PREFACE

This Environmental Impact Statement (EIS) for the proposed Ringaskiddy Resource Recovery Centre consists of four volumes, of which this is the second:

Volume 1 - Non Technical Summary

Volume 2 - EIS (Main Text)

Volume 3 - Figures

Volume 4 - Appendices

Volume 2

Table of Contents

List of Contributors

This Environmental Impact Statement (EIS) is based on an appraisal, undertaken by Arup, of the environmental effects of the proposed Ringaskiddy Resource Recovery Centre. The Arup team drew on in-house resources including environmental and earth sciences, coastal engineering and flood assessment, traffic and civil engineering and graphics.

Indaver contributed to the preparation of the EIS. The design strategy for the process engineering, architecture and landscape was undertaken by Indaver, Wilson Architecture and Brady Shipman Martin respectively.

Arup Sub Consultants

The following sub consultants, working in accordance with specifications prepared by Arup contributed to the preparation of the EIS:

- AWN Consulting: Air Quality, Climate, Noise and Vibration, and Soil Dioxin Assessment.
- Brady Shipman Martin: Landscape and Visual, including photomontages
- Dixon.Brosnan Environmental Consultants: Biodiversity and Natura Impact Statement
- Employment Health Advisers Ltd. – Human Health Impact Assessment
- Coakley O'Neill Town Planning – Planning and Policy Context
- Lane Purcell Archaeology – Archaeology, Architectural and Cultural Heritage
- Wilsons Architecture – Architectural Design

Glossary of terms

µg	microgram (10^{-6} gram)
AA	Appropriate Assessment
ACA	Architectural Conservation Area
AEP	Annual Exceedance Probability
AEWA	Agreement on the Conservation of African-Eurasian Migratory Waterbirds
AGI	Above Ground Installation
Alluvium	Sediment deposited by flowing water
Anticline	A fold in rocks with strata sloping downward on both sides from a common crest
aOD	Above Ordnance Datum
AQS	Air Quality Standards
Aquifer	A geological unit that stores and transmits significant quantities of groundwater under normal hydraulic conditions
As	Arsenic
B(a)P	Benzo[a]pyrene
barg	A unit used for the measurement of pressure (referred to as gauge pressure)
BAT	Best Available Techniques
Berm	Raised bank, artificial embankment
BGE	Bord Gáis Éireann, the Irish gas board (now called Gas Networks Ireland GNI)
bgl	Below ground level
BMW	Biodegradable municipal waste
BOD	Biochemical oxygen demand
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
BTO	British Trust for Ornithology
BREF	BAT reference document published by the European Commission under the Industrial Emissions Directive IED, 2010/75/EU)
Carboniferous	The geological period between 355 and 290 million years ago
CCDP	Cork County Development Plan
CCGT	Combined Cycle Gas Turbine
CCTV	Close Circuit TV
Cd	Cadmium
CD	Chart Datum
CDM	Clean Development Mechanism
CEALAP	Carrigaline Electoral Area Local Area Plan
CEDAS	Coastal Engineering and Design Analysis System
CEMP	Construction Environmental Management Plan
CH_4	Methane
CHP	Combined Heat and Power
CITES	Convention of International Trade of Endangered Species
CIRIA	Construction Industry Research and Information Association

CLHEG	Cork Lower Harbour Energy Group
CO	Carbon Monoxide
Co	Cobalt
CO_2	Carbon Dioxide
COP21	Conference of the Parties to the Convention (United Nations Framework Convention on Climate Change)
Cr	Chromium
cSAC	Candidate Special Areas of Conservation
CRTN	Calculation of Road Traffic Noise
CSO	Central Statistics Office
Cu	Copper
CV	Calorific Value
dB	decibel
$dB_{(A)}$	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.
DAHG	Department of Arts, Heritage and Gaeltacht
DEFRA	Department of the Environment Food and Rural Affairs (UK)
$DeNO_x$	Removal of nitrogen oxides
DETR	Department of the Environment, Transport & the Regions (UK)
DHI	Danish Hydraulic Institute
Dioxins	A collective term for the category of 75 polychlorinated dibenzo-para-dioxin compounds (PCDDs) and 135 polychlorinated dibenzofuran compounds (PCDFs). Seventeen PCDD and PCDF compounds are considered to be of toxicological significance. The most toxic of these is 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) (EPA 2016). www.epa.ie/pubs/reports/other/dioxinresults/Dioxin%20Report%202013_web.pdf
DOC	Dissolved Organic Carbon
DOEHLG	Department of the Environment, Heritage and Local Government
EHS	Environmental Health and Safety
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
ELV	Emission Limit Value
EPA	Environmental Protection Agency
EPPP	Environmental Persistent Pharmaceutical Pollutants
ESB	Electricity Supply Board
ETS	Emission Trading Scheme
EU	European Union
EWC	European Waste Catalogue
Excavation (Archaeology)	For archaeology, excavation means the manual and mechanical excavation by an archaeologist-led team with specific objectives as regards information, preservation, recording, etc. of archaeological information. Its purpose is to fully investigate archaeological deposits and features
Ferrous metals	Term for a group of metals that contain iron and share similar properties e.g. aluminium

fg	femtogram (10^{-15} gram)
Flue Gas	Combustion exhaust gas produced during the incineration process
Fluorinated Gases	Gases containing fluoride that are classed as a greenhouse gas
Furans	See *Dioxins*
Gasification	Gasification is the conversion of a solid or liquid feedstock into combustible gas by partial oxidation under the application of heat and water.
GHG	Greenhouse Gas
GHS	Geological Heritage Site
GIA	Glacial Isostatic Adjustment
GLC	Ground Level Concentration
Groundwater	Water that occupies pores and crevices in rock and soil, below the surface and above a layer of impermeable material
GSI	Geological Survey of Ireland
GWP	Global Warming Potential
Ha	Hectares
Habitat	The dwelling place of a species or community which provides a particular set of environmental conditions
HAT	Highest Astronomic Tide
HAZID	Hazard Identification and Risk Assessment
HAZOP	Hazard and operability study
HCl	Hydrogen chloride
HEFS	High End Future Scenarios
HEPA	High Efficiency Particulate Air (filter)
HF	Hydrogen fluoride
Hg	Mercury
HGV	Heavy Goods Vehicle
HSA	Health and Safety Authority
HVL	High Value Landscape
HWM	High Water Mark
ICPSS	Irish Coastal Protection Strategy Study
ID	Induced Draught
IED	Council Directive 2010/75/EU on Industrial Emissions Directive
IEEM	Institute of Ecology and Environmental Management
IGI	Institute of Geologists of Ireland
IGV	Interim Guideline Values
IMERC	Irish Maritime and Energy Research Cluster
INDC	Intended Nationally Determined Contribution
In-situ	In its original place, for archaeology it refers to the preservation of archaeological sites/features without disturbance
IPCC	Intergovernmental Panel on Climate Change

IPPC	Integrated Pollution Prevention and Control
ISO	International Standards Organisation
I-TEQ	International Toxic Equivalents
I-WeBS	Irish Wetland Bird Survey
JI	Joint Implementation
JT	Joint Implementation
kph	Kilometres per hour
L_{A90}	Sound level that is exceeded for 90% of the sample period (A-weighted). It is typically used to describe background noise
L_{Aeq}	The equivalent continuous sound level, used to describe a fluctuating noise in terms of a single noise level over the sample period (A-weighted).
$L_{Aeq\ T}$	The equivalent continuous sound level, used to describe a fluctuating noise in terms of a single noise level over a particular time period (A-weighted).
L_{Amax}	The instantaneous maximum sound level measured during the sample period.
$L_{Ar,\ T}$	The equivalent continuous sound level at a particular residential location, used to describe a fluctuating noise in terms of a single noise level over a particular time period (A-weighted).
LAP	Local Area Plan
LAT	Lowest Astronomic Tide
L_{AX}	The “A-weighted” Sound Exposure Level of the event considered (dB)
Leachate	Water that has percolated through soil or other material and contains soluble or suspended solids, or any other component of the material through which it has passed.
LEL	Lower explosive limit
LGV	Light Good Vehicles
Limit value	Specified in European Union directives or Irish regulation as a concentration of a pollutant which must not be exceeded in order to protect health or the environment
Lithology	Of a rock unit that describes its physical characteristics such as colour, texture, grain size or composition
LOAEL	Lowest Observed Abnormal Effect Levels
LoLo	Lift-on, Lift-off
$L_{w(A)}$	Combined Sound Power
Made Ground	Deposits which have accumulated through human activity and may consist of natural materials, e.g. clay and/or man made materials, e.g. refuse
MARI	Maximum At Risk Individual
MBT	Mechanical Biological Treatment
Methodology	The specific approach or techniques use to analyse impacts or describe environments
mg/Nm^3	milli grams per Newton metres cubed
MHWN	Mean High Water Neap
MHWS	Mean High Water Springs
MJ/Kg	Mega Joules per kilogram
MLWN	Mean Low Water Neap
MLWS	Mean Low Water Springs

MMP	Mobility Management Plan
Mn	Manganese
mOD	metres above Ordnance Datum
MRFS	Mid-range future scenarios
MSL	Mean Sea Level
MSW	Municipal Solid Waste
Mt	Million tonnes
MTCE	Metric tonnes of carbon equivalent
MW	Mega Watts
MWh	Mega Watts per Hour
Na_3PO_4	Sodium phosphate
NAAQS	National Ambient Air Quality Standards
NaOH	Sodium hydroxide
NCDWC	National Construction and Demolition Waste Council
NDP	National Development Plan
ng	nanogram (10^{-9} gram)
NG4	Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Schedules Activities, Environmental Protection Agency (2012)
NH_3	Ammonia
NH_4OH	Ammonium hydroxide
NHA	Natural Heritage Area
NIAH	National Inventory of Architectural Heritage
NHWMP	National Hazardous Waste Management Plan
Ni	Nickel
NIS	Natura Impact Statement
Nm^3	Cubic Metres (Normalised)
NMCI	National Maritime College of Ireland
NMI	National Museum of Ireland
NMS	National Monuments Service
NO_2	Nitrogen Dioxide
NO_x	Nitrous Oxides
NPWS	National Parks and Wildlife Service
NRA	National Roads Authority
NSL	Noise Sensitive Locations
NSS	National Spatial Strategy
O_2	Oxygen
O_3	Ozone
OD	Ordnance Datum
ODM	Ordnance Datum Malin

OEL	Occupational Exposure Limit
OPW	Office of Public Works
OSI	Ordnance Survey Ireland
Orogeny	The process of mountain formation
Outcrop	An exposure of bedrock
PAH	Polycyclic aromatic hydrocarbons
pNHA	Proposed natural heritage area
Pb	Lead
PCB	Polychlorinated Biphenols
PCDD	See *Dioxins*
PCDF	See *Furans*
pcSAC	proposed candidate Special Area of Conservation
PCU	Passenger Car Units
PEC	Predicted environmental concentration
PEL	Probable effect level
pg	Pictogram (10^{-12} gram)
pH	Potential of Hydrogen, measure of acidity or alkalinity of solution
PM_{10}	Particulate matter less than 10μg (dust)
$PM_{2.5}$	Particulate matter less than 2.5μg (dust)
pNHA	proposed Natural Heritage Area
Pollution	The direct or indirect alteration of the physical, chemical, thermal, biological, or radioactive properties of any part of the environment in such a way as to create a hazard or potential hazard to the health, safety or welfare of living species.
POP	Persistent Organic Pollutant
PPE	Personal Protection Equipment
PPV	Peak Particle Velocity
PSD	Prevention of significant deterioration
Pyrolysis	Pyrolysis is the thermal degradation of a material in the complete absence of an oxidising agent (typically air).
QESH	Quality, Environmental, Health & Safety
QNHS	Quarterly National Household Survey
Quaternary	The most recent Period of geological time (the last two million years)
Red List	In relation to protected species of birds
REFIT	Renewable Feed-In Tariff
RES-E	Renewable Energy in Electricity
RES-H	Renewable Energy in Cooling
RES-T	Renewable Energy in Transport
Rhizome	Underground stem of plants, laterally growing and capable of producing the root and shoot system of a new plant
River Basin District (RBD)	The area of land from which all surface run-off flows through a sequence of streams rivers, and possibly lakes into the sea at a single river, mouth, estuary or delta
RMP	Record of monuments and places

RoRo	Roll-on, Roll-off
RPGs	Regional planning guidelines
RPS	Record of Protected Structures
Run-off	The flow of water under gravity in open channels
SAC	Special Area of Conservation
SAP	Systems, Applications and Products in Data Processing Ltd.
Sb	Antimony
SBEACH	Storm-induced BEAch CHange computer model
SCR	Selective Catalytic Reduction
SI	Statutory Instrument
SMR	Sites and Monuments Records
SNCR	Selective Non-Catalytic Reduction
SO_2	Sulphur Dioxide
SO_x	Sulphur Oxides expressed as Sulphur Dioxide
SPA	Special Protection Area
SRTM	Shuttle Radar Topography Mission
STEL	Short Term Exposure Limit
Subsoils	Soil lying immediately under the surface soil.
SuDS	Sustainable Drainage System
SWDS	Solid Waste Disposal Sites
SWL	Still water level
SWRBD	South Western River Basin District
SWRPG	South West Regional Planning Guidelines
t/a	tonnes/annum
TA Luft	Technical Instructions on Air Quality Control – TA Luft. In accordance with article 48 of the Federal Emission Control Law (BimSchG) dated 15 March 1974 (BGBI. Ip. 721) Federal Ministry for Environment, Bonn 1986.
TCDD	See *Dioxins*
TDI	Tolerable Daily Intake
TEF	Toxic Equivalence Factor
TEN-T	Trans-European Transport Networks
TEL	Threshold Effect Level
TEQ	Toxic Equivalent
Test trenching	A form of archaeological excavation where the purpose is to establish the nature and extend of archaeological deposits and features present in a location that is proposed for development. Its purpose is not to fully investigate those deposits or features
TFL	Traffic Modelling Guidelines
TFS	Transfrontier Shipment
TI	Thallium
TII	Transport Infrastructure Ireland
TOC	Total Organic Carbon

TOMS	Toxic Organic Micropollutants Network
TP	Trial pit
tpa	Tonnes per annum
TWI	Tolerable Weekly Intake
TRL	Transport Research Laboratory
UCC	University College Cork
UN	United Nations
UPS	Un-interruptible Power Supply
USEPA	United States Environmental Protection Agency
V	Vandium
VRP	Viewshed Reference Points
Visual envelope	The extent of potential visibility of the proposed development to or from a specific area or feature in the landscape - defined by topography and vegetation
WeBS	Wetland Bird Survey
WEEE	Waste Electrical and Electronic Equipment
WFD	Water Framework Directive
WHO	World Health Organisation
WMP	Waste Management Plan
WWTP	Wastewater Treatment Plant
ZAP	Zone of Archaeological Protection
ZTVI	Zone of Theoretical Visual Influence

Glossary of Impacts

Reference is made in this EIS to environmental impacts of various qualities, significance, duration and types. Unless defined elsewhere, these follow the relevant Environmental Protection Agency guidance the subject (*Revised guidelines on the information to be contained in Environmental Impact Statements*, Draft September 2015).

Quality of Effects

Positive Effects: A change which improves the quality of the environment (for example, by increasing species diversity; or the improving reproductive capacity of an ecosystem, or removing nuisances or improving amenities).

Neutral Effects: A change which does not affect the quality of the environment.

Negative/adverse Effects: A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health or property or by causing nuisance).

Significance of Effects

Imperceptible: An effects capable of measurement but without noticeable consequences.

Not significant: An effects which causes noticeable changes in the character of the environment but without noticeable consequences.

Slight Effects: An effects which causes noticeable changes in the character of the environment without affecting its sensitivities.

Moderate Effects: An effects that alters the character of the environment in a manner that is consistent with existing and emerging trends.

Significant Effects: An effects which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.

Very Significant: An effects which, by its character, magnitude, duration or intensity significantly alters the majority of a sensitive aspect of the environment.

Profound Effects: An effects which obliterates sensitive characteristics.

Duration of Effects

Momentary Effects: Effects lasting from seconds to minutes

Brief Effects: Effects lasting less than a day

Temporary Effects: Effects lasting less than a year

Short-term Effects: Effects lasting one to seven years.

Medium-term Effects: Effects lasting seven to fifteen years.

Long-term Effects: Effects lasting fifteen to sixty years.

Permanent Effects: Effects lasting over sixty years

Types of Effects

Cumulative Effects: The addition of many small effects to create one larger, more significant, effects.

'Do Nothing Effects': The environment as it would be in the future should no project of any kind be carried out.

Indeterminable Effects: When the full consequences of a change in the environment cannot be described.

Irreversible Effects: When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.

Residual Effects: The degree of environmental change that will occur after the proposed mitigation measures have taken effect.

Synergistic Effects: Where the resultant effects is of greater significance than the sum of its constituents.

Indirect Effects: Effects that arise off-site or are caused by other parties that are not under the control of the developer (such as a quarry).

Secondary Effects: Effects that arise as a consequence of a project (a new waste water treatment plant will reduce the yield of mussels in a nearby estuary).

List of Figures (Volume 3)

7. Roads and Traffic

8. Air Quality

List of Appendices (Volume 4)