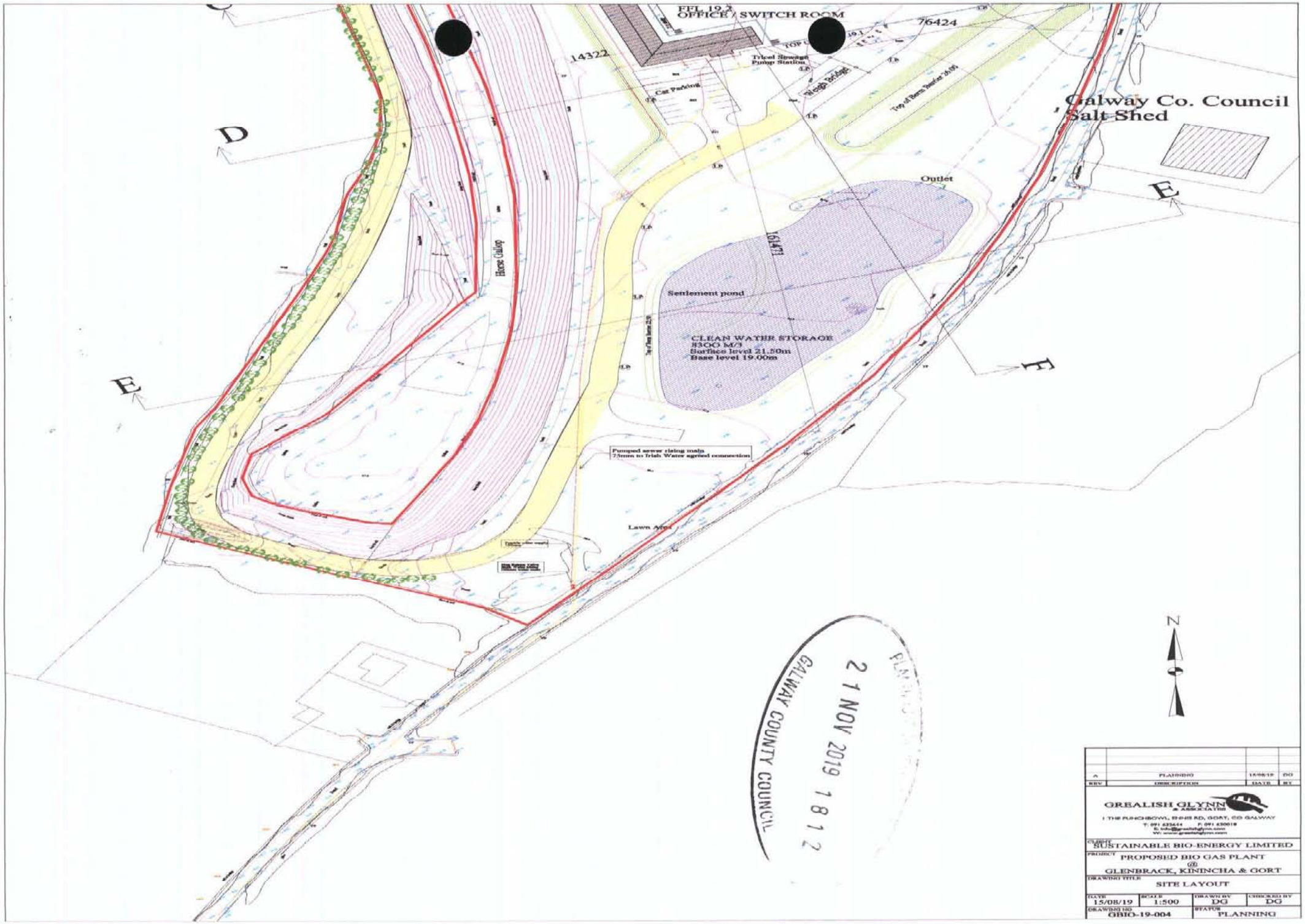
CLIENT: SUSTAINABLE BIO-ENERGY LIMITED
PROJECT: PROPOSED BIO GAS PLANT @ GLENBRACK, KINNCHA & GORT
DRAWING TITLE: SITE LAYOUT
DATE: 15/08/19
SCALE: 1:500
DRAWN BY: DG
CHECKED BY: DG
DRAWING NO: GBIO-19-002
STATUS: PLANNING
All Road works to TII Specification
SITE NOTICE
New Stone wall 1.5m high
Native Hedgerow Planting
New Stone wall 1.5m high
R13000
3000
3000
2500
192677
215000
215000
PLANNING & DEVELOPMENT SECTION
GALWAY COUNTY COUNCIL
21 NOV 2019 1812


N
210171
Emergency Exit Road
Surface level 25.00m
Base level 23.00m
Firefighting Storage
400 M^3
103900
102101
TOP OF BUND 19.1
PRIMARY DIGESTER 4
SECONDARY DIGESTER 8
SETTLEMENT & STORAGE 12
Drain off Point
Pump house
FFL 17.225
28024
SETTLEMENT & STORAGE 11
SECONDARY DIGESTER 7
PRIMARY DIGESTER 3
Ramped Access
PRIMARY BUND 17.00
Ground Level 18.2
Course Surface
14,500
SETTLEMENT & STORAGE 10
SECONDARY DIGESTER 6
PRIMARY DIGESTER 2
Drain off Point
Pump house
FFL 17.225
SETTLEMENT & STORAGE 9
FFL BUND 17.00
SECONDARY DIGESTER 5
PRIMARY DIGESTER 1
TOP OF BUND 18.4
GAS LOADING BAY 1 TO 7
'CO2 BUILDING'
FFL 18.4
Gas Cleanup area
TOP OF RAISED PLINTH 18.5
SEWER LEVEL 18.1
UNDER GROUND STORAGE
Ground Level 18.2
FFL 18.2
Airtight
Reception building
SECONDARY BUND 18.20
SURFACE WATER ATTENUATION
GORT RIVER
Hedge Cutback
Enclosed Flare
Odour Control Unit
A
B
C
D
A PLANNING 15/08/19 DO
REV DESCRIPTION DATE BY
GREALISH GLYNN & ASSOCIATES
THE PUNCHBOWL, ENNIS RD, GORT, CO GALWAY
CLIENT: SUSTAINABLE BIO-ENERGY LIMITED
PROJECT: PROPOSED BIO GAS PLANT @ GLENBRACK, KINCHA & GORT
DRAWING TITLE: SITE LAYOUT
DATE 15/08/19 | SCALE 1:500 | DRAWN BY DO | CHECKED BY DO
DRAWING NO GBIO-19-003 | STATUS PLANNING


FFL 19.2
OFFICE / SWITCH ROOM
14322
76424
Tricel Sewage Pump Station
Car Parking
Weigh Bridge
Top of Berm Barrier 20.95
Galway Co. Council Salt Shed
Outlet
Horse Gallop
Settlement pond
CLEAN WATER STORAGE
8300 M/3
Surface level 21.50m
Base level 19.00m
Pumped sewer rising main 75mm to Irish Water agreed connection
Lawn Area
D
E
F
N
PLANNING
21 NOV 2019
GALWAY COUNTY COUNCIL
A
PLANNING
15/08/19
DO
REV
DESCRIPTION
DATE
BY
GREALISH GLYNN & ASSOCIATES
1 THE PUNCHBOWL, BHAIR RD, GORT, CO GALWAY
T: 091 633414 F: 091 630618
E: info@grealishglynn.com W: www.grealishglynn.com
CLIENT
SUSTAINABLE BIO-ENERGY LIMITED
PROJECT
PROPOSED BIO GAS PLANT @ GLENBRACK, KININCHA & GORT
DRAWING TITLE
SITE LAYOUT
DATE
15/08/19
SCALE
1:500
DRAWN BY
DG
CHECKED BY
DO
DRAWING NO
GBIO-19-004
STATUS
PLANNING

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APPENDIX 7.2

Stormwater Report

Biogas Development, Gort, Co Galway

Stormwater Report

November 2019

Halston Environmental & Planning,
INHUB Building,
Westport Road,
Castlebar,
Co Mayo.

JBA Project Manager

Declan White
24 Grove Island
Corbally
Limerick
Ireland

Revision History

Revision Ref / Date Issued	Amendments	Issued to
Rev 1.0 / 27 March 2018		Halston Environmental & Planning
Rev 2.0 / 29 March 2018	Supporting Info added	Halston Environmental & Planning
Rev 3.0 / 04 April 2018	Supporting Info added	Halston Environmental & Planning
Rev 4.0 / 04 April 2018	Section 2.2.4.6 updated	Halston Environmental & Planning
Rev 5.0 / 09 April 2018	Site layout updated	Halston Environmental & Planning
Rev 6.0 / 14 November 2019	Site layout updated	Halston Environmental & Planning

Contract

This report describes work commissioned by Halston Environmental & Planning by an email dated 28/11/2017. Halston Environmental & Planning representative for this contract was Colm Staunton, Director. Declan White, Leanne Leonard and Jamie Cullen of JBA Consulting carried out this work.

Prepared by ..... Leanne Leonard
Engineer

Jamie Cullen BEng BEng (Hons) MScAssistant Engineer

Reviewed by ..... Declan White BEng (Hons) CEng MIEI
Principal Engineer

Purpose

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JBA is aiming to reduce its per capita carbon emissions.

Contents

List of Figures

List of Tables

1 Introduction

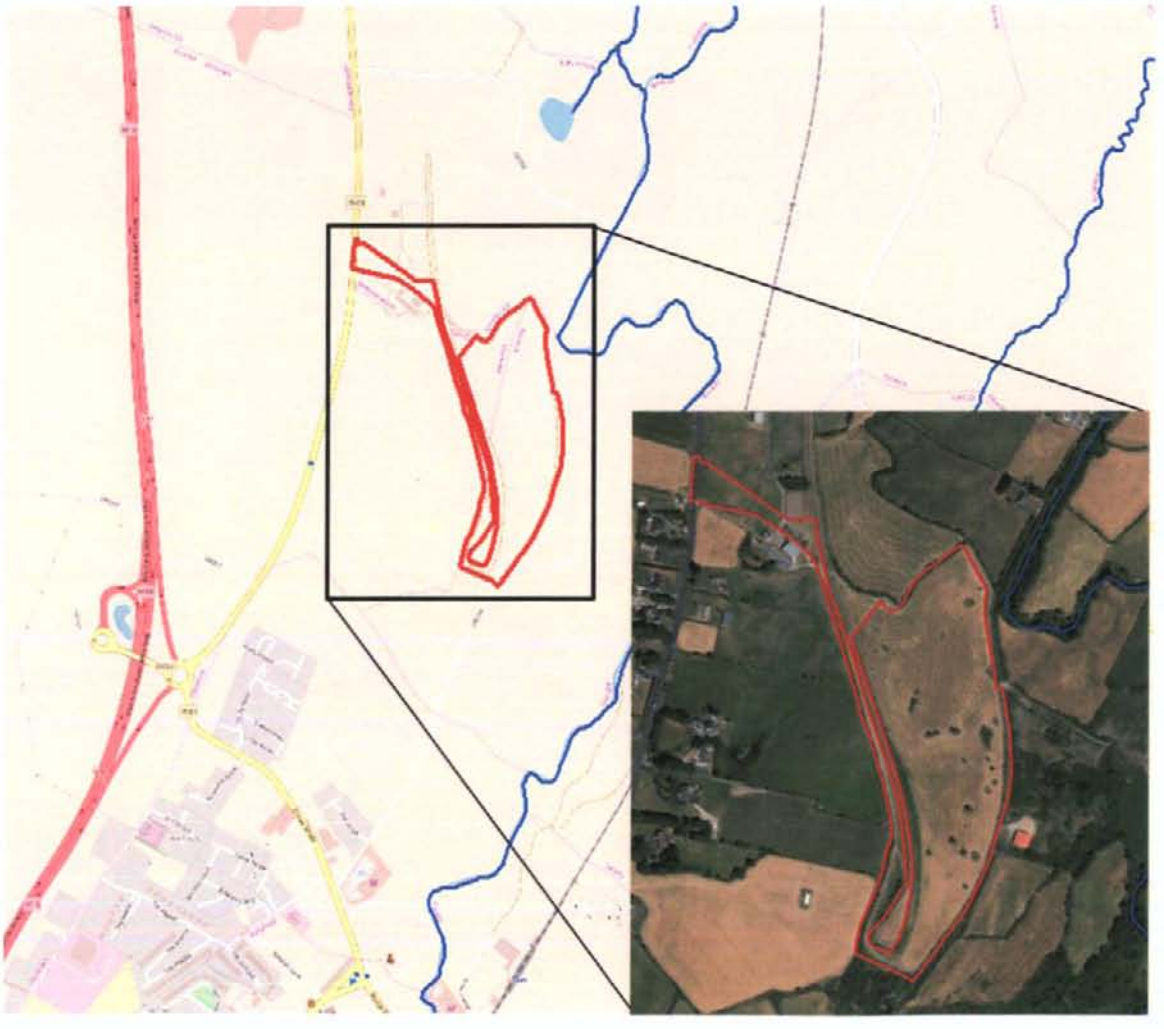
1.1 Site Description

The proposed development is a biogas plant that will be located on a currently greenfield site on the Kinincha Road, less than a kilometre north of Gort town centre, refer Figure 1-1.

At present, the site is used for agricultural purposes. The current land owner altered the ground levels and soil characteristics considerably circa the year 2000. The levels at the centre of the site were lowered, boundaries were removed, and a horse gallop was developed around the boundary of the site. A large volume of soil was removed and specialist fine soils were imported. The topography of the surrounding lands is generally flat.

The Gort River flows in a northerly direction to the east of the site. It passes within 20m of the site at the northeast border and as indicated hereunder.

Figure 1-1: Site location



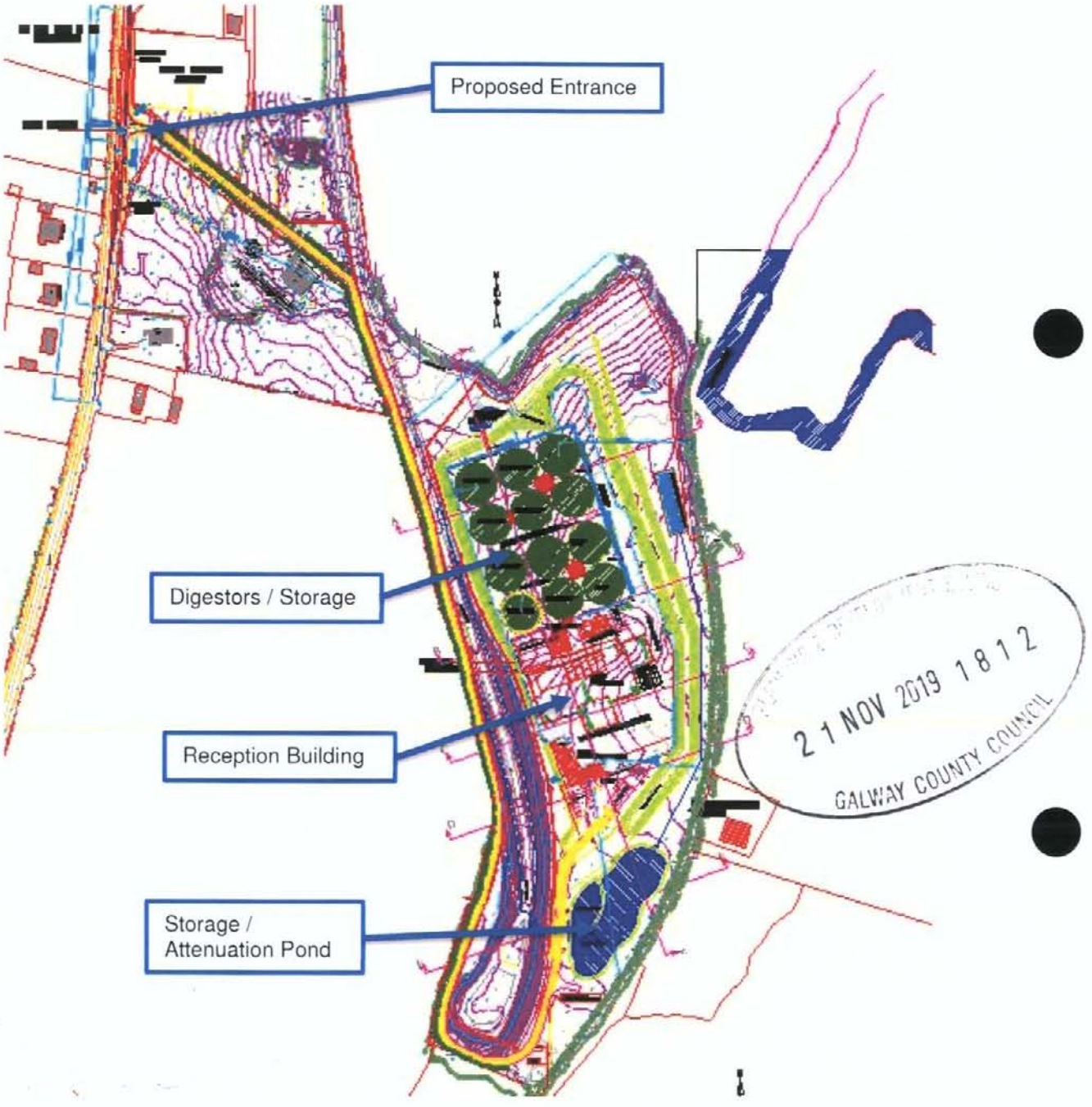
1.2 Development Description

The proposed development is a biogas plant that will intake up to 150,000 tonnes per annum of non-hazardous biodegradable feedstock, in both liquid and solid form. The feedstock with be processed within the plant operation to produce biogas and organic fertiliser.

Access to the development will be provided via an entrance to the north west of the site from the R458, refer Figure 1-2 . From here, following quality procedures, the delivery vehicles will deposit the waste in the air-sealed reception building. Inside the reception building, there will be dedicated areas for solid wastes, tanks for liquid wastes, floor mounted water supply, feeders to mix batches to the correct consistency and a vehicle washdown area.

Once the vehicles have deposited the feedstock, they will be washed with high pressure steam. A separate gully collection system will transport any 'dirty' water straight to the underground storage tank at the back of the reception building to be reused in the process.

Figure 1-2: Site Layout



All water generated within the reception building (operation plus vehicle washdown) will be classed as 'dirty' water and will be recycled internally.

Following batching in the reception building, the digestate mix is transported to the primary digesters, then the secondary digesters and finally the settlement storage tanks. From these tanks, the gas is collected from the upper domes and the solids are collected from the base of the tanks. The gas is bottled on site and both the solids and gasses are removed via specialist couriers.

Due to the sensitive nature of the surrounding environment and watercourses, all runoff will be retained on site either within the 2-day storage tank adjacent the reception building or within a storage / attenuation pond towards the southern end of the site. Only in extreme rainfall events, is any overflow expected with associated infiltration to ground.

1.3 Water Requirements

For anaerobic digestion to take place, the digestate must have a dry matter concentration of just 5%-8%, and therefore there will be a demand for up to 120,000m3 of liquor per annum at the plant. It is for this reason that all storm water will be retained on-site, except for any exceedance events.

Water will also be required for fire-fighting purposes. Following discussions with Galway County Council Fire Department, it is envisaged that a required flow rate of 50 l/s over a two hour period will be required in the event of a fire.

1.4 Existing Services

There is an existing 100mm watermain c.750m south of the site on the Kinincha Road which will be extended in and around the subject site.

2 Surface Water Drainage

2.1 Existing Drainage

There is no positive drainage from the greenfield site at present with rainfall primarily addressed by way of local infiltration.

2.2 Proposed surface water strategy

The proposed drainage for the subject development is as outlined on the following JBA drawings:

a. 2017s7157-001 (Drainage Layout - Sheet 1 of 4)
b. 2017s7157-002 (Drainage Layout - Sheet 2 of 4)
c. 2017s7157-003 (Drainage Layout - Sheet 3 of 4)
d. 2017s7157-004 (Drainage Layout - Sheet 4 of 4)
e. 2017s7157-003 (Cross Sections - Various)
f. 2017s7157-004 (Typical Details Sheet)

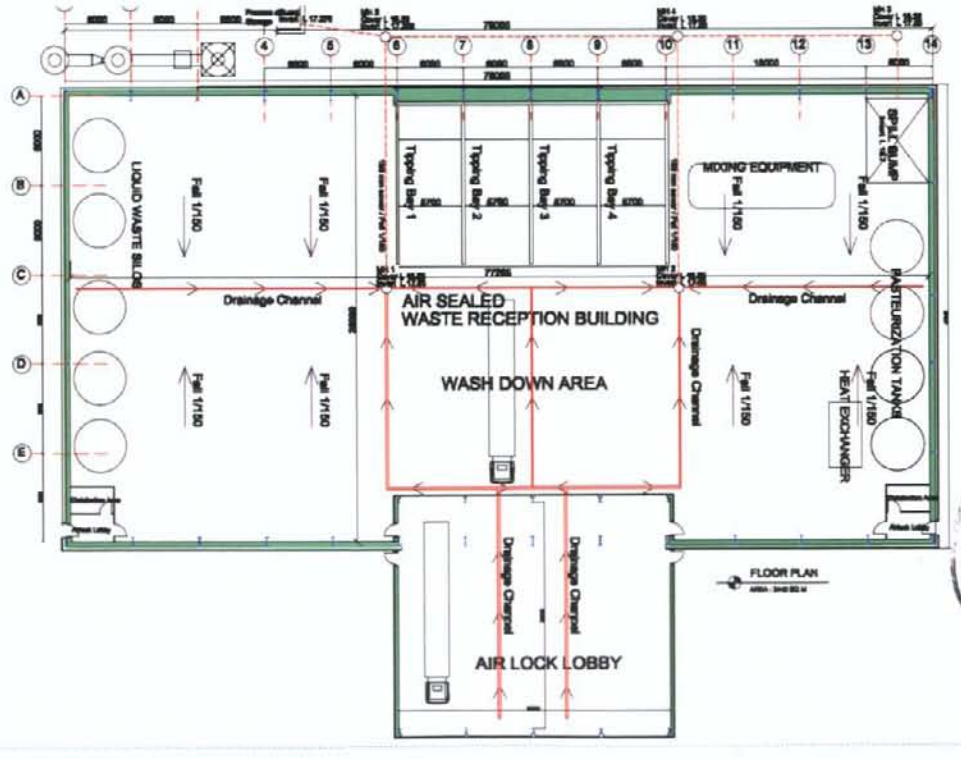
The drainage strategy for the subject site is as follows:

1. All 'dirty' or contaminated water will be confined to within the reception building;
2. Site drainage will gravitate to a 2 day storage tank to the rear of the reception building;
3. Excess volumes will be pumped to a storage pond towards the southern end of the site for temporary storage prior to gravity conveyance back to the 2-day storage tanks;
4. Maximise water quality should any overflow be required during exceedance storm events;
5. Maximise water retention on site for plant operation
6. Site drainage along the access road will be conveyed to an adjacent infiltration trench.

2.2.1 Contaminated Water within reception Building

Any water generated within the reception building, either from the processing units or vehicle washdown will be drained and stored in a process effluent storage tank(s) to the rear of the reception building, refer Grealish Glynn drawing nr GBIO-18-007 and GBIO-18-011 for details. An extract from drawing nr GBIO-18-007 to show internal drainage is shown in Figure 2-1 below.

Figure 2-1: Internal Drainage to Reception Building



The contents (washdown water) within the process effluent storage tanks will be recycled and used for subsequent processing of feedstock. Only when all process effluent storage is used, will stormwater from the 2-day storage tanks be utilised.

The drainage is designed such that no drainage internal to the reception building will be conveyed to the storage pond to the southern end of the site. Storm water from the roof of the reception building will be conveyed to the primary STORMDRAIN network, which may be temporarily stored in the storage pond.

2.2.2 Site Drainage

Site drainage will generally be collected by a series of STORMDRAIN channels strategically located throughout the site, refer drawing nr's 2017s7157-002 to 2017s7157-004. Details of the proposed STORMDRAIN details as provided within ***Appendix A*** of this report.

A by-pass petrol interceptor (Klargester model NSBE040 or similar approved) will be provided on the primary site drainage line and upstream of the 2-day storage tank to the rear of the reception building, refer drawing nr 2017s7157-002 and 2017s7157-006.

From the 2-day storage tank, stormwater can be extracted for processing of the feedstock within the reception building.

STORMDRAIN channel units will also be provided within the digester bund which will also drain to the 2-day storage tank.

When the 2-day storage tank is full, storm flows will overflow to an adjacent stormwater pumping station which will pump excess stormwater to a storage / attenuation pond located towards the southern end of the site, refer Section 2.2.3 for further details.

Part of the access road into the development from the N18 will be discharged to ground via an adjacent infiltration trench. Part of the access road immediately west of the pond is connected to a separate infiltration trench system as indicated in drawing nr's 2017s7157-002 to 2017s7157-004 These flows are unlikely to reach the infiltration basin located in the north east of the site given the permeability of the underlying subgrade, refer Section 2.3.

2.2.3 Storage / Attenuation Pond

The storage / attenuation pond will have a dual purpose by way of:

1. storage of water for future processing of the feedstock within the reception building, and;
2. attenuation of exceedance flows prior to conveyance to an infiltration blanket located towards the north-east of the subject site.

2.2.3.1 Storage

Due to the mixing liquor demand for processing the feedstock, 300-330m3/day, it is proposed to provide c.9 days storage (2,954 m3) within the storage pond, refer drawing nr 2017s7157-004 and 2017s7157-005. The invert of the pond will be 19.6m with the Top Water Level (TWL) for the 9-day storage calculated as 21.1m.

During times of dry weather, there will be no rainfall to naturally recharge the 2-day storage tank from which water is extracted to maintain the processing requirements within the reception building.

In this instance, a penstock arrangement will release water from the storage pond where it will connect via a 225mm diameter pipe into the STORMDRAIN network at junction S5 (invert level 19.462m) where it will then be conveyed to the 2-day storage tank.

The storage pond will be naturally recharged following subsequent rainfall events when the 2-day storage tanks to the rear of the reception building overflow to the stormwater pumping station.

Given the soil infiltration characteristics, refer Section 2.3, and to retain the storage water within the pond, a HDPE liner or similar approved will form part of the pond structure. The liner edge and anchoring detail shall be agreed with the selected liner specialist (Lining Tech or similar approved)

2.2.3.2 Attenuation

Should a 1 in 100-year storm event occur and coincide with the storage pond being full to the design level of 21.1m, additional storage is required to accommodate such an occurrence.

It is therefore proposed to attenuate flows in this instance to the equivalent of 4l/sec/ha (15.4 l/sec based on a drained area of 3.85ha) with the attenuation required equating to 1,986m3, refer ***Appendix B1*** for supporting calculations which are based on site specific rainfall data as received from Met Eireann, refer ***Appendix B2***.

The attenuated discharge will be controlled by a hydrobrake with the resultant flow conveyed via an infiltration trench to an infiltration basin towards the north-east of the subject site and as indicated on drawing nr's 2017s7157-002 and 2017s7157-003.

It is envisaged that not all flow will reach the infiltration basin given the permeability of the underlying subgrade, refer Section 2.3.

2.2.4 Water Quality

Whereas the intention is to retain as much water on site as possible for processing purposes, there are likely be times when exceedance flows from the attenuation pond will be conveyed to the infiltration basin towards the north-east of the site. It is therefore important to ensure that the water quality is addressed such that the risk to downstream receptors is minimised.

Provisions within the design for enhancing the water quality are as outlined hereunder:

2.2.4.1 By-Pass Petrol Interceptor

A by-pass petrol interceptor will be provided on the primary STORMDRAIN network and upstream of the 2-day storage tanks, refer drawing nr 2017s7157-004. This will protect the storage pond from pollution by oil which may be present due to minor leaks from vehicles and/or plant.

2.2.4.2 Primary Settlement

Prior to stormwater being pumped to the storage / attenuation pond, flows will firstly enter the 2-day storage tanks where any heavy silt or debris will settle out on the base of the individual units. As such, only very fine particulate matter may overflow to the stormwater pumping station and be subsequently pumped to the storage / attenuation pond.

2.2.4.3 Stormwater Pump Station Shutdown

Should one of the digester units within the concrete bund leak, there is a risk that digestate would be pumped to the storage / attenuation pond. To counter such a risk, the stormwater pumping station will be fitted with a PH sensor. In the event of any pollution (digestate, fire-water or other) being detected, the pumping station will be shut down, thereby preventing any flows being pumped to the storage / attenuation pond.

2.2.4.4 Sediment Forebay

A sediment forebay is proposed at the upstream end of the storage / attenuation pond which will allow other small particulate matter to settle out prior to entering the main storage area of the pond. Such a provision will also minimise maintenance to the entire pond in the short to medium term as any settlement of particulate is likely to be confined to the smaller confines of the sediment forebay.

2.2.4.5 Treatment Volume

The SuDS Manual (CIRIA C753) recommends that treatment volume equivalent to 15mm be provided where at least 5mm interception cannot be attained on-site.

Based on an impermeable area of 3.85ha that will be drained to the 2-day storage tank and/or the stormwater pumping station, the treatment volume equivalent to 15mm rainfall is 577.5m3.

A permanent depth of water will be provided within the storage pond (equating to c.9-day storage) with an overall depth of 1.5m, i.e. 19.6m invert level and 21.1m overflow level. The effective volume provided is c.3,043m3 which is much greater that the recommendation within The SuDS Manual, thereby providing enhanced treatment and polishing of the stormwater.

The pond (treatment volume) will treat incoming runoff through settling and biological uptake. The primary pollutant removal mechanism is the settling of fine silts (larger particulate will have settled out in the 2-day storage tanks) and suspended sediments. Uptake of pollutants, particularly nutrients, will also occur to some degree through the biological activity of the pond. Emergent and submerged aquatic vegetation along the shoreline will support an active microbial community capable of consuming dissolved constituents in the inflow. Pond inflows from most runoff events replace a portion of the prior volume and are stored and treated until displaced by the perennial baseflow or next runoff event.

2.2.4.6 Digester Leakage

Should a digester leak, pollution will be detected by the PH and turbidity sensors within the stormwater pumping station and the pumps will shut down. In this case, leakage from any digester will be stored within the concrete bund enclosing the 12 digesters.

The IPC Guidance Note on Storage and Transfer of Materials for Scheduled Activities published by the EPA advises that retention may be required depending on the volume and water hazard class (WHC) of the material stored. As the volume of liquid stored is above 100m3 and the digestate is WHC 1, retention is required. It advises that the retention volume should be the greater of the following:

(i) 110% of the capacity of the largest tank or drum within the bunded area,

(ii) 25% of the total volume of the substance which could be stored within the bunded area.

Each digester is 8.5m in height with an internal diameter of 28.54m. There is 0.5m of freeboard within the digesters as digestate is typically filled to a maximum height of 8m. The walls are typically 500mm in thickness, therefore, the plan area of individual digesters is 685m2.

The working volume of each digester is 5,100m3. 110% of the largest tank is 5,610m3 and 25% of the total volume of substance stored is 15,300m3 (equivalent of three no. tanks) and therefore retention storage for the latter must be provided.

The bund dimensions measure 103.9m x 142.5m equating to a plan area 14,806m2. The total area of nine nr digesters equate to 6,165m2. In the event of leakage from three tanks, the available storage area within the bund is 8,641m2.

The concrete bund is recessed into the ground, at a level of 17m and typically 1.2m below the surrounding site/yard level. The top of wall level of the concrete bund is 18.8m, meaning that the available storage is 15,553m3.

As the level of digestate within the bund will be greater than the surrounding ground levels (18.20m), sealed and pressurised covers will be provided on the storage tanks and a non-return valve will be provided at the inlet pipe from manhole S10. This will ensure that digestate leakage is contained within the bund and the underground storage tanks will provide an additional 283m3 storage by utilising the void space above the outlet within these tanks.

An allowance of 360m3 for contaminated water from fire-fighting requirements should also be provided, refer Section 2.4.

The available storage within the bund and the storage tanks is 15,836m3.

In effect, in the unlikely event of a leak occurring, the concrete bund can store the equivalent of three digesters and run-off from fire fighting without impacting on the general surface / site level.

2.2.5 Maximise Water Retention on-site

The provision of daily water to support the processing of the feedstock is important, therefore, retaining water on site from rainfall events is important to site operations.

As outlined previously, site drainage is designed such that excess water is stored in the storage pond towards the south of the site.

Another source of water is the build-up of water behind the retaining walls of the concrete digester bund. A perforated land drain will be provided along the northern and western walls of the bund to alleviate pore water pressure building up behind the walls with resultant flows directed into the digester bund which in turn will be conveyed to the 2-day storage tank and/or the storage pond.

2.3 Infiltration Basin

The permeability of the subgrade was carried out on Tuesday 6th February 2018 by way of testing in accordance with BRE365.

A trial hole measuring 3.9m long x 1.4m wide x 2.8m deep was excavated at the location of the proposed infiltration basin, refer drawing nr 2017s7157-002. The trial hole was subjected to 2,500 gallons of water, however, we were unable to fill the trial pit in order to take readings of the reduction in water level against time.

The result of which indicates a subgrade with a high co-efficient of permeability which is advantageous for infiltration of stormwater flows.

Whereas, a test was not concluded in accordance with BRE365 (as it was not possible to fill the trial hole), the co-efficient of permeability is considered to be high.

For comparison purposes, we refer to Table 25.1 of The SuDS Manual which indicate typical infiltration rates for varying soil textures, refer Figure 2-2 for details.

Figure 2-2: Typical Infiltration Rates as per Table 25.1 of The SuDS Manual

TABLE 25.1 Typical infiltration coefficients based on soil texture (after Bettess, 1996)

Soil type/texture	ISO 14688-1 description (after Blake, 2010)	Typical infiltration coefficients (m/s)
Good infiltration media		
• gravel	Sandy GRAVEL	$3 \times 10^{-4} - 3 \times 10^{-2}$
• sand	Slightly silty slightly clayey SAND	$1 \times 10^{-5} - 5 \times 10^{-5}$
• loamy sand	Silty slightly clayey SAND	$1 \times 10^{-4} - 3 \times 10^{-5}$
• sandy loam	Silty clayey SAND	$1 \times 10^{-7} - 1 \times 10^{-5}$
Poor infiltration media		
• loam	Very silty clayey SAND	$1 \times 10^{-7} - 5 \times 10^{-6}$
• silt loam	Very sandy clayey SILT	$1 \times 10^{-7} - 1 \times 10^{-5}$
• chalk (structureless)	N/A	$3 \times 10^{-6} - 3 \times 10^{-5}$
• sandy clay loam	Very clayey silty SAND	$3 \times 10^{-10} - 3 \times 10^{-7}$
Very poor infiltration media	–	
• silty clay loam	–	$1 \times 10^{-6} - 1 \times 10^{-5}$
• clay	Can be any texture of soil described above	$< 3 \times 10^{-6}$
• till		$3 \times 10^{-9} - 3 \times 10^{-5}$
Other		
• rock* (note mass infiltration capacity will depend on the type of rock and the extent and nature of discontinuities and any infill)	N/A	$3 \times 10^{-9} - 3 \times 10^{-5}$

Whereas, the infiltration rate on site is considered higher than the co-efficients as tabled above, we have adopted a conservative infiltration rate of 1 x 10^{-5}m/sec for calculation purposes, refer ***Appendix B3***.

For the flow rate from the attenuation pond of 15l/sec, an infiltration basin measuring 20m x 15m x 1.5m deep will be provided to deal with any overflow from the attenuation pond during exceedance rainfall events.

2.4 Fire-Fighting Requirements

Discussions with the Fire Department of Galway County Council have indicated that up to 50 l/s for a duration of two hours would be required for fire-fighting purposes. This equates to a fire-fighting volume of 360m3.

Although the firefighting ring main will be connected to the Gort watermain via a 100mm extended connection, it is proposed to provide fire-fighting storage by way of an open 400m3 pond towards the northern end of the site as a back-up in case there are any issues with pressure or supply in the public mains. Refer JBA drawing nr 2017s7157-002 and Grealish Glynn drawing nr GBIO-18-002 and GBIO-18-003 for details.

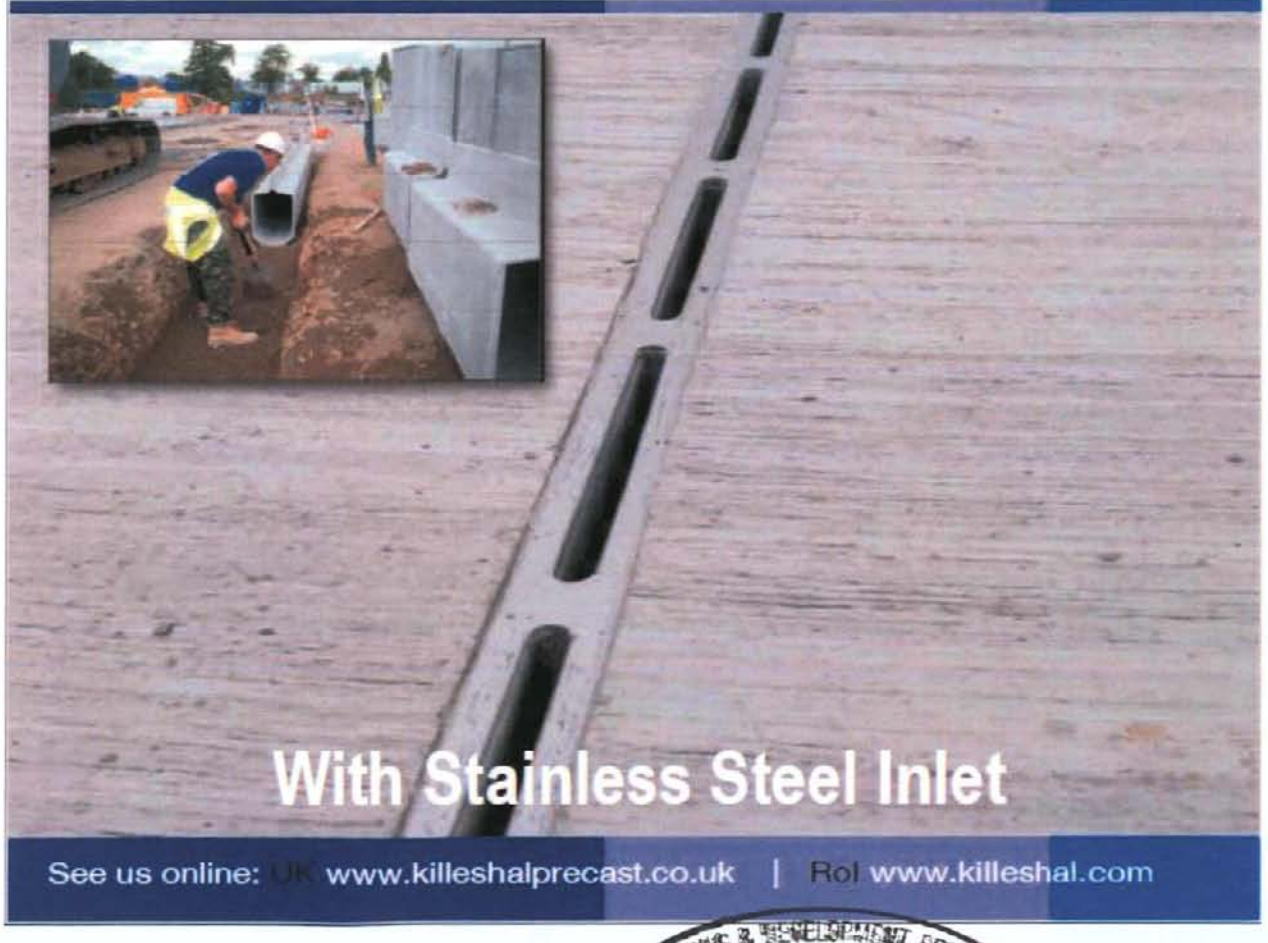
The volume is in excess of that required to account for potential evaporation, thereby minimising the reliance to pump additional water to maintain minimum volume within.

The EPA Firewater Retention Guidance Document (Final Draft) recommends that these lagoons should be lined, kept free from debris and that integrity testing should be carried out in accordance with the site maintenance schedule and to ensure compliance with licence conditions. It also states that all fire water should be retained on site.

Contaminated water from fire-fighting must be retained within the bund and analysed to determine the options for proper disposal. As indicated in Section 2.2.4.6, an allowance for the contaminated water to be stored within the concrete bund has been provided for. There should be preliminary plans in place for disposal of contaminated firewater as part of the site's emergency planning arrangements.

Appendices

A STORMDRAIN Details



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STORMDRAIN RANGE

STORMDRAIN RANGE

Killeshal Precast Concrete Ltd are proud to introduce **STORMDRAIN**

- Manufactured from "Long Fibre GRC" to incorporate greater strength to weight ratios and enhanced resistance to damage.
- High Capacity allows **STORMDRAIN** to be laid level.
- The High Capacity of **STORMDRAIN** aids the design of schemes that require attenuation.
- Longer channel runs, reduced underground pipe work and excavation, reduce site costs.
- Single unit gives a quick and simple installation.
- Stainless Steel Slotted top gives a neat appearance with no lids or gratings to install and maintain.
- Offers all the benefits of GRC including resistance to frost, chemical attack, and road salts.
- Full range of accessories including access ports, silt pits and transition units.
- Easily adapted to different load classes and surface finishes.

STORMDRAIN offers "less cost and less time, every time"

» EASY INSTALLATION

» NO LIDS TO INSTALL OR MAINTAIN

» CAN BE LAID LEVEL

STORMDRAIN™

CHANNEL RANGE

* All 12mm slot at surface

Drawing not to scale

All dimensions are for guidance purposes only. We operate a policy of continuous product development and reserve the right to modify poducts and specifications where appropriat.

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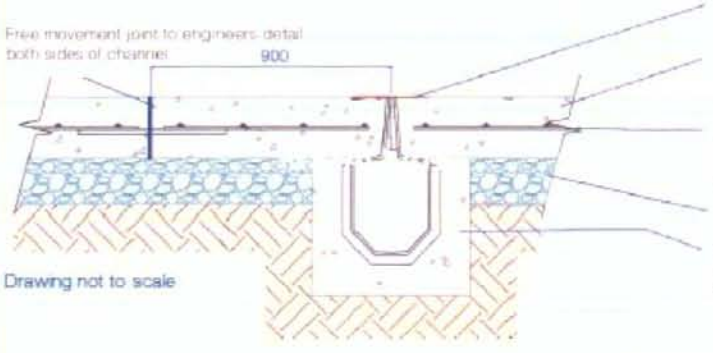
SPECIFICATIONS

Channel Size	SD250	SD350	SD400	SD500
Capacity	70 litre/metre	128 litre/metre	225 litre/metre	400 litre/metre
Length	2000 mm	2000 mm	1500 mm	1500 mm
Overall Width	270 mm	370 mm	425 mm	530 mm
Internal Width	250 mm	350 mm	400 mm	500 mm
Overall Depth	525 mm	625 mm	825 mm	1075 mm
Invert Depth	505 mm	625 mm	805 mm	1060 mm

STORMDRAIN™

TYPICAL CONSRUCTION DETAILS

SD250



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For details on the requirements for larger sizes and higher loadings please contact Killeshal's sales team on 0800 0393367.

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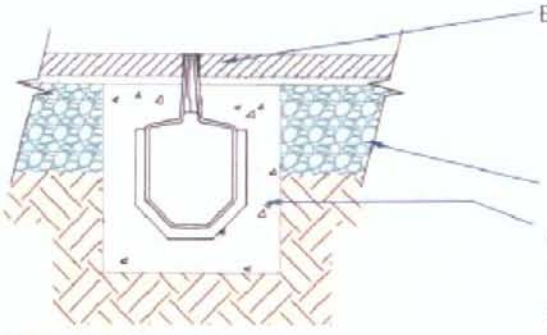
CONSTRUCTION DETAILS- Block Paving and Alternative Tarmac Detail



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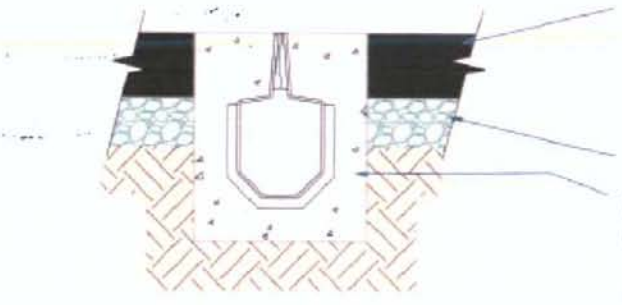
CONSTRUCTION DETAILS- Flexible Pavement



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The above diagrams show the installation detail for **STORMDRAIN** in flexible paving and block paving.