Greater Dublin **Drainage Project**

Environmental Impact Assessment Report

Volume 4 Part A
Main Report for the Regional Biosolids Storage Facility

Preface

The structure of the Environmental Impact Assessment Report (EIAR) for the proposed Greater Dublin Drainage Project (the Proposed Project) is outlined in the preface at the start of each Volume of the EIAR for clarity. The Proposed Project comprises; a proposed orbital sewer route from Blanchardstown to the proposed Wastewater Treatment Plant (WwTP) at Clonshagh, the proposed outfall pipeline route (land based section) from the proposed WwTP to the R106 Coast Road, the proposed outfall pipeline route (marine section) from the R106 Coast Road to approximately 1km north-east of Ireland's Eye in the Irish Sea, and a site proposed for the Regional Biosolids Storage Facility (RBSF) at Newtown, Dublin 11.

Volume 1 and Volume 2 provide general information on the overall Proposed Project. Volume 3 addresses all proposed elements of the Proposed Project, with the exception of the RBSF element which is addressed in Volume 4. In Volume 4, the 'Proposed Upgrade Project' refers to the Proposed Upgrade to Ringsend Wastewater Treatment Plant which was submitted for planning by Irish Water to An Bord Pleanála on 6 June 2018. Volume 5 provides drawings and large format images for the Proposed Project. The volumes and sub-section titles are summarised as follows:

Volume 1: Non-Technical Summary

Volume 1 provides a non-technical summary of the information contained in Volumes 2, 3 and 4.

Volume 2: Introduction

Part A: Report

Volume 2 Part A provides a general introduction, outlines the EIA process, describes the scope of the Proposed Project and presents the consideration of alternatives.

Part B: Appendices

Volume 2 Part B supplies data that is supplemental to the information in Volume 2 Part A.

Volume 3: Proposed Project

Part A: Report

Volume 3 Part A describes the environmental impacts specific to the Proposed Project.

Part B: Appendices

Volume 3 Part B supplies data that is supplemental to the information in Volume 3 Part A.

Volume 4: Regional Biosolids Storage Facility

Part A: Report

Volume 4 Part A describes the environmental impacts specific to the RBSF component of the Proposed Project.

Part B: Appendices

Volume 4 Part B supplies data that is supplemental to the information in Volume 4 Part A and is specific to the RBSF.

Volume 5: Drawings

Part A: Proposed Project

Volume 5 Part A illustrates the information detailed in Volume 2 and Volume 3 and is specific to the Proposed Project.

Part B: Regional Biosolids Storage Facility

Volume 5 Part B illustrates the information detailed in Volume 4 and is specific to the RBSF.

Volume 6: Proposed Project Photomontages

Volume 6 contains the photomontages for the Proposed Project.

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Glossary & Abbreviations

Acronym	Description
%	Percentage
°C	Degrees Celsius
A.D.	anno Domini
AADT	Annual Average Daily Traffic
ABP	An Bord Pleanála
AD	Anaerobic Digestion
AEP	Annual Exceedance Probability - the probability (expressed as a percentage) of a flood occurring in any given year that is equal to or more severe than a given magnitude or severity
AERMOD Model	Atmospheric dispersion model / Odour Dispersion Model - an advanced dispersion model based on the Gaussian theory of plume dispersion
am / AM	Before midday
AOD	Above Ordnance Datum
ARCADY	Assessment of Roundabout CApacity and DelaY software
AWN	AWN Consulting Ltd.
BCMS	Building Control Management System
bgl	below ground level
BH	Borehole
Biocake	Dewatered, digested biosolids (not thermally dried)
Biofert	Thermally dried biosolids. May or may not be digested
BOD	Biochemical Oxygen Demand
BPIP	Building Profile Input Program
BS	British Standard
C&D	Construction and Demolition
c.	circa (approximately)
Capacity (of the Ringsend WwTP)	The capacity is expressed as an annual average daily capacity and the plant will be designed to cater for significant daily, weekly and seasonal variations outside of this value
CAT	Cable Avoidance Tool
CBOD	Carbonaceous Biochemical Oxygen Demand
CEMP	Construction Environmental Management Plan
cfram / CFRAM	Catchment Flood Risk Assessment and Management
cfu	Colony Forming Units
CGS	County Geological Site
CH4	Methane
CIEEM	Chartered Institute of Ecology and Environmental Management
CIRIA	Construction Industry Research and Information Association
CIWEM	Chartered Institution of Water and Environmental Management

cm	Centimetre
CO	Carbon Monoxide
Co.	County
CO2	Carbon Dioxide
CO2eq	Carbon Dioxide Equivalent
COP	Conference of the Parties to the Convention
cSAC	Candidate Special Area of Conservation
CSO	Central Statistics Office
CUC	Capacity Upgrade Contract. Contract commenced in 2018 for elements of works permitted under planning application ref 29N.YA0010
daa	daa plc is the organisation responsible for the operation of Dublin Airport
DAHGI	Department of Arts, Heritage, Gaeltacht and the Islands. The Department is now the Department of Culture, Heritage and the Gaeltacht
dB	Decibels
dBA	A-weighted Sound Pressure level in decibels with a reference level of 20 mPa
DECLG	Department of the Environment, Community and Local Government. The Department is now the Department of Housing, Planning and Local Government
DEHLG / DoEHLG	Department of the Environment, Heritage and Local Government. The Department is now the Department of Housing, Planning and Local Government
diam.	Diameter
Discharge Licence	EPA Waste Water Discharge Licence for the WwTP. The EPA issued a licence for Ringsend WwTP (licence reference number D0034-01) in 2010
DMRB	Design Manual for Roads and Bridges
DTTAS	Department of Transport, Tourism and Sport
DTM	Digital Terrain Model
DWL	Drinking Water Limits
E	East
e.g.	For example
EC	European Commission
ED	Electoral Division
EEC	European Economic Community
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EIRP	Environmental Incident Response Plan
EIS	Environmental Impact Statement
EMRWMP	Eastern-Midland Region Waste Management Plan
EPA	Environmental Protection Agency
EPR	Environmental Permitting Regulations
ESB	Electricity Supply Board
ESBN	Electricity Supply Board Networks
ESRI	Economic and Social Research Institute

etc.	Et cetera (and the rest)
ETS	Emissions Trading Scheme
EU	European Union
EWIC	East-West Interconnector
FCC	Fingal County Council
FCDP	Fingal County Development Plan
FRA	Flood Risk Assessment
FRM	Flood Risk Management
FSAI	Food Safety Authority of Ireland
GDA	Greater Dublin Area
GDD	Greater Dublin Drainage
GE	General Employment
Genny	Signal Generator
GFA	Gross Floor Area
GHGs	Greenhouse Gases
GSI	Geological Survey of Ireland
GWB	Groundwater Body
H / h	Height
HA	Highways Agency
ha	Hectares
HGV	Heavy Goods Vehicle
HI	Heavy Industry
hr	Hour
HSA	Health and Safety Authority
HVDC	High Voltage Direct Current
Hz	Hertz
i.e.	id est - "That is"
IAA	Irish Aviation Authority
IAQM	Institute of Air Quality Management
ID	Identifier
IED	Industrial Emissions Directive
IFI	Inland Fisheries Ireland
IGH	Irish Geological Heritage
IGI	Institute of Geologists of Ireland
IHT	Institution of Highways & Transportation
INDCs	Intended Nationally Determined Contributions
IPPC	Integrated Pollution Prevention and Control
ISO	International Organisation for Standardisation
kg	Kilogram

km	Kilometre
kph	Kilometre per hour
kt	Kilotonne
kV	Kilovolts
l	Litres
L	The lesser of the building height or projected building width from a point source used in the odour dispersion model
LA10	The sound level that is exceeded for 10% of the sample period. It is typically used as a descriptor for traffic noise
LA90,T	Background Sound Level - A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T
LAeq,T	Equivalent continuous A-weighted sound pressure level, at the assessment location over a given time interval, T Also known as the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period
LAQM	Local Air Quality Management
LAr,T	Rating Sound Level - Specific sound level plus any adjustment for the characteristic features of the sound
LAX	Sound Exposure Level - noise level associated with an event of short duration. The Sound Exposure Level can be used to calculate the contribution of an event or series of events to the overall noise level in a given period It is the “A-weighted” Sound Exposure Level of the event considered (dB)
LCA	Landscape Character Area
LGV	Light Goods Vehicles
Li	Locally Important Aquifer, bedrock which is moderately productive only to local zones
Ltd.	Limited
m	Metres
M Euros	Million Euros
MAND	Major Accidents and/or Natural Disasters
MCL	Motorcycles
mg	Milligram
ml	Millilitre
mm	Millimetre
mOD	metres Ordnance Datum
MPN	Most Probable Number
MW	Megawatts
N	North (or, in Section 9: Noise and Vibration - The number of events over the course of time period T when calculating the sound exposure level)
N02 / NO2	Nitrite (Nitrogen Dioxide)
N03	Nitrate
N2O	Nitrous Oxide

NECD	National Emissions Ceiling Directive
nfa	Net Floor Area
NH3	Ammonia
NHA	Natural Heritage Area
NHWMP	National Hazardous Waste Management Plan
NIAH	National Inventory of Architectural Heritage
NMVOC	Non-methane Volatile Organic Compounds
NO	Nitrogen Oxide
No.	Number
NOX	Nitrogen Oxides
NPF	National Planning Framework
NPWS	National Parks and Wildlife Service
NRA	National Roads Authority
nuim	National University of Ireland, Maynooth
NVMP	Noise and Vibration Management Plan
NW	North West
NWSMP	National Wastewater Sludge Management Plan
O2	Oxygen
OCU	Odour Control Unit
OEE	Office of Environmental Enforcement
OEMP	Operational Stage Environmental Management Plan
OGV	Other Goods Vehicles
OMP	Odour Management Plan
OPW	Office of Public Works
OS	Ordnance Survey
OSCADY	Optimised Signal Capacity And DelaY software
ouE	European Odour Unit
P	Phosphorus
p.	Page
P04	Orthophosphate
Pa	Pascal
PCL	Pedal Cycles
PFRA	Preliminary Flood Risk Assessment
pH	Potential of Hydrogen (scale used to specify acidity or basicity)
Pi	Poor Aquifer, bedrock which is generally unproductive except for local zones
PICADY	Priority Intersection CApacity and DelaY software
Pl.	Planning
pm / PM	After midday
PM10	Particles of dust which are less than 10 microns

PM2.5	Particles of dust which are less than 2.5 microns
pNHA	Proposed National Heritage Area
POP	Persistent Organic Pollutant
ppm	Parts per million
PPV	Peak Particle Velocity
PRF	Potential Roost Features
PSV	Public Service Vehicles
PSZs	Public Safety Zones
Q Values	Quality Biotic Indices
r1	The distance at which LAX is expressed, where LAX is the sound exposure level
r2	The distance to the assessment location when calculating the sound exposure level
RA	Undeveloped Residential Area
RBP	Renewable BioEnergy Plant
RBSF	Regional Biosolids Storage Facility
RC	Rotary Corehole
Ref.	Reference
RFC	Ratio of Flow to Capacity
RMP	Record of Monuments and Places
ROI	Republic of Ireland
RPG	Regional Planning Guideline
RS	Existing residential area
RSA	Road Safety Authority
RSES	Regional Spatial & Economic Strategies
RU	Rural
S	South
s / sec	Second
SI	Statutory Instrument
SAC	Special Area of Conservation
SAP	Small Area Population
SBR	Sequencing Batch Reactor
SE	South East
SEA	Strategic Environmental Assessment
Seveso	The 'Seveso' Directive applies to around 10,000 industrial establishments across Europe where dangerous substances are used or stored in large quantities, mainly in the chemicals, petrochemicals, storage, and metal refining sectors
SI	Site Investigation
SID	Strategic Infrastructure Development
SIZ	Structure Influence Zone
SLA	Stephen Little & Associates - Chartered Town Planning and Development Consultants

SLR	Company - Environmental Consultants
SMR	Sites and Monuments Record
SO2	Sulphur dioxide
SOPs	Standard Operating Procedures
SPA	Special Protection Area
sqm	Square Metres
SRTM	Shuttle Radar Topography Mission
SSRS	Small Stream Risk Score
ST	Slit Trench
SuDS	Sustainable Drainage Systems
SUR	Standardised Unemployment Rate
SW	Surface Water
SWL m bgl	Standing Water Level, metres below ground level
T	Time Interval
TA Luft limit	Technische Anleitung zur Reinhaltung der Luft (Technical Instructions on Air Quality Control), in short referred to as TA Luft, is a regulation covering air quality requirements—including emissions, ambient exposures and their control methods—applicable to a number of pollutants from a range of stationary sources.
TES Ltd / TES	Company - Environmental Engineering Consultants
The Consultant	A consortium of T. J. O'Connor and Associates, J. B. Barry and Partners, and Royal HaskoningDHV
TIA	Traffic Impact Assessment
TII	Transport Infrastructure Ireland
TP	Trial Pit
tpa	Tonnes Per Annum
TRICS®	Trip Rate Information Computer System
TRL	Transport Research Laboratory
u/s	Up-stream
ug	Microgram
UK	United Kingdom
UK DEFRA	United Kingdom Department for Environment, Food and Rural Affairs
UK DETR	United Kingdom Department of Environment, Transport and the Regions
UKAS	United Kingdom Accreditation Service
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
uS	Micro Seimens
US EPA / USEPA	United States Environmental Protection Agency
UTM	Universal Transverse Mercator
UWWT	Urban Wastewater Treatment
veh	Vehicle

Vo.	Volume
VOCs	Volatile Organic Compounds
W	West
WD	Warehouse and Distribution
WFD	Water Framework Directive
WHO	World Health Organisation
WSSP	Water Services Strategic Plan
WwTP	Wastewater Treatment Plant
µg	Microgram

Section 1: Existing Environment

1.1 Introduction

This Section of the EIAR provides an overview of the existing environment of the Regional Biosolids Storage Facility (RBSF) component of the Proposed GDD Project and the Proposed Upgrade Project. Hereinafter, this component is referred to "the Proposed RBSF Component".

Details of the baseline conditions and existing environment of the specific environmental topics are set out in the respective sections.

1.2 Site Location

The site of the Proposed RBSF Component is located on the western side of the N2 national road and within the townland of Newtown, Dublin 11. It is approximately 1.6 km north of Junction 5 (Finglas) on the M50 motorway and 1.5 km west of Dublin. It is accessible via the R135 regional road. A map showing the location of the site is provided in Figure 1-1.

The site comprises of approximately 11 hectares of relatively flat land, generally between 75 m and 79 m AOD in elevation. The site predominantly consists of overgrown grassland, with existing infrastructure including roads, services, buildings and boundary fencing. The site is bounded by the R135 on its eastern side. To the north lies an area of semi-natural, dry meadow grassland with the N2 dual carriageway beyond. The western boundary is formed by a tributary of the Huntstown Stream, beyond which lies the Huntstown Quarry, which is operated by Roadstone. The southern boundary consists of hedgerows and treelines, beyond which lies the Viridian Huntstown Power Station.

Fingal County Council was granted section 175 approval by ABP (Ref. 06F.EL2045) dated 21 April 2006 for a waste recovery facility at the proposed RBSF site. Certain enabling works, including drainage works, internal access roads, boundary fencing, and electricity and telecommunications infrastructure have been carried out at the proposed RBSF site on the basis of that approval. The enabling works have been taken into account in the assessment of the existing environment at the proposed RBSF site for the purposes of this EIAR. This EIAR is being prepared relative to an application for planning permission to permit the development at the site of the proposed RBSF.

1.3 Surrounding Environment

While the surrounding landscape retains some agricultural and rural characteristics, the presence of the Power Station, quarry and N2 dual carriageway upgrade means that the character of the area can be classified as prominently industrial and employment. This is reflective of the area being zoned under the Fingal County Development Plan 2017-2023 as 'HI' - Heavy Industry, the objective of which is to: "*Provide for heavy industry*."

The site is located within an existing/emerging industrial area that is interspersed with one-off residential properties, comprising one-off housing and isolated ribbon developments. There is a residential property at the eastern boundary of the site. Two further residential properties, at approximately 25 metres from the site boundary, were demolished in March 2018. A development of six residential units on behalf of Peter McVerry Trust (charitable organization for homeless people) is permitted on the site of the demolished properties. The next nearest residential property is 260 m to the north of the site on the other side of the N2 road. The Dog's Trust also has a premises approximately 250 m to the south of the Proposed RBSF Component site.

It is estimated that a further 30 dwellings are sparsely spread over a 1 km radius from the site, generally to the north of the site. The more densely populated areas nearest the Proposed RBSF Component site are located to the south of the M50 motorway, approximately 1.8 km from the site.

The local area is predominantly occupied by industrial facilities, interspersed with small scale commercial and warehousing premises. The Huntstown Power Station and Huntstown Quarry are prominent developments in the area, which are situated beyond the southern and western boundaries of the Proposed RBSF Component.

The Huntstown Power Station, situated to the south of the Proposed RBSF Component is an independent gas generating station. It consists of two combined cycle gas turbine stations with a total generation capacity of 747 megawatts (MW).

The Huntstown Quarry is active and is designated a County Geological Site (CGS) and demonstrates the base of the Tober Colleen Formation where it directly overlies Waulsortian Limestone.

1.4 Environmental Designations

1.4.1 Ecological Designation

The site for the Proposed RBSF Component is not situated within nor adjacent to any designated conservation areas.

The nearest designated site to the Proposed RBSF Component site is the Royal Canal proposed National Heritage Area (pNHA), situated approximately 4 km to the south of the site. In addition, the Proposed RBSF Component is within the catchment of the Ward River which enters the Broadmeadow River north of Swords and ultimately discharges into the Malahide Estuary, a designated European Site under the Habitats Directive.

1.4.2 Landscape Designation

The Fingal County Development Plan 2017-2023 does not identify any Views and Prospects within the locality of the Proposed RBSF Component. The site is not contained within or is not located adjacent to any area of high natural beauty, high quality landscape character, views or prospects, listed buildings, scenic routes or amenity use designated areas.

1.4.3 Geological / Hydrogeological Designations

The Proposed RBSF Component site has no previous historical use that may result in the presence of contaminated ground.

A Locally Important Aquifer underlies the site of the Proposed RBSF Component with bedrock which is moderately productive only in local zones.

The Proposed RBSF Component site is underlain by tills derived chiefly from limestone described as a sandy gravelly CLAY. To the west of the site, the contact between the Waulsortian Limestones of the Feltrim Limestone Formation and the Tober Colleen Formation has been exposed in the roadway into the Central Quarry. This has been listed as part of Irish Geological Heritage (IGH) Programme 8. The IGH

Programme staff have visited the relevant parts of Huntstown Quarry and will ensure that the relevant geological section and rock exposure will be maintained.

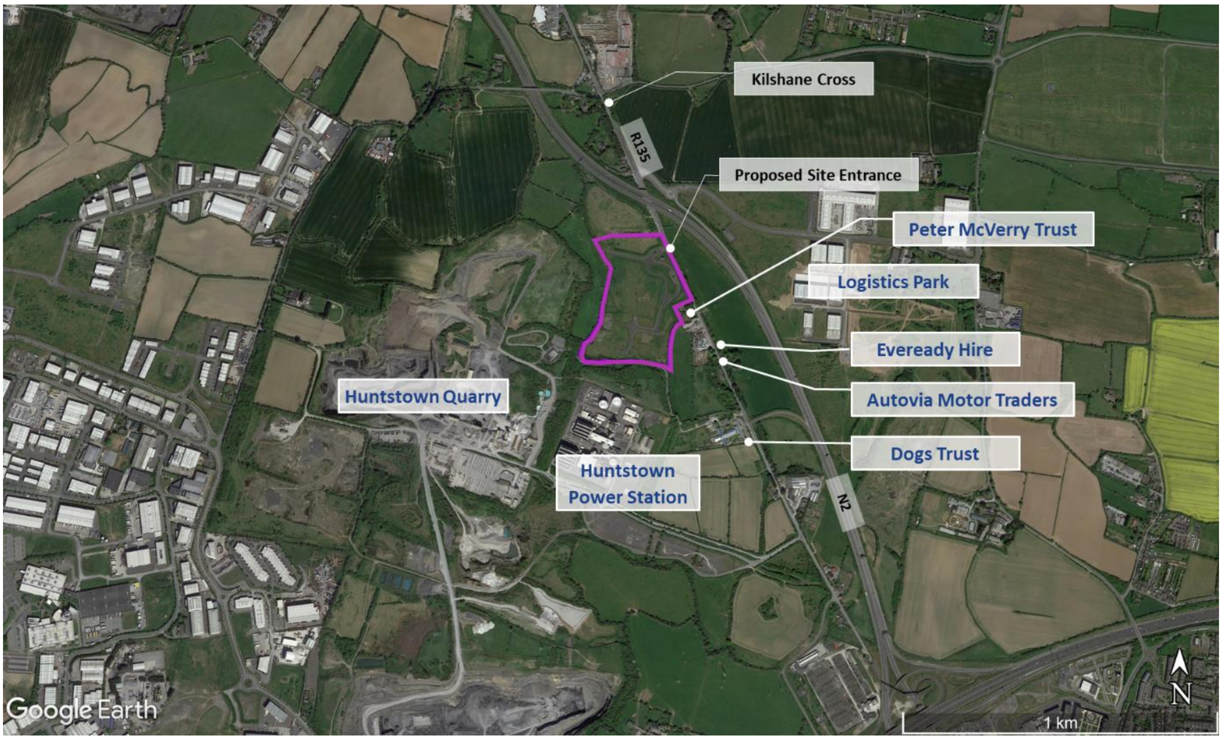

Figure 1-1: Site location map

1.5 References

Fingal County Council, (2017). *Fingal Development Plan 2017-2023*. [Online] Available at: https://www.fingal.ie/planning-and-buildings/development-plans-and-consultations/fingaldevelopmentplan2017-2023/.

Section 2: Planning and Policy Context

2.1 Introduction

This Section of the EIAR considers both the Strategic Policy and supplementary planning and development policies, which guide wastewater infrastructure. This Section also identifies the planning application history for both the Proposed RBSF Component site and its surrounding context. As shown in Figure 2-1 below, the hierarchy of planning policy is examined from the European, national and regional level down to the local level.

The details of the Environmental Impact Assessment (EIA) process are set out in Volume 2, Section 2: The EIA Process of this EIAR. This Section is focused solely on the governing planning policies and therefore does not intend to re-state the above process.

The Regional Biosolids Storage Facility (RBSF) component of the Proposed GDD Project (hereinafter: "the Proposed RBSF Component") is also guided by a wide range of water and wastewater legislation and strategies. These are set out in Section 2.2. A number of national and regional planning policy documents relating primarily to the Proposed GDD Project are already referenced in the Planning Report for the Proposed GDD Project. As the need for the RBSF arises directly from the production of the biosolids at wastewater treatment plants, these remain an important context for the Proposed GDD Project as a whole. It is not however intended to repeat those policy contexts here, rather reliance will be placed upon earlier references to these national and regional planning policy contexts in this EIAR.

European Policy Framework

Urban Waste Water Treatment Directive (91/271/EEC), Water Framework Directive (2000/60/EC).

National Policy Framework

National Planning Framework – Ireland 2040, National Development Plan 2018 – 2027, National Wastewater Sludge Management Plan.

Regional Policy Framework

The Regional Planning Guidelines for the Greater Dublin Area, Eastern-Midlands Region Waste Management Plan 2015 – 2021.

Local Policy Framework

Fingal County Development Plan 2017 – 2023.

Figure 2-1: Planning and Policy Context Hierarchy

2.2 Planning and Development Policy Framework

2.2.1 European Policy Framework

2.2.1.1 Urban Waste Water Treatment Directive

The Urban Waste Water Treatment Directive seeks to protect the environment from the adverse effects of wastewater discharges through ensuring appropriate collection and treatment of wastewater from urban areas before discharge of treated wastewater back into the water environment.

Irish Water is responsible for the collection, treatment and discharge of urban wastewater. It does so through the provision of sewerage systems to collect and transfer wastewater, the treatment of this wastewater in wastewater treatment plants, and the subsequent discharge of treated effluent back to the water environment (i.e. rivers, lakes or the sea).

There is no discharge of effluent from the Proposed RBSF Component into adjoining water bodies. The Proposed RBSF Component is an essential element the Proposed GDD Project to ensure that effluent discharged at the Proposed GDD WwTP meets the appropriate quality standards, the details of which are set out in Volume 3, Section: 4 Water.

The development of the Proposed RBSF Component will facilitate the upgrade of the Ringsend WwTP, thereby enabling compliance with the Urban Waste Water Treatment Directive.

2.2.1.2 Water Framework Directive

The delivery of water and wastewater services in Ireland takes place within the framework of EU water policy and legislation, which aims to protect public health and the water environment. The delivery of wastewater treatment in such areas must be consistent with achieving the appropriate water quality for such areas which primarily relate to the protection of human health.

The overarching aim of the Water Framework Directive (WFD) is to achieve at least 'good' status for all water bodies. It aims to do so by ensuring effective water management based on river basins and catchments, and by ensuring the sustainable use of water.

There is no discharge of effluent from the Proposed RBSF Component into adjoining water bodies. The Proposed RBSF Component is an essential element the Proposed GDD Project to ensure that effluent discharged at the Ringsend WwTP meets the appropriate quality standards, the details of which are set out in Volume 3, Section: 4 Water.

The development of the Proposed RBSF Component will facilitate the upgrade of the Ringsend WwTP, thereby enabling compliance with the Water Framework Directive.

2.2.2 National Policy Framework

2.2.2.1 National Planning Framework – Ireland 2040

The National Planning Framework (NPF) was published by the Government of Ireland in February 2018. The NPF will shape the direction of development at a national scale, and subsequently direct the Regional Assemblies in preparing the Regional Spatial & Economic Strategies (RSES), which will supersede the present Regional Planning Guidelines in due course.

The NPF refers to the overall Ringsend Proposed GDD Project in *National Strategic Outcome 9* relevant to the project, including:

"Water

Implement the Greater Dublin Strategic Drainage Study, through ***enlarging capacity in existing wastewater treatment plants (Ringsend****) and providing a new treatment plant in North County Dublin - known as the Greater Dublin Drainage Project (GDD) Project."* pg. 148 (Highlights ad

"Effective Waste Management

Waste planning in Ireland is primarily informed by national waste management policies and regional waste management plans. Planning for waste treatment requirements to 2040 will require:

- ***Additional sewage sludge treatment capacity*** *and a* ***standardised approach to managing wastewater sludge*** *and including options for the extraction of energy and other resources.* (Highlights added)
- *Biological treatment and increased uptake in anaerobic digestion with safe outlets for bio stabilised residual waste."* pg.149

The NPF therefore recognises the importance of the Proposed Ringsend WwTP Component upgrade works as a piece of nationally strategic infrastructure to ensure the growth of greater Dublin occurs in a sustainable manner. The ancillary requirement to manage wastewater sludge associated with the Ringsend WwTP arises in that context.

The Proposed RBSF Component is an essential component of the upgrade to the Ringsend WwTP. The NFP recognises the importance of this piece of strategic infrastructure to ensure the growth of the GDA occurs in a sustainable manner.

The development of the Proposed RBSF Component will facilitate the upgrade of the Ringsend WwTP, which is in accordance with the National Planning Framework.

2.2.2.2 National Development Plan, 2018 - 2027

The Government has recently approved the National Development Plan, 2018 - 2027. This provides a 10 year investment plan which aligns with the objectives of the National Planning Framework - Ireland 2040 (NPF) that was approved by the Government in February 2018.

The National Development Plan, 2018 - 2027 identifies the "*Strategic Investment Priorities 2018 - 2027*" under *National Strategic Objective 9* which relates to *"Sustainable Management of Water and other Environmental Resources".* Here it states that:

"Investment in our country's water services is critical in meeting the needs of our growing economy across the regions, of our people and their health and the protection and enhancement of the quality of our environment and ensures public health.

- *Water Infrastructure Irish Water Investment Programme*
- *Eastern and Midlands Water Supply Project*
- *Greater Dublin Drainage Project*
- *Rural Water Investment Programme"*

Under **'Waste Management and Resource Efficiency'** under *National Strategic Objective 9* on page 85 of the National Development Plan, 2018-2027 it states that:

"Investment in ***waste management infrastructure*** *is critical to our environmental and economic well-being for a growing population and to achieving circular economy and climate objectives"*

The development of the Proposed RBSF Component, in conjunction with the Proposed Ringsend WwTP Component, is consistent with National Strategic Objective 9 of the National Development Plan.

2.2.3 Supplementary National Framework

2.2.3.1 National Wastewater Sludge Management Plan

In accordance with the objectives of Irish Water's WSSP, a National Wastewater Sludge Management Plan (NWSMP) aims to ensure that the management of wastewater sludge over the next 25 years is standardised nationwide. This Plan was published in September 2016. The objectives under this Plan are:

- To avoid endangering human health or harming the environment;
- To maximise the benefits of wastewater sludge as a soil conditioner and source of nutrients;
- To ensure that all regulatory and legislative controls are met, and due regard is taken of non-statutory Codes of Practices and industry guidance;
- To establish long term, secure and sustainable disposal routes and outlets;
- To ensure cost-effective and efficient treatment and reuse/disposal techniques;
- To reduce potential for nuisance from sludge transport and sludge facilities;
- To extract energy and other resources where economically feasible; and
- To drive operational efficiencies, e.g. through use of Sludge Hub Centres.

In the operation of the Proposed WwTP Component, the wastewater treatment process generates sludge which then requires further treatment to produce biosolids. In practice, any further treatment required is occurring at the Ringsend WwTP at present and this will continue to be the case in the future. Notwithstanding this, the NWSMP sets out that alternative options will be investigated on an ongoing basis in order to reduce the current dependence on agricultural reuse and that further research into alternative reuse outlets will be undertaken to assess options, including a financial evaluation and consideration of wider environmental impacts including biodiversity, water, soils, human health and food safety. The process at the wastewater treatment plant generates sludge which then requires further treatment to produce a biosolids by-product suitable for land spreading as fertilizer on agricultural lands. This further treatment will occur at Ringsend WwTP prior to being transported to the Proposed RBSF Component. In the operation of the Proposed GDD Project, the biosolids by-product is stored prior to being collected to be used for land spreading as fertilizer on agricultural lands.

As set out in Section 7.3.5 Sludge Storage Facilities of the NWSMP there is a requirement for storage of sludge being used for land spreading during the periods when application of fertilisers to land is prohibited in accordance with SI 31/2014 European Union (Good Agricultural Practice for Protection of Waters) Regulations 2014, as amended by SI 134/2014 and SI 463/2014. In order to ensure storage requirements for sludge are met nationally, additional sludge storage facilities are required to facilitate the predicted increase in wastewater sludge as new and upgraded treatment plants are completed.

Sludge Storage Facilities will no longer be considered solely on a per-plant or per-county basis. Where appropriate, Sludge Storage Facilities will be developed to serve a number of local plants and/or a wider regional need. In particular, the Proposed GDD Project and the Proposed Upgrade Project will result in a significant increase from current sludge volumes with a consequent increase in storage requirements. Therefore, a dedicated sludge storage facility should be developed in conjunction with the Proposed GDD Project to meet its requirements and take account of other future needs in the region.

The need for increased storage capacity is identified in Section 7.4.8 of the NWSMP which details that the Sludge Hub Centre in Ringsend will be retained and upgraded, as necessary, during the upgrade of the wastewater treatment plant. Due to space limitations on the site in Ringsend, any such storage facilities are required to be located at a separate site to the existing wastewater treatment plant site.

As part of the Proposed GDD Project, a new Regional Biosolids Storage Facility is to be developed. Volume 2, Chapter 4: Description of the Proposed Project and the entire Volume 4 (this Volume) outlines the specific environmental aspects relating to this new facility (the Proposed RBSF Component).

The development of the Proposed RBSF Component is in accordance with the National Wastewater Sludge Management Plan.

2.2.4 Regional Policy Framework

2.2.4.1 The Regional Planning Guidelines for the Greater Dublin Area 2010 - 2022

The Regional Planning Guidelines (RPGs) for the Greater Dublin Area (GDA) provide a long-term sustainable planning framework for the GDA. The GDA area covers 7 no. Local Authorities, namely Dublin City, Dún Laoghaire-Rathdown, Fingal, South Dublin, Kildare, Meath and Wicklow. The Guidelines have a statutory basis in the Planning and Development Act 2000, as amended, ensuring Local Authorities, in the formulation of the Development Plan Core Strategy, incorporate these guiding framework principles. This provides a strategic context for Development Plans and in turn creates co-ordinated investment in the provision of essential Infrastructure.

The RPGs note that the wastewater treatment network in the GDA is a mix of one major facility (at Ringsend) serving an area mostly comprised of the metropolitan area. The plan identifies that existing provision has only kept pace with the levels of growth. In this regard, the plan states that:

> *"the need for investment in new treatment facilities to serve the GDA is both pressing an immediate as key existing facilities and networks are reaching capacity."* pg. 128

In order to meet the future needs of the GDA, in recognition of the existing capacity, the strategy of the RPGs as outlined under Section 6.5.1 of the plan, Strategic Policy PIP3, seeks to:

> *"Protect and work to improve water quality in, and impacted by, the GDA and seek that investment in water and surface water treatment and management projects is prioritised to support the delivery of the economic and settlement strategy for the GDA through the coordinated and integrated delivery of all essential services supporting national investment"*

The development of the Proposed RBSF Component will facilitate the upgrade of the Ringsend WwTP, which is in accordance with the Regional Planning Guidelines for the Greater Dublin Area, 2010 - 2022.

2.2.4.2 Eastern-Midland Region Waste Management Plan 2015 - 2021

Waste Management Plans are statutory planning documents which set out the policies for the development of waste treatment infrastructure and sit on the same tier as the City and County Development Plans as a statutory plan. In the event of a conflict arising between an objective in the waste plan and that of a City or County Development Plan, the waste plan objectives take precedence[1]. The NWSMP discussed above, sits beneath the Eastern-Midland Region Waste Management Plan (EMRWMP) 2015 - 2021 in terms of the hierarchy of waste management plans.

The strategic vision of the Waste Management Plans is to rethink the approach to managing waste, by viewing waste streams as valuable material resources. Making better use of our resources and reducing the leakage of materials, as wastes, from our economies will deliver benefits economically and environmentally to the region.

Section 2.3 of the EMRWMP sets out a range of waste planning documents which interact with the EMRWMP. The NWSMP is a document which is recognised as a component of the waste plan.

Section 7.4.7 of the EMRWMP notes that the management of sludge will be co-ordinated between Local Authorities and Irish Water regarding water and wastewater sludges to ensure they are managed in a safe and compliant manner. The following policies are of relevance to the Proposed RBSF Component:

> *H1: "Work with the relevant stakeholders and take measures to ensure systems and facilities are in place for the safe and sustainable management of sludges (sewage, waterworks, agricultural, industrial and septic tank) generated in the region having due regard to environmental legislation and prevailing national guidance documents, particularly in relation to the EU Habitats and Birds Directive."*

Accordingly, the EMRWMP includes 3 no. policy actions arising from policy H1 above. Of these, policy action H.1.1 targets annual meetings between Irish Water and Local Authorities regarding their plan objectives and associated treatment options for sludge waste. The Proposed RBSF component is required to ensure that the Proposed GDD Project and the Ringsend WwTP can operate to their maximum potential and to cater for the needs of the region. The biosolids by-product produced at the Proposed GDD Project (and at other WwTPs in the catchment, including the Ringsend WwTP) is to be stored at the Proposed RBSF component prior to being collected to be spread on land as a soil conditioner and fertiliser.

This represents a safe and effective method of sludge/biosolids management which is in line with the policy direction set out in the Eastern-Midland Region Waste Management Plan (EMRWMP). Furthermore, the site for the Proposed RBSF Component represents an effective and compatible use for this site.

The development of the Proposed RBSF Component, in conjunction with the upgrade Ringsend WwTP, is in accordance with the relevant policy of the EMRWMP.

2.2.5 Statutory Local Framework

2.2.5.1 Fingal County Development Plan 2017 - 2023

The Fingal County Development Plan 2017 - 2023 (hereinafter: FCDP) provides the primary local statutory planning policy framework for development for the subject site. It has regard to the higher

[1] *Section 10A (b)(i) Waste Management Act 1996.*

level national and regional strategic guidelines outlined in the above-mentioned points of this Section. Under the plan's current format, there is no local area plan provision for the subject site nor is there a proposed plan in place. The policies, objectives and development standards of the FCDP that are of relevance to the Proposed RBSF Component are set out below.

Core Strategy

The Core Strategy is intended to set out the key strategies for the administrative area of Fingal County in line with the growth targets set out in the Regional Planning Guidelines for the Greater Dublin Area (GDA).

As set out under Section 2.6:

> *"The emphasis of this Plan is to continue to consolidate the existing zoned lands and to maximise the efficient use of existing and proposed infrastructure." (pg. 35)*

The Proposed RBSF Component will be required to ensure that the Proposed GDD Project can operate efficiently and effectively. The projects combined will provide the wastewater infrastructure that is essential to accommodate the planned growth of the wider GDA and is therefore in accordance with the Core Strategy.

Policy Support for Project

Fingal County Council is committed to working closely with and to support Irish Water in the provision and maintenance of adequate public water and wastewater infrastructure throughout the county.

It is a Strategic Policy consideration contained within the FCDP to support the necessary upgrading of wastewater infrastructure:

> *"Work with Irish Water to secure the timely provision of water supply and drainage infrastructure necessary to end polluting discharges to waterbodies, comply with existing licences and Irish and EU law, and facilitate the sustainable development of the County and the Region."*

The Proposed RBSF Component will be required to ensure that the Proposed GDD Project can operate efficiently and effectively. The projects combined will provide the wastewater infrastructure that is essential to accommodate the planned growth of the wider GDA and is therefore in accordance with the Core Strategy.

It is clear that the Proposed RBSF Component supports the timely provision of drainage infrastructure, which will in turn support the ability of the Ringsend WwTP to operate effectively, thus facilitating the sustainable development of the County and the Region.

Following on from the above strategic policy, the Objectives of the Council are:

> **Objective WT03:** *"Facilitate the provision of appropriately sized and located waste water treatment plants and networks including a new Regional Wastewater Treatment Plant and the implementation of other recommendations of the Greater Dublin Strategic Drainage Study, in conjunction with relevant stakeholders and services providers, to facilitate development in the County and Region and to protect the water quality of Fingal's coastal and inland waters through the provision of adequate treatment of wastewater." (p. 263)*

The above Objective, as set out in the FCDP, supports the development of appropriate infrastructure including wastewater infrastructure and associated Proposed RBSF Component which will support the proper and sustainable growth of the County.

Land Use Zoning of the Subject Site

The Proposed RBSF component is on lands zoned 'HI' - Heavy Industry, the objective of which is: "*Provide for heavy industry*." The extent and scale of the zoned areas is shown in Figure 2-2. Under 'HI' zoning, the FCDP states:

> *"Facilitate opportunities for industrial uses, activities and processes which may give rise to land use conflict if located within other zonings. Such uses, activities and processes would be likely to produce adverse impacts, for example by way of noise, dust or visual impacts. HI areas provide suitable and accessible locations specifically for heavy industry and shall be reserved solely for such uses." (pg. 366)*

'A Waste Disposal and Recovery Facility (High Impact)' is a permissible use within this zoning designation as illustrated in Table 2-1. From a land-use perspective, the development of the Proposed RBSF Component, considering the likely activities arising would be compatible with this zoning.

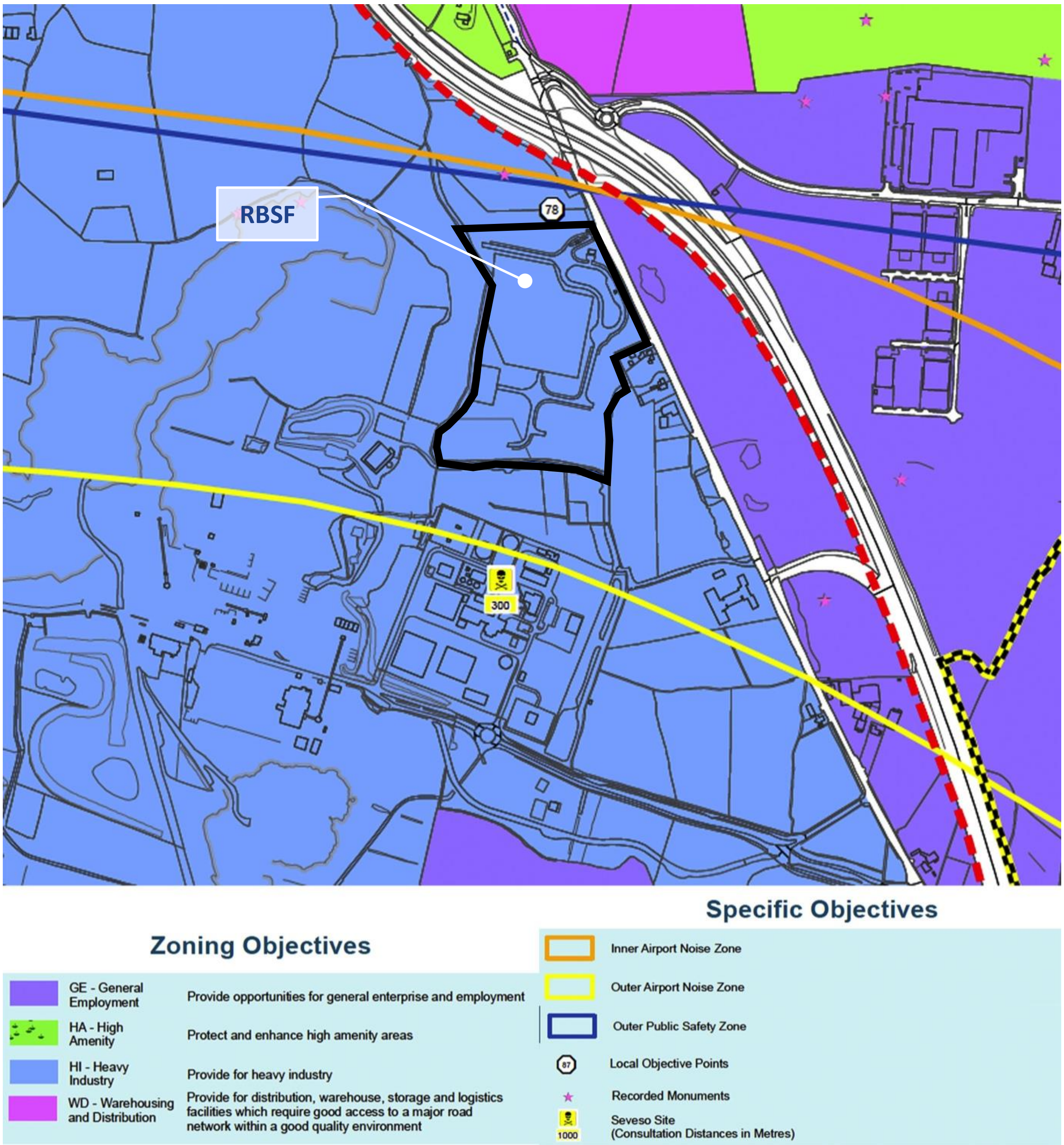

Figure 2-2: Land Use Zoning Map (RBSF site outlined in black. Source: Fingal County Development Plan, Map 12)

Land Use Zoning Matrix for the Subject Site

The purpose of zoning is to indicate the land use objectives for all the lands within the Fingal County. The following Table 2-1 sets out the types of development that are considered compatible with the associated land-use zoning (Permitted in Principle) and uses which are considered incompatible with the associated land use zoning (Not Permitted).

Table 2-1: 'HI' Zoning Matrix under the Fingal County Development Plan 2017 - 2023 pg.366

	Zoning Objective – 'HI'
Permitted in Principle	Abattoir, Concrete/Asphalt, Extractive Industry/Quarrying, Fuel Depot/Fuel Storage, Heavy Vehicle Park, Industry - High Impact, Office Ancillary to Permitted Use, Open Space, Plant Storage, Restaurant/Café, Retail - Local < 150 sqm nfa, Sustainable Energy Installation, Telecommunications Structures, Utility Installations, **Waste Disposal and Recovery Facility (High Impact).**

	Zoning Objective – 'HI'
Not Permitted	Aerodrome/Airfield, Agricultural Buildings, Agricultural Farm Supplies, Agricultural Machinery Sales and/or Maintenance, Agri-Tourism, Air Transport Infrastructure, Amusement Arcade, Bed and Breakfast, Betting Office, Boarding Kennels, Builders Provider/Yard, Burial Grounds, Car Hire Holding Area, Caravan Park - Holiday, Caravan Park - Residential, Cargo Yards, Carpark - Non-Ancillary, Casual Trading, Childcare Facilities, Civic Waste Facility, Community Facility, Conference Centre, Cultural Facility, Dancehall/Nightclub, Education, Enterprise Centre, Exhibition Centre, Fast Food Outlet/Take-Away, Farm Shop, Food, Drink and Flower Preparation/Processing, Funeral Home/Mortuary, Garden Centre, General Aviation, Golf Course, Guest House, Health Centre, Health Practitioner, High Technology Manufacturing, Holiday Home/Apartments, Home-Based Economic Activity, Hospital, Hotel, Industry – General, Industry - Light, Logistics, Office ≤100sqm, Office >100sqm and <1,000sqm, Office ≥1,000sqm, Park and Ride Facilities, Petrol Station, Place of Worship, Public House, Public Transport Station, Recreational, Facility/Sports Club, Residential, Residential Care Home/Retirement Home, Residential Institution, Retail - Convenience ≤ 500 sqm nfa, Retail - Comparison ≤ 500 sqm nfa, Retail - Comparison >500sqm nfa, Retail - Supermarket ≤ 2,500 sqm nfa, Retail - Superstore > 2,500 sqm nfa, Retail - Hypermarket > 5,000 sqm nfa, Retail - Factory Outlet Centre, Retail Warehouse, Retail - Warehouse Club, Retirement Village, Sheltered Accommodation, Taxi Office, Traveller Community Accommodation, Vehicle Sales Outlet - Small Vehicles, Vehicle Sales Outlet - Large Vehicles, Veterinary Clinic, Warehousing, Wholesale.

(Note: Highlight in bold added)

Irish Water undertook a site selection process in order to identify a suitable site for the Proposed RBSF Component including public consultation. Copies of the associated reports are located under Volume 2, Part B: Appendices 4D, 4E and 4F of the EIAR. In summary, the stages of this process are described as follows:

Stage 1: A site selection methodology was developed and included the identification of site selection considerations and criteria.

Stage 2: Suitable locations for the Proposed RBSF Component were identified by applying the site selection considerations and criteria together with any other relevant factors for assessment. From this process a shortlist of potentially suitable sites emerged.

Stage 3: The shortlist of suitable sites was subject to a detailed assessment to identify any impacts of the Proposed RBSF Component on the local community and wider area. The sites were evaluated and the most suitable site is identified.

Biosolids, or sludge, originating from the WwTP process is classified as a waste in the EPA's 'Waste Classification' document (2015). Specifically, *Code 19 08 05* in Appendix 1 'List of Waste' of the EPA document confirms "*sludges from treatment of urban waste water*" is a form of waste.

The NWSMP considers all aspects of wastewater sludge management, including treatment, transport, storage and reuse/disposal. The NWSMP identifies reuse of treated wastewater sludges (biosolids) on agricultural land (under nutrient management plans) as the preferred outlet in the short to medium term. However, there are constraints on land spreading due to legislative requirements and seasonal factors and as such, the biosolids must be stored for periods during the winter and summer months, pending transfer to land spreading. Also, there are practical seasonal requirements for farmers who typically require the product in the spring and autumn sowing seasons.

There are strict procedures for agriculture re-use of biosolids set out under legislative and regulatory framework as follows:

- Waste Management (Use of Sewage Sludge in Agriculture) Regulations, 1998 (SI 148 of 1998);
- Code of Good Practice for the Use of Biosolids in Agriculture (DoELG, 1999); and
- The Food Safety Authority of Ireland (FSAI) guidance document for land spreading in relation to food safety.

In setting out a methodology for the identification of suitably zoned lands within the catchment of the Ringsend WwTP and the Proposed GDD Project, it was considered that in terms of land use planning, the Proposed RBSF Component can be considered to be a 'waste storage facility'. The activity at the facility is a waste management operation involving the temporary storage of a waste product pending its final recovery to lands, resulting in benefit to agriculture or ecological improvement. No processing (including recovery) will take place at the Proposed RBSF Component.

A 'Biosolids Storage Facility' as a land use classification is not expressly defined within the FCDP. The land use definition which most closely aligns with the Proposed RBSF Component is a 'Waste Disposal and Recovery Facility (High Impact)'.

Under the Appendix 4, Technical Guidance Notes, of the Fingal County Development Plan Appendices, *Waste Disposal/Recovery Facilities (High Impact)* is described as:

> *"The use of land or buildings for facilities with high potential for odour, noise, dust and other nuisances including putrescible waste. Examples of high impact facilities are transfer stations and treatment plants for organic waste and residual waste which have a potential for odour, crushing and processing of construction and demolition waste, and facilities where waste is stored outside of buildings and which is visually intrusive or otherwise likely to be a nuisance, including scrapyards. Excludes landfills."* (Highlights added)

In discussion with Fingal County Council as part of the site selection process for this EIAR, the Council have confirmed that their view is that the Proposed RBSF Component falls into the category of "*Waste Disposal and Recovery Facility (High Impact)"* and is therefore permitted in principle at this location. A copy of the site selection reports can be found at in Volume 2, Part B: Appendix 4D, 4E, 4F.

Fingal County Council submitted in the site selection process that the Proposed RBSF Component aligned with the land use definition for 'Waste Disposal and Recovery Facility (High Impact)'. In addition, they considered it to have the potential for 'high impact' on the basis that the Proposed RBSF Component had potential for high impact arising from traffic generated, noise, odour, air quality and visual impact (of the proposed structures). While there is potential for impacts to arise, there are a number of robust mitigation measures included as part of the Proposed RBSF Component to ensure that the impacts are limited.

The details of these specific impacts and the proposed mitigation measures are discussed in detail under Volume 4, Section 4: Water, Volume 4, Section 8: Air and Climate, Volume 4, Section 9: Noise and Vibration, Volume 4, Section 10: Odour, Volume 4, Section 13: Traffic and Volume 4, Section 14: Landscape.

The Proposed RBSF Component can be considered as 'Permitted In Principle' under the land use zoning objectives of the FCDP given the nature of the development. Furthermore, the site sits within an area that is industrial in nature which includes an existing quarry (to the west) and electricity power station (to the south).

The development of the Proposed RBSF Component on this site is consistent with land use zoning objective for these lands contained within the Fingal County Development Plan 2017-2023.

Local Objective

Appendix 2 of the FCDP refers to Local Objective 78, which states:

> *"Facilitate the development of infrastructure for waste management, including construction and demolition waste processing, biological treatment of organic waste, a sludge treatment facility and a waste transfer station."*

This Local Objective is identified at the boundary of the Proposed RBSF Component site. It is reasonable to conclude that the Objective relates to the Proposed RBSF Component site. The Planning History of this site further supports that contention.

The Proposed RBSF Component can be considered as a 'waste transfer facility' and represents the 'development of infrastructure for waste management'. A waste transfer facility has been permitted at the Proposed RBSF Component site in the past, as outlined in more detail under Planning History, Section 2.3 below.

The development of the Proposed RBSF Component on this site is consistent with the provisions of Local Objective 78 which provides for a range of uses on these lands, including the management of waste; in this case a waste by-product called biosolids.

Surrounding Land Use Zoning

The site of the Proposed RBSF Component is located in an area that has established heavy industry uses. The site identified for the Proposed RBSF Component is adjacent to the Roadstone quarry to the east and the Huntstown Power Station to the south and is within a wider area identified for similar uses.

There are 3 no. residential units adjacent the eastern boundary of the Newtown site, 2 no. which appear to be vacant. These residential units are currently within the 'HI' land use zoning.

The lands located on the eastern side of the R135 are zoned 'GE' - General Employment, the objective of which is:

> *"Provide opportunities for general enterprise and employment."*

The development of the Proposed RBSF Component does not prejudice adjoining Land Use Zoning.

Aviation Policies and Objectives

The site lies just to the south of the Airport Safety Zone associated with the runway activities at Dublin Airport. Dublin Airport lies to the east of the Proposed RBSF Component lands. Two Airport Noise Zones are shown in the FCDP zoning maps; an Outer Zone within which the Council will continue to restrict inappropriate development and an Inner Zone within which new provisions for residential development and other noise sensitive uses will be actively resisted.

The objectives of the council are:

> **Objective DA10:** *"of the Fingal County Council Development Plan 2017 - 2023 outlines the Council's intention to restrict development which would give rise to conflicts with aircraft movements on environmental or safety grounds on lands in the vicinity of the Airport and on the main flight paths serving the Airport, and in particular restrict residential development in areas likely to be affected by levels of noise inappropriate to residential use."*
>
> **Objective DA16:** "*of the Fingal County Council Development Plan 2017 - 2023 seeks to continue to take account of the advice of the Irish Aviation Authority with regard to the effects of any development proposals on the safety of aircraft or the safe and efficient navigation thereof."*

The Proposed RBSF Component site falls within the Outer Airport Noise Zone (yellow line - Figure 2-2) and outside the Inner Airport Noise Zone (orange line - Figure 2-2).

In relation to Public Safety Zones, the FCDP notes that the Council will continue to follow the advice of the Irish Aviation Authority (IAA) regarding the effects of proposed development on the safety of aircraft and the safe and efficient navigation thereof. This includes promotion of appropriate land use patterns in the vicinity of the flight paths serving the Airport. The northern edge of the Proposed RBSF Component site falls outside the Outer Public Safety Zone (blue line - Figure 2-2) by c. 100 m and is therefore also outside the Inner Public Safety Zone (purple line) as a result. We can conclude therefore that the Proposed RBSF Component site falls outside the flight path to the existing east-west runway at Dublin Airport.

Fingal County Council will continue to follow the advice of the Irish Aviation Authority and the Dublin Airport Authority regarding the effects of proposed development on the safety of aircraft and the safe and efficient navigation thereof. Irish Water wrote to the Irish Aviation Authority (IAA) and Dublin Airport Authority (DAA) as part of the scoping phase of the preparation of the EIAR. The DAA responded with some guidance on drainage, crane heights, sound insulation for buildings. The IAA raised no objection to the Proposed RBSF Component in principle, subject to detailed requirements in relation to drainage, crane height sound insultation and the glint and glare study.

The development of the Proposed RBSF Component is considered to be in accordance with the aviation policies and objectives of the Fingal County Development Plan 2017 - 2023.

Seveso Directive Site

The Zoning Maps of the FCDP identify the location of "Seveso" designated sites with a yellow symbol (see Figure 2-2). Directive 2012/18/EU (SEVESO III) provides that appropriate consultation distances must be put in place so as to ensure that before decisions are taken, technical advice is available to Planning Authorities in respect of relevant establishments. The Health and Safety Authority provides such advice, where appropriate, in respect of planning applications within a certain distance of the perimeter of these sites.

The Seveso consultation distance applicable to the Huntstown Power Station is stated in the FCDP as being 300 m from the perimeter of the site (see Figure 2-3).

The northern perimeter of the Huntstown Power Station is located approximately 100 m from the southern boundary of the Proposed RBSF Component site. The Proposed RBSF Component structures, at their nearest point, are located approximately 310 m away from the northern perimeter of the Huntstown Power Station. While the site for the Proposed RBSF Component is within the Seveso consultation distance for the Huntstown Power Station the proposed structures themselves fall outside the 300 m consultation distance.

The development permitted previously on these lands under An Bord Pleanála Ref. PL06F.EL.2045 included structures that were within this 300 m consultation distance. Permission was granted for that development, notwithstanding this was within the consultation distance.

The Proposed RBSF Component structures are located outside of this consultation distance. Whilst the southern portion of the site is within the consultation zone, the works proposed in those areas amount to provision of roads and services associated with normal site development works and are not considered to amount to a source of or increase the risk or consequence of a major accident from the planning perspective. As a result, there is no immediate issue arising regarding the proximity of this adjoining Seveso site. The applicant has written to the Health and Safety Authority (HSA) during the Scoping exercise for this EIAR and has yet to receive a reply. In addition, the HSA is listed as a prescribed body by An Bord Pleanála whom we understand An Bord Pleanála will engage with formally, during the SID application process.

The Proposed RBSF Component recognises the existing Seveso site and has been designed to ensure its buildings lie outside the consultation zone.

TABLE 12.13: LIST OF SEVESO SITES IN FINGAL

Establishment	Tier	Consultation Distance
Barclay Chemicals Manufacturing Ltd, T/A Barclay Corp Protection, Damastown Industrial Park, Mulhuddart, Dublin 15	Upper Tier	1,000m
Chemco (Ire) Ltd. T/A Macetown North, Damastown Industrial Estate, Mulhuddart, Dublin 15h	Upper Tier	700m
Contract & General Warehousing Ltd. Westpoint Business Park, Navan Rd. Mulhuddart	Upper Tier	700m
Mallinckrodt Medical Imaging-Ireland T/A Convidien Damastown, Mulhuddart	Upper Tier	1,000m
Astellas Ireland Co., Ltd., Damastown, Mulhuddart	Lower Tier	1,000m
Clarochem Ireland Ltd., (formally Helsinn), Damastown, Mulhuddart	Lower Tier	1,000m
Gensys Power Ltd., T/A Huntstown Power Station, Huntstown Quarry, Finglas, D11	Lower Tier	300m
Swords Laboratories, Watery Lane, Swords	Lower Tier	1,000

(Source HSA June 2016)

Figure 2-3: Extract from Fingal County Development Plan Zoning, Table 12.13 - List of SEVESO Sites, with the Huntstown Power Station (located to the south of the Proposed RBSF Component site) with consultation distance from the perimeter of the Power Station site

Development Management Standards

Under the FCDP 2017 - 2023, there are no specific development management standards attributed to *'A Waste Disposal and Recovery Facility (High Impact)'*.

However, a number of Development Plan objectives are worth referring to:

> **Objective EN05:** *Encourage proposals that are low carbon, well adapted to the impacts of Climate Change and which include energy saving measures and which maximise energy efficiency through siting, layout and design.*

Objective *EN09:* *Require details of the requirements for alternative renewable energy systems, for buildings greater than 1000sq m or residential schemes above 30 units, under SI 243 of 2012 European Communities (Energy Performance of Buildings) to be submitted at pre-planning stage for consideration. These should take the form of an Energy Statement or Feasibility Study carried out by qualified and accredited experts.*

The Proposed RBSF Component buildings have been carefully located on the site having regard to their orientation, aspect and visibility from the public road. The proposals include for the provision of solar panels on the roof of one of the buildings. It has been demonstrated that this will generate substantial portion of the energy requirements for the Proposed RBSF Component. Further details on this can be found in Section 3.8 of the Engineering Design Report accompanying this application.

2.3 Planning Application History

This section will set out the relevant planning history associated with the Proposed RBSF Component site. This comprises of an overview of the planning permission existing on the Proposed RBSF Component site and relevant planning applications on sites directly adjoining the boundaries of the site. The permissions are shown on Figure 2-4 below.

2.3.1 Subject site

The application most relevant to this Proposed RBSF Component is identified below, as it is a current permission for a similar facility on these lands.

2.3.1.1 Current Approval – ABP Reg. Ref. PL06F.EL.2045

Fingal County Council sought approval under Section 175 of the Planning & Development Act 2000, as amended for development comprising:

- A Construction and Demolition Waste Recovery Facility processing 75,000 tonnes per annum (tpa);
- A Biological Waste Treatment Facility treating 45,000 tpa of segregated domestic and commercial organic waste;
- A Waste Transfer Facility processing 65,000 tpa of municipal solid waste; and
- A Sludge Hub Centre treating 26,511 tpa of municipal sludge.

The An Bord Pleanála Inspector noted in relation to the proposal, *inter alia*, that:

"It is considered that, subject to compliance with the Conditions set out in the Schedule…, and to the proposed Recycling Park being constructed and operated in accordance with a Waste Licence from the Environmental Protection Agency, the proposed development:

- *would not have an unacceptable impact on the amenities of residential properties in the vicinity,*
- *would not seriously injure the visual amenities of the area,*
- *would not interfere to any significant extent with exiting land uses in the vicinity,*
- *would not be likely to result in significant adverse effects on the environment,*
- *would not have a significant effect on the archaeological heritage of the area,*
- *would be acceptable in terms of traffic safety and convenience,*
- *would not be contrary to the proper planning and sustainable development of the area."*

Approval was granted by An Bord Pleanála in April 2006. Certain enabling works, including drainage works, internal access roads, boundary fencing, and electricity and telecommunications infrastructure have been carried out at the proposed RBSF site on the basis of that approval. An approval made pursuant to Section 175 of the Planning and Development Act 2000, as amended is of indefinite duration.

The Environmental Protection Agency (EPA) granted a Waste Licence (Waste Licence Register Number: W0223-01) in November 2007 for the operation of the proposed development including the operation of the Sludge Hub Centre proposed. The Licence has since expired.

The proposed development is considered compatible from a land-use perspective and given the established heavy industry use in the general vicinity (e.g. quarry, power station).

2.3.1.2 FCC Reg. Ref. F08A/0624

Permission was sought by Electricity Supply Board (ESB) to divert a section of the existing Finglas-Ashbourne 38 kV line. The diversion required the installation of 2 no. 38 kV 12 Metre Line Termination Masts, under the existing Finglas-Ashbourne 38 kV Line, and this will be located in the Townland of Newtown, Barony of Coolock. The diversion will also require the replacement of an Existing Single Wood Pole with a Double Wood Portal, under the existing Finglas-Ashbourne 38 kV Line and this will be located in the Townland of Kilshane, Barony of Castleknock.

Fingal County Council granted permission on 06 August 2008.

Figure 2-4: Planning Permissions adjoining site of Proposed RBSF Component

2.3.2 Developments in the Surrounding Area

2.3.2.1 FCC Reg. Ref. FW13A/0089/E1

An Extension of Duration for 5 Years was sought by Viridian Renewables ROI Limited for the construction of a Renewable Bioenergy Plant to generate up to 3.8 MW of electricity from 90,000 tonnes of non-hazardous biodegradable waste per annum utilising Anaerobic Digestion (AD) technology.

The proposed plant will comprise the following elements:

i) 13.9 m high main building (4958.5 sq. m. floor area) incorporating feedstock reception and processing areas, digestate treatment areas, storage areas, workshop and including a 3-storey administration and welfare area (1744.8 sq. m. floor area);
ii) Digestion Tank Farm (4 m high bund) enclosing 4 no. digester tanks (up to 25.4 m max. height, c.5000 m^3), 2 no. digestate treatment tanks (up to 25.4 m max. height, c.5000 m^3), 2 no. digester feed buffer tanks (up to 17.6 m max. height, 1800 m^3), and 2 no. pre-pasteurisation tanks (up to 12.8 m max. height, 700 m^3) [total 10 no. tanks], to include stairwell towers and gantries;
iii) Wastewater Treatment Plant Tank Farm (4 m high bund) enclosing 3 no. SBR Aeration tanks (up to 16.0 m max. height, c. 2200 m^3), sludge tank (up to 10.8 m max. height, c.75 m^3), process water tank (up to 22.9 m max. height, 2000 m^3) and process liquor tank (up to 22.6 m. max. height, 2400 m^3) [total 6 no. tanks], to include stairwell towers and gantries;
iv) 2 no. enclosed Combined Heat and Power 2 MW engines (3.6 m high: 65.8 sq. metres floor area each), 28 m high stack, 13.7 m high gas holder (1800 m^3), 8.2 m high biogas flare stack, 2 no. 12 m high gas scrubbers, gas treatment equipment enclosed in 1.8 m high container (30.6 sq. m floor area) and 2.5 m high container (78.8 sq. m floor area), 3 no. bunded electrical transformers (4.8 m high) and 3.0 m high sub-station (51.9 sq. m. floor area);
v) Various plant and vessels including 2 no. pasteurisation units (5.85 m high) each containing heat exchanger and 3 no. c. 24 m^3 tanks, 2.5 m high ferric chloride storage tank (c.15 m^3), 5 m high caustic storage tank (c.35 m^3), storm water tank (up to 21 m max. height, c. 2000 m^3), 4 no. liquid waste tanks (up to 10.5 m max. height, c. 90 m^3), enclosed pump equipment (2 m high, 10 sq. m floor area), boiler, and enclosed air blower unit (3 m high, 36 sq. m floor area);
vi) Odour Control System (15.7 m high: 313.8 sq. m. floor area) and 25 m high stack;
vii) Approx. 100 mm diameter 1000 m long rising main with connection into existing mains sewer at North Road, and package pumping station (2 m high: 29.7 sq. m. floor area); and
viii) 2 no. weighbridges, office (17.2 sq. m. floor area), bunded vehicle refuelling area with diesel storage tank (c.5000 litres), 2 no. wheel washes and vehicle wash, inner and outer 2.4 m high mesh panel perimeter fencing with 7 m wide entrance gate and 5.5 m wide exit gate, 5 no. directional signs (total area of 8.8 sq. m), pipebridge and walkway, lighting, landscaping, 22 no. car parking spaces and bicycle rack, internal circulation roads, concrete foundation slabs and all site works, facilities and services. Access is at an existing permitted vehicular access at North Road and vehicles will avail of existing quarry circulation roads.

Fingal County Council granted the Extension of Duration for 5 Years on 19 January 2018.

2.3.2.2 FCC Reg. Ref. F18A/0146

Permission was sought by Rohan Holdings Ltd. for a storage and distribution centre for new imported vehicles with a total capacity for 5,951 no. vehicles and comprises vehicle storage, internal circulation roadways, vehicle loading and unloading area and transporter parking spaces. The surface treatment of the vehicle storage areas comprises recycled plastic modular porous paving. Associated facilities include: a vehicle wash area, fuelling area and valet enclosure (approx. 120 sq.m.). The development also includes a vehicle inspection and fit out building (approx. 2656 sq.m. and 9.14 m high) incorporating operation control room, offices, meeting room, canteen, toilets, plant area and building signage. Other site development works include: 1 no. security hut (11 sq.m); staff car parking (28 no. spaces) and staff bicycle parking spaces (14 no. spaces); boundary treatments including landscape berm and boundary fence over wall (approx. 3.33 m high) new primary gated vehicular entrance onto the R135; emergency gated vehicular entrance onto Kilshane Road (L3125); lighting and CCTV poles (approx. 12 m high); on-site substation (24.6 sq.m); external plant area (76 sq.m.); underground drainage and electricity infrastructure; the removal of existing vegetation and new landscaping works. The development also includes road improvement works to the Kilshane Road (L3125) comprising the reconfiguration of the existing roadway (including extending existing culvert); provision of a left turn lane at the junction with the R135; and dedicated cycle and pedestrian facilities. All development is to take place on a site of approx. 13.1 hectares.

Fingal County Council granted permission on 16 May 2018.

The proposed development in this case is located on the opposite side of the R135 to the Proposed RBSF Component site.

2.3.2.3 FCC Reg. Ref. F16A/0128

Permission was sought by Rohan Holdings Ltd. for development comprising four single storey units for industrial and/or warehouse use with ancillary two storey office with a gross floor area of 15,692 square metres. The development will also include two ESB sub-stations, ancillary site development works for underground duct work, drainage and utility services, service yards, car parking, signage to the proposed units, the extension of Birch Drive to the east and to the west linking back to Elm Road and a new separate access road off Elm Road, on a site of 3.52 hectares.

Fingal County Council granted permission on 28 June 2016.

A Commencement Notice for this development been submitted to the Building Control Management System (BCMS) on 19 December 2017 with works due to commence on 15 January 2018.

The development in this case is located on the opposite side of the R135 to the Proposed RBSF Component site.

2.3.2.4 FCC Reg. Ref. FW17A/0012

Permission was sought by Roadstone Ltd. for development comprising an increase in the permitted intake rate of construction and demolition (C&D) waste at the facility from a maximum of 24,950 tonnes per annum at present to 95,000 tonnes per annum in future years. The application provides for continuation and intensification of waste recovery activity at the established C&D waste recovery facility (Planning Ref. F02A/0602) on a 1.9 hectare site within the Central Quarry, in the immediate near-term (up to 2-3 years). It also provides for relocation of C&D waste recovery activities to a new waste recovery facility on a 5.2 hectare site in north-eastern corner of the Huntstown Quarry Complex and construction of a hardstanding area, waste processing shed, surface water processing shed, surface water management infrastructure and internal access roads at the new recovery facility. The proposed development requires a review of the existing waste licence (Ref.W0277-01) by the Environmental Protection Agency.

Fingal County Council granted permission on 08 May 2017.

A Commencement Notice for this development has not yet been submitted, based upon a search of the Building Control Management System (BCMS).

2.3.2.5 FCC Reg. Ref. FW14A/0162

Permission was sought by the Peter McVerry Trust for development comprising the demolition of existing 2 no. 2 storey semi-detached dwellings with single storey extensions to rear (109 sqm) and construction of 6 no. 1 bedroom, single storey houses and single storey community building containing sitting room, meeting room and offices in two blocks and all associated site works.

Fingal County Council granted permission on 24 April 2015.

It was proposed that the surface and foul water drainage from the proposed residential development could be connected with the drainage infrastructure of the Proposed RBSF Component site once it became operational. Condition 13 of the Grant of Permission states:

> *" i) Prior to commencement of development the applicant shall submit for the written agreement of the Planning Authority details of the applicable wayleave and other relevant legal agreements with regards to the proposed connections to the existing network on the adjacent premises.*
>
> *ii) No surface water / rainwater shall discharge into the foul sewer system under any circumstances."*

It would appear from documentation submitted as part of the proposed residential development that both the surface and foul water would discharge into the adjoining rising main on the opposite side of the R135 until such time that the Proposed RBSF Component site is operational ('adjacent premises'). However, Condition 13 as outlined above contradicts this and would indicate that the surface and foul water drainage cannot be combined. It would appear that the ability to develop the residential development is premised on the ability to connect to the infrastructure within the Proposed RBSF Component site which will only itself now become operational on completion of the Proposed RBSF Component.

The development commenced in February 2018, according to details available on the BCMS.

The site of the proposed development under Reg. Ref. FW14A/0162 was designated under Local Objective 418 of the Statutory Development Plan, which seeks to:

> *"Provide for additional units to accommodate homeless persons."*

This Local Objective formed part of the previous Fingal County Development Plan (2011 - 2017) but is not identified in the current County Development Plan 2017-2023.

This permission was granted at a time when the Permission for the Council's Waste Facility had already been approved under An Bord Pleanála Ref. PL06F.EL.2045. Notwithstanding this, we confirm that provision has been made in the drainage proposals for the Proposed RBSF Component to accommodate the permitted development by Peter McVerry Trust at the adjoining property should that need arise.

While the above-mentioned planning histories reflect the granted permissions in the area, it is considered that these developments will not prejudice the delivery of the Proposed RBSF Component.

Furthermore, the Proposed RBSF Component itself will not have any adverse impact on any of the permitted schemes noted above, when compared to the already permitted development on these lands. In the case of the permitted development by the Peter McVerry Trust, the development of the Proposed RBSF Component will in fact assist in the delivery of the development proposed by the Peter McVerry Trust through the provision of the required foul drainage network.

2.4 References

An Bord Pleanála, (2018). *Planning Search*. [Online] Available at: http://www.pleanala.ie/search/advanced.php.

Eastern – Midlands Waste Region, (2018). *Eastern Midlands Waste Management Plan (EMWMP).* [online] Available at: http://emwr.ie/.

Environmental Protection Agency (EPA), (2015). *List of Waste & Determining if Waste is Hazardous or Non-hazardous*. [pdf] Available at http://www.epa.ie/pubs/reports/waste/stats/wasteclassification/EPA_Waste_Classification_2015_Web.pdf.

Fingal County Council, (2017). *Fingal Development Plan 2017-2023* [Online] Available at: https://www.fingal.ie/planning-and-buildings/development-plans-and-consultations/fingaldevelopmentplan2017-2023/.

Fingal County Council, (2018). *Planning search*. [Online] Available at: http://www.fingalcoco.ie/planning-and-buildings/apply-or-search-for-a-planning-application/view-or-search-planning-applications/.

Irish Water. *National Wastewater Sludge Management Plan (NWSMP)*. [pdf] Available at: https://www.water.ie/projects-plans/our-plans/wastewater-sludge-management/Final-NWSMP.pdf.

National Planning Framework Plan, (2018). *National Planning Framework*. Available at: http://npf.ie.

The Regional Planning Guidelines Office. (2010). *Regional Planning Guidelines for the Greater Dublin Area 2010 – 2022*. [pdf] Available at: http://emra.ie/dubh/wp-content/uploads/2015/02/Greater-Dublin-Area-Regional-Planning-Guidelines-2010-2022-Volume-I.pdf.

Section 3: Population and Human Health

3.1 Introduction

3.1.1 Population

This Section of the EIAR assesses the potential impacts (and resulting effects) likely to occur as a result the Regional Biosolids Storage Facility (RBSF) component of the Proposed GDD Project and the Proposed Upgrade Project on the social and economic activity of the population in the area together with the effects on Human Health. Hereinafter, this component is referred to “the Proposed RBSF Component”.

The population at the local level comprise three elements, namely: the resident population, the working population and the visitor community to the study area including employment aspects.

As discussed in more detail under Volume 4, Section 2: Planning and Policy Context of this EIAR, the *Regional Planning Guidelines for the Greater Dublin Area 2010 - 2022* and *Greater Dublin Strategic Drainage Study* (2005) identifies the infrastructural requirements to meet the forecasted population increase over each respective plan period. The increase in population outlined under these reports is reflected in the current trend of population growth as noted under Table 3-1 below.

Assessments of other environmental factors are referenced in this Section to address potential anticipated Population and Human Health impacts in accordance with the Draft EPA Guidelines (August 2017).

In order to provide a clear assessment of potential impacts and effects, the demography, employment aspects and visitor attractions of the *‘study area’* are identified in this Section. The potential impacts of the Proposed RBSF Component on the study area population have been assessed, taking cognisance of the various other sections of this EIAR, namely:

- Volume 4, Section 4: Water;
- Volume 4, Section 7: Land and Soils;
- Volume 4, Section 8: Air and Climate;
- Volume 4, Section 9: Noise and Vibration;
- Volume 4, Section 10: Odour;
- Volume 4, Section 12: Material Assets;
- Volume 4, Section 13: Traffic; and
- Volume 4, Section 14: Landscape.

It should be noted that there are numerous inter-related environmental topics described throughout this EIAR document, which are also of relevance to Population and Human Health. Issues such as the potential likely and significant impacts of the Proposed RBSF Component on water, land and soils, air quality and climate, noise and vibration etc. are of intrinsic direct and indirect consequence to Human Health.

The potential impacts (and resulting effects) of each of the above have been addressed under each respective section of this EIAR and have been considered in the context of this Section. The interactions between these environmental topics are considered under Volume 4, Section 16: Environmental Interactions.

3.1.2 Human Health

The consideration of effects on Human Health is very broad in scope. Ultimately, all the impacts of a development on the environment may cause effects on the local and wider population, both positively and negatively. The requirement that direct and indirect significant effects of a project on Human Health be considered comes from Article 3(1)(a) of the EIA Directive 2014/52/EU.

The EIA process, as described in Volume 2, Section 2 of this EIAR, identifies impacts, or changes in factors that may result from the Proposed RBSF Component. Some of these have the potential to influence health effects, either directly or indirectly. Direct effects are those that could result from the release of harmful or toxic emissions to air and water or from impacts from noise or odour. Direct effects may also present as health risks from hazards associated with the Proposed RBSF Component, such as traffic and construction activities. Indirect effects relate to such impacts on biodiversity, cultural heritage and archaeology and, more generally, on how the Proposed RBSF Component may effect changes to the living conditions and environment of the population.

Consideration of individual impacts and effects have been provided in discrete Sections of this EIAR by the relevant specialists. Where potential impacts are identified, appropriate mitigation measures are recommended to ameliorate or reduce those impacts to appropriate levels.

The purpose of this human health assessment is to firstly examine potential impacts as identified within the EIA process and determine their potential for significant effects on human health. Secondly, having assessed the analysis, should determine the predicted health and well-being outcomes that may be associated with the Proposed RBSF Component. Lastly, the human health impact assessment considers whether the assessment covers all vectors through which human health impacts could be caused, including adequate consideration of inter-relationships of impacts.

In addition to the sensitive environmental receptors identified in the sub-section above, a number of submissions were received during the Public Consultation process that related to Human Health. This assessment has reviewed the public consultation report for consideration in the overall assessment. The range of submissions received can be summarised as follows:

- Issues with Odours regarding biosolids storage; and
- Possibility of toxins being released into atmosphere from the storage of biosolids.

These submissions as raised have been considered as part of the overall assessment by the relevant specialists. The findings of the public consultation exercise for the Proposed RBSF Component is compiled and presented in the *Scoping of Environmental Impact Statement & Natura Impact Statement; Report on Public Consultation*, provided in Appendix 2C (of Volume 2B). Details on how matters were raised in the public consultation phase are provided in Volume 2, Section 2.5.1.

3.2 Methodology

This Population and Human Health Section has been completed in line with the details outlined under Volume 2, Section 2: The EIA Process which has been guided by the *Guidelines on Information to be Contained in Environmental Impact Assessment Reports* (Draft EPA, 2017) and the *Draft Advice Notes for preparing Environmental Impact Statements* (EPA, 2015).

3.2.1 Population

The intention of this Section is to describe: (i) the characteristics of human activity in the study area likely to be significantly affected by the Proposed RBSF Component, (ii) any likely significant effects of the Proposed RBSF Component on population absent mitigation, (iii) suitable mitigation measures and (iv) the residual impacts after mitigation.

This involves the examination, compilation and analysis of information relating to the *'study area'*. Consideration is also given to the wider population of the Greater Dublin Area.

The methodology used in relation to population in this Section relies on a desk-based study of published reference documents. An examination of the following material was carried out:

- Information provided by the Central Statistics Office (CSO), who are tasked with collection, compilation, extraction and dissemination for statistical purposes of information relating to economic, social and general activities and conditions in the State. The scope of the CSO data considers the following years: 2002, 2006, 2011 and 2016. This provided detailed figures for population at a regional level and at the local area level;
- The Regional Planning Guidelines for the Greater Dublin Area 2010-2022 which outline future population growth in the Greater Dublin Area;
- Existing visitor attractions have been identified alongside employment areas through the use of online business directories and maps and a site visit;
- ESRI Quarterly Economic Commentary, which outlines employment trends; and
- Consideration has also been given to the land use zoning characteristics, as outlined under Volume 4 Section 2: Planning and Policy Context of this EIAR.

Once the appropriate population statistics were identified, an analysis of the potential direct and indirect impacts at both the construction stage and operational stage of the Proposed RBSF Component was carried out. The effects of the Proposed RBSF Component are assessed in terms of Quality, Significance, Magnitude, Probability, Duration, and Types as detailed in Volume 2, Section 2: The EIA Process.

3.2.2 Human Health

The Human Health element of this assessment has been prepared in accordance with the following guidelines:

- Guidance on the preparation of the EIA Report (Directive 2011/92/EU as amended by 2014/52/EU) (European Union, 2017);
- Advice Notes for Preparing Environmental Impact Statements September - Draft (EPA, 2015); and
- Guidelines on the Information to be contained in Environmental Impact Assessment Reports - Draft (EPA, 2017)

It should be noted that, in accordance with Draft EPA Guidelines (2015 and 2017), this Human Health Assessment does not duplicate the assessments found in other specialist Sections of this EIAR (as outlined in Section 3.1.1 above). Instead, it focuses on the potential impacts that have been identified and assesses from a medical perspective their potential to cause significant effects on human health and well-being.

This approach is supported by the Draft EU Guidelines (2017) which states that *"…environmentally related health issues (such as health effects caused by the release of toxic substances to the environment, health risks arising from major hazards associated with the Project, effects caused by changes in disease vectors caused by the Project, changes in living conditions, effects on vulnerable groups, exposure to traffic noise or ai*r pollutants) *are obvious aspects to study. In addition, these would concern the commissioning, operation, and decommissioning of a Project in relation to workers on the Project and surrounding population*."

Accordingly, the methodology adopted for this assessment is as follows:

- Identification of Sensitive Receptors relevant to human health and well-being;
- Description of health profiles and statistics within the study area;
- Literature review of medically published journals and papers relevant to the Proposed RBSF Component and associated impacts;
- Review of the Proposed RBSF Component description and associated potential impacts;
- Assessment of potential for those impacts to effect human health; and
- Assessment of significance of effects, according to health-based standards.

Health based standards are set both nationally and internationally to protect the vulnerable members of society. They have an in-built measure of significance and are set at levels where there will be no significant health effects. For each impact as identified in the EIAR, the appropriate standard relevant to the protection of human health has been identified and brought forward for assessment.

Adopting a health-based, standards-based approach complies with the Draft EPA Guidelines (2017), which state:

> '*The evaluation of effects on these pathways is carried out by reference to accepted standards (usually international) of safety in dose, exposure or risk. These standards are in turn based upon medical and scientific investigation of the direct effects on health of the individual substance, effect or risk. This practice of reliance upon limits, doses and thresholds for environmental pathways, such as air, water or soil, provides robust and reliable health protectors [protection criteria] for analysis relating to the environment'.*

Finally, to support the identification of potential human health effects, the responses to issues raised during the consultation process (refer to Volume 2, Section 2: The EIA Process) on the Proposed RBSF Component and which are of relevance to human health, have been reviewed and are addressed in this Section.

Given the regional significance of the Proposed RBSF Component, there are two natural populations to consider; the Regional level and the Local level.

3.2.2.1 Regional Level

Irish Water has established the need for a Regional Biosolids Storage Facility (RBSF) for the purpose of receiving and storing biosolids generated by the Proposed Ringsend WwTP Component and Greater Dublin Drainage (GDD) projects.

As the RBSF will provide the storage capacity for the combined biosolids produced by Ringsend and GDD projects, it can be regarded as an integral or fundamental part of both projects. As outlined in Figure 3-1 below, the current Ringsend WwTP and GDD catchment encompasses a significant part of the metropolitan area of the Greater Dublin Area.

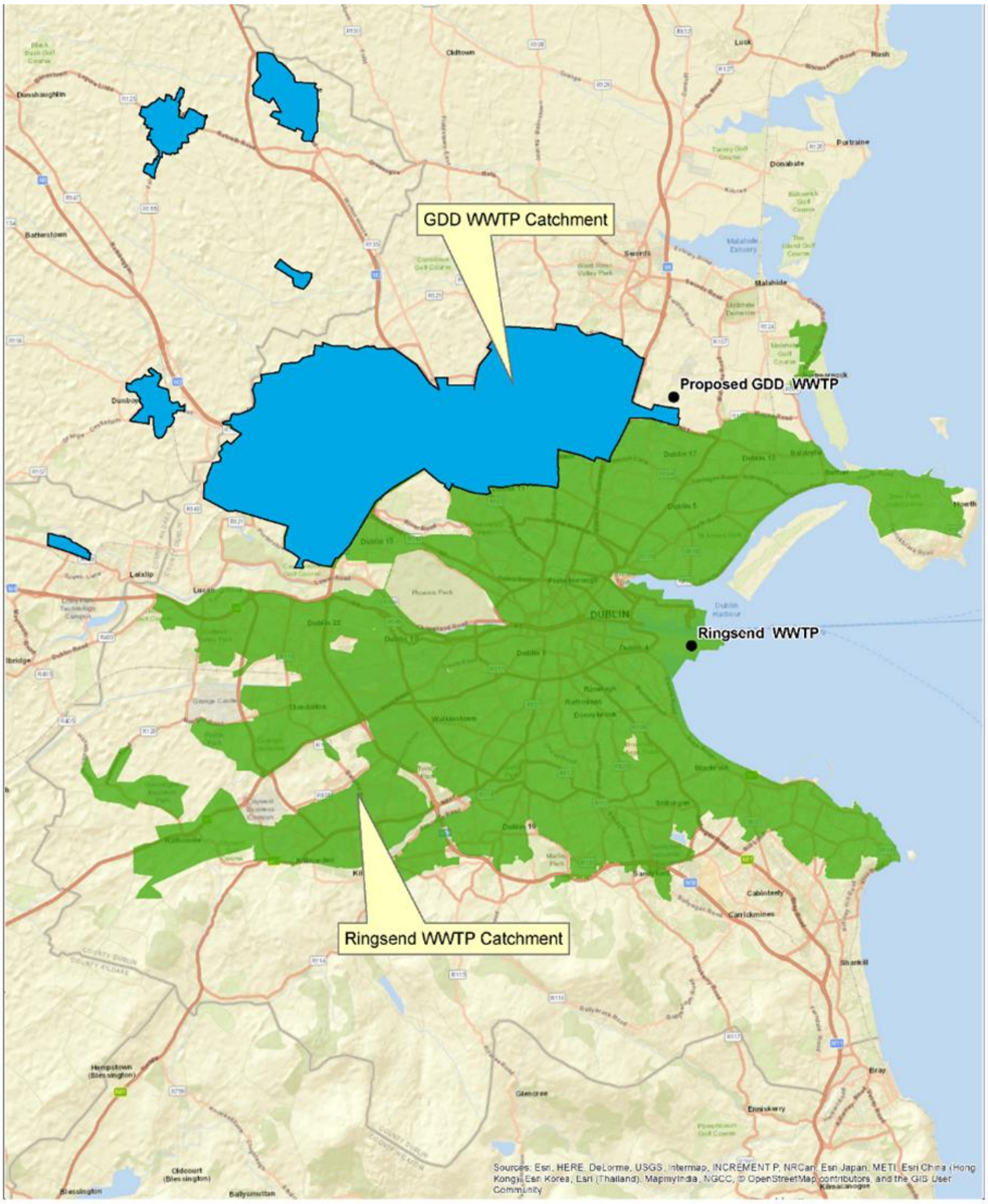

Figure 3-1: Ringsend WwTP Catchment and GDD Catchment

3.2.2.2 Local Level

The Proposed RBSF Component, the subject of this Volume of the EIAR, is to be developed on a brownfield site between the R135 and Roadstone Quarry at Newtown, Dublin 11. As set out in Volume 4, Section 2: Planning and Policy Context, Fingal County Council were granted permission by An Bord Pleanála in 2006 for a 'Kilshane Cross Recycling Park', which was proposed to consist of a Construction and Demolition Waste Recovery Facility, a Biological Waste Treatment Facility (processing segregated domestic and commercial organic waste), a Waste Transfer Facility (processing municipal solid waste) and a Sludge Hub Centre (treating municipal sludge). The proposed Recycling Park was not fully implemented except for site development works, which included road infrastructure, surface water attenuation tank and administrative buildings. The site is generally bounded by the R135 to the east, Huntstown Power Station to the south, the Roadstone Quarry to west and agricultural land to the north. The site is approximately 11.0 Ha in area.

The site is positioned along the eastern edge of the Ward Electoral Division (ED), as shown in Figure 3-2. The existing facility and its surrounding land uses can be characterised as industrial in nature and is in keeping with the 'HI' - Heavy Industry zoning objective for the area. The land use policies for the site are examined in Volume 4, Section 2: Planning Policy and Context.

The site is located on the boundary of the Ward ED and the Dubber ED shown in Figure 3-2. The use of ED for the analysis of population is considered appropriate as they consist of a defined boundary and CSO figures are readily available. Therefore, these two EDs are considered as the appropriate catchment area for the population aspects to be assessed.

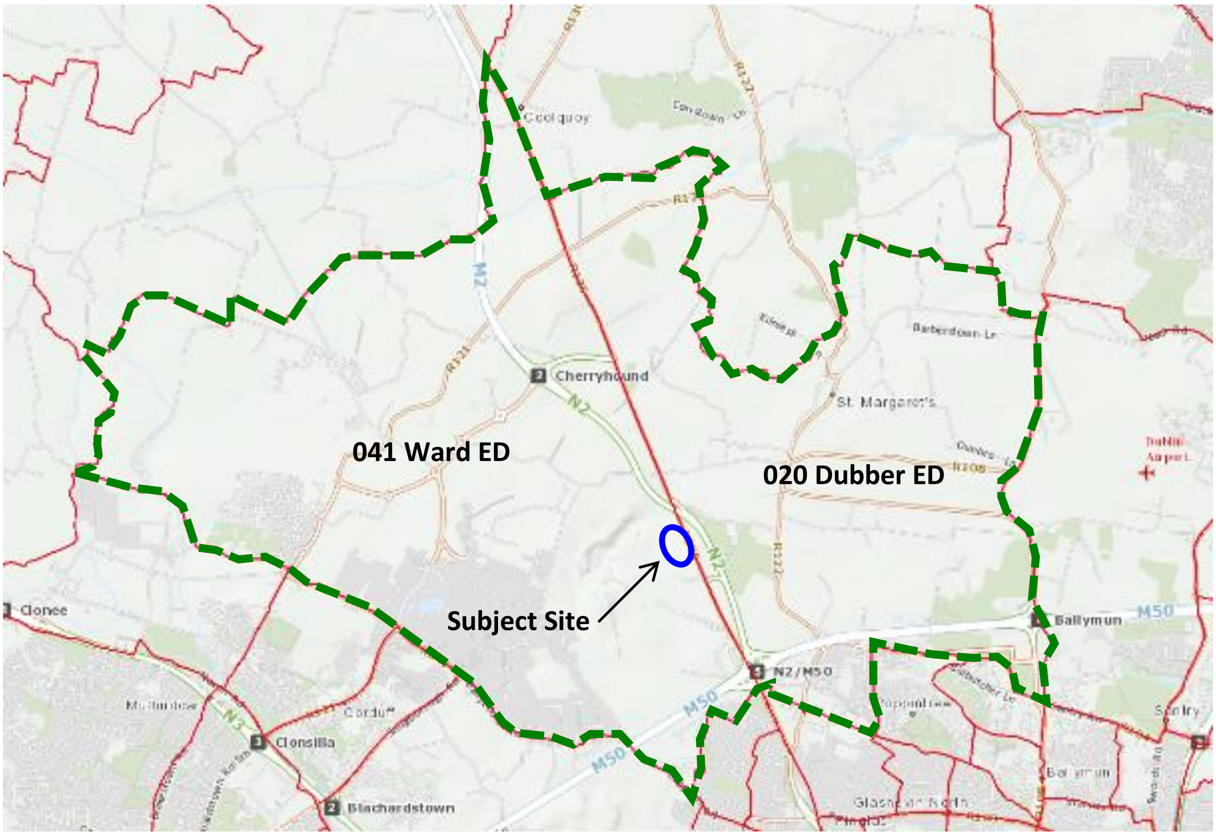

Figure 3-2: Approximate location of Proposed RBSF Component site outlined in blue with Electoral Division defining the 'local level' study area outlined in green[2]

The '*local level*' covers an area of approximately 42.29 sq km (CSO) and has been selected so as to be centred around the site and to identify the immediate confines of the Proposed RBSF Component site. The local level can be generally described as having an industrial and commercial land use with a limited amount of residential development.

Within the area illustrated by Figure 3-2, the terminals of Dublin Airport are located to the east, yet the main runway extends into the area. The M50 Motorway generally bounds the southern edge. The western portion of the area is generally characterised by light industry/business parks development and

[2] *Source of Map: CSO SAP Map*

heavy industry in closer proximity to the Proposed RBSF Component. The lands to the north generally consist of pastures for agricultural purposes.

3.3 Existing Environment

3.3.1 Population

In assessing the receiving environment in terms of population, its compositions can generally comprise of three principal elements, namely:

- The resident population;
- The working population; and
- The visiting community.

Each of these populations will experience changes in the environment in different ways. Each of these populations will be assessed at a Regional and Local Level as defined in Section 3.2.1.

3.3.1.1 The Resident Population

The Proposed RBSF Component, which forms part of the supporting infrastructure for the Ringsend WwTP Upgrade Project and the proposed Greater Dublin Drainage WwTP, will serve a regional population comprising a significant portion of the metropolitan area of the Greater Dublin Area. As such, it is useful to identify what that population comprises. Whilst this population may not be immediately aware of the Proposed RBSF Component, it is nevertheless relevant to acknowledge same given the function of the Ringsend WwTP and Greater Dublin Drainage WwTP as a regional facility within the Greater Dublin Strategic Drainage Strategy. As outlined under Volume 4, Section 2.2.2, the delivery of this infrastructure ensures the continuation of development within its catchment without creating unnecessary capacity constraints.

Regional Level

The GDSDS drainage catchment does not fully match the geographic area of the Greater Dublin Area defined in the Regional Planning Guidelines, with only parts of Meath, Wicklow and Kildare falling in to the drainage catchment, along with the four Dublin authorities. As the growth targets are set in the Regional Planning Guidelines, it is considered more appropriate to use the Greater Dublin Area as the regional study area. Table 3-1 identifies the projected population targets for the Greater Dublin Area as outlined in the 2010 - 2022 Regional Planning Guidelines. The Dublin and Mid-East area (Meath, Wicklow, Kildare) makes up the Greater Dublin Area with the existing catchment serving a significant portion of the Metropolitan Area of Dublin. The current Ringsend WwTP and GDD Project catchment encompasses a significant part of the Metropolitan Area of the Greater Dublin Area. Previously in 2010, the 2016 population target was identified as 1,955,800.

Table 3-1: Regional Population Targets 2010, 2016 and 2022[3]

	2008	2010	2016	2022
Dublin	1,217,800	1,256,900	1,361,200	1,464,200
Mid-East	514,500	540,000	594,600	649,700
GDA	1,732,300	1,796,900	1,955,800	2,113,900
State	4,422,00	4,584,900	4,997,000	5,375,200

Table 3-2: Population Change at State, Region, City and Local Level 2002-2016[4]

	2002	2006	% Change from 02- 06	2011	% Change from 06 - 11	2016	% Change from 11 - 16
State	3,917,203	4,239,848	8.2%	4,588,252	8.2%	4,761,865	3.8%
GDA	1,535,446	1,662,536	8.3%	1,804,156	8.5%	1,907,332	5.7%
Fingal County	196,413	239,992	22.2%	273,991	14.5%	296,020	8.1%
Local Area	2,146	8,928	316.0%	14,600	63.5%	16,974	16.2%

The 2016 Census figures provide the latest indication of how the growth in the GDA compares with the population targets set by the Regional Planning Guidelines.

The Regional Planning Guidelines for the GDA envisage a population of 1,955,800 by 2016, whereas the 2016 Census shows that the population is actually 1,907,332. This shows that the actual projections, while below the set target by -2.4%, are remarkably close to the target. The current emphasis of government is to build additional homes and to create additional jobs in urban areas. Thus, while the current population is marginally below the estimated target, the current government policy could potentially reach the RPG target set out in the year 2022.

Local Level

The extent of the local level is illustrated in Figure 3-2. While it is evident from Table 3-3 below that there has been a substantial increase in the population at the local level, the population growth is not distributed evenly within the EDs. As shown in Figure 3-3 below it should be noted that a majority of this increase population is located in Tyrellstown to the west of the Ward ED and to the south of the M50 in the Dubber ED. These larger residential areas are approximately 2 - 3 km away from the Proposed RBSF Component site and are separated by a variety of employment and industrial uses. It is equally clear that the local level has contributed to the rates of growth experienced within the GDA as a whole over the same period.

[3] *Source: Regional Planning Guidelines for the Greater Dublin Area, 2010 - 2022, Table 4 pg.82*

[4] *Source: CSO table annotated by SLA*

Table 3-3: Population of the local level

Electoral Division	Population in 2002	Population in 2006	% Change from 02 - 06	Population in 2011	% Change from 06 - 11	Population in 2016	% Change 11 - 16
Ward	1,308	5,181	+3,873 (+74.75%)	8,241	3,060 (+59.06%)	9,602	1,361 (+16.51%)
Dubber	838	3,747	+ 2,909 (+347.13%)	6,359	2,612 (+69.70%)	7,372	1,013 (15.93%)
Total	2,146	8,928	+ 6,782 (+316.0%)	14,600	5,672 (+63.53%)	16,974	2,374 (+16.26%)

The local level has undergone significant population changes over the years 2002 - 2016 as shown in Table 3-3 and Table 3-4. In 2002, the population represented 2,146 in the area, increasing to 16,974 by 2016 representing a significant increase. The increase between 2002 (2,146 persons) and 2006 (8,928 persons) coincided with a period of significant economic prosperity and resultant house building. There has been a steady decline in the rate of population growth between 2006 and 2016 at the local level, however, it remains significantly higher than the national growth rates as shown in Table 3-2.

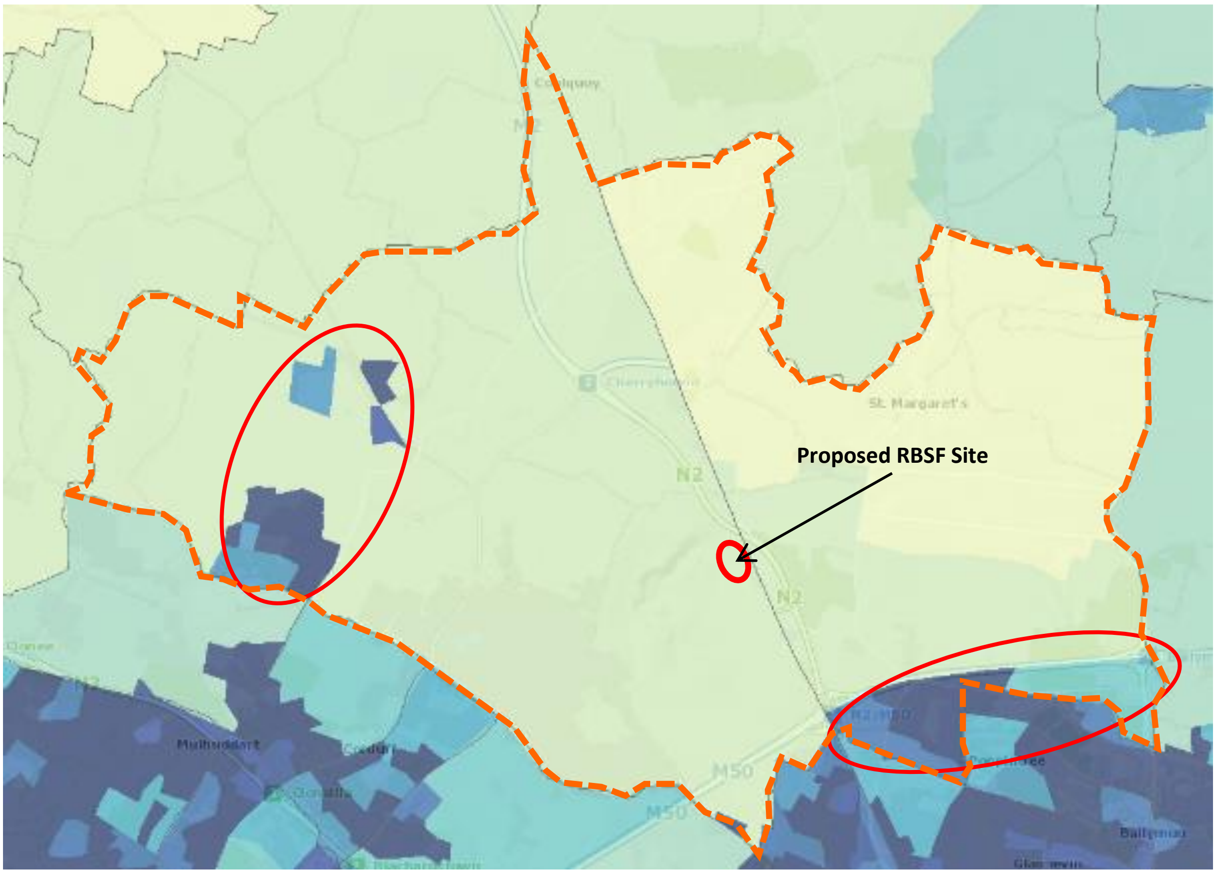

Figure 3-3: Population distribution within the local level with areas of highest concentration of population per km^2 highlighted in red (Source: airomaps.nuim.ie/id/Census2016/)

As shown under Volume 4, Section 2.2.5, the land use zoning in proximity to the Proposed RBSF Component site is generally considered as relating to industrial use. There are commercial/light industry uses further east and west of the site. Generally, large residential areas are located approximately between 2 - 3 km from the Proposed RBSF Component site (See Table 3-4 below).

Table 3-4: Residential Areas between 2 - 3 km from RBSF

Area	Proximity	Description
Hollystown	2.6 km to northwest	RA - Undeveloped residential area
Blanchardstown/Corduff	3.1 km to southwest	RS - Existing residential area
Finglas North/Charlestown	1.8 km to south	RS - Existing residential area
St. Margaret's	1.8 km to east	RU - Rural (Community group represented at last consultation)

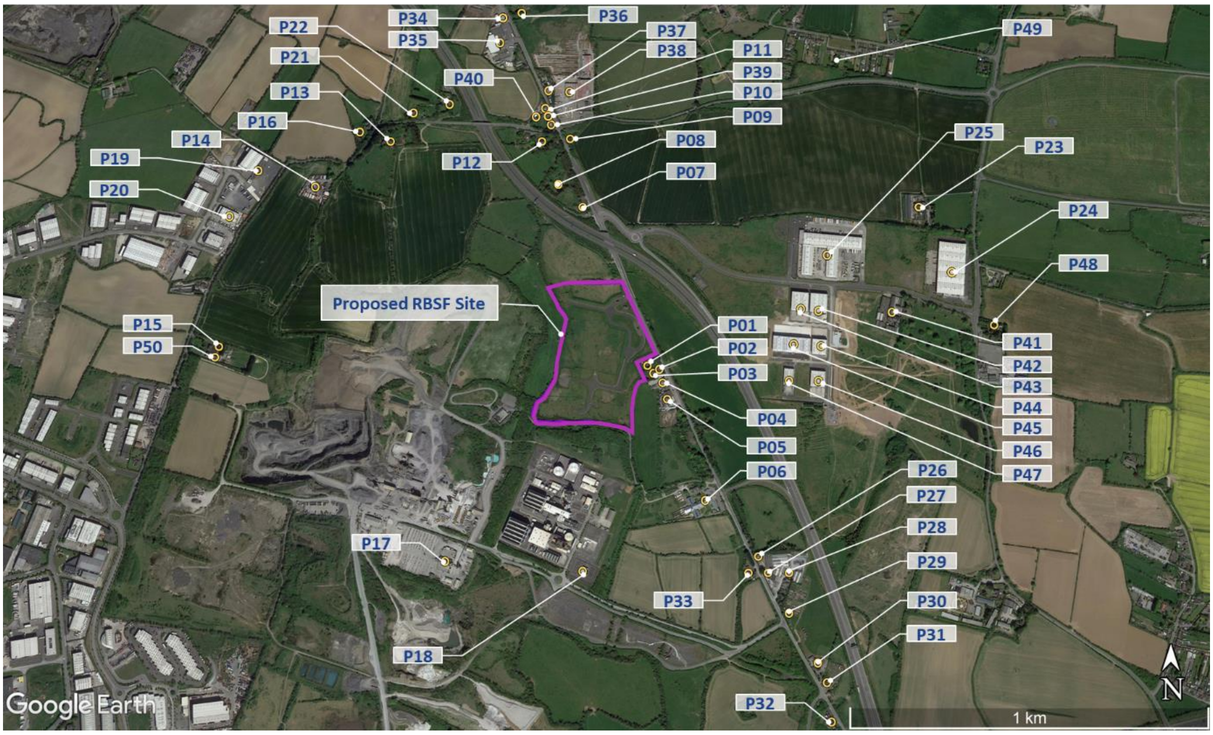

Figure 3-4: Location of properties within the vicinity of the Proposed RBSF Component site

Residential and commercial properties in the in the vicinity of the Proposed RBSF Component site are indicated in Figure 3-4. A corresponding schedule, providing further details from windshield survey of these properties, is provided in Appendix 3A.

There is a residential property at the eastern boundary of the site (P01). It should be noted further residential properties (P02 and P03), at approximately 25 metres from the site boundary, were demolished in March 2018. A development of six residential units on behalf of a charitable organization for homeless people (The Peter McVerry Trust) is being progressed on the site of the demolished properties (see Figure 3-5). Detail of the development is provided in Volume 4, section 2.3.2.

Figure 3-5: Location of Proposed RBSF Component (outlined in red) for 6 no. residential units adjacent the proposed RBSF site (outlined in orange)

3.3.1.2 The Working Population

Within the resident population, the working age cohort accounts for those persons between the ages of 15 to 64. The characteristics of this cohort would generally be described as active individuals in employment or in search of employment.

According to the CSO, the seasonally adjusted Standardised Unemployment Rate (SUR) is slowly falling at a national level. The current national figure stands at 6.4% (July 2017)[5]. This trend is decreasing on a monthly basis from 12.2% in January 2014. While there are slight increases to this figure occurring in irregular months, the general cumulative direction of the figure is showing a decrease in unemployment.

The Quarterly Economic Commentary Winter 2017[6] Statement outlines that unemployment is expected to fall to 5.4% in 2018.

Regional Level

Table 3-5, sourced from the CSO, shows the total percentage of unemployed as per Census 2011 and 2016 (no. of people seeking 1st job in addition to no. of people unemployed expressed as a percentage

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[5] *Central Statistics Office – National Monthly Unemployment,01 August 2017, available at: http://www.cso.ie/en/releasesandpublications/er/mue/monthlyunemploymentjuly2017/ (Accessed on 25.09.2017)*

[6] *The Quarterly Economic Commentary Winter (2017), McQuinn, M., O'Toole, C., Economides, P. & Monteiro, T.*

of the total population). The table indicates a reduction in unemployment across the State, GDA, Fingal County and Local Level for the 2011 to 2016 period.

As shown in Table 3-5, unemployment at a regional level has decreased from 8.8% in 2011 to 5.9% in 2016.

Table 3-5: Number of Persons looking for First Job and Unemployed having lost previous job (Source: cso.ie/en/census)

	2011 – 1st Job	2011 No. of Unemployed (%)	2016 – 1st Job	2016 No. of Unemployed (%)	2011 – 2016 change (%)
State	34,166	390,677 (9.25%)	31,434	265,962 (6.2%)	- 30.0%
GDA	13,975	145,049 (8.8%)	12,771	99,248 (5.9%)	-29.6%
Fingal County	2,224	20,416 (8.3%)	1,850	13,565 (5.2%)	-31.9%
Local Level	114	1,256 (9.4%)	110	992 (6.5%)	-19.6%

Local Level

In terms of the local level as a whole, unemployment stood at c. 6.5%. Compared with the 2011 figure of 9.4%, there is a downward trend of unemployment within the local level.

This working population do not necessarily live within the local level but rather work in the area. The working population can be considered broadly to work at the following locations within the defined local level:

1. Roadstone Quarry;
2. Huntstown Power Station;
3. Dogs Trust;
4. Dublin Airport Logistics Park;
5. Charlestown Shopping Centre;
6. Century Business Park;
7. IKEA;
8. Horizon Logistics Park;
9. Northwest Business Park;
10. Blanchardstown Corporate Park;
11. IDA Ballycoolin Business Park;
12. Millennium Business Park;
13. Huntstown Business Park;
14. Rosemount Business Park;
15. Stadium Business Park; and
16. North Park Business Park.

The location of the above-mentioned facilities is shown in Figure 3-6 below.

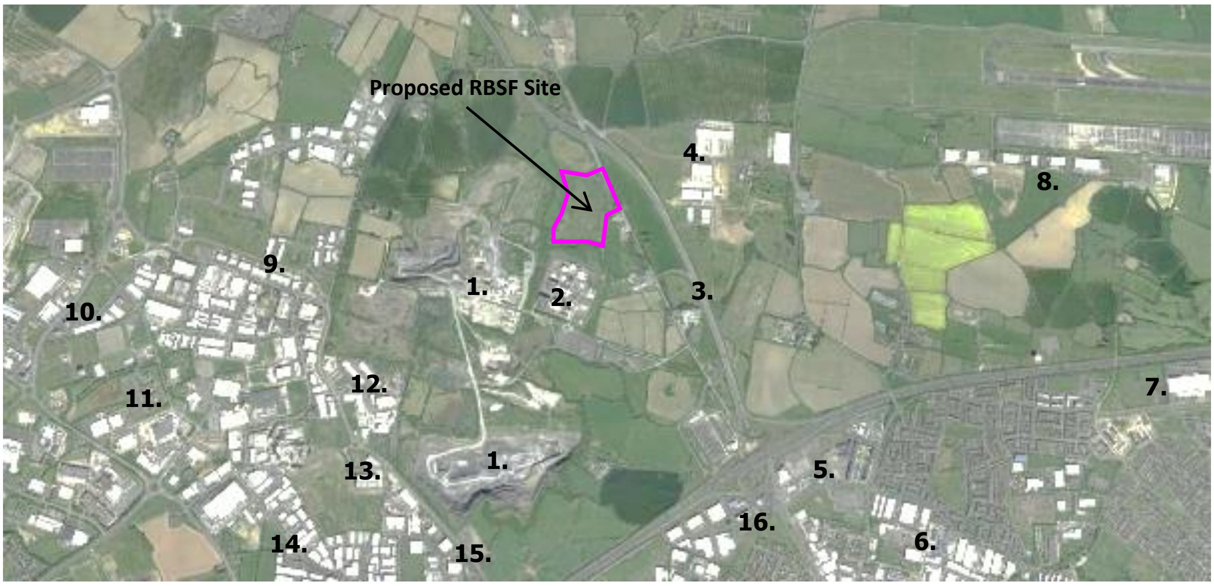

Figure 3-6: Indicative location of Employment areas

3.3.1.3 The Visiting Community

Regional Level

There are no recreational activities and attractions at a regional level that are in close proximity to the Proposed RBSF Component site.

Local Level

There are a limited amount of recreational activities and attractions in the area given the predominantly employment/industrial nature of the area in proximity to the subject site as described in terms of land use zoning and the planning history in Volume 4, Section 2. Therefore, there would be a limited population who could be attracted to the area for tourism/leisure and recreational purposes.

Nonetheless, the limited amount of amenity and recreational areas in the local level are listed as follows and shown in Figure 3-7:

- Hollystown Golf Course; and
- Silloge Golf Course.

The Tolka Valley Regional Park is located outside the local level study area and is some 4.1 km away from the Proposed RBSF Component, to the south and west. The Ward River is situated to the north of the local level and is approximately 4 km from the Proposed RBSF Component. Both of these provide recreational amenity but are at a significant distance from the RBSF site.

With regard to the transient population in that area that may be passing by the proposed site, they will be aware of the Proposed RBSF Component during construction and operation of the Proposed RBSF Component. These are likely to be a passing population who utilise the R135 for access to the N2 or for people who use the R135 for recreational walking or cycling for example.

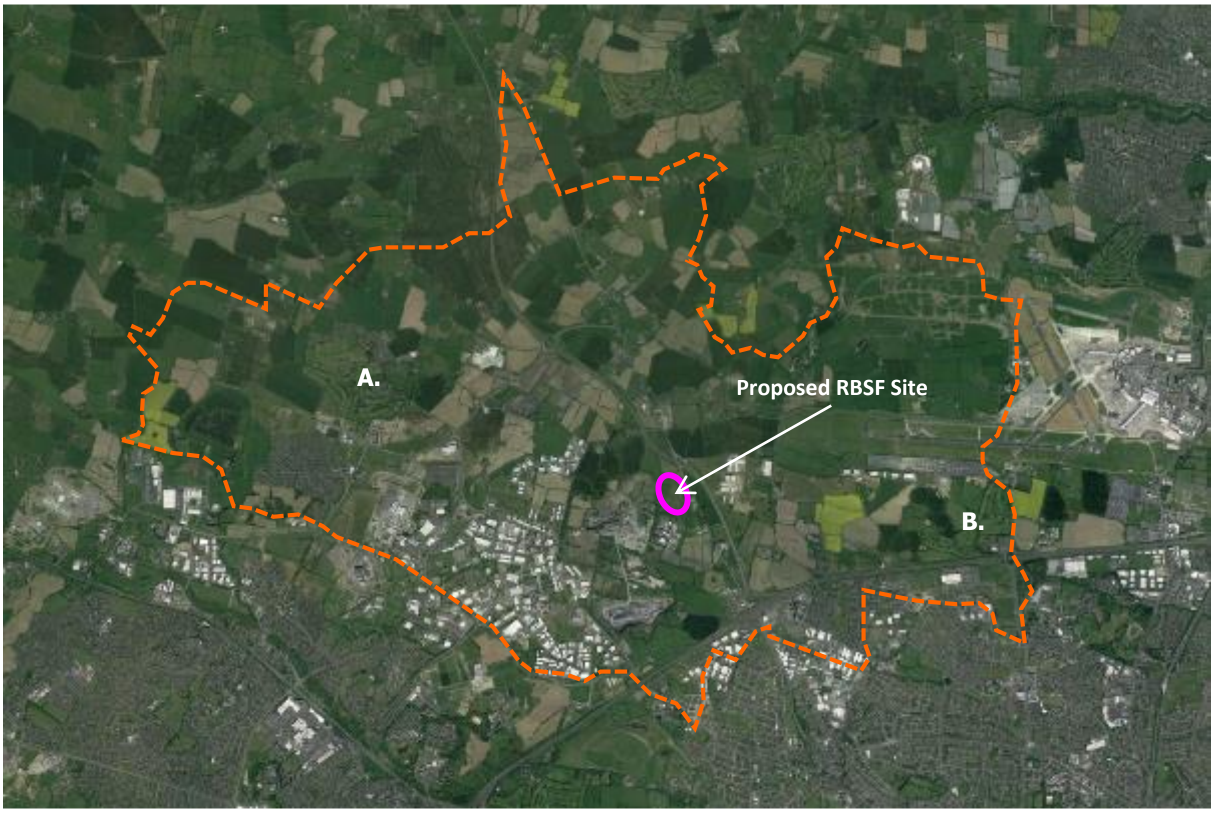

Figure 3-7: Location Map of amenity and recreation areas in the Local Level

3.3.2 Human Health

To gather a baseline description of the existing environment in which the Proposed RBSF Component is situated, it is appropriate to inspect published health profiles and statistics (e.g. Dept. Of Health: Health In Ireland, Key trends 2017). This gives an overall indication of health trends in Ireland and allows for examination of reported health at a more local level. The Health Profile for Fingal (HSE, 2015) indicates that Dublin Fingal has the lowest percentage nationally of those who report their health being bad or very bad at 1.1%, or persons with disability at 10.2% (national 1.5% and 13.0% respectively). (see Table 3-6 and Table 3-7). Cancer incidence rates are higher than average for female malignant melanoma, male colorectal cancer and male and female lung cancers (County data).

The 2016 Census figures also provide the latest figures with regard to the self-rated health reported disability within the population and carers in society, both at a national and local level. The data also suggests that Fingal has a lower than average number of persons who report their health as being fair, bad or very bad, or who have a disability (see Figure 3-8 and Figure 3-9).

Table 3-6: Percentage of population with a stated disability

	% population with a disability
State	13.50%
Dublin SPA*	13.10%
Fingal (LA)*	10.80%
Mulhuddart(MD/LEA):	9.60%
Swords(MD/LEA):	10.50%

*Geographical Hierarchy:
SPA =Strategic Planning Area, LA = Local Authority, MD/LEA = Municipal District or Local Electoral Area

Table 3-7: General Health Reporting

	Very Good	Good	Fair	Bad	Very Bad
State	59.40%	27.60%	8.00%	1.30%	0.30%
Dublin SPA*	59.60%	26.60%	7.40%	1.30%	0.30%
Fingal (LA)*	62.20%	26.30%	6.20%	1.1%	0.20%
Mulhuddart(MD/LEA):	60.30%	27.40%	5.80%	0.90%	0.20%
Swords(MD/LEA):	60.80%	26.70%	6.20%	1.00%	0.30%

*Geographical Hierarchy:
SPA =Strategic Planning Area, LA = Local Authority, MD/LEA = Municipal District or Local Electoral Area

At a local level, the reported statistics are largely consistent with the Fingal Local Authority area and lower than the national averages (see Table 3-8 and Table 3-9).

Table 3-8: Percentage of population with a stated disability by Electoral Districts in the Local Area

Electoral Area	% population with a disability
Pembroke East A	15.20%
Pembroke East B	11.40%
Pembroke East C	11.10%

Table 3-9: General Health Reporting by Electoral Districts in the Local Area

Electoral Division	Very Good	Good	Fair	Bad	Very Bad
Dubber (ED)*	58.10%	26.40%	5.30%	0.70%	0.20%
The Ward (ED)*	59.90%	25.30%	4.30%	0.60%	0.10%

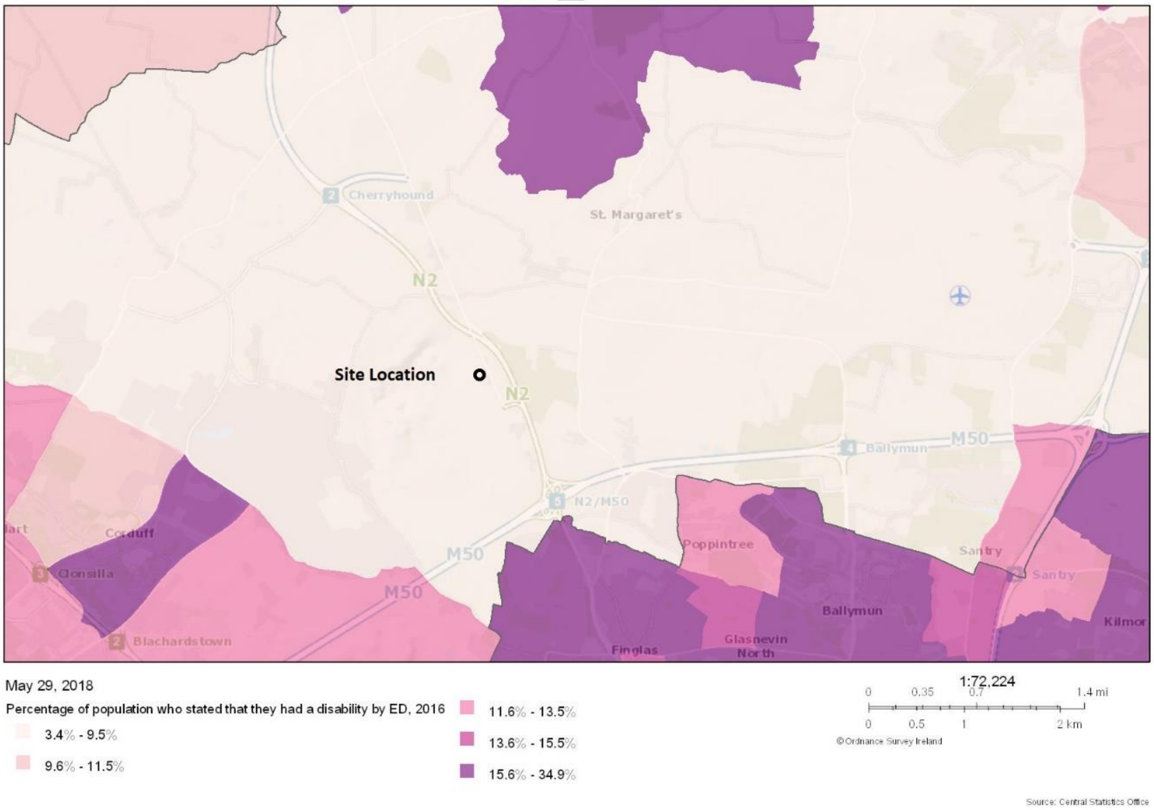

Figure 3-8: Percentage of Population who stated they had a disability by Electoral District, 2016 (Source: CSO)

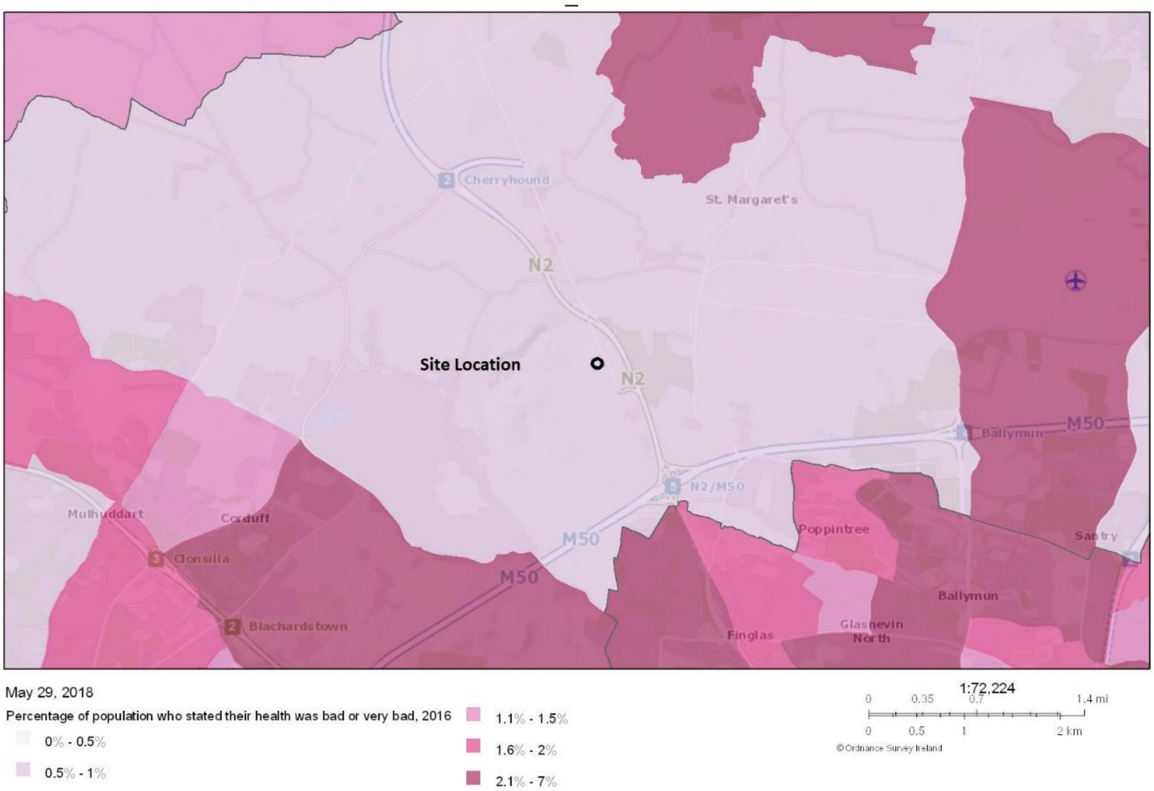

Figure 3-9: Percentage of Population who stated their health was bad or very bad by Electoral District, 2016 (Source: CSO)

Section 4.2.1 of the EPA Draft Guidelines (2015) advise that the location of sensitive neighbouring occupied premises with the potential to be directly affected by the Proposed RBSF Component be indicated. In particular:

- Homes;
- Hospitals;
- Hotels and holiday accommodation;
- Schools and rehabilitation workshops;
- Tourism and recreational facilities and amenities; and
- Economic activities such as visitor attractions based on cultural /historic or natural assets.

The above sections provide a detailed description of the local, working and residential population that live within and visit the local and regional area. It is also noted that sensitive receptors have also been identified within each of the specialist sections and assessed according to the guidelines that are relevant to that expertise.

Of particular relevance from a human health perspective are the residential locations that are adjacent to the eastern boundary. In addition, the following facilities are also present within the Local Area that are relevant to Human Health:

- Charlestown Medical and Dental Centre;
- St. Margaret's Primary National School;
- St. Luke's National School;
- Le Cheile Secondary School; and
- Tyrellstown Community Centre.

3.4 Characteristics of the RBSF Component of the Proposed GDD Project

The Proposed RBSF Component site comprises an area of 11.0 hectares and it is proposed that the principal development on the site will comprise 2 no. biosolids storage buildings (dimensions 50 m x 105 m), administrative building (dimensions 13 m x 10 m) and associated site services infrastructure, landscaping and site boundary treatment.

Biosolids is the treated sludge product arising from wastewater treatment processes. The sludge is treated to recover gas (the energy from which is used to run the plant), to reduce its volume, and to kill pathogens (bacteria and viruses). The treatment process results in 'biosolids', a biologically stable product with pathogens reduced to the extent that renders it safe for use in agriculture, and containing high levels of plant nutrients, e.g. nitrogen and phosphorus. This treatment of wastewater sludge to produce biosolids happens before the biosolids are transported to a storage facility. Most of the biosolids produced in Ireland (about 98%) is currently reused on agricultural lands as a soil conditioner and as a fertiliser. The current spread-lands for biosolids arising in the Dublin region are located in south Leinster and parts of Munster and it is proposed that these spread lands will continue to be used. The use of biosolids on agricultural lands is strictly regulated by European and National law. One of the conditions of use is a strict prohibition on spreading biosolids on lands over the winter period (October to January each year). This restriction means that biosolids reused in agriculture need to be stored for certain periods over each calendar year.

The new biosolids storage facility will form a key part of the upgraded wastewater treatment network for the Greater Dublin Area and will facilitate Dublin's continued economic and social growth, while protecting the environment.

The construction activity will generate additional vehicle movements on the local road network. Temporary hoarding, mobile cranes used to erect the storage buildings, and other general construction activity will be noticeable to people passing the site at the construction stage. Construction will also be noticeable to occupants of the proposed residential development currently being developed (commenced December 2017) by the Peter McVerry Trust (as set out in Volume 4, Section 2.3.2).

During peak construction periods, there are expected to be 60 people working at the site.

3.5 Potential Impacts

3.5.1 Do-Nothing Impacts

The Proposed RBSF Component will play a critical role in ensuring that the maximum operating capacity of the Ringsend WwTP and GDD Project is achieved. The Proposed RBSF Component and the Proposed WwTP Component and GDD Project have a crucial role in the delivery of essential infrastructure to both the local and regional level.

In the absence of the Proposed RBSF Component, to ensure that the maximum operating capacity of the Ringsend WwTP and GDD Project is achieved, demographic and employment numbers would be expected to remain unchanged. It is considered that, given the continued upwards trend in 2016 population figures and the continued need to upgrade wastewater systems to higher environmental standards, the do-nothing scenario is not an option.

With no increase in capacity for wastewater treatment, restrictions could be placed on residential, commercial and industrial development to both the local and regional level. The do-nothing impact would be a curtailment in the ability to facilitate future development be it residential, commercial or industrial.

3.5.2 Construction Phase

3.5.2.1 Resident Population

Regional Level

Specific to the Proposed RBSF Component, there is no potential for a likely significant adverse direct effect on the overall population growth of the Greater Dublin Area arising from the Proposed RBSF Component during its construction phase. Furthermore, it is not considered likely that there will be any adverse indirect impact to the population of the Greater Dublin Area arising from the construction phase.

Local Level

There is the potential for adverse direct effects on the population arising from the construction phase of the Proposed RBSF Component. The construction related activities are primarily focused on site. The nearest residential populations in the local level are adjacent to the eastern boundary of the Proposed RBSF Component site. Impacts are likely to include noise and dust arising from the construction process including demolition of 3 no. existing small structures on site, site clearance works (including the partial removal of existing internal roads), excavation and construction of the various buildings proposed. The likely effects are not significant and are short-term in their duration. The details of these specific effects and the proposed mitigation measures are discussed in detail under Volume 4, Section 8: Air and Climate and Volume 4, Section 9: Noise and Vibration.

HGV movements during the construction phase would have the potential for negative impacts. The likely effects are not significant and are short-term. The details of these specific impacts and the proposed mitigation measures are discussed in detail under Volume 4, Section 8: Air and Climate and Volume 4, Section 9: Noise and Vibration.

Regional Level

The construction phase of the Proposed RBSF Component is likely to have indirect positive impacts on ancillary support services in the building supply services, professional and technical professions etc. These beneficial impacts on economic activity will be largely temporary but will contribute to the overall future viability of the construction sector and related services and professions over the construction period.

Local Level

There is expected to be a direct positive impact on the working population arising from the construction phase of the Proposed RBSF Component. The associated construction activity in the short to medium-term will see an increase in the working population for this period in this area. This will assist in addressing the national and local unemployment rates, which is a positive impact. It is anticipated that up to 70 workers will be employed on site during the peak construction period.

3.5.2.2 Visiting Community

Regional Level

There is no potential for significant direct impacts on the visiting population arising from the construction phase of the Proposed RBSF Component.

Local Level

There are a limited number of recreational activities and attractions within proximity to the Proposed RBSF Component site. The nearest local recreational facilities, as identified in Section 3.4, are between 2.5 and 3.5 km away from the site and access to each of these facilities does not require interaction with the Proposed RBSF Component site.

With regards to the transient population in the area that may be passing by the Proposed RBSF Component site (driving, walking or cycling), they will be aware of the Proposed RBSF Component during the construction phase. Impacts will relate to construction related dust, noise, and vehicular movements. The likely impacts are not significant and short-term. The details of these specific impacts and the proposed mitigation measures are discussed in detail under Volume 4 Section 8: Air and Climate, Section 9: Noise and Vibration and Volume 4, Section 13: Traffic.

3.5.2.3 Human Health

The impacts from the construction phase on the various environmental disciplines have been summarised in Table 3-10. Where residual impacts have been identified as neutral or imperceptible, it can be objectively concluded that there will be no potential for a significant negative effect on Human Health and consequently can be excluded from further consideration. Sections that identify emissions or the potential for significant effects have been screened for further examination or assessment.

Table 3-10: Summary of Potential Construction Impacts and effects on Human Health

Section	Topic	Summary of predicted Impact	Potential for significant effects on Human Health
Section 4	Water	There are no significant impacts anticipated.	No significant effect on Human Health.
Section 6	Biodiversity	No significant residual impacts on Biodiversity.	No significant effect on Human Health.
Section 7	Land and Soils	There are no predicted impacts on land and soils.	No significant effect on Human Health.
Section 8	Air and Climate	Potential for dust arising from construction activities.	Potential Dust Impacts on surrounding areas.
Section 9	Noise and Vibration	Noise emissions from a range of plant and machinery both during construction and operational phases.	Construction Noise on residential areas.
Section 10	Odour	No Odour impacts during the construction phase.	Potential effects for Human Health.
Section 11	Cultural Heritage	No significant residual impacts on cultural heritage.	No significant effect on Human Health.
Section 12	Material Assets	No significant residual impacts on material assets.	No significant effect on Human Health.
Section 13	Traffic	Increased Traffic volumes due to construction activities.	Potential for traffic emissions (noise / air quality). Increase in traffic accidents/ injuries/deaths.
Section 14	Landscape	No significant residual landscape or visual impact will remain on amenities, activities, character, uses or views	No significant effect on Human Health.
Other	Raised at Public Consultation	Potential for pets and rodents to be attracted to or displaced by construction and operation activities.	Rodents are potential vectors of disease.

From Table 3-10, the following sections were identified for further assessment with respect to Human Health.

- Air and Climate - Dust
- Noise
- Traffic
- Pests

These potential impacts are considered individually in this Section. Where applicable, human health impacts have been assessed with respect to relevant standards and guidelines.

Air and Climate

Volume 4, Section 8: Air and Climate of this EIAR identifies two impacts associated with the Construction Phase - namely dust and emissions associated with traffic generated through Construction Activities, including nitrogen oxides, carbon dioxide and benzene.

Dusts (or particulate matter) can be classified as either total inhalable dust or respirable dust. The different categories relate to the size of the particulates in the atmosphere. Respirable dust is finer and thus able to penetrate further into the lungs, where it can remain. The main health effects associated with dust exposure are bronchitis, asthma and in extreme cases cancer.

The assessment identifies two high sensitivity receptors located less than 50 m from the Proposed RBSF Component construction works and two medium sensitivity receptors within 200 m of the site boundary. Based on the IAQM criteria outlined in Table 8-6 of Section 8, the worst-case sensitivity of the area to human health effects due to an increased exposure to PM_{10} concentrations is considered to below.

The maximum permissible emission level for dust deposition over a one-year period is 350 mg/m^2/day at any receptors outside the site boundary. This value is a generally adopted threshold, which is set at a level considered appropriate for the protection of Human Health and to allow for the enjoyment of amenities in the vicinity of the Proposed RBSF Component.

In relation to traffic emissions during the construction phase of the Proposed RBSF Component, the air quality dispersion modelling has found that there will be an imperceptible impact for all pollutants at all receptors assessed. No other aspect of the construction phase of the Proposed RBSF Component will give rise to Air and Climate impacts with a potential to cause adverse effects on Human Health.

It can therefore be concluded that, throughout the construction phase of the Proposed RBSF Component, there will not be significant adverse effects on Human Health, following the implementation of mitigation measures and best practice standards and guidelines as detailed in Section 8: Air and Climate.

Consequently, it can be concluded that the construction phase of the Proposed WwTP Component will not give rise to significant impacts on human health due to potential air quality impacts.

Noise and Vibration

Volume 3, Section 9: Noise and Vibration of this EIAR identifies potential noise impacts from the construction phase of the Proposed RBSF Component - mainly from excavation of the site and the erection of onsite structures over a phased period. These primary sources of noise are expected to arise from onsite construction works, as well as increased additional traffic on public roads.

Noise has the potential to impact on Human health, and the health effects of exposure to significant construction noise levels are well documented (e.g. Seizas *et al.*, 2005). Exposure to elevated background noise can also lead to hypertension and ischemic heart disease and impact on mental health through annoyance, sleep disturbance, and decreased concentration and activity (Passchier-Vermeer W., 2000).

The nearest noise receptors are located adjacent to the eastern boundary of the Proposed RBSF Component site. The noise model and assessment determines that construction activities at the site will not give rise to significant noise levels and will comply with standards and threshold noise limits (BS8223:2014). Therefore, it can be concluded that construction noise will not give rise to significant adverse effects on Human Health.

Traffic

The World Health Organisation (2006) considers road traffic one of the most important determinants of health in Europe. Traffic-related air pollution, noise, crashes and social effects can combine to generate a wide range of negative health consequences, including increased mortality, cardiovascular, respiratory and stress-related diseases, cancer and physical injury. These impacts can impact on residential communities in which the traffic is generated and particularly vulnerable groups such as children and elderly people, cyclists and pedestrians.

Volume 4, Section 13: Traffic of this EIAR details the predicted impacts on traffic volumes in the local area arising from construction activities associated with the Proposed RBSF Component. Emissions associated with these traffic volumes have also been assessed, namely Air and Quality in Section 8, and Noise in Section 9. Both types of emissions have the potential to cause adverse effects on human health and have been considered in the relevant section. Air quality models and noise models that are based on predicted traffic numbers demonstrate that construction traffic will not give rise to exceedances of thresholds that protect human health. The other obvious potential health impacts associated with construction traffic activity include increased risk of road traffic accident and injury. This is considered under human health as well as in Volume 3, Section 15: Risk Management (Major Accidents and Natural Disasters).

It is considered that the implementation of the traffic management plan will therefore minimise emissions associated with construction traffic volumes as well as minimise the risk of the occurrence of traffic accidents. Therefore, it can be concluded that construction traffic will not give rise to significant adverse effects on human health. No mitigation measures are required from a human health perspective further to those outlined in Volume 3, Section 13: Traffic of this EIAR. Therefore, it can be concluded that Construction Traffic will not give rise to significant adverse effects on Human Health. No mitigation measures are required from a Human Health perspective further to those outlined in the Volume 4, Section 13 of this EIAR.

Rodent and Pest Control

Rodent-borne diseases and their associated risks for public health is a well researched topic (e.g. Meerburg, Singleton & Kijlstra, 2009) and there are a large number of known pathogens that are directly or indirectly transmitted by rodents, including salmonellosis, toxoplasmosis, ornithosis and leptospirosis (CIEH, 2009). These diseases and their associated vectors present significant risks to human health.

Construction activities, particularly on brownfield sites and industrial areas have the potential to result in the disruption and dispersion of rodents that habitually in and around the site and inadvertently facilitate the potential spread of diseases.

3.5.3 Operational Phase

3.5.3.1 Resident Population

Regional Level

There is potential for an indirect positive long-term impact on the population of the Greater Dublin Area arising from the increased capacity of the existing Ringsend WwTP and the GDD Project, which will be supported by the Proposed RBSF Component. The upgrading of the wastewater infrastructure will facilitate the growth of the Greater Dublin Area, which in turn supports development of residential, commercial and industrial projects. The development of residential schemes will provide additional homes which is key to sustaining growth, while commercial and industrial projects will support increased job opportunities and increased economic growth. The upgrading and modernisation of the wastewater infrastructure will also support the protection of public health and the environment.

Local Level

There is the potential for adverse direct impacts on the population arising from the operational phase of the Proposed RBSF Component. The transient population in that area that may be passing by the Proposed RBSF Component site (driving, walking or cycling) will be aware of the development of the Proposed RBSF component. Impacts are likely to include the potential for dust arising from the transfer of biosolids, potential odour generated from the transfer of biosolids and noise generated by plant and the movement of vehicles on site and the additional movements generated by HGVs. The likely effects are not significant and long-term. The details of these specific impacts and the proposed mitigation measures are discussed in detail under Volume 4, Section 8: Air and Climate, Volume 4, Section 9: Noise and Vibration, Volume 4, Section 10: Odour and Volume 4, Section 13: Traffic.

3.5.3.2 Working Population

Regional Level

The potential indirect impact of the operational phase of the Proposed RBSF Component is that the planned developments within the Greater Dublin Area can be developed. The RBSF will serve the Ringsend WwTP and GDD which in turn will facilitate development within the Greater Dublin Area. The employment benefits associated with the operational phase of those developments can be expected to generate further significant additional jobs in the economy.

Local Level

The direct impact of this Proposed RBSF Component is that there will be approximately 6 no. full time operators, and up to 10 at certain times, at the facility.

It is predicted that no likely significant negative impacts will arise to the working population at the operational stage.

3.5.3.3 Visiting Community

Regional Level

HGV movements during the operational phase would have the potential for adverse impacts on the visiting population at a Regional Level due to the additional traffic generated between the Proposed RBSF Component and Ringsend WwTP and the GDD. The likely impacts are imperceptible and long-term. The details of these specific impacts and the proposed mitigation measures are discussed in detail under Volume 4, Section 13: Traffic.

Local Level

There is the potential for adverse direct impacts on the population arising from the operational phase of the Proposed RBSF Component. The nearest residential populations at the local level are adjacent to the eastern boundary of the RBSF site. Impacts are likely to include the potential for dust arising from the transfer of biofert, potential odour generated from the transfer of biofert and noise generated by plant and the movement of vehicles on site and the additional movements generated by HGVs. The likely effects are not significant and long-term. The details of these specific impacts and the proposed mitigation measures are discussed in detail under Volume 4, Section 8: Air and Climate, Volume 4, Section 9: Noise and Vibration, Volume 4, Section 10: Odour and Volume 4, Section 13: Traffic.

3.5.3.4 Human Health

The residual impacts from the operational phase of the Proposed RBSF Component has been summarised in Table 3-11, below. Where residual impacts have been identified as neutral or imperceptible, it can be objectively concluded that there will be no potential for significant effects on

Human Health and consequently can be excluded from further consideration. Sections that identify emissions or the potential for significant effects have been brought forward for further examination or assessment.

Table 3-11: Summary of Potential Operational Impacts and Effects on Human Health

Section	Section	Summary of predicted Impact	Potential for significant effects on Human Health
Section 4	Water	No significant impact Predicted.	No significant effect on Human Health.
Section 6	Biodiversity	No significant residual impacts on Biodiversity.	No significant effect on Human Health.
Section 7	Land and Soils	There are no significant residual impacts on Land and Soils.	No significant effect on Human Health.
Section 8	Air and Climate	No significant impacts associated with the operational phase.	No significant effect on Human Health.
Section 9	Noise and Vibration	Noise emissions from a range of plant and machinery during operational phase.	Potential effects from operational Noise.
Section 10	Odour	Odour Annoyance Criterion - 3 $ouE.m^{-3}$ as the 98th percentile of hourly averages at receptor locations.	Consider for potential effects on Human Health.
Section 11	Cultural Heritage	No significant residual impacts on cultural heritage.	None Identified.
Section 12	Material Assets	No significant residual impacts on material assets.	None Identified.
Section 13	Traffic	Increased Traffic volumes due to operational activities.	Potential for traffic emissions (noise / air quality).
Section 14	Landscape	No significant impacts on landscape.	None Identified.

From Table 3-11 above, the following sections were identified for further assessment with respect to Human Health.

- Air Quality
- Noise
- Traffic
- Odour

These potential impacts are considered individually in this section. Where applicable, human health impacts have been assessed with respect to relevant standards and guidelines.

Air Quality

There are no residual impacts to Air Quality or Climate envisaged as a result of the Proposed RBSF Component.

The maximum permissible emission level for dust deposition over a one-year period is 350 $mg/m^2/day$ at any receptors outside the site boundary. In relation to traffic emissions during the construction phase of the Proposed RBSF Component. As in the previous section, the potential risk for dust deposits on Human Health is considered to be low.

It can therefore be concluded that the operational phase of the Proposed RBSF Component will not give rise to significant adverse effects on Human Health, following the implementation of mitigation measures and best practice standards and guidelines, as detailed in the Air and Climate Section. No additional mitigation measures are required from a Human Health perspective further to those outlined in Volume 4, Section 8 of this EIAR.

Noise

Volume 3, Section 9: Noise and Vibration of this EIAR identifies potential noise impacts from the operation phase of the Proposed RBSF Component, mainly from building services plan, material handling and vehicular activity on the site.

Noise has the potential to impact on human health, and the health effects of exposure to significant construction noise levels are well documented (e.g. Seizas *et al.*, 2005). Exposure to elevated background noise can also lead to hypertension and ischemic heart disease and impact on mental health through annoyance, sleep disturbance, and decreased concentration and activity (Passchier-Vermeer W., 2000).

Mitigation measures to control noise emissions have been recommended by the noise specialist so as not to generate a cumulative noise level in excess of 40dB$L_{Aeq,T}$ at the nearest noise sensitive receptor (R02).

Provided that the mitigation measures discussed in Section 9.6.2 are implemented, it can be concluded that the Proposed RBSF Component will not give rise to significant effects on Human health.

Traffic

The World Health Organisation (2006) considers road traffic one of the most important determinants of health in Europe. Traffic-related air pollution, noise, crashes and social effects can combine to generate a wide range of negative health consequences, including increased mortality, cardiovascular, respiratory and stress-related diseases, cancer and physical injury. These impacts can impact on residential communities in which the traffic is generated and particularly vulnerable groups such as children and elderly people, cyclists and pedestrians.

Volume 4, Section 13 of this EIAR details the predicted impacts on traffic volumes in the local area arising from operational activities associated with the Proposed RBSF Component. Emissions associated with these traffic volumes have also been assessed, namely Air and Quality in Section 8, and Noise in Section 9. Both types of emissions have the potential to cause adverse effects on human health and have been considered in the above sections. Operational traffic will not give rise to significant adverse effects on human health in relation to noise pollution or air quality.

The other obvious potential health impacts associated with changes in operational traffic activity include increased risk of road traffic accident and injury. This is considered under human health as well as in Volume 4, Section 15 (Major Accidents and Natural Disasters).

A traffic management plan will be implemented throughout the operational phase. Operational traffic will not give rise to increased journey times and traffic disruption, following the implementation of mitigation measures and best practice standards and guidelines.

Therefore, it can be concluded that Operational Traffic will not give rise to significant adverse effects on Human Health. No mitigation measures are required from a Human Health perspective further to those outlined in the Volume 3, Section 9 of this EIAR.

Potential for Pathogens

The potential risk of the storage of biosolids and potential associated risk on human health was raised during consultation. The Biosolids are a treated by-product of the wastewater treatment process. The production of biosolids results in a low odour product that is not harmful to human health. The biosolids has been treated to USEPA standards or equivalent, which ensures that pathogenic bacteria, enteric viruses and viable helminth ova contained in the biosolids are below detectable levels. The biosolids will be stored in a purpose-built facility to prevent fugitive emissions to the surrounding area. It can therefore be objectively concluded that the storage of biosolids at the proposed facility will not give rise to significant effects on human health.

3.5.3.5 Do-Nothing Impact

The proposed development of the RBSF will play a critical role in ensuring that the maximum operating capacity of the Ringsend WwTP and GDD Project is achieved. The proposed RBSF and the Ringsend WwTP upgrade and GDD Project have a crucial role in the delivery of essential infrastructure to both the local and regional level.

In the absence of the proposed RBSF, to ensure that the maximum operating capacity of the Ringsend WwTP and GDD Project is achieved, demographic and employment numbers would be expected to remain unchanged. It is considered that, given the continued upwards trend in 2016 population figures and the continued need to upgrade wastewater systems to higher environmental standards, the do-nothing scenario is not an option.

With no increase in capacity for wastewater treatment, restrictions could be placed on residential, commercial and industrial development to both the local and regional level. The do-nothing impact would be a curtailment in the ability to facilitate future development be it residential, commercial or industrial.

3.6 Mitigation Measures

3.6.1 Construction Phase

3.6.1.1 Resident Population

There are no requirements for mitigation measures relating to the resident population other than those planned under other specific Sections of this EIAR under Volume 4, Section 4: Water, Volume 4, Section 8: Air and Climate, Volume 4, Section 9: Noise and Vibration, Volume 4, Section 10: Odour and Volume 4, Section 13: Traffic.

In addition, it is standard practice to prepare a Construction Management Plan and a Traffic Management Plan for a development of this type, part of which would include a Liaison Personnel. The Applicant is committed to ensuring the preparation of these documents. This will ensure local residents are kept informed of developments and provide a dedicated point of contact for local residents to raise any matters arising during the course of the construction phase.

3.6.1.2 Working Population

The Proposed RBSF component will be designed and constructed to the best industry standards, with priority given to the health and safety of employees, local residents and the community at large. All contracts will be tendered to reputable and competent contractors with a track record in the safe delivery of this type of work. Only contractors who demonstrate compliance with Irish Water's strict health and safety standards will be invited to tender for the works. All workers will be required to conform to the Health and Safety plans of their respective employers, which will be subjected to regular audits by Irish Water and their consultants.

There are no specific mitigation measures proposed relating to other working populations of the area.

3.6.1.3 Visiting Community

There are a limited number of recreational activities and attractions within proximity to the Proposed RBSF Component site. Hollystown Golf Club is located approximately 3.5 km northwest of the Proposed RBSF Component site and Silloge Golf Club is located approximately 2.5 km of the east of the Proposed RBSF Component site.

There are no specific mitigation measures proposed relating to the visiting population other than those planned under other specific Sections of this EIAR under Volume 4, Section 4: Water, Volume 4, Section 8: Air and Climate, Volume 4, Section 9: Noise and Vibration, Volume 4, Section 10: Odour and Volume 4, Section 13: Traffic.

3.6.1.4 Human Health

Mitigation measures relevant to protecting Human Health during the construction phase have been applied to the Proposed RBSF Component according to the relevant Sections in this EIAR. These have been examined and determined to be of a sufficient standard to protect human health and wellbeing.

In addition to these identified measures, it is recommended that a rodent and pest control plan is put in place so as to manage and limit any potential disturbance to populations that may utilise the site. The pest control plan should be in accordance with the Chartered Institute of Environmental Health's "*Pest minimisation best practice for the construction industry"* guidelines or a similar appropriate standard.

3.6.2 Operational Phase

3.6.2.1 Resident Population

There are no requirements for mitigation measures relating to the resident population during the operation of the Proposed RBSF Component other than those planned under other specific sections of this EIAR under Volume 4, Section 4: Water, Volume 4, Section 8: Air and Climate, Volume 4, Section 9: Noise and Vibration, Volume 4, Section 10: Odour and Volume 4, Section 13: Traffic.

3.6.2.2 Working Population

There are no requirements for mitigation measures relating to the resident population during the operation of the Proposed RBSF Component other than those planned under other specific Sections of this EIAR under Volume 4, Section 4: Water, Volume 4, Section 8: Air and Climate, Volume 4, Section 9: Noise and Vibration, Volume 4, Section 10: Odour and Volume 4, Section 13: Traffic.

3.6.2.3 Visiting Community

There are no requirements for mitigation measures relating to the resident population during the operation of the Proposed RBSF Component other than those planned under other specific Sections of this EIAR under Volume 4, Section 4: Water, Volume 4, Section 8: Air and Climate, Volume 4, Section 9: Noise and Vibration, Volume 4, Section 10: Odour and Volume 4, Section 13: Traffic.

3.6.2.4 Human Health

Mitigation measures relevant to protecting Human Health during the operational phase have been applied to the Proposed RBSF Component according to the relevant Sections in this EIAR. These have been examined and determined to be of a sufficient standard to protect human health and wellbeing.

No further mitigation requirements have been identified from a Human Health perspective.

3.7 Residual Impacts

It is considered that there are no significant negative residual impacts predicted to the population environment of either the GDA or the immediate environs of the Proposed RBSF Component, defined as the 'local level'.

3.7.1 Construction Phase

3.7.1.1 Resident Population

There are likely to be direct effects on the population directly adjacent the site arising from the Proposed RBSF Component during its construction phase.

During the construction phase, the resident population will be aware of increased activity, from site preparation works including demolition (noise, dust, odour, vibration), construction works and particularly related to the increases in traffic on the local road network. The details of these specific impacts and the proposed mitigation measures are discussed in detail under Volume 4, Section 8: Air and Climate, Volume 4, Section 9: Noise and Vibration, Volume 4, Section 10: Odour and Volume 4, Section 13: Traffic.

3.7.1.2 Working Population

There is predicted to be a direct positive impact on the working population arising from the construction phase due to the jobs provided by this stage of the Proposed RBSF Component.

3.7.1.3 Visiting Community

There are likely to be no direct significant impact on the visiting population at the local level arising from the Proposed RBSF Component.

3.7.1.4 Human Health

No residual impacts have been identified that will give rise to significant adverse effects on Human Health.

3.7.2 Operational Phase

3.7.2.1 Resident Population

There is no predicted likely direct impact on the resident population arising from the operational phase of the Proposed RBSF Component.

3.7.2.2 Working Population

The direct impact of the Proposed RBSF Component is that there will be 10 no. additional employees based at the RBSF.

There is no predicted likely significant direct impact on the working population in the area arising from the operational phase of the Proposed RBSF Component.

3.7.2.3 Visiting Community

There is no predicted likely direct impact on the visiting population arising from the operational phase of the Proposed RBSF Component.

3.7.2.4 Human Health

No residual impacts have been identified that will give rise to significant adverse effects on Human Health.

3.7.3 Interactions

3.7.3.1 Population

There are numerous inter-related environmental topics described in detail throughout this EIAR document which are of relevance to population and human health. The population (i.e. people) will interact with the Proposed RBSF Component during both the construction and operation of the facility.

Water

Surface water runoff from the Proposed RBSF Component may give rise to a change in water quality of the adjoining watercourse to the west of the site. This watercourse will inevitably reach larger water bodies which people may use for recreation.

Appropriate mitigation measures to ensure the likely effects are minimised where possible are set out in Volume 4, Section 4: Water.

Air and Climate

The local population are likely to be aware of vehicular emissions from traffic associated with the site and site activities and potential dust emissions from construction related activities (including demolition).

Appropriate mitigation measures to ensure the likely effects are minimised where possible are set out in Volume 4, Section 8: Air and Climate.

Noise and Vibration

The local population are likely to be aware of vehicular noise from traffic associated with the site and site activities and potential vibrations from construction related activities (including demolition).

Appropriate mitigation measures to ensure the likely effects are minimised where possible are set out in Volume 4, Section 9: Noise and Vibration.

Odour

The local population may be aware of additional odours arising from the construction works and the operation of the facility.

Appropriate mitigation measures to ensure the likely effects are minimised where possible are set out in Volume 4, Section 10: Odour.

Traffic

The local population are likely to be aware of increased traffic, in particular HGV movements, within the vicinity of the Proposed RBSF Component during both the construction and operational phase.

Appropriate mitigation measures to ensure the likely effects are minimised where possible are set out in Volume 4, Section 13: Traffic.

Landscape

The local population will be aware of the change in the landscape arising from the construction of the Proposed RBSF Component including the storage buildings, roadside boundary treatment and associated landscaping (including additional tree planting).

Appropriate mitigation measures to ensure the likely effects are minimised where possible are set out in Volume 4, Section 14: Landscape.

3.7.3.2 Human Health Interactions

Human beings can generally be considered regarded as 'Receptors' in an Environmental Impact Assessment, and as such there is the potential for interactions between human health and all other aspects of an Environmental Impact Assessment. Consequently, the human health impact assessment is primarily formulated on the consideration between these interactions. For further details of human health interactions, please refer to Sections 3.5.2.4 and 3.5.3.4 of this Section.

3.7.4 Cumulative Impacts

3.7.4.1 Construction Phase

Resident Population

There are likely to be no significant cumulative impacts on the population directly adjacent the Proposed RBSF Component site during the construction phase of the Proposed RBSF Component.

This would likely change if a development on adjacent lands within this general industrial area were to be proposed and commenced during the construction of the Proposed RBSF Component. Likely cumulative impacts may arise from construction process including dust, noise and traffic. The details of these specific impacts and the proposed mitigation measures are discussed in detail under Volume 4, Section 8: Air and Climate, Volume 4, Section 9: Noise and Vibration, and Volume 4, Section 13: Traffic.

Working Population

The likely cumulative impact of the Proposed RBSF Component is, in general, that the working population of the Greater Dublin Area will be capable of expanding significantly over time due to the increased levels of construction activity and associated construction employment generating uses that the Proposed RBSF Component (which supports the Proposed WwTP Component and GDD Scheme) will accommodate. This will have significant widespread economic benefit to the Region and the State as a whole. This is a significant indirect and positive impact of the Proposed RBSF Component.

Visiting Community

There are not likely to be cumulative impacts on the visiting population in proximity to the RBSF site arising from the development of the RBSF component.

3.7.4.2 Operational Phase

Resident Population

The likely cumulative impact of the Proposed RBSF Component is that the resident population of the Greater Dublin Area will be capable of growing to its target population levels (i.e. both population and employment numbers) over time due to the increased capacity of the Ringsend WwTP which is supported by the Proposed RBSF Component. This will enable objectives at both national and regional level to be met. This is a significant indirect and positive impact of the Proposed RBSF Component.

Working Population

The likely cumulative impact of the Proposed RBSF Component is, in general, that the working population of the Greater Dublin Area will be capable of expanding significantly over time due to the increased levels of construction activity and the development of employment generating uses in the City region which the Proposed RBSF Component will facilitate. This will have significant widespread economic benefit to the region and State as a whole. This is a significant indirect and positive impact of the Proposed RBSF Component.

Visiting Community

There is no predicted likely cumulative impact on the visiting population arising from the operational phase of the Proposed RBSF Component.

3.7.4.3 Human Health

No cumulative impacts with the potential to give rise to significant adverse effects on human health have been identified.

3.8 Monitoring

In relation to the impact of the Proposed RBSF Component on population and human health it is considered that the monitoring measures outlined in regard to the other environmental topics such as water, air quality and climate and noise etc. sufficiently address monitoring requirements. The details of these specific impacts and the proposed mitigation measures are discussed in detail under Volume 4, Section 4: Water, Volume 4, Section 8: Air and Climate, Volume 4, Section 9: Noise and Vibration, Volume 4, Section 10: Odour and Volume 4, Section 13: Traffic.

3.9 Difficulties Encountered

No significant difficulties were encountered in compiling the required information.

3.10 References

Central Statistics Office, (2018). *Central Statistics Office*. [online] Available at: http://www.cso.ie/en/statistics/. [Accessed on the 28.09.2017].

McQuinn, M., O'Toole, C., Economides, P. & Monteiro, T., (2017). *The Quarterly Economic Commentary Winter*. Dublin: The Economic and Social Research Institute.

The National Pest Advisory Panel, Chartered Institute of Environmental Health. (2012). *Pest Minimisation Best Practice for the Construction Industry*. [pdf] Available at: https://www.cieh.org/uploadedFiles/Core/Policy/Publications_and_information_services/Policy_publications/Publications/Pest_Minimisation-Best_practice_construction_industry.pdf.

The Regional Planning Guidelines Office. (2010). *Regional Planning Guidelines for the Greater Dublin Area 2010 – 2022*. [pdf] Available at: http://emra.ie/dubh/wp-content/uploads/2015/02/Greater-Dublin-Area-Regional-Planning-Guidelines-2010-2022-Volume-I.pdf.

Section 4: Water

4.1 Introduction

This Section of the EIAR assesses the potential impacts (and resulting effects) likely to occur as a result of the Regional Biosolids Storage Facility (RBSF) component of the Proposed GDD Project and the Proposed Upgrade Project on the receiving water environment (including hydrological, surface water and drainage aspects) within, and downstream of, the catchment of the site and outlines the measures required to minimise these potential impacts. Hereinafter, this component is referred to "the Proposed RBSF Component".

It should be noted that groundwater/hydrogeology is assessed in Volume 4, Section 7: Land and Soils.

4.2 Methodology

This section of the EIAR was prepared having regard to:

- Guidelines on the Information to be contained in Environmental Impact Statements (EPA, 2002);
- Advice Notes on Current Practice in the preparation of Environmental Impact Statements (EPA, 2003);
- Guidelines on the Information to be contained in Environmental Impact Assessment Reports (Draft) (EPA, August 2017);
- Advice Notes for Preparing Environmental Impact Statements (Draft) (EPA, September 2015); and
- Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA, 2009).

The assessment is based on a desk study review of published hydrological data for the Mid Ward Catchment[7] and a review of previous hydrological investigations carried out on the site and in the vicinity. A site walkover and surface water sampling were also undertaken. The aspects of the Proposed RBSF Component that interact with and effect the receiving/existing environment were examined.

The likely significant effects of the Proposed RBSF Component on the hydrological environment are discussed, and the measures to mitigate any adverse impacts are described. Adverse impacts are those that result in a detrimental effect to the current environment, i.e. deterioration in surface water quality, increased risk of flooding. The effects are assessed in terms of Quality, Significance, Magnitude, Probability, Duration, and Types.

This assessment of hydrological impacts follows guidelines established by the TII/NRA in its "*Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes"* (2009).

[7] *Source: EPA Integrated Catchment Management website – www.catchments.ie*

The significance of impacts on specific receptors are considered in terms of the magnitude of the effect/impact of an element of the Proposed RBSF Component on a receptor and the importance of that receptor.

The magnitude of the effect/impact can be assessed based on the criteria shown in Table 4-1. The criteria for rating the importance of the attribute is shown in Table 4-2. The impact significance is outlined in Table 4-3.

Table 4-1: Estimation of Magnitude of Impact

Magnitude of Impact	Criteria
Large Adverse	Results in loss of attribute and /or quality and integrity of attribute
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity

Table 4-2: Criteria for Rating Site Attributes - Hydrology Attributes (NRA 2009)

Criteria	Extremely High	Very High	High	Medium	Low
	Attribute has a high quality or value on an international scale	Attribute has a high quality or value on a regional or national scale	Attribute has a high quality or value on a local scale	Attribute has a medium quality or value on a local scale	Attribute has a low quality or value on a local scale
Baseline Water Quality	Natura 2000 designated river, wetland or surface water body ecosystem	NHA designated River, wetland or surface water body ecosystem WFD Status - "High"	WFD Status - "Good"	WFD Status - "Moderate"	WFD Status "Poor"- "Bad"

Table 4-3: Rating of Significant Environmental Impacts

Importance of Attribute	Magnitude of Impact			
	Negligible	Small Adverse	Moderate Adverse	Large Adverse
Extremely High	Imperceptible	Significant	Profound	Profound
Very High	Imperceptible	Significant/ Moderate	Profound/ Significant	Profound
High	Imperceptible	Moderate/ Slight	Significant/ Moderate	Profound/ Significant
Medium	Imperceptible	Slight	Moderate	Significant
Low	Imperceptible	Imperceptible	Slight	Slight/ Moderate

4.2.1 Desk Study

Information on the hydrology and surface water quality has been obtained from the following sources:

- Hydrometric data from the Office of Public Works website (www.opw.ie/hydro);
- Historic flood data was obtained from the National Flood Hazard Mapping website www.floodmaps.ie;
- Environmental Impact Statement for Kilshane Cross Recycling Park (September 2005);

- Environmental Impact Statement for Huntstown Renewable Bioenergy Plant (2013) prepared by SLR Ltd;
- Preliminary Flood Risk Assessment (PFRA) maps were obtained from the Office of Public Works (OPW) and the Eastern Catchment Flood Risk Assessment and Management study website http://www.eastcframstudy.ie/;
- Catchments.ie - Water quality data;
- www.GSI.ie - Mapping;
- www.cfram.ie/prfa - Mapping;
- www.opw.ie/en/floodriskmanagement/ - Mapping;
- Flood Risk Assessment Report prepared by J.B. Barry & Partners Ltd; and
- Water quality data from the Environmental Protection Agency website (http://maps.epa.ie/internetmapviewer/mapviewer.aspx).

4.2.2 Legislation and policy

The legislation and guidance relevant to water are:

- Water Framework Directive 2000/60/EC and SI No. 722/2003 - European Communities (Water Policy) Regulations 2003, as amended SI No. 272/2009 - European Communities Environmental Objectives (Surface Waters) Regulations 2009, as amended;
- Directive 2014/52/EU of The European Parliament and of the Council amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment; and
- Control of Water Pollution from Construction Sites - Guide to Good Practice (C532) (CIRIA, 2001).

4.2.3 Site Visit and Surface Water Sampling

A site walkover was undertaken on 14 September 2017. Water samples were collected from the stream adjoining the western boundary of the site to provide baseline data on the water quality upstream and downstream of the proposed discharge point for the surface water runoff from the Proposed RBSF Component. A small streams risk assessment survey (SSRS) was also undertaken (December 2017), at two locations, in order to assess the biological health of the receiving water. The surface water sampling locations and results are discussed in section 4.3.5.

4.3 Existing Environment

4.3.1 Site Description

The site of the Proposed RBSF Component is located on the western side of the N2 national road and within the townland of Newtown, Dublin 11. It is approximately 1.6 km north of Junction 5 (Finglas) on the M50 motorway and 1.5 km west of Dublin.

The site is approximately 11 hectares in area and the existing elevation ranges from 75 mOD to 79 mOD. Fingal County Council was granted permission in 2006 for a waste recovery facility at the Proposed RBSF Component site. Certain enabling works, including drainage works, internal access roads, boundary fencing, and electricity and telecommunications infrastructure have been carried out at the Proposed RBSF Component site. The site comprises overgrown grassed agricultural land in a single, large field bounded by hedgerows (Figure 4-1). The R135 borders the site to the east.

The Huntstown Quarry, which is operated by Roadstone Dublin Ltd., is located approximately 500 m to the southwest and west of the Proposed RBSF Component site. The Huntstown Power Station is located at the southern boundary of the site. The proposed Huntstown Bioenergy development is located some 430 m to the south of the Proposed RBSF Component site.

A tributary of the Huntstown Stream, which is a tributary of the River Ward, borders the site to the west and south. This is part of a network of drainage ditches that form the headwaters of the Huntstown Stream. The drainage from the Huntstown Quarry feeds into this network.

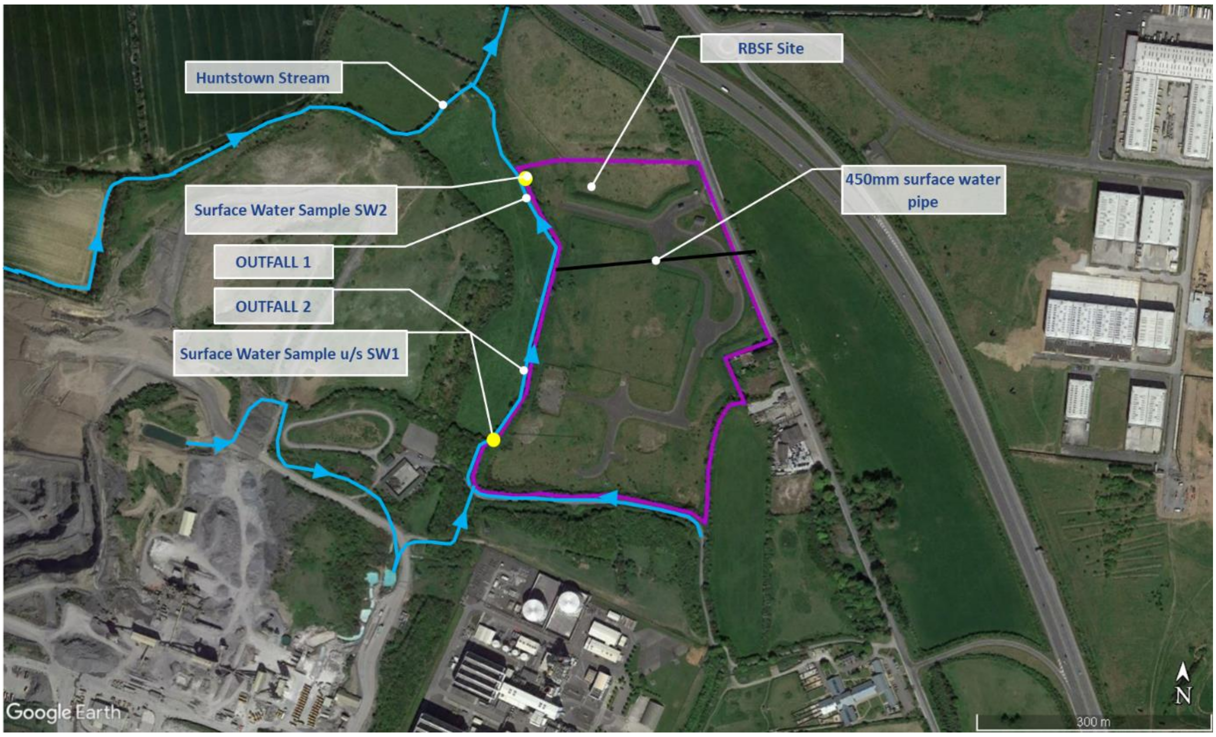

Figure 4-1: Proposed RBSF Site Location

The Proposed RBSF Component site is underlain by between 13 and 21 metres of low permeability Boulder Clay. Based on the site conditions, the groundwater vulnerability classification is Low (see Section 7.2.8) which indicates that infiltration is low and runoff is high.

4.3.2 Pipeline Wayleave

The Coldwinters site located to the East of the RBSF site is currently drained to the St. Margaret's stream via a 450mm diameter surface water pipe. This pipe is contained within a 10m wayleave, which traverses the RBSF site as shown on Figure 4-1. Irish Water propose to reroute this pipeline within the RBSF site to a new outfall downstream of the existing location. The diversion will facilitate the construction of the RBSF and have no impact on the existing surface water regime within the Coldwinters site. The proposed diversion is shown on Drg No. Y17702-PL-015.

4.3.3 Surface Water Catchments

The Proposed RBSF Component site lies at the very southern edge of the Mid Ward catchment (Ward_030). The boundary of the Ward and Tolka catchments lies approximately 100 metres south of the site boundary. All surface water draining from the site enters the Huntstown Stream via a drainage ditch that lies on the southern and western boundary of the Proposed RBSF Component site. This drainage ditch is part of a network of ditches which form the headwaters of the Huntstown Stream which flows in a northerly direction (under the N2 at Kilshane Bridge) to join the Ward River at Owens Bridge some 4.5 km to the north.

The Huntstown Stream is part of the Ward_030 River Waterbody which is part of the Broadmeadow subcatchment (Broadmeadow_SC_010) of the Nanny Delvin Catchment (Nanny Delvin_08).

The Huntstown Stream in the vicinity of the Proposed RBSF Component site was inspected during the site visit on 14 September 2017. The drainage from Huntstown Quarry (including Huntstown Power) discharges to this. The stream is at the bottom of a deep drainage ditch (1.5 -2.9 metres deep) in the vicinity of the Proposed RBSF Component site. The depth of water is less than 150 mm and its bed is covered in a thick layer of silt. The flow was barely perceptible at the time of the visit. The stream and ditch were assessed as unsuited for taking biotic kick samples for determination of Q Values due to low flow and a lack of gravel substrate. SSRS's were carried out to establish the biological health of the receiving water (discussed in section 4.3.5).

The runoff from the drainage system that was constructed as part of the enabling works for the 2006 planning permission discharges to the drainage ditch on the western boundary of the Proposed RBSF Component site (Outfall 1 and Outfall 2 in Figure 4-1).

4.3.4 Flooding

In accordance with the guidelines produced by the DEHLG (Department of Environment Heritage and Local Government) *"The Planning System and Flood Risk Management: Guidelines for Planning Authorities"* (2009) (referred to hereafter as the FRM Guidelines) - a Flood Risk Assessment (FRA) has been undertaken for the Proposed RBSF Component. The Proposed RBSF Component site lies outside of the 1% (Flood Zone A) and 0.1% (Flood Zone B) AEP fluvial flood extents and thus is deemed to be in Flood Zone C. Flood Zone C is deemed appropriate for all types of development. The OPW Summary Local Area Report shows no indication of previous fluvial related flooding at the Proposed RBSF Component site.

The PFRA Map (Appendix 2 of the FRA report) of the area indicates a pluvial flood risk at the Proposed RBSF Component site. However, the OPW Summary Local Area Report shows no indication of previous pluvial related flooding at the Proposed RBSF Component site. It should be noted that the pluvial flood risk is assessed on the basis of Digital Terrain Model (DTM) data. As such, the pluvial 'indicative extents' map identifies low lying areas and depressions where surface water from rainfall could pond.

The closest flooding incident to the Proposed RBSF Component site recorded on the OPW flood hazard website was recorded 1.4 km to the north of the Proposed RBSF Component site at Kilshane Cross where the Huntstown Stream passes under the N2 National Primary Road. Flooding incidents were recorded here in 2002 and 2005. These flooding incidents appear to have occurred on the N2 road and are described as being caused by runoff from adjacent 'grasslands'. As a result of those flooding incidents, drainage works were carried out in 2005 as part of the N2 road development. There are no reported flood events since the completion of the drainage works.

4.3.5 Surface Water Quality

4.3.5.1 Water Framework Directive

The Water Framework Directive establishes a framework for the protection, improvement and management of all waters. The overall aim for surface waters, which include rivers, lakes, transitional (estuaries and lagoons) and coastal waters, is to achieve at least 'good ecological status' and 'good chemical status'.

A surface water body must achieve both good ecological status and good chemical status before it can be considered to be of good status. The chemical status of a water body is assessed based on the concentrations of certain chemical pollutants. The ecological status is assessed on Quality (Q) Values (Biotic Indices). The EPA scheme of Q Values and its relationship to WFD is set out in the Table 4-4.

The Q value at the nearest monitoring point (5.5 km downstream of the site on the River Ward at Owens Bridge) is Q4 (Good). The details are set out in Table 4-5 below.

Table 4-4: WFD Status[8] and EPA Q Values

Q Value	WFD Status
Q5	High
Q4-5	High
Q4	Good
Q3-4	Moderate
Q3	Poor
Q2-3	Poor
Q2	Bad
Q1-2	Bad
Q1	Bad

Table 4-5: Measured Q Values River Ward (2014)

Station Number	Station Name	River	Distance from Proposed RBSF	2004	
RS 08 WO 130 00	Br N of Killeek	Ward	5500 m d/s	Q4	GOOD

4.3.5.2 Neighbouring Discharge Authorisations

Huntstown Quarry, Huntstown Power Station and the proposed Huntstown BioEnergy Facility have licences to discharge to surface water upstream of the Proposed RBSF Component. Huntstown Power Station and the proposed Huntstown BioEnergy Facility are discharging via the settlement ponds within the quarry. Runoff from the quarry and pumped water to maintain dry working conditions in the quarry are also discharged to the tributary of the Huntstown Stream (following passage through sedimentation ponds).

Huntstown Power Company Limited (IPPC Licence Reg. No. (P0483-03))

Emissions to Water - Huntstown Power is licenced to discharge neutralised effluent from its boiler blowdown and demineralisation plant to the Huntstown Quarry dewatering network, from where it will ultimately discharge to the drainage ditch that borders the Proposed RBSF Component site.

[8] *The overall water quality status of the Ward_030 waterbody (including the Huntstown Stream), into which the proposed RBSF site will drain, is "Good"*

Huntstown BioEnergy Limited (Industrial Emissions Licence Reg. No. P0993-01)

Emissions to Water - There shall be no emissions to water of environmental significance.

Roadstone Ltd. Huntstown Quarry (Waste Licence Reg. No. W0277-02)

Emissions to Water - Roadstone Ltd. is licenced to discharge up to 1800 m^3/day from its settlement ponds to the drainage ditch that borders the Proposed RBSF Component site. The emission limits are listed below in Figure 4-2.

Parameter	Emission Limit Value
Temperature	25 °C (max)
pH	6 - 9
	mg/l
BOD	5.0
Suspended Solids	15.0
Ammonia (as N)	0.5
Orthophosphate (as P)	0.5

Figure 4-2: Emission Limit Value

4.3.5.3 Receiving Water Sampling

The stream on the western boundary of the site was sampled upstream and downstream of the Proposed RBSF Component surface drainage discharge points (Outfall 1 and Outfall 2 in Figure 4-1) on 14 September 2017. The sampling locations were the same as the locations sampled by TES in 2005 in the EIS for the Recycling Park. The results of the analysis are shown in Table 4-6. The calcium and sulphate concentrations were elevated. This reflects the runoff from the Huntstown Quarry upstream. The activities at the quarry include production of concrete blocks and concrete batching. Elevated calcium and sulphate are associated with cement leaching.

The chloride is elevated also but well within the drinking water standard. The Faecal Coliform counts were 2500 and 1100 colony forming units per 100 ml for the upstream and downstream samples respectively. This is not unusual for small streams that are used as watering points for livestock.

While these analyses are a snapshot of the quality at the time of sampling they have shown that the quality generally reflects that recorded in 2005. The analyses also show that the natural water quality is being influenced by activities upstream. Nonetheless these results can be used for comparison with future analyses.

Table 4-6: Baseline Surface Water Quality (14/09/17)

Parameter	Units	SW1 Upstream	SW2 Downstream	Physio-Chemical Parameters-Rivers (SI No. 272 of 2009: Surface Water Regulations 2009)
Alkalinity	mg/l	206.18	220.35	
Ammonia as N	mg/l	0.077	0.055	High status ≤0.040 (mean) or ≤0.090 (95%ile) Good status ≤0.065 (mean) or ≤0.140 (95%ile)
CBOD5	mg/l O2	< 2	< 2	High status ≤1.3 (mean) or ≤ 2.2 mg/l (95%ile) Good status ≤1.5 (mean) or ≤2.6 (95%ile)
Calcium	mg/l	214.644	242.706	
Cadmium	ug/l	0.9	0.6	
Chloride	mg/l	99.959	49.493	
Chromium	ug/l	2.4	2.6	
Conductivity @ 20°C	uS/cm @20°C	984	947	
Copper	ug/l	24	16.3	<30mg/l (Annual Average) (Hardness > 100 mg/l CaCo3
Dissolved Oxygen	mg/l O2	9.49	9.76	
Magnesium	mg/l	23.39	23.083	
Iron	ug/l	< 7.2	< 7.2	
Lead	ug/l	< 1.7	< 1.7	
Manganese	ug/l	1.3	2.6	
Mercury	ug/l	< 0.01	< 0.01	
Nitrite as N02	mg/l	0.106	0.082	
Nitrate as N03	mg/l	< 8.9	< 8.9	
Nickel	ug/l	3.7	6	
Orthophosphate as P04	mg/l	< 0.025	< 0.025	High status ≤0.025 (mean) or ≤0.045 (95%ile) Good status ≤ 0.035 (mean) or ≤ 0.075 (95%ile)
PH	pH Unit	7.82	8.11	6.0< pH < 9.0
Potassium	mg/l	7.136	7.393	
Sodium	mg/l	32.654	25.612	
Sulphate	mg/l	281	304	
Temperature	°C	15.6	15.6	
Total Organic Carbon	mg/l	2.53	1.9	
Total Suspended Solids	mg/l	< 2	4	
Zinc	ug/l	8.3	9.3	
Coliforms	MPN/100ml	27550	12590	
Faecal Coliforms	cfu/100ml	2500	1100	

SSRS Survey

The receiving water drainage ditch was assessed as unsuited for taking biotic kick samples for determination of Q Values due to low flow and a lack of gravel substrate. However, it was decided that Small Stream Risk Score Assessments SSRS's would provide an indication of the biological health of the receiving water (see Table 4-7). Limnos Consultancy carried out the sampling on 18 December 2017. The SSRS is a macroinvertebrate-based system designed to assess the risk of a stream not achieving 'Good Ecological Status' in the sense of the Water Framework Directive. A 'kick-sample' with a net is taken and the macroinvertebrates - insects, snails, crustaceans, etc. - caught in the net are assessed using a standard protocol depending on their sensitivity or tolerance to pollution or other pressures and assigned a score.

Table 4-7: Small Stream Risk Score (SSRS) threshold values

>7.25	>6.5 – 7.25	<6.5
Probably not at risk	Indeterminate, Stream may be at risk	Stream at risk

Two sites were sampled and their locations are shown in Figure 4-3. Both sites had low SSRS values putting the stream at risk of not meeting good status under the WFD. The stream was very slow-flowing at both sites with a heavy deposit of a fine, grey-coloured silt. When disturbed there were significant signs of anoxia - the underlying sediment was black and sulphurous-smelling with some gas released.

Table 4-8: SSRS Results (18 December 2017)

Site	SSRS	No. of Taxa	Macroinvertebrates Recorded
Site 1	2.4	8	*Potamopyrgus*, Chironomidae, *Asellus*, *Gammarus*, Gyrinidae, Dytiscidae, Limnephilidae, *Chironomus*
Site 2	1.6	6	*Asellus*, Chironomidae, Limnephilidae x 2 species, *Gammarus*, Tubificidae

The SSRS values of 2.4 and 1.6 are low and suggest that the stream is at risk and would be unlikely to achieve good status at present (see Table 4-8). Similarly, the number of different macroinvertebrate types observed, eight and six respectively, is low compared to an unimpacted stream, where twice or three times that many would realistically be expected.

It is concluded that the stream is already quite polluted at the upper perimeter of the Proposed RBSF Component site due to upstream pressures. This contrasts with the "Good" status assigned under WFD. However, the WFD status is based on samples collected in Ward River at Owens Bridge.

The importance of the receiving water as an attribute is considered to be Low.

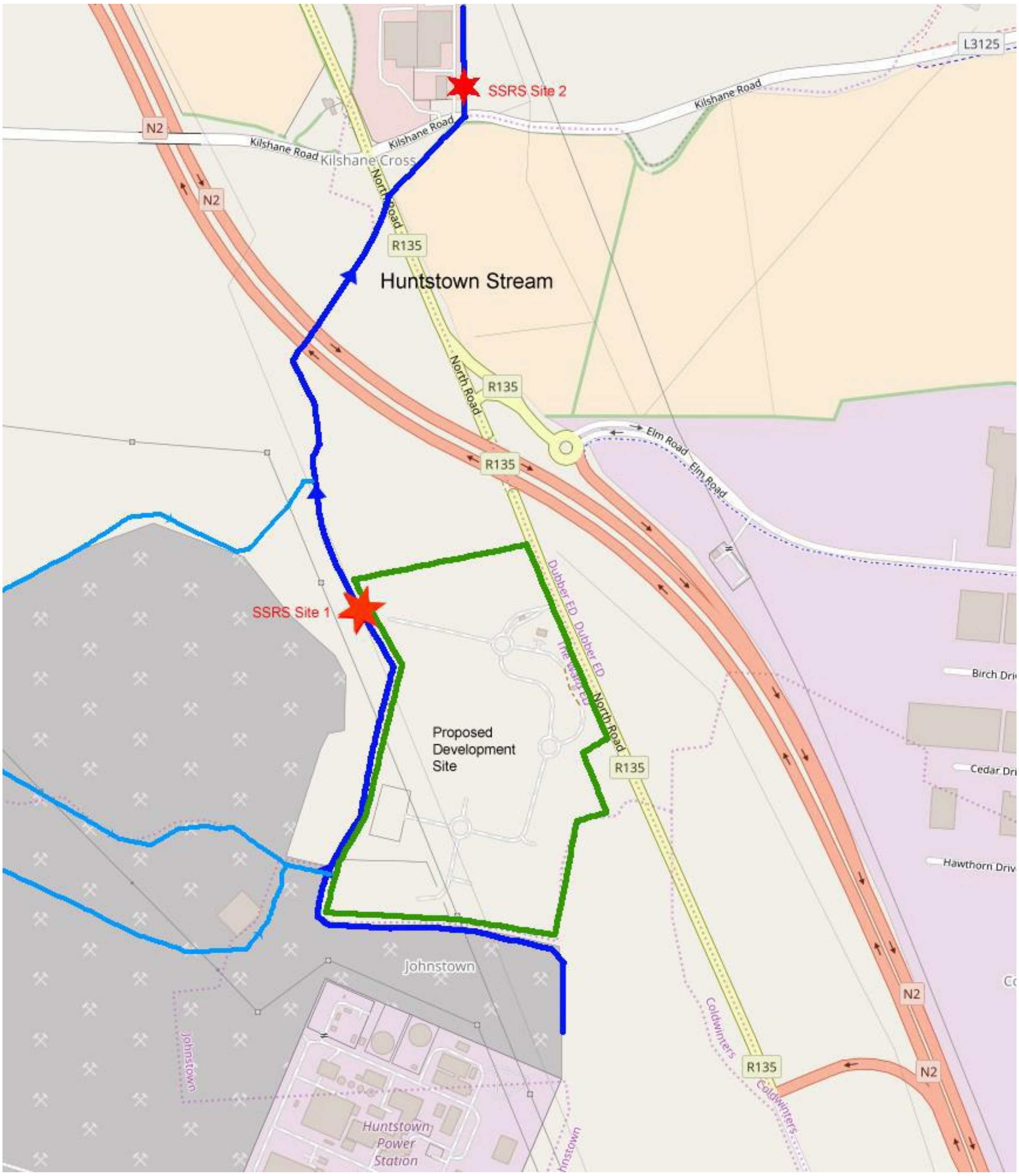

Figure 4-3: SSRS Sampling Locations

4.4 Characteristics of the RBSF Component of the Proposed GDD Project

4.4.1 General

The construction of the Proposed RBSF Component forms part of the overall Proposed GDD Project and the Proposed Upgrade Project. The facility will provide storage for the biosolids generated at both Ringsend WwTP and the GDD WwTP. The storage facility will comprise 2 buildings each with a total area of approximately 5,250 m^2. The water related elements of the Proposed RBSF Component are set out in Sections 4.4.2 - 4.4.4.

4.4.2 Water Supply

The water supply to the Proposed RBSF Component will be provided by mains water. There will be no abstraction from the water courses. Rainwater will be harvested for non-potable use (Wheel Wash). There will be no interaction with the local surface water environment.

4.4.3 Wastewater Disposal

The wastewater generated by the Proposed RBSF Component will be collected onsite and will be discharged to the public sewer. Water from Wheel Wash will discharge to the foul sewer. Any drainage from within the storage buildings will be discharged to the foul sewer.

4.4.4 Drainage

The design of certain project elements in following best practice, other guidelines and statutory requirements can contain embedded mitigation. Impacts are predicted and assessed including this embedded mitigation.

Objective SW04 of the Fingal County Development Plan 2017-2023 states: "*Require the use of sustainable drainage systems (SuDS) to minimise and limit the extent of hard surfacing and paving and require the use of sustainable drainage techniques where appropriate, for new development or for extensions to existing developments, in order to reduce the potential impact of existing and predicted flooding risks*". The drainage systems will be designed in accordance with the report entitled "*The Planning System and FRM Guidelines for Planning Authorities"* (2009). Surface drainage will be attenuated to greenfield runoff rates and will make allowance for climate change.

The Proposed RBSF Component will incorporate the construction of paved areas, internal roads and carparks, the runoff from which will be collected in a purpose designed drainage system. The proposed surface water drainage will be designed to incorporate SuDS devices, in the form of dry swales and permeable paving, at source to limit any potential pollutants in runoff prior to discharge to the receiving water course. The system will incorporate a hydrocarbon interceptor to prevent any oil, petrol or diesel entering the receiving water. The drainage from the northern part of the site incorporating the storage building roads etc. will discharge (following attenuation) to the drainage ditch on the western boundary at Outfall 2. The southern part of the site will continue to drain via the existing attenuation pond at Outfall 1.

The proposed design for the RBSF integrates rainwater harvesting as part of a water conservation strategy for the site. It is anticipated the daily demand for recycled water will be in the region of $42m^3$ by the 2040 design horizon, generated by the proposed wheel wash.

The site-specific drainage system will be designed to collect the runoff from the Proposed RBSF Component including:

- Storm water attenuation storage and discharge control devices that will ensure that the peak runoff from the Proposed RBSF Component will not exceed the existing greenfield runoff. The attenuation will be designed to cater for the 1 in 100 year event (1% Annual Exceedance Probability);
- Roof run-off will be conveyed via a series of rainwater down pipes into a rainwater harvesting system.
- All runoff from paved areas will pass through a bypass petrol/oil interceptor; and

- Following attenuation, the runoff will discharge to the tributary of the Huntstown Stream on the western boundary of the site.

There will be no alterations to the existing natural drainage regime as part of the construction and operation of the Proposed RBSF Component.

4.5 Potential Impacts

The potential hydrological Impacts include:

- Risk of flooding to the Proposed RBSF Component Site;
- Risk of Flooding to surrounding area;
- Impacts on the water quality of nearby watercourses; and
- Impacts on Hydromorphology.

The significance of the impact is a consideration of the importance of the receptor (attribute) being impacted and the magnitude of impact.

Table 4-9: Criteria for Rating Site Attributes - Hydrology Attributes (NRA 2009)

Criteria	Extremely High	Very High	High	Medium	Low
	Attribute has a high quality or value on an international scale	Attribute has a high quality or value on a regional or national scale	Attribute has a high quality or value on a local scale	Attribute has a medium quality or value on a local scale	Attribute has a low quality or value on a local scale
Baseline Water Quality	Natura 2000 designated river, wetland or surface water body ecosystem	NHA designated River, wetland or surface water body ecosystem WFD Status - "High"	WFD Status - "Good"	WFD Status - "Moderate"	WFD Status "Poor"- "Bad"

Based on the SSRS, the importance of the Huntstown stream (and the drainage channels) in the vicinity of the Proposed RBSF Component site is "Low". The lower reaches of the Huntstown Stream close to where it joins the Ward at Owens Bridge is "High" due the assigned WFD status of "Good" (see Table 4-9).

4.5.1 Do-Nothing Impacts

The 'Do-nothing' alternative describes the circumstance where no development occurs. There will be no impact on the hydrological environment if the 'Do-nothing' scenario is followed.

The effects on the water environment are assessed in the following sections for the construction and operation of the Proposed RBSF Component.

4.5.2 Construction Phase Impacts

4.5.2.1 Flood Risk

As all the works associated with the Proposed RBSF Component will be located in Flood Zone C, there are no predicted impacts in relation to flooding of the Proposed RBSF Component site.

If the runoff from the site is uncontrolled during the construction stage, there is a potential to increase the risk of flooding downstream. The magnitude of the impact is assessed to be "Small Adverse" on an attribute of "Low" importance. The significance of this potential impact is "Imperceptible", negative in quality and temporary in duration.

The FRA has identified some elements of the site to be at risk of pluvial flooding (following extreme rainfall events) due to natural depressions in the topography (Note: There are no reports of any flooding on the site). In the absence of any mitigation there is the potential for pluvial flooding (waterlogging/ponding) to continue in local depressions in the topography.

4.5.2.2 Water Quality

Potential impacts to water quality in local water courses during the construction stage in the absence of control measures are:

- The main potential impact of the Proposed RBSF Component on the water in the absence of control measures is an increase in sediment concentration in watercourses during the construction phase. Sedimentation is the deposition of fine sediment either within the gravel or directly on the substrate surface of an aquatic system. The site is relatively flat and runoff will be gentle. Much of the sediment will settle on the ground before entering the water channel. Consequently, the magnitude of the impact is assessed to be "Small Adverse" on an attribute of "Low" importance. The significance of this potential impact is "Imperceptible", negative in quality and temporary in duration.
- Chemical pollutants such as hydrocarbons and other chemicals used in the construction process may enter the surface waters in the event of accidental release and have implications for the area, particularly those sources located down-stream of the Proposed RBSF Component. The volumes of hydrocarbons that could potentially spill during the construction phase will be small. Spills will gather on site rather than discharge directly to the water course. The magnitude of the impact is assessed to be "Small Adverse" on an attribute of "Low" importance. The significance of this potential impact is "Imperceptible", negative in quality and temporary in duration.
- Sanitary waste from inadequate containment and treatment of on-site toilet and washing facilities could lead to contamination of receiving waters. The flatness of the site will restrict rapid runoff to the water course. The magnitude of the impact is assessed to be "Negligible" on an attribute of "Low" importance. The significance of this potential impact is "Imperceptible", negative in quality and temporary in duration.

4.5.2.3 Hydromorphology

Alterations to the shape or route of the receiving water channel are not proposed. No culverting is proposed. There will be no temporary damming of surface water channels during construction. Consequently, there are no hydromorphological impacts predicted.

4.5.3 Operational Phase

4.5.3.1 Flood Risk

The Greater Dublin Strategic Drainage Study (2005) requires all new developments to incorporate SuDS unless it can be demonstrated that such facilities are not feasible. The Proposed RBSF Component will incorporate SuDS as it is deemed practical and feasible.

The site lies within Flood Zone C and is not at risk of flooding.

The FRA Report recommends that to prevent any increased flooding resulting from excess surface water from the Proposed RBSF Component, SuDS measures will be implemented and the discharge from the site be limited to the greenfield discharge rates. The implementation of these SuDS measures will ensure that there is no increase to the risk of flooding elsewhere. The SuDs measures, as recommended by the RBSF FRA to limit discharge from the site to greenfield discharge rates, are detailed in Volume 2, Chapter 4: Description of the Proposed Project of this EIAR. It should be noted that these measures are a planning requirement for new developments.

The design of the proposed drainage system ensures that there will be no increase in the risk of flooding from the site. Therefore, there are no flooding impacts predicted as a result of the Proposed RBSF Component.

The CFRAM mapping of the existing site indicates a risk of pluvial flooding based on possible depressions in ground surface identified by the remote Lidar survey. This is a common feature of the mapping and reflects shallow waterlogging of small topographical depressions. Pluvial related flooding is not considered to be significant following the completion of the Proposed RBSF Component. In addition, the site preparation earthworks and construction will remove any localised depressions where pluvial flooding could occur. Any impact associated with pluvial flooding is considered temporary in duration, small adverse in magnitude and slight in significance.

4.5.3.2 Water Quality

Routine runoff will be rainfall and is not considered a hazard. During the operation of the site the only emissions to surface water will be treated attenuated surface water runoff from roofs and hardstanding areas. Runoff will pass through hydrocarbon interceptors, silt traps/sedimentation and attenuation prior to discharge to the water course on the western boundary of the Proposed RBSF Component site. Wastewater and any runoff from inside the buildings will be collected and will be pumped off site to a public sewer.

The main potential impact will arise from accidental spillages of chemicals, hydrocarbons or other contaminants entering the drainage system and discharging to the stream. However, the drainage design (incorporating embedded mitigation) considerations will ensure that in the event of significant accidental spills, the discharge will be contained by hydrocarbon interceptors. Therefore, it is considered that the magnitude of the impact on the receiving water quality will be negligible during the operational phase and imperceptible in significance.

Firefighting Water Runoff: In the event of a fire, the firefighting water could become contaminated and enter the receiving water via the on-site system. The magnitude of the impact is assessed to be moderate adverse on an attribute of low importance. The significance of this potential impact is slight, negative in quality and temporary in duration.

4.5.3.3 Hydromorphology

There are no alterations (culverts, realignment, dredging) proposed to the receiving water channel. SuDS guidelines will be followed in the design of the drainage system. The operation of Proposed RBSF Component will have no effect or impact on the local hydromorphology.

4.6 Mitigation Measures

4.6.1 Construction Phase

The construction contracts will require that the contractor at construction stage produce a contract specific Construction Environmental Management Plan (CEMP).

The specific measures identified as minimum requirements to be included in a CEMP to ensure any impacts are limited, are summarised in the following subsections.

4.6.1.1 Flood Risk

- The attenuation storage will be established and the required outlet control to attenuate the discharge flow will be constructed as early as possible in the construction stage; and
- Runoff from all impermeable areas formed for the Proposed RBSF Component during the construction stage will be directed through the storm water storage and attenuated to the greenfield run off rate.

Following implementation of mitigation, no significant residual impacts are predicted.

4.6.1.2 Water Quality

- Foul drainage from all site facilities will be to a public sewer (pumped) or, in the case of portaloos, contained and disposed of at a licensed facility offsite;
- When cast in-place concrete is required, all work must be done in the dry and effectively isolated from any flowing water (or water that may enter rivers or streams) for a period sufficient to ensure no leachate from the concrete;
- No direct discharges to be made to waters where there is potential for cement or other contaminant residues in discharges;
- Designated impermeable cement washout areas must be provided;
- Within the site boundary fence, temporary earth bunds will be constructed to contain surface water run-off and channel it to a silt trap or settlement pond before discharge to the drainage network;
- Any excavated vegetation, soil and subsoil will be temporarily stockpiled away at least 20 m from any surface water features in order to reduce the likelihood of any suspended solids reaching them;
- All oils and fuels will be stored in bunded tanks with the provision of a storage/retention capacity of 110% of tank storage. Care and attention will be taken during refuelling and maintenance operations. Particular attention shall be paid to gradient and ground conditions which could increase the risk of discharge to waters; and
- Discharge points to the drainage network will entail a mechanism for containment of runoff in the event of accidental spillage, to enable clean-up and appropriate disposal through licensed facilities.

All construction works in the vicinity of the stream on the western boundary of the site will be undertaken in accordance with the requirements of Inland Fisheries Ireland “*Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters”* (2016).

Following implementation of mitigation, no significant residual impacts are predicted.

4.6.1.3 Hydromorphology

As there will be no impact, no mitigation is proposed.

4.6.2 Operational Phase

The design of the drainage system has inbuilt mitigation as outlined Section 4.4.4. Other potential operational impacts are substantially mitigated through avoidance by the implementation of good management systems and sensible practices.

4.6.2.1 Flooding

No mitigation required apart from removal of localised depressions in topography by site contouring.

4.6.2.2 Water Quality

Firefighting Water Runoff: A shut off valve will be installed on the outlet to the stream. This will be used to contain any contaminated runoff in the event of a major accident on site. In the event of a fire, the shutoff valve will close and the firewater will be contained in the attenuation storage system. The residual impact on the receiving water following the implementation of this mitigation measure will be neutral.

No other specific mitigation measures are required for the operational stage.

4.6.2.3 Hydromorphology

As no impact is predicted, no mitigation is required.

4.7 Residual Impacts

The predicted overall residual impact of the Proposed RBSF Component on the surface water environment both during construction and operational stages will be neutral/imperceptible. As the impacts are neutral/imperceptible there are no cumulative impacts with other projects predicted.

4.7.1 Construction Phase

The predicted overall residual impact of the Proposed RBSF Component on hydrology and water quality and hydrogeology during the construction stage will be neutral or imperceptible.

4.7.2 Operational Phase

The predicted overall residual impact of the Proposed RBSF Component on hydrology and water quality during the operational stages will be neutral or imperceptible.

4.7.3 Interactions

The principal interactions requiring information exchange occurred between the water specialist and the biodiversity specialist. The Biodiversity specialist assessed the biological health of the receiving water and its importance as an ecological receptor. A survey to determine the Small Stream Risk Score was undertaken and made available to the Water specialist. The Water specialist provided details on the discharges and impacts on water quality to assist the Biodiversity specialist in his assessment. The potential impacts on aquatic biodiversity are addressed in Section 6: Biodiversity - Terrestrial.

4.7.4 Cumulative Impacts

The Huntstown Quarry, Huntstown Power Station and proposed Huntstown Bio-Energy plant are projects that discharge to the same sub-catchment as the Proposed RBSF Component site.

The overall residual impact of the Proposed RBSF Component on the surface water environment during both the construction and operational phases has been assessed to be neutral/imperceptible. Accordingly, the Proposed RBSF Component will not give rise to cumulative impacts, indirect impacts or impacts interactions with other plans or projects.

4.8 Monitoring

As all the impacts are predicted to be neutral/imperceptible, no monitoring is proposed.

4.9 Difficulties Encountered

No difficulties were encountered in compiling the information required to carry out this assessment of potential impacts on the water environment as a result of the Proposed RBSF Component.

4.10 References

Environmental Protection Agency (EPA). (2002). *Guidelines on Information to Be Contained in Environmental Impact Statements*. Dublin. [pdf] Available at: http://www.epa.ie/pubs/advice/ea/guidelines/EPA_Guidelines_EIS_2002.pdf.

Environmental Protection Agency (EPA). (2003) *Advice Notes on Current Practice (In the Preparation of Environmental Impact Statements)*. [pdf] Available at: https://www.epa.ie/pubs/advice/ea/guidelines/EPA_advice_on_EIS_2003.pdf.

Environmental Protection Agency (EPA) (2015). *Draft Advice Notes for Preparing Environmental Impact Statements*. [pdf] Available at: https://www.epa.ie/pubs/consultation/reviewofdrafteisguidelinesadvicenotes/Draft%20Advice%20Notes%20for%20preparing%20an%20EIS.pdf.

Environmental Protection Agency (EPA). (2017) *Draft Guidelines of the Information to be Contained in Environmental Impact Assessment Reports*. [pdf] Available at: https://www.epa.ie/pubs/advice/ea/EPA%20EIAR%20Guidelines.pdf.

J.B. Barry & Partners Ltd. *Flood Risk Assessment Report*.

National Roads Authority, (2009). *Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes*.

Office of Public Works, (2018). *Eastern Catchment Flood Risk Assessment and Management Study: Preliminary Flood Risk Assessment (PFRA) maps.* [Online] Available at: http://www.eastcframstudy.ie/.

Stream Bioenergy Ltd., (2013). *Proposed Renewable Bioenergy Plant at Huntstown, North Road, Finglas, Dublin 11: Environmental Impact Statement. Volumes I & II*. Dublin: SLR Consulting Ireland.

Stream Bioenergy Ltd., (2013). *Proposed Renewable Bioenergy Plant at Huntstown, North Road, Finglas, Dublin 11: Environmental Impact Statement. Volumes I & II*. Dublin: SLR Consulting Ireland.

TES Ltd., (2005). *Kilshane Recycling Park: Environmental Impact Statement*. Fingal County Council.

Section 5: Biodiversity - Marine

Not Used

Section 6: Biodiversity - Terrestrial

6.1 Introduction

This Section of the EIAR assesses the potential impacts (and resulting effects) likely to occur as a result of the Regional Biosolids Storage Facility (RBSF) component of the Proposed GDD Project and the Proposed Upgrade Project on the biodiversity of the Proposed RBSF Component site using standard methods of field survey and classification. Hereinafter, this component is referred to "the Proposed RBSF Component".

This Section and assessment have been completed having regard to the guidance outlined in the Environmental Protection Agency documents *Guidelines on the information to be contained in Environmental Impact Assessment Reports* (Draft, August 2017) and *Advice Notes for Preparing Environmental Impact Statements* (Draft, September 2015).

6.2 Methodology

6.2.1 Relevant Guidance

This Section followed the *Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* (Environmental Protection Agency, 2017). It also took account of the *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal*, 2nd edition (CIEEM, 2016).

6.2.2 Desktop Survey

A desktop survey was undertaken to collate all available documentary evidence on biodiversity at the site of the Proposed RBSF Component. This included a review of a previous Environmental Impact Statement undertaken in 2005 for a recycling facility on the site (Tobin Environmental Services for Fingal County Council). Aerial photography of the habitats present on the site, a biological survey of the small stream at the western perimeter of the site (McGarrigle, 2018) and a survey of fish (undertaken for Fingal County Council) on the lower stretches of the Ward River into which this stream discharges were also reviewed.

6.2.3 Habitat Survey

The site was originally surveyed from outside the perimeter on 02 June 2017 to assess field boundaries and general habitat types present (see Figure 6-1). A second survey of the site was undertaken on 20 September 2017. This included a full walkover and habitat survey following *Best Practice Guidance for Habitat Survey and Mapping* (Smith *et al.,* 2011). Habitats were classified according to *A Guide to Habitats in Ireland* (Fossitt, 2000). Special attention was given to tree lines, mature tree species and hedgerows bordering the site. Watercourses in the surrounding areas were inspected, especially in relation to drainage from the site.

6.2.4 Freshwater Biological Survey

A biological survey of the small stream that runs along the perimeter of the Proposed RBSF Component site was undertaken at two locations at and downstream of the site (McGarrigle, 2018) and the results are reviewed in this Section. This survey used the Small Streams Risk Score (SSRS). The SSRS is a macroinvertebrate-based system designed to assess the risk of a stream not achieving 'Good Ecological Status' in the sense of the Water Framework Directive. A 'kick-sample' with a net was taken at each location and the macroinvertebrates - insects, snails, crustaceans, etc. caught in the net were assessed using a standard protocol depending on their sensitivity or tolerance to pollution or other pressures.

6.2.5 Bird and Large Mammal Survey

Bird species encountered on the site during the field survey on 20 September 2017 were recorded and mapped. A further survey of breeding birds was carried out on 17 May 2018. A transect was walked that covered all parts of the site. Bird registrations will be made using direct sightings and identification from bird song. Registrations were entered on aerial photographs, using standard species codes. Large mammal signs (droppings, burrows and foraging signs) were surveyed for by careful examination of the ground on a series of parallel transects at 10 m intervals. Bats were subject to a separate survey method as outlined below.

6.2.6 Bat Surveys

Bat surveys were conducted with regard to the following guidelines:

- Bat Surveys for Professional Ecologists: Good Practice Guidelines (Collins, 2016);
- Bat Mitigation Guidelines for Ireland (Kelleher and Marnell, 2006); and
- Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes (NRA, 2006).

Surveys included visual inspection of trees within the area of proposed works and buildings (external inspection only) within the Proposed RBSF Component site and assessment of their suitability for roosting bats. The visual assessments were conducted prior to the commencement of activity surveys on 21 September 2017.

Bat activity is usually detected by the following signs:

- Bat droppings (these will accumulate under an established roost or under access points);
- Insect remains (under feeding perches);
- Oil (from fur) and urine stains;
- Scratch marks; or
- Bat corpses.

A manual dusk activity survey was undertaken on 21 September 2017 using direct observation and handheld ultrasound detector (Elekon Batlogger M). The dusk survey was carried out from sunset to two hours after sunset (19:26 to 21:30). The weather was mild (12-14°C) and dry for the duration of the survey.

An emergence survey was undertaken at the buildings within the subject lands, followed by an activity survey of the lands. The lands were walked at a slow and steady pace.

One Wildlife Acoustics SM3 automatic (static) bat detector was deployed on 21 September 2017 and collected on 27 September 2017, recording for a duration of six nights. The detector was deployed on a willow tree in the centre of the site.

The data generated from the manual transect surveys was analysed using Elekon BatExplorer software. The data generated from the static detector was analysed using Wildlife Acoustics Kaleidoscope software. Calls were identified against species descriptions within *British Bat Calls: A Guide to Species Identification* (Russ, 2012).

6.2.7 Site Evaluation and Assessment Criteria

The assessment criteria outlined in Table 6-1 below are derived from Collins (2016)[9], and are used for the assessment of the site in terms of its suitability for commuting and foraging bats, and where relevant, the suitability of roosting habitats for bats.

Table 6-1: Assessment criteria for potential suitability of Proposed RBSF Component sites for bats, derived from similar criteria in Bat Surveys for Professional Ecologists: Good Practice Guidelines (Collins, 2016)

Suitability	Description of Roosting Habitat	Commuting and Foraging Habitats
Negligible	Negligible habitat features on site likely to be used by roosting bats.	Negligible habitat features on site likely to be used by commuting or foraging bats.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions[10] and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely to be suitable for maternity or hibernation). A tree of sufficient size and age to contain PRFs but with none seen from the ground or features seen with only very limited roosting potential.	Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or un-vegetated stream, but isolated, i.e. not very well connected to the surrounding landscape by other habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
High	A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat.	Continuous habitat connected to the wider landscape that could be used by bats for commuting such as lines of trees and scrub, hedgerows. Linked back gardens, river valleys, streams and woodland edge. Habitat that is connected to the wider landscape that could be used by foraging bats such as trees scrub, grassland or water. Site is close to and connected to a known roost.

6.2.8 Limitations to the Survey

There were no limitations to the survey.

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[9] Based on professional experience and understanding, the category "moderate suitability" has been removed from the assessment criteria as it was felt that this category overlaps significantly with the categories "low suitability" and "high suitability".

[10] For example in terms of temperature, humidity, height above ground level, light levels or levels of disturbance.

6.3 Existing Environment

6.3.1 Designations

The site is not covered by any nature conservation designations. The nearest Natura 2000 (European) sites are illustrated in Figure 6-1 and listed in Table 6-2 (Proposed Natural Heritage areas cannot be mapped as they are not included in the NPWS mapviewer). The site is within the catchment of the Ward River which enters the Broadmeadow River north of Swords and ultimately discharges into the Broadmeadow Estuary (part of the Malahide Estuary SAC and Malahide Estuary SPA).

Figure 6-1: Natura 2000 sites in within 10 km of the site

Table 6-2: Designated areas within 10 km of the site

Site code	Site name*	Distance from site
002103	Royal Canal pNHA	4 km south
000178	Santry Demesne pNHA	5 km east
004024	South Dublin Bay and River Tolka Estuary SPA	9 km south-east
000205	Malahide Estuary SAC	9.5 km north-east
004025	Malahide Estuary SPA	9.5 km north-east

*pNHA = proposed Natural Heritage Area; SAC = Special Area of Conservation; SPA = Special Protection Area

The Habitats Directive (Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora) forms a basis for the designation of Special Areas of Conservation (SACs) and Special Protection Areas (SPAs). Collectively, SACs and SPAs are referred to as Natura 2000 sites. In general terms, they are considered to be of exceptional importance in terms of rare, endangered or vulnerable habitats and species within the European Community. Under Article 6(3) of the Habitats Directive, an

Appropriate Assessment must be undertaken for any plan or project that is likely to have a significant effect on the conservation objectives of a Natura 2000 site. An Appropriate Assessment is an evaluation of the potential impacts of a plan or project on the conservation objectives of a Natura 2000 site. An Appropriate Assessment Screening Report and Natura Impact Statement have been undertaken for the Proposed GDD Project.

Proposed Natural Heritage Areas (pNHAs) were published on a non-statutory basis in 1995 but have not since been statutorily proposed or designated. These sites are of significance for wildlife and habitats. Prior to statutory designation, pNHAs are subject to limited protection, through recognition of the ecological value of pNHAs by Planning and Licencing Authorities. There are no possible pathways for impacts to pNHAs from the Proposed RBSF Component.

6.3.2 Habitats

A habitat map is included in Figure 6-2. The site comprises mainly open areas of grassland which are currently ungrazed. Most of the sections contain dry meadow and grassy verges (GS2) of varying sizes. To the north of the site, lying behind a grassy berm, there is an area of meadow grassland (GS2) with some areas of damp ground being actively grazed by horses. The grassland has been colonized by a variety of woody species including Birch *(Betula pubescens),* Hawthorn *(Crataegus monogyna),* Willow *(Salix* sp.), Gorse *(Ulex europaeus),* Dog rose *(Rosa canina)* and Butterfly bush *(Buddleja davidii*) (see Figure 6-3 and Figure 6-4). There are also significant areas of Rosebay willowherb *(Chamerion angustifolium).* No invasive plant species were found on the site.

The western, southern and south-eastern boundaries of the site are bordered by mature tree lines (WL2), dominated by Ash *(Fraxinus excelsior)* and Hawthorn with some stretches of hedgerow (WL1) containing mainly Hawthorn and Elder *(Sambucus niger).*

The site slopes very gently to the north-east. There are four small modern buildings in the north-eastern corner of the site. The site is intersected by artificial surfaces (BL3) comprising advance concrete roadways. It is surrounded by metal security fencing.

A preliminary assessment of the habitats present confirms that the site is of local biodiversity value only. All the habitats present are common and widespread, and none are listed for protection in the EU Habitats Directive.

Figure 6-2: Habitat Map of the Site

Figure 6-3: Grassland with willow invading at the south-eastern part of the site

Figure 6-4: Grassland with rushes at the northern part of the site

6.3.3 Aquatic Environment

A minor drainage ditch (FW4) borders the western perimeter of the site. This flows into the Huntstown Stream, a larger tributary of the Ward River which crosses the North Road close to Kilshane Cross. The site is approximately 5 km south-west of the confluence with the Ward River at Owens Bridge. The Ward River enters the Broadmeadow River north of Swords and ultimately discharges into the Broadmeadow Estuary. The ditch is very slow flowing and has a silty substrate, so it is unsuitable for spawning by salmonid (salmon and trout) fish which require clean gravels.

Two sites were sampled in December 2017 (McGarrigle, 2018) using the standard methods of Small Streams Risk Score (SSRS) and their locations are shown in Figure 6-5. Both sites had low SSRS values putting the stream at risk of not meeting good status under the Water Framework Directive (WFD). The stream was very slow-flowing at both sites with a heavy deposit of a fine, grey-coloured silt. When disturbed there were significant signs of anoxia - the underlying sediment was black and sulphurous-smelling with some gas released. The results are given in Table 6-3.

Table 6-3: SSRS Results (18 December 2017)

Site	SSRS	No. of Taxa	Macroinvertebrates Recorded
Site 1	2.4	8	*Potamopyrgus*, Chironomidae, *Asellus*, *Gammarus*, Gyrinidae, Dytiscidae, Limnephilidae, *Chironomus*
Site 2	1.6	6	*Asellus*, Chironomidae, Limnephilidae x 2 species, *Gammarus*, Tubificidae

The SSRS values of 2.4 and 1.6 are quite low and suggest that the stream is at risk and would be unlikely to achieve good status at present. Similarly, the number of different macroinvertebrate types observed, eight and six respectively, is low compared to an unimpacted stream, where twice or three times that many would realistically be expected. It is concluded that the stream is already quite polluted at the upper perimeter of the proposed site due to upstream pressures. This contrasts with the “Good” status assigned under WFD. However, the WFD status is based on samples collected in Ward River at Owens Bridge. The importance of the receiving water as an attribute is considered to be Low.

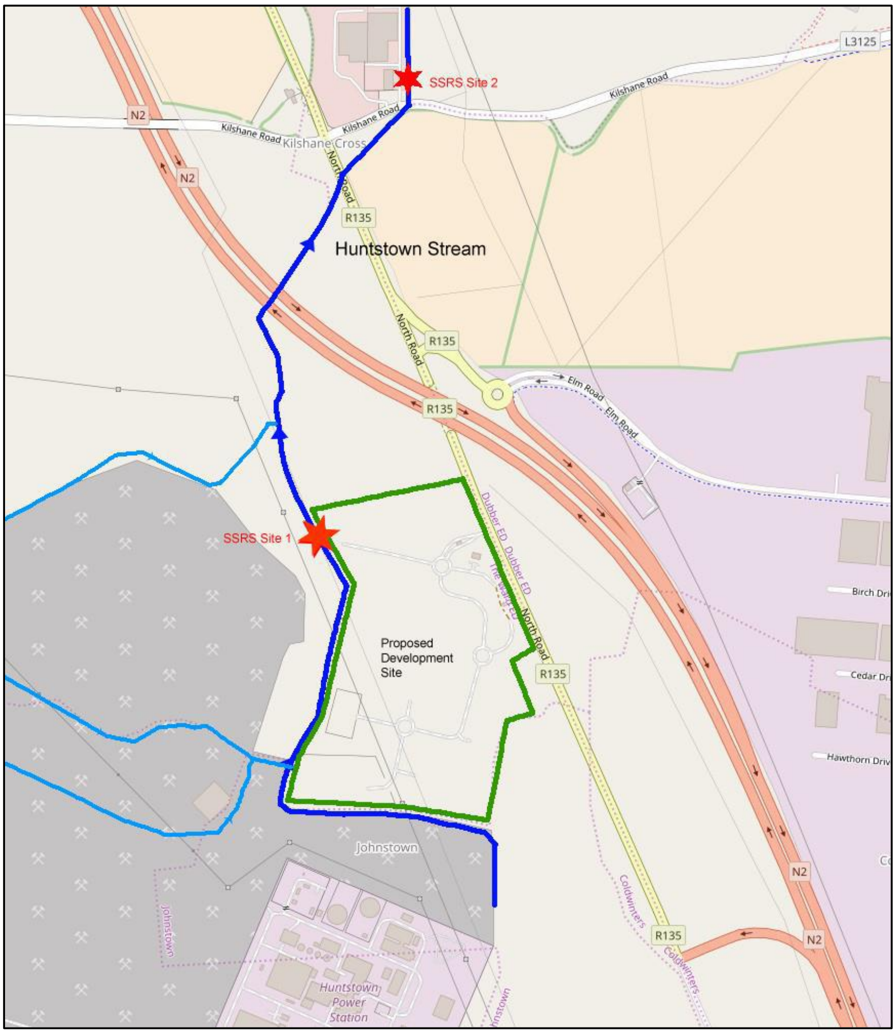


Figure 6-5: SSRS Sampling Locations

The Ward River has been sampled in 2003 using electro-fishing by Inland Fisheries Ireland (IFI) at Ward River Valley Park (approximately 10 km downstream of the site). This survey found Brown Trout and juvenile Salmon (fry and yearling fish). Important salmon spawning gravels were located over a substantial length of the river upstream of Swords Castle. The other species found in this area were Minnow, Eel, Stone Loach, 3-spined Stickleback, Roach and Dabb (information from Fingal Country Council). This means that the watercourses downstream of the site have good water quality and are very vulnerable to any forms of pollution.

A submission from Inland Fisheries Ireland in relation to the Proposed RBSF Component contained the following information *(in litt).* The Proposed RBSF Component is within the catchment of the Ward River, an important salmonid system. The Ward River is exceptional among rivers in the area in having resident salmon and sea trout populations, underlining the sensitivity of this particular watercourse and the Ward catchment in general. Electrofishing surveys carried out by IFI in the past found a significant population of juvenile salmon in the lower reaches of the Ward around Swords. Sea trout have been found in the Ward upstream of Coolatrath Bridge in the Lower Ward area. Poor ecological conditions continue in the upper and lower reaches of the Ward River in 2014, according to the EPA.

6.3.4 Birds

The results of the bird surveys of the site in September 2017 and May 2018 are given in Table 6-4.

Table 6-4: Bird species present on the site

Species	Sept 2017	May 2018	Status	Birds of Conservation Concern[11]
Blackbird	Present	Song	Breeding	Not listed
Blackcap		Song	Breeding	Not listed
Blue Tit		Song	Breeding	Not listed
Buzzard	Overflying	Overflying	Non-breeding	Not listed
Chaffinch		Singing	Breeding	Not listed
Chiffchaff		Singing	Breeding	Not listed
Goldfinch		Singing	Breeding	Not listed
Great Tit	Present	Singing	Breeding	Not listed
Hooded Crow		Overflying	Non-breeding	Not listed
Magpie		Present	Breeding	Not listed
Reed Bunting	Present		Non-breeding	Not listed
Robin	Present	Singing	Breeding	Amber list
Snipe	Present		Non-breeding	Not listed
Stonechat	Present		Non-breeding	Not listed
Swallow		Overflying	Non-breeding	Not listed
Whitethroat		Singing	Breeding	Not listed
Woodpigeon		Singing	Breeding	Not listed
Wren		Singing	Breeding	Not listed

Of the 18 species recorded 12 were assessed to be breeding on the site, mainly in the field boundaries and some more dense scrub in the south-east corner. All of these species are common and widespread in farmland in Ireland (Nairn and O'Halloran 2012) and only one species, Robin, is amber-listed (medium conservation concern) in the *Birds of Conservation Concern in Ireland* (Colhoun and Cummins, 2013). During the September site visit a single Snipe was flushed from some damp vegetation in the centre of the site. This is likely to be a bird on passage which was foraging here.

6.3.5 Large mammals

No larger mammals were observed on the site during the habitat survey on 20 September 2017. However, some Badger foraging signs were noted in grassland close to the centre of the site. Badgers are active nocturnally and are likely to be common in the surrounding farmland. No badger setts

[11] *Colhoun, K. & Cummins, S. 2013. Birds of Conservation Concern in Ireland 2014-2019. Irish Birds 9:523-544.*

(breeding burrows) or trails were located on the Proposed RBSF Component site. It is likely that the site is only used infrequently for foraging.

6.3.6 Bats

6.3.6.1 Tree, building and landscape suitability assessment

The rough grassland occupying most of the site is considered to have potential for foraging bats, while the boundary treelines/hedgerows are considered to also have potential for commuting bats. The four small buildings within the site are considered to have negligible suitability for roosting bats as the buildings were small, of modern construction, with well-sealed roofs and eaves, and roll down metal shutters. All trees within the site are small and contain little or no features suitable for roosting bats (e.g. visible signs of rot or cavities). These are considered to have negligible suitability for roosting bats (See Figure 6-6 and Figure 6-7).

Figure 6-6: Buildings within the north-eastern part of the site

Figure 6-7: Treeline at the south-eastern perimeter of the site in background

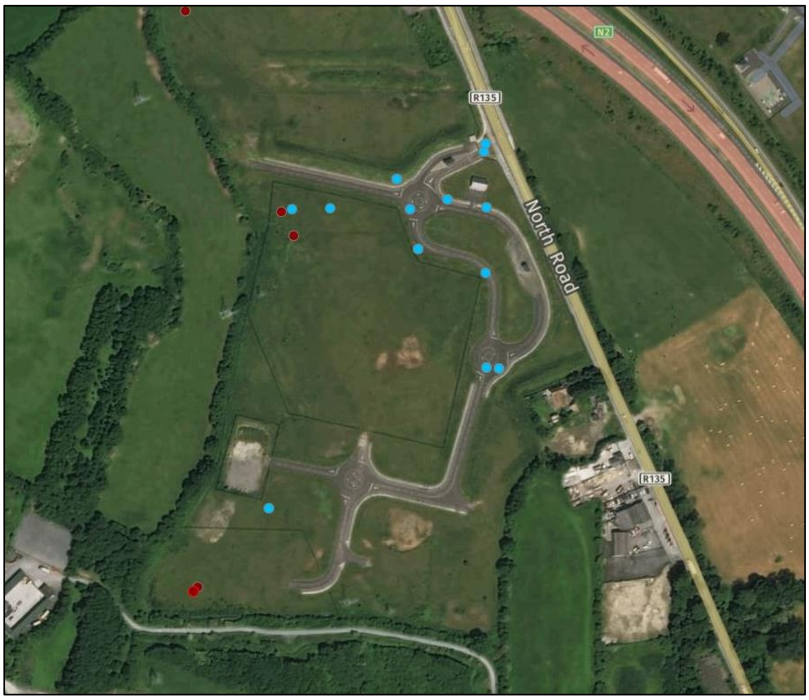
There is strong light spill from the adjacent gas power station onto the Proposed RBSF Component site. This level of lighting is likely to deter any of the light sensitive bat species. This analysis is consistent with the results of the surveys outlined below.

6.3.6.2 Manual Dusk Activity Surveys

Two species of bat were recorded foraging or commuting within the lands during the manual survey on 21 September 2017. Activity commenced at 19:57 (i.e. 31 minutes after sunset). Leisler's bat was the first (at 19:57) and last (at 21:17) species recorded. Bat activity within the subject lands is illustrated in Figure 6-8. The majority of activity within the subject lands was attributed to Leisler's bat (*Nyctalus leisleri)* recorded in the north-eastern part of the site, although no visual observations were made of the species. There were a total of 47 recordings of Leisler's Bat, with low levels of activity throughout the survey period. There were seven recordings of Common Pipistrelle *(Pipistrellus pipistrellus),* along the western boundary of the site recorded between 20:02 (36 minutes after sunset) and 20:49.

6.3.6.3 Dusk Emergence Survey

No bats were observed emerging from any of the buildings within the Proposed RBSF Component lands.



Leisler's recordings　　Common pipistrelle recordings

Figure 6-8: Bat passes recorded during manual transect and location of static detector

6.3.6.4 Static Detector Survey Results

The results of the static detector, deployed on a willow tree within the central part of the site are presented in Table 6-4. Four species of bat were recorded on the static detector with 55 bat calls logged over the six nights that the detector was deployed. The night with the highest number of recordings was on 24 September 2017 (24 recordings), while on other nights the number of recordings ranged between 1 and 11. Most recordings (where an identification to species level was possible) were attributed to Leisler's (24 recordings), followed by Common pipistrelle (11 recordings) and Soprano pipistrelle bats (*Pipistrellus pygmaeus)* (2 recordings). There was one recording attributed to an unidentified *Myotis* species. There were 17 recordings which could not be attributed to any specific species.

Activity commenced between 19:59 at its earliest and 20:56 at the latest (*i.e.* approximately between 30 minutes and 1.5 hours after sunset), with the earliest activity nearly always attributed to either Leisler's or Common pipistrelle. The last bat activity recorded on each night varied between 21:23 and 06:58 and was nearly always attributed to Common pipistrelle.

Table 6-4: Summary Results of Static Detector Survey of Bats on Site

Date	Recordings	Start	End	Species
21/09/2017	2	20:56	21:23	Leisler's bat
22/09/2017	8	20:08	23:03	Leisler's bat, Common and Soprano pipistrelles
23/09/2017	3	20:33	01:35	Leisler's bat
24/09/2017	24	19:59	06:58	Leisler's bat, Common and Soprano pipistrelles, unidentified *Pipistrellus* species and *Myotis* species
25/09/2017	11	20:14	02:19	Leisler's bat, Common and Soprano pipistrelles
26/09/2017	6	20:34	06:52	Leisler's bat and *Myotis* species
27/09/2017	1	03:12	03:12	Common pipistrelle
Total Recordings	**55**	**19:59**	**06:58**	

6.3.6.5 Evaluation of Survey results

The buildings within the lands were assessed to be of negligible value for roosting bats, and no bats were observed emerging from them. While the potential for roosting bats cannot be ruled out in its entirety, it is considered extremely unlikely in this instance that any bats would be making use of the buildings within the site. None of the trees within the Proposed RBSF Component lands are considered to be suitable for roosting bats. It is extremely unlikely that any bats are roosting within the Proposed RBSF Component site. The absence of any significant levels of activity soon after sunset or immediately prior to dawn (although it should be noted that pre-dawn swarming at roost re-entry would not be expected at this time of year) suggest that there was no significant roost immediately adjacent to the Proposed RBSF Component site present at the time of surveys.

Activity within the subject lands was largely associated with Leisler's bat, with some activity of Common pipistrelle, and very low numbers of recordings for a few species (Soprano pipistrelle, unidentified *Myotis* species and unidentified *Pipistrellus* species). Common pipistrelle appeared to be more associated with the western boundary hedgerows and trees.

The Proposed RBSF Component site is considered to be suitable for foraging and commuting bats, and the boundary treelines and hedgerows within the lands act as a resource for these species in terms of foraging. The majority of the bat registrations were recorded on the northern part of the site while the central area (where the proposed buildings will be located) was least used by bats. The hedgerows and treelines connect to a broader network of treelines and hedgerows in north county Dublin and are therefore also likely to act as commuting features for bats travelling between roosts (external to the lands) and feeding areas.

The population of bats within the subject lands has been evaluated as of local importance (higher value) for the following reasons:

- The site supports a resident or regularly occurring population of bat species (assessed as being important at the Local level) which are included on Annex IV of the Habitats Directive and are protected under the Wildlife Acts (as amended) and the Birds and Habitats Regulations (2011); and
- This site contains features that are essential in maintaining links and ecological corridors for bat species.

6.3.7 Overall Site Evaluation

The site is considered to be of local importance (higher value) for biodiversity. The habitats and bird species recorded on the site are common and widespread in Ireland. Only one of the breeding bird species is listed as of medium conservation concern. Three bat species were recorded foraging on the site, but it is not considered suitable for roosting by any of these species. The bat species are all listed for protection in Annex II of the EU Habitats Directive. Badger foraging signs were found on the site but there were no other signs of occupation by this species which are likely to use the site infrequently. The small stream that flows parallel to the western boundary of the site is of negligible biological value due to a silty substrate and very slow flow. It does not contain any habitats suitable for spawning by salmonids. There is salmonid spawning approximately 10 km downstream of the site and this would be vulnerable to any water pollution discharging from the Proposed RBSF Component site.

6.4 Characteristics of the RBSF Component of the Proposed GDD Project

The construction of the Proposed RBSF Component forms part of the overall Proposed GDD Project and the Proposed Upgrade Project. The facility will provide storage for the Biosolids generated at both Ringsend and GDD wastewater treatment plants. The following are the aspects of the Proposed RBSF Component that interact with the Land and Soils environment.

6.4.1 Building

The provision of Provision of 2 no. biosolids storage buildings, each approximately 50 m wide, 105 m long and 15 m in height, including solar panels on the roof of one building, and associated hard standing areas and facility buildings within the site. These buildings have a combined capacity to store up to 48,000 cubic metres of biosolids waste at any one time.

6.4.2 Drainage

The Proposed RBSF Component will incorporate the construction of paved areas, internal roads and carparks, the runoff from which will be collected in a purpose designed drainage system. The rainfall runoff collected will be attenuated in a stormwater attenuation system prior to discharging to the Huntstown stream. All runoff from paved areas will pass through a hydrocarbon interceptor.

6.5 Potential Impacts

The significance of impacts on specific receptors are considered in terms of the magnitude of the effect/impact of an element of the Proposed RBSF Component on a receptor and the importance of that receptor. The magnitude of the effect/impact can be assessed based on the criteria shown in Table 6-5 and Table 6-6.

Table 6-5: Estimation of Magnitude of Impact

Magnitude of Impact	Criteria
Large Adverse	Results in loss of attribute and /or quality and integrity of attribute
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity

Table 6-6: Rating of Significant Environmental Impacts

Importance of Attribute	Magnitude of Impact			
	Negligible	Small Adverse	Moderate Adverse	Large Adverse
Extremely High	Imperceptible	Significant	Profound	Profound
Very High	Imperceptible	Significant/ Moderate	Profound/ Significant	Profound
High	Imperceptible	Moderate/ Slight	Significant/ Moderate	Profound/ Significant
Medium	Imperceptible	Slight	Moderate	Significant
Low	Imperceptible	Imperceptible	Slight	Slight/ Moderate

6.5.1 Do-Nothing Impacts

The do-nothing impacts would be to leave the site as is. That is, a partially developed site of limited ecological value, comprising a mixture of dry-meadow grassland and made ground, which will undergo ecological succession. The do-nothing impacts are permanently neutral.

6.5.2 Construction Phase

6.5.2.1 Impacts on terrestrial biodiversity

The footprint of the construction area is approximately 5.7 hectares out of a total site area of 11 hectares. This area is predominantly covered with dry meadow and grassy verges subdivided by a number of internal roads and hard standings. This is formerly agricultural grassland where grazing was discontinued approximately a decade ago and the site is being slowly colonized by immature trees and shrubs. None of the remaining 5.3 hectares of the site will be removed. The breeding birds are mainly confined to the boundary hedgerows or treelines and none of these will be adversely impacted during construction. The bat activity recorded for this assessment was largely absent from the central part of the site where the proposed buildings will be located. The construction of two large buildings in the centre of the site will not affect the use of the site by bats, which will continue to feed in the remaining grassland areas and along the field boundaries. As badgers are active at night when construction activity ceases there will be no indirect disturbance. Some badger foraging signs were found on the site but there was no evidence of any permanent badger setts. As almost half of the grassland will remain undeveloped there will be adequate foraging for badgers within the site. The magnitude of the construction impacts on terrestrial biodiversity is assessed to be “Small Adverse” on an attribute of “Low” importance. The significance of this potential impact is “Imperceptible”, negative in quality and permanent in duration.

6.5.2.2 Impacts on freshwater biodiversity

Based on the SSRS, the importance of the Huntstown stream in the vicinity of the Proposed RBSF Component site is "Low". The lower reaches of the Huntstown Stream close to where it joins the Ward River at Owens Bridge is "High" due the assigned WFD status of "Good". Potential impacts to water quality in local water courses during the construction stage in the absence of control measures are:

- The main potential impact of the Proposed RBSF Component on the water in the absence of control measures is an increase in sediment concentration in watercourses during the construction phase. Sedimentation is the deposition of fine sediment either within the gravel or directly on the substrate surface of an aquatic system. The magnitude of the impact is assessed to be "Small Adverse" on an attribute of "Low" importance. The stream which drains the western part of the site is already heavily silted and of low biodiversity value due to the presence of a quarry in its catchment. Any impact would be localised in effect. The significance of this potential impact is "Imperceptible", negative in quality and temporary in duration;
- Chemical pollutants such as hydrocarbons and other chemicals used in the construction process may enter the surface waters in the event of accidental release and have implications for the area, particularly those sources located down-stream of the Proposed RBSF Component. The volumes of hydrocarbons that could potentially spill during the construction phase will be small. The magnitude of the impact is assessed to be "Small Adverse" on an attribute of "Low" importance. The significance of this potential impact is "Imperceptible", negative in quality and temporary in duration; and
- Sanitary waste from inadequate containment and treatment of on-site toilet and washing facilities could lead to contamination of receiving waters. The magnitude of the impact is assessed to be "Negligible" on an attribute of "Low" importance. The significance of this potential impact is "Imperceptible", negative in quality and temporary in duration (see also Volume 4, Section 4: Water).

6.5.3 Operational Phase

6.5.3.1 Impacts on terrestrial biodiversity

The operation of the Proposed RBSF Component will have no significant impacts on habitat diversity of the site given that approximately half of the grassland will not be affected. Bird species recorded using the site are common and widespread in farmland and are already habituated to vehicles and personnel operating in the general area. Indirect disturbance of birds will thus be of "Imperceptible" significance.

The Proposed RBSF Component site is considered to be suitable for foraging and commuting bats of at least three species. The boundary treelines and hedgerows are the main areas used for foraging and commuting by bats travelling between roosts (external to the lands) and feeding areas. The operation of the Proposed RBSF Component will not affect these boundary treelines and hedgerows. Indirect disturbance of bats will thus be of "Imperceptible" significance on a receptor of local importance (higher value).

6.5.3.2 Impacts on freshwater biodiversity

Routine runoff will be rainfall and is not considered a hazard. During the operation of the Proposed RBSF Component, the only emissions to surface water will be treated attenuated surface water runoff from roofs and hardstanding areas. Runoff will pass through hydrocarbon interceptors, silt traps/sedimentation and attenuation prior to discharge to the tributary of the Huntstown stream on the western boundary of the Proposed RBSF Component site. Wastewater and any runoff from inside the buildings will be collected and will be pumped off site to a public sewer.

The main potential impact will arise from accidental spillages of chemicals, hydrocarbons or other contaminants entering the drainage system and discharging to the stream. However, the drainage design (incorporating embedded mitigation) considerations will ensure that in the event of significant accidental spills, the discharge will be contained by hydrocarbon interceptors. The design considerations will ensure the magnitude of the impact on the receiving water quality will be negligible during the operational phase will be and imperceptible in significance.

6.6 Mitigation Measures

Mitigation on terrestrial biodiversity during construction

No vegetation will be cleared from the site during the bird breeding season between 01 March and 31 August to avoid any potential for disturbance to nests although the majority of birds breed in the boundary hedgerows and treelines which will not be affected. Given the observed badger usage of the site for foraging there will be a confirmatory survey for badgers prior to construction as they could establish in the construction area in the intervening period. If required, appropriate mitigation measures will be put in place in accordance with applicable guidelines and in consultation with the NPWS where required. General biosecurity measures will be implemented to ensure invasive species are not imported to site.

Mitigation on freshwater biodiversity during construction

Rainfall runoff from the site will be attenuated and subsequently discharged to the small stream that borders the site outside its western perimeter. The runoff will not contain any effluent from the biosolids. Run-off with potential for containing biosolids, such as drainage near the storage buildings, will be collected and discharged to a public wastewater sewer. Petrol and oil interceptors will be used to remove any potential contaminants from road runoff on the site. No changes in the water quality of the neighbouring ditch or downstream watercourses are expected as a result. This will mitigate against any adverse impacts on fisheries (especially salmonid spawning areas) in the downstream sections of the Huntstown Stream and Ward River.

Mitigation on terrestrial biodiversity during operation

The Proposed RBSF Component will entail the removal of an area of abandoned agricultural grassland in the centre of the site. To mitigate the loss of some potential foraging areas for bats, an area of existing grassland in the northern part of the site will be planted with deciduous trees (native species of local provenance where possible) to form an additional foraging area for bats (see Volume 4, Section 14: Landscape). The open area at the south of the site is unsuitable for foraging by some bat species due to artificial light spread from the neighbouring power station and quarry. Lighting from the Proposed RBSF Component will be screened by planting on the berm to the north of the buildings and any floodlighting will be directed downwards so that the beam spread does not cover the proposed woodland planting. Certain species of bats avoid brightly lit areas for foraging while others are attracted to artificial light (*Bat Conservation Ireland 2010*, Bieir 2006, Rydell 2006).

6.7 Residual Impacts

6.7.1 Construction Phase

The predicted overall residual impact of the Proposed RBSF Component on biodiversity during the construction stage will be neutral imperceptible, subject to the implementation of mitigation measures outlined in Section 6.6. above.

6.7.2 Operational Phase

The predicted overall residual impact of the Proposed RBSF Component on biodiversity during the construction stage will be neutral imperceptible, subject to the implementation of mitigation measures outlined in Section 6.6. above.

6.7.3 Interactions

The principal interactions requiring information exchange between the water specialist and other environmental specialists and the design team are summarised in the following subsections.

6.7.3.1 Landscape and Visual

The Landscape and Visual Impact Assessment and the landscape plan as shown in Y17702-PL-011 will incorporate the mitigation measures contained in Section 6.6 above for the operational phase of the Proposed RBSF Component.

6.7.3.2 Air and Climate

The construction activities will generate dust. Impacts and mitigation of dust generation are addressed in Section 8: Air and Climate. The dust settlement can have potential impacts on terrestrial and freshwater habitats within the vicinity of a construction site. With the implementation of the dust management plan proposed in Section 8, this will not give rise to significant interactions of impacts.

6.7.3.3 Noise

Construction and operation noise has the potential to disturb fauna in the vicinity of the site. This may result in a temporary to short term impact on wildlife in the immediate vicinity of the site. However, this is not expected to be significant given the localised extent of the impact.

6.7.4 Cumulative Impacts

Following mitigation, the Proposed RBSF Component on this site will have no significant adverse impacts on biodiversity. The site itself is of Low Importance (Higher Value) and the extent of potentially significant impacts will not extend beyond the site itself. Accordingly, there are no cumulative impacts with other projects predicted.

6.8 Monitoring

The Proposed RBSF Component will not give rise to significant environmental impacts, with or without mitigation measures. Therefore, no monitoring proposals are suggested.

6.9 Difficulties Encountered

No difficulties were encountered in the preparation of this report.

6.10 References

Bat Conservation Ireland, (2010). *Bat and Lighting - Guidance Notes for: Planners, Engineers, Architects and Developers.*

Bieir, P. (2006). Effects of artificial night lighting on terrestrial mammals. In: *Ecological Consequences of Artificial Night Lighting.* (Eds. C. Rich & T. Longcore). Washington. Island Press.

CIEEM, (2016). *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal.* Chartered Institute of Ecology and Environmental Management.

Colhoun, K. and Cummins, S. (2013). Birds of Conservation Concern in Ireland 2014-2019. *Irish Birds* 9: 523-544.

Collins, J. (2016). *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd edn.). The Bat Conservation Trust, London.

Environmental Protection Agency (EPA), (2017). *Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports*. Wexford: Environmental Protection Agency.

Fossitt, J.A. (2000*). A Guide to Habitats in Ireland.* Kilkenny: The Heritage Council.

McGarrigle, M. (2018). *Biological Survey of Small Stream at Proposed Kilshane Cross Biosolids Storage Site*. Limnos Consulting for J.B. Barry & Partners.

Mitchell-Jones, A.J., Amori, G., Bogdanowicz, W., Krystufek, B., Reijnders, P.J.H, Spitzenberger, F., Stubbe, M., Thissen, J.B.M, Vohralik, V. and Zima, J. (1999). *The Atlas of European Mammals*. London: U.K.: T & AD Poyser.

National Roads Authority, (2009). *Guidelines for Assessment of Ecological Impacts of National Road Schemes*. Dublin: National Roads Authority.

National Roads Authority, (2006). *Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes*. Dublin: National Roads Authority.

O'Reilly, P. (2009). *Rivers of Ireland: a flyfisher's guide*. Ludlow: Merlin Unwin Books.

O'Sullivan, P. (1994). *Bats in Ireland. 24: Special Zoological Supplement to The Irish Naturalists' Journal.*

Roche, N., Aughney, T., Marnell, F., and Lundy, M. (2014). *Irish bats in the 21st Century. Bat Conservation Ireland.*

Russ, J. (2012). *British Bat Calls: A Guide to Species Identification*. Exeter: Pelagic Publishing. ISBN 978-1-907807-25-1.

Rydell, J. (2006). Bats and their insect prey at streetlights. In: *Ecological Consequences of Artificial Night Lighting.* (Eds. C. Rich & T. Longcore). Washington: Island Press.

Smith, G.F., O'Donoghue, P., O'Hora, K. & Delaney, E. (2011). *Best practice guidance for habitat survey and mapping.* Kilkenny: The Heritage Council.

Section 7: Land and Soils

7.1 Introduction

This Section of the EIAR assesses the potential impacts (and resulting effects) likely to occur as a result of the Regional Biosolids Storage Facility (RBSF) component of the Proposed GDD Project and the Proposed Upgrade Project on the Land and Soils environment (including Hydrogeology). Hereinafter, this component is referred to “the Proposed RBSF Component”. It should be noted that Land Use and Land Take is assessed in Volume 4, Section 12: Material Assets.

This Section and assessment have been completed having regard to the guidance outlined in the Environmental Protection Agency documents *Guidelines on the information to be contained in Environmental Impact Assessment Reports* (Draft, August 2017) and *Advice Notes for Preparing Environmental Impact Statements* (Draft, September 2015).

7.2 Methodology

In addition to the documents mentioned in Section 7.1, this section of the EIAR was prepared having regard to:

- Guidelines on the Information to be contained in Environmental Impact Statements (EPA, 2002);
- Advice Notes on Current Practice in the preparation of Environmental Impact Statements (EPA, 2003); and
- Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA, 2009).

The assessment methodology is described in Volume 2, Section 2: The EIA Process.

A desk study (including information from previous site investigation data) as well as site-specific site investigations were undertaken to provide the data to compile the description of the existing environment. The aspects of the Proposed RBSF Component that interact with and effect the receiving/existing environment were examined.

The likely significant effects of the Proposed RBSF Component on land, soils and hydrogeology are discussed, and the measures to mitigate adverse impacts are described. Adverse impacts are those that result in a detrimental effect to the current environment, i.e. deterioration in groundwater quality. The effects are assessed terms of Quality, Significance, Magnitude, Probability, Duration, and Types. This approach considers both the importance of each environmental receptor and the magnitude of the potential environmental impacts arising from the Proposed RBSF Component on that receptor and the significance of the impact.

7.2.1 Desk Study

Information on the soils and hydrogeology has been obtained from the following sources:

- TES Ltd – Environmental Impact Statement for Kilshane Cross Recycling Facility (September 2005);
- EPA (2006), Subsoil Mapping;
- Geological Survey of Ireland (GSI) 1:100,000 scale Bedrock Geology Map, Sheet 13 (Meath);

- Geological Survey of Ireland (GSI) 1:100,000 scale Bedrock Geology Map, Sheet 16 (Kildare-Wicklow);
- GSI Bedrock Geological Map of Ireland;
- GSI Groundwater Mapping Databases;
- GSI Quaternary Geology Map of Ireland;
- IGI 2002 Geology in Environmental Impact Statements - a Guide;
- Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road -National Roads Authority;
- TES Ltd., Trial Pit and Borehole Logs for the Recycling Park at Kilshane Cross (2001);
- Glovers Site Investigations Ltd., Kilshane N2, Ground Investigation, Geotech Laboratory Test Results Report No. 4389 (January, 2002); and
- Priority Geotechnical Limited, Regional Biosolids Storage Facility, Site Investigation - Factual Report (Report No. P17148, 2018).

7.2.2 Site Investigations

Site-specific investigations have been carried out to establish subsurface conditions at the site and these are summarised below in Table 7-1.

Table 7-1: Site Investigation Summary

Contractor	Description of Investigation	Details of Investigation	Date of Works
TES Ltd. (with Glovers Site Investigations conducting boreholes and laboratory testing)	Site investigations for Kilshane Cross Recycling Park	7 No. Trial pits 3 No. Boreholes (air rotary/odex drilling) Laboratory testing on soil samples	2001
Priority Geotechnical Ltd.	Regional Biosolids Storage Facility Site Investigations	11 No. Trial Pits 6 No. Slit Trenches 3 No. Rotary Coreholes 8 No. Cable Percussion Boreholes Laboratory testing on soil and rock samples	2017

The various Site Investigation Reports were reviewed and used to develop a conceptual model of the subsurface conditions.

7.3 Existing Environment

7.3.1 Site Description

The Proposed RBSF Component site is located in Newtown, Dublin 11, approximately 1.5 km north of the N2/M50 interchange. The site comprises overgrown grass land in a single, large field bounded by hedgerows. The site of the Proposed RBSF Component is situated in a predominantly industrial setting. The R135 borders the site to the east while a small tributary of the Huntstown Stream, which itself is a tributary of the River Ward, borders the site to the west.

Fingal County Council was granted section 175 approval by An Bord Pleanála (Ref. 06F.EL2045) dated 21 April 2006 for a waste recovery facility at the Proposed RBSF Component site. Certain enabling works, including drainage works, internal access roads, boundary fencing, and electricity and telecommunications infrastructure have been carried out at the Proposed RBSF Component site (the **"Enabling Works")** on the basis of that approval. The Enabling Works have been taken into account in the assessment of the existing environment at the Proposed RBSF Component for the purposes of this EIAR.

The Huntstown Quarry, which is operated by Roadstone Dublin Ltd., is located approximately 500 m to the southwest and west of the site. The Huntstown Power Station is located at the southern boundary of the site.

7.3.2 Bedrock Geology

7.3.2.1 Regional Bedrock Geology

The Regional Bedrock Geology is shown in Figure 7-1. The site is underlain by the Malahide formation. The lower part of the formation is composed of calcareous shales, siltstones and sandstones and occasionally thin limestones, the top is made up of argillaceous, less fossiliferous limestones, nodular pale wackestones and shales. The formation contains regularly NW/SE trending faults and is bounded to the north by the Waulsortian Limestone and to the south by the Tober Colleen Formation where the Waulsortian Limestone is absent.

7.3.2.2 Encountered Bedrock Geology

Three historical boreholes were drilled (by air rotary/odex) as part site investigation (2001) associated with the proposed Kilshane Cross Recycling Park EIS. The depth to bedrock varied from 13 m bgl to 22 m bgl. The bedrock to the south of the site was described as weathered, orange/yellow, semi-formed bedrock. The bedrock in the other two boreholes was described as dark grey limestone and was not weathered.

The 2017 site investigations, conducted as part of the Proposed RBSF Component, encountered bedrock in three rotary coreholes (RC01, RC04 and RC07). The depth to bedrock in these coreholes ranged from between 19.3 m bgl to 22.3 m bgl. The bedrock was described as strong, grey fossiliferous limestone, lightly to heavily weathered, with moderate to heavy fracturing, heavy clay smearing and heavy red/orange/brown iron oxide staining. The location of these site investigation points are shown on Figure 7-2.

It should be noted that the more accurate site investigation information contradicts the information available from the GSI website which indicates that the rock is close to or at the surface.

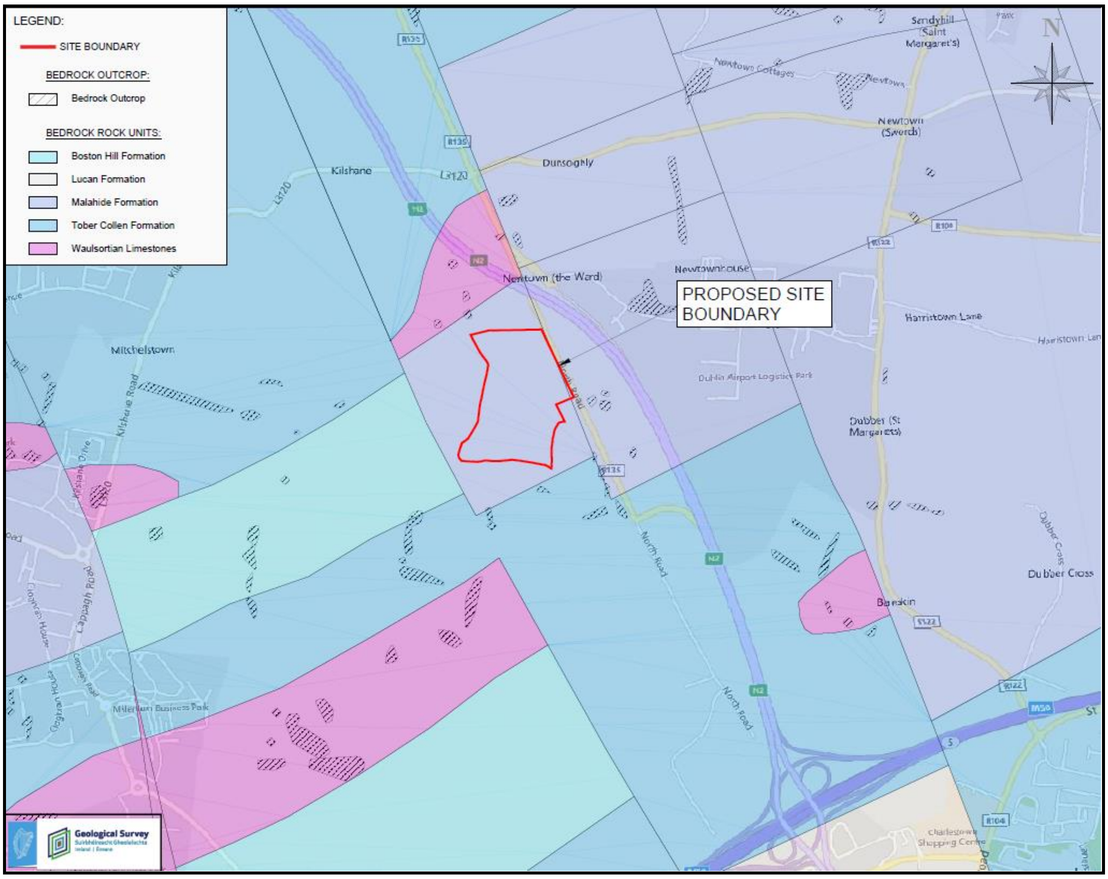


Figure 7-1: Bedrock Geology (GSI web-mapping online viewer www.gsi.ie)

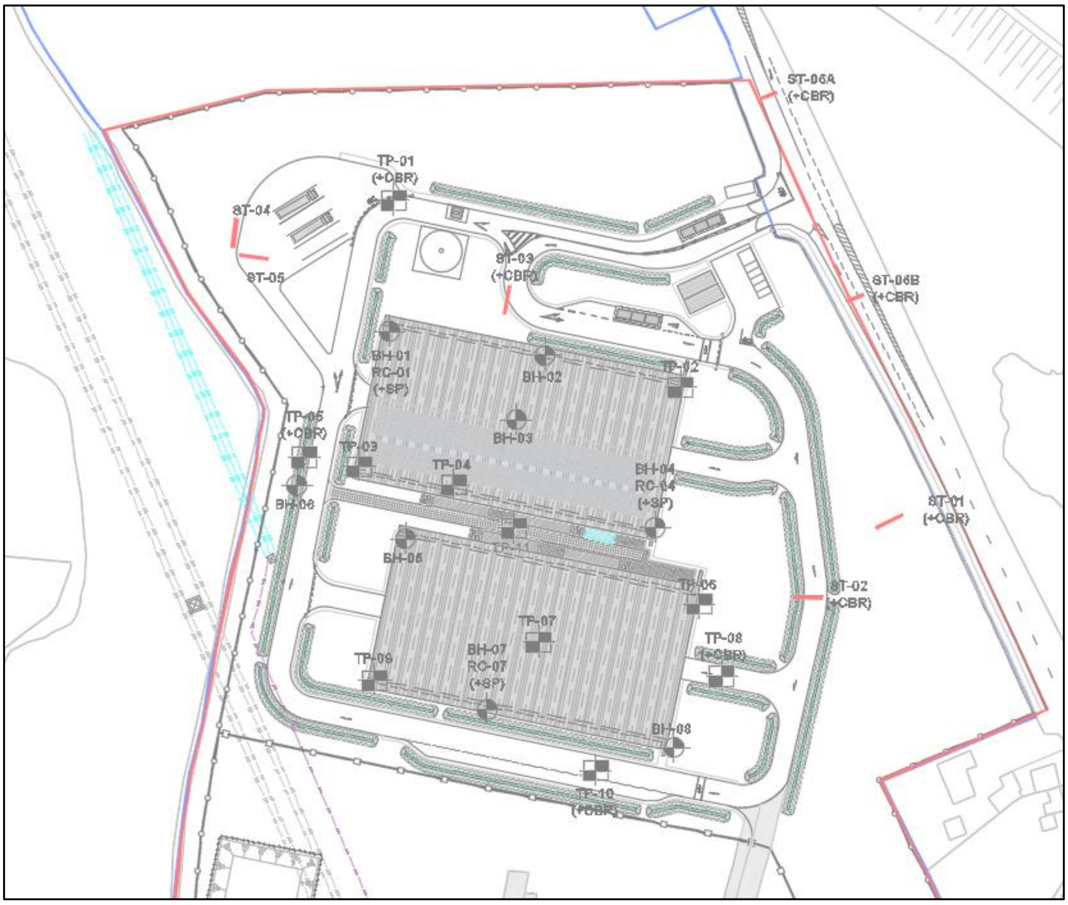


Figure 7-2: Location of Site Investigations points, 2017

7.3.3 Quaternary Deposits

The GSI Quaternary Geology Map of Ireland (Figure 7-3) indicates that the site is underlain by poorly drained limestone tills to the northwest and by well drained limestone tills to the southeast. Further information was provided by the trial pits, cable percussive boreholes and rotary coreholes conducted as part of the 2001 and 2017 site investigations.

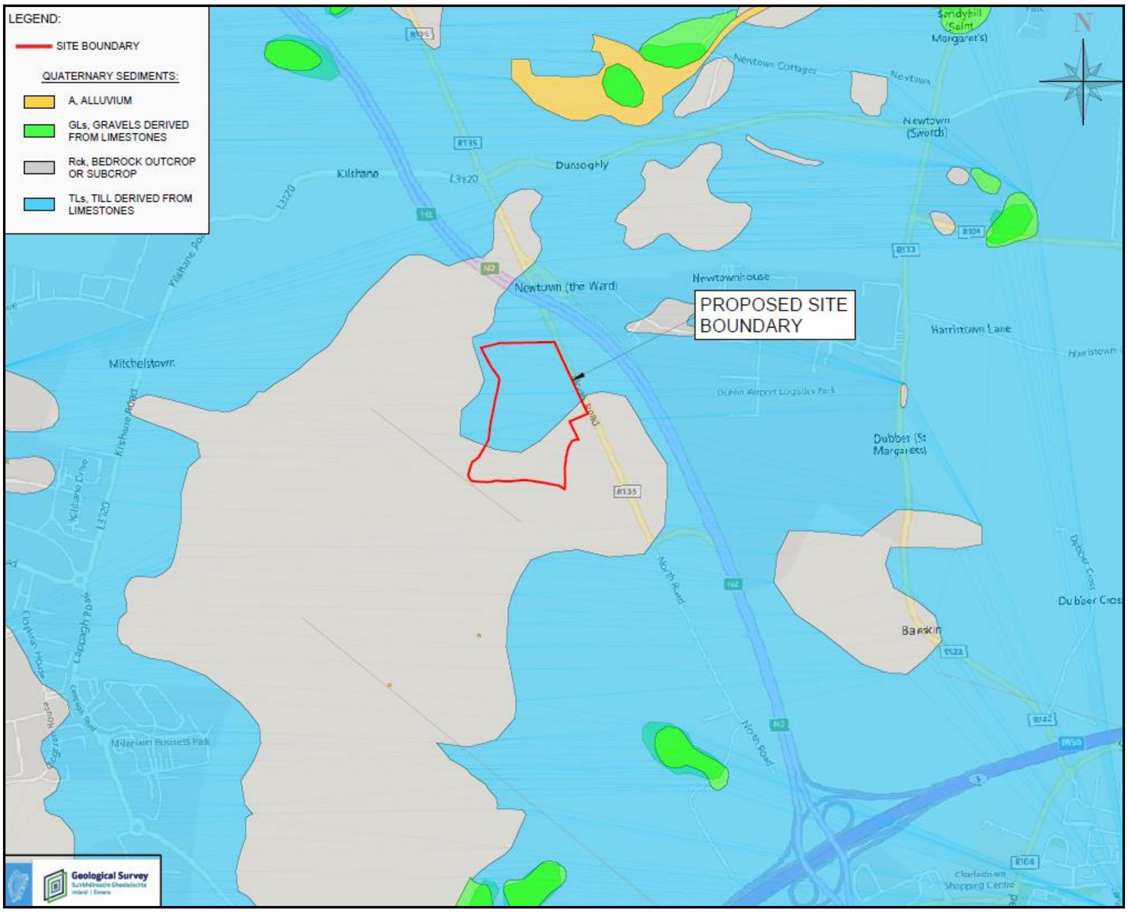


Figure 7-3: Quaternary Geology (GSI web-mapping online viewer www.gsi.ie)

7.3.3.1 Topsoil

The topsoil on the site varies from 0.2 m to 0.8 m thick and was typically described as black/brown, soft, sandy, SILT. In the 2001 SI it was described as being friable with good humus content.

7.3.3.2 Cohesive Glacial Tills

The majority of material noted in the site investigation was cohesive glacial till. The till was described as soft to very stiff (slightly) sandy (slightly) gravelly CLAY, occasionally with low to medium cobble and boulder content / dark brown firm to stiff CLAY / soft to stiff slightly sandy, slightly to very gravelly SILT with low to medium cobble content and boulders noted in the 2001 site investigation.

The top of the strata ranged from between 0.2 - 2.5 m bgl and the thickness of the strata ranged from between 1.1 - 22.0 m. Note that the minimum and maximum thickness of the strata is unproven and represent the thicknesses encountered in the relevant SI points, which may not have reached the bottom of the strata.

Firm to stiff cohesive glacial material is considered suitable for building foundations. Any soft cohesive till material beneath the proposed building foundations or roads should be excavated to a depth where suitable soils are encountered.

7.3.3.3 Sands / Gravels

Granular material was not encountered in the majority of the SI points on this site. However, in three SI points (TP5 (2001), TP6 (2001) and RC07 (2017)), some sand and gravels were noted. The depth to the top of these strata ranged from between 0.5 –-3.6 m bgl and the thickness ranged from between 0.3 - 1.6 m.

The granular material was described as peaty sandy GRAVEL / medium dense peaty SAND / loose, grey, sandy GRAVEL / gravelly SAND with pockets of marl and some small boulders.

7.3.3.4 Organic Silts

Organic silt was noted in two SI points (TP05 (2017) and TP1 (2001)). There were other instances of “peaty” material noted in the SI logs, however, subsequent laboratory tests did not verify this description. There is also possible organic silt in TP2 (2001), where a high water content of 88% was measured, although organics were not noted in the log description.

In TP1 (2001) and TP05 (2017), the organic silt was described as cream/grey/white with a depth to top of strata ranging between 0.6 to 0.9 m bgl. The thickness of this strata was between 0.1 - 0.8 m. It was described as cream or light grey very soft slightly sandy organic SILT / very stiff, grey or white, sandy SILT with clay.

Where the silt is soft it will not be suitable as a foundation stratum or as engineering fill material.

In TP05 (2017), the organic silt is described as a blue to dark grey silt and was encountered between the depths of 1.4 - 2.5 m bgl. It was described as very soft and will not be suitable as foundation stratum or as engineering fill material.

7.3.3.5 Made Ground

As the Proposed RBSF Component site has been partially developed, there are areas where roads and other made ground is present. In ST02, there was made ground in the form of broken up compacted bits of concrete beneath fill material (which was part of the existing road). In ST03, made ground was encountered below fill (associated with the road) and was described as concrete, re-bar and builder’s rubble. In ST04, made ground was encountered below the topsoil and was described as gravelly SILT and clayey GRAVEL. ST06 encountered made ground in the form of slightly sandy gravelly SILT with rebar. This was underlain by an underground attenuation tank.

Made ground was also encountered in TP09 beneath the topsoil and was described as slightly sandy slightly gravelly SILT with broken clay pipe fragments.

7.3.3.6 Fill

Fill in the form of Clause 804 material was noted in a number of slit trenches (ST01, ST02, ST03, ST04). It was encountered in ST01, ST02 and ST03 below the bituminous paving material in the existing roadway.

7.3.3.7 Contaminated Soils

No evidence of soil contamination or illegal dumping was encountered during the site investigations.

7.3.4 Summary of Ground Conditions

Using the subsurface information from geotechnical investigations and published data, an inferred conceptual site model has been developed to characterise the soil and rock strata and is presented in Table 7-2.

Table 7-2: Conceptual Site Model

Unit	Material	Description	Depth to Top of Unit (m bgl)	Range of Unit Thickness* (m)
1	Topsoil	Soft slightly gravelly SILT	0.0	0.2 - 0.8
2	Cohesive Glacial Tills	Soft – very stiff (slightly) sandy (slightly) gravelly CLAY, occasionally with low to medium cobble and boulder content Dark brown firm to stiff CLAY Soft to stiff slightly sandy, slightly to very gravelly SILT with low to medium cobble content and boulders noted in the 2001 SI	0.2 - 2.5	1.1 - 22.0 (Definitive depths shown in the RC logs)
3	Sand/Gravel	Peaty sandy GRAVEL / Medium dense peaty SAND Loose, grey, sandy GRAVEL / Gravelly SAND with pockets of marl and some small boulders	0.5 - 3.6	0.3 - 1.6
4	Silt with organics	Very soft to firm blue/brown/mottled purple sandy gravelly SILT with low organics Soft/firm moist, sandy SILT with clay, good/high humus content	0.6 - 1.4	0.1 - 1.9
5	Made Ground	Sandy gravelly SILT with medium cobble content and broken clay pipes / gravel and gravelly slightly sandy CLAY / Gravelly SILT with rebar	0.0 - 0.5	0.5 - 0.7 (unproven maximum thickness)
6	Bedrock	Strong, dark grey LIMESTONE, lightly to heavily weathered, moderately to very heavily fractured, with iron oxide staining and clay smearing	13.0 - 22.3	Unproven

*Note that the minimum and maximum thickness of each strata is unproven and represent the thicknesses encountered in the relevant SI points, which may not have reached the bottom of the strata.

7.3.5 Karst Features

Karst is the name given to a landscape characterised by remarkable surface and underground forms, created from the action of the water on the permeable limestones. Surface and underground features occur where fissures and fractures have been widened by dissolution to allow the passage of groundwater. As groundwater flows through fissures and fractures, the rock is dissolved to form caves and caverns of varying sizes that are referred to as 'solution features'.

A review of the GSI karst database indicated there are no karst features within 5 km of the Proposed RBSF Component.

7.3.6 Economic Geology

The Huntstown limestone quarry is directly south west of the site, the site is designated a geological heritage site (see section 7.3.7 Geological Heritage). Huntstown is considered a major quarry.

7.3.7 Geological Heritage

A review of the GSI's Geological Heritage Sites, indicated that there are no County Geological Sites (CGS) identified within the perimeter of the site. Huntstown Quarry to the south west of the site is a County Geological Site designated because the limestone quarry face exposes the base of Tober Colleen formation where it directly overlies the Waulsortian Limestone.

7.3.8 Hydrogeology

Aquifer classification and groundwater vulnerability classifications are sourced from the Geological Survey of Ireland (GSI) Groundwater mapping program and refined using the site-specific SI data.

7.3.8.1 Aquifer Classification

The GSI mapping indicates that the Proposed RBSF Component site is underlain by the Malahide Formation. The overall GSI aquifer classification (Figure 7-4) for this formation is "Li" (locally important aquifer unproductive except for local zones). The underlying Groundwater Body (GWB) is the Swords Groundwater Body. The water quality status of this GWB is "good" and it is not considered at risk of deterioration.

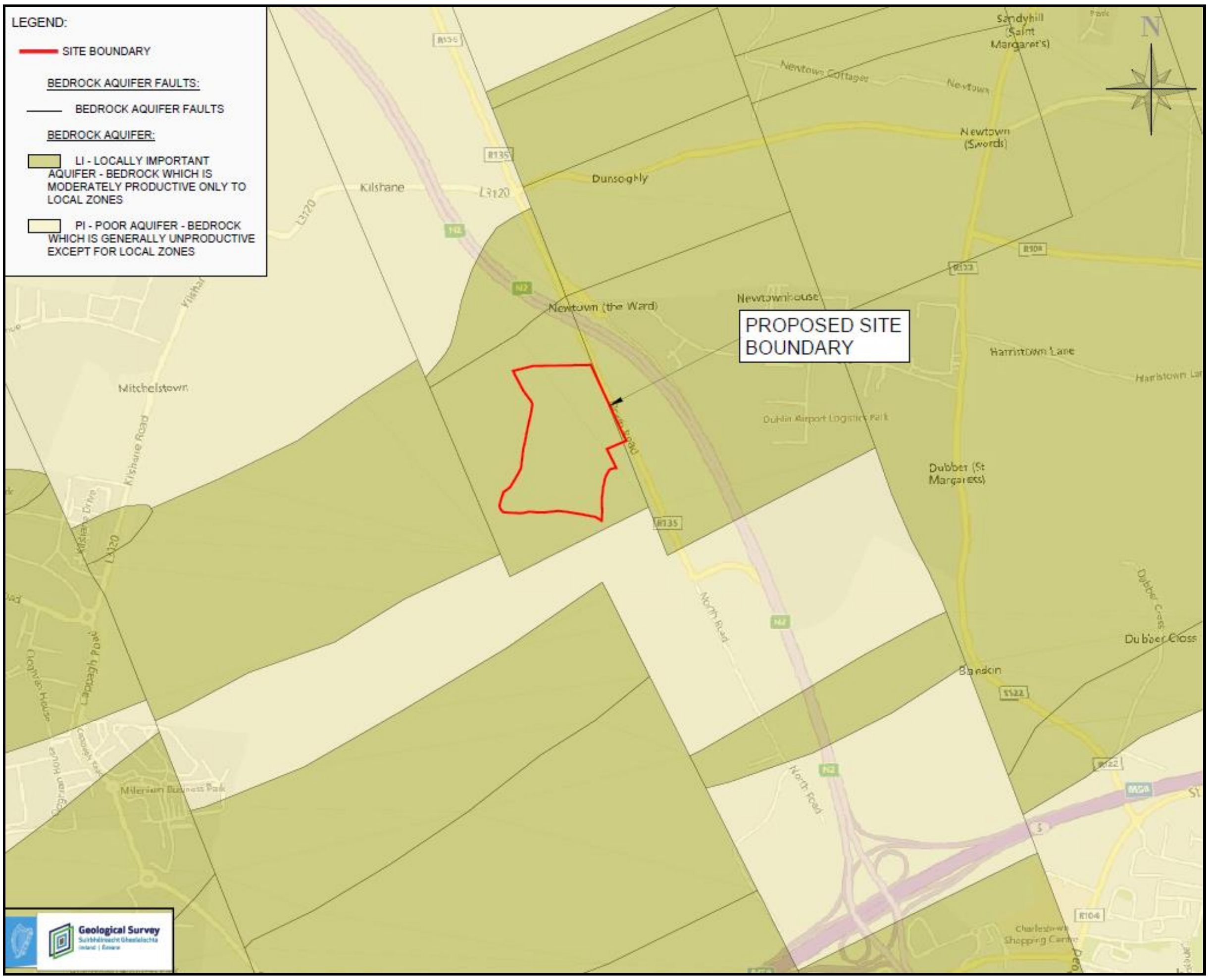


Figure 7-4: Bedrock Aquifers (GSI web-mapping online viewer www.gsi.ie)

7.3.8.2 Groundwater Dependent Terrestrial Ecosystems

There are no groundwater dependent terrestrial ecosystems within 15 km of the Proposed RBSF Component site.

7.3.8.3 Groundwater Vulnerability

Groundwater vulnerability provides an indication of the ease at which potential contaminants can migrate downwards from the surface to the underlying aquifer. The GSI groundwater mapping website indicates that the vulnerability (Figure 7-5) is classified as being “Extreme” (<3.0 m of overburden).

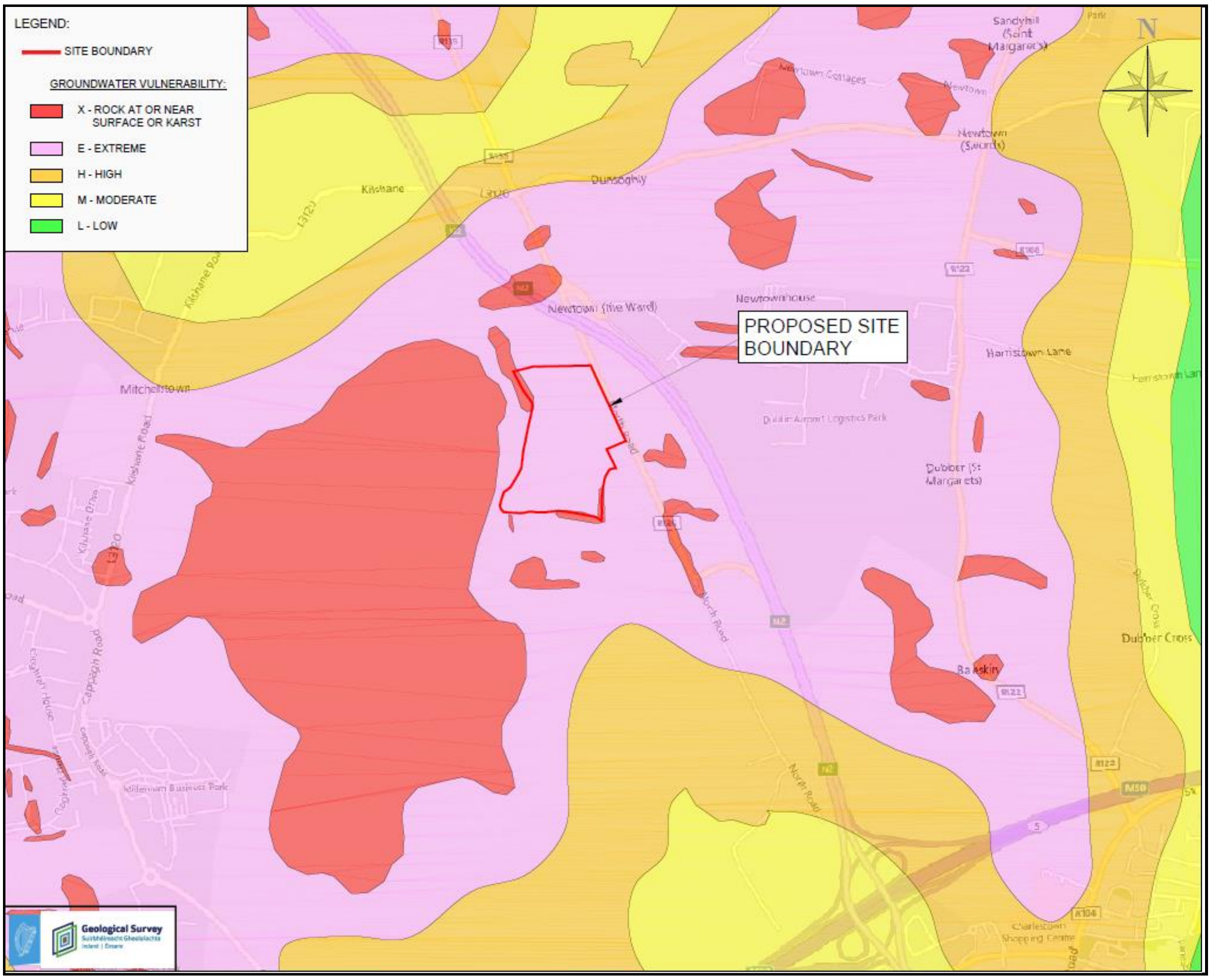


Figure 7-5: Groundwater Vulnerability (GSI web-mapping online viewer www.gsi.ie)

However, based on the subsurface conditions encountered on site during site investigation works, a more accurate vulnerability assessment can be made by applying the GSI vulnerability mapping guidelines as shown in Table 7-3. Bedrock overlain by glacial tills (clays) was recorded between 13 and 22.3 m bgl. Therefore, in view of the fact that the bedrock aquifer is protected by an aquitard >10 m of low permeability glacial till, the vulnerability relating to the bedrock aquifer is reclassified as “low”.

Table 7-3: GSI Vulnerability Mapping Guidelines

Vulnerability Classification	Subsoil Permeability (Type and Thickness)			Unsaturated Zone	Karst Features
	High permeability (sand/gravel)	Moderate permeability (e.g. sandy subsoil)	Low permeability (e.g. clayey subsoil, clay, peat)	(Sand / Gravel Aquifers only)	(<30m radius)
Extreme (E)	0 - 3.0m	0 - 3.0m	0 - 3.0m	0 - 3.0m	-
High (H)	>3.0m	3.0 - 10.0m	3.0 - 5.0m	>3.0m	N/A
Moderate (M)	N/A	>10.0m	5.0 – 10.0m	N/A	N/A
Low (L)	N/A	N/A	>10.0m	N/A	N/A

7.3.8.4 Groundwater Users

The GSI groundwater mapping data base has no record of any groundwater wells within 1 km of the site, see Figure 7-6. The Roadstone quarry at Huntstown pumps groundwater to maintain dry working conditions at the lower levels. The majority of the pumped water is discharged to the Huntstown Stream. It should be noted that there is no groundwater abstraction proposed as part of the construction and operation of the Proposed RBSF Component.

There are no public groundwater supply wells within 10 km of the site and consequently there are no groundwater source protection schemes in place.

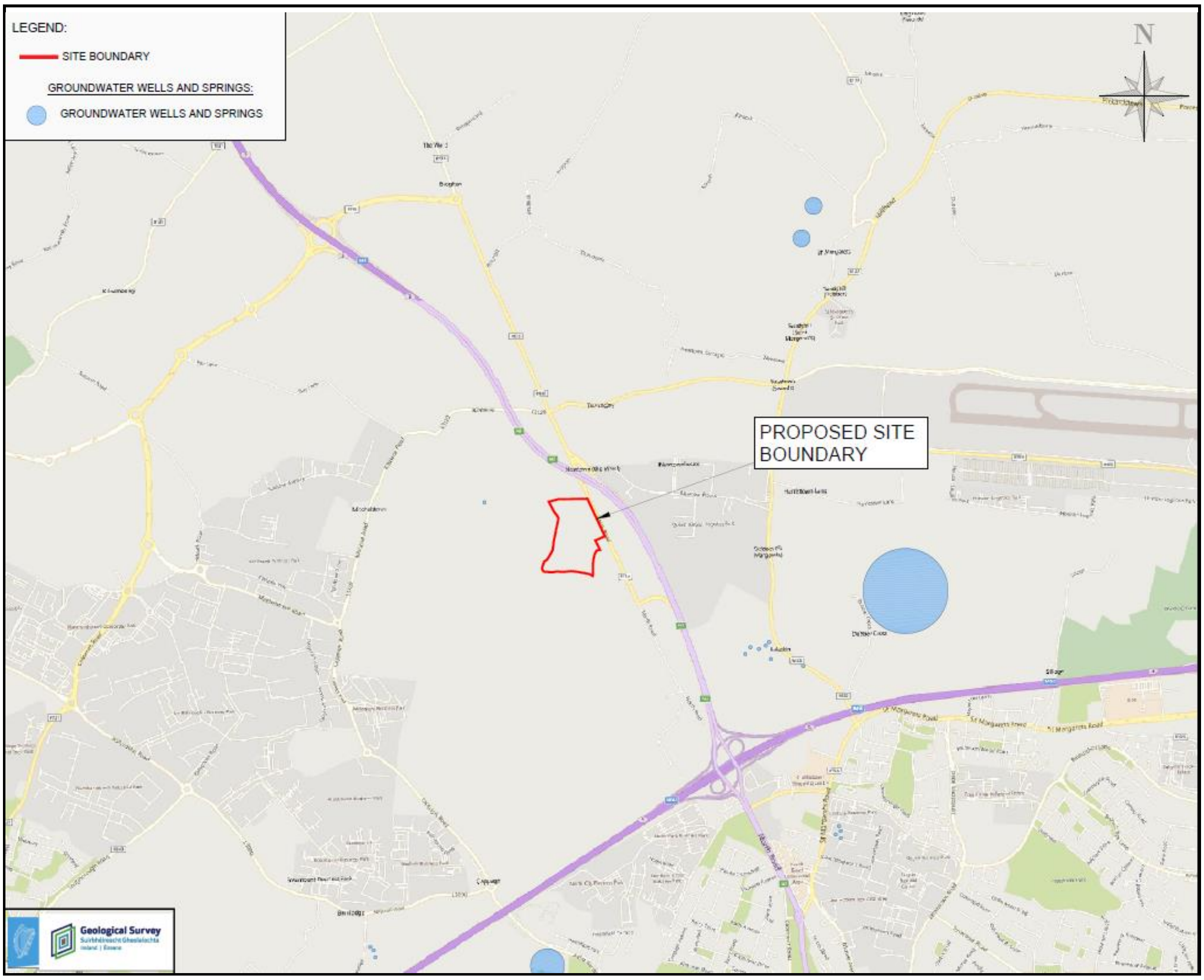


Figure 7-6: Groundwater Wells from GSI Data Base. (GSI web-mapping online viewer www.gsi.ie)

7.3.8.5 Groundwater Levels and Flow

Standpipes were installed in the three rotary coreholes conducted as part of the 2017 site investigations. No groundwater was encountered during drilling of these coreholes. The water levels in the standpipes were measured on 07 December 2017 and the results are presented in Table 7-4.

Table 7-4: Groundwater Levels Newtown (07/12/2017)

	Borehole	Borehole	Borehole
	RC01	RC04	RC07
Ground Level m OD	76.5	77.78	77.93
SWL m bgl	16.15	21.2	23.55
SWL m OD	60.35	56.58	54.38

The only other incidences of groundwater being encountered were during SI works, as follows:

- In TP10 (2017) there was a groundwater strike at 2.6m bgl during excavation, with only a trickle rate of flow noted;
- In BH101 there were groundwater strikes at 7.9 m bgl and 15 m bgl;
- In BH102 there were groundwater strikes at 10 m bgl and 11.7 m bgl; and
- In BH103 there were groundwater strikes at 10.1 m bgl and 17.9 m bgl.

Groundwater level data collected from boreholes drilled on the site in 2017 SI indicate that the groundwater flow is to the south/southwest. The groundwater flow direction is influenced by the dewatering being undertaken in the Huntstown quarry.

7.4 Characteristics of the RBSF Component of the Proposed GDD Project

The construction of the Proposed RBSF Component forms part of the overall Proposed GDD Project and the Proposed Upgrade Project. The facility will provide storage for the Biosolids generated at both Ringsend and GDD wastewater treatment plants. The following are the aspects of the Proposed RBSF Component that interact with the Land and Soils environment.

7.4.1 Earthworks

The development of the Proposed RBSF Component will interact with the land, soils and hydrogeological environments during the earthworks undertaken during the construction stage. Soil will be routinely excavated and the site recontoured to accommodate the foundations and construction of the storage buildings.

7.4.2 Water Supply

The water needs of the development will be provided by mains water.

7.4.3 Wastewater Disposal

The wastewater generated by the Proposed RBSF Component will be collected and piped to a public sewer.

7.4.4 Drainage

The RBSF will incorporate the construction of paved areas, internal roads and carparks, the runoff from which will be collected in a purpose designed drainage system. The rainfall runoff collected will be attenuated in a stormwater attenuation system prior to discharging to the Huntstown stream. All runoff from paved areas will pass through a hydrocarbon interceptor.

7.5 Potential Impacts

The effects on the Land, Soils and Hydrogeological Environments are assessed in the following sections for the construction and operation of the Proposed RBSF Component.

This assessment of Impacts follows guidelines established by the TII/NRA in its "*Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes* (2009)".

The significance of impacts on specific receptors are considered in terms of the magnitude of the effect/impact of an element of the Proposed RBSF Component on a receptor and the importance of that receptor.

The magnitude of the effect/impact can be assessed based on the criteria shown in Table 7-5 and Table 7-6.

Table 7-5: Estimation of Magnitude of Impact

Magnitude of Impact	Criteria
Large Adverse	Results in loss of attribute and /or quality and integrity of attribute
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity

Table 7-6: Rating of Significant Environmental Impacts

Importance of Attribute	Magnitude of Impact			
	Negligible	Small Adverse	Moderate Adverse	Large Adverse
Extremely High	Imperceptible	Significant	Profound	Profound
Very High	Imperceptible	Significant/ Moderate	Profound/ Significant	Profound
High	Imperceptible	Moderate/ Slight	Significant/ Moderate	Profound/ Significant
Medium	Imperceptible	Slight	Moderate	Significant
Low	Imperceptible	Imperceptible	Slight	Slight/ Moderate

The potential impacts are described in terms of the following characteristics:

- Earthworks and Disposal;
- Groundwater Quality; and
- Hydromorphology.

The significance of the impact is a consideration of the importance of the receptor (attribute) being impacted and the magnitude of impact (see Table 7-7).

Table 7-7: Criteria for Rating Site Attributes (NRA 2009)

Criteria	Extremely High	Very High	High	Medium	Low
	Attribute has a high quality or value on an international scale	Attribute has a high quality or value on a regional or national scale	Attribute has a high quality or value on a local scale	Attribute has a medium quality or value on a local scale	Attribute has a low quality or value on a local scale

7.5.1 Do-nothing Impacts

The “Do-nothing” alternative describes the circumstance where no Proposed RBSF Component occurs. There will be no impact on the land, soils, geology and hydrogeology if the “Do-nothing” scenario is followed.

7.5.2 Construction Phase

There are a number of elements associated with the Proposed RBSF Component which have the potential to impact the land, soils, geological and hydrogeological environment.

7.5.2.1 Excavation, Earthworks, Surplus and Unsuitable Soils

Excavation and removal of subsoils will be required to accommodate the foundations of the buildings and levelling of the site. Any soft and/or organic material is not considered suitable as a bearing stratum for foundations/roads and will require excavation. Unsuitable and surplus excavated material will be reused on the site for bunding and landscaping. There will be no rock excavation on the site. Any impact resulting from excavation will be negligible in magnitude and imperceptible in significance.

During construction, aquifer vulnerability may be slightly increased due to a reduction in depth of overburden in areas of excavation which may increase the potential for migration of contaminants (from accidental spills) to the underlying bedrock aquifer. However, due to the thickness of overburden (19.3 m - 22.3 m in the vicinity of the areas where the earthworks will be undertaken) and the “low” groundwater vulnerability classification (which will remain the same), the impact of the reduction in overburden depth on the groundwater quality will be negligible in magnitude and imperceptible in significance and highly unlikely as there are no proposed discharges to ground.

7.5.2.2 Karst Features

There will be no impact on karst features.

7.5.2.3 Temporary Construction Dewatering and Groundwater Users

The water table lies at least 16 m below ground level. No temporary dewatering will be required to construct foundations. Consequently, there will be no alteration of the existing groundwater flow regime and no impact on the available groundwater resource.

7.5.2.4 Accidental Spillages - Contamination of Soils and Groundwater

Potential impacts during the construction phase include the leakage or spillage of construction related materials on site. For example, raw or uncured concrete and grouts, wash down water from exposed aggregate surfaces, cast-in-place concrete from concrete trucks, fuels, lubricants and hydraulic fluids for equipment used on the development site, bitumen and sealants used for waterproofing concrete surfaces can all potentially impact on soils and groundwater during construction stage. However, the vulnerability classification of the underlying aquifer has been classified as "Low" based on site specific information. The impact on groundwater water quality is predicted to be negligible in magnitude and imperceptible in significance, temporary in duration and unlikely. The impact of accidental spillages on soils is negligible in magnitude and imperceptible in significance.

7.5.3 Operational Phase

There will be no direct discharges to or abstractions from the soil and hydrogeological environment during the operational phase of the Proposed RBSF Component.

7.5.3.1 Economic Geology

The loss of a high proportion of future quarry or pit reserves would be considered a significant impact, however, as the rockhead level was identified as between 13 and 22.3 m bgl, it is not considered economically viable for any expansion of Huntstown Quarry to include the Proposed RBSF Component site. Therefore, the impact on quarry reserves is assessed as negligible in magnitude and imperceptible in significance.

7.5.3.2 Geological Heritage

The Geological Heritage site to the southwest of the site is due to the excavation of rock at Huntstown Quarry, exposing the base of the Tober Coleen Limestone where it overlies the Waulsortian Limestone. The development of the Proposed RBSF Component will have no impact on the Geological Heritage site within Huntstown Quarry.

7.5.3.3 Reduction in Recharge area

The Proposed RBSF Component will incorporate approximately 3.4 hectares of impermeable surfaces (roofs, roads and hardstanding areas). This will result in a reduction in recharge to the aquifer. The site is underlain by 13-22.3 metres of low permeability overburden which will severely restrict recharge. When compared to the overall recharge area to the aquifer, which amounts to thousands of hectares, the reduction in recharge area is insignificant. Taking into account the fact that the aquifer is only locally important and that there are very few groundwater users, the overall impact on the groundwater resource due to loss in recharge area will be imperceptible.

7.5.3.4 Accidental Spillages – Contamination of Soils and Groundwater

During the operational phase the leakage or spillage of fuels, lubricants and hydraulic fluids for equipment can all potentially impact on soils and groundwater during construction stage. However, the vulnerability classification of the underlying aquifer has been classified as "Low" based on site specific information. The impact on groundwater water quality is predicted to be negligible in magnitude and imperceptible in significance, temporary in duration and unlikely. The impact of accidental spillages on soils is negligible in magnitude and imperceptible in significance.

7.6 Mitigation Measures

7.6.1 Construction Phase

The following mitigation measures have been identified which will form part of a Construction Environmental Management Plan (CEMP) which will include measures for reduction or elimination of pollution of soils and groundwater. An Outline Waste Management Plan is contained in Appendix 7A.

7.6.1.1 Excavation and Earthworks, Surplus and Unsuitable Soils

Soft materials and surplus soils that are excavated will be reused, for bunds, landscaping etc.

To mitigate densification of the soil due to construction activities, all topsoil shall be removed and stored in advance of earthworks, the surface shall be scarified, and the topsoil replaced and reseeded upon completion.

7.6.1.2 Accidental Spillages - Contamination of Soils and Groundwater

- Contractor Guidance set out in the Control of Water Pollution from Construction Sites (CIRIA, 2001) shall be adhered to. Good construction management practices will be employed. During the construction stage, all potentially harmful substances (e.g. oils, diesel, herbicides, pesticides, concrete etc.) will be stored in accordance with the manufacturer's guidelines regarding safe and secure buildings/compounds;
- Designated impermeable cement washout areas must be provided;
- All oils and fuels will be stored in bunded tanks with the provision of a storage/retention capacity of 110% of tank storage. Care and attention will be taken during refuelling and maintenance operations;
- Adequate means to absorb or contain any spillages of these chemicals will be available at all times; and
- Any soil contaminated from an accidental spillage will be contained and treated appropriately and disposed of in accordance with the Waste Management Act 1996-2012.

7.6.2 Operational Phase

As there is no operational interaction or impacts on the land, soils and hydrogeological environments due to the Proposed RBSF Component, no mitigation is proposed.

7.7 Residual Impacts

7.7.1 Construction Phase

The predicted overall residual impact of the Proposed RBSF Component on hydrology and water quality and hydrogeology during the construction stage will be neutral imperceptible.

7.7.2 Operational Phase

The predicted overall residual impact of the Proposed RBSF Component on hydrology and water quality during the operational stages will be neutral imperceptible.

7.7.3 Interactions

The principal interactions requiring information exchange between the water specialist and other environmental specialists and the design team are summarised in the following subsections.

7.7.3.1 Biodiversity

Removal of trees and hedgerows impacting on habitats of bats and birds. Data provided by the land and soils team assisted in this assessment. An area of existing grassland in the northern part of the site will be planted with native deciduous trees to form an additional foraging area for bats. There are no significant impacts on biodiversity predicted in either the construction or operational phases.

7.7.3.2 Landscape and Visual

The excavation of soils can remove screening properties and influence the visual impact of the project. Landscape and Visual Impacts are addressed in Section 14: Landscape and Visual. The Proposed RBSF Component will not give rise to any negative landscape or visual effects of a residual nature.

7.7.3.3 Air and Climate

The construction activities will generate dust. Impacts and mitigation of dust generation are addressed in Section 8: Air and Climate. The impacts of dust associated with the construction phase are predicted to be imperceptible following implementation of the proposed mitigation measures.

7.7.3.4 Noise

The activities associated with the land and soil environment (earthworks) will contribute to the noise emission from the site. The noise impacts are addressed in Section 9: Noise and Vibration. The vibration impacts are also assessed in Section 9: Noise and Vibration.

7.7.3.5 Cultural Heritage

Information on the depths of earthworks and excavations were provided to the Cultural Heritage specialist to assist in determining the likelihood of unearthing buried archaeology during construction works. No impact on the archaeological environment is predicted as a result of earthworks.

7.7.3.6 Material Assets

Land-use is addressed in Section 12: Material Assets. Geological Heritage site assessments are required for the assessment of impacts on Material Assets. Quarries and their reserves are assessed as part of Material Assets section. Land and soils related impacts on Material Assets are predicted to be neutral.

7.7.4 Cumulative Impacts

The residual impact of the Proposed RBSF Component on land, soils, geology and hydrogeology during both the construction and operational phases is predicted to be neutral. Accordingly, they are unlikely to interact with the impacts of other existing or permitted projects, including the Huntstown Quarry to the west of the site. There are no cumulative impacts with other projects predicted.

7.8 Monitoring

As all the impacts are predicted to be neutral/imperceptible, no monitoring is proposed.

7.9 Difficulties Encountered in compiling required information

No difficulties were encountered in compiling this section.

7.10 References

Daly, K. and Fealy, R. (2006). *Digital Soil Information System for Ireland – Scoping Study (2005-S-DS-22-M1). Final Report*. Johnstown: Teagasc, Environmental Research Centre on behalf of Environmental Protection Agency (Ireland).

Environmental Protection Agency (EPA). (2002). *Guidelines on Information to Be Contained in Environmental Impact Statements*. Dublin. [pdf] Available at: http://www.epa.ie/pubs/advice/ea/guidelines/EPA_Guidelines_EIS_2002.pdf.

Environmental Protection Agency (EPA). (2003) *Advice Notes on Current Practice (In the Preparation of Environmental Impact Statements)*. [pdf] Available at: https://www.epa.ie/pubs/advice/ea/guidelines/EPA_advice_on_EIS_2003.pdf.

Environmental Protection Agency (EPA) (2015). *Draft Advice Notes for Preparing Environmental Impact Statements.* [pdf] Available at: https://www.epa.ie/pubs/consultation/reviewofdrafteisguidelinesadvicenotes/Draft%20Advice%20Notes%20for%20preparing%20an%20EIS.pdf.

Environmental Protection Agency (EPA). (2017) *Draft Guidelines of the Information to be Contained in Environmental Impact Assessment Reports*. [pdf] Available at: https://www.epa.ie/pubs/advice/ea/EPA%20EIAR%20Guidelines.pdf.

Geological Survey of Ireland (GSI) *1:100,000 scale Bedrock Geology Map, Sheet 13 (Meath).*

Geological Survey of Ireland (GSI) *1:100,000 scale Bedrock Geology Map, Sheet 16 (Kildare-Wicklow).*

Geological Survey of Ireland (GSI), (2018). *Quaternary Geology Map of Ireland.* [Online] Available at: https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=afa76a420fc54877843aca1bc075c62b.

Glovers Site Investigations Ltd., (2002). *Kilshane N2, Ground Investigation, Geotech Laboratory Test Results Report No. 4389 (January, 2002).*

National Roads Authority, (2009). *Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes.*

Priority Geotechnical Limited. *Regional Biosolids Storage Facility: Site Investigation – Factual Report. (Report No. P17148, 2018).*

TES Ltd. (2005). *Kilshane Recycling Park: Environmental Impact Statement*. Fingal County Council.

TES Ltd. (2001). *Trial Pit and Borehole Logs for the Recycling Park at Kilshane Cross.*

The Institute of Geologists of Ireland (IGI), (2002). *Geology in Environmental Impact Statements - a Guide*. Dublin: The Institute of Geologists of Ireland.

Section 8: Air and Climate

8.1 Introduction

This Section of the EIAR assesses the potential impacts (and resulting effects) likely to occur as a result of the Regional Biosolids Storage Facility (RBSF) component of the Proposed GDD Project and the Proposed Upgrade Project on air quality and climate. Hereinafter, this component is referred to "the Proposed RBSF Component".

This Section and assessment have been completed having regard to the guidance outlined in the Environmental Protection Agency documents *Guidelines on the information to be contained in Environmental Impact Assessment Reports* (Draft, August 2017) and *Advice Notes for Preparing Environmental Impact Statements* (Draft, September 2015).

8.1.1 Background Information

8.1.1.1 Ambient Air Quality Standards

In order to reduce the risk to health from poor air quality, national and European statutory bodies have set limit values in ambient air for a range of air pollutants. These limit values or "Air Quality Standards" are health or environmental based levels for which additional factors may be considered. For example, natural background levels, environmental conditions and socio-economic factors may all play a part in the limit value which is set (see Table 8-1 and Appendix 8A).

Air quality significance criteria are assessed on the basis of compliance with the appropriate standards or limit values. The applicable standards in Ireland include the Air Quality Standards Regulations 2011, which incorporate EU Directive 2008/50/EC, which has set limit values for SO_2, NO_2, PM_{10}, $PM_{2.5}$, benzene and CO (see Table 8-1). Council Directive 2008/50/EC combines the previous Air Quality Framework Directive (96/62/EC) and its subsequent daughter directives (including 1999/30/EC and 2000/69/EC). Provisions were also made for the inclusion of new ambient limit values relating to $PM_{2.5}$ (see Appendix 8A).

Table 8-1: Air Quality Standards Regulations 2011

Pollutant	Limit Type	Value
Nitrogen Dioxide (NO_2)	Hourly limit for protection of human health - not to be exceeded more than 18 times/year	200 $\mu g/m^3$
	Annual limit for protection of human health	40 $\mu g/m^3$
	Critical level for protection of vegetation	30 $\mu g/m^3$ NO + NO_2
Lead	Annual limit for protection of human health	0.5 $\mu g/m^3$
Sulphur dioxide (SO_2)	Hourly limit for protection of human health - not to be exceeded more than 24 times/year	350 $\mu g/m^3$
	Daily limit for protection of human health - not to be exceeded more than 3 times/year	125 $\mu g/m^3$
	Critical limit for the protection of ecosystems	20 $\mu g/m^3$
Particulate Matter (PM_{10})	24-hour limit for protection of human health - not to be exceeded more than 35 times/year	50 $\mu g/m^3$
	Annual limit for protection of human health	40 $\mu g/m^3$

Pollutant	Limit Type	Value
Particulate Matter ($PM_{2.5}$)	Annual limit for protection of human health	25 µg/m^3
Benzene	Annual limit for protection of human health	5 µg/m^3
Carbon Monoxide (CO)	8-hour limit (on a rolling basis) for protection of human health	10 mg/m^3 (8.6 ppm)

8.1.1.2 Dust Deposition Guidelines

The primary concern from a health perspective is focussed on particles of dust which are less than 10 microns (PM_{10}) and less than 2.5 microns ($PM_{2.5}$) and the EU ambient air quality standards outlined in Table 8-1 have set ambient air quality limit values for PM_{10} and $PM_{2.5}$.

With regards to larger dust particles that can give rise to nuisance dust, there are no statutory guidelines regarding the maximum dust deposition levels that may be generated during the construction phase of a development in Ireland.

With regard to dust deposition, the German TA-Luft standard for dust deposition (non-hazardous dust) (TA Luft, 2002) sets a maximum permissible emission level for dust deposition of 350 mg/(m^2*day), measured via the Bergerhoff method and averaged over a one-year period at any receptors outside the site boundary. Recommendations from the Department of the Environment, Heritage & Local Government (2004) apply the Bergerhoff limit established in the TA Luft of 350 mg/(m^2*day) to the site boundary of quarries. In the absence of Irish guidance on dust emission limits from construction sites, this limit value can be implemented with regard to dust impacts from the construction of the Proposed RBSF Component. Dust emissions above this limit value have the potential to cause nuisance impacts to any nearby sensitive receptors.

8.1.1.3 Climate Agreements

Ireland ratified the United Nations Framework Convention on Climate Change (UNFCCC) in April 1994 and the Kyoto Protocol in principle in 1997 and formally in May 2002 (Framework Convention on Climate Change, 1997 and 1999) For the purposes of the EU burden sharing agreement under Article 4 of the Kyoto Protocol, in June 1998, Ireland agreed to limit the net growth of the six greenhouse gases (GHGs) under the Kyoto Protocol to 13% above the 1990 level over the period 2008 to 2012 (ERM, 1998) (European Commission, 2014). The UNFCCC is continuing detailed negotiations in relation to GHGs reductions and in relation to technical issues such as Emission Trading and burden sharing. The most recent Conference of the Parties to the Convention (COP23) took place in Bonn, Germany from the 06 to 17 November 2017 and focussed on advancing the implementation of the Paris Agreement. The Paris Agreement was established at COP21 in Paris 2015 and is an important milestone in terms of international climate change agreements. The “Paris Agreement”, agreed by over 200 nations, has a stated aim of limiting global temperature increases to no more than 2°C above pre-industrial levels with efforts to limit this rise to 1.5°C. The aim is to limit global GHG emissions to 40 gigatonnes as soon as possible whilst acknowledging that peaking of GHG emissions will take longer for developing countries. Contributions to greenhouse gas emissions will be based on Intended Nationally Determined Contributions (INDCs) which will form the foundation for climate action post 2020. Significant progress was also made on elevating adaption onto the same level as action to cut and curb emissions.

The EU, on 23 and 24 October 2014, agreed the “2030 Climate and Energy Policy Framework” (European Commission, 2014) (European Union, 2014). The European Council endorsed a binding EU target of at least a 40% domestic reduction in GHG emissions by 2030 compared to 1990. The target will be delivered collectively by the EU in the most cost-effective manner possible, with the reductions in the ETS (emissions trading scheme) and non-ETS sectors amounting to 43% and 30% by 2030 compared to 2005, respectively. Secondly, it was agreed that all Member States will participate in this effort, balancing considerations of fairness and solidarity. The policy also outlines, under "Renewables and Energy Efficiency", an EU binding target of at least 27% for the share of renewable energy consumed in the EU in 2030.

8.1.1.4 Gothenburg Protocol

In 1999, Ireland signed the *Gothenburg Protocol to the 1979 UN Convention on Long Range Transboundary Air Pollution*. The objective of the Protocol is to control and reduce emissions of Sulphur Dioxide (SO_2), Nitrogen Oxides (NO_X), Volatile Organic Compounds (VOCs) and Ammonia (NH_3). To achieve the initial targets, Ireland was obliged, by 2010, to meet national emission ceilings of 42 kt for SO_2 (67% below 2001 levels), 65 kt for NO_X (52% reduction), 55 kt for VOCs (37% reduction) and 116 kt for NH_3 (6% reduction). In 2012, the Gothenburg Protocol was revised to include national emission reduction commitments for the main air pollutants to be achieved in 2020 and beyond and to include emission reduction commitments for $PM_{2.5}$.

European Commission Directive 2001/81/EC, the National Emissions Ceiling Directive (NECD), prescribes the same emission limits as the 1999 Gothenburg Protocol. A National Programme for the progressive reduction of emissions of these four transboundary pollutants has been in place since April 2005 (ERM, 1998). Data available from the EU in 2010 indicated that Ireland complied with the emissions ceilings for SO_2, VOCs and NH_3 but failed to comply with the ceiling for NO_X (European Commission, 2014). COM (2013) 920 Final is the "*Proposal for a Directive on the reduction of national emissions of certain atmospheric pollutants and amending Directive 2003/35/EC*". The proposal will apply the 2010 NECD limits until 2020 and establish new national emission reduction commitments which will be applicable from 2020 and 2030 for SO_2, NO_X, NMVOC, NH_3, $PM_{2.5}$ and CH_4. In relation to Ireland, 2020-29 and 2030 GHG emission targets are detailed in Table 8-2 below.

Table 8-2: GHG Emission Targets

Target Date	SO_2	NO_X	VOCs	NH_3	$PM_{2.5}$
2020-29	65% below 2005 levels	49% reduction	25% reduction	1% reduction	18% reduction
2030	83% below 2005 levels	75% reduction	32% reduction	7% reduction	35% reduction

8.2 Methodology

During construction and operation of the Proposed RBSF Component, dust may be released from activities on site (refer to Figure 8-1 for site boundary) which could potentially cause nuisance to nearby sensitive receptors. Air quality can be impacted by localized increases in ambient levels of air pollutants as a result of increased traffic levels associated with the Proposed RBSF Component. These could also result in increased CO_2 and greenhouse gas emissions impacting climate. These potential impacts have been assessed using the methodology outlined below.

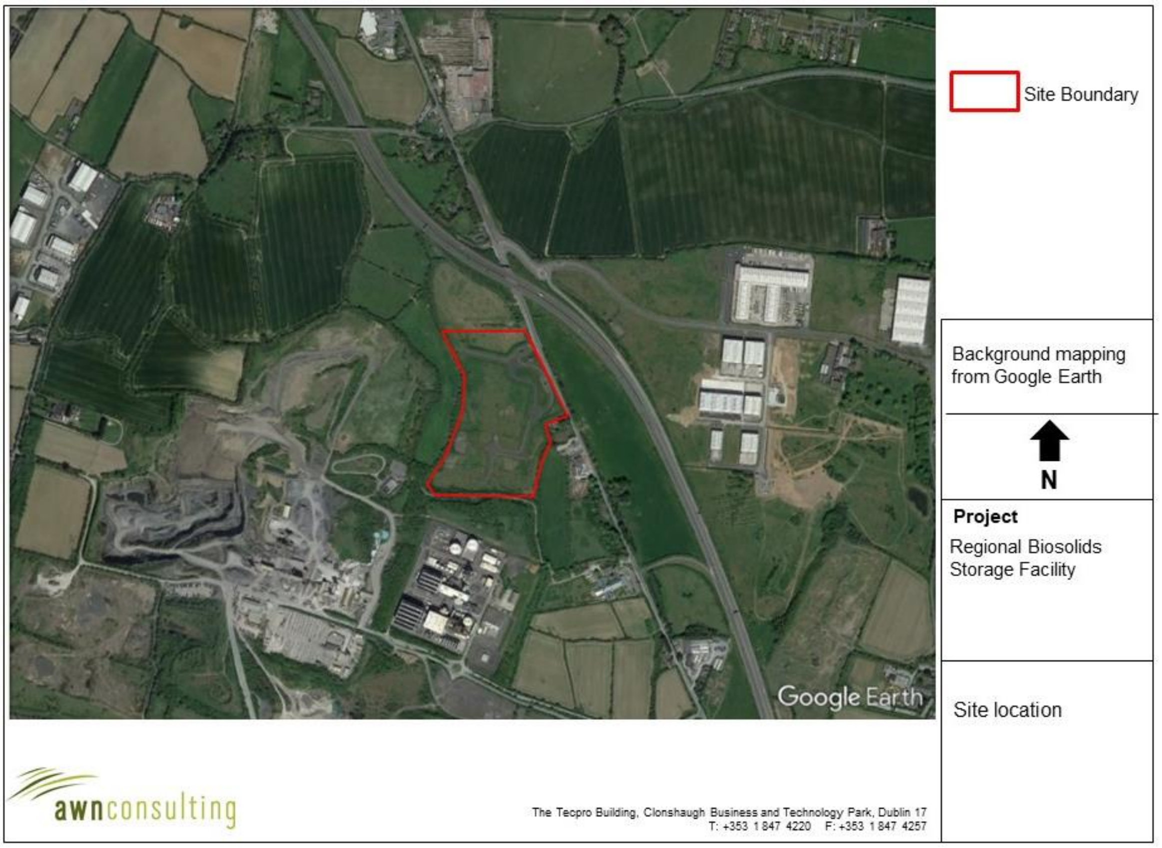


Figure 8-1: Site location

8.2.1 Local Air Quality Assessment

The air quality assessment is carried out following procedures described in the publications by the EPA (Environmental Protection Agency, 2002) (Environmental Protection Agency, 2015) and using the methodology outlined in the policy and technical guidance notes, LAQM.PG(16) and LAQM.TG(16), issued by the UK Department for Environment, Food and Rural Affairs (UK DEFRA, 2016a) (UK Highways Agency, 2007). The assessment of air quality is carried out using a phased approach as recommended by the UK Department for Environment, Food and Rural Affairs (UK DEFRA, 2016b). The phased approach recommends that the complexity of an air quality assessment be consistent with the risk of failing to achieve the air quality standards. In the current assessment, an initial scoping of key pollutants was carried out at sensitive receptors. These sensitive receptors have the potential to experience increased concentrations of key pollutants due to the Proposed RBSF Component. An examination of recent EPA and Local Authority data in Ireland (Environmental Protection Agency, 2017b) (Environmental Protection Agency, 2017c), has indicated that SO_2 and smoke are unlikely to be exceeded at the Proposed RBSF Component and thus these pollutants do not require detailed monitoring or assessment to be carried out. However, the analysis of recent data did indicate potential increases in nitrogen dioxide (NO_2) and PM_{10} at busy junctions in urban centres Environmental Protection Agency, 2017b) (Environmental Protection Agency, 2017c). Benzene, although previously reported at quite high levels in urban centres (Environmental Protection Agency, 2017b) (Environmental Protection Agency, 2017c), has recently been measured at several city centre locations to be well below the EU limit value (Environmental Protection Agency, 2017b) (Environmental Protection Agency, 2017c). Historically, CO levels in urban areas were a cause for concern. However, CO concentrations have decreased significantly over the past number of years and are now measured to be well below the limits even in urban centres (Environmental Protection Agency, 2017b) (Environmental Protection Agency, 2017c). The key pollutants to be reviewed in this assessment are NO_2, PM_{10}, $PM_{2.5}$, benzene and CO, with particular focus on NO_2 and PM_{10}.

8.2.1.1 Construction Phase

In the absence of applicable and detailed Irish guidance on assessing the impacts of construction dust emissions on sensitive receptors, The Institute of Air Quality Management in the UK (IAQM) guidelines (IAQM, 2014) have been used. These guidelines outline an assessment method for predicting the impact of dust emissions from demolition, earthworks, construction and haulage activities based on the scale and nature of the works and the sensitivity of the area to dust impacts. The IAQM methodology has been applied to the construction phase of the Proposed RBSF Component in order to predict the likely magnitude of the dust impacts in the absence of mitigation measures.

8.2.1.2 Operational Phase

Any potential dust impacts during the operational stage of the Proposed RBSF Component will be assessed using the IAQM guidelines as detailed above.

To assess the impact of increased traffic-based pollutants as a result of the Proposed RBSF Component, the following methodology has been used which involves air dispersion modelling using the UK Design Manual for Roads and Bridges Screening Model (UK Highways Agency, 2007) (Version 1.03c, July 2007), the NO_x to NO_2 Conversion Spreadsheet (UK DEFRA, 2016) (Version 5.1), and following guidance issued by Transport Infrastructure Ireland (Transport Infrastructure Ireland, 2011), UK Highways Agency (UK Highways Agency, 2007), UK Department for Environment, Food and Rural Affairs (UK DEFRA, 2016b) and the EPA (Environmental Protection Agency, 2002, 2003, 2015, 2017a).

Transport Infrastructure Ireland guidance states that the assessment must progress to detailed modelling if:

- Pollutant concentrations exceed 90% of the air quality limit values when assessed by the screening method; or
- Sensitive receptors exist within 50 m of a complex road layout (e.g. grade separated junctions, hills etc).

The UK Design Manual for Roads and Bridges guidance (UK Highways Agency, 2007), on which Transport Infrastructure Ireland guidance was based, states that road links meeting one or more of the following criteria can be defined as being 'affected' by a proposed development and should be included in the local air quality assessment:

- Road alignment change of 5 m or more;
- Daily traffic flow changes by 1,000 AADT or more;
- HGVs flows change by 200 vehicles per day or more;
- Daily average speed changes by 10 km/h or more; or
- Peak hour speed changes by 20 km/h or more.

None of the road links impacted by the Proposed RBSF Component satisfied any of the criteria outlined above, therefore no assessment of the traffic impact using the DMRB model is considered to be required for the Proposed RBSF Component as no roads are classified as "affected".

8.2.1.3 Ecological Sites

Impacts to Ecological Sites primarily result from nitrogen deposition as a result of increased traffic volumes in the vicinity of the Proposed RBSF Component. Vehicles, primarily heavy good vehicles (HGVs) emit nitrogen oxides (NO_X) in their exhaust gases. For transport routes which pass within 2 km of a designated area of conservation (either National or European designation), Transport Infrastructure Ireland requires consultation with an Ecologist (Transport Infrastructure Ireland, 2011). However, in practice the potential for impact to an ecological site is highest within 200 m of the proposed development and when significant changes in AADT (>5%) occur.

Transport Infrastructure Ireland's *Guidelines for Assessment of Ecological Impacts of National Road Scheme*s (TII, 2009) and *Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities* (DEHLG, 2010) provide details regarding the legal protection of designated conservation areas.

If both of the following assessment criteria are met, an assessment of the potential for impact due to nitrogen deposition should be conducted:

- A designated area of conservation is located within 200 m of the proposed development; and
- A significant change in AADT flows (>5%) will occur.

There are no designated sites within the vicinity of the Proposed RBSF Component, therefore this assessment is not needed and none of the road links are classified as "affected".

8.3 Existing Environment

8.3.1 Meteorological Data

A key factor in assessing temporal and spatial variations in air quality are the prevailing meteorological conditions. Due to variations in wind speed and direction, individual receptors may experience very significant variations in pollutant levels under the same source strength (i.e. same traffic levels) (WHO, 2006). Wind is of key importance in dispersing air pollutants and for ground level sources, such as traffic emissions, pollutant concentrations are generally inversely related to wind speed. Thus, concentrations of pollutants derived from traffic sources will generally be greatest under very calm conditions and low wind speeds when the movement of air is restricted. In relation to PM_{10}, the situation is more complex due to the range of sources of this pollutant. Smaller particles (less than $PM_{2.5}$) from traffic sources will be dispersed more rapidly at higher wind speeds. However, fugitive emissions of coarse particles ($PM_{2.5}$ - PM_{10}) will actually increase at higher wind speeds. Thus, measured levels of PM_{10} will be a non-linear function of wind speed.

The nearest representative weather station collating detailed weather records is Dublin Airport, which is located approximately 4.5 km east of the Proposed RBSF Component. Dublin Airport met data has been examined to identify the prevailing wind direction and average wind speeds over a five-year period (see Figure 8-2). For data collated during five representative years (2012 - 2016), the predominant wind direction is westerly to south-westerly, with generally moderate wind speeds averaging 10.4 m/s for the period 2005 - 2016.

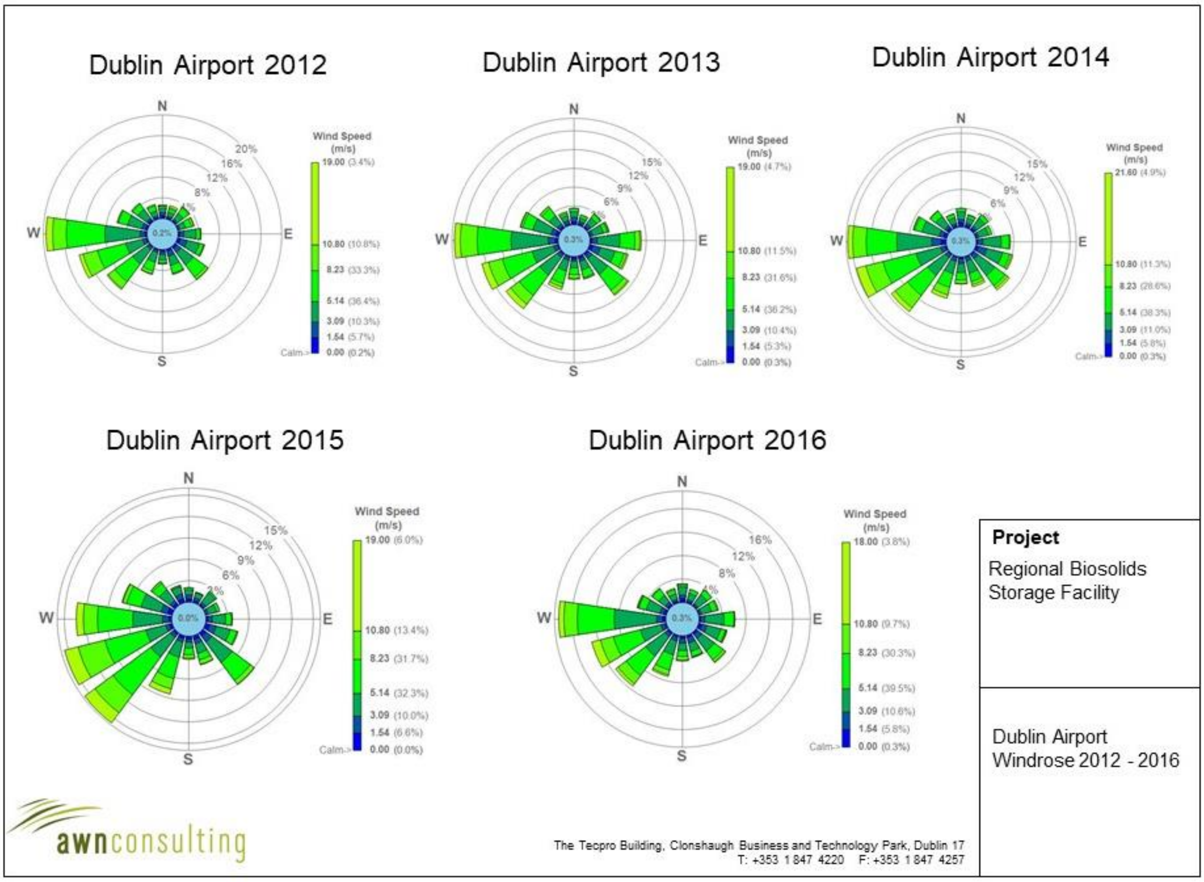


Figure 8-2: Dublin Airport Windroses (2012 - 2016)

8.3.2 Trends in Air Quality

Air quality is variable and subject to both significant spatial and temporal variation. In relation to spatial variations in air quality, concentrations generally fall significantly with distance from major road sources (UK Highways Agency, 2007). Thus, residential exposure is determined by the location of sensitive receptors relative to major roads sources in the area. Temporally, air quality can vary significantly by orders of magnitude due to changes in traffic volumes, meteorological conditions and wind direction.

8.3.2.1 Baseline Air Quality – Review of Available Background Data

Air quality monitoring programs have been undertaken in recent years by the EPA and Local Authorities. The most recent annual report on air quality in Ireland is the "*Air Quality Monitoring Report 2016*" (Environmental Protection Agency, 2017c). The EPA website details the range and scope of monitoring undertaken throughout Ireland and provides both monitoring data and the results of previous air quality assessments (Environmental Protection Agency, 2017b).

As part of the implementation of the Air Quality Standards Regulations 2002 (SI No. 271 of 2002), four air quality zones have been defined in Ireland for air quality management and assessment purposes (Environmental Protection Agency, 2017c). Dublin is defined as Zone A and Cork as Zone B. Zone C is composed of 23 towns with a population of greater than 15,000. The remainder of the country, which represents rural Ireland but also includes all towns with a population of less than 15,000, is defined as Zone D.

In terms of air monitoring and assessment, the Proposed RBSF Component is within Zone A (Environmental Protection Agency, 2017c). The EPA long-term monitoring data has been used to determine background concentrations for the key pollutants in the region of the Proposed RBSF Component. The background concentration accounts for all non-traffic derived emissions (e.g. natural sources, industry, home heating etc.).

With regard to NO_2, continuous monitoring data from the EPA (Environmental Protection Agency, 2017b, 2017c) at the Zone A locations of Rathmines, Blanchardstown, Dún Laoghaire, Ballyfermot and Swords, which are the most representative of the site as they are located outside the city centre, show that levels of NO_2 are below both the annual and 1-hour limit values (see Table 8-3), with average long-term concentrations ranging from 13 - 31 µg/m^3 for the period 2012 - 2016. Results for this five year period suggest an upper average of no more than 29 µg/m^3. Based on these results and with regard to the proximity of the Proposed RBSF Component to the N2 roadway, the background NO_2 concentration in the region of the Proposed RBSF Component in 2017 is estimated to be 29 µg/m^3.

Table 8-3: Trends in Zone A Air Quality - Nitrogen Dioxide (NO2)

Station	Averaging Period [12]	Year				
		2012	2013	2014	2015	2016
Rathmines	Annual Mean NO_2 (µg/m^3)	21	19	17	18	20
	Max 1-hr NO_2 (µg/m^3)	138	107	112	106	102
Blanchardstown	Annual Mean NO_2 (µg/m^3)	30	29	31	25	30
	Max 1-hr NO_2 (µg/m^3)	194	154	215	178	160
Dún Laoghaire	Annual Mean NO_2 (µg/m^3)	18	16	15	16	19
	Max 1-hr NO_2 (µg/m^3)	136	123	105	103	142
Ballyfermot	Annual Mean NO_2 (µg/m^3)	-	16	16	16	17
	Max 1-hr NO_2 (µg/m^3)	-	107	128	142	127
Swords	Annual Mean NO_2 (µg/m^3)	15	15	14	13	16
	Max 1-hr NO_2 (µg/m^3)	241	211	325	170	206

Continuous PM_{10} monitoring carried out at the locations of Rathmines, Ballyfermot, Blanchardstown, Dún Laoghaire, Tallaght and Davitt Road showed 2016 annual mean concentrations of 11 - 15 µg/m^3 (Table 8-4), with at most 3 exceedances (in Rathmines) of the 24-hour limit value of 50 µg/m^3 (35 exceedances are permitted per year) (Environmental Protection Agency, 2017c). Data collated over the five year period 2012 - 2016 suggests an upper average annual mean of PM_{10} levels of no more than 18 µg/m^3. Based on the EPA data (Table 8-4) the background PM_{10} concentration in the region of the Proposed RBSF Component in 2017 is estimated to be 18 µg/m^3.

[12] *Annual average limit value - 40 µg/m3 (EU Council Directive 2008/50/EC & SI No. 180 of 2011). 1-hour limit value - 200 µg/m3 as a 99.8th%ile, i.e. not to be exceeded >18 times per year (EU Council Directive 2008/50/EC & SI No.180 of 2011).*

Table 8-4: Trends in Trends in Zone A Air Quality - PM10

Station	Averaging Period[13]	Year				
		2012	2013	2014	2015	2016
Rathmines	Annual Mean PM_{10} (µg/m^3)	14	17	14	15	15
	24-hr Mean > 50 µg/m^3 (days)	2	8	3	5	3
Ballyfermot	Annual Mean PM_{10} (µg/m^3)	-	12	11	12	11
	24-hr Mean > 50 µg/m^3 (days)	-	2	2	3	0
Blanchardstown	Annual Mean PM_{10} (µg/m^3)	-	20	18	17	18
	24-hr Mean > 50 µg/m^3 (days)	-	11	5	9	2
Dún Laoghaire	Annual Mean PM_{10} (µg/m^3)	12	17	14	13	13
	24-hr Mean > 50 µg/m^3 (days)	1	5	2	3	0
Tallaght	Annual Mean PM_{10} (µg/m^3)	-	17	15	14	14
	24-hr Mean > 50 µg/m^3 (days)	-	5	2	4	0
Davitt Road	Annual Mean PM_{10} (µg/m^3)	-	13	13	13	14
	24-hr Mean > 50 µg/m^3 (days)	-	1	1	6	2

Continuous $PM_{2.5}$ monitoring carried out at the Zone A locations of Rathmines and Marino showed average levels of $PM_{2.5}$ to be between 7 - 11 µg/m^3 over the 2012 - 2016 period. There is no data available for other stations. The annual average level measured in Rathmines, the only site which has PM_{10} measurements to allow the ratio to be calculated, in 2016 and 2015 was 10 µg/m^3, with an average $PM_{2.5}/PM_{10}$ ratio of 0.67. The annual average level measured in 2014 was 9 µg/m^3, with an average $PM_{2.5}/PM_{10}$ ratio of 0.64. Based on this information, a ratio of 0.66 was used to generate a background $PM_{2.5}$ concentration in the region of the Proposed RBSF Component in 2017 of 11.9 µg/m^3.

In terms of benzene, the annual mean concentration in the Zone A monitoring location of Rathmines for 2016 was 1.01 µg/m^3. This is well below the limit value of 5 µg/m^3. Between 2012 - 2016 annual mean concentrations at Zone A sites ranged from 0.94 - 1.2 µg/m^3. Based on this EPA data the background benzene concentration at the Proposed RBSF Component in 2017 is estimated to be 1 µg/m^3.

With regard to CO, annual averages at the Zone A, city centre locations of Winetavern St. and Coleraine St. are low, peaking at 5% of the limit value (10 mg/m^3) (EPA, 2017c) in 2016. Over the period 2012 - 2016, CO annual average levels have ranged from 0 - 0.5 mg/m^3. Based on this EPA data, the background CO concentration in the region of the Proposed RBSF Component in 2017 is estimated to be 0.5 mg/m^3, this is considered to be a conservative estimate as the Proposed RBSF Component is a significant distance from the city centre.

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[13] *Annual average limit value - 40 µg/m3 (EU Council Directive 2008/50/EC & SI No. 180 of 2011). 24-hour limit value - 50 µg/m3 as a 90.4th%ile, i.e. not to be exceeded >35 times per year (EU Council Directive 1999/30/EC & SI No. 180 of 2011).*

8.4 Characteristics of the RBSF Component of the Proposed GDD Project

The Proposed RBSF Component is located in the Newtown, Dublin 11, adjacent to the R135. The site is approximately 11.0 ha in area and the development will comprise of two large warehouse-style storage buildings for the biosolids material, as well as an administrative building.

Construction dust is likely to be the major source of air quality impacts as a result of the Proposed RBSF Component and thus is the main focus of this assessment. Significant climatic impacts are unlikely as a result of the Proposed RBSF Component.

8.5 Potential Impacts

8.5.1 Do-nothing Impacts

The Do-nothing scenario would involve retention of the site as it is at present with no construction works taking place. In this scenario, ambient air quality at the site will remain as per the baseline and will change in accordance with trends within the wider area (including influences from any potential new developments in the surrounding areas, changes in road traffic, etc).

8.5.2 Construction Phase

8.5.2.1 Air Quality

It is important to note that the potential impacts associated with the construction phase of the Proposed RBSF Component are short term and temporary in nature. Construction dust has the potential to cause local impacts through dust nuisance at the nearest sensitive receptors. Construction activities such as excavation, earth moving and backfilling may generate quantities of dust, particularly in dry and windy weather conditions. While dust from construction activities tends to be deposited within 200 m of a construction site, the majority of the deposition occurs within the first 50 m. The extent of any dust generation depends on the nature of the dust (soils, peat, sands, gravels, silts etc.) and the nature of the construction activity. In addition, the potential for dust dispersion and deposition depends on local meteorological factors such as rainfall, wind speed and wind direction. Vehicles transporting material to and from the site also have the potential to cause dust generation along the selected haul routes from the construction area.

Sensitivity of the Receiving Environment

Dust Soiling

There are 3 residential properties (receptors[14] P01, P02, P03) which will be located less than 50 m from the Proposed RBSF Component and 2 commercial properties (receptors P04, P05) along the R135 which will be within 300 m of the Proposed RBSF Component. Residential properties are considered to be high sensitivity receptors to dust soiling, while commercial premises are considered medium sensitivity. Based on the IAQM criteria outlined in Table 8-5, the worst-case sensitivity of the area to dust soiling is considered to be **low**.

[14] *Refer to Volume 4, section 3.3.1 Population for details of receptors in the vicinity of the Proposed RBSF Component site.*

Table 8-5: Sensitivity of the Area to Dust Soiling Effects on People and Property

Receptor Sensitivity	Number of Receptors	Distance from source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Human Health Impacts

In addition to sensitivity to dust soiling, the IAQM guidelines also outline the assessment criteria for determining the sensitivity of the area to health effects due to an increased exposure to PM_{10}. The criteria take into consideration the current annual mean PM_{10} concentration, receptor sensitivity based on type (residential receptors are classified as high sensitivity) and the number of receptors affected within various distance bands from the construction works. A worst case scenario of the current annual mean PM_{10} concentration, based on monitoring data from EPA sites discussed in section 8.3.2.1, in the vicinity of the Proposed RBSF Component is estimated to be 18 µg/m^3 and there are 3 high sensitivity receptors located less than 50 m from the proposed construction works and 2 medium sensitivity receptors within 200 m of the Proposed RBSF Component. Based on the IAQM criteria outlined in Table 8-6, the worst-case sensitivity of the area to human health effects due to an increased exposure to PM_{10} is considered to be **low**.

Table 8-6: Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number of Receptors	Distance from source (m)			
			<20	<50	<100	<200
High	< 24 µg/m^3	>100	Medium	Low	Low	Low
		10-100	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Medium	< 24 µg/m^3	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Low	< 24 µg/m^3	>1	Low	Low	Low	Low

Potential Dust Emission Magnitude

In order to determine the level of dust mitigation required during the construction of the Proposed RBSF Component, the potential dust emission magnitude for each dust generating activity has been determined. The major dust generating activities are divided into four types within the IAQM guidance to reflect their different potential impacts. These are:

- Demolition;
- Earthworks;
- Construction; and
- Trackout (movement of heavy vehicles).

Demolition

The dust emission magnitude from the proposed demolition activities on site can be classified as small, medium or large based on the definitions from the IAQM guidance as set out below:

Large: Total building volume >50,000 m^3, potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >20 m above ground level;

Medium: Total building volume 20,000 m^3 - 50,000 m^3, potentially dusty construction material, demolition activities 10-20 m above ground level; and

Small: Total building volume less than 20,000 m^3.

The dust emission magnitude of the demolition activities can be classified as small as the total building volume to be demolished is less than 20,000 m^3.

The sensitivity of the area is combined with the dust emission magnitude for each dust generating activity to define the risk of dust impacts in the absence of mitigation. As outlined in Table 8-7, this results in an overall **negligible risk** of temporary dust soiling impacts and temporary human health impacts as a result of the proposed demolition activities.

Table 8-7: Risk of Dust Impacts - Demolition

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

Earthworks

Earthworks will primarily involve excavating material, loading and unloading of materials, tipping and stockpiling activities. Activities such as levelling the site and landscaping works are also considered under this category. The dust emission magnitude from earthworks is classified as small, medium or large based on the definitions from the IAQM guidance as set out below:

Large: Total site area > 10,000 m^2, potentially dusty soil type (e.g. clay which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds > 8 m in height, total material moved >100,000 tonnes;

Medium: Total site area 2,500 m^2 - 10,000 m^2, moderately dusty soil type (e.g. silt), 5 - 10 heavy earth moving vehicles active at any one time, formation of bunds 4 - 8 m in height, total material moved 20,000 - 100,000 tonnes; and

Small: Total site area < 2,500 m^2, soil type with large grain size (e.g. sand), < 5 heavy earth moving vehicles active at any one time, formation of bunds < 4 m in height, total material moved < 20,000 tonnes, earthworks during wetter months.

The dust emission magnitude for the proposed earthwork activities for the Proposed RBSF Component is classified as large given that the total site area will be greater than 10,000 m^2.

The sensitivity of the area is combined with the dust emission magnitude for each dust generating activity to define the risk of dust impacts in the absence of mitigation. As outlined in Table 8-8, this results in an overall **low risk** of temporary dust soiling impacts and temporary human health impacts as a result of the proposed earthworks activities.

Table 8-8: Risk of Dust Impacts - Earthworks

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Construction

Factors which determine the potential dust emission magnitude associated with the construction works are; the size of the building or infrastructure, method of construction, materials and duration of the build. The magnitude of dust emissions from construction is classified as small, medium or large based on the definitions from the IAQM guidance as transcribed below:

Large: Total building volume > 100,000 m^3, on-site concrete batching, sandblasting;

Medium: Total building volume 25,000 m^3 - 100,000 m^3, potentially dusty construction material (e.g. concrete), on-site concrete batching; and

Small: Total building volume < 25,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber).

The potential worst-case dust emission magnitude as a result of the construction of the Proposed RBSF Component is classified as large on the basis that the total building volume will be greater than 100,000 m^3, however it should be noted that there is unlikely to be any sandblasting occurring on site.

The sensitivity of the area is combined with the dust emission magnitude for each dust generating activity to define the risk of dust impacts in the absence of mitigation. As outlined in Table 8-9, this results in an overall **low risk** of temporary dust soiling impacts and temporary human health impacts as a result of the proposed construction activities.

Table 8-9: Risk of Dust Impacts - Construction

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Trackout

Factors which determine the dust emission magnitude are vehicle size, vehicle speed, number of vehicles, road surface material and duration of movement. Dust emission magnitude from trackout can be classified as small, medium or large based on the definitions from the IAQM guidance as transcribed below:

Large: > 50 HGV (> 3.5 t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length > 100 m;

Medium: 10 - 50 HGV (> 3.5 t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 - 100 m; and

Small: < 10 HGV (> 3.5 t) outward movements in any one day, surface material with low potential for dust release, unpaved road length < 50 m.

The worst-case scenario of the magnitude of the potential dust emission impact from trackout is considered to be large, however it should be noted that it is unlikely that this volume of HGVs will be present on site in any one day. This over-estimation gives a worst-case scenario.

The sensitivity of the area is combined with the dust emission magnitude for each dust generating activity to define the risk of dust impacts as a result of trackout in the absence of mitigation. As outlined in Table 8-10, this results in an overall **Low** risk of temporary dust soiling impacts and temporary human health impacts as a result of the proposed trackout activities.

Table 8-10: Risk of Dust Impacts - Trackout

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

8.5.2.2 Summary of Potential Dust Impacts – Construction Phase

The risk of dust impacts as a result of the Proposed RBSF Component are summarised in Table 8-11 for each activity. The magnitude of risk determined is used to prescribe the level of site specific mitigation required for each activity in order to prevent significant impacts occurring.

Table 8-11: Summary of Dust Impact Risk used to Define Site-Specific Mitigation

Potential Impact	Dust Emission Magnitude			
	Demolition	Earthworks	Construction	Trackout
Dust Soiling	Negligible Risk	Low Risk	Low Risk	Low Risk
Human Health Effects	Negligible Risk	Low Risk	Low Risk	Low Risk

8.5.2.3 Climate

Construction traffic would be expected to be the dominant source of greenhouse gas emissions as a result of the Proposed RBSF Component. Construction vehicles and machinery will give rise to CO_2 and N_2O emissions during the construction of the Proposed RBSF Component. Based on the small number of construction vehicles and equipment anticipated to be required during construction and the temporary nature of the construction activities, the potential impact on climate from the Proposed RBSF Component is considered to be temporary and imperceptible.

The impact of the construction phase of the Proposed RBSF Component on climate has been estimated using the UK Environment Agency's Carbon Calculator (Version 3.6, 2014). The carbon calculator measures the greenhouse gas impacts of construction activities (in terms of CO_2eq) by calculating the embodied CO_2eq of material plus the CO_2eq associated with their transportation. The model can also consider personnel travel, site energy use and waste management. The estimated GHG emissions associated with the Proposed RBSF Component are outlined in Table 8-12.

Table 8-12: Greenhouse Gas Emissions Associated with the Proposed RBSF Component

Sub-Totals	Tonnage of Materials	CO_2eq / tonne	CO_2eq (Tonnes)	%
Quarried Material	10,000	0.005	50.0	2%
Timber	4	0.31	1.2	0%
Concrete, Mortars and Cement	15,000	0.11	1605.0	51%
Metals	870	1.46	1270.2	40%
Plastics	0	3.31	0.0	0%
Glass	0	0.91	0.0	0%
Miscellaneous	0	n/a	0.0	0%
Finishings, coatings and adhesives	0	2.91	0.0	0%
Plant and equipment emissions	0	n/a	0.0	0%
Waste Removal	0	n/a	0.0	0%
Portable site accommodation	n/a	n/a	0.0	0%
Material transport	n/a	n/a	159.6	5%
Personnel travel	n/a	1,049 kgCO_2eq/week	75.5	2%
Total	25,874	n/a	3,162	100%

As shown in Table 8-12, the major source of GHG emissions associated with the construction phase of the Proposed RBSF Component is the use of concrete, equating to approximately 51% of the total anticipated emissions. Other sources include metals, quarried materials and timber material emissions. The GHG emissions produced during the construction phase of the Proposed RBSF Component are expected to account for 0.00075% of Ireland's EU 2020 target and therefore the impacts on climate are considered to be long-term, imperceptible and not significant.

8.5.3 Operational Phase

8.5.3.1 Air Quality

The additional traffic associated with the Proposed RBSF Component in the operational phase is below the threshold requiring a quantitative assessment. Therefore, the potential impact of the traffic emissions associated with the operational phase of the Proposed RBSF Component on ambient air quality is deemed to be imperceptible.

The biofert material to be stored within the facility has a high potential for dust emissions. As a result, there is the potential for operational dust emissions to impact air quality. A number of mitigation measures outlined in the mitigation section will be implemented to avoid any significant operational stage dust impacts to nearby sensitive receptors.

It is envisaged that trackout of material will be the greatest source of dust emissions which have the potential to impact the nearby sensitive receptors. Using the criteria outlined for trackout above (see Section 8.5.1), the dust emission magnitude can be classified as **large** as during peak periods there will be greater than 50 HGVs leaving site, however, all roads will be paved. This results in a **Low Risk** of dust soiling or human health impacts as a result of trackout from the site.

8.5.3.2 Climate

Operational traffic will give rise to greenhouse gas emissions with the potential to impact Climate. However, as the increased traffic flows are below the criteria requiring a quantitative air quality assessment set out in section 8.2.1, they will not be of a great enough magnitude to cause a significant impact to Climate. It can therefore be expected that any potential impacts to Climate as a result of the Proposed RBSF Component will be long-term and imperceptible, it is therefore, not considered significant.

Climate change can result in increased rainfall which can lead to flooding events. The site has been designed to mitigate the potential impacts from flooding. A flood risk assessment for the Proposed RBSF Component is submitted with the planning application.

8.6 Mitigation Measures

In order to sufficiently mitigate the likely air quality or climate impacts, a schedule of air control measures have been formulated for both the construction and operational phases of the Proposed RBSF Component.

8.6.1 Construction Phase

8.6.1.1 Air Quality

The greatest potential impact on air quality during the construction phase is from potential dust emissions, $PM_{10}/PM_{2.5}$ emissions and the potential for nuisance dust impacts at nearby sensitive receptors.

In order to ensure that no significant dust impact occurs during the demolition, earthworks, construction or trackout activities on site, a series of mitigation measures associated with a low risk of dust impacts (refer to Table 8-9) will be implemented. These mitigation measures will be incorporated into the CEMP for the site and it is the duty of the principal contractor to ensure they are complied with. These mitigation measures are recommended by the IAQM Guidance. Sensitive receptors which have the potential to be impacted by dust include the small number of residential properties adjacent to the site boundary, and the commercial properties along the R135. Once the dust minimisation measures detailed in the dust minimisation plan in Appendix 8B and summarised below, are implemented, it is anticipated that emissions of dust from construction activities will pose no significant impact at nearby receptors.

- The name and contact details of a person to contact regarding air quality and dust issues shall be displayed on the site boundary, this notice board should also include head/regional office contact details;
- A complaints register will be kept on site detailing all telephone calls and letters of complaint received in connection with construction activities, together with details of any remedial actions carried out;

- Where feasible, hoarding/screening will be erected around site boundaries to reduce visual impact. This will also have an added benefit of preventing larger dust particles from impacting on nearby sensitive receptors;
- Hard surface roads, within the site and for approximately 500m from the site entrance, will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic. Any road that has the potential to give rise to dust emissions will be regularly watered, as appropriate, during dry and/or windy conditions;
- Vehicles using site roads will have their speed restricted, and this speed restriction must be enforced rigidly. On any un-surfaced site road, this will be 20 kph, and on hard surfaced roads as site management dictates;
- Vehicles delivering material with dust potential (soil, aggregates) will be enclosed or covered with tarpaulin at all times to restrict the escape of dust;
- Public roads outside the site will be regularly inspected for cleanliness, and cleaned as necessary; and
- Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods.

At all times, these procedures will be strictly monitored and assessed by the contractor. In the event of dust impacts occurring outside the Proposed RBSF Component site boundary, movements of materials likely to raise dust would be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction activities.

8.6.1.2 Climate

Construction traffic and embodied energy of construction materials are expected to be the dominant source of greenhouse gas emissions as a result of the construction phase of the Proposed RBSF Component. Embodied energy is defined as the energy consumed by all of the processes associated with the production of a building, from the mining and processing of natural resources to manufacturing, transport and product delivery. Construction vehicles, generators etc., may give rise to some CO_2 and N_2O emissions. However, due to the short-term and temporary nature of these works, the impact on Climate will not be significant.

However, some site-specific mitigation measures can be implemented during the construction phase of the Proposed RBSF Component to ensure emissions are reduced further. In particular, vehicles on-site, including delivery vehicles, will be prevented from leaving engines idling, even over short periods. Waste of materials due to poor timing or over ordering on site will be minimised. This will minimise the embodied carbon footprint of the site.

8.6.2 Operational Phase

8.6.2.1 Air Quality

There is the potential for operational stage dust emissions as a result of the storage of the biofert material. A series of measures will be introduced to reduce the risk of dust impacts occurring off site:

- All processes such as loading and unloading of trucks, will occur within sealed buildings, doors will remain closed at all times apart from when trucks are entering and exiting the building;
- Trucks will be completely covered to avoid the escape of any dusty material when being transported to / from site;

- In normal operations, operatives will remain within the air-conditioned cabs of their vehicles. If pedestrian access to or egress from buildings is necessary, it will be provided through self-closing pedestrian doors in order to minimise the potential dust impact to staff or site personnel and the escape of dust from buildings; and
- Windows of truck or machinery cabs must remain closed at all times when within the buildings to avoid dust impacts to site personnel.

If deemed necessary and a high level of fugitive dust is resulting from trackout from site, a wheel wash facility will be established before exiting the site to remove any material that may have adhered to truck wheels while passing through the storage building.

8.6.2.2 Climate

The impact of the Proposed RBSF Component on climate will be imperceptible. Thus, no site-specific mitigation measures are required.

8.7 Residual Impacts

8.7.1 Construction Phase

If the mitigation measures specified in Appendix 8B are implemented, it is anticipated that emissions of dust from the construction activities on site will be insignificant and will not pose a nuisance at nearby receptors.

8.7.2 Operational Phase

There are no residual impacts to Air Quality or Climate envisaged as a result of the operation of the Proposed RBSF Component.

8.7.3 Interactions

Air quality does not have a significant number of interactions with other sections. The most significant interactions are between human beings and air quality. An adverse impact due to air quality in either the construction or operational phase has the potential to cause health and dust nuisance issues. The mitigation measures that will be put in place at the Proposed RBSF Component will ensure that the impact of the development complies with all ambient air quality legislative limits and therefore the predicted impact is temporary and imperceptible with respect to human beings.

The construction and operation of the Proposed RBSF Component will lead to dust emissions to atmosphere which have the potential to impact on sensitive flora, fauna and water. However, mitigation measures implemented on site will ensure that the deposition of dust is minimised and therefore the predicted effect from air (including dust) on flora, fauna and water are neutral for both the construction and operational phase.

With the appropriate mitigation measures in place it is predicted that any interactions on Soil, Geology and Noise are neutral.

8.7.4 Cumulative Impacts

There is the potential for cumulative dust impacts with regard to a number of existing or proposed facilities in the vicinity of the Proposed RBSF Component. The Roadstone, Huntstown Quarry is located less than 200 m from the Proposed RBSF Component's western site boundary and is a prominent source of existing dust levels in the locality. The DEHLG guidance document '*Quarries and Ancillary Activities:*

Guidelines for Planning Authorities' (DEHLG, 2004) applies the TA Luft limit value of 350 mg/m^2/day averaged over a 30-day period at the site boundary of quarries. This limit value is applied at the boundary of the Huntstown Quarry in addition to on-site mitigation measures to avoid nuisance dust impacts at nearby sensitive receptors.

It has been recommended in the Dust Minimisation Plan outlined in Appendix 8B that the TA Luft limit value also be implemented at the site boundary of the Proposed RBSF Component during construction works and monitored using the Bergerhoff method. With this limit value and mitigation measures in place at both the Proposed RBSF Component and Huntstown Quarry, cumulative dust nuisance impacts are not predicted to be an issue.

The Huntstown Power Station is located approximately 100 m to the south of the Proposed RBSF Component site boundary. This type of development does not have any form of significant dust emissions and therefore the cumulative dust impact associated with the Proposed RBSF Component is imperceptible and not considered significant.

Permission has been grated for the development of a Bio-Energy Plant less than 500 m from the Proposed RBSF Component's southern site boundary. If the construction phases of both developments were to overlap, there is the potential for cumulative dust nuisance impacts at the small number of sensitive receptors in the area. However, mitigation measures employed on site to curtail dust emissions should be sufficient in avoiding any significant cumulative dust impacts. Cumulative operational impacts as a result of dust emissions are not envisaged.

In general, the predicted dust deposition levels associated with the Proposed RBSF Component are low and preventative and mitigation measures will be in place accordingly to avoid the escape of dust during both construction and operation. Therefore, the overall cumulative impact with any existing or future developments is not predicted to be significant.

8.8 Monitoring

It is recommended that during the construction phase of the Proposed RBSF Component that monitoring of construction dust deposition should be put in place to ensure dust mitigation measures are controlling emissions. Dust monitoring should be conducted using the Bergerhoff method in accordance with the requirements of the German Standard VDI 2119. The Bergerhoff Gauge consists of a collecting vessel and a stand with a protecting gauge. The collecting vessel is secured to the stand with the opening of the collecting vessel located approximately 2 m above ground level. The TA Luft limit value is 350 mg/(m^2*day) during the monitoring period between 28-32 days.

8.9 Difficulties Encountered

Subsequent to the environmental impact assessment described in this Section, two of the three residential receptors referred to in section 8.5.2.1, were demolished. In February/March 2018, construction work commenced for 6 new housing units in their place. It should be noted that this has no effect on the outcome of the assessment.

8.10 References

BRE, (2003). *Controlling Particles, Vapours & Noise Pollution From Construction Sites.*

Department of the Environment, Heritage and Local Government (DEHLG), (2003). *Strategy to Reduce Emissions of Trans-boundary Pollution by 2010 to Comply with National Emission Ceilings - Discussion Document*.

Department of the Environment, Heritage and Local Government (DEHLG), (2004). *National Programme for Ireland under Article 6 of Directive 2001/81/EC for the Progressive Reduction of National Emissions of Transboundary Pollutants by 2010.*

Department of the Environment, Heritage and Local Government (DEHLG), (2004). *Quarries and Ancillary Activities, Guidelines for Planning Authorities.*

Department of the Environment, Heritage and Local Government (DEHLG), (2007a). *Update and Revision of the National Programme for Ireland under Article 6 of Directive 2001/81/EC for the Progressive Reduction of National Emissions of Transboundary Pollutants by 2010*.

Department of the Environment, Heritage and Local Government (DEHLG), (2010). *Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities*.

Environmental Protection Agency (EPA), (2002). *Guidelines on the Information to be Contained in Environmental Impact Statements.*

Environmental Protection Agency (EPA), (2003). *Advice Notes on the Current Practice in the Preparation of Environmental Impact Statements.*

Environmental Protection Agency (EPA), (2015). *Draft Advice Notes for Preparing Environmental Impact Statements.*

Environmental Protection Agency (EPA), (2017a). *Draft Guidelines on Information to be Contained in Environmental Impact Assessment Reports.*

Environmental Protection Agency (EPA), (2017b). *Air Monitoring Data*. [Online] Available at: http://www.epa.ie/air/quality/monitor/.

Environmental Protection Agency (EPA), (2017c). *Air Quality Monitoring Report 2015 (& previous annual reports 1997-2015).*

ERM, (1998). *Limitation and Reduction of CO_2 and Other Greenhouse Gas Emissions in Ireland. Manchester:* Environmental Resources Management.

European Commission, (2014). *A policy framework for climate and energy in the period from 2020 to 2030.*

European Economic Area, (2012). *NEC Directive Status Reports 2011*.

European Union, (2014). *EU 2030 Climate and Energy Framework.*

Framework Convention on Climate Change, (1997). *Kyoto Protocol To The United Nations Framework Convention On Climate Change.*

Framework Convention on Climate Change, (1999). *Ireland - Report on the in-depth review of the second national communication of Ireland.*

German VDI, (2002) *Technical Guidelines on Air Quality Control – TA Luft.*

IAQM, (2014). *Guidance on the Assessment of Dust from Demolition and Construction.* Institute of Air Quality Management.

The Scottish Office, (1996). *Planning Advice Note PAN50 Annex B: Controlling The Environmental Effects Of Surface Mineral Workings Annex B: The Control of Dust at Surface Mineral Workings*.

Transport Infrastructure Ireland (TII), (2009). *Guidelines for Assessment of Ecological Impacts of National Roads Schemes (Rev. 2).* National Roads Authority.

Transport Infrastructure Ireland (TII), (2011). *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes*. National Roads Authority.

UK DEFRA, (2001). *DMRB Model Validation for the Purposes of Review and Assessment.* U.K. Department for Environment, Food & Rural Affairs.

UK DEFRA, (2011). *Trends in NO_x and NO_2 emissions and ambient measurements in the UK.* U.K. Department for Environment, Food & Rural Affairs.

UK DEFRA, (2016a). *NO_x to NO_2 Conversion Spreadsheet (Version 5.1). U.K. Department for Environment, Food & Rural Affairs.* U.K. Department for Environment, Food & Rural Affairs.

UK DEFRA, (2016b). *Part IV of the Environment Act 1995: Local Air Quality Management, LAQM.TG(16).* U.K. Department for Environment, Food & Rural Affairs.

UK DEFRA, (2016c*). Part IV of the Environment Act 1995: Local Air Quality Management, LAQM. PG(16).* U.K. Department for Environment, Food & Rural Affairs.

UK DETR, (1998). *Preparation of Environmental Statements for Planning Projects That Require Environmental Assessment - A Good Practice Guide, Appendix 8 - Air & Climate.* U.K. Department of the Environment, Transport and the Regions.

UK Highways Agency, (2007). *Design Manual for Roads and Bridges Vol 11 Chapter 3, HA 207/07 (Document & Calculation Spreadsheet).*

UK Highways Agency, (2012). *Interim Advice Note 170/12 Updated air quality advice on the assessment of future NO_x and NO_2 projections for users of DMRB Volume 11, Section 3, Part 1 'Air Quality'.*

USEPA, (1997). *Fugitive Dust Technical Information Document for the Best Available Control Measures.* United States Environmental Protection Agency.

World Health Organisation (WHO), (2006). *Air Quality Guidelines – Global Update 2005 (and previous Air Quality Guideline Reports 1999 & 2000)*.

Section 9: Noise and Vibration

9.1 Introduction

This Section of the EIAR assesses the potential impacts (and resulting effects) likely to occur as a result of the Regional Biosolids Storage Facility (RBSF) component of the Proposed GDD Project and the Proposed Upgrade Project. Hereinafter, this component is referred to "the Proposed RBSF Component". The site of the Proposed RBSF Component is herein referenced to as "the Site".

This Section and assessment have been completed having regard to the guidance outlined in the Environmental Protection Agency documents *Guidelines on the information to be contained in Environmental Impact Assessment Reports* (Draft, August 2017) and *Advice Notes for Preparing Environmental Impact Statements* (Draft, September 2015).

A Glossary of Acoustic Terminology has been prepared and included in Appendix 9A for reference.

9.2 Methodology

In assessing the noise and vibration impacts of the Site, the following methodology has been adopted:

- Characterise the receiving environment at the Site through a series of baseline surveys;
- Determine appropriate criteria for evaluating the significance of noise and vibration impacts through reference to local guidance documents where applicable and international best practice;
- Outline the potential noise and vibration impacts associated with the Site;
- Where necessary specify ameliorative, remedial or reductive (mitigation) measures to control the impacts to be within the adopted criteria; and
- Present the predicted impact of the proposed development including the ameliorative, remedial or reductive (mitigation) measures.

9.2.1 Assessment Criteria - Construction Phase

9.2.1.1 Noise

There is no published statutory Irish guidance relating to the maximum permissible noise level that may be generated during the construction phase of a project. Fingal County Council typically controls construction activities by imposing limits on the hours of operation in planning permissions, considering noise limits at their discretion and referring to British Standard *BS 5228-1:2009+A1:2014 Code of Practice for Noise and Vibration Control On Construction and Open Sites - Noise* for the control of construction noise impacts (*BS 5228-1:2009+A1:2014*).

The approach in this standard calls for the designation of a noise sensitive receptor into a specific category (A, B or C) based on existing ambient noise levels in the absence of construction noise. This then sets a threshold noise value that, if exceeded at this location, indicates that a significant noise impact is associated with the construction activities.

BS 5228-1:2009+A1:2014 sets out guidance on permissible noise levels relative to the existing noise environment. Table 9-1 sets out the values which, when exceeded, signify a significant effect at the facades of residential receptors.

Table 9-1: Example Threshold of Significant Effect at Dwellings

Assessment category and threshold value period (L_{Aeq})	Threshold value, in decibels (dB)		
	Category A[15]	Category B[16]	Category C[17]
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75
Evenings and weekends[18]	55	60	65
Night-time (23:00 to 07:00hrs)	45	50	55

For the appropriate periods (i.e. daytime) the ambient noise level is determined and rounded to the nearest 5 dB. Baseline monitoring carried out as part of this assessment would indicate that Category B values are appropriate in terms of the nearest noise sensitive receptors (see section 9.4.2) being considered in this instance.

Baseline monitoring carried out as part of this assessment (section 9.3.1) would indicate that the categories detailed in Table 9-2 are appropriate in terms of the nearest noise sensitive receptors being considered in this instance (section 9.4.2).

Table 9-2: Rounded Baseline Noise Levels and Associated Categories

Period	Rounded Baseline Noise Level L_{Aeq} (dB)	Category	Suggested Limit
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	B	70
Evening (19:00 to 23:00hrs)	60	C	65
Night time (23:00 to 07:00hrs)	55	C	55

If the construction noise exceeds the appropriate category value, then a significant effect is deemed to occur.

9.2.1.2 Vibration

Vibration standards are generally split into two categories, those dealing with human comfort and those dealing with cosmetic or structural damage to buildings. In both instances, in terms of construction vibration, it is appropriate to consider the magnitude of vibration in terms of Peak Particle Velocity (PPV).

Human Comfort

It is acknowledged that humans are particularly sensitive to vibration stimuli and that any perception of vibration may lead to concern. In the case of road traffic, vibration is perceptible at around 0.5 mm/s

[15] *threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.*

[16] *threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.*

[17] *threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.*

[18] *19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays.*

and may become disturbing or annoying at higher magnitudes. However, higher levels of vibration are typically tolerated for single events or events of short duration during daytime hours.

Cosmetic Damage

Guidance relevant to acceptable vibration within buildings during the construction phase of a development is contained in the following documents:

- British Standard BS 7385-2: 1993 - Evaluation and Measurement for Vibration in Buildings - Guide to Damage Levels from Ground Borne Vibration, (BS 7385-2:1993); and
- British Standard BS 5228-2: 2009+A1:2014 - Code of Practice for Noise and Vibration Control on Construction and Open Sites - Vibration (BS 5228-2: 2009+A1:2014).

BS 7385-2: 1993 states that there should typically be no cosmetic damage if transient vibration does not exceed 15 mm/s at low frequencies rising to 20 mm/s at 15 Hz and 50 mm/s at 40 Hz and above. These guidelines relate to relatively modern buildings and should be reduced to 50% or less for more critical buildings.

BS 5228-2:2009+A1:2014 recommends that, for soundly constructed residential property and similar structures that are generally in good repair, a threshold for minor or cosmetic (i.e. non-structural) damage should be taken as a peak component particle velocity (in frequency range of predominant pulse) of 15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz and 50 mm/s at 40 Hz and above. Below these values minor damage is unlikely. Where continuous vibration is such as to give rise to dynamic magnification due to resonance, the guide values may need to be reduced by up to 50%. BS 5228-2:2009+A1:2014 also comments that important buildings, such as protected structures, which are difficult to repair might require special consideration on a case by case basis.

Table 9-3 presents the vibration criteria to be adopted during construction at nearby soundly constructed residential properties and similar structures that are generally in good repair. These limit values have been selected to avoid cosmetic (i.e. non-structural) damage. Please note that the potential for vibration induced damage is greater at lower frequencies of vibration. Therefore, the limit values proposed are related to the frequency range of the vibration. To put this into context, most building damage from man-made sources (construction, traffic etc.) occurs in the frequency range of 1 Hz to 150 Hz.

Table 9-3: Allowable vibration during construction phase for soundly constructed buildings

Allowable vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration, at a frequency of		
Less than 10 Hz	**10 to 50 Hz**	**50 to 100 Hz (and above)**
15 mm/s	20 mm/s	50 mm/s

Underground Services

Consideration should also be given to the potential for vibration induced damage to underground services nearby. Generally underground structures are less susceptible to damage due to vibration. Notwithstanding this, *BS 5228-2:2009+A1:2014* recommends that in the absence of specific criteria from the statutory undertakers, the following criteria should be applied to underground services:

- Maximum Peak Particle Velocity for intermittent or transient vibrations - 30 mm/s; and
- Maximum Peak Particle Velocity for continuous vibrations - 15 mm/s.

These criteria should be reduced by 30% in the case where dilapidated brick sewers are encountered.

In summary therefore, the following vibration criteria are proposed for the construction phase:

- **Soundly Constructed Buildings**: Vibration limits ref. Table 9-3;
- **Underground Services**: 30 mm/s PPV (intermittent/transient vibration) and 15 mm/s PPV (continuous vibration); and
- **Dilapidated Brick Sewers**: 21 mm/s PPV (intermittent/transient vibration) and 10.5 mm/s PPV (continuous vibration).

9.2.2 Assessment Criteria - Operational Phase

9.2.2.1 Noise

Fingal County Council Development Plan

The site will not require a licence from the Environmental Protection Agency (EPA). As such it is important to acknowledge the policy outlined in the Fingal County Council Development Plan (2017 - 2023) (referred to hereafter as the Development Plan) in relation to noise.

Whilst there is a strong emphasis on aircraft noise within the Development Plan, a number of objectives are outlined in respect of general noise reduction. In the context of the Proposed RBSF Component, the following policy objective is deemed to be relevant:

> ***Objective NP03*** *Require all developments to be designed and operated in a manner that will minimise and contain noise levels.*

It is important to note that whilst the Development Plan itself does not espouse or propose any specific criteria or standards in relation to noise, Fingal County Council typically provide noise limits for industrial and commercial operations with reference to the EPA *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities* (NG4) January 2016.

For reference, the typically applied NG4 limits are as follows:

- Daytime (07:00 to 19:00 hrs) 55 dB $L_{Ar,T}$;
- Evening (19:00 to 23:00 hrs) 50 dB $L_{Ar,T}$; and
- Night-time (23:00 to 07:00 hrs) 45 dB $L_{Aeq,T}$.

In the context of the Proposed RBSF Component and having regard to the prevailing noise environment (section 9.3.2), the NG4 limits are therefore deemed to be applicable.

Building Services Noise

It is also prudent to make reference to British Standard BS 4142:2014 *Methods for Rating and Assessing Industrial and Commercial Sound* (BS 4142:2014).

The BS 4142:2014 standard is considered appropriate guidance for setting appropriate noise levels for new plant items affecting existing residential areas. The document describes a method for assessing the impact of a specific noise source at a specific location with respect to the increase in “background” noise level that the specific noise source generates. The standard provides the following definitions that are pertinent to this application:

Ambient Sound Level, $L_{Aeq,T}$ — Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at any given time, usually

	from many sources near and far, at the assessment location over a given time interval, T.
Residual Sound Level, $L_{Aeq,T}$	Equivalent continuous A-weighted sound pressure level of the residual sound (i.e. ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound) at the assessment location over a given time interval, T.
Specific Sound Level, $L_{Aeq,T}$	Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, Tr.
Rating Level, $L_{Ar,T}$	Specific sound level plus any adjustment for the characteristic features of the sound.
Background Sound Level, $L_{A90,T}$	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels.

In order to establish an initial estimate of impact, BS 4142:2014 states the following:

Obtain an initial estimate of the impact of the specific sound by subtracting the measured background sound level from the rating level, and consider the following.

- Typically, the greater this difference, the greater the magnitude of the impact.
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.

Additional Road Traffic

There are no specific guidelines of limits relating to traffic related sources along the local or surrounding roads. In this instance, in order to assess the potential noise impact from any changes in road traffic, Table 9-4 offers guidance as to the likely impact associated with a particular change in traffic noise level (Highways Agency *Design Manual for Roads and Bridges* HA 213/08).

Table 9-4: Likely Impact Associated with Change in Traffic Noise Level

Change in Sound Level (dB L_{A10})	Subjective Reaction	Impact
< 3	Inaudible	Imperceptible
3 – 5	Perceptible	Slight
6 – 10	Up to a doubling of loudness	Moderate
11 – 15	Over a doubling of loudness	Significant
> 15		Profound

9.2.2.2 Vibration

No significant sources of vibration are expected to arise during the operational phase of the Proposed RBSF Component. Operational vibration has therefore been scoped out from further assessment in this Section.

9.3 Existing Environment

9.3.1 Baseline Noise Survey

An environmental noise survey was conducted in order to quantify the existing noise environment. The survey was conducted in general accordance with ISO 1996-2:2017 *Acoustics - Description, Measurement and Assessment of Environmental Noise - Determination of Sound Pressure Levels*. Specific details are set out below.

9.3.1.1 Measurement Locations

Three measurement locations were selected; each is described in turn below and illustrated on Figure 9-1.

- Location S01 is located south of the Site on the R135 in the vicinity of the Dogs Trust;
- Location S02 is located north of the Site on the R135 in the vicinity of the nearest noise sensitive receptor to the north (R03); and,
- Location USL01 is located on the south-eastern boundary of the Site adjacent the nearest noise sensitive receptor (R02) to the south.

Figure 9-1: Baseline Noise Survey Locations

9.3.1.2 Survey Periods

Noise measurements were conducted at Locations S01, S02 and USL01 over the following periods:

- S01 and S02: 15:00 to 16:54 hrs 14 November 2017; and
- USL01: 14:47 hrs on 20 November 2017 to 13:47 hrs on 24 November 2017

The measurements periods were selected in order to provide a typical snapshot of the existing noise climate, with the primary purpose being to ensure that the proposed noise criteria associated with the Proposed RBSF Component are commensurate with the prevailing environment.

9.3.1.3 Personnel and Instrumentation

Aoife Kelly (AWN) performed the measurements during the survey periods at S01 and S02. Measurements were made using a Brüel & Kjær Type 2250 Sound Level Meter. Ronan Murphy (AWN) installed and removed the unattended meter at USL01. Measurements were made using an NTi Audio XL-2 TA Sound Level Meter.

9.3.1.4 Procedure

Measurements were conducted at Locations S01 and S02 on a cyclical basis. Sample periods for the noise measurements were nominally 15 minutes during all survey periods. The results were noted onto a Survey Record Sheet immediately following each sample and were also saved to the instrument memory for later analysis where appropriate. Survey personnel noted all primary noise sources contributing to noise build-up.

Sample periods for the unattended noise measurements were nominally 1-minute duration. Sound recording was enabled on the sound level meter to assist post surveying data processing.

9.3.1.5 Weather

The weather during the attended survey period was dry and calm with temperatures of 13 °C and winds of 1 to 3 m/s.

The weather during the unattended survey period varied with temperatures ranging from 0 to 11 °C and winds falling between 1 and 8 m/s.

9.3.1.6 Measurement Parameters

The noise survey results are presented in terms of the following parameters:

L_{Aeq} is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period.

L_{A10} is the sound level that is exceeded for 10% of the sample period. It is typically used as a descriptor for traffic noise.

L_{A90} is the sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise.

The "A" suffix denotes the fact that the sound levels have been "A-weighted" in order to account for the non-linear nature of human hearing. All sound levels in this report are expressed in terms of decibels (dB) relative to $2x10^{-5}$ Pa.

9.3.2 Results and Discussion

The survey results of the baseline survey are summarised in Table 9-5 to Table 9-7**.**

9.3.2.1 Survey Location S01

Table 9-5: Survey Results - Survey Location S01

Time	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)		
	L_{Aeq}	L_{A10}	L_{A90}
15:00 - 15:15	68	71	55
15:40 - 15:55	65	69	54
16:19 - 16:34	65	69	54

During the daytime survey period, the dominant intermittent noise source influencing the ambient noise level was intermittent aircraft overhead and road traffic on the R135 and the N2. Background noise levels were dominated by distant road traffic. Daytime ambient noise levels of the order of 65 to 68 dB $L_{Aeq,15min}$ whilst background noise levels ranged between 54 to 55 dB $L_{A90,15min}$.

9.3.2.2 Survey Location S02

Table 9-6: Survey Results - Survey Location S02

Time	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)		
	L_{Aeq}	L_{A10}	L_{A90}
15:21 - 15:36	69	74	59
16:00 - 16:15	72	73	60
16:39 - 16:54	67	70	60

During the daytime survey period, the dominant intermittent noise source influencing the ambient noise level was intermittent aircraft overhead and road traffic on the R135 and the N2. Background noise levels were dominated by distant road traffic. Daytime ambient noise levels of the order of 69 to 72 dB $L_{Aeq,15min}$ whilst background noise levels ranged between 59 to 60 dB $L_{A90,15min}$.

9.3.2.3 Survey Location USL01

Table 9-7: Survey Results - Survey Location S03

Time	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)		
	L_{Aeq}	L_{A10}	L_{A90}
Day (07:00 to 19:00hrs)	65	68	59
Evening (19:00 to 23:00hrs)	60	65	52
Night (23:00 to 07:00hrs)	57	60	47

During the daytime survey period, the dominant intermittent noise source influencing the was intermittent aircraft overhead and road traffic on the R135 and the N2. Background noise levels were deemed to be influenced by distance road traffic from the N2 and M50 road networks.

9.3.3 Nearest Noise Sensitive Receptors

In the first instance, it is important to identify the receptors located in the vicinity of the Proposed RBSF Component site that may be sensitive to noise.

The nearest noise sensitive receptors consist primarily of detached dwelling houses. The nearest noise sensitive receptor (R02) is located approximately 5 metres from the south-eastern boundary. Subsequent to the environmental impact assessment described in this Section, receptor R01 was demolished. In February/March 2018, construction work commenced for 6 new housing units in their place. It should be noted that this has no effect on the outcome of the assessment. The next nearest noise sensitive receptors are located approximately 280 metres north of the Site boundary on the opposite side of the N2. For reference, the noise sensitive receptors have been illustrated in Figure 9-2.

Figure 9-2: Noise Sensitive Receptors

For reference, the nearest noise sensitive receptors to the Proposed RBSF Component have been referenced and indicated on Figure 9-3.

Figure 9-3: Nearest Noise Sensitive Receptors

9.4 Characteristics of the RBSF Component of the Proposed GDD Project

9.4.1.1 Construction Phase - Noise

During the construction phase of the Proposed RBSF Component, it is possible that a variety of plant items may be required including but not limited to excavators, lifting equipment, dumper trucks, compressors and generators. Due to the nature of daytime activities undertaken on a construction site of this nature, there is potential for generation of significant levels of noise. The flow of vehicular traffic to and from a construction site is also a potential source of noise levels.

9.4.1.2 Construction Phase - Vibration

It is expected that due to the potential activities required during the construction phase as well as the distance between the primary construction work location and the nearest noise sensitive receptor (R02), the impact of vibration during the construction phase of the Proposed RBSF Component will be insignificant and has not been addressed further within the EIAR.

The potential cumulative vibration impact of the Proposed RBSF Component and the nearby quarry are discussed in section 9.7.3.

9.4.1.3 Operation Phase - Noise

During the operational phase, it is anticipated that noise will arise from vehicular activity onsite, handling of material within the warehouse and from building services plant required to maintain the buildings under negative pressure.

9.5 Potential Impacts

When considering a development of this nature, the potential noise and vibration impact on the surroundings must be considered for each of two distinct stages:

- Construction phase, and;
- Operational phase.

The construction phase will involve excavation of the Site and the erection of onsite structures over a phased period. The primary sources of noise are expected to arise from onsite construction works and increased additional traffic on public roads. It is anticipated that construction activity has the potential to give rise to short term negative impacts. The significance of impacts arising during the construction phase has been discussed further in section 9.5.2.

The primary sources of outward noise in the operational context are deemed long term and will involve building services plant, material handling as well as vehicular movement onsite and on public roads. Noise during the operational phase has the potential to give rise to long-term negative impacts. The significance of impacts arising during the operational phase of the Proposed RBSF Component has been discussed further in section 9.5.3.

9.5.1 Do-Nothing Impacts

The site is in a location that is incident to high levels of noise from both road and aircraft traffic. In a "Do-Nothing" scenario, considering the projected do-nothing traffic volumes, noise levels in the vicinity of the nearest noise sensitive receptor (R02 as per Section 9.4.2) would be expected to increase. Revised flight arrangements at Dublin Airport could also have an effect, however, there is insufficient information available to determine this accurately.

9.5.2 Construction Phase

It is predicted that the construction programme will create typical construction related noise on site. During the construction phase of the Proposed RBSF Component, a variety of items of plant will be in use, such as excavators, lifting equipment, dumper trucks, compressors and generators. It is understood that the construction programme will be temporary in duration and not more than 12 months for the first phase and 9 months for the construction stage of the second building (refer to Volume 2, Section 3.4.4 for further details).

Due to the nature of daytime activities undertaken on a construction site of this nature, there is potential for generation of significant levels of noise. The flow of vehicular traffic to and from a construction site is also a potential source of noise levels.

The potential for vibration at neighbouring sensitive receptors during construction is typically limited to excavation works, piling and the movement of heavy vehicles on uneven road surfaces. Due to the depth of rock over the Site, rock breaking will not be required for site preparation. In consideration of the nature of the proposed construction works and the distance between the Site and the nearest sensitive receptor, the levels of vibration arising at the nearest sensitive receptor are expected to be imperceptible. Vibration arising on onsite construction activity has therefore not been considered further.

The proposed general construction hours are 07:00 to 18:00 hrs, Monday to Friday and 08:00 to 14:00 hrs on Saturdays in accordance with standard working hours.

9.5.2.1 Construction Noise

Site Activity

While as is typical at this stage of a development that the construction programme has been established in outline form only, such that it is difficult to determine, accurately, the specific magnitude of noise emissions from site and compound related construction activity, it is possible nevertheless to present a scenario based on worst case noise levels using guidance set out in *BS 5228-1:2009+A1:2014*. Table 9-8 outlines typical plant items and associated noise levels that are anticipated for various phases of the construction programme.

Table 9-8: Typical Noise Levels Associated with Construction Plant Items

Phase	Item of Plant (*BS 5228-1:2009+A1:2014 Ref.*)	Construction Noise Level at 10m Distance (dB $L_{Aeq(1hour)}$)
Site Preparation	Pneumatic Breaker (D2.2)	81
	Wheeled Loader Lorry (D3 1)	75
	Track Excavator (C2 22)	72
	Dump Truck (C4.2)	78
Foundations	Large Rotary Bored Piling Rig – Cast In-Situ (C3.14)	83
	Tracked Excavator (C3.24)	74
	Concrete Pump (C3.25)	78

Phase	Item of Plant (*BS 5228-1:2009+A1:2014 Ref.*)	Construction Noise Level at 10m Distance (dB $L_{Aeq(1hour)}$)
	Compressor (D7 6)	77
	Poker Vibrator (C4 33)	78
Shed Construction	Mobile Telescopic Crane 100 tonne (C4.41)	71
	Telescopic Handler 4 tonne (C.4.54)	70
	Articulated lorry (C11.10)	77
General Construction	Hand tools	81
	Pneumatic Circular Saw (D7.79)	75

For the purposes of the assessment we have assumed that standard good practice measures for the control of noise from construction sites will be implemented. These issues are commented upon in further detail in the mitigation section of this assessment. Table 9-9 presents the potential noise levels arising at the nearest noise sensitive receptor (R02) during the construction phase. Note, construction noise sources are assumed to be running 66% of the time. This % is estimated as the average percentage on-time from estimates of the time that construction plant will be operating at full power, over the course of a typical working day (Ref BS 5228-1:2009+A1:2014, Figure F5) and is based on our experience of other similar sites. A correction of 10 dB has been assumed for screening provided by the existing earth berm running along the south-eastern boundary of the Site. This barrier screening estimation is based on the guidance outlined in Annex F.2.2 of BS 5228-1:2009+A1:2014.

Table 9-9: Construction Noise Impact at Nearest Noise Sensitive Receptor (R02)

Phase	Predicted Construction Noise Level $L_{Aeq(1hour)}$ (dB)	Construction Noise Criteria $L_{Aeq(1hour)}$ (dB)					
		Daytime (07:00 – 19:00) And Saturdays (07:00 – 13:00)		Evening (19:00 to 23:00hrs)		Night time (23:00 to 07:00hrs)	
		Criteria	Complies?	Criteria	Complies?	Criteria	Complies?
Site Preparation	64	70	✓	65	✓	55	✓
Foundations	62		✓		✓		✓
Framework	55		✓		✓		✓
Fitout	58		✓		✓		✓

The predicted construction noise levels are within the relevant noise criteria over the construction phase.

There are no items of plant that would be expected to give rise to noise levels that would be considered out of the ordinary or in exceedance of the levels outlined. The impact on the noise environment due to construction activities will be transient in nature and mitigation measures specified in Section 9.5 below will be implemented to minimise the impact of construction activities on the noise environment.

Additional Construction Traffic on Public Roads

In addition to construction activity on the Site, the noise impact of additional traffic on the local road network due to the construction activity must also be addressed. Access to the Proposed RBSF

Component site for construction traffic will be via the R135. The nearest noise sensitive receptor (R02, shown on Figure 9-3) to the proposed haul routes are the dwellings located immediately southeast of the Site, located approximately 30 metres from the nearest roadside. The noise impact on these locations associated with construction traffic is assessed in the following paragraphs.

The noise level associated with an event of short duration, such as a passing vehicle movement, may be expressed in terms of its Sound Exposure Level (L_{AX}). The Sound Exposure Level can be used to calculate the contribution of an event or series of events to the overall noise level in a given period.

The appropriate formula is given below.

$$L_{Aeq,T} = L_{AX} + 10\log10(N) - 10\log10(T) + 20\log10(r_1/r_2)dB$$

where:

$L_{Aeq,T}$ is the equivalent continuous sound level over the time period T (in seconds);

L_{AX} is the “A-weighted” Sound Exposure Level of the event considered (dB);

N is the number of events over the course of time period T;

r_1 is the distance at which L_{AX} is expressed; and

r_2 is the distance to the assessment location.

The mean Sound Exposure Level for a heavy goods vehicle (HGV) moving at low to moderate speeds (i.e. 15 to 45 km/hr) is in the order of 82 dB L_{AX} at a distance of 5 metres from the vehicle. Similarly, the mean Sound Exposure Level for a car moving at low to moderate speeds (i.e. 15 to 45 km/hr) is in the order of 67 dB L_{AX} at a distance of 5 metres from the vehicle. These figures are based on a series of measurements conducted under controlled conditions.

The following one-way peak hourly construction traffic volumes are expected to be generated during the construction stage:

- 3 trucks arriving and departing; and
- Arrival/departure of 30 staff vehicles.

Assuming the worst case of 10 HGV’s and 30 cars/LGVs per hour, the worst case predicted noise level at the nearest receptor to the southeast (R02, shown on Figure 9-3) would be expected to fall in the region of 40 dB $L_{Aeq,\ 1hour}$. In consideration of the fact that the prevailing ambient noise level during the daytime is dominated by traffic and falls in the region of 65 dB $L_{Aeq,16hour,}$ the level of construction traffic noise will be significantly below the prevailing measured daytime noise levels.

As no construction activity will occur during the evening or night time periods, the impacts of construction related traffic on public roads can therefore be regarded as insignificant.

9.5.2.2 Construction Vibration

Vibration Generated by HGVs on Public Road

Once an adequate road surface is maintained on the haul road, the level of vibration expected to be generated by unladen or laden HGVs would be expected to be very low. Therefore, once a smooth and level road surface is maintained, the levels of vibration likely to be generated in close proximity to the proposed haul roads would be expected to be significantly below the 15 mm/s PPV recommended for the prevention of cosmetic damage to buildings.

Therefore, the impact of vibration arising from construction traffic is expected to be insignificant.

9.5.3 Operational Phase

The primary sources of outward noise in the operational context are deemed to be long term in nature and will involve:

- Building Services Plant;
- Material Handling (unloading, loading and movement of biosolids);
- Vehicular Activity within the Site; and
- Additional Vehicular Traffic on Public Roads.

9.5.3.1 Operational Noise

Building Services Plant

In order to control odour, the storage buildings will be maintained under negative pressure. Plant items typically required for this type of facility include blower fans which will be located externally in a dedicated plant area. Small pumps may also be required.

While the plant area has been located to optimise acoustic screening offered by the buildings themselves, it is acknowledged that the fans required have the potential to generate elevated levels of noise in the vicinity of the nearest noise sensitive receptor (R02). The plant area located between the two storage buildings, shown on drawing Y17702-PL-004, provided in Volume 5, Part B.

At this stage, as is usual, specific details of the plant items are not available. In order to ensure that no impacts arise during operation, it will be necessary that all plant items are designed so as to not generate a cumulative noise level (i.e. from all site plant items) in excess of 40 dB $L_{Aeq,T}$ at the nearest noise sensitive receptor (R02, shown on Figure 9-3).

Mitigation measures have been discussed in section 9.6.2.

Material Handling

The nature of the Proposed RBSF Component will be such that the handling of biosolids material within the dedicated bays will be a frequent activity. In addition to noise and reversing sirens, a significant potential noise generated from such operation includes the scraping and impact of the loader bucket against the concrete slab or loading bays. Whilst the building envelope will offer some reduction in levels from this activity, it is expected that some breakout of noise will arise.

Mitigation in respect of reducing the potential for such operations to give rise to excessive noise levels offsite has been outlined in section 9.6.2.

Vehicular Activity within the Site

Movement of vehicles onsite has the potential to give rise to elevated levels of noise whilst manoeuvring into and out of the warehouses. It is noted that the one-way traffic arrangement within the Proposed RBSF Component site is such that the level of noise incident to the nearest noise sensitive receptor (R02) will be reduced.

It is envisaged that peak hourly movement within the Site would be 18 no. HGV's and 10 no. cars/LGV's per hour, as modelled by the Traffic Specialist in the 2040 scenario. Taking into account that the proximity of the onsite road network to the nearest noise sensitive receptor (R02 shown on Figure 9-3) falls in the region of 35 metres, the predicted level of noise arising from onsite vehicular movement would be expected to fall in the region of 34 dB $L_{Aeq,1hour}$ using the formula outlined in section 9.4.3.

Additional Vehicular Traffic on Public Roads

For the purposes of assessing potential noise impact, it is appropriate to consider the relative increase in noise level associated with traffic movements on existing roads and junctions with and without the Proposed RBSF Component using the provided Annual Average Daily Traffic figures. Table 9-10 and Table 9-11 present the Do-Nothing, i.e. without the Proposed RBSF Component, and the Do-Something, i.e. with the Proposed RBSF Component, traffic figures and associated change in noise level for the surrounding road network.

Table 9-10: Summary of Change in Noise Level Due to Traffic R135

Year	Opening Year Traffic Volume (Annual Average Daily Traffic)		Increase in Noise Level (dBA)
	Do-Nothing	Do-Something	
2021	5,965	6,057	<1
2025	6,378	6,470	<1
2040	7,522	7,614	<1

Table 9-11: Summary of Change in Noise Level Due to Traffic N2

Year	Opening Year Traffic Volume (Annual Average Daily Traffic)		Increase in Noise Level (dBA)
	Do-Nothing	Do-Something	
2021	42,111	42,283	<1
2025	44,688	44,860	<1
2040	50,732	50,904	<1

In summary, the predicted increase in noise levels along all of the junctions assessed due to additional vehicular traffic associated with the Proposed RBSF Component is less than 1 dB, which can be regarded as imperceptible. The associated noise impact is therefore deemed to be insignificant.

9.5.3.2 Operational Vibration

As previously discussed, the Proposed RBSF Component will not contain any significant sources of vibration during the operational phase. As such, no impacts are expected to occur.

9.6 Mitigation Measures

9.6.1 Construction Phase

Construction activities will be required to comply with the following noise limits (see Table 9-12), measured at the nearest noise sensitive receptor:

Table 9-12: Construction Noise Limits

Period	Rounded Baseline Noise Level L_{Aeq} (dB)	Category	Suggested Limit
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	B	70
Evening (19:00 to 23:00hrs)	60	C	65
Night time (23:00 to 07:00hrs)	55	C	55

Construction activities will be required to comply with the following vibration limits (see Table 9-13), measured at the nearest noise sensitive receptor:

Table 9-13: Allowable vibration during construction phase for soundly constructed buildings

Allowable vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration, at a frequency of		
Less than 10Hz	10 to 50Hz	50 to 100Hz (and above)
15 mm/s	20 mm/s	50 mm/s

In addition, construction activities will be required to ensure that vibration in the vicinity of underground services does not exceed the following:

- Maximum Peak Particle Velocity for intermittent or transient vibrations - 30 mm/s; and
- Maximum Peak Particle Velocity for continuous vibrations - 15 mm/s.

The impact assessment conducted for the construction activity during the construction phase has highlighted that the predicted construction noise levels will be within the relevant noise emission criteria. Nevertheless, it will be a requirement for the contractor to employ and implement best practice construction noise and vibration management techniques throughout the construction phase in order to further reduce the noise and vibration impact to nearby noise sensitive receptors.

In the first instance, the Contractor will compile a Noise and Vibration Management Plan (NVMP) which will deal specifically with management processes and strategic mitigation measures to remove or reduce significant noise and vibration impacts, and cumulative noise and vibration impacts from the construction works. The NVMP will define noise and vibration monitoring and reporting. The NVMP will also include method statements for each phase of the works, the associated specific measures to minimise noise and vibration in so far as is reasonably practicable for the specific works covered by each plan and a detailed appraisal of the resultant construction noise and vibration generated.

The contractor will be required to provide proactive community relations and will notify the public and noise and vibration sensitive receptors (R01 to R04 shown on Figure 9-3) before the commencement of any works forecast to generate appreciable levels of noise or vibration, explaining the nature and duration of the works.

The contractor will distribute information circulars informing people of the progress of works and any likely periods of significant noise and vibration.

The BS 5228 standard includes guidance on several aspects of construction site mitigation measures, including, but not limited to:

- Selection of quiet plant;
- Control of noise sources;
- Screening;
- Hours of work;
- Liaison with the public; and
- Monitoring.

Detailed comment is provided on these items in Appendix 9B. Noise control measures that will be considered include the selection of quiet plant, enclosures and screens around noise sources, limiting the hours of work and noise monitoring. The Construction Environmental Management Plan (CEMP) will described how mitigation and monitoring measures will be delivered. An Outline CEMP is provided in Appendix 17A.

9.6.2 Operational Phase

During the operational phase, noise arising from the Proposed RBSF Component will be required to achieve the following limits, when measured at the nearest noise sensitive receptor:

- Daytime (07:00 to 19:00 hrs) 55 dB $L_{Ar,T}$;
- Evening (19:00 to 23:00 hrs) 50 dB $L_{Ar,T}$; and
- Night-time (23:00 to 07:00 hrs) 45 dB $L_{Aeq,T}$.

9.6.2.1 Building Services Plant

Noise from onsite will be minimised through the selection of "low noise" equipment where required as well as the incorporation of appropriate attenuation in the form of:

- Acoustic enclosures for fans;
- Provision of attenuators for fan intake's; and
- Use of acoustic rated doors on all plant rooms or enclosures.

Plant items will be specified and designed to ensure that the cumulative plant noise levels from the Site do not exceed 40 dB $L_{Aeq,T}$ at the nearest noise sensitive receptor (R02).

9.6.2.2 Material handling

The following mitigation measures will be taken to reduce noise levels arising from the handling of material within the buildings:

- Loaders to be specified with white noise reversing sirens;
- Impact protection will be provided to reduce noise generated by impact with loading bays; and
- Loader operators to be advised on appropriate operation of loader to reduce impact noise or scraping.

9.6.2.3 Vehicular Activity within the Site

The following mitigation measures will be taken to reduce noise levels arising from the vehicular activity in and around the Proposed RBSF Component site:

- The design of the Site is such that reversing should not be required in open areas, drivers should be requested to adhere onsite traffic arrangements to avoid the use of reverse sirens;
- A speed limit of 20 km/h shall be applicable to all vehicles traversing the Site;
- Vehicles shall not be permitted to loiter on or near the south-eastern corner of the Site;

- Under no circumstances are air brakes to be used by vehicles onsite; and
- Vehicle horns should not be sounded whilst onsite, except in the event of an emergency.

9.6.2.4 Additional Vehicular Traffic on Public Roads

The noise impact assessment outlined previously has demonstrated that mitigation measures are not required.

9.7 Residual Impacts

9.7.1 Construction Phase

In so far as the mitigation measures are applied in full, the level of residual noise generated from the Proposed RBSF Component site during the construction phase would be expected to fall within the appropriate limits.

As the predicted impacts to the environment are slight in the short term, the cumulative impacts from simultaneous construction of the Proposed RBSF Component site and any external developments in the immediate vicinity of the Site are also expected to fall within appropriate limits.

A description of the likely effects is summarised in Table 9-14 for the nearest noise sensitive locations:

Table 9-14: Description of Expected Construction Phase Effects

Quality	Significance	Duration
Negative	Moderate Effects	Short-term

9.7.2 Operational Phase

In so far as the mitigation measures are applied in full, the level of residual noise generated from the Proposed RBSF Component during the operational phase would be expected to fall within the appropriate limits. A description of the likely effects is summarised in Table 9-15 for the nearest noise sensitive locations:

Table 9-15: Description of Expected Operational Phase Effects

Quality	Significance	Duration
Neutral	Slight	Long-term

9.7.3 Interactions

In preparing the EIAR Noise and Vibration impact assessment, AWN made interactions with a number of team members including Traffic (Section 13), Biodiversity - Terrestrial (Section 6) and Population and Human Health (Section 3).

9.7.4 Cumulative Impacts

The potential cumulative noise and/or vibration impact of the Proposed RBSF Component site and nearby Roadstone Huntstown quarry has been considered. The quarry operates under an EPA Waste Licence (ref. W0277-01). Schedule B.3 of Roadstone's Waste Licence provides noise limits for the operation of the quarry as follows:

- Daytime (07:00 to 19:00 hrs) 55 dB $L_{Ar,T}$;
- Evening (19:00 to 23:00 hrs) 50 dB $L_{Ar,T}$; and

- Night-time (23:00 to 07:00 hrs) 45 dB $L_{Aeq,T}$.

These limits are the same as those proposed for the Proposed RBSF Component site (i.e. section 9.2.2.1). The noise criteria for operational phase of the Proposed RBSF Component has been derived with consideration of, and with influence from, baseline noise levels in the area, during which the quarry was operational. Therefore, the noise limits proposed for the Proposed RBSF Component's operational phase have considered potential cumulative noise levels and potential significant cumulative noise impacts are not expected.

The construction phase vibration limits proposed have been selected to ensure that building damage does not occur. Monitoring of vibration during the construction phase will ensure that vibration, either from the Proposed RBSF Component site, or cumulative including any vibration generated due to quarry activities, will not exceed the prescribed limits. Potential significant cumulative vibration impacts are therefore not expected.

9.8 Monitoring

It is recommended that the appointed contractor monitor levels of noise and vibration at nearby sensitive locations and/or Proposed RBSF Component site boundaries during the construction phase.

In operational context of the Site, noise levels should be monitored at commissioning stage following the assessment methodology outlined in the EPA *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities* (NG4).

Feedback, during public consultation, suggested that monitoring be carried out at Newtown Cottages, which is approximately 1 km to the northeast of the Site. In accordance with the guidance document mentioned above, this location is not considered appropriate as a monitoring location (i.e. closest receptors are generally chosen as monitoring locations).

9.9 Difficulties Encountered

There were no difficulties encountered during the environmental assessment of Noise and Vibration.

9.10 References

The British Standards Institution, (2014). *British Standard - Methods for Rating and Assessing Industrial and Commercial Sound (BS4142:2014).*

The British Standards Institution, (2014). *British Standard BS 7385: 1993: Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration*.

The British Standards Institution, (2014). *BS 5228:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise.*

The British Standards Institution, (2014). *BS 5228:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Vibration*.

The British Standards Institution, (2014). *BS8233:2014 Guidance on sound insulation and noise reduction for buildings*

Ministry of Business, Innovation & Employment, (1999). *DIN 4150-3 (1999-02) Structural Vibration - Effects of Vibration on Structures*.

Dublin City Council, (2013). *Dublin Agglomeration Environmental Noise Action Plan (2013 - 2018).*

Dublin City Council, (2016). *Dublin City Development Plan 2016-2022*.

Environmental Protection Agency (EPA), (2017). *Draft Guidelines on Information to be Contained in Environmental Impact Assessment Reports.*

Environmental Protection Agency (EPA), (2016). *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4).*

Environmental Protection Agency (EPA), (2015). *Advice Notes for Preparing Environmental Impact Statements*.

Highways England Company Limited, Transport Scotland, The Welsh Government and The Department for Regional Development (Northern Ireland), (2017). *Design Manual for Roads and Bridges (DMRB)*.

International Organisation for Standardization, (1996). *ISO 1996: 2017: Acoustics – Description, measurement and assessment of environmental noise.*

International Organisation for Standardization, (1996). *ISO 9613-2:1996 Acoustics - Attenuation of Sound during Propagation Outdoors - General Method of Calculation.*

Transport Infrastructure Ireland (TII), (2014). *Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes.*

Transport Infrastructure Ireland (TII), (2014). *Guidelines for the Treatment of Noise and Vibration in National Road Schemes.*

World Health Organization (WHO), (1999). *Guidelines for Community Noise.*

Section 10: Odour

10.1 Introduction

This Section of the EIAR assesses the potential impacts (and resulting effects) likely to occur as a result of the Regional Biosolids Storage Facility (RBSF) component of the Proposed GDD Project and the Proposed Upgrade Project regarding odour. Hereinafter, this component is referred to "the Proposed RBSF Component". The site of Proposed RBSF Component is herein referenced to as "the Site".

This Section and assessment have been completed having regard to the guidance outlined in the Environmental Protection Agency documents *Guidelines on the information to be contained in Environmental Impact Assessment Reports* (Draft, August 2017) and *Advice Notes for Preparing Environmental Impact Statements* (Draft, September 2015).

The 2017 Irish Water RBSF Scoping Report, stated in Section 5.9.2 that:

"The storage of biosolids has the potential to generate emissions of odour. There is a possibility of an odour annoyance where receptors are located in the vicinity of a proposed storage facility. As a consequence, odour is identified as a likely significant impact, which needs to be assessed."

This assessment considers in detail the impacts of the Proposed RBSF Component at Newtown, Dublin 11 using dispersion modelling assessment tools.

10.2 Methodology

This Section outlines the methodology used to assess the odour impact of the Proposed RBSF Component. The assessment process was conducted in line with EPA guidelines on the preparation of EIAR and includes; a review of relevant topic specific legislation and guidance, selection of odour assessment criteria, a description of the dispersion model and the selected methodology. Assessment assumptions and calculation of odour emission rates used in the modelling study are also presented.

10.2.1 Legislation

The legislative context and policies which are applicable to the Proposed RBSF Component, as are relevant to odour emissions and management, are described below.

10.2.1.1 Environmental Protection Agency Act 1992 (as amended 2003)

The requirement to consider the potential impacts of odour is defined in the Environmental Protection Agency Act 1992 (as amended 2003), referred to herein as 'the Act'. The Act states that:

"4 (1) In this Act 'environmental protection', includes -

a) *the prevention, limitation, elimination, abatement or reduction of environmental pollution, and*
b) *the preservation of the quality of the environment as a whole.*

(2) In this Act 'environmental pollution' means the direct or indirect *introduction to an environmental medium, as a result of human activity, of substances, heat or noise which may be harmful to human health or the quality of the environment, result in damage to material property, or impair or interfere with amenities and other legitimate uses of the environment […]*

[…](c) in relation to waste, the holding, transport, recovery or disposal of waste in a manner which would, to a significant extent, endanger human health or harm the environment and, in particular-

> *ix) (create a risk to the atmosphere, waters, land, plants or animals,*
> *x) create a nuisance through noise, odours or litter, or*
> *xi) adversely affect the countryside or places of special interest […]"*

The Act does not specifically define what constitutes a "nuisance" in relation to odour.

10.2.1.2 Statutory Instrument 32/2010

SI 32/2010 - Waste Management (Registration of Sewage Sludge Facility) Regulations 2010 define the requirements for operators to sewage sludge facilities. With regard to environmental protection, including odour, the Regulations state that:

"*8. The local authority shall attach to each certificate of registration issued by it pursuant to Regulation 7(1) or Regulation 9(3), as the case may be, such conditions as it deems necessary to give effect to the provisions of the Community Act specified in Regulation 2, and ensure the protection of the environment and shall in any case include the following, as appropriate:*

> *1. requirements concerning the types and quantities of sludges to be stored or treated,*
> *2. requirements concerning a dedicated area for reception of sludges and facility entry and exit,*
> *3. requirements concerning control of odours and the covering of tankers in the sludge reception area,*
> *4. requirements concerning the washing of vehicles,*
> *5. requirements concerning the integrity of all storage tanks or storage bays and their maintenance and checking by a certified expert at reasonable intervals,*
> *6. requirements concerning the maintenance of adequate records including sludge imports and exports, origin and destination locations, waste collection contractors,*
> *7. requirements concerning the avoidance of environmental pollution."*

These requirements have been considered as part of the Proposed RBSF Component design and will be demonstrated in the necessary application for a certificate of registration to operate the RBSF with the local authority, subject to planning permission being obtained.

10.2.2 Guidance

10.2.2.1 EPA - Air Dispersion Modelling from Industrial Installations Guidance Note (AG4)[19]

Although intended as guidance for Environmental Protection Agency (EPA) licensed industrial installations, the Environmental Protection Agency (2010) AG4 Guidance (AG4 Guidance) provides a structure for assessing potential air quality impacts using dispersion modelling. Section 6.9 and Appendix I (of AG4) provides specific guidance on assessment of odour impacts including suggestions for appropriate odour criteria. The AG4 Guidance provides a framework for selection of the appropriate

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[19] *Environmental Protection Agency -Air Dispersion Modelling Guidance from Industrial Installations, Guidance Note AG4, 2010 (http://www.epa.ie/pubs/advice/air/emissions/airdispersionmodellingfromindustrialinstallationsguidancenoteag4.html)*

assessment tool, meteorological data site, source building and terrain data and consideration of input data sensitivity. The AG4 Guidance does provide some information on odour criteria used overseas but does not suggest a specific criterion which is applicable for studies in Ireland.

This odour assessment has followed the principles and suggestions of the AG4 Guidance document.

10.2.3 Selection of Odour Criteria

Currently there is no defined statutory odour standard in Ireland which is applied universally in either planning applications or within the Integrated Pollution Control regulations. This assessment has therefore sought to apply an appropriate odour assessment level in order to quantify the magnitude and likely significance of odour impacts, by reference to the AG4 Guidance.

The AG4 Guidance references the UK Environmental Permitting Regulations guidance (H4 Guidance)[20] and approaches defined in New Zealand. These approaches all use the European Odour Unit (ou_E) as a unit of assessing odour concentrations and include a time-based criterion over which the odour should be assessed. Appendix I of AG4 states that overseas regulations identify that a significant odour impact could occur when magnitudes of between 1 and 10 $ou_E.m^{-3}$ are predicted using a specific time-based compliance criteria.

The AG4 Guidance identifies that the odour magnitude criterion for international environmental permitting regimes are based on the relative offensiveness of the emitted odour. The UK Environmental Permitting Regulations (EPR) regime, defined in the Environment Agency's H4 Odour Management guidance document (H4 Guidance), applies a set of benchmark odour criteria for the most offensive (1.5 $ou_E.m^{-3}$), moderately offensive (3.0 $ou_E.m^{-3}$) and least offensive (6.0 $ou_E.m^{-3}$) sources of odours. Examples of the offensive classifications are also provided in this guidance, however they do not specifically include benchmark criteria for processed (as opposed to raw, untreated or septic) biosolids storage sites.

The time-based criteria are described in terms of a percentile compliance value which effectively allows a defined number of hourly exceedances of the unitary standard. The AG4 Guidance notes case studies which have a time-based compliance of between the 98th (175 hours per year) to 99.9th (9 hours per year) percentile, which reflect that a duration of exposure is required before an impact is likely to cause annoyance. In Ireland, it is common practice to use the 98th percentile assessment criterion for planning assessments.

On the basis of the H4 Guidance, this assessment considers that odours from the RBSF are likely to fall within the "Moderately Offensive" group. This is based on the classification examples in the H4 Guidance, where the "Most Offensive" sources are attributed to septic effluent or sludge (interpreted as raw or untreated sludge), and hedonic tone analysis of samples taken from fresh biosolids from the Ringsend WwTP.

The material to be stored at the RBSF is a treated, de-watered and stable fertiliser product which is distinct from raw, unprocessed and potentially septic sludges classified as "Most Offensive" in the H4

[20] *Environment Agency, H4 Odour Management - How to comply with your environmental permit, 2011 (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/296737/geho0411btqm-e-e.pdf)*

Guidance, such that "Moderately Offensive" is a reasonable classification, and 3.0 $ou_E.m^{-3}$ is the appropriate benchmark criteria.

Hedonic tone analysis of both types of biosolids (biocake and biofert) (samples taken from Ringsend WwTP) was conducted by a UKAS accredited laboratory (Silsoe Odours Ltd.) using the internationally accepted VDI 3882 Olfactometry; determination of Hedonic Odour Tone guidelines. The results from odour sampling of these Ringsend biosolids in August 2016 and June 2017 suggested that, at concentrations likely to occur in the outdoor environment (less than 5 $ou_E.m^{-3}$), the hedonic score was approximately -2 for both types of biosolid, on the +4 to -4 scale. This hedonic score corresponds to an 'unpleasant' classification as opposed to the 'highly unpleasant' classification attributed to a score of -4. These samples were taken from fresh biosolids material. Anecdotal experience is such that as the material ages, the moisture content will further reduce and the material becomes increasing stable. As a result, the odour emission and level of offensiveness will further decrease (i.e. become less offensive with time).

The following odour annoyance criterion has been adopted for this assessment:

- 3 $ou_E.m^{-3}$ as the 98th percentile of hourly averages at sensitive receptor locations identified at 10.2.6 below.

To aid evaluation of local impacts, the assessment has also presented odour concentration at the Proposed RBSF Component site boundary and as contour (isopleth) maps however, these are presented for information purposes only.

10.2.4 Odour Dispersion Modelling

10.2.4.1 Odour Dispersion Model

The assessment used the United States Environmental Protection Agency (US EPA) AERMOD model, version 16216, an advanced dispersion model based on the Gaussian theory of plume dispersion. It is widely used in Ireland and overseas for regulatory and assessment purposes and is cited in the AG4 Guidance as an applicable modelling tool for the assessment of odour. Atmospheric dispersion is determined by input data (meteorological data, building dimensions, local terrain/topography considerations, receptor location and source pollutant release parameters) to calculate ground level odour concentrations at the Proposed RBSF Component boundary and across a selected receptor grid network.

10.2.4.2 Meteorological Data

Long term conditions at the study area were represented by hourly sequential meteorological data from the Dublin Airport meteorological station for the years 2011 - 2015 and were considered within this dispersion modelling assessment. This meteorological station is the closest recording station to the Proposed RBSF Component and is located approximately 2 km to the east of the Proposed RBSF Component. It represents an area with few complex topographical features and data are considered to be representative of the Proposed RBSF Component location. The second closest recording station, Casement Aerodrome, is located 15 km to the southwest of the Proposed RBSF Component site. This site was considered less representative as it is located further from the Site, located further inland and adjacent to more complex terrain features and was therefore discounted from use in this assessment. Wind roses for the five assessment years are provided in Figure 10-1.

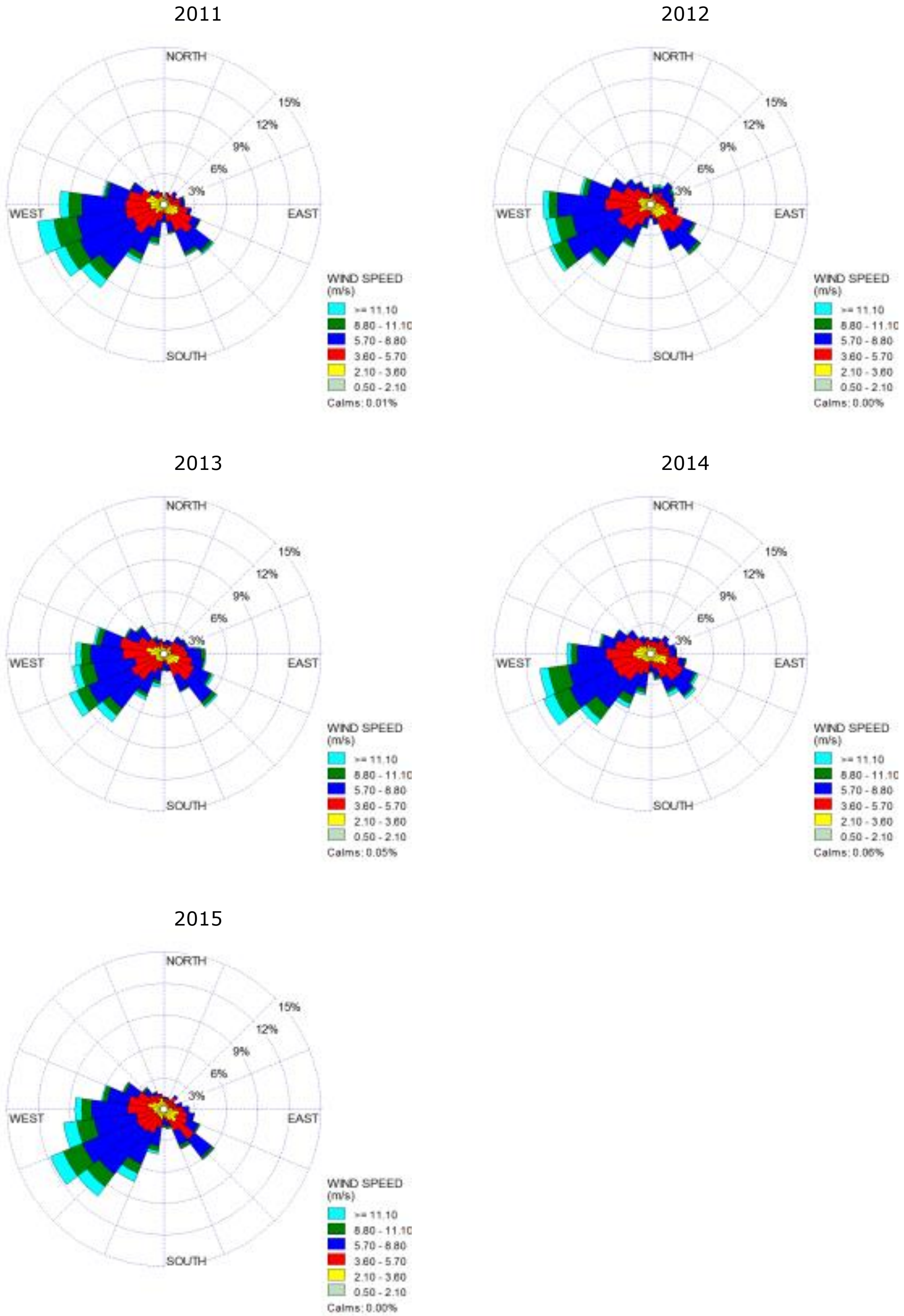


Figure 10-1: Wind Roses for Dublin Airport Meteorological Station (2011-2015)

The meteorological data were processed using the AERMET software to make their interaction with the land surface representative of the area in the vicinity of the Proposed RBSF Component. The land use profile was classified as 'cultivated land' and was attributed a surface roughness of 0.3 m.

The highest predicted odour concentration from the five individually assessed meteorological datasets (2011 - 2015) was used to represent odour conditions at each specifically assessed receptor location identified in section 10.2.6. The assessment conclusions were based upon the odour contour that gave rise to the highest concentration at a relevant receptor location. Contours for all assessment years are presented in Appendix 10A.

10.2.4.3 Treatment of Buildings

Atmospheric dispersion tools can consider the influence of buildings and structures on dispersion within a modelled domain. The AERMOD model uses the Building Profile Input Program (BPIP) building downwash program which considers the impact of early grounding of dispersion plumes from stack sources.

The AERMOD dispersion model incorporates downwash analysis upon point sources where they are located within the Structure Influence Zone (SIZ). The BPIP program assesses downwash influences where a building is located 5 L downwind or 2 L upwind of a point source (L being the lesser of the building height or projected building width).

The assessment evaluated whether there were buildings in the vicinity of assessed emission sources that could affect plume downwash on emitted plumes. The only buildings which would be within the SIZ were the two proposed RBSF buildings, at a height of 13.5 m. All building input data is detailed in Table 10-1.

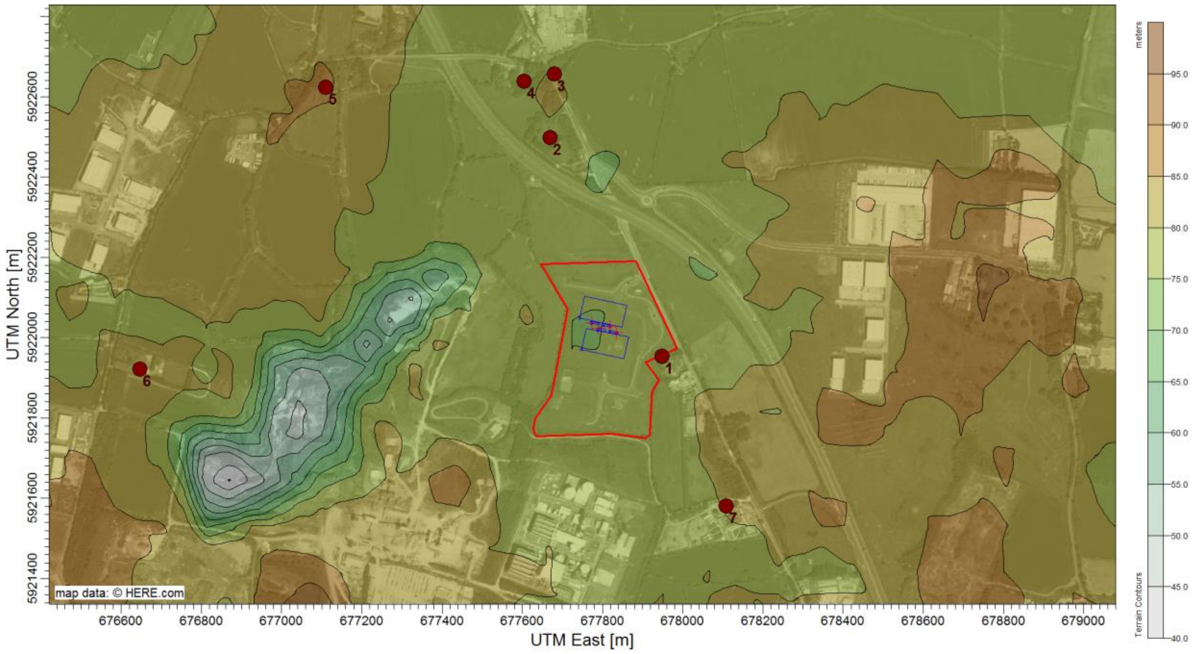
Table 10-1: Buildings Considered within the Dispersion Model

Building name	Height	X length	Y length	Coordinate (UTM)	
	(m)	(m)	(m)	X	Y
RBSF - Building 1	13.5	108	55	677743.5	5922048.8
RBSF - Building 2	13.5	108	55	677747.9	5921970.0
OCU Housing 1	3.5	5	20	677788.8	5922019.0
OCU Housing 2	3.5	5	20	677800.1	5922030.0
OCU Housing 3	3.5	5	20	677816.3	5922013.5
OCU Housing 4	3.5	5	20	677772.2	5922036.5

10.2.4.4 Terrain Data and Surface Parameters

To represent the influence of terrain elevations on odour dispersion, a digital elevation file was used in the AERMOD model setup. Shuttle Radar Topography Mission (SRTM1) elevation data was extrapolated from the WebGIS website and incorporated into the modelling assessment. This dataset provides terrain data at a resolution of 30 m from satellite data released in stages from 2013. This dataset is considered to be more recent and at a higher resolution than standard OS topographical survey data.

For both the receptors and grid points, the recommended Lakes Inverse Distance interpolation was used. This function interpolates the neighbouring points using inverse distance to obtain the elevation at the desired point. The terrain data was applied to an area, as a minimum, extending 2.5 km from the Proposed RBSF Component site in all directions, which is in excess of the study area size considered in Section 10.2.6. A visualisation of terrain within the study area is provided in Figure 10-2.



map data: © HERE.com

Figure 10-2: Terrain Data Considered Within the Study Area

10.2.5 Scenarios Considered within the Assessment

The assessment considered the following scenarios:

- With Proposed RBSF Component Scenario - Future development scenario after implementation of the Proposed RBSF Component.

It is assumed that, as there are no other identified similar odour sources within 2 km of the Site, background odour levels are negligible.

10.2.6 Selection of Receptor Locations

The assessment has evaluated the significance of impacts using an odour impact assessment criterion at both specific receptors and the Site boundary. Use of a boundary standard often represents a conservative position where the concentration predicted at the site boundary is used as a proxy for all off-site locations irrespective of whether there is public exposure at these locations. On occasions, the maximum ground level concentration is predicted at a location distanced from the site boundary, a consideration which is often linked to plume grounding from elevated emission points. As such, it is considered robust to assess concentrations at areas of relevant public exposure (i.e. specific discrete receptor locations) and present contours (isopleths) of predicted odour concentrations in the wider study area.

The modelling assessment considered two receptor networks in order to quantify the impact of the Proposed RBSF Component. These are:

- A site boundary network for comparison to the site-specific odour condition at a minimum resolution of 10 m; and
- A 2 km polar receptor grid centred upon the site, at a resolution of 25 m.

Seven specific discrete receptors were also selected to represent the position of sensitive receptors in the vicinity of the Proposed RBSF Component. The selected locations are identified in Table 10-2 and shown in Figure 10-3.

Table 10-2: Selected Discrete Receptor locations

Building name	Receptor Type	Proximity to RBSF Boundary	Coordinate (UTM) X	Coordinate (UTM) Y
R1 - Property on R135	Residential	<5 m to the southeast	677947.7	5921953
R2 - Property on R135	Residential	315 m to the north	677668.8	5922499
R3 - Property on R135	Residential	475 m to the north	677679.8	5922657
R4 - Property on R135	Residential	450 m to the north	677604.1	5922639
R5 - Property on Kilshane Road	Residential	700 m to the northwest	677109.7	5922624
R6 - Property on Kilshane Road	Residential	1,000 m to the west	676646.6	5921923
R7 - Dogs Trust Ireland, R135	Non-Residential	250 m to the southeast	678108.8	5921580

These locations represent the closest areas of existing or potential future long-term public exposure, likely to have sensitivity to odour. Odour impacts at other receptors within the study area are likely to be less than at the specified discrete receptor locations. Concentrations at any location within the study area can however be assessed by evaluation of the presented odour contour plots.

Areas of long-term residential use (housing, hospitals and care homes) are considered to be high risk areas due to likely high receptor sensitivity to odour and potential for long-term duration of exposure (i.e. an individual member of the public is expected to be present in a residential location for a significant proportion of a year, a time period comparable to the odour assessment criteria).

Other areas, where only short-term individual public exposure is expected (hotels, parks, leisure areas), may be equally sensitive to odour but the temporary or infrequent duration of use is likely to reduce the overall odour annoyance of a nearby odour source. Areas used for commercial, industrial and port uses in the vicinity of the Proposed RBSF Component are also unlikely to be considered as highly sensitive receptor locations. This is due to the low frequency and short duration of public use and a reduced loss of amenity, compared to residential uses, if impacted by odour.

map data: © HERE.com

Figure 10-3: Sensitive Receptors included in the Dispersion Model

10.2.7 Calculation of Emission rates

Odour emission quantification was based upon the Proposed RBSF Component design specification and expected odour mitigation performance provided by the selected supplier of the odour abatement equipment (Anua Clean Air International). The following outline specifications are part of the proposed design:

- Four proposed Odour Control Units (OCU), two for each of the two RBSF storage buildings;
- Odour treatment technology (likely to be a biological system) achieving a manufacturer specified outlet odour concentration, at all times, of no greater than 500 $ou_E.m^{-3}$;
- Each odour control unit has a minimum volumetric flow rate of 35,000m^3 per hour (9.722 $m^3.s^{-1}$);
- Fresh air is provided to central areas of the building at a rate of 31,500m^3 per hour (8.750 $m^3.s^{-1}$);
- Stack height of 17.5 m (approximately 4 m above the modelled building ridge height); and,
- Air velocity to be no less than 15 $m.s^{-1}$ (achieved by a stack tip diameter not exceeding 0.9 m).

Based on the above design, each odour control unit is predicted to emit at an odour emission rate no greater than 4,861 $ou_E.s^{-1}$ (i.e. 500 $ou_E.m^{-3}$ multiplied by 9.72 $m^3.s^{-1}$), a total site emission of 19,444 $ou_E.s^{-1}$ (for all four OCU).

The assessment has assumed that fugitive emissions from the Proposed RBSF Component will be minimised by implementation of the proposed mitigation and adherence to a robust odour management plan, both described in section 10.6. As such, the dispersion model has not included consideration of any releases other than those associated with the internal odour control system.

10.3 Existing Environment

10.3.1 Historical and Current Odour Baseline Situation

The Proposed RBSF Component is located in a predominantly agricultural area, parts of which are utilised for industrial purposes. The assessment has however not identified any existing sources of industrial odour pollution and there is no known history of odour complaints within 1 km of the Proposed RBSF Component site boundary. There are construction waste handling facilities further afield, Greenstar Materials and Panda Waste which are located approximately 1.5 km and 1.8 km to the south-west of the RBSF structures. It is expected that due to the separation distances, the identified waste facilities are unlikely to affect baseline odour conditions in areas near the Proposed RBSF Component where receptors are located.

As such it is considered that the current odour baseline situation is odour free.

10.4 Characteristics of the RBSF Component of the Proposed GDD Project

The RBSF component of the Proposed GDD Project will involve development of two storage buildings and associated infrastructure located in the northern part of the Site. Haulage vehicles bringing biosolids to and from the storage facility will access the buildings from the eastern end and will exit from the western end. Fast closing entry and exit doors for vehicles will be located at each end of each building. Separate doors will be provided for pedestrian access. The vehicles will tip biosolids inside the buildings during operation and a loader will move the biosolids to nearest storage bay, also inside. All haulage vehicles will be covered.

An odour control system will be provided to ensure that odour does not give rise to any nuisance beyond the boundary of the Proposed RBSF Component. The system will involve extracting air from within the storage buildings on a continuous basis. Fans located outside, between the storage buildings, will draw air though ducting to an outside odour control unit comprising an organic filer media to remove odour. The treated air will be emitted to the atmosphere through vertical stacks which will extend to a height of approximately 3 m above the roof level of the storage buildings. Each building will be split into two zones, which can be operated independently. This results in a total of four separate stacks. The indicative location of the stacks of shown in Drawing Y17702-PL-022, provided in Volume 5, Part B.

10.5 Potential Impacts

The potential impact of the Proposed RBSF Component was assessed by predicting the increase in odour concentrations at the Site boundary, specifically defined areas of relevant public exposure and at all off site locations within 2 km of the Proposed RBSF Component. The assessment considered the proposed design of the RBSF and incorporated all sources where an odour emission to the atmosphere is likely to occur.

10.5.1 Do-nothing Impacts

Baseline odour conditions would remain unchanged compared to existing levels without implementation of the Proposed RBSF Component.

10.5.2 Construction Phase

Biosolids material will not be stored at the Proposed RBSF Component until construction of the structures and odour control mitigation is completed. As such, there are likely to be no expected odour emissions during the construction phase of the development. All potential odour effects are limited to the operational phase or Post-Development Scenario.

10.5.3 Operational Phase

Predicted odour concentrations after implementation of the Proposed RBSF Component are detailed in Table 10-3. The maximum predicted concentration at the worst affected receptor and the RBSF site boundary are presented individually for the five years of meteorological data considered in this assessment.

Table 10-3: Predicted Odour Concentrations - 'Post Development' Scenario

Receptor	Odour Concentration					Assessment Criterion
	2011	2012	2013	2014	2015	
Maximum at modelled receptor location	0.97	0.92	0.92	0.94	0.94	3 $ou_E.m^{-3}$ as the 98th percentile of hourly averages
Maximum at Site Boundary	2.51	2.64	2.57	2.67	2.38	N/A

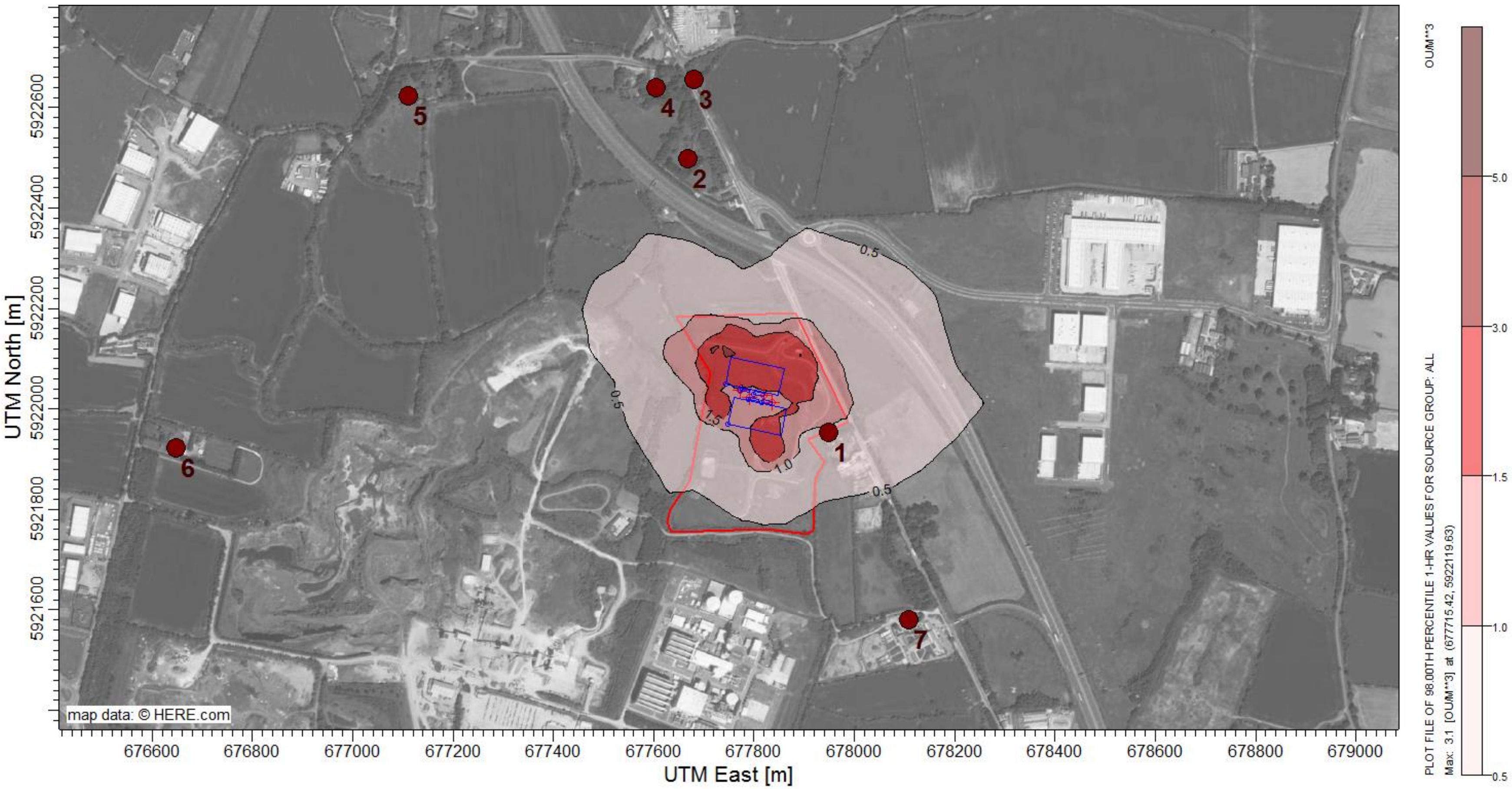
Values in bold indicate the highest predicted odour concentration from the five assessment years.

The worst affected receptor was predicted to be R1, to the southeast of the Site, in each assessment year. Although not presented in Table 10-3, for information purposes, concentrations at all other identified receptor locations identified were predicted to be less than 0.3 $ou_E.m^{-3}$ as the 98th percentile of hourly averages, shown by evaluation of the presented odour contour plots.

Concentrations approaching the adopted odour annoyance criterion were predicted at the western site boundary at the closest point to the proposed RBSF structures. These areas are not considered to be relevant areas of existing public exposure.

The Contour plot for the worst case meteorological year, as defined in Table 10-3, is presented as Figure 10-4. The results of the post-development assessment scenario indicated that:

- The adopted odour annoyance criterion of 3 $ou_E.m^{-3}$ as the 98th percentile of hourly averages was not exceeded at any receptor location.



map data: © HERE.com

Figure 10-4: Predicted Odour Concentration - 'RBSF' Scenario, 17.5 m stack - 2014 Meteorological Data (ou$_E$.m^{-3} as the 98th Percentile of Hourly Averages)

10.5.4 Impact Significance

This assessment concluded that odour effects from the Proposed RBSF Component were not significant based upon:

- Predicted odour concentrations at all identified receptor locations were below 3 $ou_E.m^{-3}$ as the 98th percentile of hourly averages.

As defined in the assessed scenario descriptions, this assessment predicted the impact of the Proposed RBSF Component. The predictions include the operation of four OCU and a mitigation system which would minimise fugitive releases. With effective implementation of the proposed odour mitigation infrastructure, it is considered unlikely that a significant odour impact (such as to give rise to nuisance) would occur.

10.6 Mitigation Measures

10.6.1 Construction Phase

No odorous material will be stored at the Site until full commission of the Proposed RBSF Component. As such, there are no mitigation measures, specific to odour, that are proposed as part of the construction phase.

10.6.2 Operational Phase

The assessment considered the potential odour impact of the Proposed RBSF Component with the inclusion of physical mitigation measures incorporated into the design. The proposals include provision for all potential odour sources to be covered, extracted and treated using one of four proposed OCUs.

In addition to the base level of mitigation accounted for in this assessment, the odour control system has the following additional physical controls to provide further environmental protection:

- Duty/Standby fans for each OCU to protect against any individual fan failures or planned maintenance;
- A variable fan motor will be fitted to allow increased air extraction in the event of an elevated build-up of odour within the building;
- A modern building fabric with no passive louvers or vents into the storage areas to prevent fugitive emissions;
- Fast action shutter doors for vehicle access and egress;
- A traffic light vehicle entry system which prevents the doors being open during material disturbance activities. Doors will remain shut for 5 minutes after unloading/loading to clear any elevated odour levels within the building via the odour control system; and
- All worker access points to the storage areas will be fitted with separate self-closing doors with an audible alarm if doors are open for more than 30 seconds.

These physical odour mitigation measures adopted into the fabric of the Proposed RBSF Component structure will be combined with other odour mitigation including the necessity of all material storage vehicles to be fitted with close fitting covers, management of deliveries to minimise the queuing of loaded vehicles, all loading and unloading operations to be carried out within buildings, and strictly no storage of material outside of the odour-controlled buildings.

The facility will also employ a robust odour management regime to ensure that physical systems and operational practices minimise the potential for odour emissions. This will culminate in the production of a site Odour Management Plan (OMP) which will detail best practice operational practices, identification of all odour sources, specified mitigation measures, good housekeeping principles and guidance on effective operation of the odour control system.

The OMP will also provide operator instructions for planned odour control maintenance and emergency situations with the potential to generate off site odour. These will include maintenance and renewal timetables for the OCU and ventilation components, a handling procedure for material with an unusually high odour, instructions for OCU failure and contingencies to deal with a loss of power. The OMP remains a live document and will require to be reviewed, as a minimum, every five years or if there are any changes to the operation of the facility.

10.7 Residual Impacts

10.7.1 Construction Phase

No residual impacts were identified that would occur during the construction of the Proposed RBSF Component.

10.7.2 Operational Phase

No residual impacts were identified that would occur after implementation of the Proposed RBSF Component.

10.7.3 Interactions

No interactions are expected with any other environmental impact.

10.7.4 Cumulative Impacts

Due to the way the brain responds to odours, it is not often possible to quantitatively assess the cumulative impacts of multiple odour sources. This is due to the way in which the brain responds to odours, which is not generally additive[21] in the same way as decibels for noise or specific air quality pollutant concentrations. The brain has a tendency to screen out odours which are always present but those that are out of place or intermittent may noticeably stand out. As an example, an out of place or unexpected odour at a concentration of a few odour units, could be distinct and detectable within an environment where the overall concentration is much higher, typically up to 40 $ou_E.m^{-3}$ [22].

As a result, where odours have notably different characters, it is not expected that an arithmetically combined odour, which includes all local and environmental background sources, is representative of total exposure. However, it must be noted that although odours from different sources are not

[21] *Environment Agency/Scottish Environmental Protection Agency, Integrated Pollution Prevention and Control (IPPC) – Draft Horizontal Guidance for Odour – Part 1, Regulation and Permitting. Note, guidance superseded in 2010 however where not contradicted by subsequent guidance information is still considered relevant*

[22] *Ref: Wijnen H (1986) Air quality standards on odours in the Netherlands. VDI Berichte 561: 365-385*

combinable, an annoyance or loss of amenity may be created by the cumulative burden from a range of different sources.

A review of the local area was undertaken to identify any odour sources that could be of a similar nature to the RBSF. As described in Section 10.3, no major odour producing activities were identified in the immediate vicinity of the Proposed RBSF Component. On this basis, it is considered that odour sources further afield (in excess of 1 km) are unlikely to have significant in-combination impacts at receptors considered within the Proposed RBSF Component study area.

The assessment has also considered potential cumulative impacts associated with any known future processes with the potential to emit odour. A review of approved planning applications was conducted to identify consented facilities in the vicinity (within 1km) of the RBSF, with the potential to emit odour. The review identified one facility with the potential to emit odour, an anaerobic digester facility approximately 700 m to the south of the RBSF structures, known as the Huntstown Renewable BioEnergy Plant (RBP), which received planning approval in 2014. As the facility is located in the vicinity of receptors within the RBSF study area, the potential for cumulative impacts was considered.

Although predicted odour concentrations from two assessments cannot be arithmetically combined, due to the use of a percentile assessment criterion, odour predictions at communal receptor locations can be compared qualitatively to give an indication of the combined effect.

Odour emissions were considered, within Chapter 8 of the Huntstown RBP planning application, by application of dispersion modelling techniques. The Huntstown RBP considered a number of receptor locations relevant to its discrete study area, including receptors adjacent to the RBSF site boundary (R1 in the RBSF assessment). Concentrations at this location (R12 in the Huntstown RBP odour assessment) were predicted to be no more than 0.17 $ou_E.m^{-3}$, compared to 0.94 $ou_E.m^{-3}$ from the Proposed RBSF Component as the 98^{th} percentile of hourly averages.

The predicted odour contribution from the Huntstown RBP facility is considered to be negligible at receptors within the Proposed RBSF Component study area and that the combined impact is likely to be well below the adopted odour annoyance criterion of 3 $ou_E.m^{-3}$ as the 98^{th} percentile of hourly averages. As such, it is expected that the odour from the two proposed facilities, in combination, will not lead to a cumulative significant odour impact.

10.8 Monitoring

Although the selected emission rates are considered to be appropriate, for newly commissioned sources, post commissioning odour testing is recommended. This monitoring will be used to confirm the emission rate assumptions and ensure that actual emissions do not exceed those presented in this assessment.

The following programme of post commissioning testing is proposed:

- Post commissioning survey for the following sources:
  - Olfactometry testing of the inlet and outlet of all OCU;
  - In duct air flow testing to ensure the design extraction rate of 9.72 $m^3.s^{-1}$ is met at each unit.
- All testing to be conducted on the following schedule/basis:

- Survey to be undertaken after full commissioning of the OCU;
- Recommendation of testing three months after commission to allow biological media to acclimatise;
- Surveys will persist on a 6-month basis until two concurrent tests are shown to be below the stated target level. Note: compliance required with both the outlet odour concentration $ou_{E.}m^{-3}$ and odour emission rate $ou_{E.}s^{-1}$ targets;
- Odour analysis undertaken by a nationally or internationally accredited laboratory including accreditation to the EN 13725 European standard for odour analysis; and
- Surveys would be considered void if conducted during periods of low odour generation, i.e. undertaken during a period with reduced levels of stored material.

It is important to acknowledge that a breach of the assessed levels may not result in an annoyance at a receptor. However, any breaches should be highlighted as an operation concern in line with a commitment to maintain and minimise odour emissions from the Proposed RBSF Component on a long-term basis.

Once commissioning testing has confirmed operational performance in line with expectations, it is expected that odour monitoring will be added to the schedule of regular testing defined within the Site OMP. This would be in addition to the daily, weekly and monthly checks that are undertaken to identify plant failure (including visual checks and in duct measurements taken using calibrated and hand held H_2S equipment). As biological media degrades over time, it is suggested that the Proposed RBSF Component OCUs should be surveyed on the following basis.

- Annual testing of inlet and outlet odour concentrations;

  - Outlet odour concentration ($ou_{E.}m^{-3}$) and odour emission rate ($ou_{E.s}^{-1}$) remain at expected levels used in this assessment;
  - Ensure that extraction rates are maintained at the design level.

Breach of either of these design aspects would trigger a maintenance response by the operator to reinstate odour performance levels to expected levels.

10.9 Difficulties Encountered

An inherent difficulty in assessing the impacts of proposed odour sources is associated with the selection of odour emission rates used to represent the sources. This assessment used information provided by the OCU manufacturer to predict odour emission from the Site based on the proposed odour removal technology. Although the selected emission rates are considered to be appropriate, the post commissioning testing schedule, discussed in Section 10.8, will be used to confirm that both actual emission levels (odour concentration and emission rates) and dispersion properties (air speed and volumetric flow rates) flow rate meet the parameters stipulated in this assessment.

10.10 References

Chartered institution of Water and Environmental management (CIWEM) (2010) *Position Statement - Control of Odour*. Available at: http://ciwem.org/wp-content/uploads/2016/04/Control-of-odour.pdf. London: Chartered Institution of Water and Environmental management.

Environment Agency (UK), (2011). *H4 Odour Management: How to comply with your environmental permit*. Bristol: Environment Agency.

European Communities, (2005). *SI 787/2005 - (Waste Water Treatment) (Prevention of Odours and Noise) Regulations, 2005.*

Environmental Protection Agency Office of Environmental Enforcement (OEE), (2010). *Air Dispersion Modelling from Industrial Installations Guidance Note (AG4)*. Johnstown: Environmental Protection Agency.

Government of Ireland, (2003). *Protection of The Environment Act, Statutory Instrument: No. 27 of 2003.*

Institute of Air Quality Management (IAQM), (2014). *Guidance on the Assessment of Odour for Planning*.

Section 11: Cultural Heritage

11.1 Introduction

This Section of the EIAR assesses the potential impacts (and resulting effects) likely to occur as a result of the Regional Biosolids Storage Facility (RBSF) component of the Proposed GDD Project and the Proposed Upgrade Project on the heritage, archaeological and architectural heritage. Hereinafter, this component is referred to "the Proposed RBSF Component". The site of the Proposed RBSF Component is herein referenced to as "the Site".

A wide variety of paper, cartographic, photographic and archival sources were consulted. All of the lands of the Site have been archaeologically assessed through test excavation and were visually inspected in September 2017.

This Section and assessment have been completed having regard to the guidance outlined in the Environmental Protection Agency documents *Guidelines on the information to be contained in Environmental Impact Assessment Reports* (Draft, August 2017) and *Advice Notes for Preparing Environmental Impact Statements* (Draft, September 2015).

11.2 Methodology

This study, which complies with the requirements of Directive EIA 2014/52/EU, is an assessment of the known or potential cultural heritage resource within a specified area and includes the information that may reasonably be required for reaching a reasoned conclusion on the significant effects of the Proposed RBSF Component on the environment, taking into account current knowledge and methods of assessment. It consists of a collation of existing written and graphic information in order to identify the likely context, character, significance and sensitivity of the known or potential cultural heritage, archaeological and structural resource using an appropriate methodology as per the "*Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*" (EPA, 2017).

The study involved detailed investigation of the cultural heritage, archaeological, architectural and historical background of the Site and the study area. The overall study area, which extends 1 km from the Site, is presented in Figure 11-1.

This area was examined using information from:

- The Record of Monuments and Places (RMP) for County Dublin;
- The Sites and Monuments Record (SMR);
- The Fingal County Development Plan 2017-23;
- The National Inventory of Architectural Heritage;
- Aerial photographs;
- Excavation reports;
- Cartographic sources; and
- Documentary sources.

A field visit was carried out on 13 September 2017 to identify and assess any unknown archaeological sites, structures and previously unrecorded features and possible finds within the Site.

An impact evaluation and mitigation strategy has been prepared. The evaluation has been undertaken to evaluate the significant effects, if any, on the cultural heritage, archaeology and architecture which can reasonably be expected to occur because of the Proposed RBSF Component, while a mitigation strategy has been designed to remedy any significant adverse effects on the cultural heritage.

11.3 Existing Environment

11.3.1 The Landscape

The Site is situated in the south of the administrative County of Fingal, in the townland of Newtown, approximately 2.5 km north-west of Finglas and immediately west of the N2 Dual Carriageway (refer to Figure 11-1).

11.3.2 Historical and Archaeological Background

The following is a summary of the archaeological and historical development of the study area and the main types of sites, monuments and structures that are known from the surrounding area. The purpose of this approach is to place the types of sites, monuments and structures in the study area in a cultural and chronological context to assist the assessment. The Site is located in the townland of Newtown which is situated in the Civil Parish of St. Margaret’s and the Barony of Coolock. The RMP sites in the study area are presented in Appendix 11A and the SMR sites in Appendix 11B.

11.3.2.1 The Prehistoric Period

The only evidence for possible prehistoric activity in the study area are two burnt spreads in Newtown townland (03E1450).

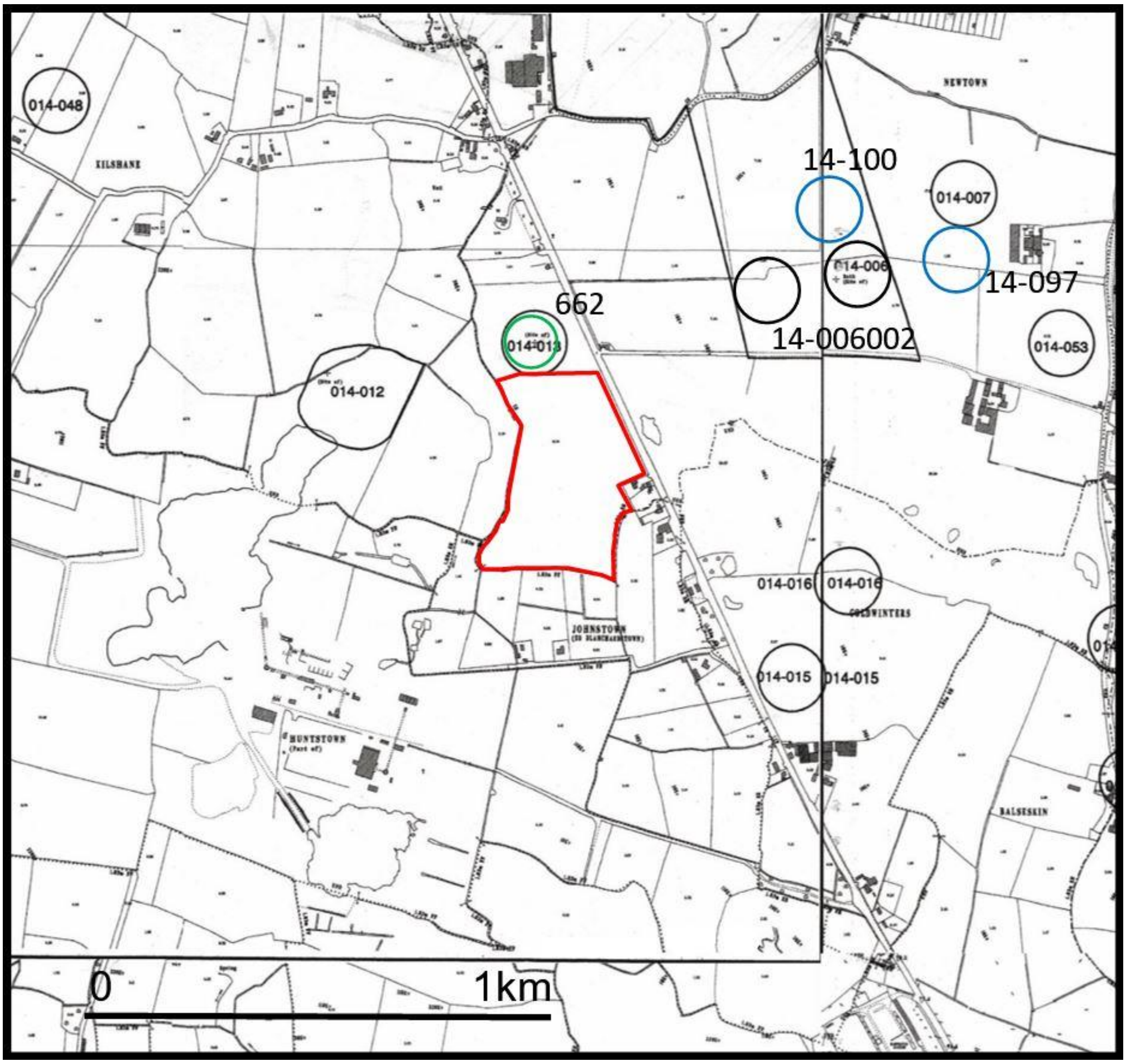


Figure 11-1: The Study Area

The Site, outlined in red, is indicated on the Statutory Record of Monuments and Places map for Dublin (Figure 11-1). The figure represents the study area which extends 1 km from the Site at the four cardinal points. Recorded Monuments are indicated by black circles, SMR sites by blue circles and Protected Structures are indicated by green circles.

11.3.2.2 The Early Medieval Period

In the Early Medieval period, the study area was situated in the Tuath of Tuirbe under the Ui Chormaic kings (MacCotter 2008, p. 165). Early Medieval settlement is usually associated with enclosed farmsteads known as Ringforts. There are five possible ringforts known in the study area in Newtown townland (DU014-00601, DU014-00602, DU014-007, DU014-0097 and DU014-0097) and two possible enclosures that may be the remains of ringforts in Newtown and Coldwinters townlands (DU014-0053 and DU014-0015). A large early medieval cemetery identified in Kilshane townland (DU014-0048) during the construction of a gas pipeline in 1988 also indicates substantial early medieval settlement in the study area.

11.3.2.3 The Later Medieval Period

Following the Anglo-Norman invasion of Ireland, the Site formed part of the manor of Dunsoghly and in the twelfth century a Motte and Bailey castle was constructed in Newtown Townland. In the Medieval period Dunsoghly was held by the Finglas family and William de Finglas is recorded at Dunsoghly in 1338. Roger Finglas is recorded at Dunsoghly in 1424 but soon after the manor came into the hands of Sir Rowland Plunkett, son of the Baron Killeen. In 1446, Sir Rowland Plunkett of Dunsoghly Castle was appointed Chief Justice of the King's bench and the Plunkett's retained Dunsoghly for the rest of the medieval period (Ball 1920, p. 61-83, D'Alton 1838, p. 384-87).

11.3.2.4 Post medieval period

In the post-medieval period the Site was called Newtowne-Donsoughly and formed part of the Dunsoghly estate held by the Plunkett family. In 1641, Newtown was held by James Plunkett of Dunsoghly and in 1670 it was held by Nicholas Plunkett (http://downsurvey.tcd.ie/). The Civil Survey of Co. Dublin records that in 1641 Newtowne-Donsoughly townland, which contains the Site, consisted of 100 acres of arable, 8 of meadow and 12 of pasture and contained a few cottages valued at 4 pounds (see Figure 11-5, Simington 1945, p. 211).

11.3.3 Architectural/Building Heritage

11.3.3.1 Protected Structures

The Fingal County Development Plan 2016-2022 was examined as part of the baseline study for this section of the EIAR. The review established that there are no Protected Structures situated within the Site. There is one Protected Structure situated within the study area, the levelled remains of Kilshane Motte (see Table 11-1).

Table 11-1: Protected Structures in the study area

Ref	Location	Description	Distance to structure (m)
0662	N2 Road, Kilshane, The Ward, Co. Dublin	Archaeological site of levelled Anglo-Norman motte (geophysical survey has confirmed archaeological responses).	30 m

The Kilshane Motte was levelled in 1952. Subsequent archaeological assessment identified subsurface features associated with the monument and recommended a buffer zone be created to the south of the monument (Fitzpatrick, 2002). The buffer zone will be incorporated into the current proposal and the surviving subsurface features will not be directly or indirectly impacted by the Proposed RBSF Component.

11.3.3.2 Non-Designated Structures

The National Inventory of Architectural Heritage (NIAH) maintained by the Department of Culture, Heritage and the Gaeltacht was examined as part of the assessment 11 October 2017. This review established that there are no structures in the Site or in the study area listed in the NIAH.

11.3.3.3 Field Inspection

On 13 September 2017 fieldwork was carried out to identify any additional structures in the vicinity of the Site omitted from the Record of Protected Structures and the National Inventory of Architectural Heritage. This involved assessing all upstanding Structures within 300 m of the Site indicated on the 1st Edition Ordnance Survey map of 1836 (see Figure 11-1). There are no additional structures of heritage interest within this area.

11.3.4 Archaeology

11.3.4.1 Recorded Monuments

Examination of the Record of Monuments and Places for Dublin indicated that the area of archaeological notification of one monument DU014-013- is situated 30 m north of the boundary of the Site and more than 100 m north of the proposed main storage buildings (see Figure 11-2, Figure 11-3 Figure 11-4 and Figure 11-7).

This is described in the RMP as:

> *"DU014-013---- Newtown Castle - motte and bailey*
> *Situated in a field next to the N2. Prior to its destruction in 1952 this site comprised a circular platform (diam. 28m; H 3m) which was enclosed around the base by a wide fosse. This flat-topped platform was further enclosed by an oval earthwork or bailey (dims. 100m E-W; 70m N-S; NMI IA 245/1952). The site is visible as a soil mark on an aerial photograph taken in 1971 (FSI 2.4154/4) and on colour vertical photograph (OS 8/Flight 31, 7616). A cropmark showing oval enclosure with the faint traces of a smaller oval enclosure within is visible on digital globe aerial view created on the 9 June 2016"*

Archaeological test excavation and monitoring of the Site carried out in 2001 (Licence No. 01E1214, see Figure 11-6) identified no archaeological material. A screened buffer zone between the monument and the Site will be left undeveloped by Irish Water and therefore the remains of this monument will not be directly or indirectly impacted by the Proposed RBSF Component (see Figure 11-7).

Examination of the RMP indicates that there are six Recorded Monuments situated in the study area outside the Site (see Figure 11-1 and Appendix 11A). The closest site DU014-01202 is the site of a possible burial ground in Kilshane townland and is situated 230 m north-west of the Site. This and the other Recorded Monuments in the study area are considered to be too far distant from the Site to be directly or indirectly impacted by the Proposed RBSF Component.

Figure 11-2: View of RMP site DU014-013---- looking north-east

Figure 11-3: View from the Proposed RBSF Component site to RMP site DU014-013 (looking north showing the existing screening bund)

Figure 11-4: View from RMP site DU014-013---- to the Proposed RBSF Component site looking south showing the existing screening bund

11.3.4.2 Undesignated Monuments

The SMR which is maintained by the Department of Culture, Heritage, and the Gaeltacht was examined as part of the assessment on 11 October 2017. This review established that there are no additional undesignated monuments entered in the database in the Site. There are two SMR sites in the study area (see Figure 11-1 and Appendix 11B). The closest SMR site to the Site is a Ring-ditch in Newtown townland DU014-0100---. This monument is situated 0.56 km north-east of the Site and is considered too far distant to be directly or indirectly impacted by the Proposed RBSF Component.

11.3.4.3 Cartographic Sources

The Down Survey map of 1656 (Figure 11-5), John Rocque's map of 1762, Ordnance Survey 1st and 3rd edition six-inch and 1st edition 25-inch maps of the Site were examined as part of the assessment. This analysis did not indicate any previously unrecorded archaeological sites or monuments in the Site or in the vicinity of it.

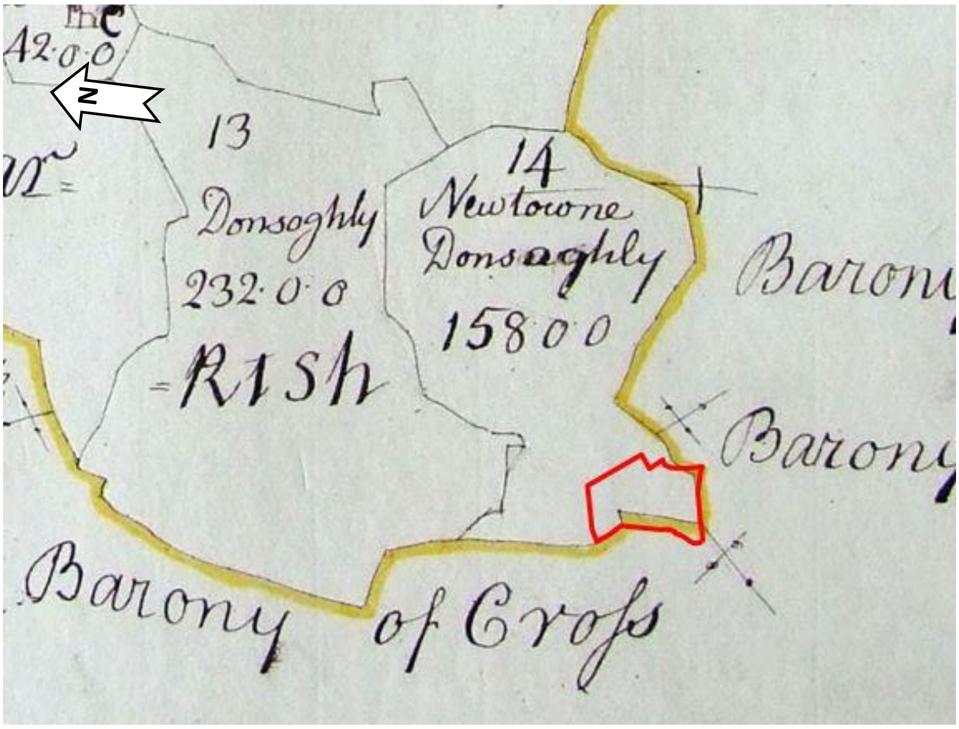


Figure 11-5: The Proposed RBSF Component (in red) indicated on the 1656 Down Survey mapping of St. Margaret's parish

Figure 11-6: Google Earth image from 2002 with regularly-spaced herringbone pattern linear archaeological test trenches indicating the extent of archaeological testing carried out in the Proposed RBSF Component site (outlined in red)

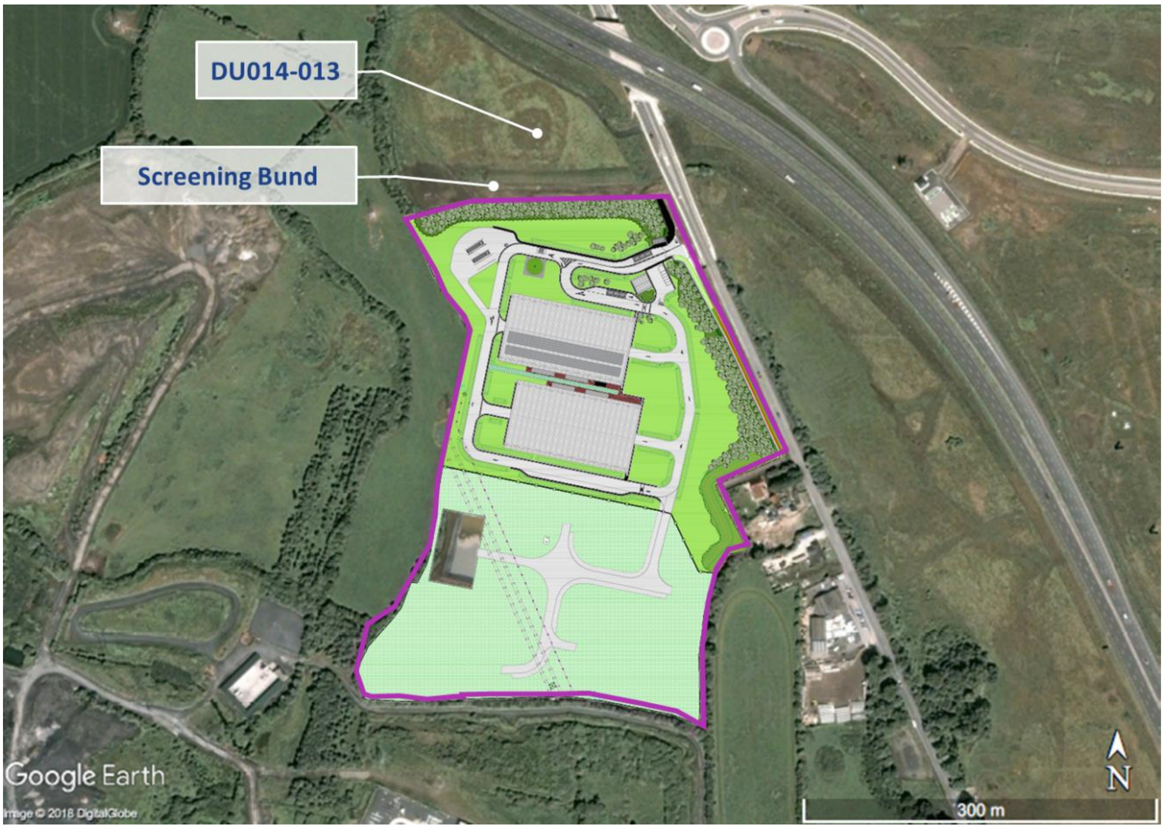


Figure 11-7: Google Earth image from 2008 indicating the Proposed RBSF Component layout, RMP DU014-013—and the intervening screening bund

11.3.4.4 Aerial Photography

Ordnance Survey aerial photography taken in 1995, 2000 and 2005, as well as Google Earth imagery from 2002, 2003, 2004, 2008, 2009, 2012, 2013, 2014, 2015, 2016 and 2017 and Microsoft Bing imagery from 2011 were examined as part of the assessment (see Figure 11-6 and Figure 11-7). This analysis did not identify any additional cultural heritage material in the Site or vicinity.

11.3.4.5 Placename Evidence

The *Placenames Database of Ireland* (Logainm.ie) notes the old name of the townland in which the Site is situated as Newtowne Dunsoghly.

11.3.4.6 National Museum of Ireland

Examination of the finds registers of the National Museum of Ireland indicated that no artefacts from the study area have been reported to the Museum.

11.3.4.7 Archaeological Investigations

There have been two archaeological investigations carried out in the Site associated with a previous development proposal. The 2002 test excavation constituted a comprehensive investigation of the current Site that identified no archaeological material (see Figure 11-6). The investigations are summarised below and included in Appendix 11C. There have been nine archaeological investigations carried out in the vicinity of the Site that are summarised in Appendix 11C and placed in context in section 15.4.2.

11.3.4.8 NEWTOWN: Site of motte and Bailey: SMR 14:13: 01E1214

In November 2001, seven test pits were monitored in connection with the pre-development works for a proposed waste recycling facility (at the site of the Proposed RBSF Component) in the townland of Newtown, Kilshane, Co. Dublin. No artefacts or features of archaeological significance were identified during the monitoring (Rooney, 2001).

11.3.4.9 NEWTOWN: Site of motte and Bailey: SMR 14:13: 01E1214 ext

An archaeological assessment of a proposed waste recycling facility in the townland of Newtown, Kilshane, Co. Dublin (at the site of the Proposed RBSF Component), found that one monument, the site of a possible motte and bailey, was located within its boundary. The site was inspected in 1952 by a representative from the National Museum of Ireland, prior to its demolition as part of a land project scheme. The monument was recorded as a circular platform 28 m in diameter and 3 m in height. The base of the flat-topped platform was enclosed by a wide ditch, which was in turn enclosed by an oval earthwork (100 m by 70 m). At present the site is only visible as a soil-mark on aerial photographs. The test excavation consisted of the machine excavation of nineteen test trenches in July - August 2002 that were set across the entire Site. None of the trenches produced any significant archaeological features. The area tested had undergone large scale land improvement and was crossed by numerous field drains. The archaeological assessment report recommended a buffer zone to the monument and that recommendation has been followed by the current Proposed RBSF Component. Monitoring of ground disturbance at the site was recommended by the assessment (Fitzpatrick, 2002).

11.3.4.10 Field Inspection

A field inspection was carried out on 13 September 2017 and involved a walkover of all the areas of the Proposed RBSF Component. The Site consists mostly of flat to undulating green field with an access road extending along the eastern and through the southern part of the site. The site is well screened by tall trees to the west and south and by screening berms at the north and east. There was no indication of any cultural or archaeological material (Figure 11-8 and Figure 11-9).

Figure 11-8: View of the Site looking south

Figure 11-9: View of the Site looking north

11.4 Characteristics of the RBSF Component of the Proposed GDD Project

No characteristics of the Proposed RBSF Component have the potential to impact the Cultural Heritage of the area.

11.5 Potential Impacts

11.5.1 Do-Nothing Impacts

In the absence of the Proposed RBSF Component, there would be no impact on archaeology and cultural heritage.

11.5.2 Construction Phase

The Site has been comprehensively archaeologically assessed through test excavations and no archaeological material has been identified. There will be no direct impact on any items of cultural heritage, archaeology or buildings of heritage interest in the Site or the vicinity.

11.5.3 Operational Phase

The main storage buildings will be more than 100 m south of the neighbouring motte RMP DU014-013--- and the visual amenity of the monument will be protected by a landscaped buffer zone. The operational phase will have no direct or indirect impacts on any known items of cultural heritage, archaeology or buildings of heritage interest in the Site or the vicinity.

11.5.4 Indirect Impacts

There are no indirect impacts on any known items of cultural heritage, archaeology or buildings of heritage interest in the Site or the vicinity.

11.6 Mitigation Measures

11.6.1 Construction Phase

No impacts have been identified and no mitigation measures are required.

11.6.2 Operational Phase

No impacts have been identified and no mitigation measures are required.

11.7 Residual Impacts

11.7.1 Construction Phase

There will be no residual impacts.

11.7.2 Operational Phase

There will be no residual impacts.

11.7.3 Interactions

There will be no interactions.

11.7.4 Cumulative Impacts

There will be no cumulative impacts.

11.8 Monitoring

There will be no monitoring required.

11.9 Difficulties Encountered

No difficulties were encountered in the compilation of this assessment.

11.10 References

Ball, F.E. (1920). *A history of the County Dublin; the people, parishes and antiquities from the earliest times to the close of the eighteenth-century Vo. VI.* Dublin.

D'Alton, J. *The History of the County of Dublin*. Dublin.

Department of Arts, Heritage, Gaeltacht and the Islands (DAHGI), (1998). *Recorded Monuments Protected under Section 12 of the National Monuments (Amendment) Act, 1994*. Dublin.

Environmental Protection Agency (Ireland), (2002). *Guidelines on the Information to be Contained in Environmental Impact Statements.*

Environmental Protection Agency (Ireland), (2003). *Advice Notes on the Current Practice in the Preparation of Environmental Impact Statements.*

Environmental Protection Agency (Ireland), (2015). *Draft Advice Notes for Preparing Environmental Impact Statements.*

Fitzpatrick, M. (2002). *Archaeological Report on pre-development testing at Newtown, Co. Dublin Licence No. 01E124.* Unpublished Report for TES Ltd.

MacCotter, P. (2008). *Medieval Ireland*. Dublin.

Rooney, F. (2001). *Archaeological Report on the monitoring of test pits at the proposed development in the townland of Newtown, Co. Dublin Licence No. 01E124*. Unpublished Report for TES Ltd.

Simington, R.C. (1945). *The Civil Survey A.D. 1654-6. Vol. VII. Dublin*. Dublin

Section 12: Material Assets

12.1 Introduction

This Section of the EIAR assesses the potential impacts (and resulting effects) likely to occur as a result the Regional Biosolids Storage Facility (RBSF) component of the Proposed GDD Project and the Proposed Upgrade Project on the material assets of the area. Hereinafter, this component is referred to "the Proposed RBSF Component".

Material Assets are considered to be materials of intrinsic value to an area and can be of natural or human origin. Guidelines on the Information to be contained in Environmental Impact Assessment Reports (Draft) (EPA, August 2017) define as *"resources that are valued and that are intrinsic to specific places are called 'material assets'"*.

Full details of the Proposed GDD Project and the Regional Biosolids Storage Facility component can be found in Volume 2, Chapter 3: Description of the Proposed Project.

12.2 Methodology

This Section has been assessed in terms of the likely effect, if any, of the Proposed RBSF Component at Newtown, Dublin 11 on the material assets of the surrounding environment and access roads. The objective of this section is to determine if these assets can be used in a sustainable manner post-development of the RBSF.

This section of the EIAR was prepared having regard to the following;

- Guidelines on the Information to be contained in Environmental Impact Statements (EPA, 2002);
- Advice Notes on Current Practice in the preparation of Environmental Impact Statements (EPA, 2003);
- Advice Notes for Preparing Environmental Impact Statements (Draft) (EPA, September 2015);
- Guidelines on the Information to be contained in Environmental Impact Assessment Reports (Draft) (EPA, August 2017); and
- Guidance on the preparation of Environmental Impact Assessment Report (EU Directive 2011/92/EU as amended by 2014/52EU).

The following Material Assets, which could be affected by construction and operation of the Proposed RBSF Component, have been considered. Volume 4, Section 3: Population and Human Health, defines the Local Level as the Ward and Dubber Electoral Divisions as outlined in Figure 3-3 and Table 3-3.

- Non-renewable resources (e.g. minerals, soils, oil, gas, etc.);
- Cities, towns, villages and settlements;
- Transportation infrastructure (roads, railways, airports, etc.);
- Major utilities (water supplies, sewage, power systems, telecommunication systems, etc.);
- Commercial and Industrial Development;
- Property; and
- Tourism and Recreational Infrastructure.

12.3 Existing Environment

The site on which it is proposed to locate the Proposed RBSF Component (chosen following a public consultation process)[23] is 11 hectares in area and is situated to the west of the N2 with the R135 adjacent to the eastern boundary. Roadstone's Huntstown Quarry is situated to the west of the site and the Huntstown Power Station is situated on the southern side of the site as shown in Figure 12-1.

A tributary of the Huntstown Stream runs nearby the western boundary with agricultural lands abutting the northern boundary of the site. The site comprises over-grown grassland in a single, large field bounded by hedgerows. The site and surrounding area is generally flat with a landscaping bund adjacent to the southern boundary of the site.

The site is predominantly located within an industrialised area that is interspersed with smaller commercial properties and one-off residential properties. Within the electoral division that the site is situated, the more largely populated areas are located south of the M50 motorway, while the heavy industrial areas are primarily situated north of the M50 motorway and to the west of the Proposed RBSF Component site.

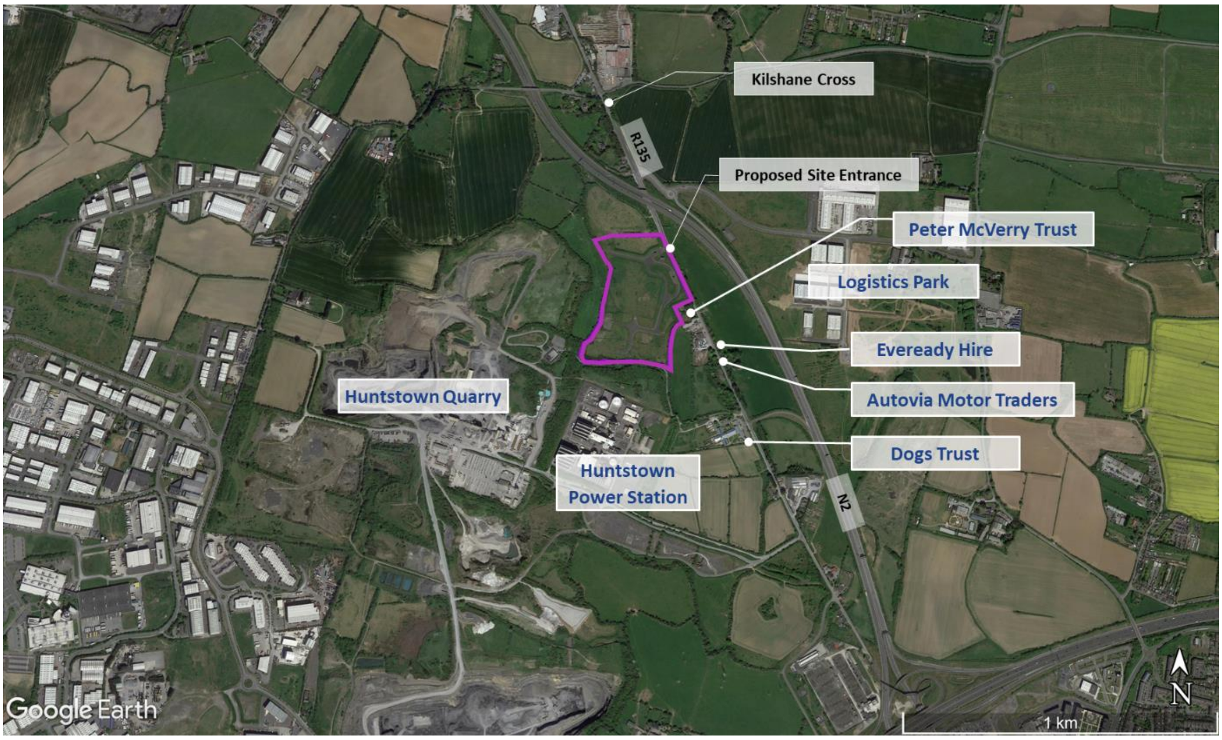


Figure 12-1: Site Layout

While the immediate area around the site retains some of its rural characteristics, its proximity to large scale power generation, extractive industries and the recent N2 upgrade, is such that the industrial and employment character of the locality is most prominent.

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[23] *RBSF Site Selection Reports are provided in Appendices to Volume 2 of the EIAR*

A review of the cultural heritage established that there are no recorded monuments within the site, however there is a levelled recorded monument, Castle - motte and bailey (DU014-013), situated to the north of the Proposed RBSF Component site. See Volume 4, Section 11: Cultural Heritage.

There are no SPAs or SACs located within or adjacent to the site, however the River Ward and its catchment area discharges to the Malahide Estuary SAC (000205) and Broadmeadow/Swords Estuary SPA (004025) approximately 12 km downstream. There are a total of 5 SACs and 5 SPAs within 15 km of the site which include South Dublin Bay cSAC (000210), Rye Water Valley/Carton SAC (001398), Malahide Estuary SAC (000205), North Dublin Bay cSAC (000206), Howth Head cSAC (000202), South Dublin Bay and River Tolka Estuary SPA (004024), North Bull Island SPA (004006), Baldoyle Bay SPA (004016), Broadmeadow/Swords Estuary SPA (004025) and Rogerstown Estuary SPA (004015).

Fingal County Council was granted approval by ABP in 2006 for a waste recovery facility at the Proposed RBSF Component site. Certain enabling works, including drainage works, internal access roads, boundary fencing, and electricity and telecommunications infrastructure have been carried out at the proposed RBSF site on the basis of that approval. Some of this infrastructure will require demolition, such an administration building, weighbridge kiosks and sections of roads to allow the site to be utilised as the RBSF. There will be other amendments to the existing drainage network on the site. These works form part of the planning application.

A waste licence (W0223) was granted by the EPA for the site although it ceased to have effect in late 2015 because operation for its intended purpose had not been substantially commenced by Fingal County Council.

12.3.1 Road Networks

The Proposed RBSF Component site is located adjacent to the N2 national road and within the townland of Newtown, approximately 1.5 km north of the N2/M50 interchange. It is accessible coming from Dublin via the R135 regional road from an exit on the N2, which is 0.7 km to the south of the site. Vehicles returning towards the M50 motorway and Dublin, access the N2 from Junction 2 - St. Margaret's, some 0.7 km north of the site.

12.3.2 Land Utilisation

The land in the 11 hectare site is non-agricultural in utilisation. The site is currently a poor-quality grassland and has been partially developed as outlined in section 12.3. The surrounding area is largely industrialised. The Peter McVerry Trust received planning approval in 2015 for the demolition of two existing two storey semi-detached dwellings and the construction of 6 no. single residential units with a community building adjacent to the south eastern boundary of the site. That development commenced in February/March 2018.

12.3.3 Utilities

A summary of significant existing utilities on site and within 1 km of the site is provided below. Utility connections to individual buildings adjacent to the site are not considered as these are seen as minor in nature and will not be affected by the Proposed RBSF Component. However, the Dublin to Dundalk natural gas transmission pipeline, despite it being more than 1 km from the site, is included due to its national importance.

- ESB Networks (ESBN) operate a 110 kV and 38 kV transmission and distribution system in the area with the 110 kV running overhead diagonally across the site from mid-point on the western boundary to mid-point on the southern boundary. The 38 kV cable runs underground diagonally across the site and parallel to the 110 kV overhead line. See Volume 5, Part B, Drawing Y17702-PL-022;

- An existing 450 mm diameter surface water pipeline traverses the site in an east/west direction. This pipeline provides a drainage outlet to St. Margaret's Stream for a site located on the eastern side of the R135;
- A 36-inch trunk watermain from Ballycoolen to Kingstown is located approximately 200 m to the north of the site runs in an east/west direction;
- The Dublin to Dundalk natural gas transmission pipeline, operated by Gas Networks Ireland runs within 5 km to the north of the site;
- The Huntstown Power Station is served by a gas connection to the south of the Proposed RBSF Component site. There are no gas pipelines located in the site;
- Site lighting ducting has been installed on the site along the internal roads;
- A medium voltage ESB overhead line runs on the eastern side of the R135. The electrical supply to the Proposed RBSF Component site will connect to this overhead line and the R135 underground cable crossing will terminate in the electrical substation adjacent to the eastern boundary of the RBSF;
- An existing telecoms network runs under the R135 and parallel to the Proposed RBSF Component eastern site boundary. A connection will be made to this telecoms network to provide telecommunications linkage to the RBSF site;
- An onsite foul sewer network is pumped from a central site pump station and connected to the public foul sewer on the adjacent R135 road; and
- A ducting network is in place on the site to facilitate the connection of electricity and communication cable infrastructure.

12.3.4 Major Infrastructure

A summary of major infrastructure within 1.0 km of the site is provided below. Again, Dublin airport is included at 1.5 km due to its national importance.

- The site is situated 1.5 km west of Dublin Airport close to but not directly under the western flight path for the airport;
- The Huntstown Power Station is situated approximately 100 m from the Proposed RBSF Component site boundary and is designated as a lower tier Seveso III site;
- The Ballycoolin to Kingstown Trunk Main is a 1 metre diameter water supply pipe located approximately 200 m north of the RBSF site. It runs west/east and passes under the N2 national road;
- There is no rail infrastructure in the immediate area; and
- Huntstown BioEnergy Ltd. hold full planning permission for the construction of a renewable bioenergy plant to generate up to 3.8 MW of electricity from 90,000 tonnes of non-hazardous biodegradable waste per annum utilising Anaerobic Digestion (AD) Technology. The proposed renewable bioenergy plant site covers an area of 2.38 hectares (5.9 acres) and is within the Huntstown Quarry complex, approximately 400 metres west of the R135 and adjacent to the Huntstown Power Station.

12.3.5 Water Supply Infrastructure

An onsite potable water network (150 mm diameter) will be connected to a 150 mm diameter watermain on the R135 which in turn is connected to the Ballycoolen trunk watermain. This is a 36-inch diameter pipe and runs west-east approximately 200 m to the north of the northern site boundary.

12.3.6 Drainage Infrastructure

An existing surface water drainage network on the site discharges to the watercourse on the western side of the site at 2 locations. Most of this network will be retained and incorporated into the proposed surface water network for the Proposed RBSF Component. The proposed network will be designed to include sustainable drainage systems and attenuation measures as outlined in Volume 2, Chapter 4: Description of the Proposed Project.

An existing 450 mm diameter surface water pipe traverses the Proposed RBSF Component site in an east/west direction. This surface water pipe services an undeveloped site to the east of the proposed RBSF site and on the eastern side of the R135. It provides an outlet for surface water runoff from that site to the watercourse on the western boundary of the site for the Proposed RBSF Component. It will be necessary to divert the surface water pipe within the proposed RBSF site, in order to progress with development of the Proposed RBSF Component.

A foul sewer network has been constructed on site but is not operational. Foul drainage requirements will be accommodated in the existing foul drainage network on the site. The foul drainage network currently drains to a pump station in the southern part of the site. This pump station is already connected to the public sewer via an existing rising main, which connects to a pump station outside the site on the easterly side of the R135. The wastewater generated by the Proposed RBSF Component will be collected and pumped from the chamber on the site to the nearby public sewer.

12.3.7 Watercourses

There are no significant watercourses within or adjacent to the site. A tributary of the Huntstown Stream, which in turn is a minor tributary of the River Ward, runs adjacent to the western and southern boundaries of the site. See Volume 4, Section 4.3.1.

12.3.8 Recreational Facilities and Amenities

Amenities within the immediate area (3 to 4 km radius from the site) are quite limited.

The following list represents the most notable amenity features within the wider area. The distance from the Proposed RBSF Component site is also provided.

- Silloge Golf Club - 2.8 km;
- Ward River - 3.8 km;
- St. Margaret's GAA Club - 3 km;
- St. Margaret's Golf Club - 3.5 km; and
- Hollystown Golf Club - 3.55 km.

The town of Swords is situated circa 10 km from the site and Ashbourne is situated circa 12 km from the site. Both towns provide a full range of sporting and recreational amenities. In addition, the following facilities are also present within the Local Area as outlined in Volume 4, Section 3.3.2;

- Charlestown Medical and Dental Centre;
- St. Margaret's Primary National School;
- St. Luke's National School;
- Le Cheile Secondary School; and
- Tyrrelstown Community Centre.

12.3.9 Geological Heritage and Extractable Reserves

The Huntstown Quarry, which is operated by Roadstone Dublin Ltd., is located approximately 500 m to the southwest and west of the site. The limestone quarry is designated a geological heritage site, as outlined in Volume 4, Section 7: Land and Soils.

12.4 Characteristics of the RBSF Component of the Proposed GDD Project

The Proposed RBSF Component forms part of the Proposed GDD Project and the GDD projects. The RBSF will provide storage for the biosolids generated at both wastewater facilities (and at other Irish Water owned wastewater facilities). The construction and operational phases have potential to impact on the Material Assets of the area, and in that regard the following issues have been considered:

- Changes to site layout and fence lines;
- Effects of the project on road network;
- Effect on public utilities;
- Effect on recreational amenities; and
- Land utilisation.

12.5 Potential Impacts

Potential Impacts have been assessed as outlined in Volume 2, Section 2.7 together with the descriptions as outlined in Volume 2, Section 2, Table 2-15. The impacts are rated in terms of their quality, significance, extent, probability of occurrence and duration of effects.

12.5.1 Do-nothing Impacts

The 'Do-nothing' alternative describes the circumstance where no Proposed RBSF Component is developed. There will be no impact on the Material Assets if the 'Do-nothing' scenario is followed.

12.5.2 Construction Phase

12.5.2.1 Road Networks

There will be a not significant, temporary negative impact on the nearby road network surface quality, during the construction phase arising from wear and tear due to additional construction traffic. Minor roadworks along the boundary of the site with the R135 are likely to lead to temporary slight negative impacts during the construction phase. The sensitive receptors to particularly impacted will be the residential units, currently under construction for the Peter McVerry Trust (as outlined above in section 12.3.2), neighbouring the site.

There is also potential for a temporary not significant negative impact during construction due to HGV wheels bringing waste material onto the road network.

12.5.2.2 Land Utilisation

There will be no impact during the construction stage. See Volume 4, Section 7: Land and Soils which covers any potential impact on extractable resources.

12.5.2.3 Utilities

There will be no impact on public utilities. Any connections to existing utilities required for the construction of the Proposed RBSF Component, as outlined in section 12.3.3 above, will be planned with utility providers.

12.5.2.4 Major Infrastructure

No construction works are planned that could impact on Major Infrastructure. Therefore, there will be no impacts on major infrastructure during the construction phase.

12.5.2.5 Water Supply Infrastructure

There will be no impact on water supply infrastructure. Any connections to existing water supply required for the construction of the Proposed RBSF Component, as outlined in section 12.3.3 above, will be planned with utility providers.

12.5.2.6 Drainage Infrastructure

The existing surface water drainage network on the Proposed RBSF Component site will be incorporated into the proposed design and the overall system will be designed to operate in accordance with the current requirements of the local authority. The diversion of the surface water which crosses the site from the opposite side of the R135 to facilitate the construction of the Proposed RBSF Component will require construction of a new manhole to allow a tie in and associated revised pipeline layout. This construction work will be a short-term construction activity of less than a month duration and the potential impact can be rated as a temporary negative effect of imperceptible significance as outlined in Volume 2, Section 2.7 and Section 2.7.1.

Foul drainage requirements will be accommodated in the existing foul drainage network on the Proposed RBSF Component site. The foul drainage network is not yet operational. There will be no impact arising due to foul drainage works during the construction phase.

12.5.2.7 Watercourses

The potential impacts are assessed under Volume 4, Section 4: Water.

12.5.2.8 Recreational Facilities and Amenities

The site is removed from recreational facilities or amenities and is situated in a largely industrialised area. Any temporary inconvenience arising during construction will be brief and localised to the site. The most likely cause for short term impact would be through traffic congestion and Traffic is examined in Volume 4, Section 13.

12.5.2.9 Geological Heritage

The impacts on geological heritage during the construction phase are assessed in Volume 4, Section 7: Land and Soils.

12.5.3 Operational Phase

12.5.3.1 Road Networks

Impacts on the road network surface quality during the operational phase due to the volume of HGV movements and will be no more than temporary, negative and imperceptible. See Volume 4, Section 13: Traffic for further details. There is potential for a brief imperceptible negative impact during the operational phase due to HGV wheels bringing biosolids waste material onto the road network.

12.5.3.2 Land Utilisation

There will be no impact on land utilisation in the operational stage. See Volume 4, Section 7: Land and Soils which addresses any potential impact on extractible resources.

12.5.3.3 Utilities

There will be no impacts on utilities during the operational stage. Energy usage on the site in the operational phase will be low as there is no significant process involved requiring significant energy input. The main operational stage energy load will arise from lighting and odour control measures but will neutral and imperceptible in nature.

12.5.3.4 Major Infrastructure

There are no activities or emissions related to the operation of the Proposed RBSF Component, that affect Major Infrastructure. Therefore, there will be no impacts on major infrastructure during the operational phase. Volume 4, Section 13: Traffic separately assesses the effects of traffic during the operational phase. Volume 4, Section 15: Risk Management assesses worst case scenarios and associated procedures.

12.5.3.5 Water Supply Infrastructure

There will be no impacts on water supply infrastructure during the operational phase. Water usage during the operational phase will be low. Rain water harvesting shall be used in HGV cleaning operations for traffic exiting the site.

12.5.3.6 Drainage Infrastructure

There will be no impacts on surface drainage and wastewater collection infrastructure during the operational phase.

12.5.3.7 Watercourses

There will be no impacts on watercourses during the operational phase. See Volume 4, Section 4: Water.

12.5.3.8 Recreational Facilities and Amenities

There will be no impacts on recreational facilities and amenities during the operational phase.

12.5.3.9 Geological Heritage

The impacts on geological heritage during the operational phase are assessed in Volume 4, Section 7: Land and Soils.

12.6 Mitigation Measures

12.6.1 Construction Phase

The following mitigation measures will be implemented where appropriate;

12.6.1.1 Road Network

A Traffic Management Plan, in conjunction with safety management plans will be developed by the Contractor in conjunction with IW, for the construction phase, as described in Volume 4, Section 13: Traffic.

Wheel cleaning facilities shall be installed on site so that all HGVs exiting site shall be cleaned and washed prior to leaving site.

Any damage arising to the road network shall be remediated in consultation with Fingal County Council Roads Department.

12.6.1.2 Utilities

Communication and consultation will be conducted with public utility providers prior to commencement of construction.

The construction contracts will require that the Contractor will produce a contract-specific Construction Environmental Management Plan (CEMP).

Underground surveying techniques are a key method of understanding the below ground conditions and confirming the presence of utility services. A Cable Avoidance Tool and a Signal Generator (CAT and Genny) are used to scan the surface of the ground with an audible signal being developed where underground utilities are detected. Surface radar scanning shall also be used to locate underground services before commencement of any mechanical excavation in the vicinity of underground services. These detection surveys shall be undertaken by the Contractor.

Method Statements shall be developed for the construction phase by the Contractor to ensure that all underground services are located manually and carefully protected. The CEMP, prepared by the Contractor and approved by IW, shall outline a methodology and procedure for carrying out such detection surveys.

An avoidance policy shall be adopted where possible in relation to all services and appropriate protection shall be provided for all above and below ground services as necessary.

12.6.1.3 Water Supply Infrastructure

The mitigation measures outlined for utilities will be repeated for mitigation of impacts on water supply infrastructure.

12.6.1.4 Drainage Infrastructure

The mitigation measures outlined for utilities will be repeated for mitigation of impacts on drainage infrastructure.

Additionally, the following shall apply:

- All runoff from paved areas will pass through an oil/fuel interceptor to ensure that contaminated waters are not discharged into adjacent watercourses.
- A shut-off valve will be installed on the outlet into the receiving watercourse. This will be used to contain any contaminated runoff in the event of a major accident on site.

Additional information relating to drainage is provided in section 12.3.6 above.

12.6.1.5 Watercourses

The mitigation measures outlined for utilities will be repeated for mitigation of impacts on wastewater collection infrastructure.

Additionally, the following shall apply:

- All runoff from paved areas will pass through a bypass oil/fuel interceptor; and
- A shut off valve will be installed on the outlet to the receiving watercourse. This will be used to contain any contaminated runoff in the event of a major accident on site.

Additional information relation to significant watercourses is provided in section 12.3.7 above.

12.6.2 Operational Phase

The following mitigation measures will be implemented where appropriate;

12.6.2.1 Road Network

Specific wheel cleaning facilities shall be installed on site so that all HGVs exiting the site shall be cleaned prior to leaving site.

Volume 4, Section 13.6: Mitigation Measures (Traffic) outlines that specific mitigation measures will not be required but lists some best practice measures which can be implemented.

12.7 Residual Impacts

12.7.1 Construction Phase

There will be no residual impacts during construction phase once the mitigation measures have been implemented.

12.7.2 Operational Phase

There will be no residual impacts during the operational phase once the mitigation measures have been implemented.

12.7.3 Interactions

Traffic movements of HGVs are outlined in Volume 4, Section 13: Traffic. The traffic volumes and proposed mitigation measures will influence the potential impact on the road surface quality during both the construction and operational phases.

Volume 4, Section 7: Land and Soils considers Geological Heritage and mineral extraction which are considered Material Assets of the area.

Volume 4, Section 4: Water considers water quality issues and water courses. Water courses are typically considered as Material Assets although it has been stated in this Material Assets section of Volume 4, Section 12.3.8: Watercourses that there are no significant watercourses in the vicinity of the site.

12.7.4 Cumulative Impacts

The residual impact of the Proposed RBSF Component, following implementation of mitigation measures as outlined in Section 12.6.1 and Section 12.6.2, on the Material Assets of the study area, as defined in each category of asset (Volume 4, Sections 12.3.1 to 12.3.10), during both the construction and operational phases is considered to be neutral. There are no likely cumulative impacts predicted with other projects.

12.8 Monitoring

No monitoring will be required prior to, or post implementation of mitigation measures.

12.9 Difficulties Encountered

No significant difficulties were encountered during the evaluation of the material assets section.

12.10 References

European Union, (2014). *Guidance on the preparation of Environmental Impact Assessment Report (EU Directive 2011/92/EU as amended by 2014/52/EU).*

Environmental Protection Agency (EPA), (2017). *Draft Guidelines on Information to be Contained in Environmental Impact Assessment Reports.*

Section 13: Traffic

13.1 Introduction

This Section of the EIAR assesses the potential traffic impacts (and resulting effects) likely to occur as a result the Regional Biosolids Storage Facility (RBSF) component of the Proposed GDD Project and the Proposed Upgrade Project. Hereinafter, this component is referred to "the Proposed RBSF Component".

13.2 Methodology

13.2.1 Introduction

This Section and assessment have been completed having regard to the guidance outlined in the Environmental Protection Agency documents *Guidelines on the information to be contained in Environmental Impact Assessment Reports* (Draft, August 2017) and *Advice Notes for Preparing Environmental Impact Statements* (Draft, September 2015).

The following guidance documents have also been referenced in the course of this assessment:

- Traffic and Transport Assessment Guidelines (TII 2014);
- Guidelines for Traffic Impact Assessment (TIA), Institution of Highways & Transportation (IHT, 1994);
- TII Project Appraisal Guidelines Unit 5.1: Construction of Traffic Models (TII 2016);
- TII Project Appraisal Guidelines Unit 5.3 – Travel Demand Projections (TII 2016);
- TII Project Appraisal Guidelines Unit 16.1: Expansion Factors for Short Period Traffic Counts (TII 2016); and
- Fingal Development Plan 2017-2023.

The methodology adopted for this assessment is based on the abovementioned guidance and is summarised as follows:

- Reference was made to site layout drawings;
- Existing and proposed access arrangements for the Proposed RBSF Component onto the surrounding road network were considered;
- Traffic surveys were undertaken at the junctions most likely to be impacted by the Proposed RBSF Component;
- The trip generation arising from the Proposed RBSF Component was estimated for the construction phase and operational phase;
- The Proposed RBSF Component specific trip generation was assigned and distributed throughout the study area;
- The anticipated traffic associated with background traffic growth were applied to the baseline network model to develop the 2020, 2024, 2025 and 2040 models; and
- The anticipated traffic associated with developments on adjoining sites were applied to the future network models to develop the cumulative impact models; and
- The junctions considered most likely to be impacted upon by traffic movements associated with the Proposed RBSF Component based on an assessment of the selected haul route to and from the Proposed RBSF Component were assessed in terms of capacity and road safety.

The assessment is based on the findings of site visits, observations, on-site traffic counts, plans associated with the Proposed RBSF Component and consultation with the design team responsible for the Proposed RBSF Component. The criteria utilised for the assessment are Ratio of Flow to Capacity (RFC), Queuing Delay and Maximum Queue Length.

During the assessment, the Roads and Traffic Planning Division of Fingal County Council were consulted and, as summarised in Volume 2, Section 2: The EIA Process, concerns regarding traffic in the locality raised during public consultation were considered in this assessment.

13.2.2 Objectives

The primary objectives of this assessment are to:

- Assess the existing environment, as defined in section 13.3.3, in terms of traffic and transportation during the 2017 base year;
- Estimate the likely trip generation during the construction phase and operational phase of the Proposed RBSF Component;
- Identify, quantify and analyse the likely traffic impacts on the surrounding road network which are likely to result from the construction and the operation of the Proposed RBSF Component;
- Identify mitigation measures to alleviate traffic impacts and residual impacts, if any, occurring as a result of the Proposed RBSF Component; and
- To present any residual impacts resulting from the Proposed RBSF Component.

13.2.3 Scope of Study

The study area was determined by considering existing and proposed access arrangements for the Proposed RBSF Component onto the surrounding road network and is shown in Figure 13-1. Sections of the public roads listed below fell within the study area:

- N2 National Road;
- R135 Regional Road; and
- Elm Road.

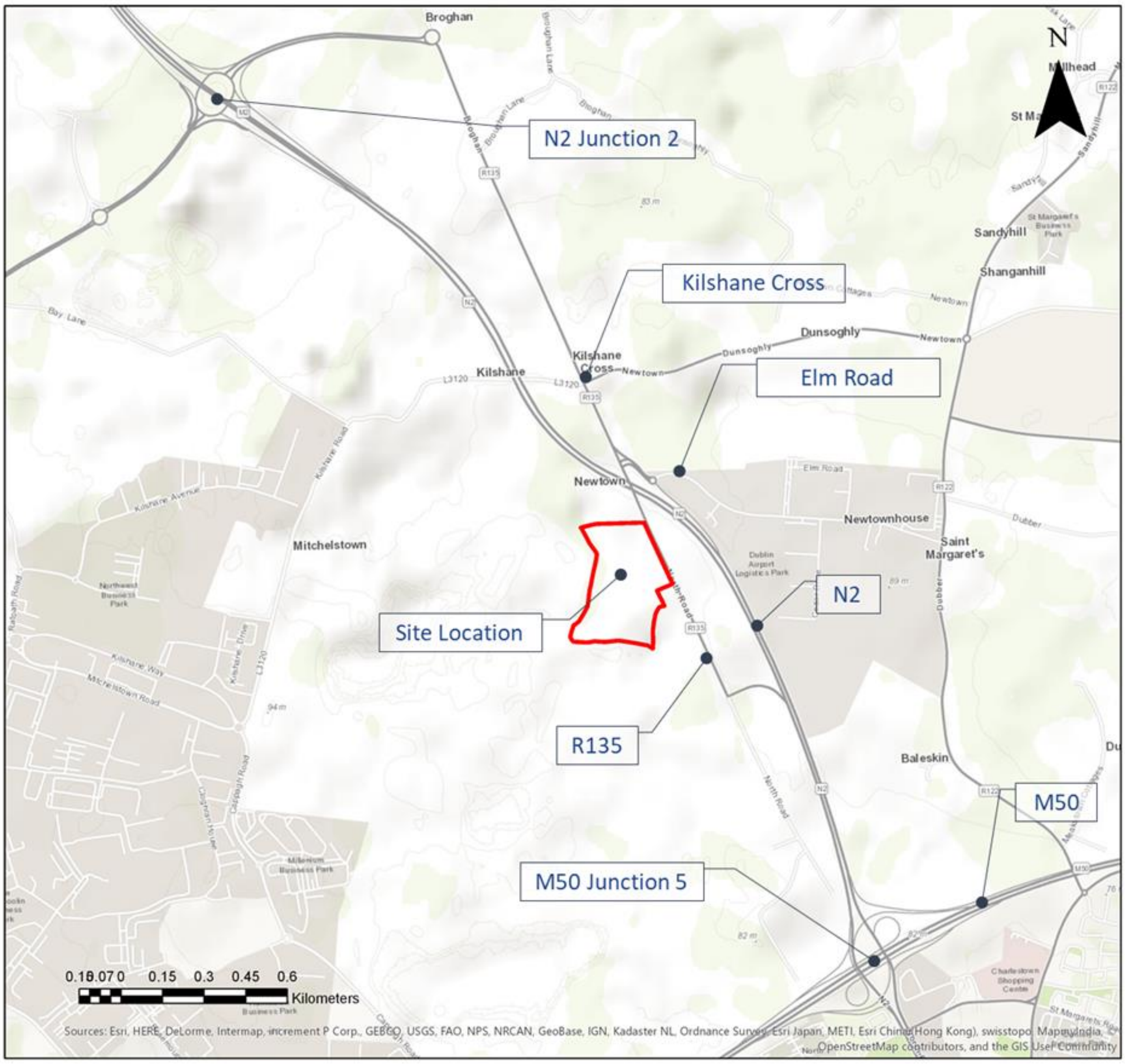

Figure 13-1: Local Road Network

The N2 National Road runs in a north/south direction from M50 Junction 5 to the border with Northern Ireland near Aughnocloy, Co. Tyrone, via Ashbourne, Ardee and Monaghan Town. The N2 has a carriageway width of approximately 34.5 m, split evenly over two carriageways, each comprising three no. 3.65 m running lanes, 3.0 m hard-shoulder and 0.5 m central hard strip adjacent a 5.0 m central median. The N2 has an Annual Average Daily Traffic (AADT) of 38,126 vehicles according to TII traffic counter TMU M02 000.0 N[24].

The R135 Regional Road is located to the east of the site and runs in a north/south direction. The R135 has a carriageway width of 12.5 m and 60 kph speed limit within the study area.

[24] *Accessed on 20 December 2017.*

Elm Road is a minor road from a roundabout on the eastern side of the N2 and leads into the Dublin Airport Logistics Park.

13.2.4 Traffic Surveys

In order to determine current traffic behaviour in the vicinity of the Proposed RBSF Component, classified traffic count surveys were carried out at the following locations:

- Location 1 - Kilshane Cross (Signalised) Junction;
- Location 2 - North Road (R135)/Elm Road Junction (R135 Signalised Junction);
- Location 3 - Elm Road/N2 Southbound Link Junction (Elm Road (Roundabout) Junction);
- Location 4 - N2 Northbound Link/North Road (R135) Junction (N2 Northbound Slip Road (Priority) Junction); and
- Location 5 - N2 Mainline.

The junctions identified for the traffic count surveys are the junctions most likely to be affected by the Proposed RBSF Component, based on an assessment of available haul routes to and from the Proposed RBSF Component site.

Irish Traffic Surveys were commissioned to undertake classified traffic counts between 7:00 am and 7:00 pm on Tuesday, 03 October 2017. The counts were designed to establish a 12-hour profile of traffic and trip patterns at each junction and also to identify the critical peak hour periods of traffic flow through each junction. The traffic count survey locations are shown on Figure 13-2.

Full turning counts were recorded, and data was collected in 15-minute intervals at each traffic count survey location. The following count classifications were employed:

- Light Vehicles:
  - Pedal Cycles (PCL);
  - Motorcycles (MCL);
  - Car; and
  - Light Goods Vehicles (LGV).
- Heavy Goods Vehicles:
  - Other Goods Vehicles - 2-axle and 3-axle rigid commercial vehicles (OGV1);
  - Other Goods Vehicles - 4-axle-rigid and 3-axle (or more) articulated commercial vehicles (OGV2); and
  - Public Service Vehicles (PSV).

An initial analysis of the traffic data was undertaken in order to establish the baseline peak hour traffic flows for each count location.

The AADT flow was obtained by utilising the methodology specified in TII (NRA) Project Appraisal Guidelines - Unit 16.1: Expansion Factors for Short Period Traffic Counts.

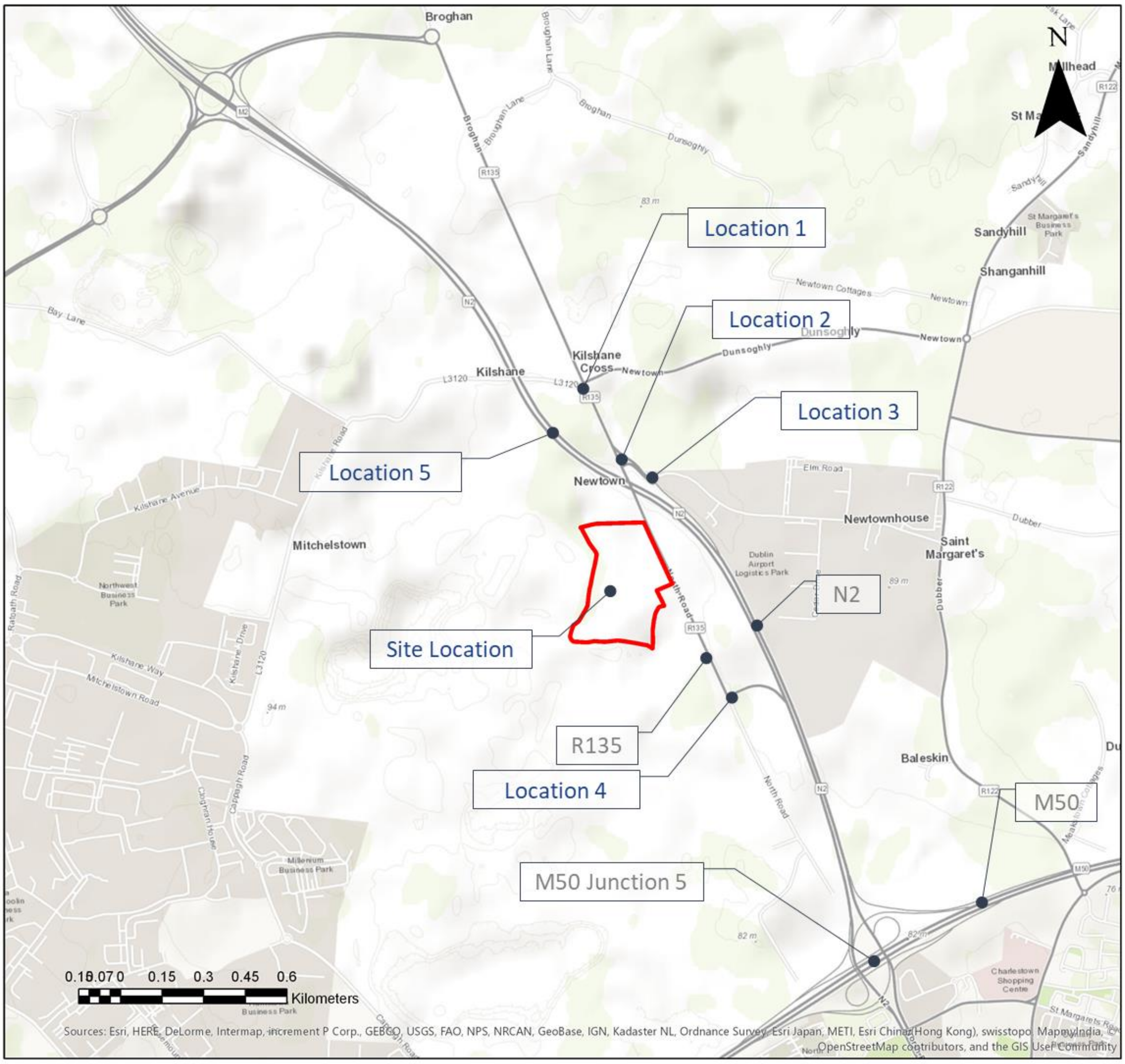

Figure 13-2: Traffic Count Location Map

13.2.5 Modelling Methodology

Classified traffic count surveys were carried out in the vicinity of the Proposed RBSF Component site at the junctions most likely to be affected by the Proposed RBSF Component. These traffic count surveys were utilised to develop the 2017 AM and PM Peak baseline traffic models.

This assessment has developed a microscopic model to assess the impact of the Proposed RBSF Component on the adjoining junctions, based on traffic count data and derived trip rates from committed developments in the surrounding area.

To establish future year flows, traffic flow figures contained in the baseline model were factored up to the design years 2020, 2024, 2025 and 2040 using central growth rates contained within TII (NRA) Project Appraisal Guidelines: Unit 5.3 - Travel Demand Projections.

Traffic volumes associated with the construction phase of the Proposed RBSF Component were developed by calculating the average number of HGV vehicles per hour during the construction phase.

To provide a worst-case assessment of the impact of construction related HGVs on the operation of the N2, it has been assumed HGV trips will access the site via the existing northbound slip road located to the south of the site and will access the N2 via the existing slip road located to the north. It has been assumed that light vehicles associated with staff and smaller deliveries will be attracted to and distributed from the subject site in a similar proportion to the baseline traffic model. In this regard, the peak turn-in and turn-out flows calculated for the Proposed RBSF Component were distributed and assigned throughout the junctions considered in similar proportions to the overall traffic flows identified as part of the baseline traffic model.

A capacity assessment of the Kilshane Cross (Signalised) Junction and the R135 Signalised Junction, was undertaken utilising the surveyed results described in Section 13.3.2 and the Transport Research Laboratory's (TRL) OSCADY (Optimised Signal Capacity And DelaY) software for signalised junctions. Similarly, a capacity assessment of the N2 Northbound Slip Road (Priority) Junction was undertaken using TRL's PICADY (Priority Intersection Capacity and DelaY) software for priority-controlled junctions. Finally, a capacity assessment of the Elm Road (Roundabout) Junction was undertaken using TRL's ARCADY (Assessment of Roundabout Capacity and DelaY) software for roundabout junctions.

A cumulative assessment of the local road network was undertaken which made allowance for future development of the surrounding, undeveloped lands in line with the current land-use zoning contained within the Fingal Development Plan 2017 – 2023. The area examined for future development is illustrated in Figure 13-3 and comprises the area bounded by the M50 to the south, the L3120 and L3125 to the north, the R122 to the east and the Cappagh Road to the west. This area was selected as it is anticipated that this area of future development would utilise the same junctions as the Proposed RBSF Component for access to the surrounding road network.

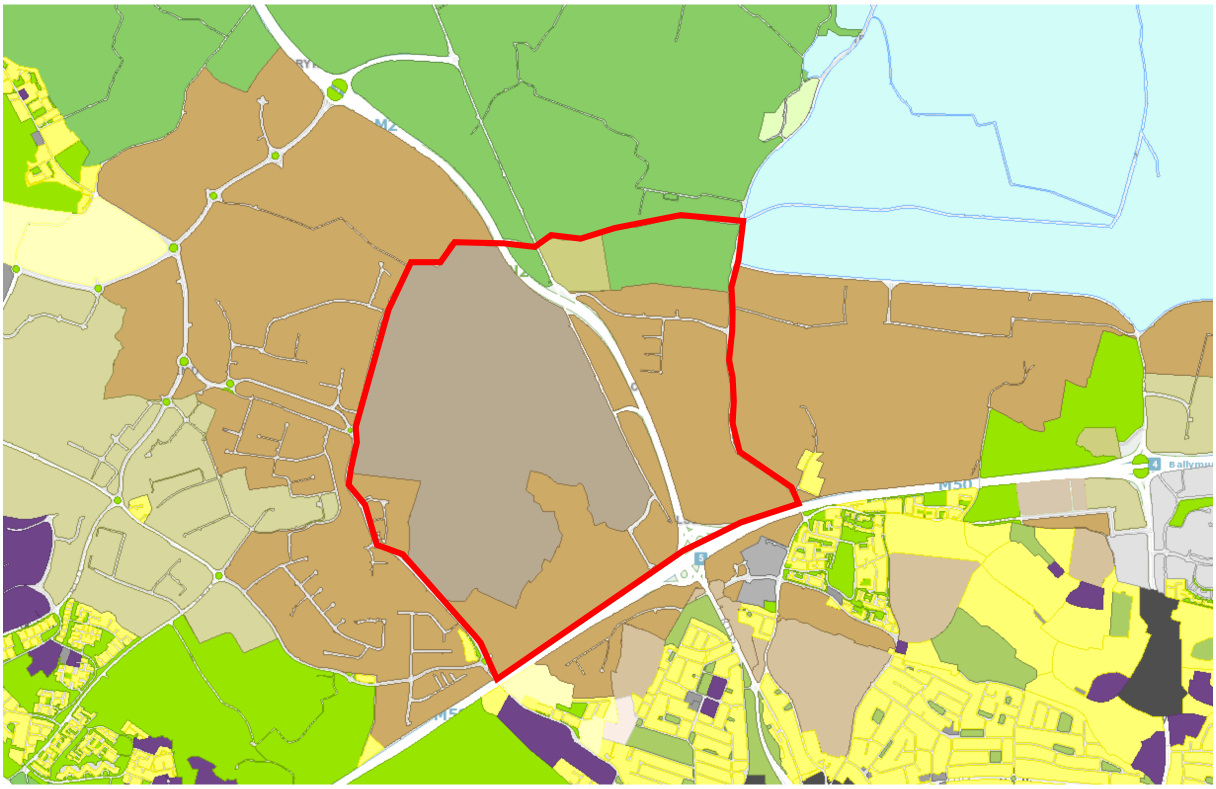

Figure 13-3: Area of Future Development Considered

The area of land for each zoning objective was estimated and the anticipated Gross Floor Area (GFA) of potential developments on these areas of land was calculated using a ratio of 0.3 GFA to total site area, which is consistent with the current ratio of GFA to total site area in the adjoining Dublin Airport Logistics Park. The TRICS® trip generation database was interrogated to determine the anticipated trip rates associated with the development of the surrounding, undeveloped lands. Whilst details of the nature and type of development in the surrounding, undeveloped lands are unknown, it was estimated that 95 ha are currently zoned for Heavy Industry, 14 ha are currently zoned for Warehousing and Distribution, and 182 ha are currently zoned for General Employment. For the purposes of this assessment it has been assumed that all of the surrounding lands will be developed by 2040, with an incremental increase in traffic volumes from 2017 to 2040. It has been assumed that vehicles associated with the development of the surrounding lands are likely to be attracted to and distributed from the sites in a similar proportion to the baseline traffic model.

13.2.6 Do-Nothing Scenario

To establish future year flows, traffic flow figures contained in the baseline model were factored up to the design years 2024, 2025 and 2040 using central growth rates contained within TII (NRA) Project Appraisal Guidelines: Unit 5.3 - Travel Demand Projections.

13.2.7 With Project Scenario

13.2.7.1 Trip Distribution and Trip Assignment

Light vehicular traffic to and from with the Proposed RBSF Component site is likely to be attracted to and distributed from the Proposed RBSF Component in a similar proportion to vehicles entering and exiting the R135 in the baseline traffic model.

In this regard, the peak turn-in and turn-out flows calculated for the Proposed RBSF Component were distributed and assigned throughout the junctions considered in similar proportions to the overall traffic flows established as part of the baseline traffic model.

HGVs associated with the Proposed RBSF Component will access the site from the N2 northbound slip road and will return to the N2 via the N2 southbound slip road.

13.2.7.2 Construction Phase

Assessment Years

It is anticipated that the Proposed RBSF Component will be constructed in two phases with phase one commencing in 2020. Construction of phase one is expected to last for 12 months with completion anticipated in 2021. Phase two is anticipated to commence in 2024, with all works completed by 2025. The traffic impact during the construction phases will, therefore, focus on the following worst-case scenarios:

- Phase One Construction Period - 2020
- Phase Two Construction Period - 2024

As noted the projected 2020 and 2024 baseline network flows have been calculated by factoring up the 2017 recorded network flows in accordance with *Project Appraisal Guidelines Unit 5.3 - Travel Demand Projections* (TII/NRA). It should also be noted that the Proposed RBSF Component will be operational in 2024, during the construction period for phase two. The traffic analysis associated with the phase two construction works also allows for operational traffic associated with phase one.

Concurrent construction of both Biosolids Storage Buildings of the Proposed RBSF Component will result in little or no extension to the overall construction programme. However, additional construction staff and resources would be required during the construction period. The traffic movements associated with this increased construction phase are similar to those associated with the Phase Two Construction Period – 2024, which includes both construction traffic and operational traffic. Phase Two Construction in 2024 includes additional background traffic associated with annual traffic growth. Therefore, the traffic modelling outlined previously provides for a worst-case scenario.

Construction Traffic Trip Generation

The anticipated peak hour trip generation figures for both construction phases are summarised in Table 13-1.

Table 13-1: Construction Traffic AM Peak Hour Trip Generation

Year	Construction Phase	HGVs		Staff		Total	
		Arrivals	Departures	Arrivals	Departures	Arrivals	Departures
2020	Phase 1	10	10	30	0	40	10
2024	Phase 2	10	10	30	0	40	10

For the purposes of this assessment it has been assumed that PM Peak trips are the inverse of the AM Peak, i.e. 40 total departures and 10 arrivals during the peak hour.

Additionally, the 2024 phase two construction scenario also includes for operational traffic associated with the operation of phase one. The anticipated AM peak hour trip generation associated with the operation phase is summarised in Table 13-2.

Table 13-2: 2024 AM Peak Hour Operational Traffic Trip Generation

Year	HGVs		Staff		Total	
	Arrivals	Departures	Arrivals	Departures	Arrivals	Departures
2024	4	4	10	0	14	4

For the purposes of this assessment it has been assumed that PM Peak trips are the inverse of the AM Peak, i.e. 10 total departures and 4 arrivals during the peak hour.

13.2.7.3 Operation Phase

Assessment Years

Traffic analysis associated with the impact of the operation of the Proposed RBSF Component will focus on the following future scenarios:

- Year of Opening - 2025; and
- Design Year - 2040.

As noted, the projected 2025 and 2040 baseline network flows have been calculated by factoring up the 2017 recorded network flows in accordance with *Project Appraisal Guidelines Unit 5.3 - Travel Demand Projections* (TII/NRA).

Operational Trip Generation

The peak hour trip generation associated with the 2025 year of opening and the 2040 design year are summarised in Table 13-3.

Table 13-3: AM Peak Hour Operational Traffic Trip Generation

Year	HGVs		Staff		Total	
	Arrivals	Departures	Arrivals	Departures	Arrivals	Departures
2025	5	5	6	0	11	5
2040	9	9	10	0	19	9

For the purposes of this assessment it has been assumed that PM Peak trips are the inverse of the AM Peak, i.e. 19 total departures and 9 arrivals during the 2040 peak hour.

13.2.7.4 Total Trip Generation

Trip generation for the construction traffic and operational traffic travelling to and from the Proposed RBSF Component during both phases of construction are based on estimates provided by the design team and worst-case traffic estimates were adopted.

There will be up to approximately 6 no. staff, up a maximum of 10 no. staff onsite during the operational phase of the Proposed RBSF Component. For this assessment, the number of staff is assumed to be 10. It is anticipated that HGV trips throughout with the operational phase of the Proposed RBSF Component will increase as the RBSF approaches capacity in the design year 2040. HGV trips associated with the operational phase of the Proposed RBSF Component comprise deliveries from the Ringsend WwTP and the Greater Dublin Drainage scheme. A summary of the daily trip generation rates for the construction and operational phases of the Proposed RBSF Component are contained in Table 13-4.

Table 13-4: Daily Trip Generation Figures

Year	Construction Traffic				Operation Traffic			
	HGVs		Staff		HGVs		Staff	
	Arrivals	Departures	Arrivals	Departures	Arrivals	Departures	Arrivals	Departures
2020	25	25	70	70	-	-	-	-
2024	25	25	70	70	30	30	10	10
2025	-	-	-	-	40	40	10	10
2040	-	-	-	-	70	70	10	10

13.3 Existing Environment

13.3.1 Site Location

The Proposed RBSF Component will be located at Newtown, Dublin 11. The site comprises approximately 11 hectares of partially developed land and is situated off the R135 road, on the western side of the N2 national road. It is approximately 1.6 km north of M50 Junction 5 (Finglas) and 1.5 km west of Dublin Airport.

13.3.2 Local Road Network

13.3.2.1 Location 1: Kilshane Cross (Signalised) Junction

The morning (AM) peak hour was identified as the period from 8:00 am to 9:00 am, when a total of 1,576 vehicles passed through the junction. The evening (PM) peak hour was identified as the period from 4:00 pm to 5:00 pm when 1,448 vehicles passed through the junction. The AM and PM peak hour traffic flows through the junction are illustrated in Figure 13-4 and Figure 13-5 respectively.

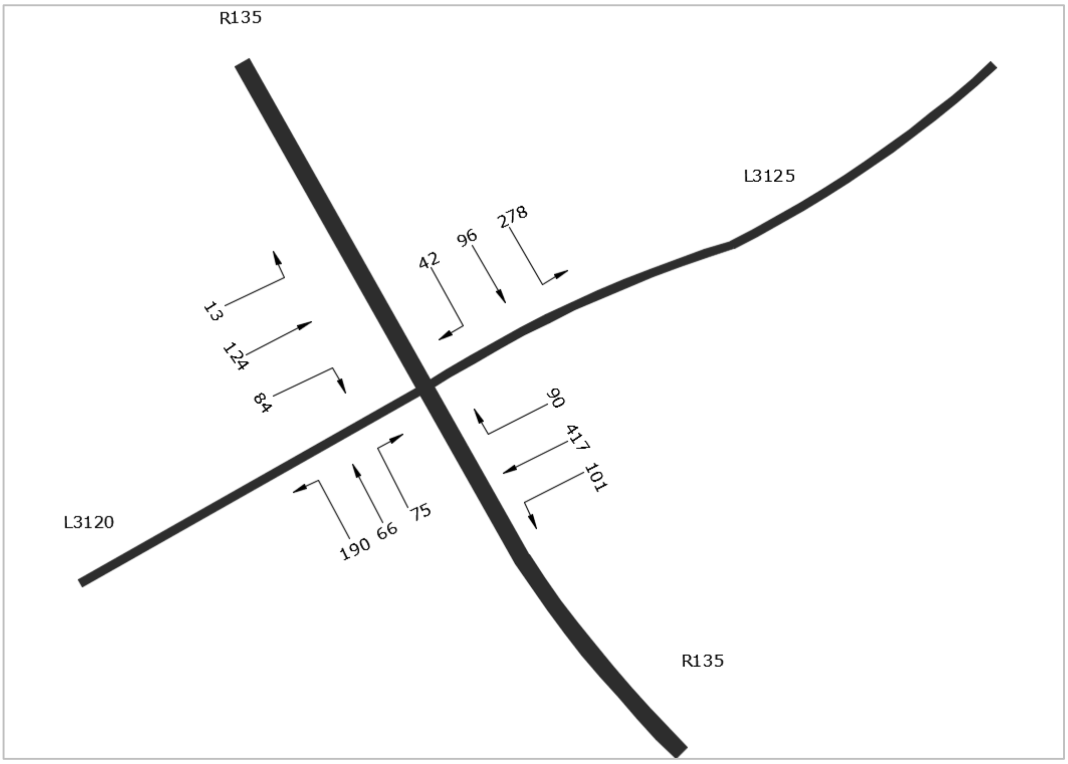

Figure 13-4: AM Peak Traffic Flows for Location 1

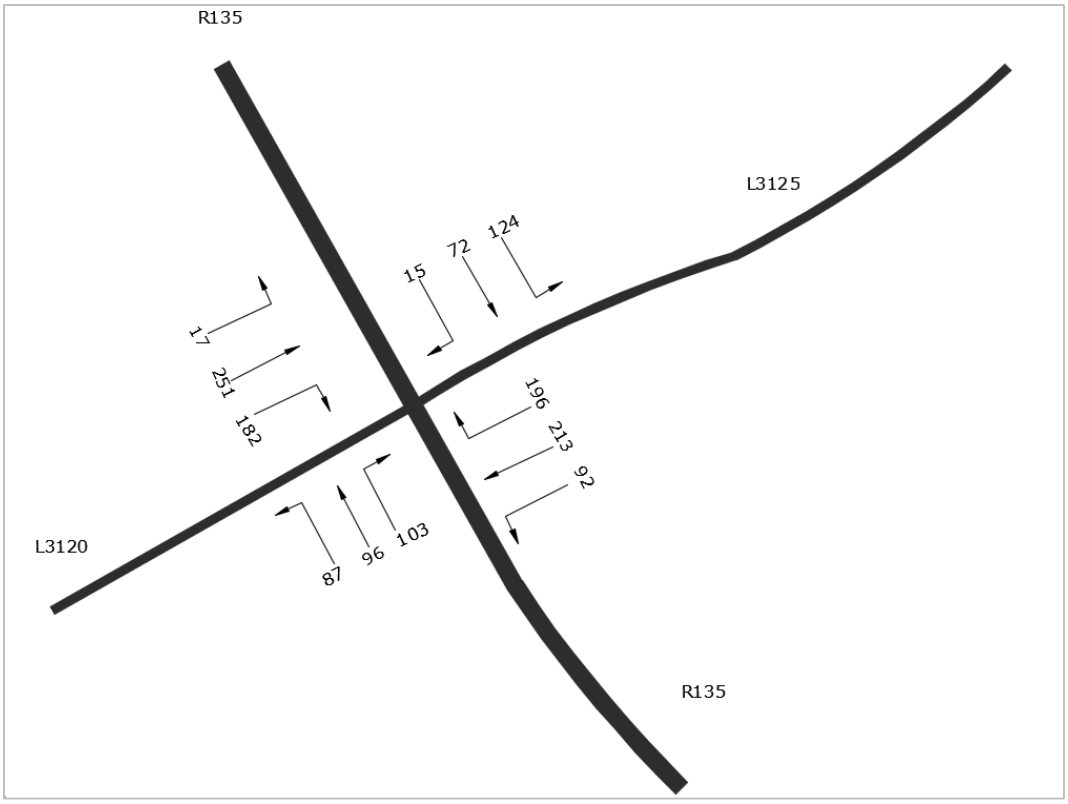

Figure 13-5: PM Peak Traffic Flows for Location 1

13.3.2.2 Location 2: R135 Signalised Junction

The morning (AM) peak hour was identified as the period from 8:00 am to 9:00 am, when a total of 763 vehicles passed through the junction. The evening (PM) peak hour was identified as the period from 1:00 pm to 2:00 pm when 724 vehicles passed through the junction. The AM and PM peak hour traffic flows through the junction are illustrated in Figure 13-6 and Figure 13-7 respectively.

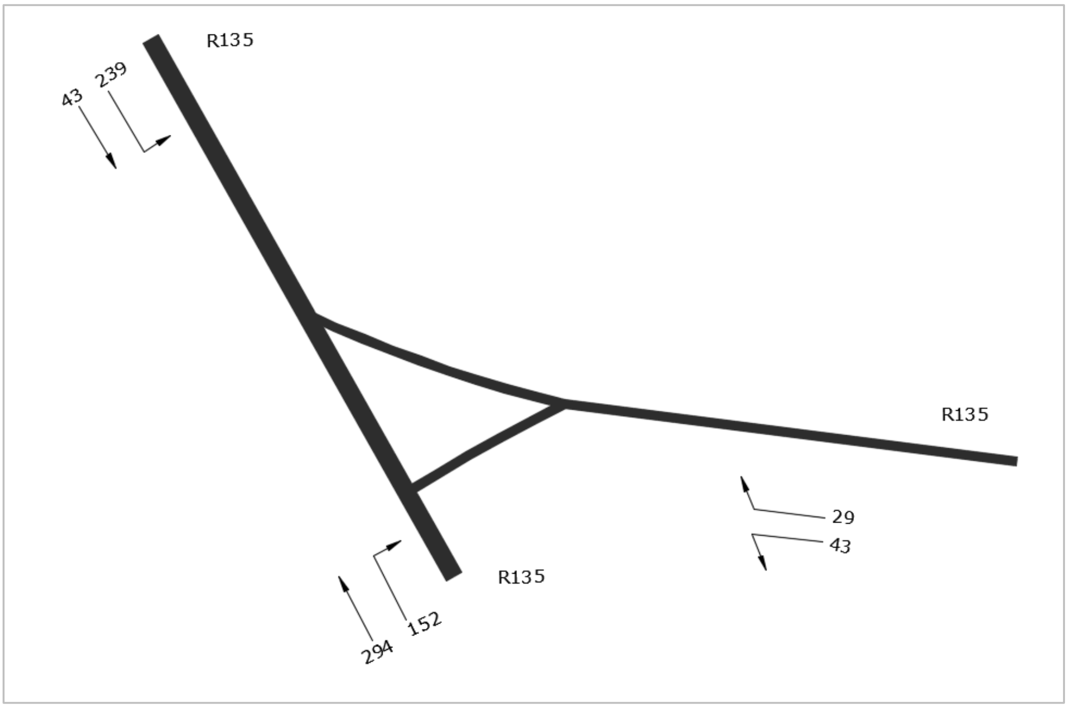

Figure 13-6: AM Peak Traffic Flows for Location 2

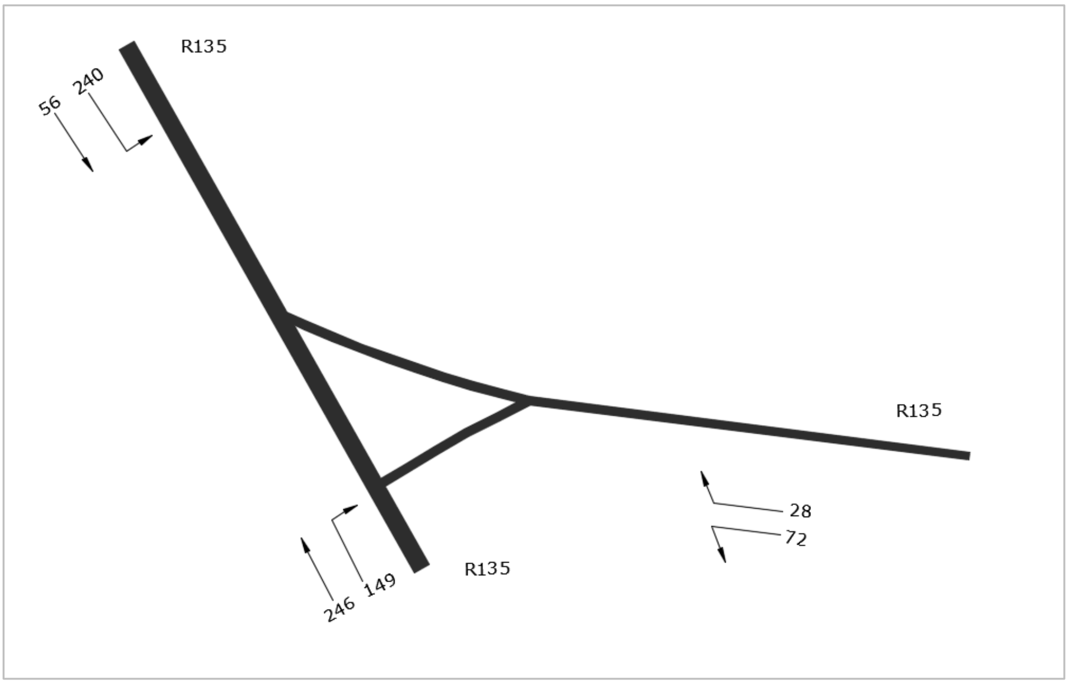

Figure 13-7: PM Peak Traffic Flows for Location 2

13.3.2.3 Location 3: Elm Road (Roundabout) Junction

The morning (AM) peak hour was identified as the period from 8:00 am to 9:00 am, when a total of 467 vehicles passed through the junction. The evening (PM) peak hour was identified as the period from 4:00 pm to 5:00 pm when 559 vehicles passed through the junction. The AM and PM peak hour traffic flows through the junction are illustrated in Figure 13-8 and Figure 13-9 respectively.

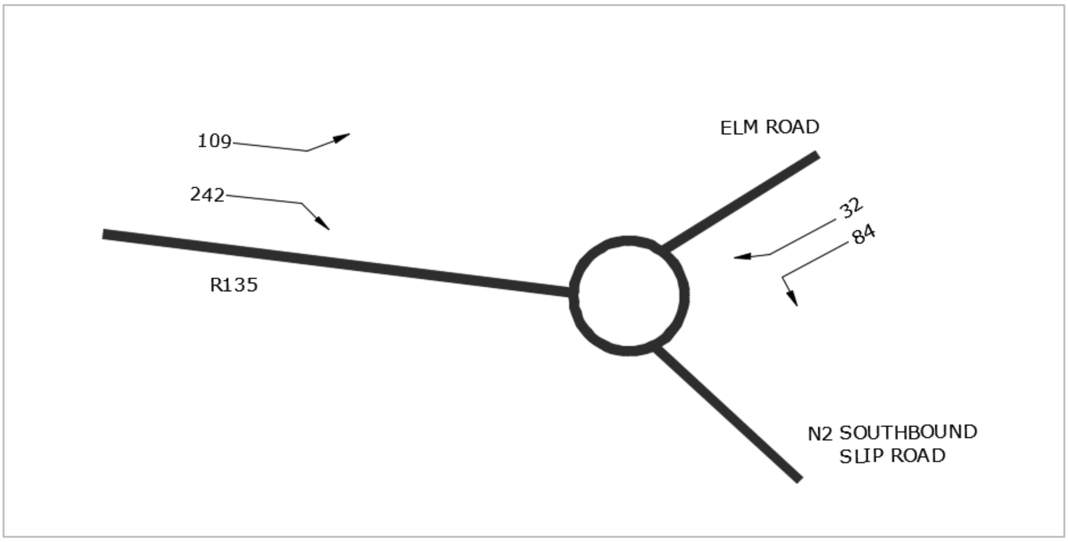

Figure 13-8: AM Peak Traffic Flows for Location 3

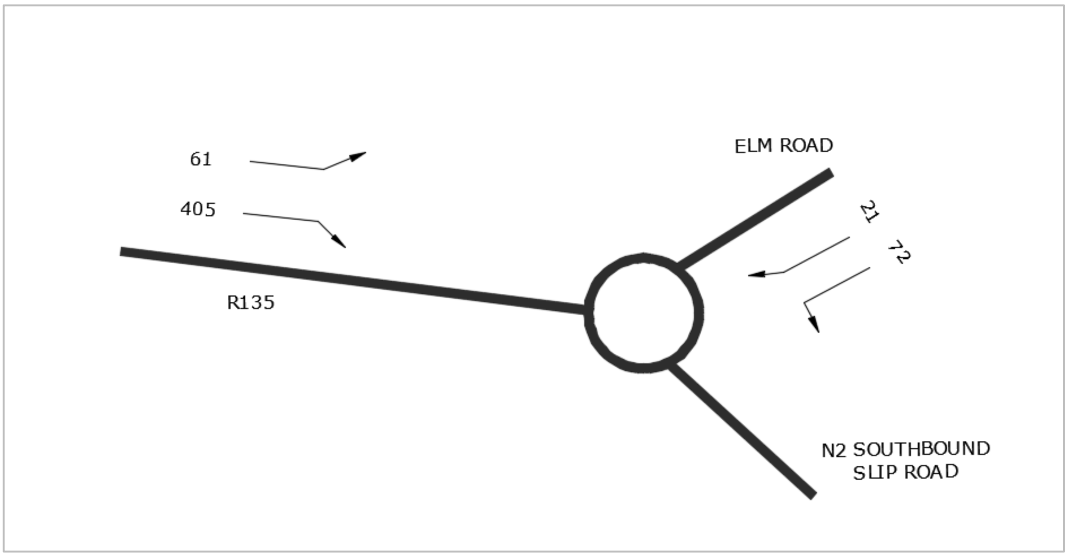

Figure 13-9: PM Peak Traffic Flows for Location 3

13.3.2.4 Location 4: N2 Northbound Slip Road (Priority) Junction

The morning (AM) peak hour was identified as the period from 10:00 am to 11:00 am, when a total of 534 vehicles passed through the junction. The evening (PM) peak hour was identified as the period from 1:00 pm to 2:00 pm when 519 vehicles passed through the junction. The AM and PM peak hour traffic flows through the junction are illustrated in Figure 13-10 and Figure 13-11 respectively.

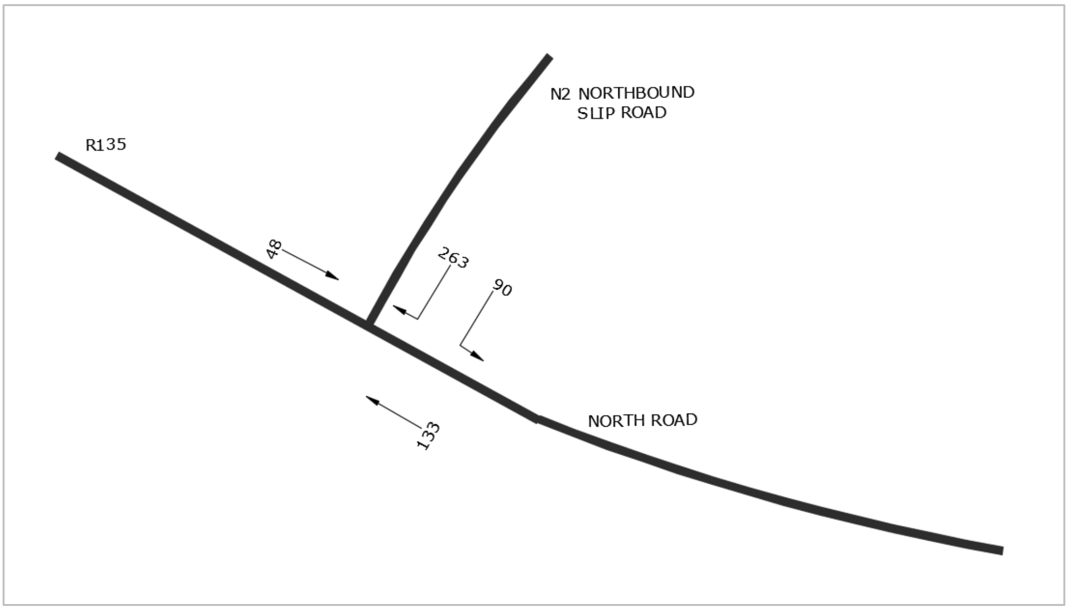

Figure 13-10: AM Peak Traffic Flows for Location 4

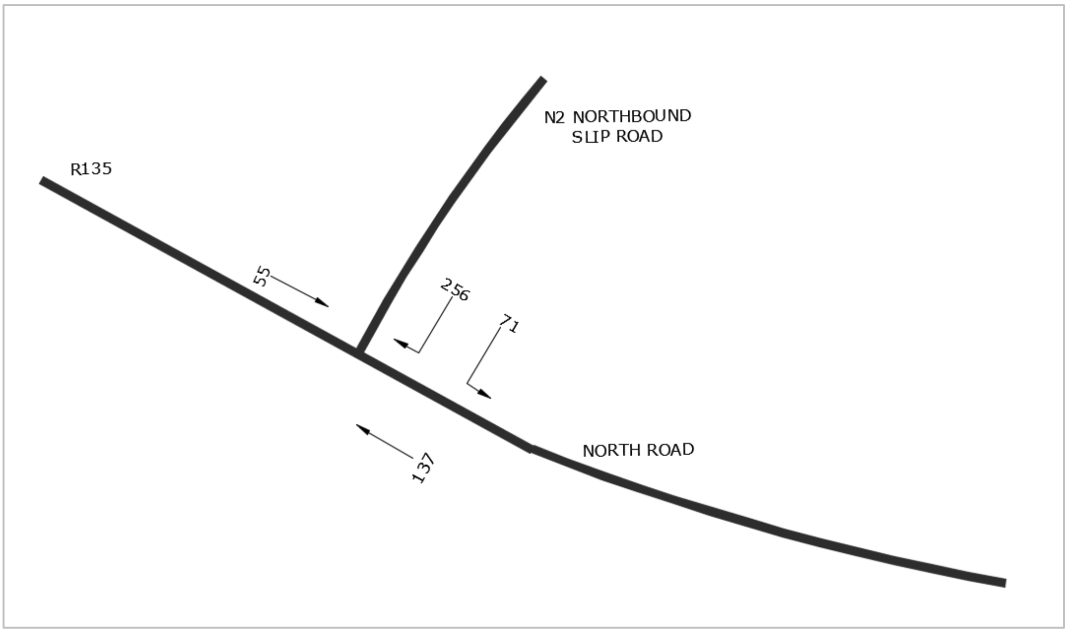

Figure 13-11: PM Peak Traffic Flows for Location 4

13.3.3 2017 Base Year Capacity Analysis

13.3.3.1 Base Year 2017 Annual Average Daily Traffic (AADT) Flows

The 2017 AADT for the N2 and R135 were derived using the methodology set out in *Project Appraisal Guidelines - Unit 16.1: Expansion Factors for Short Period Traffic Counts* (TII/NRA) as detailed in Table 13-5.

Table 13-5: 2017 AADTs Derived from Traffic Count Data

Link	12 Hour Flow (Vehicles)	AADT
N2	36,085	39,692
R135	5,073	5,580
Elm Road	1,504	1,654

Given the difference of less than 15%[25] between the values, the N2 AADT of 39,692 is directly comparable to the AADT figures of 38,126 obtained from the TII traffic count data provided in section 13.3.2.

The calculated AADTs are illustrated in Figure 13-12.

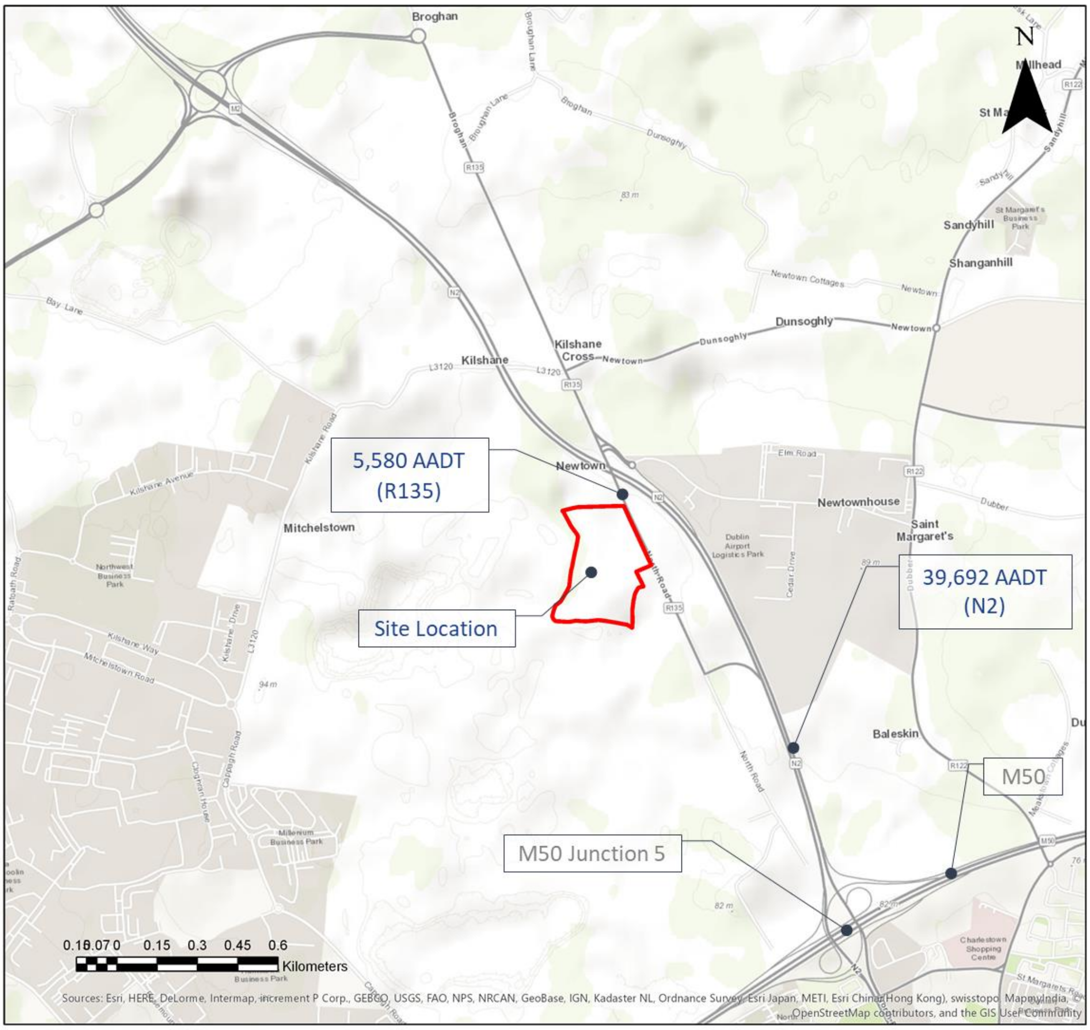

Figure 13-12: 2017 AADTs on Local Road Network

13.3.3.2 2017 Base Year Capacity Assessment

A summary of the results of the analysis for the AM and PM peak hours are shown in Table 13-6 and Table 13-7 respectively.

The normal design threshold for the ratio of flow to capacity (RFC) at a priority junction is 0.85 and 0.90 at a signal-controlled junction. As can be seen from the Table 13-6 and Table 13-7, the RFCs at Kilshane

[25] *NRA Project Appraisal Guidelines Unit 5.1: Construction of Traffic Models (TII 2016)*

Cross Junction in the 2017 scenario are in excess of the 0.90 design threshold for both the AM and PM scenarios.

Table 13-6: 2017 Baseline AM Peak Junction Capacity Analysis

Junction	Highest RFC	Queuing Delay (sec/veh)	Maximum Queue Length (veh)
Kilshane Cross (Signalised) Junction	0.910	120	17.5
R135 Signalised Junction	0.543	20	3.0
Elm Road (Roundabout) Junction	0.195	2	0.2
N2 Northbound Slip Road (Priority) Junction	0.733	18	2.6

Table 13-7: 2017 Baseline PM Peak Junction Capacity Analysis

Junction	Highest RFC	Queuing Delay (sec/veh)	Maximum Queue Length (veh)
Kilshane Cross (Signalised) Junction	0.928	125	17.1
R135 Signalised Junction	0.521	18	2.8
Elm Road (Roundabout) Junction	0.259	2	0.3
N2 Northbound Slip Road (Priority) Junction	0.689	17	2.1

13.3.4 Existing Road Safety Assessment

The Road Safety Authority (RSA) database of road collision information was interrogated to establish if the surrounding road network in the vicinity of the Proposed RBSF Component holds records relating to historical collision occurrence (see Figure 13-13).

The exercise revealed that there was one fatal collision on the R135, one serious collision on the R135, and ten minor collisions comprising, five on the R135, two on the L3120 and three on the L3125 in the vicinity of the Proposed RBSF Component.

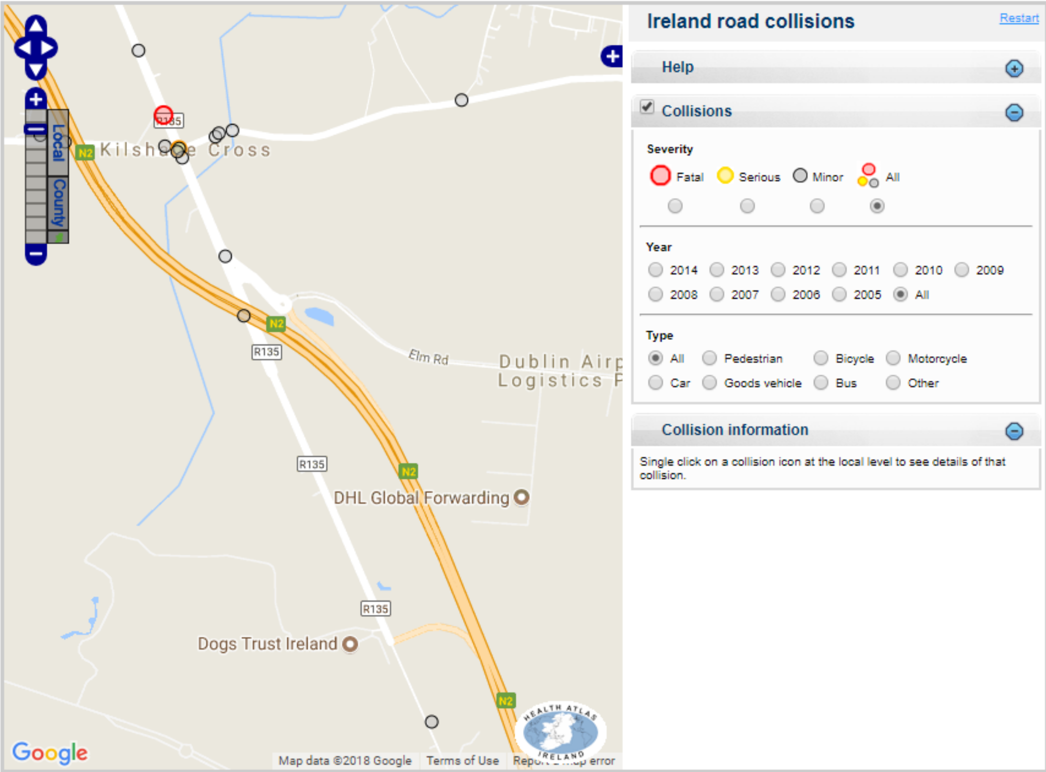

Figure 13-13: Road Safety Authority Collision Database

13.4 Characteristics of the RBSF Component of the Proposed GDD Project

The Proposed RBSF Component is described in Volume 2, Chapter 4: Description of the Proposed Project. The characteristics of the Proposed RBSF Component relating to traffic are discussed in the following sections.

13.4.1 Access Arrangements

Access to the Proposed RBSF Component is provided via the existing access from the R135. A deceleration lane is currently provided for northbound vehicles on the R135 and a right-turn pocket is currently provided for southbound vehicles. Visibility in excess of 90 m, which is the desirable minimum distance commensurate to a 60 kph speed limit, is available to the left and right at the existing access.

The proposed haul route for HGV's from/to M50 Junction 5 to/from the site is illustrated in Figure 13-14.

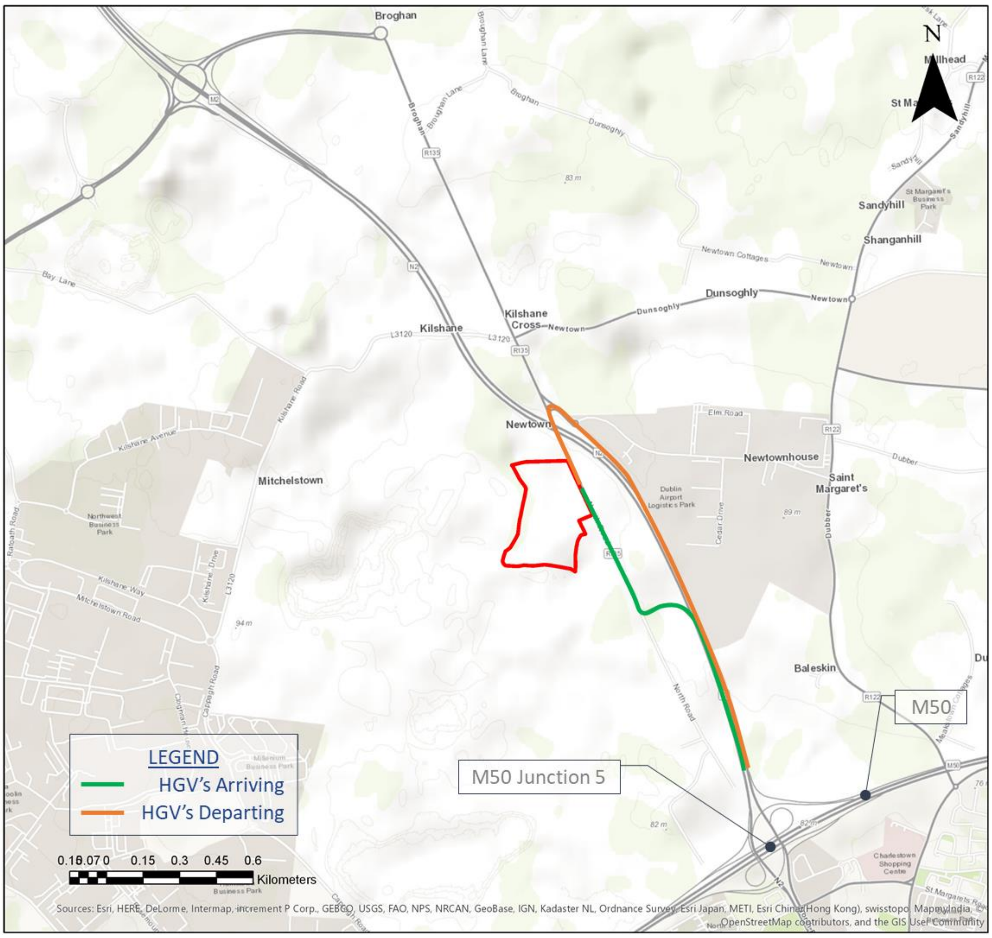

Figure 13-14: Proposed HGV Haul Route

13.4.2 Total Trip Generation

Trip generation for the construction traffic and operational traffic travelling to and from the Proposed RBSF Component are based on estimates provided by the design team and worst-case traffic estimates were adopted. Refer to section 13.2.7.4 for details of the total trip generation utilised for this assessment.

13.5 Potential Impacts

13.5.1 Do-Nothing Impacts

13.5.1.1 2020 Junction Analysis

A summary of the Do-Nothing Impacts for 2020 for the AM and PM peak hours are shown in Table 13-8 and Table 13-9.

The normal design threshold for the ratio of flow to capacity (RFC) at a priority junction is 0.85. For a signal-controlled junction the normal design threshold is 0.90. As can be seen from Table 13-8 and Table 13-9, the RFCs at Kilshane Cross (Signalised) Junction in the 2020 scenario will be in excess of the 0.90 design threshold for both the AM and PM scenarios.

Table 13-8: 2020 AM Peak Junction Capacity Analysis

Junction	Scenario	Highest RFC	Queuing Delay (sec/veh)	Maximum Queue Length (veh)
Kilshane Cross (Signalised) Junction	Do-Nothing	0.950	139	20.9
R135 Signalised Junction	Do-Nothing	0.538	20	3.2
Elm Road (Roundabout) Junction	Do-Nothing	0.204	2	0.3
N2 Northbound Slip Road (Priority) Junction	Do-Nothing	0.774	20	3.2

Table 13-9: 2020 PM Peak Junction Capacity Analysis

Junction	Scenario	Highest RFC	Queuing Delay (sec/veh)	Maximum Queue Length (veh)
Kilshane Cross (Signalised) Junction	Do-Nothing	0.971	144	21.2
R135 Signalised Junction	Do-Nothing	0.537	19	3.0
Elm Road (Roundabout) Junction	Do-Nothing	0.270	2	0.4
N2 Northbound Slip Road (Priority) Junction	Do-Nothing	0.728	18	2.5

13.5.1.2 2024 Junction Analysis

A summary of the Do-Nothing Impacts for 2024 for the AM and PM peak hours are shown in Table 13-10 and Table 13-11.

As can be seen from the following tables, the RFCs at Kilshane Cross Junction in the 2024 scenario will be in excess of the 0.90 design threshold for both the AM and PM scenarios. It should be noted that Kilshane Cross Junction exceeds the theoretical traffic carrying capacity of 1.0 in both the AM and PM scenarios.

Table 13-10: 2024 AM Peak Junction Capacity Analysis

Junction	Scenario	Highest RFC	Queuing Delay (sec/veh)	Maximum Queue Length (veh)
Kilshane Cross (Signalised) Junction	Do-Nothing	1.007	178	30.1
R135 Signalised Junction	Do-Nothing	0.583	21	3.5
Elm Road (Roundabout) Junction	Do-Nothing	0.218	2	0.3
N2 Northbound Slip Road (Priority) Junction	Do-Nothing	0.831	24	4.4

Table 13-11: 2024 PM Peak Junction Capacity Analysis

Junction	Scenario	Highest RFC	Queuing Delay (sec/veh)	Maximum Queue Length (veh)
Kilshane Cross (Signalised) Junction	Do-Nothing	1.029	179	31.1
R135 Signalised Junction	Do-Nothing	0.561	19	3.2
Elm Road (Roundabout) Junction	Do-Nothing	0.287	2	0.4
N2 Northbound Slip Road (Priority) Junction	Do-Nothing	0.782	21	3.3

13.5.1.3 2025 Junction Analysis

A summary of the Do-Nothing Impacts for 2025 for the AM and PM peak hours are shown in Table 13-12 and Table 13-13.

The RFCs at Kilshane Cross Junction in the 2025 scenario will be in excess of the 0.90 design threshold for both the AM and PM scenarios. It should be noted that Kilshane Cross Junction exceeds the theoretical traffic carrying capacity of 1.0 in both the AM and PM scenarios.

Table 13-12: 2025 AM Peak Junction Capacity Analysis

Junction	Scenario	Highest RFC	Queuing Delay (sec/veh)	Maximum Queue Length (veh)
Kilshane Cross (Signalised) Junction	Do-Nothing	1.030	194	35.7
R135 Signalised Junction	Do-Nothing	0.589	21	3.6
Elm Road (Roundabout) Junction	Do-Nothing	0.221	2	0.3
N2 Northbound Slip Road (Priority) Junction	Do-Nothing	0.848	25	4.9

Table 13-13: 2025 PM Peak Junction Capacity Analysis

Junction	Scenario	Highest RFC	Queuing Delay (sec/veh)	Maximum Queue Length (veh)
Kilshane Cross (Signalised) Junction	Do-Nothing	1.057	197	37.2
R135 Signalised Junction	Do-Nothing	0.566	19	3.3
Elm Road (Roundabout) Junction	Do-Nothing	0.291	2	0.4
N2 Northbound Slip Road (Priority) Junction	Do-Nothing	0.798	22	3.6

13.5.1.4 2040 Junction Analysis

A summary of the Do-Nothing Impacts for 2040 for the AM and PM peak hours are shown in Table 13-14 and Table 13-15 following.

Table 13-14 and Table 13-15 demonstrate that the anticipated RFCs at Kilshane Cross Junction and the N2 Northbound Slip Road Junction, in the 2040 scenario will be in excess of the normal design thresholds (0.90 at Kilshane Cross Junction and 0.85 at N2 Northbound Slip Road Junction) for both the AM and PM scenarios. It should be noted that Kilshane Cross Junction exceeds the theoretical traffic carrying capacity of 1.0 in both the AM and PM scenarios.

Table 13-14: 2040 AM Peak Junction Capacity Analysis

Junction	Scenario	Highest RFC	Queuing Delay (sec/veh)	Maximum Queue Length (veh)
Kilshane Cross (Signalised) Junction	Do-Nothing	1.150	305	75.6
R135 Signalised Junction	Do-Nothing	0.642	23	4.5
Elm Road (Roundabout) Junction	Do-Nothing	0.256	2	0.3
N2 Northbound Slip Road (Priority) Junction	Do-Nothing	1.018	60	18.9

Table 13-15: 2040 PM Peak Junction Capacity Analysis

Junction	Scenario	Highest RFC	Queuing Delay (sec/veh)	Maximum Queue Length (veh)
Kilshane Cross (Signalised) Junction	Do-Nothing	1.185	312	74.6
R135 Signalised Junction	Do-Nothing	0.624	22	4.2
Elm Road (Roundabout) Junction	Do-Nothing	0.331	2	0.5
N2 Northbound Slip Road (Priority) Junction	Do-Nothing	0.960	42	11.2

13.5.2 Construction Phase

A summary of the "With Project" (where "Project" refers to the Proposed RBSF Component) and "Do-Nothing" results of the analysis for the 2020 Construction Year for the AM and PM peak hours are shown in Table 13-16 and Table 13-17.

The normal design threshold for the ratio of flow to capacity (RFC) at a priority junction is 0.85. For a signal-controlled junction the normal design threshold is 0.90. As can be seen from Table 13-16 and Table 13-17, the RFCs at Kilshane Cross (Signalised) Junction in the 2020 scenario will be in excess of the 0.90 design threshold for both the AM and PM scenarios. However, it should be noted that the "With Project" scenario results in an increase in RFC of between 0.2 and 9.2% which equates to an increase in maximum queue length of 1.5 vehicles and is only a slight reduction in capacity and increase in queue lengths. The Proposed RBSF Component will result in a Slight Negative Short-Term Impact during the 2020 Construction Year in both the AM and PM peak hours.

Table 13-16: 2020 AM Peak Junction Capacity Analysis

Junction	Scenario	Highest RFC	Queuing Delay (sec/veh)	Maximum Queue Length (veh)
Kilshane Cross (Signalised) Junction R135 Signalised Junction	With Project	0.953	140	21.2
	Do-Nothing	0.950	139	20.9
Elm Road (Roundabout) Junction	With Project	0.567	20	3.2
	Do-Nothing	0.538	20	3.2
Kilshane Cross (Signalised) Junction R135 Signalised Junction	With Project	0.221	2	0.3
	Do-Nothing	0.204	2	0.3
Elm Road (Roundabout) Junction	With Project	0.841	25	4.7
	Do-Nothing	0.774	20	3.2

Table 13-17: 2020 PM Peak Junction Capacity Analysis

Junction	Scenario	Highest RFC	Queuing Delay (sec/veh)	Maximum Queue Length (veh)
Kilshane Cross (Signalised) Junction R135 Signalised Junction	With Project	0.973	145	21.5
	Do-Nothing	0.971	144	21.2
Elm Road (Roundabout) Junction	With Project	0.547	19	3.0
	Do-Nothing	0.537	19	3.0
Kilshane Cross (Signalised) Junction R135 Signalised Junction	With Project	0.287	2	0.4
	Do-Nothing	0.270	2	0.4
Elm Road (Roundabout) Junction	With Project	0.795	22	3.6
	Do-Nothing	0.728	18	2.5

A summary of the “With Project” and “Do-Nothing” results of the analysis for the 2024 Construction Year for the AM and PM peak hours are shown in Table 13-18 and Table 13-19.

As can be seen from the following tables, the RFCs at Kilshane Cross (Signalised) Junction in the 2024 scenario will be in excess of the 0.90 design threshold for both the AM and PM scenarios. It should be noted that Kilshane Cross (Signalised) Junction exceeds the theoretical traffic carrying capacity of 1.0 in both the “With Project” and “Do-Nothing” AM and PM scenarios. The RFCs at N2 Northbound Slip Road (Priority) Junction will be in excess of the 0.85 design threshold for both the AM and PM “With Project” scenarios. However, it should be noted that the N2 Northbound Slip Road (Priority) Junction will operate within its theoretical traffic carrying capacity of 1.0 in both the “With Project” and “Do-Nothing” AM and PM scenarios. It should be noted that the “With Project” scenario results in an increase in RFC of between 0.3 and 11.4% which equates to an increase in maximum queue length of 3.6 vehicles and is only a slight reduction in capacity and increase in queue lengths. The Proposed RBSF Component will result in a Slight Negative Short-Term Impact during the 2024 Construction Year in both the AM and PM peak hours.

Table 13-18: 2024 AM Peak Junction Capacity Analysis

Junction	Scenario	Highest RFC	Queuing Delay (sec/veh)	Maximum Queue Length (veh)
Kilshane Cross (Signalised) Junction R135 Signalised Junction	With Project	1.010	181	30.8
	Do-Nothing	1.007	178	30.1
Elm Road (Roundabout) Junction	With Project	0.592	22	3.6
	Do-Nothing	0.583	21	3.5
Kilshane Cross (Signalised) Junction R135 Signalised Junction	With Project	0.239	2	0.3
	Do-Nothing	0.218	2	0.3
Elm Road (Roundabout) Junction	With Project	0.918	34	8.0
	Do-Nothing	0.831	24	4.4

Table 13-19: 2024 PM Peak Junction Capacity Analysis

Junction	Scenario	Highest RFC	Queuing Delay (sec/veh)	Maximum Queue Length (veh)
Kilshane Cross (Signalised) Junction R135 Signalised Junction	With Project	1.033	179	31.7
	Do-Nothing	1.029	179	31.1
Elm Road (Roundabout) Junction	With Project	0.572	20	3.3
	Do-Nothing	0.561	19	3.2
Kilshane Cross (Signalised) Junction R135 Signalised Junction	With Project	0.309	2	0.4
	Do-Nothing	0.287	2	0.4
Elm Road (Roundabout) Junction	With Project	0.871	28	5.6
	Do-Nothing	0.782	21	3.3

13.5.2.1 Road Safety

It is considered that the Proposed RBSF Component, which is located off the public road network, will have an imperceptible impact on road safety during the construction phase.

13.5.3 Operational Phase

13.5.3.1 Year of Opening

A summary of the “With Project” and “Do-Nothing” results of the traffic analysis for the 2025 Year of Opening for the AM and PM peak hours are shown in Table 13-20 and Table 13-21.

The RFCs at Kilshane Cross (Signalised) Junction in the 2025 scenario will be in excess of the 0.90 design threshold for both the AM and PM scenarios. It should be noted that Kilshane Cross (Signalised) Junction exceeds the theoretical traffic carrying capacity of 1.0 in both the “With Project” and “Do-Nothing” AM and PM scenarios. The RFCs at N2 Northbound Slip Road (Priority) Junction will be in excess of the 0.85 design threshold for both the AM and PM “With Project” scenarios. However, it should be noted that the N2 Northbound Slip Road (Priority) Junction will operate within its theoretical traffic carrying capacity of 1.0 in both the “With Project” and “Do-Nothing” AM and PM scenarios It should be noted that the “With Project” scenario results in an increase in RFC of between 0.1 and 2.9% which equates to an increase in maximum queue length of 0.8 vehicles and is only a slight reduction in capacity and increase in queue lengths. The Proposed RBSF Component will result in an Imperceptible Negative Long-Term Impact in both the AM and PM peak hours.

Table 13-20: 2025 AM Peak Junction Capacity Analysis

Junction	Scenario	Highest RFC	Queuing Delay (sec/veh)	Maximum Queue Length (veh)
Kilshane Cross (Signalised) Junction R135 Signalised Junction	With Project	1.031	194	35.9
	Do-Nothing	1.030	194	35.7
Elm Road (Roundabout) Junction	With Project	0.591	22	3.6
	Do-Nothing	0.589	21	3.6
Kilshane Cross (Signalised) Junction R135 Signalised Junction	With Project	0.227	2	0.3
	Do-Nothing	0.221	2	0.3
Elm Road (Roundabout) Junction	With Project	0.870	28	5.7
	Do-Nothing	0.848	25	4.9

Table 13-21: 2025 PM Peak Junction Capacity Analysis

Junction	Scenario	Highest RFC	Queuing Delay (sec/veh)	Maximum Queue Length (veh)
Kilshane Cross (Signalised) Junction R135 Signalised Junction	With Project	1.057	197	37.4
	Do-Nothing	1.057	197	37.2
Elm Road (Roundabout) Junction	With Project	0.569	19	3.3
	Do-Nothing	0.566	19	3.3
Kilshane Cross (Signalised) Junction R135 Signalised Junction	With Project	0.297	2	0.1
	Do-Nothing	0.291	2	0.4
Elm Road (Roundabout) Junction	With Project	0.821	23	4.1
	Do-Nothing	0.798	22	3.6

13.5.3.2 Design Year

A summary of the "With Project" and "Do-Nothing" results of the analysis for the 2040 Design Year for the AM and PM peak hours are shown in Table 13-22 and Table 13-23 following.

Table 13-22 and Table 13-23 demonstrate that the anticipated RFCs at Kilshane Cross (Signalised) Junction and the N2 Northbound Slip Road (Priority) Junction, in the 2040 scenario will be in excess of the normal design thresholds (0.90 at Kilshane Cross (Signalised) Junction and 0.85 at N2 Northbound Slip Road (Priority) Junction) for both the AM and PM scenarios. It should be noted that Kilshane Cross (Signalised) Junction exceeds the theoretical traffic carrying capacity of 1.0 in both the With Project and Do-Nothing AM and PM scenarios, while the N2 Northbound Slip Road (Priority) Junction exceeds the theoretical traffic carrying capacity of 1.0 in the AM scenario. It should be noted that the "With Project" scenario results in an increase in RFC of between 0.1 and 3.4% which equates to an increase in maximum queue length of 5.8 vehicles and is only a slight reduction in capacity and increase in queue lengths. The Proposed RBSF Component will result in an Imperceptible Negative Long-Term Impact during the 2040 Design Year in both the AM and PM peak hours.

Table 13-22: 2040 AM Peak Junction Capacity Analysis

Junction	Scenario	Highest RFC	Queuing Delay (sec/veh)	Maximum Queue Length (veh)
Kilshane Cross (Signalised) Junction R135 Signalised Junction	With Project	1.151	305	76.0
	Do-Nothing	1.150	305	75.6
Elm Road (Roundabout) Junction	With Project	0.645	23	4.5
	Do-Nothing	0.642	23	4.5
Kilshane Cross (Signalised) Junction R135 Signalised Junction	With Project	0.264	2	0.4
	Do-Nothing	0.256	2	0.3
Elm Road (Roundabout) Junction	With Project	1.051	76	24.7
	Do-Nothing	1.018	60	18.9

Table 13-23: 2040 PM Peak Junction Capacity Analysis

Junction	Scenario	Highest RFC	Queuing Delay (sec/veh)	Maximum Queue Length (veh)
Kilshane Cross (Signalised) Junction R135 Signalised Junction	With Project	1.186	313	74.8
	Do-Nothing	1.185	312	74.6
Elm Road (Roundabout) Junction	With Project	0.626	22	4.2
	Do-Nothing	0.624	22	4.2
Kilshane Cross (Signalised) Junction R135 Signalised Junction	With Project	0.339	2	0.5
	Do-Nothing	0.331	2	0.5
Elm Road (Roundabout) Junction	With Project	0.993	51	14.9
	Do-Nothing	0.960	42	11.2

13.5.3.3 Road Safety

It is considered that the Proposed RBSF Component, which is located off the public road network, will an imperceptible impact on road safety during the operational phase.

13.6 Mitigation Measures

There are no effects that require specific mitigation but the following best practice measures are proposed for the Proposed RBSF Component:

13.6.1 Construction Phase

- A Preliminary Traffic Management Plan will be drafted by the Project Supervisor Design Process for the works in full consultation with Fingal County Council, An Garda Síochána, the Fire Service and the Ambulance service. When the works are awarded to a contractor, the Preliminary Traffic Management Plan will be developed by the Project Supervisor Construction Stage into a Detailed Traffic Management Plan in full consultation with the same stakeholders. All traffic management plans, including working times, shall be agreed with and approved by Fingal County Council Transportation Department in advance of implementation;
- Protection measures are to be provided at sensitive archaeological sites as noted in Section 11: Cultural Heritage;
- Tracked excavators will be moved to and from the site on low-loaders and will not be permitted to drive on the street pavements;
- Contractor's, Subcontractor's or Supplier's vehicles or staff vehicles, or any vehicles associated with the works will not be permitted to park, idle or queue on the public road network;
- Wheel washers / judder bars will be placed at all site access points to minimise the migration of detritus onto the public roads. The roads will be inspected and cleaned on a regular basis;
- Haul vehicles must be covered after loading to ensure there is no risk of construction material falling; and
- Water bowsers will be deployed within the sites during periods of hot weather to damp down potential dust generation from unbound surfaces.

An Application for an Abnormal Load Permit will be made to Fingal County Council, in advance for any abnormal loads exceeding the thresholds laid out in the Road Traffic (Construction and Use of Vehicles) Regulations 2003. Where possible, abnormal load movements will be restricted to evening or night time to minimise disruption to local traffic and traffic on strategic routes.

13.6.2 Operational Phase

No mitigation measures are proposed during the operational phase of the Proposed RBSF Component.

13.7 Residual Impacts

13.7.1 Construction Phase

No residual impacts to the safety of the road network are anticipated as a result of the construction phase of the Proposed RBSF Component following implementation of the mitigation measures outlined.

Residual impacts are anticipated to the traffic flows on the adjoining roading road network. Traffic analysis associated with the impact of the construction works focused on the AM and PM peak periods in both the 2020 Phase 1 Construction Scenario and the 2024 Phase 2 Construction Scenario.

In the 2020 and 2024 scenarios Kilshane Cross (Signalised) Junction will be in excess of the 0.90 design threshold for both the AM and PM scenarios. In the 2024 scenario, Kilshane Cross (Signalised) Junction will be in excess of the theoretical traffic carrying capacity of 1.0 in both the “With Project” and “Do-Nothing” AM and PM scenarios. However, it should be noted that the “With Project” scenario results in an increase in RFC of between 0.2 and 0.4% which is only a slight reduction in capacity and increase in queue lengths. The N2 Northbound Slip Road (Priority) Junction will be in excess of the 0.85 design threshold for both the AM and PM “With Project” 2024 scenarios. However, it should be noted that the N2 Northbound Slip Road (Priority) Junction will operate within its theoretical traffic carrying capacity of 1.0 in both the “With Project” and “Do-Nothing” AM and PM scenarios. It should be noted that the “With Project” scenario results in an increase in RFC of between 0.3 and 8.9% which is only a slight reduction in capacity and increase in queue lengths. The percentage change in RFC for each construction stage scenario at each junction as a result of the Proposed RBSF Component is presented in Table 13-24 to Table 13-27.

Table 13-24: 2020 Phase 1 Construction AM Peak Percentage Change in RFC

Junction	Do-Nothing RFC	With Project RFC	Percentage Change in RFC
Kilshane Cross (Signalised) Junction	0.950	0.953	0.3
R135 Signalised Junction	0.538	0.567	2.9
Elm Road (Roundabout) Junction	0.204	0.221	1.7
N2 Northbound Slip Road (Priority) Junction	0.774	0.841	6.7

Table 13-25: 2020 Phase 1 Construction PM Peak Percentage Change in RFC

Junction	Do-Nothing RFC	With Project RFC	Percentage Change in RFC
Kilshane Cross (Signalised) Junction	0.971	0.973	0.2
R135 Signalised Junction	0.537	0.547	1.0
Elm Road (Roundabout) Junction	0.270	0.287	1.7
N2 Northbound Slip Road (Priority) Junction	0.728	0.795	6.7

Table 13-26: 2024 Phase 2 Construction AM Peak Percentage Change in RFC

Junction	Do-Nothing RFC	With Project RFC	Percentage Change in RFC
Kilshane Cross (Signalised) Junction	1.007	1.010	0.3
R135 Signalised Junction	0.583	0.592	0.9
Elm Road (Roundabout) Junction	0.218	0.239	2.1
N2 Northbound Slip Road (Priority) Junction	0.831	0.918	8.7

Table 13-27: 2024 Phase 2 Construction PM Peak Percentage Change in RFC

Junction	Do-Nothing RFC	With Project RFC	Percentage Change in RFC
Kilshane Cross (Signalised) Junction	1.029	1.033	0.4
R135 Signalised Junction	0.561	0.572	1.1
Elm Road (Roundabout) Junction	0.287	0.309	2.2
N2 Northbound Slip Road (Priority) Junction	0.782	0.871	8.9

Based on the assessment of RFC, Queuing Delay and Maximum Queue Length it has been determined that the Proposed RBSF Component will result in a Slight Negative Short-Term Impact during construction.

13.7.2 Operational Phase

No residual impacts to the safety of the road network are anticipated as a result of the operational phase of the Proposed RBSF Component.

Residual impacts are anticipated to the traffic flows on the adjoining roading road network. Traffic analysis was undertaken to examine the impact of traffic associated with the operational phase of the Proposed RBSF Component on the surrounding road network in the 2025 Scenario and the 2040 Design Year scenario in the AM and PM peak periods.

In the 2025 and 2040 scenarios Kilshane Cross (Signalised) Junction will be in excess of the 0.90 design threshold for both the AM and PM scenarios. Kilshane Cross (Signalised) Junction will also be in excess of the theoretical traffic carrying capacity of 1.0 in both the “With Project” and “Do-Nothing” AM and PM scenarios. However, it should be noted that the “With Project” scenario results in an increase in RFC of between 0.0 and 0.1% which is only a slight reduction in capacity and increase in queue lengths. In the 2025 scenario, the N2 Northbound Slip Road (Priority) Junction will be in excess of the 0.85 design threshold for both the AM “With Project” scenario. However, it should be noted that the N2 Northbound Slip Road (Priority) Junction will operate within its theoretical traffic carrying capacity of 1.0 in both the “With Project” and “Do-Nothing” AM and PM scenarios. N2 Northbound Slip Road (Priority) Junction exceeds the theoretical traffic carrying capacity of 1.0 in both the “With Project” and “Do-Nothing” AM scenarios. It should be noted that the “With Project” scenario results in an increase in RFC of between 2.2 and 3.3% which is only a slight reduction in capacity and increase in queue lengths. The percentage change in RFC for each construction stage scenario at each junction as a result of the Proposed RBSF Component is presented in Table 13-28 to Table 13-31.

Table 13-28: 2025 AM Peak Percentage Change in RFC

Junction	Do-Nothing RFC	With Project RFC	Percentage Change in RFC
Kilshane Cross (Signalised) Junction	1.030	1.031	0.1
R135 Signalised Junction	0.589	0.591	0.2
Elm Road (Roundabout) Junction	0.221	0.227	0.6
N2 Northbound Slip Road (Priority) Junction	0.848	0.870	2.2

Table 13-29: 2025 PM Peak Percentage Change in RFC

Junction	Do-Nothing RFC	With Project RFC	Percentage Change in RFC
Kilshane Cross (Signalised) Junction	1.057	1.057	0.0
R135 Signalised Junction	0.566	0.569	0.3
Elm Road (Roundabout) Junction	0.291	0.297	0.6
N2 Northbound Slip Road (Priority) Junction	0.798	0.821	2.3

Table 13-30: 2040 Design Year AM Peak Percentage Change in RFC

Junction	Do-Nothing RFC	With Project RFC	Percentage Change in RFC
Kilshane Cross (Signalised) Junction	1.150	1.151	0.1
R135 Signalised Junction	0.642	0.645	0.3
Elm Road (Roundabout) Junction	0.256	0.264	0.8
N2 Northbound Slip Road (Priority) Junction	1.018	1.051	3.3

Table 13-31: 2040 Design Year PM Peak Percentage Change in RFC

Junction	Do-Nothing RFC	With Project RFC	Percentage Change in RFC
Kilshane Cross (Signalised) Junction	1.185	1.186	0.1
R135 Signalised Junction	0.624	0.626	0.2
Elm Road (Roundabout) Junction	0.331	0.339	0.8
N2 Northbound Slip Road (Priority) Junction	0.960	0.993	3.3

Based on the assessment of RFC, Queuing Delay and Maximum Queue Length it has been determined that the Proposed RBSF Component will result in an Imperceptible Negative Long-Term Impact during the operational phase.

13.7.3 Interactions

The most significant interactions are between air quality and traffic. Emissions increase with increased traffic movements. The impacts of the Proposed RBSF Component on air quality are assessed in Section 8: Air and Climate. The change in annual average daily traffic on roads close to the site was assessed and the impact of the interactions between traffic and air quality in both the construction and operational phases are considered to be not significant.

Significant interactions may also occur between traffic and noise and vibration. Noise and vibration increase with increased traffic movements. The impacts of the Proposed RBSF Component on noise and vibration are assessed in Section 9: Noise and Vibration. The change in annual average daily traffic on roads close to the site was assessed and the impact of the interactions between traffic and noise and vibration in both the construction and operational phases are considered to be not significant.

13.7.4 Cumulative Impacts

A cumulative assessment of the local road network, which represents the "worst-case" scenario with respect to development in the surrounding area, was undertaken which made allowance for future development of the surrounding, undeveloped lands in line with the current land-use zoning contained within the Fingal Development Plan 2017 – 2023 (see Figure 13-15). The area examined for future development was bounded by the M50 to the south, the L3120 and L3125 to the north, the R122 to the east and the Cappagh Road to the west. Refer to section 13.2.5 for details of the area of future development considered.

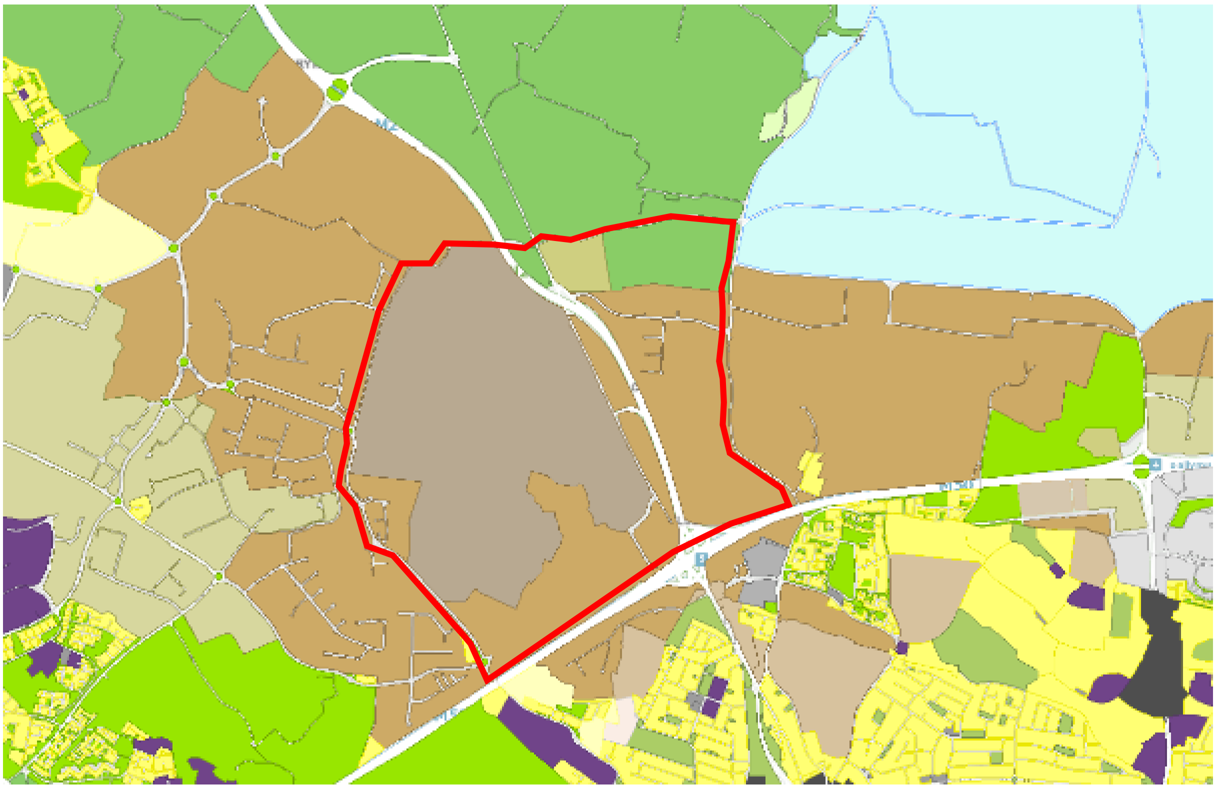

Figure 13-15: Area of Future Development Considered

The area of land assessed in the cumulative assessment and the methodology for estimating trip generation rates are described in section 13.2.5.

Table 13-32 and Table 13-33 shows that the anticipated RFCs at Kilshane Cross (Signalised) Junction and the N2 Northbound Slip Road (Priority) Junction, in 2020 will be in excess of these design thresholds (0.90 for the Kilshane Cross (Signalised) Junction and 0.85 for the N2 Northbound Slip Road (Priority) Junction) for both the AM and PM scenarios. It should be noted that Kilshane Cross (Signalised) Junction and the N2 northbound Slip Road Junction exceeds the theoretical traffic carrying capacity of 1.0 in both the "With Project" and "Do-Nothing" AM and PM scenarios. However, it should be noted that the "With Project" scenario results in only marginal reductions in capacity at all junctions. The Proposed RBSF Component will result in an Imperceptible Negative Short-Term Impact during the 2020 Construction Year in both the AM and PM peak hours.

Table 13-32: 2020 Cumulative Impact AM Peak Junction Capacity Analysis

Junction	Do-Nothing RFC	With Project RFC	Percentage Change in RFC
Kilshane Cross (Signalised) Junction	1.384	1.386	0.1%
R135 Signalised Junction	0.794	0.797	0.4%
Elm Road (Roundabout) Junction	0.324	0.341	5.2%
N2 Northbound Slip Road (Priority) Junction	2.038	2.117	3.9%

Table 13-33: 2020 Cumulative Impact PM Peak Junction Capacity Analysis

Junction	Do-Nothing RFC	With Project RFC	Percentage Change in RFC
Kilshane Cross (Signalised) Junction	1.431	1.433	0.1%
R135 Signalised Junction	0.768	0.767	0.0%
Elm Road (Roundabout) Junction	0.446	0.462	3.6%
N2 Northbound Slip Road (Priority) Junction	1.144	1.224	7.0%

Table 13-34 and Table 13-35 shows that the anticipated RFCs at Kilshane Cross (Signalised) Junction, the R135 Signalised Junction and the N2 Northbound Slip Road (Priority) Junction, in 2024 will be in excess of these design thresholds (0.90 for the Kilshane Cross (Signalised) Junction and R135 Signalised Junction, and 0.85 for the N2 Northbound Slip Road (Priority) Junction) for both the AM and PM scenarios. It should be noted that Kilshane Cross (Signalised) Junction and the N2 northbound Slip Road (Priority) Junction exceeds the theoretical traffic carrying capacity of 1.0 in both the “With Project” and “Do-Nothing” AM and PM scenarios. However, it should be noted that the “With Project” scenario results in only marginal reductions in capacity at all junctions. The Proposed RBSF Component will result in an Imperceptible Negative Short-Term Impact during the 2024 Construction Year in both the AM and PM peak hours.

Table 13-34: 2024 Cumulative Impact AM Peak Junction Capacity Analysis

Junction	Do-Nothing RFC	With Project RFC	Percentage Change in RFC
Kilshane Cross (Signalised) Junction	2.086	2.089	0.1%
R135 Signalised Junction	1.179	1.179	0.0%
Elm Road (Roundabout) Junction	0.498	0.520	4.4%
N2 Northbound Slip Road (Priority) Junction	4.507	4.642	3.0%

Table 13-35: 2024 Cumulative Impact PM Peak Junction Capacity Analysis

Junction	Do-Nothing RFC	With Project RFC	Percentage Change in RFC
Kilshane Cross (Signalised) Junction	2.102	2.105	0.1%
R135 Signalised Junction	1.137	1.140	0.3%
Elm Road (Roundabout) Junction	0.696	0.718	3.2%
N2 Northbound Slip Road (Priority) Junction	2.028	2.167	6.9%

Table 13-36 and Table 13-37 shows that the anticipated RFCs at Kilshane Cross (Signalised) Junction, the R135 Signalised Junction and the N2 Northbound Slip Road (Priority) Junction, in 2025 will be in excess of these design thresholds (0.90 for the Kilshane Cross (Signalised) Junction and R135 Signalised Junction, and 0.85 for the N2 Northbound Slip Road (Priority) Junction) for both the AM and PM scenarios. It should be noted that Kilshane Cross (Signalised) Junction and the N2 Northbound Slip Road (Priority) Junction exceeds the theoretical traffic carrying capacity of 1.0 in both the "With Project" and "Do-Nothing" AM and PM scenarios. However, it should be noted that the "With Project" scenario results in only marginal reductions in capacity at all junctions. The Proposed RBSF Component will result in an Imperceptible Negative Short-Term Impact during the 2025 Year of Opening in both the AM and PM peak hours.

Table 13-36: 2025 Cumulative Impact AM Peak Junction Capacity Analysis

Junction	Do-Nothing RFC	With Project RFC	Percentage Change in RFC
Kilshane Cross (Signalised) Junction	2.271	2.272	0.0%
R135 Signalised Junction	1.291	1.291	0.0%
Elm Road (Roundabout) Junction	0.542	0.547	0.9%
N2 Northbound Slip Road (Priority) Junction	5.333	5.371	0.7%

Table 13-37: 2025 Cumulative Impact PM Peak Junction Capacity Analysis

Junction	Do-Nothing RFC	With Project RFC	Percentage Change in RFC
Kilshane Cross (Signalised) Junction	2.283	2.284	0.0%
R135 Signalised Junction	1.247	1.248	0.1%
Elm Road (Roundabout) Junction	0.759	0.765	0.8%
N2 Northbound Slip Road (Priority) Junction	2.338	2.377	1.7%

Table 13-38 and Table 13-39 shows that the anticipated RFCs at Kilshane Cross (Signalised) Junction, the R135 Signalised Junction and the N2 Northbound Slip Road (Priority) Junction, in 2040 will be in excess of these design thresholds (0.90 for the Kilshane Cross (Signalised) Junction and R135 Signalised Junction and 0.85 for the N2 Northbound Slip Road (Priority) Junction) for both the AM and PM scenarios. It should be noted that all junctions will exceed the theoretical traffic carrying capacity of 1.0 in both the

"With Project" and "Do-Nothing" AM and PM scenarios, with the capacity on one arm on the N2 Northbound Slip Road (Priority) Junction reducing to zero as a result of high traffic volumes on opposing arms preventing vehicles entering the junction. However, it should be noted that the "With Project" scenario results in only marginal reductions in capacity at all junctions when compared with the "Do-Nothing" scenario. The Proposed RBSF Component will result in an Imperceptible Negative Short-Term Impact during the 2040 Design Year in both the AM and PM peak hours.

Table 13-38: 2040 Cumulative Impact AM Peak Junction Capacity Analysis

Junction	Do-Nothing RFC	With Project RFC	Percentage Change in RFC
Kilshane Cross (Signalised) Junction	4.815	4.816	0.0%
R135 Signalised Junction	2.933	2.933	0.0%
Elm Road (Roundabout) Junction	1.177	1.185	0.7%
N2 Northbound Slip Road (Priority) Junction	***	***	N/A

*** Due to traffic volumes on the adjoining arms of the junction which oppose vehicle movements at other arms, the entry capacity of at least one arm is reduced to zero.

Table 13-39: 2040 Cumulative Impact PM Peak Junction Capacity Analysis

Junction	Do-Nothing RFC	With Project RFC	Percentage Change in RFC
Kilshane Cross (Signalised) Junction	4.711	4.711	0.0%
R135 Signalised Junction	2.885	2.885	0.0%
Elm Road (Roundabout) Junction	1.748	1.751	0.2%
N2 Northbound Slip Road (Priority) Junction	***	***	N/A

*** The entry capacity of at least one arm has become zero due to traffic volumes on the adjoining arms opposing vehicle movements.

13.8 Monitoring

Traffic flow and vehicle queue lengths at the N2 Northbound Slip Road Junction shall be monitored as part of the Detailed Traffic Management Plan process and restrictions shall be placed on the movement of construction related traffic if deemed necessary by Fingal County Council and/or an Garda Síochána.

13.9 Difficulties Encountered

Exact details of potential developments in the surrounding area, which is zoned for Heavy Industry, General Employment and Warehousing and Distribution, are not currently available. Therefore, an approximation of the operational traffic was made through interrogation of the Fingal Development Plan 2017 - 2023, and the TRICS database.

13.10 References

Fingal County Council, (2017). *Fingal Development Plan 2017-2023.* [Online] Available at: https://www.fingal.ie/planning-and-buildings/development-plans-and-consultations/fingaldevelopmentplan2017-2023/.

Institution of Highways & Transportation (IHT), (1994). *Guidelines for Traffic Impact Assessment (TIA)*.

Transport Infrastructure Ireland (TII), (2014). *Traffic and Transport Assessment Guidelines*. National Roads Authority.

Transport Infrastructure Ireland (TII), (2016). *Project Appraisal Guidelines Unit 5.1: Construction of Traffic Models. PE-PAG-02015, October 2016.* National Roads Authority.

Transport Infrastructure Ireland (TII), (2016). *Project Appraisal Guidelines Unit 5.3: Travel Demand Projections. PE-PAG-02017, October 2016*. National Roads Authority.

Transport Infrastructure Ireland (TII), (2016). *Project Appraisal Guidelines Unit 16.1: Expansion Factors for Short Period Traffic Counts. PE-PAG-02039, October 2016*. National Roads Authority.

Section 14: Landscape

14.1 Introduction

This Section of the EIAR assesses the potential landscape and visual impacts (and resulting effects) likely to occur as a result the Regional Biosolids Storage Facility (RBSF) component of the Proposed GDD Project and the Proposed Upgrade Project. Hereinafter, this component is referred to "the Proposed RBSF Component".

This Section and assessment have been completed having regard to the guidance outlined in the Environmental Protection Agency's document '*Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports'* (August 2017) and *Advice Notes for Preparing Environmental Impact Statements* (Draft, September 2015). The assessment has also had regard to EU publication *'Environmental Impact Assessment of Projects: Guidance on the Preparation of the Environmental Impact Assessment of Projects'*, 2017.

A separate assessment of the potential impact caused by glint and glare from the proposed photovoltaic installation (solar panels) on the roof of one of the storage buildings at the proposed RBSF Component. A Glint and Glare Assessment Report, which details the methodology and the findings of this assessment is provided in Appendix 14B of Volume 4, Part B.

14.2 Methodology

The landscape assessment has considered the likely significant effects of the Proposed RBSF Component on the landscape as an environmental resource and the visual assessment has considered the effect on visual change on receptors. Landscape and visual effects have been considered for the construction and operational phases of the Proposed RBSF Component. This Section is accompanied by Photomontages of the Proposed RBSF Component which are included in Appendix 14A in Volume 4B.

The landscape and visual assessment involved visits to the site and environs of the Proposed RBSF Component, together with reviewing aerial photography, publications and reports and project information included with the application and in this EIAR. In addition, a series of photomontages, illustrating the physical and visual appearance of the Proposed RBSF Component, has been prepared from a range of publicly accessible locations that are representative of the more open views in the surrounding environment. The Photomontage views are included within Appendix 14A in Volume 4B.

The landscape and visual impact assessment for the Proposed RBSF Component takes account of the character and nature of the existing site and its surrounds, the location of sensitive landscapes and visual receptors, the sensitivity and significance of the site, and its vulnerability to change.

The classification of significance of effects or impacts as set out in Table 14-1 has been derived from the EPA's Draft *Guidelines on information to be contained in Environmental Impact Assessment Reports;* from the UK Landscape Institute's *Guidelines for Landscape and Visual Impact Assessment (3rd Edition)*; and from the experience of the author in carrying out landscape and visual assessments for over 25 years.

Table 14-1: Classification of Significance of Effects (Impacts)

<table>
<tr><th colspan="2" rowspan="2"></th><th colspan="4">Existing Environment
Significance / Sensitivity</th></tr>
<tr><th>High</th><th>Medium</th><th>Low</th><th>Negligible</th></tr>
<tr><td rowspan="4">Description of Impact
Character/Magnitude/ Duration /Probability/ Consequences</td><td>High</td><td>Profound</td><td>Very Significant</td><td>Significant / Moderate</td><td>Moderate / Slight</td></tr>
<tr><td>Medium</td><td>Very Significant / Significant</td><td>Significant / Moderate</td><td>Moderate</td><td>Slight / Not Significant</td></tr>
<tr><td>Low</td><td>Significant / Moderate</td><td>Moderate / Slight</td><td>Slight / Not Significant</td><td>Not Significant / Imperceptible</td></tr>
<tr><td>Negligible</td><td>Slight / Not Significant</td><td>Not Significant</td><td>Not Significant / Imperceptible</td><td>Imperceptible</td></tr>
</table>

The significance of effects, which in nature may be positive, neutral or negative/adverse, are described as follows:

Imperceptible: An effect capable of measurement but without significant consequences.
Not significant: An effect which causes noticeable changes in the character of the environment but without significant noticeable consequences.
Slight: An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate: An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant: An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant: An effect which, by its character, magnitude, duration or intensity significantly alters the majority of a sensitive aspect of the environment.
Profound: An effect which obliterates sensitive characteristics.

In terms of **duration** effects are considered as follows:

Momentary: Lasting seconds to minutes.
Brief: Lasting up to one day.
Temporary: Lasting up to one year.
Short-term: Lasting one to seven years.
Medium-term: Lasting seven to fifteen years.
Long-term: Lasting fifteen to sixty years.
Permanent: Lasting over sixty years.

Further aspects of effects including the **magnitude** (*i.e.* extent, frequency, and context); **probability** (*i.e.* likely, indeterminable, 'worse-case'); and **type** (*i.e.* cumulative, interaction (synergistic), residual, indirect, *etc.*) are also considered in the assessment, where appropriate.

14.3 Existing Environment

14.3.1 Site Context and Description

The site for the Proposed RBSF Component lies immediately west of the R135 (Old N2), just south of where the N2 crosses the R135 on elevated overbridge. Huntstown Power Station and Roadstone's Huntstown Quarry lie to the south/southwest of the proposed site. Stream BioEnergy has planning permission for a Renewable Bioenergy Plant on lands located directly south of the Huntstown Power Station (FCC planning reg. ref. no.: FW13A/0089), refer to Figure 14-1. High voltage transmission lines are prominent features of the landscape immediately to the west and south of the proposed site and Finglas 220 kV Station is located at the junction of the N2 and M50, c. 1.0 km south of the proposed site. A variety of business parks lie west of the quarry and east of the N2 Road corridor (refer to Figure 14-1). Dublin Airport (terminals etc.) is over 5 km east of the proposed site, and outside of any visual relationship with the site.

The Proposed RBSF Component site is mainly grassland with some roads and small buildings provided as part of a previous incomplete waste recycling facility. The proposed site is bounded by a palisade fence along the R135 to the east; by a concrete post and chain-link fence to the north; and by field boundary hedgerows to the west and south. Views from the R135 are partly open in the vicinity of the proposed site entrance and partly screened by grass mounds. The proposed site is also visible against a backdrop of energy and quarry infrastructure from a short elevated section of the N2.

The Proposed RBSF Component site slopes from east to west with a difference of approximately 2 to 3 m between the highest and lowest areas. The proposed site drains to a field drain on the western boundary, which in turn drains north to the Huntstown Stream (refer to Figure 14-1), a tributary of the River Ward.

An existing residential property, with permission for development by The Peter McVerry Trust of 6 one-bedroom single-storey houses and a single-storey community building, (FCC planning ref. no. FW18A/0038 and FW14A/0162) lies to the immediate east of the Proposed RBSF Component site. The construction site of these new residential units commenced in early 2018 on this site and on the site of two nearby derelict cottages. There are also some light industrial/commercial developments located along the R135 to the immediate southeast/east of The Peter McVerry Trust site. The Dogs Trust Ireland Centre, the Beech Vista Garden Centre and a number of residential properties are also located along the R135 over 400 m south of the Proposed RBSF Component site. An application for permission for 2 industrial/warehousing units and offices is pending with the planning authority (FCC planning reg. ref. no. F17A/0769) for a site north of the Garden Centre. This development is c. 500 m south of the proposed site, refer to Figure 14-1. Further commercial / industrial developments are also pending within 1 km of the proposed site. The locations of these developments are indicated on Figure 14-1 and discussed in section 14.7.1: Cumulative Impacts, of this Section.

Further residential properties are located north of the Proposed RBSF Component site, and north of the N2, near Kilshane Cross (500 m from the proposed site) and further northeast at Newtown Cottages (900 m from the proposed site). The Finglas 220 kV Electricity Sub-station is located over 1.0 km south of the proposed site at the southern end of the R135 where it abuts the M50/N2 Junction, refer to Figure 14-1.

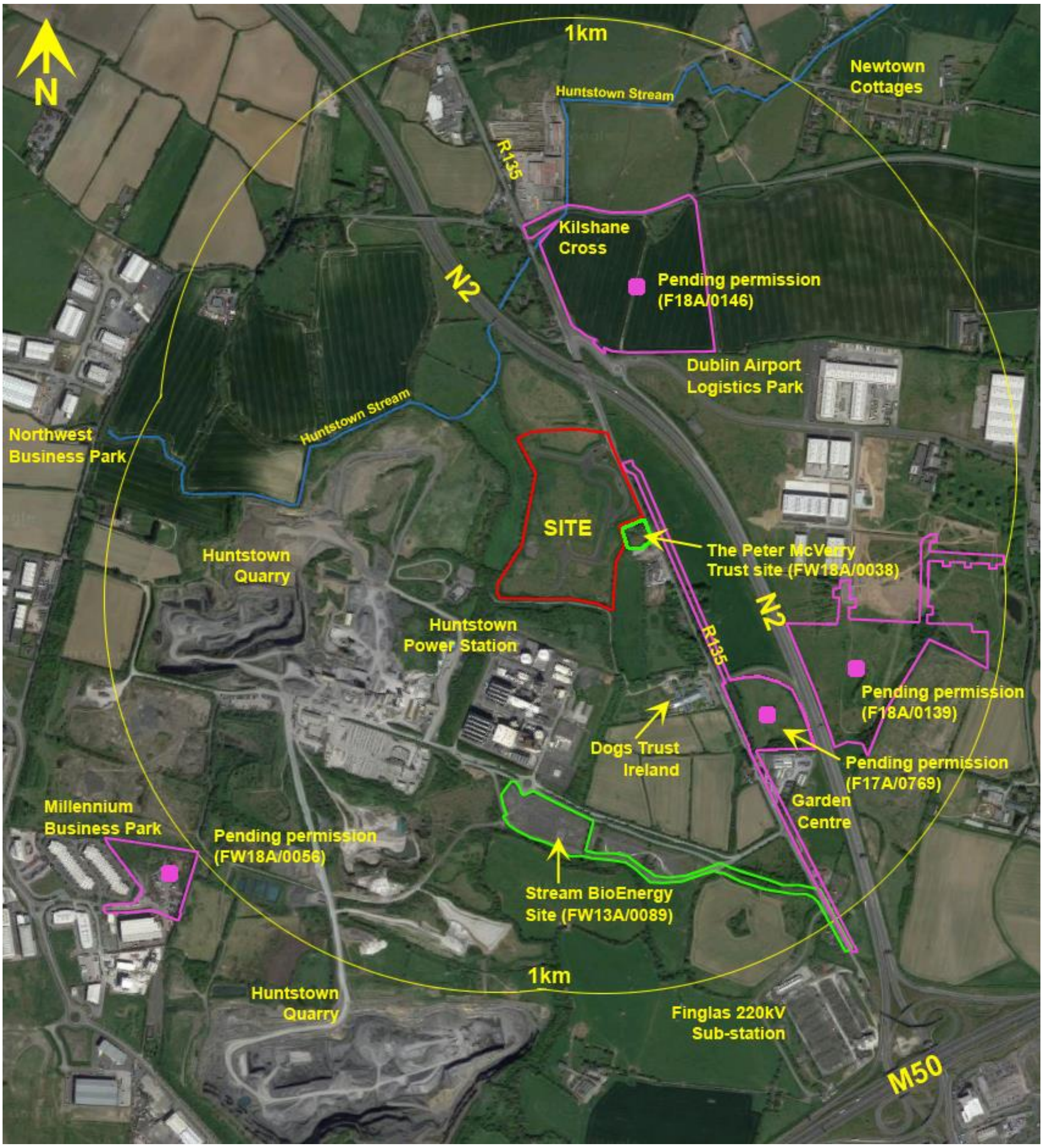

Figure 14-1: Site Context (*source: Google Maps*) (Permitted (but not built) developments outlined in green. Pending (not permitted) developments outlined in pink.)

14.3.2 Landscape Planning Designations

This Proposed RBSF Component site is located at Newtown, Dublin 11, where the Fingal County Development Plan 2017-2023 provides the statutory planning framework.

14.3.2.1 Fingal County Development Plan 2017-2023

The Proposed RBSF Component site and its immediate surrounds are zoned HI - Provide for Heavy Industry. The objective vision is to: "*Facilitate opportunities for industrial uses, activities and processes which may give rise to land use conflict if located within other zonings. Such uses, activities and processes would be likely to produce adverse impacts, for example by way of noise, dust or visual impacts. HI areas* *provide suitable and accessible locations specifically for heavy industry and shall be reserved solely for such uses*."

Local Objective No.78, which applies to the proposed site, seeks to: "facilitate *the development of infrastructure for waste management, including construction and demolition waste processing, biological treatment of organic waste, a sludge treatment facility and a waste transfer station*."

Under Specific Objectives, the Huntstown Power Station is identified as a Seveso Site with a 300 m consultation distance.

The proposed site and its surrounds are located at the southern end of the large Low Lying Agricultural Landscape Character Area (LCA) described as being: "*characterised by a mix of pasture and arable farming on low lying land with few protected views or prospects.*" While this description is correct in the context of the broader rural based LCA, the proposed site is actually located towards the southern end of the LCA where industrial and urban edge development is of increasing influence on the peri-urban character of this area.

There is no protected structure or historic graveyard identified within the Proposed RBSF Component site or its immediate surrounds. Kilshane historic graveyard is located over 300 m to the west.

There are no specific Green Infrastructure Objectives pertaining to the proposed site.

There are no listed or scenic views, no landscape or amenity designations or protected trees pertaining to the proposed site or its immediate surrounds.

14.3.3 Summary of Significance and Sensitivity of the Existing Landscape and Visual Environment

The landscape is relatively flat and open and surrounding land uses include industrial and business developments as well as some individual or permitted small-scale residential development. The proposed site is zoned as *HI - Provide for Heavy Industry* and is located in the context of existing large-scale and visually significant generating, transmission and quarry infrastructure.

The Proposed RBSF Component site has no significant trees or internal hedgerows and is not particularly prominent or visible in the landscape. Likewise, the proposed site has no specific landscape or visual designations. Visual sensitivities are limited to nearby residential and community properties, especially to the permitted Peter McVerry Trust development located along the eastern boundary of the proposed site.

14.4 Characteristics of the RBSF Component of the Proposed GDD Project

Development of the Proposed RBSF Component is to be located within the northern part of the proposed site. Existing small-scale buildings and road infrastructure on the site will be removed. Biosolids stored in two new buildings located at the centre of the site. Each building will be 105 m long, 50 m wide and up to circa 15.5 m high at the highest point of the curved roofs. A number of stacks from the odour control units for venting air extracted from the buildings are to be located between the buildings will rise to circa. 18 m.

An additional building will be provided on the eastern side of the proposed site for administrative purposes and welfare facilities for staff. The height of this small-scale building is approximately 4 m above ground level. An existing parking area is to be provided in front of the Administration and Welfare Building for staff and visitors.

The existing electricity substation at the northeast corner of the proposed site will be reconstructed at the same location to provide a new structure, approximately 5m deep and 10m long. Separate weighbridges are to be provided for HGVs entering and exiting the proposed site. Parking for circa 4 haulage vehicles is to be provided in the northwest corner of the proposed site. Road-side lighting columns will be approximately 6 m high and the lighting columns in the HGV parking area will be 8 m high. Solar panels are to be provided on part of the roof of one storage building.

14.5 Potential Impacts

14.5.1 Do-nothing Impacts

The proposed site is zoned "*HI - To provide for heavy industry*" in the Fingal County Development Plan 2017 - 2023. Should the Proposed RBSF Component not proceed, it is likely that development of an industrial nature will establish on the proposed site.

14.5.2 Construction Phase

The initial phase of construction for the Proposed RBSF Component will involve site development and the construction of one storage building. The construction works are estimated to last approximately 12 months. The second building is likely to be constructed in a second phase to meet overall Proposed RBSF Component requirements and construction will last for approximately 9 months.

Site development and associated traffic, including establishment of construction compound, site hoarding/fencing, earthworks, and construction of proposed structures will give rise to visual disturbance and intrusion for immediately adjoining properties and areas located south of the N2 overbridge. Visual disturbance associated with and construction stage will have significant temporary, and moderate short-term negative visual effects. The significant temporary/short-term visual effects are limited to properties on the R135 adjacent to the site boundaries, and most notably to the residential property located on the eastern boundary of the proposed site.

Visual effects on passing views from the nearby elevated section of the N2 will be slight negative, temporary/short-term. No adverse visual impact will arise from the west or from further afield, *e.g.* north or east of the N2, from Newtown Cottages, or from further south along the R135.

The site was partly developed in the past and contains little by way of internal trees and hedgerows. Boundary hedgerows will be protected and retained. Site development will see stripping of soils and commencement of construction works. The construction works for the Proposed RBSF Component are consistent with the nature and scale of other construction works, previously completed, permitted and planned in the surrounding environment, including at Dublin Airport Logistics Park to the east. The works are also consistent with the nature and scale of works which would be expected to arise as a result of the landuse zoning for the proposed site and its surrounds. The Proposed RBSF Component construction works will not have a significant negative landscape impact.

14.5.3 Operational Phase

The visual nature and scale of the Proposed RBSF Component, which will appear as 2 large warehouse style buildings, with minor ancillary structures, is broadly consistent with the character of other developments in the local environment, especially the business and warehouse developments. That said, the landscape is open, and the buildings will present significant massing in views from the east, including from the R135 and from nearby residential properties located along the R135.

The landscape impact is localised and moderate negative and the overall visual impact is also moderate and negative. The Proposed RBSF Component will have a significant but localised visual impact at the residential property (The Peter McVerry Trust site) on the eastern boundary of the proposed site.

14.5.3.1 Impacts on Landscape and Visual Policy

The Proposed RBSF Component will have no impact on landscape or visual policies or objectives as identified in the Fingal County Development Plan.

14.5.3.2 Impact on Views

A series of photomontages have been prepared showing the visual nature of the Proposed RBSF Component from viewpoints in the immediately surrounding and wider environment, as shown Figure 14-2 and Table 14-2. The photomontages, which are included at Appendix 14A of Volume 4B of the EIAR, also illustrate the proposed landscape works. Where the Proposed RBSF Component is not visible in the view, a red outline of the location of the Proposed RBSF Component is indicated on the views.

Figure 14-2: Location and Viewpoint of Photomontages (Proposed RBSF Component site outlined in red)

Table 14-2: Photomontage References

View	Description	Photomontage Reference (Appendix 14A)	
		As Existing	As Proposed
View 1	View 1 from footbridge over N2/M50 Interchange	Figure: 1.1.1	Figure: 1.1.2
View 2	View 2 from North Road (R135) southeast of the Site	Figure: 1.2.1	Figure: 1.2.2
View 3	View 3 from North Road (R135) east of the Site	Figure: 1.3.1	Figure: 1.3.2
View 4	View 4 from North Road (R135) north of the Site entrance	Figure: 1.4.1	Figure: 1.4.2
View 5	View 5 from N2 bridge over R135	Figure: 1.5.1	Figure: 1.5.2
View 6	View 6 from Kilshane Road (L3120) bridge over N2	Figure: 1.6.1	Figure: 1.6.2
View 7	View 7 Newtown Cottages (L7231)	Figure: 1.7.1	Figure: 1.7.2

View 1

View 1 is north from the pedestrian overbridge at the M50/N2 Junction. Existing view (Photomontage Figure 1.1.1) is dominated by Finglas 220 kV Station in foreground, with Huntstown Power Station in background. The view is of low sensitivity.

The Proposed RBSF Component is located over 1.25 km north of the viewpoint and is fully screened by intervening vegetation (Photomontage Figure 1.1.2). The landscape and visual impacts are negligible in magnitude and in significance and hence, the impact from View 1 is assessed as being imperceptible.

View 2

View 2 is north/northwest from the R135 located south of the Proposed RBSF Component site. The existing view (Photomontage Figure 1.2.1) is dominated by the character of existing roadside land uses. The view is of low sensitivity.

The Proposed RBSF Component will be screened by foreground development and boundary vegetation (Photomontage Figure 1.2.2), so much so that only the upper element/roof of the proposed storage buildings will be visible.

The landscape and visual effects are negligible to low in magnitude and in significance and hence, the impact from View 2 is assessed as being imperceptible/not significant and neutral.

View 3

View 3 is west/northwest to the Proposed RBSF Component site from the R135 (Photomontage Figure 1.3.1). The existing site is visually open behind the palisade boundary fence. The existing buildings are visible on the site. The view is of moderate sensitivity.

The proposed view is shown in Figure 14-3. The new boundary detail, railing and planted mounds will be openly visible. In time the two proposed storage buildings will be well-screened and visually integrated by the proposed boundary treatment and planting works. However, the buildings will be prominent for a number of years (5 to 8) until such time as proposed planting matures sufficiently to provide screening (Photomontage Figure 1.3.2).

The landscape and visual effects will initially be of medium magnitude and significance and hence the short-term impact from View 3 is assessed as being moderate/significant. As the proposed planting matures the medium and longer-term impact from View 3 is assessed as being slight to moderate and neutral.

Figure 14-3: View 3 - As proposed view west/northwest to the Proposed RBSF Component site from the R135 (Extract from Photomontage Figure 1.3.2)

View 4

View 4 is south/southwest to the Proposed RBSF Component site from the R135 (Photomontage Figure 1.4.1). The existing buildings and existing R135 boundary fence are prominent. The R135 is wide and a dominant feature of the view. The sensitivity of the view is low to moderate.

The proposed view is shown in Figure 14-4. The proposed entrance, new boundary railings, and planted mounds will be openly visible. The two proposed storage buildings will be well-screened and visually integrated by the proposed boundary treatment and planting works. However, the buildings will be prominent for a number of years (5 to 8) until such time as the proposed planting matures sufficiently as a screen (Photomontage Figure 1.4.2).

Initially the landscape and visual effects will be of medium magnitude and significance and the short-term impact from View 4 is assessed as being moderate. As the proposed planting matures the medium and longer-term impact from view 4 is assessed as being slight and neutral.

Figure 14-4: View 4 - As proposed view south/southeast to the Proposed RBSF Component site from the R135 (Extract from Photomontage Figure 1.4.2)

View 5

View 5 is south over the proposed site from the elevated N2 Overbridge (Photomontage Figure 1.5.1). The view over undeveloped lands is dominated by Huntstown Power Station and Quarry Infrastructure with the Dublin / Wicklow Mountains in the background. The view is of moderate sensitivity.

Initially the proposed storage buildings will be openly visible in passing views. In time, the two large proposed buildings will be well-screened and visually integrated by the proposed planting works, however, the buildings will be visually prominent for a number of years (5 to 8) until such time as the proposed planting matures (Photomontage Figure 1.5.2).

Initially the landscape and visual effects will be of low magnitude and low significance and the short-term impact from View 5 is assessed as being slight to moderate. As the proposed planting matures the medium and longer-term impact from View 5 is assessed as being not significant and neutral.

View 6

View 6 is south from an elevated local road Overbridge located over 500 m north of the proposed site (Photomontage Figure 1.6.1). The passing view is of moderate sensitivity.

At this distance, while the roof of the storage buildings will be visible, the Proposed RBSF Component will not be particularly prominent in its setting or against its background (Photomontage Figure 1.6.2). In time the proposed buildings will be fully integrated by the proposed planting works.

The landscape and visual effects will initially be of low magnitude and significance and the short-term impact from view 4 is assessed as being not significant to slight. As the proposed planting matures the medium and longer-term impact from view 6 is assessed as being negligible and neutral.

View 7

View 7 (Photomontage Figure 1.7.1) is southwest from the residential area of Newtown Cottages, located circa 1 km from the proposed site. The view is of high sensitivity.

The Proposed RBSF Component will not be visible from this location (Photomontage Figure 1.7.2), as it is entirely screened by the combination of intervening distance, topography and vegetation.

The landscape and visual effects will be of negligible magnitude and significance and the impact from View 7 is assessed as being negligible.

14.6 Mitigation Measures

The Proposed RBSF Component is well-sited and when considered with proposed landscape measures, is not anticipated to give rise to significant landscape or visual effects. As noted, the Proposed RBSF Component includes for an appropriate and comprehensive landscape scheme comprising earth mounding, dense deciduous and evergreen planting and an upgraded roadside boundary railing and entrance details.

14.6.1 Construction Stage

- Construction hoarding of minimum 2.4 m in height is to be provided on the boundaries with the adjoining residential site (The Peter McVerry Trust site) located at the southeast corner of the site;
- Construction compounds will not be located adjacent to the site boundary with The Peter McVerry Trust site;
- Earth berms are to be constructed to provide a basis for immediate low-level screening and enhanced screening effect from proposed planting;
- Landscape measures, including extensive planting works, will be completed as part of the construction works; and
- The boundary with the R135 will be upgraded to a new boundary railing backed by proposed landscape works.

14.6.2 Operation Stage

- Proposed landscape works, including the extensive planting, will be maintained in line with standard landscape maintenance practice so as to ensure establishment. Failed or dead plants will be replaced in the planting season following identification of any such defects; and
- Lighting standards will be fitted with horizontal cut-off fittings to avoid light spill.

14.7 Residual Impacts

The Proposed RBSF Component is well-sited and includes comprehensive landscape/planting proposals that will ensure that it is appropriately integrated into its landscape and visual setting. The Proposed RBSF Component with associated landscape works and planting, as illustrated in the photomontages, will not give rise to significant residual landscape or visual effects.

14.7.1 Cumulative Impacts

In terms of potential cumulative impacts, the landscape and visual assessment has taken account of existing developments in the surrounding environment, including Huntstown Quarry, and its permitted developments (*e.g.* FW12A/0022; FW16A/0120; FW17A/0012; FW17A/0228), Huntstown Power

Station, Finglas 220kV Station, and developments at Dublin Airport Logistics Park located to the east of Proposed RBSF Component site and east of the N2.

The assessment has also considered the following permitted developments (refer to Figure 14-1) in the area:

Planning reg. ref. no. FW18A/0038 (& FW14A/0162):
The Peter McVerry Trust granted permission for demolition of existing structures and construction of 6 one-bedroom, single-storey houses and a single-storey community building and offices in two blocks at Kilshane, Newtown, North Road (R135), Finglas, Dublin 11. This proposed development is located at the eastern boundary of the site for the Proposed RBSF Component.

This is a relatively small residential development, which will not give rise to any potential for significant cumulative landscape or visual effects. Potential for the Proposed RBSF Component to have landscape or visual effects on The Peter McVerry Trust development has been considered in the assessments set out under Section 14.5 of this section.

Planning reg. ref. no. FW13A/0089:
Stream BioEnergy Limited was granted permission for a 3.8 MW Renewable Bio Energy Plant on a site of 2.38 hectares, located east of Roadstone's Quarry and south of Huntstown Power Station, circa 500 m south of the site for the Proposed RBSF Component.

This permitted development, which was subject to a separate EIA is located adjacent and south of the existing Huntstown Power Station. While this development would be visible from the site of the Proposed RBSF Component, and from the R135 and adjoining properties, its distance from the Proposed RBSF Component site and proximity to the more visually significant power plant means it will not give rise to potential for significant cumulative landscape or visual effects.

The following proposed developments, which are pending consent, (refer to Figure 14-1) are also noted:

Planning reg. ref. no. F17A/0769:
Coldwinters Devco Ltd. is applying for construction of two single-storey units for industrial and/or warehousing use with ancillary two-storey offices, with new separate access off R135 on a site of c. 3.35 hectares at Coldwinters, St. Margaret's, Co. Dublin. The proposed development is located east of the R135 and circa 500 m south of the Proposed RBSF Component site. However, the proposed development also includes for provision of a 300 mm diameter surface water pipe to be located on the east side of the R135 directly east of the Proposed RBSF Component site.

Planning reg. ref. no. F18A/0146:
Killeen Properties Ltd. is applying for construction of a storage and distribution centre for new imported vehicles on a site of c. 13.1 hectares at Newtown, Kilshane Cross, Co Dublin. This site is located north of the N2 and east of the R135 at Kilshane Cross and c. 200 m north and northeast of the Proposed RBSF Component site.

Planning reg. ref. no. F18A/0139:
Dublin Port Company is applying for development of 2 plots generally for industrial, warehouse, storage and logistic use and ancillary works at Plots 2 and 9, Dublin Inland Port, South of Dublin Airport Logistics Park, Off Maple Avenue, Coldwinters, St. Margarets, Co. Dublin. This 8.45

hectare site is located east of the R135 and east of the N2 and c. 500 m southeast of the Proposed RBSF Component site.

Planning reg. ref. no. FW18A/0056:
Starrus Eco Holdings Ltd. is applying for construction of a single-storey waste recovery/transfer building within the site of the existing Materials Recovery Facility at the Greenstar Materials Recovery Facility, Millennium Business Park, Cappagh Road, Townland of Grange, Ballycoolin, Dublin 11. This site is located southwest of the Roadstone Quarry and c. 1.0 km southwest of the Proposed RBSF Component site.

These developments, which are pending permission, are either sufficiently distant and visually separate from the site of the Proposed RBSF Component, and/or have intervening road infrastructure (i.e. R135 and N2) so as to ensure that they will not give rise to potential for significant cumulative landscape or visual effects. At over 5 km distant, there is no landscape or visual relationship between the Proposed RBSF Component site and proposed developments at Dublin Airport.

Cumulative landscape and visual effects arise in that when taken together with existing, permitted and planned developments, the development of the Proposed RBSF Component will tend to further reinforce the prevailing and emerging business / industrial character of the area. Local landscape and visual will tend to be more focused and punctuated where construction of other permitted and/or planned developments proceed in tandem with or overlap with the construction of the Proposed RBSF Component. Once completed, the Proposed RBSF Component includes for a significant level of landscape planting - so much so that any potential for cumulative landscape and/or visual impact is appropriately and substantially mitigated.

The Proposed RBSF Component is also considered to be consistent with the existing land use zoning for site and surrounding lands as "*HI - To provide for heavy industry*". In this manner the Proposed RBSF Component is considered to be appropriate for the site and the wider area and the overall cumulative landscape and visual effects are considered to be moderate and neutral.

14.8 Monitoring

Monitoring of landscape-related works is an integral aspect of the Proposed RBSF Component, and includes monitoring of:

- Tree and hedgerow removal, retention and protection;
- Topsoil stripping and storage;
- Disturbance by site works, services etc.;
- Excavation / alteration of ground levels;
- Landscape build-up; profiling and cultivation;
- Landscape finishing and implementation;
- Proposed planting and grass seeding; and
- 12 months aftercare of landscape measures.

All works associated with soil stripping and movement; landscape build-up and finishing and landscape implementation shall be approved and monitored by a qualified Landscape Architect.

14.9 Difficulties Encountered

No difficulties were encountered during the preparation of the assessment.

14.10 References

Environmental Protection Agency (EPA), (2002). *Guidelines on the Information to be Contained in Environmental Impact Statements.*

Environmental Protection Agency (EPA), (2003). *Advice Notes on the Current Practice in the Preparation of Environmental Impact Statements.*

Environmental Protection Agency (EPA), (2015). *Draft Advice Notes for Preparing Environmental Impact Statements.*

Environmental Protection Agency (EPA), (2017) *Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports*.

Fingal County Council, (2017). *Fingal Development Plan 2017-2023.* [Online] Available at: https://www.fingal.ie/planning-and-buildings/development-plans-and-consultations/fingaldevelopmentplan2017-2023/.

Landscape Institute (UK) and Institute for Environmental Management & Assessment, (2013). *Guidelines for Landscape and Visual Impact Assessment, 3rd Edition*.

Section 15: Risk Management

15.1 Introduction

This section of the EIAR identifies how the potential for accidents and disasters relevant to the Regional Biosolids Storage Facility (RBSF) component of the Proposed GDD Project and the Proposed Upgrade Project. Hereinafter, this component is referred to "the Proposed RBSF Component".

The Section considers:

- Major accidents and/or natural disasters that the Proposed RBSF Component may be vulnerable to;
- The potential for significant adverse environmental effect(s) resulting from such a major accident and/or disaster; and
- Existing and proposed mitigation measures to prevent or mitigate the likely significant adverse effects of such events on the environment.

Full details of the Proposed GDD Project and the Regional Biosolids Storage Facility component can be found in Volume 2, Chapter 4: Description of the Proposed Project.

Article 3 of the amended Environmental Impact Assessment (EIA) Directive 2014/52/EU requires for the assessment of expected effects of major accidents and/or disasters within EIA. Article 3(2) of the Directive states that *"The effects referred to in paragraph 1 on the factors set out therein shall include the expected effects deriving from the vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project concerned".*

The Draft EPA Guidelines (2015) refers to Accidents, recommending that… *"Aspects of the proposal that could cause accidents with a likelihood of creating significant environmental impacts should be considered".* The Draft EPA Guidelines (2017) elaborates on risk assessment further under Section 3.7.3: *"To address unforeseen or unplanned effects the Directive further requires that the EIAR takes account of the vulnerability of the project to risk of major accidents and /or disasters relevant to the project concerned and that the EIAR therefore explicitly addresses this issue. The extent to which the effects of major accidents and / or disasters are examined in the EIAR should be guided by an assessment of the likelihood of their occurrence (risk)".*

For the purposes of this assessment, the following definitions have been adopted:

- Major Accident - incidents or events that threaten immediate or chronic serious damage to human health, welfare and/or the environment;
- Natural Disaster - naturally occurring extreme weather events (e.g. storm, flood, temperature) with the potential to cause an event or incident; and
- Risk - defined as the likelihood of an incident occurring, combined with magnitude effect or consequence(s) of the impact on a receptor or surrounding area.
- Significance - Significant effect resulting from Major Accidents or Natural Disasters are adverse effects if they meet the criteria for 'Significant', 'Very Significant' or 'Profound' under the Draft EPA Guidelines (2017) and Volume 2, Section 2: The EIA Process of this report.

15.2 Methodology

15.2.1 Scope and Context

It is noted that the identification, control and management of risk is an integral part of the design and assessment process throughout all stages of a project lifecycle. The Proposed RBSF Component will be designed, built and operated in line with current international best practice and guidelines. The storage facility itself will not be classified as an 'upper-tier' or 'lower-tier' establishment under the Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2015. The RBSF will most likely not be a 'Domino' facility of the Gensys Power Ltd. Facility based at Huntstown, which is designated as a lower-tier establishment according to the Health and Safety Authority (HSA, Jan. 2018).

The Proposed RBSF Component facility incorporates technologies and measures that are designed to reduce and eliminate the occurrence of accidents. Measures to control risks associated with construction and operational activities will be incorporated into the Construction Environmental Management Plan (CEMP) and the Operational Stage Environmental Management Plans (OEMP).

The scoping criteria for this risk assessment is:

- Identify Major Accidents and /or Natural Disasters (i.e. unplanned incidents) where there is a risk that the project may be vulnerable; and
- Assess the consequent effects and significance of such incidents in relation to environmental, social and economic receptor where they occur.

Such risks may be present at the construction, operation and decommissioning phases of the Proposed RBSF Component.

15.2.2 Guidelines and Reference Material

The development of the risk assessment methodology has been informed by the following guidelines:

- Advice Notes for Preparing an Environmental Impact Statement - Draft (EPA, 2015);
- Guidelines on the Information to be contained in Environmental Impact Assessment Reports - Draft (EPA, 2017);
- National Risk Assessment 2017 Overview of Strategic Risks (Department of Taoiseach, 2017);
- Guidance on Assessing and Costing Environmental Liabilities (EPA, 2014);
- A Guide to the Chemicals Act (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2015 (SI No. 209 of 2015) (HSA, 2015);
- A Guide to Risk Assessment in Major Emergency Management (DoEHLG, 2010); and
- A National Risk Assessment for Ireland 2017 (Department of Defence, 2017).

The following Plans and Assessments have also informed the assessment:

- Major Emergency Plan (Fingal County Council, 2011);
- Maximum Aircraft Movement Data and the Calculation of Risk and PSZs: Dublin Airport (DTTAS, 2005);
- Huntstown Power Station - Accident Prevention and Emergency Response Plan (2006);
- Roadstone Quarry - Environmental Contingency Plan (2016);
- Guide to Field Storage of Biosolids (USEPA, 2000);
- The Fire and Explosion Hazards of Dried Sewage Sludge (2000), Manchester S.J., *Symposium Series no. 148* IChemE Safety & Loss Prevention Special Interest Group; and

- Irish Water Sludge Storage Facility - Initial Fire Strategy (MSA, 2018).

15.2.3 Risk Assessment Methodology

The assessment is set out in three stages:

- Identification and Screening;
- Risk Classification; and
- Risk Evaluation.

15.2.3.1 Identification and Screening

The first stage of the assessment is to identify potential unplanned risks that the Proposed RBSF Component may be vulnerable to. An initial list of Major Accidents and/or Natural Disasters (MAND) were sourced through consultation with relevant environmental specialists, utilising the guidelines and reference documentation.

The list of potential MANDs was subjected to an initial screening assessment, to identify potential risks that met the scoping criteria. The risks were screened out of the assessment according to the following criteria:

- MANDs addressed in the Design Risk Assessment for design and planning phase of the Proposed RBSF Component;
- MANDs that have already been assessed in other areas of this EIA. These are summarised and referenced in this section;
- MANDs associated with construction and operational activities that fall within the scope of Health and Safety legislation and associated obligations;
- MANDs where there is no 'Source-Pathway-Receptor linkage' exists. Examples include incidents that cannot be plausibly associated with the Proposed RBSF Component, such as volcanic activity, earthquakes and risk of nuclear accidents; and
- MANDs that possess low likelihood low consequence, as they do not meet criteria of assessment.

15.2.3.2 Risk classification

Following the initial identification and screening process, remaining MANDs were evaluated with regard to the likelihood of occurrence and the potential for consequence of impact. The rating criteria adopted for the assessment follows that used in the *Guide to risk assessment in Major Emergency Management* (DoEHLG, 2010). The 2017 Draft EIAR Guidelines state that the risk assessment be based on a "worst case" approach, therefore the consequent rating assumes that all proposed mitigation measures and safety procedures have failed to prevent the MAND.

The classification and rating of likelihood and consequence are provided in Table 15-1 and Table 15-2 below:

Table 15-1: Classification of Likelihood

Rating	Classification	Effect Description
1	Extremely Unlikely	May occur only in exceptional circumstances; once every 500 or more years.
2	Very Unlikely	Is not expected to occur; and/or no recorded incidents or anecdotal evidence; and/or very few incidents in associated organisations, facilities or communicates; and / or little opportunity, reason or means to occur;

Rating	Classification	Effect Description
		May occur once every 100-500 years.
3	Unlikely	May occur at some time; and /or few, infrequent, random recorded incidents or little anecdotal evidence; some incidents in associated or comparable organisations worldwide; some opportunity, reason or means to occur; May occur once per 10-100 years.
4	Likely	Likely to or may occur; regular recorded incidents and strong anecdotal evidence and will probably occur once per 1-10 years.
5	Very Likely	Very likely to occur; high level of recorded incidents and/or strong anecdotal evidence. Will probably occur more than once a year.

Table 15-2: Classification of Consequence

Rating	Classification	Impact	Description
1	Minor	Life, Health, Welfare, Environment, Infrastructure, Social.	▪ Small number of people affected; no fatalities and small number of minor injuries with first aid treatment. ▪ No contamination, localised effects ▪ <€0.5M Euros ▪ Minor localised disruption to community services or infrastructure (<6 hours).
2	Limited	Life, Health, Welfare, Environment, Infrastructure, Social.	▪ Single fatality; limited number of people affected; a few serious injuries with hospitalisation and medical treatment required. Localised displacement of a small number of people for 6-24 hours. Personal support satisfied through local arrangements ▪ Simple contamination, localised effects of short duration ▪ €0.5-3M ▪ Normal community functioning with some inconvenience
3	Serious	Life, Health, Welfare, Environment, Infrastructure, Social.	▪ Significant number of people in affected area impacted with multiple fatalities (<5), multiple serious or extensive injuries (20), significant hospitalisation. Large number of people displaced for 6-24 hours or possibly beyond; up to 500 evacuated. External resources required for personal support. ▪ Simple contamination, widespread effects or extended duration ▪ €3-10M Community only partially functioning, some services available
4	Very Serious	Life, Health. Welfare, Environment, Infrastructure, Social.	▪ 5-50 fatalities, up to 100 serious injuries, up to 2000 evacuated ▪ Heavy contamination, localised effects or extended duration ▪ €10-25M Euros ▪ Community functioning poorly, minimal services available

Rating	Classification	Impact	Description
5	Catastrophic	Life, Health. Welfare, Environment, Infrastructure, Social.	▪ Large numbers of people impacted with significant numbers of fatalities (>50), injuries in the hundreds, more than 2000 evacuated. ▪ Very heavy contamination, widespread effects of extended duration. ▪ >€25M ▪ Serious damage to infrastructure causing significant disruption to, or loss of, key services for prolonged period. Community unable to function without significant support.

15.2.3.3 Risk Evaluation

In accordance with the DoEHLG 2010 guidelines, the evaluated MANDs will be subject to a risk matrix to determine the level of significance of each risk for each scenario. These have been grouped according to 3 categories:

High Risk

Scenarios that have an evaluation score of 12-25, as indicated by the Red Zones in Table 15-3.

Medium Risk

Scenarios that have an evaluation score of 8 -11 as indicated by the Amber Zone in Table 15-3.

Low Risk

Scenarios that have an evaluation score 1-7, of as indicated by the Green Zones in Table 15-3.

Table 15-3: Levels of Significance

Likelihood	5 – V. Likely					
	4 – Likely					
	3 – Unlikely					
	2 – V. Unlikely					
	1 – Ext. Unlikely					
		1 - Minor	2 - Limited	3 – Serious	4 – V. Serious	5 - Catastrophic
	Consequence of Impact					

Significant effects resulting from MANDs are adverse effects that are described as 'Significant', 'Very Significant' or 'Profound' under the Draft EPA Guidelines (2017) and Volume 2, Section 2: The EIA Process of this report. Consequently, MANDs that fall within Amber or Red Zones ('Medium' or 'High' Risk Scenarios) are brought forward for further consideration and assessment for further mitigation.

15.3 Predicted Impacts

As mentioned in section 15.2, the predicted impacts in this section assume a worst-case scenario, which does not consider the implementation of mitigation measures or Emergency Plans that are implemented to reduce the effect of any major accident or disaster.

A Risk Register has been developed which contains all the plausible scenarios identified with the construction and operation of the Proposed RBSF Component and has been evaluated using the criteria in Section 15.2. This is provided in Table 15-4.

Table 15-4: Rating of Major Accidents and Disasters without mitigation

Risk ID	Event	Likelihood	Rating	Consequence	Rating
Construction and Operation Phase					
A	Fire resulting in significant or widespread damage on site	Unlikely	3	Potentially Serious with potential fatalities, injuries. Potential to Discharge deleterious material to adjacent watercourse Hazards associated with Smoke to neighbouring residents, businesses and activities	3
B	Damage to hi-voltage overhead lines that cross site	Unlikely	3	Potentially Serious with potential fatalities, injuries. Potential to lead to fire and associated effects	3
C	Road Traffic Accidents on site or resulting from Traffic with construction and operation activities	Likely	4	Potentially Serious, resulting in a number of fatalities and/or injury Simple localized contamination of area or minor structural damage	3
D	Road Traffic Accidents from on haul route	Likely	4	Potentially Serious, resulting in a number of fatalities and/or injury Simple localized contamination of area or minor structural damage	2
E	Incident at adjacent IED Sites leading to shutdown / evacuation of Biosolids Storage Facility	Unlikely	3	Limited - Potentially Localised displacement of a small number of people or simple contamination, localised effects of short duration	2
F	Aircraft related accident	Extremely Unlikely	1	Potentially very serious	4

The results from the evaluation have been applied to Table 15-5 below to determine the Levels of Significance.

Table 15-5: Evaluation of Levels of Significance without Mitigation

Likelihood	**5 – V. Likely**					
	4 – Likely					
	3 – Unlikely		[E]	[A][B]	[C] [D]	
	2 – V. Unlikely					
	1 – Ext. Unlikely				[F]	
		1 - Minor	**2 - Limited**	**3 – Serious**	**4 – V. Serious**	**5 - Catastrophic**
	Consequence of Impact					

From examining the plausible risks presented in Table 15-4, Risk ID's E and F are considered as being below the threshold of Significance set for the purposes of this assessment. It is noted that for Risk F (Airport Related Accidents) - the site fringes the southern boundary of the outer public safety zone and consequently it is not considered significant. The scenario with the highest risk score relates to traffic accidents associated with the site.

Risk ID's A, B, C, D are subject to further assessment and consideration of mitigation measures.

15.4 Mitigation Measures

The design of the Proposed RBSF Component incorporates mitigation measures that have been embedded into the design of the facility.

No 'High' Risk scenarios have been identified for the Proposed RBSF Component. Risk ID's A, B, C and D have all been identified as being of 'Medium' Risk and are as such are subject to further assessment and determination of risk post-implementation of mitigation measures. The results are presented in Table 15-6 and Table 15-7.

Table 15-6: Major Accidents and/or Disasters - Assessment of Mitigation Measures

Risk ID.	Project Risk	Pre-Mitigation Risk Score	Mitigation Measures [including confirmatory studies]	Post Mitigation Likelihood level of significance	Post Mitigation Consequence
A	Fire resulting in significant or widespread damage on site.	Medium	Mitigation measures in Design Refer to Section 15.4.1	2 Very Unlikely	2 Limited
B	Damage to hi-voltage Overhead Lines that cross site.	Medium	Hazard Identification and Goalposting. Refer to Section 15.4.1	3 Unlikely	2 Limited
C	Road Traffic Accidents on site or resulting from Traffic with construction and operation activities.	Medium	Traffic Management Plan Refer to Section 15.4.3	2 Very unlikely	3 Serious
D	Road Traffic Accidents for Traffic on Haulage Route.	Medium	Traffic Management Plan Refer to Section 15.4.3	2 Very unlikely	3 Serious

Table 15-7: Evaluation of Levels of Significance Post Mitigation

Likelihood						
	5 – V. Likely					
	4 – Likely					
	3 – Unlikely		[B]			
	2 – V. Unlikely		[A]	[C][D]		
	1 – Ext. Unlikely					
		1 - Minor	2 - Limited	3 – Serious	4 – V. Serious	5 - Catastrophic
	Consequence of Impact					

15.4.1 Mitigation Measures Embedded in the Proposed RBSF Component Design

Regulation 15 of the Safety, Health and Welfare at Work (Construction) Regulations, 2013 places a duty on designers carrying out work related to the design of a project to take account of the General Principles of Prevention as listed in Schedule 3 of the Safety, Health and Welfare at Work Act, 2005.

In addition to the duties imposed by Regulation 15 of the Construction Regulations, 2013 designers must comply with Section 17 (2) of the Safety, Health and Welfare at Work Act, 2005 which requires persons who design a project for construction work to ensure, so far as is reasonably practicable, that the project is designed and is capable of being constructed to be safe and without risk to health, can be maintained safely and without risk to health during use, and complies in all respects, as appropriate, with other relevant legislation. This would include the Building Regulations and if the works being designed are intended for use as a workplace, the relevant parts of the General Application Regulations. Furthermore, the design proposed for the various buildings on site will be such that a Fire Safety Certificate will be granted by Fingal County Council in due course.

In order to meet these requirements, an initial review of the options for Building Regulations Compliance at the Proposed RBSF Component was undertaken along with consultation with the Dublin Fire Brigade Senior Fire Prevention Officer for the proposed location on 15 January 2018. The detailed design of the Proposed RBSF Component will be in accordance with relevant British Standard and International Standard Design codes and specifications to the forms of construction or design of fire protection installation. This includes a proposed a fire fighting water supply of 3,800 litres/min with a total quantity of 880 m^3.

15.4.2 Traffic Management Plans

The risk of MAND's resulting from a Road Traffic Accident associated with the Proposed RBSF Component will be reduced by the development and implementation of a Traffic Management Plan as detailed in Section 13.5.

15.4.3 Environmental Incident Response Plan

An Environmental Incident Response Plan (EIRP) will be updated by the Contractor/Operator of the Proposed RBSF Component, in consultation with the emergency services and other relevant third parties and will be submitted to IW for approval.

The updated EIRP will contain Incident Response Procedures which will outline the detailed procedures for dealing with any potential Emergency and shall include the following;

- Initial Response Procedures;
- List of Emergency Numbers;
- Records and sharing of records with prescribed bodies;
- Training to be provided; and
- Emergency response equipment list to be provided on site.

These Incident Response procedures have been developed at this stage primarily to ensure that the design is taking account of the risks associated with the scenarios mentioned.

The EIRP will ensure that resources necessary to make safe and/or deal with situations in the first instance are available to respond to Emergencies at all times during construction and operation. It will also ensure that suitably qualified personnel ("Duty Officers") will be available at all times to manage the response of the contractor/operator to Emergencies. A schedule of the telephone numbers for Duty Officers shall be provided to the Gardaí and other Relevant Authorities so that contact can be made with the Duty Officers at all times.

15.5 Residual Impact

There are no identified incidents or examples of Major Accident and/or Disasters that present a sufficient combination of risk and consequence that would lead to significant residual impacts or environmental effects.

15.6 Monitoring

The Environmental Incident Response Plan is a live document that undergoes regular monitoring, review and update throughout the lifetime of the Proposed RBSF Component. The risk management assessment of major accidents and/or disasters will be continued on an ongoing basis throughout the planning, design, construction and operational phases of the Proposed RBSF Component. Activities on site will be monitored to ensure risk does not increase over time at the site.

15.7 Conclusion

Table 15-4 lists five plausible MAND incidents that have the potential to occur during both the construction and operational phases of the Proposed RBSF Component. In a worst-case scenario (i.e. without the implementation of mitigation measures), two were determined to be of ‘Low’ Risk and four were determined to be of ‘Medium’ Risk.

The four potentially medium-risk scenarios were subsequently assessed with regard to the embedded mitigation measures included in the design phase, including the provision of the fire suppressant system, and the implementation Traffic Management Plans and Environmental Incident Response Plans.

The Management Plans contain mitigation measures and action plans designed to limit the loss of life or injury to employees, contractors, visitors and local residents, damage to facilities and damage to the environment.

Through the implementation of mitigation measures, there are no identified incidents or examples of Major Accidents and/or Disasters that present a sufficient combination of risk and consequence that would lead to significant residual impacts or environmental effects.

15.8 Difficulties Encountered

The risk assessment relies on information gleaned from consultations and a review of publicly available information combined with professional opinion and the inclusion of specific design measures. The published information from planners, safety authority, local authority etc. may not reflect the exact activities occurring on a daily basis near the Proposed RBSF Component location.

15.9 References

Department of Defence, (2017). *A National Risk Assessment for Ireland 2017*.

Department of Taoiseach, (2017). *National Risk Assessment 2017 Overview of Strategic Risks*.

Department of the Environment, Housing and Local Government (DoEHLG), (2010). *A Guide to Risk Assessment in Major Emergency Management*.

Department of Tourism Transport and Sport (DTTAS), (2015). *Maximum Aircraft Movement Data and the Calculation of Risk and PSZs: Dublin Airport*.

Environmental Protection Agency (EPA), (2014). *Guidance on Assessing and Costing Environmental Liabilities*.

Environmental Protection Agency (EPA), (2015). *Draft Advice Notes for Preparing Environmental Impact Statements*.

Environmental Protection Agency (EPA), (2017). *Draft Guidelines on Information to be Contained in Environmental Impact Assessment Reports*.

Fingal County Council, (2011). *Major Emergency Plan of Fingal County Council*.

Health Safety Authority, (2015). *A Guide to the Chemicals Act (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2015 (SI No. 209 of 2015)*.

Manchester S.J. (2000). *The Fire and Explosion Hazards of Dried Sewage Sludge. Symposium Series no. 148 IChemE Safety & Loss Prevention Special Interest Group*.

Michael Slattery Associates (MSA), (2018). *Irish Water Sludge Storage Facility - Initial Fire Strategy*.

(2006). *Huntstown Power Station - Accident Prevention and Emergency Response Plan*.

(2016). *Roadstone Quarry – Environmental Contingency Plan*.

USEPA, (2000). *Guide to Field Storage of Biosolids*. United States Environmental Protection Agency.

Section 16: Environmental Interactions

16.1 Introduction

This Section of the EIAR addresses the interactions between the various environmental aspects of the Regional Biosolids Storage Facility (RBSF) component of the Proposed GDD Project and the Proposed Upgrade Project, covered in Sections 3 to 14 (with the exception of Section 5, Biodiversity - Marine, which is not used in this Volume). Hereinafter, this component is referred to "the Proposed RBSF Component".

The following Section is directed by Article 3 section 1 (e) of DIRECTIVE 2014/52/EU on the Assessment of the Effects of Certain Public and Private Projects on the Environment. The EPA *Guidelines on Information to be contained in Environmental Impact Assessment Reports* (Draft 2017) and *Advice Notes for Preparing Environmental Impact Statements* (Draft, September 2015) were also considered.

Article 3 of the Directive states:

1. *The environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors:*

   (a) population and human health;

   (b) biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;

   (c) land, soil, water, air and climate;

   (d) material assets, cultural heritage and the landscape;

   (e) ***the interaction between the factors referred to in points (a) to (d).***

This Volume of the EIAR has considered the effects of the Proposed RBSF Component on the various aspects of the receiving environment. There are cases where an effect on one element of the environment results in an effect on another element. In most cases the effect is automatically considered. For example, noise is assessed based on the effect of the Proposed RBSF Component on traffic and the noise that the predicted traffic will generate, which is compared with acceptable environmental standards, which in turn are based on human health considerations.

To facilitate the understanding of, and interactions between, the various environmental disciplines, a workshop was convened for the environmental specialists and the design team. This workshop identified areas of interaction and the information exchange required to predict the direct and indirect effects of the Proposed RBSF Component.

The interactions and interrelationships involved knowledge sharing and information exchange in relation to the following elements:

- Design and Construction Details: The design team provided project specific details to the specialist environmental team to ensure that they had sufficient information to determine the effects on the receiving environment;

- Sensitive Receptors: Each specialist provided information on the receptors within their study area and their vulnerability to particular effects arising from the Proposed RBSF Component;
- Baseline and Modelling Data: For example, predicted traffic volumes provided by the Traffic specialist were provided to the Noise and Vibration and Air specialists to predict the effects of the proposed GDD Project on noise and air environments; and
- Impacts and Mitigation Measures: Each specialist assessed the effect of the other disciplines on the sensitive receptors within his / her discipline and where necessary, recommended that mitigation was provided to meet the necessary environmental standards (where available).

As a result of this collaboration, the interactions and interdependent impacts/effects are addressed in the respective sections within the EIAR and appropriate mitigation and environmental standards recommended. The residual impacts for each discipline consider the interactions and are summarised in Section 18: Summary of Residual Impacts.

The various interdisciplinary interactions are summarised in Table 16-1.

Table 16-1: Summary of Interactions

	Water	Biodiversity - Terrestrial	Land and Soils	Air and Climate	Noise and Vibration	Odour	Cultural Heritage	Material Assets	Traffic	Landscape	Population and Human Health
Water		✓	✗	✗	✗	✗	✗	✗	✗	✗	✓
Biodiversity - Terrestrial			✓	✓	✓	✗	✗	✗	✗	✓	✗
Land and Soils				✓	✓	✗	✓	✓	✓	✓	✓
Air and Climate					✗	✓	✗	✗	✓	✗	✓
Noise and Vibration						✗	✗	✗	✓	✗	✓
Odour							✗	✗	✗	✗	✓
Cultural Heritage								✗	✗	✗	✗
Material Assets									✓	✗	✗
Traffic										✗	✓
Landscape											✗
Population and Human Health											

✓ = Interaction ✗ = No interaction

16.2 Interdisciplinary Interactions

The principal interactions requiring information exchange between the environmental specialists and the design team are summarised below. The assessment of impacts described in Sections 3 to 14 (excluding Section 5: Biodiversity - Marine, which is not used in this Volume) have taken into account the interactions listed below.

16.2.1 Water

The assessment of impacts on Water is addressed in Section 4. The operation of the Proposed RBSF Component will interact with the water environment by discharging surface water runoff. Discharges of wastewater will be to the public sewer.

16.2.1.1 Biodiversity

The Biodiversity specialist assessed the biological health of the receiving water and its importance as an ecological receptor. A survey to determine the Small Stream Risk Score was undertaken and made available to the Water specialist. The Water specialist provided details on the discharges and impacts on water quality to assist the Biodiversity specialist in his assessment. The potential impacts are addressed in Section 6: Biodiversity - Terrestrial. Impacts on biodiversity as a result of changes in water quality is predicted to be Neutral Imperceptible.

16.2.2 Biodiversity

The assessment of impacts on Biodiversity is addressed in Section 6: Biodiversity - Terrestrial. The effects of the Proposed RBSF Component on water, air quality, noise, landscape and land and soils interacts with the assessment of the impacts on the Biodiversity environment.

16.2.2.1 Water

The Biodiversity specialist assessed the biological health of the receiving water and its importance as an ecological receptor. A survey to determine the Small Stream Risk Score was undertaken and made available to the Water specialist. The Water specialist provided details on the discharges and impacts on water quality to assist the Biodiversity specialist in his assessment. The potential impacts are addressed in Section 6: Biodiversity - Terrestrial. Impacts on biodiversity as a result of changes in water quality is predicted to be Neutral Imperceptible.

16.2.2.2 Land and Soils

Removal of trees and hedgerows impacting on habitats of bats and birds. Data provided by the land and soils team assisted in this assessment. An area of existing grassland in the northern part of the site will be planted with deciduous trees to form an additional foraging area for bats. There are no significant impacts on biodiversity predicted in either the construction or operational phases.

16.2.2.3 Air and Climate

Emissions to the atmosphere associated the Proposed RBSF Component have potential to impact on sensitive terrestrial flora and fauna receptors. The impacts of air quality on terrestrial flora and fauna is addressed in Section 6: Biodiversity - Terrestrial. The air quality data was reviewed to determine if there was any impact on terrestrial flora and fauna. No impact is predicted on biodiversity as a result of changes in air quality.

16.2.2.4 Noise

The results of the noise surveys and assessment were used to assess the impacts on flora and fauna. The noise specialist provided the biodiversity specialist with predicted noise levels resulting from the construction and operational phases. No impact is predicted on biodiversity due to noise.

16.2.2.5 Landscape and Visual

Information on lighting and proposed landscaping was provided to assist in the assessment of the Proposed RBSF Component on bats and other fauna and flora. No significant impact on the Biodiversity receptors is predicted as a result of landscape and visual effects.

16.2.3 Land and Soils

The assessment of impacts on Lands and Soils is addressed in Section 7. The earthworks associated with the construction of the Proposed RBSF Component interacts with several disciplines.

16.2.3.1 Biodiversity

See Section 16.2.2.2.

16.2.3.2 Landscape and Visual

The excavation of soils can remove screening properties and influence the visual impact of the Proposed RBSF Component. Landscape and Visual Impacts are addressed in Section 14: Landscape and Visual. The Proposed RBSF Component will not give rise to any negative landscape or visual effects of a residual nature.

16.2.3.3 Air and Climate

The construction activities will generate dust. Impacts and mitigation of dust generation are addressed in Section 8: Air and Climate. The impacts of dust associated with the construction phase are predicted to be imperceptible following implementation of the proposed mitigation measures.

16.2.3.4 Noise

The activities associated with the land and soil environment (earthworks) will contribute to the noise emission from the site. The noise impacts are addressed in Section 9: Noise and Vibration. The vibration impacts are also assessed in Section 9: Noise and Vibration.

16.2.3.5 Cultural Heritage

Information on the depths of earthworks and excavations were provided to the Cultural Heritage specialist to assist in determining the likelihood of unearthing buried archaeology during construction works. No impact on the archaeological environment is predicted as a result of earthworks.

16.2.3.6 Material Assets

Land-use is addressed in Section 12: Material Assets. Geological Heritage site assessments are required for the assessment of impacts on Material Assets. Quarries and their reserves are assessed as part of Material Assets section. Land and soils related impacts on Material Assets are predicted to be neutral.

16.2.4 Air and Climate

The assessment of impacts on air quality and the climate is addressed in Section 8: Air and Climate. The Proposed RBSF Component will cause a change in the air quality resulting from traffic emissions and the generation of dust. It should be noted that impacts due to odour are assessed separately in Section 10: Odour.

16.2.4.1 Biodiversity

See Section 16.2.2.3.

16.2.4.2 Land and soils

See Section 16.2.3.3.

16.2.4.3 Odour

Odour is addressed separately in Section 10 while Air and Climate are addressed in Section 8. The principal interaction between the odour and air quality is that they are each dealt with in different sections of the EIAR.

16.2.4.4 Traffic

The future traffic volumes were required to predict the associated change in the air quality. The change in air quality was assessed against standard thresholds required to avoid impacts on public health. The impacts of traffic on air quality are addressed in Section 8: Air and Climate and are predicted to be imperceptible (following the implementation of proposed mitigation measures).

16.2.4.5 Population and Human Health

The future traffic volumes were required to predict the associated change in the air quality. The change in air quality was assessed against standard thresholds required to avoid impacts on public health. The impacts of air quality on human health are addressed in Section 3: Population and Human Health. The changes in air quality and dust generated will not give rise to significant adverse effects on human health, following the implementation of mitigation measures and best practice standards and guidelines as detailed in Section 8: Air and Climate.

16.2.5 Noise and Vibration

The assessment of impacts due to noise and vibration impacts are addressed in Section 9: Noise and Vibration.

16.2.5.1 Biodiversity

See Section 16.2.2.4.

16.2.5.2 Land and soils

See Section 16.2.3.4.

16.2.5.3 Traffic

Through modelling, future traffic volumes associated with both construction and operation were estimated. The future traffic volumes were reviewed to predict the noise levels during construction and operation. These predicted traffic volumes were input to the noise model to predict the future noise levels. No significant impacts are predicted as a result of traffic noise.

16.2.5.4 Population and Human Health

The predicted noise levels were assessed for impacts on human health. There can be nuisance impacts associated with noise that impact on the local population. The noise model and assessment determines that construction activities at the Proposed RBSF Component site will not give rise to significant noise levels and will comply with standards and threshold noise limits (BS8223:2014), which are set to protect human health and exposure to undue noise levels. Therefore, it can be concluded that construction noise will not give rise to significant adverse effects on human health.

16.2.6 Odour

The impacts of the Proposed RBSF Component on odour levels are addressed separately in Section 10: Odour.

16.2.6.1 Population and Human Health

The principal impacts of odour are nuisance to the local population. The implications of the predicted odour levels on human health are assessed in Section 3: Population and Human Health. As long as the odour limits set out in the EIAR are adhered to there will be no residual impact on population or human health.

16.2.7 Cultural Heritage

The impacts of the Proposed RBSF Component on Cultural Heritage are addressed separately in Section 11: Cultural Heritage.

16.2.7.1 Land and soils

See Section 16.2.3.5.

16.2.8 Material Assets

The impacts on Material Assets are addressed in Section 12: Material Assets.

16.2.8.1 Land and soils

See Section 16.2.3.5.

16.2.8.2 Traffic

Increases in traffic volumes have the potential to damage the road network.

16.2.9 Traffic

The construction and operation of the Proposed RBSF Component will result in a change of traffic volumes to and from the site.

16.2.9.1 Air Quality

See Section 16.2.4.4.

16.2.9.2 Noise

See Section 16.2.5.3.

16.2.9.3 Material Assets

Impacts on the road network asset resulting from wear and tear will be dependent on the volume of future traffic predicted.

16.2.9.4 Population

There will be a potential nuisance to the local population resulting from possible traffic delays due to increased traffic. The impact is predicted to be slight negative and short term.

16.2.10Landscape and Visual

16.2.10.1 Biodiversity

See Section 16.1.2.5.

16.2.10.2 Land and soils

See Section 16.2.3.5.

16.2.11 Population and Human Health

Each of the impacts from Land and Soils, Air and Climate, Noise and Vibration, Odour and Traffic are assessed in terms of the potential impacts on human health.

The commitment to meeting environmental limits will mitigate impacts on human health. For example, if air quality or noise meet the standards set, there will be no impact on human health due to the Proposed RBSF Component.

The overall assessment of impacts on human health are summarised in Section 3: Population and Human Health. The human health impacts predicted take into account the interactions with the disciplines referred to above.

16.3 References

Environmental Protection Agency (EPA), (2015). *Draft Advice Notes for Preparing Environmental Impact Statements*. [pdf] Available at: https://www.epa.ie/pubs/consultation/reviewofdrafteisguidelinesadvicenotes/Draft%20Advice%20Notes%20for%20preparing%20an%20EIS.pdf.

Environmental Protection Agency (EPA), (2017). *Draft Guidelines of the Information to be Contained in Environmental Impact Assessment Reports*. [pdf] Available at: https://www.epa.ie/pubs/advice/ea/EPA%20EIAR%20Guidelines.pdf.

European Union, (1992). *Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.*

European Union, (2009). *Directive 2009/147/EC; of 30 November 2009 on the conservation of wild birds.*

European Union, (2011). *DIRECTIVE 2014/52/EU on the Assessment of the Effects of Certain Public and Private Projects on the Environment.*

Section 17: Summary of Mitigation

This Volume of the EIAR has assessed the impacts and resulting effects likely to occur as a result of the Regional Biosolids Storage Facility (RBSF) component of the Proposed GDD Project and the Proposed Upgrade Project on the various aspects of the receiving environment. Hereinafter, this component is referred to “the Proposed RBSF Component”.

The Proposed RBSF Component has been designed and will be constructed in a manner to ensure that the impacts on the receiving environment are avoided where possible. Full details of the Proposed RBSF Component can be found in Volume 2, Chapter 4: Description of the Proposed Project. In cases where impacts or potential impacts have been identified, the mitigation that has been proposed aims to avoid/prevent/reduce or offset the significance of particular impacts. These mitigation recommendations are contained in the specific environmental sections within this document.

This Section proposes to collate and summarise the mitigation commitments made in Section 3 to Section 15 of this Volume of the EIAR. In addition to the mitigation measures proposed, appropriate best practice measures relating to construction activities are also provided.

Mitigation of environmental impacts are described as follows:

Mitigation by Design

The design of the Volume of the EIAR has incorporated many inherent elements to avoid undesirable environmental impacts. Buildings that can accommodate operations internally will mitigate impacts on the local environment. Odour control, road layout and drainage measures are environmental design considerations. This EIAR has assessed the environmental effects of the construction and operation of the Proposed RBSF Component. Where impacts were identified, appropriate mitigation measures will be incorporated in the construction and operation stages as described in the various sections of the EIAR.

Mitigation by Management

Many potential environmental impacts have been identified that are associated with construction activity and methodology. Consequently, an outline Construction Environmental Management Plan (CEMP) has been drafted (this outline CEMP is included in Appendix 17A). The CEMP will incorporate all the mitigation measures proposed in this Volume of the EIAR as well as other good practices and guidelines. The CEMP will be updated to include any conditions that are set out as part of a planning approval. The contract specific CEMP will be a live document that will be reviewed and updated throughout the Proposed RBSF Component project in conjunction with the local authority and prescribed bodies as may be outlined in planning conditions. Likewise, an Environmental Management Plan will be put in place post construction, in the operational phase which shall also address environmental monitoring procedures. The mitigation measures are summarised in Table 17-1.

Note that in the table below, mitigation measures are itemised and numbered based on the stage that they are relevant to (i.e. construction or operational - C or O) and the Section that they come from. For example, mitigation measure C.7.1 relates to construction mitigation measure no. 1 from the Land and Soils Section 7.

Monitoring

Monitoring is also listed under each Section title in Table 17-2 in order to summarise any monitoring requirements identified within this Volume of the EIAR. Monitoring items are numbered in the same way as mitigation measures.

Table 17-1: Summary of Mitigation Measures

Mitigation Measure No.	Construction / Operational Stage	Impact / Topic	Mitigation and Environmental Commitments
General			
C.Gen.1 and O.Gen.1	Construction and Operational	Construction Impacts General	A contract specific Outline Construction Environmental Management Plan (CEMP) has been prepared by IW. Detailed CEMPs will be developed for individual contracts and implemented by the various Contractors. The individual CEMPs will have regard to the guidance contained in the handbook published by Construction Industry Research and Information Association (CIRIA) in the UK, Environmental Good Practice on Site, CIRIA 2005, as well as the Outline CEMP document. The CEMPs shall have individual project specific Management Plans appended relating to Waste Management, Invasive Species Management, Traffic Management, Monitoring Plans, and Emergency Response Plans. Any planning conditions imposed by the planning authority shall be strictly observed and monitoring requirements shall be observed in either the construction or operational phase as conditioned.
Section 3: Population and Human Health			
C.3.1 and O.3.1	Construction and Operational	Human Health	It is recommended that a rodent and pest control plan is put in place so as to manage and limit any potential disturbance to populations that may utilise the site. The pest control plan should be in accordance with the Chartered Institute of Environmental Health's "*Pest minimisation Best practice for the construction industry*" guidelines or a similar appropriate standard.
Section 4: Water			
C.4.1	Construction	Control of Water Pollution General	Good construction management practices will be implemented using "Control of water pollution from construction sites, Guidance for consultants and contractors" (C532) (CIRIA).
C.4.2	Construction	Protection of Fisheries	The guidelines provided by the Inland Fisheries Ireland (2016) on the protection of fisheries habitats during construction projects will be adhered to.
C.4.3	Construction	Fuel / Chemical Handling Potential Spills	All fuels or chemicals kept on the construction site will be stored in bunded tanks with the provision of a storage/retention capacity of 110% of tank storage. All refuelling and maintenance will be carried out in ramped containment areas at least 20 m from sensitive environments (i.e., up-gradient of adjacent watercourses).
C.4.4	Construction	Flood Risk Construction	The attenuation storage will be established and the required outlet control to attenuate the discharge flow will be constructed as early as possible in the construction stage.

Mitigation Measure No.	Construction / Operational Stage	Impact / Topic	Mitigation and Environmental Commitments
			Runoff from all impermeable areas formed for the RBSF during the construction stage will be directed through the storm water storage and attenuated to the greenfield run off rate.
C.4.5	Construction	Control of Water Pollution	Foul drainage from all site facilities will be to a public sewer (pumped) or contained and disposed of at a licensed facility offsite.
C.4.6	Construction	Control of Water Pollution	When cast in-place concrete is required, all work must be done in the dry and effectively isolated from any flowing water (or water that may enter rivers or streams) for a period sufficient to ensure no leachate from the concrete. No direct discharges to be made to waters where there is potential for cement or other contaminant residues in discharges. Designated impermeable cement washout areas must be provided.
C.4.7	Construction	Control of Water Pollution	Within the site boundary fence, temporary earth bunds will be constructed to contain surface water run-off and channel it to a silt trap or settlement pond before discharge to the drainage network.
C.4.8	Construction	Control of Water Pollution	Any excavated vegetation, soil and subsoil will be temporarily stockpiled away at least 20 m from any surface water features in order to reduce the likelihood of any suspended solids reaching them.
O.4.1	Operational	Control of Firewater Runoff (operational)	A shut off valve will be installed on the outlet to the stream. This will be used to contain any contaminated runoff in the event of a major accident on site. In the event of a fire, the shutoff valve will close and the firewater will be contained in the attenuation storage system.
Section 5: Biodiversity - Marine			
-	-	-	N/A to this Volume of the EIAR
Section 6: Biodiversity - Terrestrial			
C.6.1	Construction	Terrestrial biodiversity during construction	No vegetation will be cleared during the breeding season between 01 March and 31 August, subject to the results of a breeding bird survey prior to construction. If no breeding birds are observed during the survey, then this mitigation measure will not be required. Given the observed badger usage of the site for foraging there will be a confirmatory survey for badgers prior to construction as they could establish in the construction area in the intervening period. General biosecurity measures will be implemented to ensure invasive species are not imported to site.
O.6.1	Operational	Lighting	During the operational phase, lighting from the proposed storage facility should be screened by planting on the berm to the north of the buildings and any floodlighting should be directed downwards so that the beam spread does not cover the proposed woodland planting. See Drawing Y17702-PL-023.

Mitigation Measure No.	Construction / Operational Stage	Impact / Topic	Mitigation and Environmental Commitments
O.6.2	Operational	Loss of foraging for bats	An area of existing grassland in the northern part of the site will be planted with deciduous trees to form an additional foraging area for bats. See Drawing Y17702-PL-011.
-	Construction and Operational	Surface Water Discharge	See mitigation measures outlined in the Water Section of this Table.
Section 7: Land and Soils (Including Waste)			
C.7.1	Construction	Management of Groundwater and Water	Measures set out in the Construction Industry Research and Information Association (CIRIA) on the control and management of water pollution from construction sites shall be adhered to by the Contractor. Good construction management practices will be employed. During the construction stage, all potentially harmful substances (e.g. oils, diesel, concrete, etc.) will be stored in accordance with the manufacturer’s guidelines regarding safe and secure buildings/compounds. The contractor will ensure that adequate means (Spill kits) to absorb or contain any spillages of these chemicals are available at all times.
C.7.2	Construction	Management of Groundwater and Water	Fuels or chemicals kept on the construction site will be stored in bunded tanks with the provision of a storage/retention capacity of 110% of tank storage. Refuelling areas will be sited within specified hardstanding bunded areas. The drainage from these areas will pass through an oil interceptor.
C.7.3	Construction	Waste Disposal	The waste collected on site will be delivered to authorised waste facilities in accordance with the Waste Management Acts 1996-2010.
C.7.4	Construction	Waste Management Plan	The appointed contractor will be required to produce a Waste Management Plan (to be agreed with the planning authority) for the project in accordance with “*Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects*”.
C.7.5	Construction	Reuse of Spoil	Soft materials and surplus soils that are excavated will be reused, for bunds, landscaping etc.
C.7.6	Construction	Waste Management Soil Disposal	Any soil contaminated from an accidental spillage will be contained and treated appropriately and disposed of in accordance with the Waste Management Act 1996-2012.
C.7.7	Construction	Densification of Soil	To mitigate densification of the soil due to construction activities, all topsoil shall be removed and stored in advance of earthworks, the surface shall be scarified, and the topsoil replaced and reseeded upon completion.
-	Operational	-	None

Mitigation Measure No.	Construction / Operational Stage	Impact / Topic	Mitigation and Environmental Commitments
Section 8: Air and Climate			
C.8.1	Construction	Dust Management	A Dust Minimisation Plan will be implemented during the construction phase. Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic. Any road that has the potential to give rise to fugitive dust will be regularly watered, as appropriate, during dry and/or windy conditions. Vehicles using site roads will have their speed restricted, and this speed restriction will be enforced rigidly. Vehicles delivering material with dust potential (soil, aggregates) will be enclosed or covered with a tarpaulin at all times to restrict the escape of dust. Public roads outside the site will be regularly inspected for cleanliness and cleaned as necessary. Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods. Water bowsers will be deployed within the sites during periods of dry weather to damp down potential dust generation from unbound surfaces. The Contractor will be required to comply with the TA Luft Standards "Technical Instructions on Air Quality Control".
C.8.2	Construction	Reduction of Emissions Climate	HGV management to avoid unnecessary idling while on site. Avoidance policy to be implemented in relation to waste of material through over ordering.
O.8.1	Operational	Dust Monitoring Operational Phase	All HGV unloading activities occur within sealed buildings, doors will remain closed at all times apart from when trucks are entering and exiting the building. Trucks will be completely covered to avoid the escape of any dusty material when being transported to / from the site. Training in HGV operations will be provided for HGV drivers
-	Operational	Climate	None
Section 9: Noise and Vibration			
C.9.1	Construction	Management - Noise Limits	The Contractor will compile and implement a Noise and Vibration Management Plan (NVMP).

<table>
<tr><th>Mitigation Measure No.</th><th>Construction / Operational Stage</th><th>Impact / Topic</th><th>Mitigation and Environmental Commitments</th></tr>
<tr><td></td><td></td><td></td><td>Construction activities will be required to comply with the following noise limits, measured at the nearest noise sensitive receptor:
<table>
<tr><th>Period</th><th>Rounded Baseline Noise Level L_{Aeq} (dB)</th><th>Category</th><th>Suggested Limit</th></tr>
<tr><td>Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)</td><td>65</td><td>B</td><td>70</td></tr>
<tr><td>Evening (19:00 to 23:00hrs)</td><td>60</td><td>C</td><td>65</td></tr>
<tr><td>Night time (23:00 to 07:00hrs)</td><td>55</td><td>C</td><td>55</td></tr>
</table></td></tr>
<tr><td>C.9.2</td><td>Construction</td><td>Management - Vibration Limits</td><td>
<table>
<tr><th colspan="3">Allowable vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration, at a frequency of</th></tr>
<tr><th>Less than 10Hz</th><th>10 to 50Hz</th><th>50 to 100Hz (and above)</th></tr>
<tr><td>15 mm/s</td><td>20 mm/s</td><td>50 mm/s</td></tr>
</table>
In addition, construction activities will be required to ensure that vibration in the vicinity of underground services does not exceed the following:
Maximum Peak Particle Velocity for intermittent or transient vibrations - 30 mm/s; and
Maximum Peak Particle Velocity for continuous vibrations - 15 mm/s.</td></tr>
<tr><td>C.9.3 and O.9.1</td><td>Construction and Operational</td><td>Noise control measures</td><td>During both the construction and operational phases, mitigation measures will include the selection of quiet plant, enclosures and screens around noise sources, limiting the hours of work and noise monitoring.</td></tr>
<tr><td>C.9.4 and O.9.2</td><td>Construction and Operational</td><td>Communication</td><td>The contractor will take a “proactive community relations” stance and will distribute information circulars informing people of the progress of works and any likely periods of significant noise / vibration during construction as required, in line with the construction programme.</td></tr>
<tr><td>O.9.3</td><td>Operational</td><td>Noise limits</td><td>During the operational phase, noise arising from the facility will be required to achieve the following limits, when measured at the nearest noise sensitive receptor:
Daytime (07:00 to 19:00 hrs) 55 dB $L_{Ar,T}$;
Evening (19:00 to 23:00 hrs) 50 dB $L_{Ar,T}$; and
Night-time (23:00 to 07:00 hrs) 45 dB $L_{Aeq,T}$.</td></tr>
</table>

Mitigation Measure No.	Construction / Operational Stage	Impact / Topic	Mitigation and Environmental Commitments
O.9.4	Operational	Noise Control Measures	Noise from building services plant will be minimised through the selection of "low noise" equipment where required as well as the incorporation of appropriate attenuation in the form of: ▪ Acoustic enclosures for fans; ▪ Provision of attenuators for fan intake's; and ▪ Use of acoustic rated doors on all plant rooms or enclosures. The following mitigation measures will be taken to reduce noise levels from the handling of material within buildings; ▪ White noise reversing sirens ▪ Impact protection ▪ Operator training The following mitigation measures will be taken to reduce noise levels arising from the vehicular activity in and around the site: ▪ The design of the site is such that the need for reversing should be minimised in open areas and drivers will be required to adhere to onsite traffic management to reduce the use of reverse sirens. ▪ A speed limit of 20 km/h shall be applicable to all vehicles traversing the site. ▪ Vehicles shall not be permitted to loiter on or near the south-eastern corner of the site. ▪ Under no circumstances are air brakes to be used by vehicles onsite. ▪ Vehicle horns should not be sounded whilst onsite, except in the event of an emergency.
Section 10: Odour			
-	Construction	-	None
O.10.1	Operational	Odour Control Measures	An Odour Management Plan (OMP) will be developed for the operational phase and implemented and will detail best operational practices, identification of all odour sources, good housekeeping principles and guidance on effective operation of the odour control system. OMP operative training to be provided together with maintenance programmes for OCUs.

Mitigation Measure No.	Construction / Operational Stage	Impact / Topic	Mitigation and Environmental Commitments
O.10.2	Operational	Building Control Measures	There shall be a modern building fabric with no passive louvers or vents into the storage areas to prevent fugitive emissions. 4 No. odour control units will be installed. Fast action shutter doors for vehicle access and egress will be used. There shall be no external storage and all incoming HGVs will be covered. See Air and Climate mitigation measures. All worker's access points to the storage areas will be fitted with separate self-closing doors with an audible alarm if doors are open for more than 30 seconds. Traffic light vehicle entry system to be used to ensure efficient door opening/closing management
Section 11: Cultural Heritage			
-	Construction	-	None
-	Construction	-	None
Section 12: Material Assets			
C.12.1	Construction	Utilities	Communication and consultation will be conducted with public utility providers ahead of construction commencement. The construction contracts will require that the Contractor produce a contract specific Construction Environmental Management Plan (CEMP). Utilities Underground surveying techniques are a key method of understanding the below ground conditions and confirming the presence of utility services. A Cable Avoidance Tool and a Signal Generator (CAT and Genny) are used to scan the surface of the ground with an audible signal being developed where underground utilities are detected. Surface radar scanning shall also be used to locate underground services before commencement of any mechanical excavation in the vicinity of underground services. These detection surveys shall be undertaken by the Contractor. Method Statements shall be developed for the construction phase by the Contractor to ensure that all underground services are located manually and carefully protected. The CEMP prepared by the Contractor and approved by IW shall outline a methodology and procedure for carrying out such detection surveys. An avoidance policy shall be adopted where possible in relation to all services and appropriate protection shall be provided for all above and below ground services as necessary.

Mitigation Measure No.	Construction / Operational Stage	Impact / Topic	Mitigation and Environmental Commitments
C.12.2	Construction	Drainage Infrastructure, Watercourses and Water Supply Infrastructure	The mitigation measures outlined for utilities will be repeated. All runoff from paved areas will pass through an oil/fuel interceptor to ensure that contaminated waters are not discharged into adjacent watercourses. A shut-off valve will be installed on the outlet to the receiving watercourse.
O.12.1	Operational	Internal Roads	Wheel cleaning facilities to be provided.
Section 13: Traffic			
C.13.1	Construction	Site Deliveries	Restricted HGV movements into and out of site to avoid peak traffic shall be in force during both construction and operational phases.
C.13.2	Construction	Traffic Management	A Preliminary and Detailed Traffic Management Plan will be created by Irish Water and adhered to for the works in full consultation and agreement with Fingal Co. Council, An Garda Siochana, the Fire Service and the Ambulance service.
C.13.3	Construction	Equipment Management	Tracked excavators will be moved to and from the site on low-loaders and will not be permitted to drive on the street pavements.
C.13.4	Construction	Road Surface Cleaning	Wheel washers / judder bars will be placed at all site access points to minimise the migration of detritus onto the public roads. The roads will be inspected and cleaned on a regular basis. Reference also Vol. 4 Section Water 4.6.1.2
C.13.5	Construction	Abnormal Loads	An Application for an Abnormal Load Permit will be made to Fingal Co. Council in advance for any abnormal loads exceeding the thresholds laid out in the Road Traffic (Construction and Use of Vehicles) Regulations 2003. Where possible, abnormal load movements will be restricted to evening or night time to minimise disruption to local traffic and traffic on strategic routes.
-	Operational	-	None
Section 14: Landscape			
C.14.1	Construction	Screening	Construction hoarding of minimum 2.4 m in height is to be provided on the boundaries with the adjoining residential site (The Peter McVerry Trust site) located at the southeast corner of the site; Construction compounds will not be located adjacent to the site boundary with The Peter McVerry Trust site; Earth berms are to be constructed to provide a basis for immediate low-level screening and enhanced screening effect from proposed planting;

Mitigation Measure No.	Construction / Operational Stage	Impact / Topic	Mitigation and Environmental Commitments
			Landscape measures, including extensive planting works, will be completed as part of the construction works; and The boundary with the R135 will be upgraded to a new boundary railing backed by proposed landscape works.
O.14.1	Operational	Reinstatement of landscape	Proposed landscape works, including the extensive planting, will be maintained in line with standard landscape maintenance practice so as to ensure establishment. Failed or dead plants will be replaced in the planting season following identification of any such defects; and Lighting standards will be fitted with horizontal cut-off fittings to avoid light spill.
Section 15: Risk Management			
C.15.1	Construction and Operation	Damage to hi-voltage Overhead Lines that cross site	Hazard Identification and Goalposting
C.15.2 and O.15.2	Construction and Operation	Road Traffic Accidents	Development and implementation of a traffic management plan.
C.15.3 and O.15.3	Construction and Operation	Emergency Response Plan	An Environmental Incident Response Plan (EIRP) will be updated by the Contractor/Operator of the Proposed RBSF Component, in consultation with the emergency services and other relevant third parties and will be submitted to IW for approval. The updated EIRP will contain Incident Response Procedures which will outline the detailed procedures for dealing with any potential Emergency and shall include the following; ▪ Initial Response Procedures; ▪ List of Emergency Numbers; ▪ Records and sharing of records with prescribed bodies; ▪ Training to be provided; and ▪ Emergency response equipment list to be provided on site.
-	-	Embedded Mitigation Measure	The detailed design of the Proposed RBSF Component will be in accordance with relevant British Standard and International Standard Design codes and specifications to the forms of construction or design of fire protection installation. This includes a proposed a fire fighting water supply of 3,800 litres/min with a total quantity of 880 m^3.

Table 17-2: Summary of Monitoring Requirements

Monitoring Measure No.	Construction / Operational Stage	Impact / Topic	Monitoring Requirements
General			
C.Gen.1	Construction	General Construction	Any planning conditions imposed by the planning authority shall be strictly observed and monitoring requirements shall be observed as conditioned.
O.Gen.1	Operational	General Operational	Any planning conditions imposed by the planning authority shall be strictly observed and monitoring requirements shall be observed as conditioned.
Section 3: Population and Human Health			
-	Construction	-	None
-	Operational	-	None
Section 4: Water			
-	Construction	-	None
-	Operational	-	None
Section 5: Biodiversity - Marine			
-	-	-	N/A to this Volume of the EIAR
Section 6: Biodiversity - Terrestrial			
-	Construction	-	None
-	Operational	-	None
Section 7: Land and Soils (Including Waste)			
-	Construction	-	None
-	Operational	-	None
Section 8: Air and Climate			
	Construction	Dust Monitoring	During the construction phase, dust deposition monitoring will be put in place to ensure dust mitigation measures are adequately controlling emissions. Dust monitoring will be conducted using the Bergerhoff method in accordance with the requirements of the German Standard VDI 2119. The Bergerhoff Gauge consists of a collecting vessel and a stand with a protecting gauge. The collecting vessel is secured to the

Monitoring Measure No.	Construction / Operational Stage	Impact / Topic	Monitoring Requirements
			stand with the opening of the collecting vessel located approximately 2 m above ground level. The TA Luft limit value is 350 mg/(m^2*day) during the monitoring period which is between 28 - 32 days.
-	Operational	-	None
Section 9: Noise and Vibration			
C.9.1	Construction	Noise and Vibration	It is recommended that the appointed contractor monitor levels of noise and vibration at nearby sensitive locations and/or development site boundaries.
O.9.1	Operational	Site operational noise	In the operational phase, and as part of the sites Licence to operate (i.e. IEL / IED), noise levels will be required to be monitored annually in accordance with the EPA *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities* (NG4).
Section 10: Odour			
O.10.1	Operational (post commissioning)	Odour Monitoring	Post commissioning olfactometry survey for the following sources ▪ Olfactometry testing of the inlet and outlet of all OCU; ▪ In duct air flow testing to ensure the design extraction rate of 9.72 $m^3.s^{-1}$ is met at each unit. ▪ All testing to be conducted on the following schedule/basis ▪ Survey to be undertaken after full commissioning of the source/OCU; ▪ Recommendation of testing three months after commission to allow biological media to acclimatise; ▪ Surveys will persist on a 6-month basis until two concurrent tests are shown to be below the stated target level. Note: compliance required with both the outlet odour concentration $ou_E.m^{-3}$ and odour emission rate $ou_E.s^{-1}$ targets; ▪ Odour analysis undertaken by a nationally or internationally accredited laboratory including accreditation to the EN 13725 European standard for odour analysis; and ▪ Surveys would be considered void if conducted during periods of low odour generation, i.e. persistent cold weather and large-scale precipitation events.
O.10.2	Operational	Odour Monitoring	Annual testing of inlet and outlet odour concentrations; Outlet odour concentration ($ou_E.m^{-3}$) and odour emission rate ($ou_{E}.s^{-1}$) remain at expected levels used in this assessment; Ensure that extraction rates are maintained at the design level.

Monitoring Measure No.	Construction / Operational Stage	Impact / Topic	Monitoring Requirements
Section 11: Cultural Heritage			
-	Construction	-	None
-	Operational	-	None
Section 12: Material Assets			
-	Construction	-	None
-	Operational	-	None
Section 13: Traffic			
C.13.1	Construction	-	Traffic flow and vehicle queue lengths at the N2 Northbound Slip Road Junction shall be monitored as part of the Detailed Traffic Management Plan process and restrictions shall be placed on the movement of construction related traffic if deemed necessary by Dublin City Council and/or an Garda Síochána.
C.13.2	Operational	-	None
Section 14: Landscape			
C.14.1	Construction	Landscape Related Works	Monitoring of landscape-related works is an integral aspect of the Proposed RBSF Component, and includes monitoring of: ▪ Tree and hedgerow removal, retention and protection; ▪ Topsoil stripping and storage; ▪ Disturbance by site works, services etc.; ▪ Excavation / alteration of ground levels; ▪ Landscape build-up; profiling and cultivation; ▪ Landscape finishing and implementation; ▪ Proposed planting and grass seeding; and ▪ 12 months aftercare of landscape measures. All works associated with soil stripping and movement; landscape build-up and finishing and landscape implementation shall be approved and monitored by a qualified Landscape Architect.
-	Operational	-	None

Monitoring Measure No.	Construction / Operational Stage	Impact / Topic	Monitoring Requirements
Section 15: Risk Management			
C/O.15.1	Construction and Operational	Risk Assessment	The Environmental Incident Response Plan is a live document that undergoes periodic monitoring, review and update throughout the lifetime of the Proposed RBSF Component. The risk management and assessment of major accidents and/or disasters will be continued on an ongoing basis throughout the planning, design, construction and operational phases of the Proposed RBSF Component. Activities on site will be monitored to ensure risk does of major accidents does not increase over time on the site.

17.1 References

Chartered Institute of Environmental Health's, (2009). *Pest minimisation Best practice for the construction industry*.

Construction Industry Research and Information Association (CIRIA), (2001). *Control of water pollution from construction sites, Guidance for consultants and contractors: (C532)*

Construction Industry Research and Information Association (CIRIA), (2005). *Environmental Good Practice on Site*.

Construction Industry Research and Information Association (CIRIA) *Control and management of water pollution from construction sites*.

Department of Environment, Heritage and Local Government (2006). *Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects*.

Environmental Protection Agency (EPA), (2016). *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities, (NG4)*

European Standard, (2018). *EN 13725 European Standard for Odour Analysis.*

Government of Ireland, (1996). *Waste Management Act 1996-2012.*

Government of Ireland, (2003). *S.I. No. 5/2003 – Road Traffic (Construction and Use of Vehicles) Regulations 2003.*

Inland Fisheries Ireland (IFI), (2016) *Guidelines on protection of fisheries during construction works and in adjacent to water*.

The Association of German Engineers (2013) *German Standard VDI 2119: Ambient air measurements - Sampling of atmospheric particles <größer> 2,5 µm on an acceptor surface using the Sigma-2 passive sampler - Characterisation by optical microscopy and calculation of number settling rate and mass concentration*.

Section 18: Summary of Residual Impacts

This section collates and summarises the residual impacts predicted in Section 3 to Section 14 (with the exception of Section 5, Biodiversity - Marine, which is not used) of this Volume of the EIAR resulting from the Regional Biosolids Storage Facility (RBSF) component of the Proposed GDD Project and the Proposed Upgrade Project. Hereinafter, this component is referred to "the Proposed RBSF Component".

Full details of the Proposed GDD Project and the Regional Biosolids Storage Facility component can be found in Volume 2, Chapter 4: Description of the Proposed Project.

The residual impacts are the impacts that remain following the implementation and incorporation of the mitigation measures and environmental commitments summarised in Section 17. Ideally, in cases where a negative impact has been predicted, the residual impact following the implementation of mitigation measures and good construction practice will be "Neutral". However, in a few isolated cases, for certain potential impacts, a residual impact remains even after the proposed mitigation has been applied. Where an impact is positive no mitigation is required.

On the basis of the assessment of potential impacts and the recommended mitigation measures in this Volume of the EIAR, the Proposed RBSF Component is not likely to impose any significant adverse effects on the environment. Table 18-1 below lists the residual impacts (both positive and negative) of the Proposed RBSF Component following mitigation. The majority of impacts on the environment are either non-existent, neutral quality or of imperceptible/slight significance.

Table 18-1: Summary of Residual Impacts

Environmental Element	Stage	Residual Impact	Significance
Section 3: Population	Construction	Resident population: the resident population will be aware of increased construction activity, particularly related to the increases in traffic on the local road network (See Traffic impacts).	Slight Negative Short term
		Working Population: Employment opportunities for up to 70 construction workers.	Positive Short-Term
		Visiting Population: Nuisance associated with construction activity.	No Significant Impact
	Operational	Resident population: There is no predicted likely direct impact on the resident local population arising from the operational phase of the Proposed RBSF Component.	No Significant Impact
		Working Population. Up to 10 No. employees at the RBSF.	Positive Imperceptible Long-term
		Visiting Population. There is no predicted likely direct impact on the visiting population arising from the operational phase of the Proposed RBSF Component.	No Significant Impact
		Overall operational impacts on population.	Neutral Imperceptible Long-term
Section 3: Human Health	Construction	No impacts predicted on Human Health associated with the construction phase of the Proposed RBSF Component.	Neutral
	Operational	No impacts predicted on Human Health associated with the operational phase of the Proposed RBSF Component.	Neutral
Section 4: Water	Construction	No Flooding or Water Quality impacts are predicted during the construction phase of the Proposed RBSF Component.	Neutral Imperceptible
	Operational	No Flooding or Water Quality impacts are predicted during the operational phase of the Proposed RBSF Component.	Neutral Imperceptible
Section 6: Biodiversity Terrestrial	Construction	There will be no significant adverse impact on any biodiversity receptors during the construction phase.	No Significant Impact
	Operational	There will be no significant adverse impact on any biodiversity receptors during the operational phase. An area of existing grassland in the northern	No Significant Impact

Environmental Element	Stage	Residual Impact	Significance
		part of the site will be planted with deciduous trees (local species) to form an additional foraging area for bats.	
Land and Soils	Construction	Impacts on land, soils and groundwater are insignificant.	Neutral
	Operational	Impacts on land, soils and groundwater are insignificant.	Neutral
Air and Climate	Construction	Dust: Following the implication of dust mitigation measures it is predicted that emissions of dust from the site will not pose a nuisance or health risk at nearby receptors. Climate: The GHG emissions produced during the construction phase of the Proposed RBSF Component are expected to account for 0.00075% of Ireland's EU 2020 target.	Insignificant Long term, Neutral Imperceptible
	Operational	Impacts of traffic and dust on air quality. Impacts on climate.	Neutral, Imperceptible Long Term, Neutral, Imperceptible
Noise and Vibration	Construction	The predicted construction noise levels are within the relevant noise criteria over the construction phase.	Insignificant
	Operational	The predicted increase in noise levels along all of the junctions assessed due to additional vehicular traffic associated with the Proposed RBSF Component is less than 1 dB.	Neutral Imperceptible
Odour	Construction	None.	Neutral No Impact
	Operational	The predictive modelling exercise has shown that odour impacts will not be perceptible by local receptors.	Neutral
Cultural Heritage	Construction	There are no impacts on the cultural heritage environment predicted as a result of the construction phase.	Neutral
	Operational	There are no impacts on the cultural heritage environment predicted as a result of the operational phase.	Neutral
Material Assets	Construction	There are no impacts on material assets predicted as result of the construction phase.	Neutral
	Operational	There are no impacts on material assets predicted as result of the operational phase.	Neutral

Environmental Element	Stage	Residual Impact	Significance
Traffic	Construction	Increase in traffic volumes on adjoining roads and junctions at peak times causing nuisance to road users during the construction stage.	Slight Negative Short-Term
	Operational	Increase in traffic volumes on adjoining roads and junctions.	Imperceptible Negative Long-Term
Landscape and Visual	Operational	The Proposed RBSF Component will not give rise to any negative landscape or visual effects of a residual nature.	Neutral
	Construction	Construction works will not have residual landscape or visual effects.	Neutral

Section 19: Cumulative Impacts

19.1 Introduction

This Section considers the potential cumulative impacts and resulting effects arising from the Regional Biosolids Storage Facility (RBSF) component of the Proposed GDD Project and the Proposed Upgrade Project when combined with other existing and/or approved projects. Hereinafter, this component is referred to "the Proposed RBSF Component".

Full details of the Proposed GDD Project and the Regional Biosolids Storage Facility component can be found in Volume 2, Chapter 4: Description of the Proposed Project.

Where potential cumulative impacts and effects have been identified, this Section provides a summary description of same and provides a reference to the relevant section of this EIAR where the potential impact and effect has been assessed.

19.2 Methodology

19.2.1 Legislative Context and Guidelines

The cumulative impact assessments have been undertaken by each specialist, as outlined in each relevant section of this EIAR. The assessments have been undertaken in accordance with the following legislation and guidelines:

19.2.1.1 Legislation

Article 3(1) and Annex III of the EIA Directive (2014/52/EU) confirms that the likely significant effects on the environment must be considered with regard to the impact of any project.

- Annex III (3)(g) includes for: "the cumulation of the impact with the impact of other existing and/or approved projects"; and
- Annex IV(5)(e) includes for a description of the likely significant effects of the project on the environment resulting from inter alia: "*the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources*".

19.2.1.2 Guidelines

The cumulative impact assessments have been carried out in accordance with the following guidelines:

- EU (2017) Environmental Impact Assessment of Projects Guidance on the Preparation of the Environmental Impact Assessment Report;
- EPA (2017) Revised Guidelines on the Information to be contained in Environmental Impact Assessment Reports (Draft);
- EPA (2015) Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (Draft); and
- EC (1999) European Commission Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions.

The EU 1999 guidelines define cumulative impacts as "*Impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project*" whilst the

EPA Draft Guidelines (2017) define cumulative impacts as "*The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects*".

The EC Guidelines (1999) also considers 'Indirect Impacts' as well as 'Impact Interactions' in addition to 'Cumulative Impacts' and states that the three types of impact overlap. For the purposes of this assessment, these impacts were considered as follows:

- Indirect Impacts: Impacts on the environment that are not a direct result of the project;
- Impact Interactions: Where two impacts have the potential to interact to create a new type of impact;

Indirect Impacts and Impact Interactions have been considered in the cumulative impact assessments.

It is noted that both the Directive and the Guidelines refer to both 'impacts' and 'effects' and these terms can often be used interchangeably. For clarity, this Section follows the general consensus in considering 'impacts' as the changes resulting from the provision of a project, and 'effects' are defined as the consequences of identified impacts.

19.2.2 Characteristics of the Proposed RBSF Component

The Proposed RBSF Component, for which permission is now being sought, is an 11 ha site at Newtown, Dublin 11 and will include the following elements:

- Demolition of existing buildings and some site infrastructure;
- 2 no. biosolids storage buildings, including solar panels on the roof of one building;
- Administration and welfare building with staff parking;
- Internal roads;
- 2 no. weighbridges;
- HGV parking area;
- HGV cleaning area;
- Odour control units with ventilation stacks;
- Site services, including electricity supply substation;
- Landscaping and site boundary treatment;
- Use of the existing vehicular access off the R135 regional road.

A detailed description of the Proposed RBSF Component is provided in Section 3.4 of Volume 2 of this EIAR.

It is proposed to transition to the use of the RBSF from the existing storage facility at Thornhill, County Carlow. The initial phase of construction for the RBSF will involve the construction of one storage building in 2020. The construction works are estimated to last 12 months. The second building is likely to be constructed in 2024 to meet requirements at that stage following the transition from the Thornhill facility and will last for approximately 9 months. If necessary, it is expected that both buildings can be constructed in 2020 with little or no extension to the overall construction programme. However, additional construction staff and resources would be required during the construction period.

19.2.3 Identification of Plans / Projects

In accordance with the EPA Draft 2017 Guidelines, a scoping exercise was undertaken to identify existing and/or approved projects with the potential for cumulative impacts, considering any existing environmental problems relating to areas of environmental importance likely to be affected or the use of natural resources.

The scoping process considered three types of projects as follows:

- Existing projects, including projects under construction with a valid planning permission within the vicinity of the Proposed RBSF Component site with the potential for significant cumulative effects with the Proposed RBSF Component;
- Approved projects with a valid planning permission within the vicinity of the Proposed RBSF Component site with the potential for significant cumulative effects with the Proposed RBSF Component; and
- Proposed projects that do not have planning permission but are considered integral to the Proposed RBSF Component as a whole.

Projects included for consideration included those that required an Environmental Impact Assessment as part of their planning stage, such as power stations, quarries, industrial developments, other major infrastructure development, other Strategic Infrastructure Development (SID), or public utilities and services within the vicinity of the Proposed RBSF Component.

Projects identified within the vicinity of the Proposed RBSF Component site that have the potential to give rise to significant cumulative effects are as follows:

- Huntstown Quarry, Huntstown;
- Huntstown Power Station, Huntstown;
- Dublin Airport Authority developments; and
- Huntstown BioEnergy Limited.

In scoping the potential for cumulative impact assessments to occur, it is important to note that the Proposed RBSF component forms an integral part of both the Proposed GDD Project and the Proposed Upgrade Project. Furthermore, the main purpose of the Proposed RBSF Component is to store biosolids prior to its re-use on agricultural and silvicultural land, as set out in the National Wastewater Sludge Management Plan (NWSMP).

Consequently, this assessment should also consider potential cumulative impacts that may arise from the following elements:

- Cumulative elements from the Proposed GDD Project and Ringsend WwTP Upgrade Projects; and
- Existing/and or approved projects associated with the NWSMP.

19.3 Evaluation of Potential Cumulative Environmental Impacts with other Projects

Projects with the potential for causing cumulative impacts, indirect impacts or interaction amongst impacts are identified in Section 19.2 of this report. A desktop study was undertaken for each of these projects to ascertain the nature and scale of their development and to identify where such impacts have the potential to occur. The desktop study included a review of plans and particulars - including Environmental Impact Statements, Reports, Planning conditions and Licenses where relevant. The findings of this review are presented in Table 19-1 below and presented to the relevant specialist for assessment where relevant.

Table 19-1: Evaluation for Cumulative, Indirect Impacts and Impact Interactions

Discipline	Projects			
	Huntstown Quarry	Huntstown Power Station	DAA Developments	Huntstown BioEnergy Limited
Population and Human Health	✓	✓	×	✓
Water	✓	✓	×	✓
Biodiversity Terrestrial	✓	✓	×	✓
Land and Soils	×	×	×	×
Air and Climate	✓	✓	✓	✓
Noise and Vibration	✓	✓	✓	✓
Odour	×	×	×	✓
Cultural Heritage	×	×	×	×
Material Assets	×	×	×	×
Traffic	✓	✓	✓	✓
Landscape	✓	✓	×	✓

✓ Denotes potential for cumulative, indirect or interaction amongst impacts

× Denotes no potential for cumulative, indirect or interaction amongst impacts

19.4 Assessment of Cumulative Impacts, Indirect Impacts and Impact Interactions

19.4.1 Population and Human Health

The Population and Human Health section (Volume 4, Section 3) considers potential cumulative impacts from the Proposed RBSF Component during both the construction phase (Section 3.7.1) and the operational phase (Section 3.7.2) on the residential population, working population and visiting population.

The likely cumulative impact of the Proposed RBSF Component is, in general, that the working population of the Greater Dublin Area will be capable of expanding significantly over time due to the increased levels of construction activity and associated construction employment generating uses that the Proposed RBSF Component (which supports the Proposed GDD Project and the Proposed Ringsend Upgrade Project) will accommodate. This will have significant widespread economic benefit to the Region and the State as a whole. This is a significant indirect and positive impact of the Proposed RBSF Component.

The Population assessment also notes the beneficial cumulative effects of the GDD Project, in cumulation with the Proposed RBSF Component, in allowing the sustainable expansion of the Greater Dublin Area over time. This will have significant widespread economic benefit to the Region and the State as a whole. This is a significant indirect and positive impact of the Proposed RBSF Component.

19.4.2 Water

Volume 4, Section 4 of this EIAR considers potential cumulative impacts resulting from the Proposed RBSF Component. The Section identifies the Huntstown Quarry, Huntstown Power Station and proposed Huntstown Bio-Energy plant as projects that discharge to the same sub-catchment as the Proposed RBSF Component site.

The overall residual impact of the Proposed RBSF Component on the surface water environment during both the construction and operational phases has been assessed to be neutral/imperceptible. Accordingly, the Proposed RBSF Component will not give rise to cumulative impacts, indirect impacts or impacts interactions with other plans or projects.

19.4.3 Biodiversity

The Biodiversity - Terrestrial assessment (Section 6) considers potential direct and indirect impacts resulting from the Proposed RBSF Component. Following mitigation, the Proposed RBSF Component will have no significant adverse impacts on biodiversity. The site itself is of Low Importance (Higher Value) and the extent of potentially significant impacts will not extend beyond the site itself. Accordingly, there are no cumulative impacts with other projects predicted.

19.4.4 Land and Soils

The residual impact of the Proposed RBSF Component on land, soils, geology and hydrogeology during both the construction and operational phases is predicted to be neutral. Accordingly, they are unlikely to interact with the impacts of other existing or permitted projects, including the Huntstown Quarry to the west of the site. There are no cumulative impacts with other projects predicted.

19.4.5 Air Quality and Climate

Volume 4, Section 8.7.4 of this EIAR provides an assessment of the potential cumulative impacts associated with the Proposed RBSF Component. The effects on air quality and climate assessment identifies and considers vehicular emissions from traffic associated with the site and site activities and considers dust emissions that may potentially arise from the construction and operation of the plant. With regard to traffic emissions, the assessment has been based on predicted future traffic volumes which are based on a cumulative impact.

The cumulative impact assessment considered predicted dust deposits associated with the construction of the Proposed RBSF Component and neighbouring facilities, including the Huntstown Quarry, Power Station and permitted Huntstown Bio-energy site.

Predicted dust deposition levels associated with the Proposed RBSF Component are low and preventative and mitigation measures will be in place accordingly to avoid the escape of dust during both construction and operation. Therefore, the overall cumulative impact with any existing or future developments is not predicted to be significant

19.4.6 Noise and Vibration

The Noise impact assessment consisted of a baseline noise survey to describe the existing noise environment, which includes existing activities and development in the area. The Noise model is based on the outputs of the traffic model which predicted the cumulative increase in traffic.

The potential cumulative noise and/or vibration impact of the Proposed RBSF Component site and nearby Roadstone Huntstown quarry has been considered. The quarry operates under an EPA Waste Licence (ref. W0277-01). Schedule B.3 of Roadstone's Waste Licence provides noise limits for the operation of the quarry as follows:

- Daytime (07:00 to 19:00 hrs) 55 dB $L_{Ar,T}$;
- Evening (19:00 to 23:00 hrs) 50 dB $L_{Ar,T}$; and
- Night-time (23:00 to 07:00 hrs) 45 dB $L_{Aeq,T}$.

These limits are the same as those proposed for the Proposed RBSF Component site (i.e. section 9.2.2.1). The noise criteria for operational phase of the Proposed RBSF Component has been derived with consideration of, and with influence from, baseline noise levels in the area, during which the quarry was operational. Therefore, the noise limits proposed for the Proposed RBSF Component's operational phase have considered potential cumulative noise levels and potential significant cumulative noise impacts are not expected.

The construction phase vibration limits proposed have been selected to ensure that building damage does not occur. Monitoring of vibration during the construction phase will ensure that vibration, either from the Proposed RBSF Component site, or cumulative including any vibration generated due to quarry activities, will not exceed the prescribed limits. Potential significant cumulative vibration impacts are therefore not expected.

19.4.7 Odour

Section 10.7.4 of this Volume of the EIAR provides an assessment of the Cumulative Impact. The assessment identifies the Huntstown Renewable BioEnergy Plant (RBP) as another potential Odour Source, located approximately 700 m to the south. This plant has recently been granted a 5-year extension to its planning permission, though it is uncertain as to when it will commence construction. The assessment reviewed the modelling data and odour section submitted as part of the planning application.

The predicted odour contribution from the Huntstown RBP facility is considered to be negligible at receptors within the Proposed RBSF Component study area and that the combined impact is likely to be well below the adopted odour annoyance criterion of 3 $ou_E.m^{-3}$ as the 98th percentile of hourly averages. As such, it is expected that the odour from the two proposed facilities, in combination, will not lead to a cumulative significant odour impact.

No other potential odour sources have been identified within the vicinity.

19.4.8 Cultural Heritage

No residual impacts on Cultural Heritage have been identified. Accordingly, the Proposed RBSF Component will not give rise to significant cumulative impacts.

19.4.9 Material Assets

Predicted residual impacts on Material Assets have been assessed to be neutral / imperceptible. Accordingly, the Proposed RBSF Component will not give rise to significant cumulative impacts.

19.4.10 Traffic

The cumulative impact assessment for Traffic was informed by the scoping exercise undertaken in the development of this EIAR. The assessment is based on the findings of site visits, observations, on-site traffic counts, plans associated with the Proposed RBSF Component and consultation with the design team responsible for the Proposed RBSF Component.

Furthermore, Section 13.2.7.4, which provides the anticipated deliveries to the site includes deliveries from the proposed GDD Project.

Section 13.7.4 provides a summary of the cumulative impacts, which includes a conservative assessment of the local road network which made allowance for future development of that all of the surrounding lands which represents the "worst-case" scenario with respect to development in the surrounding area, was undertaken which made allowance for future development of the surrounding, undeveloped lands in line with the current land-use zoning contained within the Fingal Development Plan 2017 - 2023. The area examined for future development was bounded by the M50 to the south, the L3120 and L3125 to the north, the R122 to the east and the Cappagh Road to the west. Refer to section 13.2.5 for details of the area of future development considered.

The cumulative assessment concludes that the Proposed RBSF Component will result in an Imperceptible Negative Short-Term Impact during the 2040 Design Year in both the AM and PM peak hours.

19.4.11Landscape

In terms of potential cumulative impacts, the landscape and visual assessment has taken account of existing developments and permitted developments in the area. Existing developments include the Huntstown Quarry, the Huntstown Power Station, Finglas 220 kV Station, and developments at Dublin Airport Logistics Park located to the east of Proposed RBSF Component site and east of the N2. Permitted developments include the Peter McVerry Trust, Huntstown Bioenergy Plant, Warehousing and storage facilities and a Material's recovery facility.

These developments, which are pending permission, are either sufficiently distant and visually separate from the site of the Proposed RBSF Component, and/or have intervening road infrastructure (i.e. R135 and N2) so as to ensure that they will not give rise to potential for significant cumulative landscape or visual effects.

At over 5 km distant, there is no landscape or visual relationship between the Proposed RBSF Component site and proposed developments at Dublin Airport.

Cumulative landscape and visual effects arise in that when taken together with existing, permitted and planned developments, the development of the Proposed RBSF Component will tend to further reinforce the prevailing and emerging business / industrial character of the area. Local landscape and visual will tend to be more focused and punctuated where construction of other permitted and/or planned developments proceed in tandem with or overlap with the construction of the Proposed RBSF Component. Once completed, the Proposed RBSF Component includes for a significant level of landscape planting - so much so that any potential for cumulative landscape and/or visual impact is appropriately and substantially mitigated.

The Proposed RBSF Component is also considered to be consistent with the existing land use zoning for site and surrounding lands as "*HI - To provide for heavy industry*". In this manner, the Proposed RBSF

Component is considered to be appropriate for the site and the wider area and the overall cumulative landscape and visual effects are considered to be moderate and neutral.

19.5 Cumulative Interactions with the Proposed GDD Project and the Proposed Upgrade Project

This sub-section considers the potential cumulative impacts that may result from the Proposed RBSF Component and both the Proposed GDD Project and the Proposed Upgrade Project. Potential cumulative impacts that may arise solely between the Proposed GDD Project and the Proposed Upgrade Project are discussed in Volume 3 of this EIAR.

Each of the sites are geographically remote from each other and present no combined potential for cumulative impacts. However, both the Proposed GDD Project and the Proposed Upgrade Project identify the Proposed RBSF Component as an integral part of their proposed developments. The Proposed RBSF Component is required to receive biosolids from both installations for storage prior to re-use on agricultural lands.

Each of the sites are geographically remote from each other and do not present the potential for cumulative impacts or impact interactions, other than in the generation and handling of biosolids and in traffic between the Proposed RBSF Component and the respective facilities.

The estimated quantities of biosolids generated by the Proposed GDD Project and the Proposed Upgrade Project, based on design loads (including headroom) are summarised o in Table 19-2 below.

Table 19-2: Storage Volume Requirement for Biosolids

Year	**Source**	**Biosolids Type**	**Annual**		**Storage Period**	
			Dry Tonnes (tDS)	Tonnes	Tonnes	**Volume (m3)**
2021	Ringsend WwTP	Biocake	11,400	43,700	14,000	13,340
		Biofert	15,300	16,650	5,400	12,200
	Total					**25,540**
2025	Ringsend WwTP	Biocake	7,700	29,640	9,500	9,100
		Biofert	15,300	16,650	5,400	12,200
	GDD WwTP	Biocake	4,880	19,520	6,250	6,000
	Total					**27,300**
2040	Ringsend WwTP	Biocake	10,900	42,000	13,460	12,800
		Biofert	15,300	16,650	5,400	12,100
	GDD WwTP	Biocake	7,900	31,700	10,200	9,700
	Total					**34,600**

Note: Figures are rounded.

The Proposed RBSF Component has been designed to cater for the cumulative biosolids volumes from both the Proposed GDD Project and the Proposed Upgrade Project. Furthermore, the mitigation measures incorporated into the design and operation of the Proposed RBSF Component ensure that this component will not give rise to significant impacts. Consequently, it can be concluded that the storage of biosolids generated by the Proposed GDD Project and the Proposed Upgrade Project do not give rise to cumulative impacts or effects.

Furthermore, section 13.2.7.4, which provides the anticipated deliveries to the site, includes deliveries from the Proposed GDD Project has been incorporated into the assessment for traffic impacts. The findings of that assessment conclude that the cumulative traffic volumes between the Proposed RBSF Component and the Proposed GDD Project and the Proposed Upgrade Project will not give rise to undue or significant impacts.

19.6 Landspreading of Biosolids under the National Wastewater Sludge Management Plan

As described in Volume 2, Section 3, the wastewater treatment process results in the production of biosolids, suitable for land spreading as fertilizer on agricultural lands. The biosolids produced at the Ringsend WwTP and the Sludge Hub Centre at the proposed GDD WwTP, which will treat sludges from other Fingal WwTPs, will all be stored at the Proposed RBSF Component. In case of Struvite, it will be stored unless it achieves a declaration of 'end of waste' by the EPA and a certification under the REACH process by the HSA such that it is suitable to be sold directly to the fertiliser industry as a product. Biosolids will be collected from the relevant WwTP by authorised waste contractors, for transmission by road and then either spread on land as a soil conditioner and fertiliser, or transferred to an appropriate licensed waste facility, as per the National Wastewater Sludge Management Plan (NWSMP).

It is anticipated that up to 34,600 tonnes of biosolids will be produced at the proposed Ringsend WwTP and GDD WwTP and stored at the Proposed RBSF Component. An assessment of the likely significant effects of the traffic impacts arising from the transport of the biosolids to and from the Proposed RBSF Component is included in Volume 3, Section 13. The likely significant effects of the storage of the biosolids have been assessed throughout the sections of this EIAR. Based on the expected volumes of biosolids, approximately 7000 hectares capacity in spread lands will be required. The NWSMP (which was the subject of public consultation in 2016 and both SEA and AA) has already identified that there is a vastly greater area of agricultural lands in Ireland suitable for land spreading of biosolids than the volume of biosolids that will be produced from Irish Water's WwTP, including the Ringsend WwTP and GDD WwTP. See in particular Section 8.6 of the NWSMP. All biosolids from Fingal WwTP's and Ringsend WwTP's are currently used in agriculture.

The actual lands that will be utilised for the land spreading of the biosolids produced at the Ringsend WwTP and GDD WwTP, cannot be identified at this remove in time. The actual lands that will be utilised can only be identified at the time when the biosolids are being generated and the nutrient needs of the relevant lands have been identified. This changes from year to year depending on a number of factors. Irish Water does and will ensure that the lands utilised for the landspreading of all biosolids generated by its WwTPs are only those that comply with all relevant laws and regulation, as committed to in the NWSMP.

In that regard, there are a significant number of important environmental controls on the use of biosolids in agriculture. Contractors used by Irish Water or its DBO operators are obliged to ensure that biosolids are only spread in accordance with the Waste Management (Use of Sewage Sludge in Agriculture) Regulations, 1998 as amended in 2001; the EU (Good Agricultural Practice for the Protection of Waters) Regulations 2017 as amended; and the Code of Good Practise for Use of Biosolids in Agriculture. Nutrient Management Plans (NMPs) must be prepared by the relevant contractor, covering each of the spread lands that are proposed to be used. All contractors collecting the biosolids must be licensed to do so, using authorised vehicles with valid waste collection permits. All material will be weighed and recorded on leaving the Proposed RBSF Component. In preparing the NMP for the receiving spreadlands, a comprehensive soil analysis of the entire landholding will be carried out. Soil samples will be submitted for analysis to an accredited laboratory. Individual local authorities may also require water sampling and other tests to assess aquifer and groundwater vulnerability, with all samples required to be submitted for analysis to an accredited laboratory. Based on these analyses and the farming programme for the year, a crop NMP will be drawn up. The NMP will determine the amounts of biosolids which may be spread on each parcel of land in the overall holding. The NMP will be submitted to the relevant local authority for assessment, after first being submitted to Irish Water for review. This entire NMP process typically takes 2 months to complete. The environment section of the local authority then assesses the NMP (which usually takes another 4 weeks) and may require prior notification before landspreading, and again on completion. Contractors are required to report to Irish Water on all land spreading activities, on a monthly basis, in relation to contracts for sludge management. These reports detail the volumes of biosolids spread and the lands used. Irish Water also undertakes audits of contractor activities. Irish Water is obliged to submit sludge returns to the EPA annually. In addition to this, local authorities monitor the use of sludge in agriculture in their functional areas, and also require monthly and annual reportage. Local authorities maintain a sludge register. It includes the quantities of sludge produced and used in agriculture in their functional area, the composition and parameters of that sludge; the treatment the sludge has undergone; and the name and address of each sludge recipient. There is therefore a strict environmentally controlled regime within which the land spreading of biosolids in agriculture takes place, with full traceability, reportage and reconciliation of volumes so utilised.

The environmental and human health impacts of landspreading were extensively considered in the SEA and AA carried out for the NWSMP, which was the subject of extensive public consultation during 2016 prior to its publication in September 2016.

19.7 Conclusion

This EIAR has considered potential cumulative impacts arising from the construction and operation of the Proposed RBSF Component in accordance with requirements as set out in the EIA Directive and EPA and EC Guidelines. The location, scale and nature of its design, construction and operation has been assessed, and potential impacts have been identified as set out in the various sections of this Volume of the EIAR.

The cumulative assessments are mainly informed by undertaking of baseline surveys and the development of models that assess emissions that relate to Odour, Noise, Air Quality and Traffic. Furthermore, the Proposed RBSF Component has been designed to accommodate the combined biosolids volumes from both the GDD and Ringsend projects in a manner that will not give rise to significant environmental effects on the surrounding environment.

The Proposed RBSF Component is not likely to give rise to any significant cumulative effects, in combination with existing and/or permitted projects in the area.

19.8 References

SLR Consulting, (2008). *Stream BioEnergy- Proposed Renewable BioEnergy Plant at Huntstown, Dublin 11 - Environmental impact Statement.*