

CHAPTER 16

Waste

Shannon LNG Limited
August 2021

Shannon Technology and Energy Park
Environmental Impact Assessment Report

Table of Contents

16.	Material Assets - Waste	16-5
16.1	Introduction.....	16-5
16.2	Competent Expert.....	16-5
16.3	Sources of Information and Methodology	16-5
16.3.1	Legislation and Guidance.....	16-5
16.3.2	Study Area.....	16-8
16.3.3	Determination of the Baseline Environment.....	16-8
16.3.4	Determination of Sensitive Receptors.....	16-8
16.3.5	Describing Potential Effects	16-8
16.3.6	Limitations and Assumptions.....	16-9
16.4	Baseline Environment	16-10
16.4.1	Background Information.....	16-10
16.4.2	Construction and Demolition Waste Arisings	16-10
16.4.3	Hazardous Waste Arisings	16-10
16.4.4	Municipal Waste Arisings	16-10
16.4.5	Landfill Inputs and Capacity	16-11
16.4.6	Other waste management infrastructure.....	16-11
16.5	Assessment of Impact and Effect	16-12
16.5.1	Effects from Construction and Demolition Waste on National Waste Plans and Policies and National Capacity.....	16-12
16.5.2	Effects from Operational Waste on National Waste Plans and Policies and National Capacity	16-15
16.6	Cumulative Impact Assessment	16-17
16.7	Mitigation Measures.....	16-17
16.8	Do Nothing Scenario.....	16-18
16.9	Residual Impacts and Effects.....	16-19
16.10	Transboundary Impacts.....	16-19
16.11	Decommissioning Phase.....	16-19
16.12	Summary	16-19
16.13	References	16-22

Figures

Figure 16-1	Waste Hierarchy	16-18
-------------	-----------------------	-------

Tables

Table 16-1 Policy and Legislation.....	16-6
Table 16-2 Significance of Effect Criteria.....	16-9
Table 16-3 National Construction and Demolition Waste Material Streams Collected In 2018 (EPA, 2020a).....	16-10
Table 16-4 National Hazardous Waste Management, 2019 (EPA, 2020b).....	16-10
Table 16-5 Number of Operational Landfills, 2013-2020 (EPA, 2020d)	16-11
Table 16-6 Landfills Accepting Municipal Waste for Disposal, 2020	16-11
Table 16-7 Number of Operational Incinerators, 2013-2020 (EPA, 2020d)	16-11
Table 16-8 Authorised Waste to Energy Capacity	16-12
Table 16-9 Authorised Capacity for Composting, Anaerobic Digestion and Biostabilisation of Organic Fines (EPA, 2020d).....	16-12
Table 16-10 Estimated Main Types and Quantities of Non-hazardous Waste Generated During Construction and Demolition	16-14
Table 16-11 Estimated Waste Quantities from Operation.....	16-15
Table 16-12 Characteristics of Waste Water Treatment Plant Discharge.....	16-17
Table 16-13 Summary.....	16-20

16. Material Assets - Waste

16.1 Introduction

This chapter presents an assessment of the impacts of the Proposed Development with respect to waste management.

The effects associated with waste generated from the Proposed Development on physical environmental aspects are assessed separately in the relevant chapters e.g. air and water.

This chapter defines the study area; the methodology used for developing the baseline and impact assessment; provides a description of the baseline environment in relation to waste arisings and infrastructure; and presents the findings of the impact assessment.

For the purpose of this EIAR, waste is defined as per the Waste Framework Directive (Wafd) (EC, 2008), as amended, as *'any substance or object which the holder discards or intends or is required to discard.'* The generic term used for waste generated from any civil engineering activities and in the Wafd is construction and demolition waste (CDW). CDW *'arises from activities such as the construction of buildings and civil infrastructure, total or partial demolition of buildings and civil infrastructure, road planning and maintenance'* (EC, 2008).

The scope of this waste management assessment includes:

- Waste generated by the construction and operation of Shannon Technology and Energy Park which includes the LNG Terminal (including FRSU and AGI) and CCGT Power Plant; and
- Any potential cumulative impacts arising from wastes generated by Shannon Technology and Energy Park in combination with other projects.

The assessment considers the following types of impact:

- Impact from construction activities on national waste plans and policies and the national infrastructure capacity; and
- Impact from operational activities on national waste plans and policies and the national infrastructure capacity.

16.2 Competent Expert

This assessment has been undertaken by Mike Bains, Technical Director, BSc (Hons), CChem MRSC. Mike has 24 years' experience in environmental consultancy, predominantly in the field of waste management in Ireland, the UK and internationally. He has been subject-matter expert for waste management in a large number of major projects, including nationally significant infrastructure projects in the UK. Mike is also experienced in waste management in the pharmaceutical sector.

16.3 Sources of Information and Methodology

In the absence of specific guidance on assigning significance for waste management impacts, professional judgement, national and local policy, and recognised best practice have been used to objectively assess the impact and associated effect of the Proposed Development against the baseline.

16.3.1 Legislation and Guidance

The assessment of the impacts of waste and the design of appropriate mitigation is informed by the legislation, regulations, policies and guidance in the key documents as outlined below and in Table 16-1.

National waste management regulations in Ireland include the following:

- Waste Management (Collection Permit) Regulations 2007 (as amended) (Government of Ireland, 2007a);
- Waste Management (Facility Permit and Registration) Regulations 2007 (Government of Ireland, 2007b);
- Waste Management (Licensing) Regulations 2004 (Government of Ireland, 2004);

- Waste Management (Packaging) Regulations 2014 (Government of Ireland, 2014);
- Waste Management (Planning) Regulations 1997 (Government of Ireland, 1997a);
- Waste Management (Landfill Levy) Regulations 2015 (Government of Ireland, 2015);
- Waste Management (Food Waste) Regulations 2009 (as amended) (Government of Ireland, 2009);
- Waste Management (Hazardous Waste) Regulations 2007 (as amended) (Government of Ireland, 2007c);
- Waste Management (Shipments of Waste) Regulations 2007 (as amended) (Government of Ireland, 2007d);
- Waste Management (Movement of Hazardous Waste) Regulations 1998 (Government of Ireland, 1998);
- The Waste Management Act 1996 (as amended 2001) (Government of Ireland, 1996);
- Environmental Protection Agency Act 1992 (Government of Ireland, 1992);
- The Protection of the Environment Act 2003 (Government of Ireland, 2003);
- Litter Pollution Act 1997 (Government of Ireland, 1997b); and
- Planning and Development Act (as amended 2020) (Government of Ireland, 2000).

Table 16-1 Policy and Legislation

Legislation	Year	Key Points
Waste Framework Directive 201/851 (EC, 2008)	2018	<p>Directive (EU) 2018/ 851 amends Directive 2008/ 98/ EC including:</p> <ul style="list-style-type: none"> • Increase targets for preparing for re-use and recycling of waste; • Remove substances intended for animal feed from the scope of directive 2008/ 98/ ec; • Add several new definitions; • Change end-of-waste conditions and requirements; • Set out exemptions for separation of waste collection; • Establish bio-waste separation; • Establish household hazardous waste collection; and • Update record keeping requirements. <p>This Directive includes the following target:</p> <ul style="list-style-type: none"> • By 2020, a minimum of 70% (by weight) of non-hazardous construction and demolition waste excluding naturally occurring material defined in category 17 05 04 in the List of Wastes (LoW) shall be prepared for re-use, recycled or undergo other material recovery.
Southern Region Waste Management Plan (SRWMP, 2015)	2015-2021	For the purposes of waste management planning, Ireland is divided into three regions: Southern, Eastern-Midlands and Connacht-Ulster. Waste Management Plans (WMP) for the three regions were published in May 2015. The Proposed Development is location within the Southern region. The WMP for the Southern Region is the framework for the prevention and management of wastes in a safe and sustainable manner.
A Waste Action Plan for a Circular Economy – Irelands National Waste Policy (Government of Ireland, 2020))	2020-2025	The new national waste policy will inform and direct waste planning and management in Ireland and embeds climate action in all aspects of public policy, aligning with the goals of the European Green Deal. The policy shifts focus away from waste disposal, moving it back up the production chain. The document contains over 200 measures across various waste areas including Circular Economy, Municipal Waste, Consumer Protection and Citizen Engagement, Plastics and Packaging, Construction and Demolition, Textiles, Green Public Procurement and Waste Enforcement.
National Hazardous Waste Management Plan, 2014-2020 (EPA 2014)	2014	<p>The overarching objectives for the National Hazardous Waste Management Plan for the revised Plan period are:</p> <ul style="list-style-type: none"> • To prevent and reduce the generation of hazardous waste by industry and society generally; • To maximise the collection of hazardous waste with a view to reducing the environmental and health impacts of any unregulated waste;

Legislation	Year	Key Points
		<ul style="list-style-type: none"> To strive for increased self-sufficiency in the management of hazardous waste and to minimise hazardous waste export; and To minimise the environmental, health, social and economic impacts of hazardous waste generation and management.
European Communities (Waste Directive) Regulations, 2011, S.I. No 126 of 2011 (EC, 2011)	2011	This regulation transposes the EU Waste Framework Directive into Irish legislation, and (amongst other provisions) allows an operator to decide that a material is a by-product and not a waste material if approved by the EPA.
Waste Management Act 1996 and Amendment Act 2001 (Government of Ireland, 1996)	2001	The Waste Management Acts provide for a general duty on everyone not to hold, transport, recover or dispose of waste in a manner that causes or is likely to cause environmental pollution.
Basel Convention (Basel Convention, 1992)	1992	<p>The Basel Convention regulates transboundary movements of hazardous wastes and provides obligations upon its Parties to ensure that such wastes are managed and disposed of in an environmentally sound manner. The main principles of the convention are as follows:</p> <ul style="list-style-type: none"> Transboundary movements of hazardous wastes should be reduced to a minimum, which is consistent with their environmentally sound management; Hazardous wastes should be treated and disposed of as close as possible to their source of origin; and Hazardous waste generation should be reduced and minimised at source. <p>Annexes I–VIII of the Basel Convention provide lists of waste categories requiring special consideration or controls, including disposal operations. Annex I outlines a list of waste categories to be controlled, Annex II details waste categories requiring special consideration and Annex III provides a list of important hazardous characteristics.</p>
The International Convention for the Prevention of Pollution from Ships (MARPOL) (IMO, 1973)	1973/78	<p>MARPOL is the main international convention covering prevention of pollution of the marine environment by ships from operational or accidental causes. The Convention includes regulations aimed at preventing and minimizing pollution from ships - both accidental pollution and that from routine operations - and currently includes six technical Annexes. Special Areas with strict controls on operational discharges are included in most Annexes.</p> <p>The relevant Annexes for waste management for the Proposed Development are:</p> <ul style="list-style-type: none"> Annex I - Regulations for the Prevention of Pollution by Oil: covers prevention of pollution by oil from operational measures as well as from accidental discharges; the 1992 amendments to Annex I made it mandatory for new oil tankers to have double hulls and brought in a phase-in schedule for existing tankers to fit double hulls, which was subsequently revised in 2001 and 2003. Annex IV - Prevention of Pollution by Sewage from Ships: contains requirements to control pollution of the sea by sewage; the discharge of sewage into the sea is prohibited, except when the ship has in operation an approved sewage treatment plant or when the ship is discharging comminuted and disinfected sewage using an approved system at a distance of more than three nautical miles from the nearest land; sewage which is not comminuted or disinfected has to be discharged at a distance of more than 12 nautical miles from the nearest land. Annex V - Prevention of Pollution by Garbage from Ships: deals with different types of garbage and specifies the distances from land and the manner in which they may be disposed of; the most important feature of the Annex is the complete ban imposed on the disposal into the sea of all forms of plastics. <p>The Sea Pollution Act, 1991 enabled Ireland to ratify MARPOL 73/ 78: regulations to give effect to MARPOL were introduced in 1994 and updated in 1997, 2002 and 2003.</p>
Kerry County Development Plan 2015-2021 (KCC, 2015)	2015-2021	The County Development Plan 2015-2021 incorporates the aims, objectives, policies and guidelines to provide for the proper planning and sustainable development of Co. Kerry. The County Development Plan is a spatial planning framework that gives

Legislation	Year	Key Points
		<p>effect to the delivery of sustainable and planned economic and social development in a manner consistent with higher level plans and strategies.</p> <p>In Chapter 7, the plan sets out the Council's overall aims for waste management, which are to:</p> <ul style="list-style-type: none">• Seek to ensure the provision of the highest standards of waste management and to prevent and control water, air and noise pollution. <p>With respect to waste policy, the Council's objectives are to:</p> <ul style="list-style-type: none">• Ensure the implementation of the Regional Waste Management Plan with emphasis on waste reduction, reuse and recycling and the sustainable disposal of residual waste in the most appropriate manner.• Facilitate the implementation of the current Regional Waste Management Plan, and any replacement or amending plan, to include implementation of the waste hierarchy and maximising the diversion of waste from landfill in accordance with current national and European policy.

16.3.2 Study Area

The extent of the study area for the assessment of waste management infrastructure capacity for the Proposed Development includes the footprint of the Proposed Development site (within which waste will be generated from the construction and operational activities). This also extends to the whole of Ireland due to the need to consider all available waste management infrastructure capacity in Ireland.

16.3.3 Determination of the Baseline Environment

The baseline environment for waste focuses on national waste arisings and the availability and capacity of waste management infrastructure within the study area.

The baseline information on waste arisings and waste management facilities capacity in Ireland has been sourced from the most recent available data published by the Environmental Protection Agency (EPA).

16.3.4 Determination of Sensitive Receptors

Assessment of waste impacts does not follow the approach of identifying receptors and determining their sensitivity that is typically used for other environmental aspects. Attempting to identify receptors is problematic since:

- Waste producers have a legal duty of care to manage their waste in accordance with regulations and to ensure that any waste leaving the site of generation is transferred to a suitably licensed facility for further treatment or disposal;
- Facilities transferring, treating or disposing of waste must be either licensed or apply for an exemption from a license. Impacts arising from the operation of waste management facilities are considered as part of the planning and permitting process for such facilities; and
- Waste collectors are required by the Waste Management (Waste Collection Permit) Regulations 2007 as amended, to have and comply with conditions of a permit to collect waste. Offaly Co. Council was appointed the National Waste Collection Permit Office (NWCPO) in 2012 and is responsible for administering waste collection permits in the Republic of Ireland.

The receptor for this assessment is therefore the waste management infrastructure capacity in the study area.

16.3.5 Describing Potential Effects

The waste assessment focuses on the effects the waste arisings generated onsite would have on the capacity of waste management infrastructure in the study area.

In the absence of specific guidance or requirements, professional judgement is used to determine the significance of effect by the following approach:

- Establishing the baseline waste infrastructure capacity and arisings for the study area;

- Estimating the likely types and quantities of waste that would be generated by the Proposed Development;
- For each category of waste, comparing the likely waste arisings from the Proposed Development to the baseline waste arisings and confirming whether sufficient capacity is available; and
- Assessing whether the Proposed Development conforms to relevant Irish and European waste policies and strategies.

The criteria used for assessing the significance of effect are shown in Table 16-2.

Table 16-2 Significance of Effect Criteria

Significance of Effect	Criteria
Imperceptible	<ul style="list-style-type: none"> • No waste generated
Not Significant	<ul style="list-style-type: none"> • Project achieves >99% overall material recovery/ recycling (by weight) of non-hazardous CDW excluding naturally occurring material defined in category 17 05 04 in the List of Wastes. • Project waste for disposal is ≤1% of national waste arisings (for the relevant categories of waste).
Slight	<ul style="list-style-type: none"> • Project achieves 70-99% overall material recovery/ recycling (by weight) of non-hazardous CDW excluding naturally occurring material defined in category 17 05 04 in the List of Wastes. • Project waste for disposal is ≤5% of national waste arisings (for the relevant categories of waste).
Moderate	<ul style="list-style-type: none"> • Project achieves less than 70% overall material recovery/ recycling (by weight) of non-hazardous CDW excluding naturally occurring material defined in category 17 05 04 in the List of Wastes. • Project waste for disposal is >5% and < 10% of national waste arisings (for the relevant categories of waste).
Significant	<ul style="list-style-type: none"> • Project recovers or recycles a negligible proportion of non-hazardous CDW excluding naturally occurring material defined in category 17 05 04 in the List of Wastes. • Project waste for disposal is >10% of national waste arisings (for the relevant categories of waste).
Very Significant	<ul style="list-style-type: none"> • Project waste for disposal is >25% of national waste arisings (for the relevant categories of waste).

16.3.6 Limitations and Assumptions

The assessment presented herein has been developed based on the following limitations and assumptions:

- The assessment has been undertaken on the basis of information available at the time of writing.
- Waste arising from the offsite extraction, processing and manufacture of demolition and remediation plant and materials has been scoped out of this assessment. This is based on the assumption that these products and materials are being developed in a manufacturing environment with their own waste management plans, facilities, and supply chain, which are potentially in different regions of Ireland or the world, and therefore outside of the geographical scope of this assessment.
- Environmental impacts associated with the management of waste for the Proposed Development are addressed in the following:
 - Land and soils, e.g. impacts from hazardous waste to ground – Chapter 05
 - Water, e.g. from uncontrolled wastewater discharge or runoff – Chapter 06
 - Air quality, e.g. emissions to atmosphere from the site – Chapter 08;
 - Noise and vibration, e.g. from waste generating activities and processing – Chapter 09;
 - Climate, e.g. greenhouse gas emissions – Chapter 15; and

- Roads and traffic, (e.g. removal of waste by road) – Chapter 11.

16.4 Baseline Environment

16.4.1 Background Information

The Proposed Development is located within the Southern Region. The region has appointed Limerick City and Co. Councils and Tipperary Co. Council as regional leads acting on behalf of the other authorities (including Kerry Co. Council (KCC)) with responsibility for the implementation of the Southern Region Waste Management Plan 2015-2021. The Waste Enforcement Regional Lead Authority (WERLA) for the Southern Region is Cork Co. Council. In terms of waste management, the WERLA are responsible for setting priorities and common objectives for waste enforcement within the region.

16.4.2 Construction and Demolition Waste Arisings

In 2018, an estimated 6,251,396 tonnes of CDW was collected by authorised waste collectors in the whole of Ireland (Table 16-3). Recent data for the Southern Waste Region is not available. Waste soil and stones made up 76.7% of the total quantity. Mixed CDW accounted for 7% of the total, and concrete, bricks, tiles and similar for 12%.

Table 16-3 National Construction and Demolition Waste Material Streams Collected In 2018 (EPA, 2020a)

Waste Materials from CDW Sources	Quantity (tonnes)
Soil and stone	4,794,821
Mixed CDW	437,598
Concrete, bricks, tiles and similar	750,168
Metals	187,542
Bituminous mixtures (asphalt/ tarmacadam)	62,514
Segregated wood, glass and plastic	25,006
Total	6,251,396

The EPA's 'Progress to EU Targets' published on 12th December 2020 shows that Ireland achieved 77% recovery of CDW in 2018.

16.4.3 Hazardous Waste Arisings

The EPA reported that 580,977 tonnes of hazardous waste were managed in Ireland in 2019 by the methods shown in Table 16-4 below.

Table 16-4 National Hazardous Waste Management, 2019 (EPA, 2020b)

Year	2019
Irish hazardous waste treatment facilities - hazardous waste excl. soils	117,246
Irish hazardous waste treatment facilities - contaminated soils	55,282
Onsite treatment at licensed industrial facilities - hazardous waste excl. soils	29,063
Exports - hazardous waste excl. soils	333,195
Exports - contaminated soils	46,191

16.4.4 Municipal Waste Arisings

The EPA reports that in 2018, Ireland generated 2,912,353 tonnes of municipal waste (EPA, 2020c), which includes both waste from households, and similar types of waste from commercial activities. The EPA does not publish statistics for overall generation of non-hazardous industrial waste, although it

reports that in 2017 113,825 tonnes of industrial waste were disposed of and landfilled and 46,020 tonnes were recovered.

16.4.5 Landfill Inputs and Capacity

Table 16-5 shows that there has been a significant decrease (86%) in the availability of landfills accepting municipal waste over the last 12 years. There are three landfills currently receiving municipal waste (Table 16-6) with a total capacity of 570,000 tonnes per annum.

Table 16-5 Number of Operational Landfills, 2013-2020 (EPA, 2020d)

Year	2013	2014	2015	2016	2017	2018	2019	2020
Number of landfills accepting municipal waste for disposal	11	9	6	7	5	5	4	3

Table 16-6 Landfills Accepting Municipal Waste for Disposal, 2020

Authorisation Number	Facility Name and Location	Waste for Disposal (maximum tonnes per annum)	Waste Types for Disposal (maximum tonnes per annum)	Waste Types for Recovery (maximum tonnes per annum)	
W0146	Knockharley Landfill Co. Meath	175,000	household	25,000 construction & demolition 70,000 inert waste	
			commercial		45,000
			industrial		30,000
W0165	Ballynagran Residual Landfill Co. Wicklow	175,000	household	28,000 construction & demolition	
			commercial		67,500
			industrial		45,000
W0201	Drehid Waste Management Facility Co. Kildare	120,000	non-hazardous municipal, commercial and industrial wastes	No limit for inert waste where used in landfill engineering	
Total		470,000			

There is no commercial hazardous waste landfill in Ireland, and there are limited hazardous waste treatment operations (these are mainly used for oil recovery, healthcare waste treatment and solvent reclamation), meaning that Ireland is dependent on export for treatment of many hazardous waste streams.

16.4.6 Other waste management infrastructure

Table 16-7 shows that there has been an increase in the availability of incinerators. There are two incinerators currently operating (Table 16-8) with a total capacity of 835,000 tonnes per annum. An additional 342,875 tonnes of capacity is available for co-incineration in cement kilns.

Table 16-7 Number of Operational Incinerators, 2013-2020 (EPA, 2020d)

Year	2013	2014	2015	2016	2017	2018	2019	2020
Number of municipal waste incinerators	1	1	1	1	2	2	2	2

Table 16-8 Authorised Waste to Energy Capacity

Authorised Waste to Energy Capacity in Ireland		Authorisation Number	Maximum Waste Acceptance Limit Per Year (tonnes)
Incineration	Indaver Ireland Ltd.	W0167	235,000
	Dublin Waste to Energy Ltd.	W0232	600,000
Co-Incineration	Lagan Cement	P0487	95,000
	Irish Cement Ltd.	P0030	120,000
	Quinn Cement Ltd.	P0378	127,875
Total			1,177,875

The authorised capacity for composting, anaerobic digestion and biostabilisation of organic fines is 687,660 per year as shown in Table 16-9

Table 16-9 Authorised Capacity for Composting, Anaerobic Digestion and Biostabilisation of Organic Fines (EPA, 2020d)

Maximum Annual Intake Authorised for:	Tonnes per annum
Composting, anaerobic digestion and biostabilisation of organic fines ¹	687,660
Composting ²	Approximately 459,000
Anaerobic digestion ²	Approximately 110,000
Biostabilisation of organic fines ²	Approximately 143,700

Notes

- 1: Does not include facilities where only waste generated onsite is treated onsite such as at industrial installations.
- 2: Approximate as some facilities carry out more than one activity e.g. composting and biostabilisation.

Authorised capacity for other types of waste management infrastructure including material recovery facilities and CDW treatment facilities are not summarised in the EPA waste data release.

16.5 Assessment of Impact and Effect

16.5.1 Effects from Construction and Demolition Waste on National Waste Plans and Policies and National Capacity

The following wastes will be generated from the construction and demolition works:

- Workforce waste from construction workers and site offices;
- Surplus or damaged construction materials including steel, concrete and aggregates;
- Small quantities of hazardous wastes (e.g. paints, chemicals, lubricants, oily rags etc.); and
- Site clearance wastes (e.g. vegetation).

The estimated main types and quantities of non-hazardous waste generated during construction and demolition and potential recovery rates are shown in Table 16-10. Estimates of quantities of waste from vegetation clearance and jetty piling are not available at this stage but are expected to be of similar or smaller quantities to those main waste types identified below.

At this stage it is anticipated that excavated material will be reused onsite to form the development platform, giving an overall cut-fill balance, and hence no requirement to transport any surplus excavated material offsite as waste.

It is planned to reuse all material excavated during the construction period onsite (including pile arisings from jetty construction works). Typically, excavated material that is unsuitable for use as engineering fill will be used where possible for landscaping and other uses throughout the site thus eliminating the need for offsite disposal (see Chapter 10 – Landscape and Visual).

Any waste material that is required to be moved offsite for treatment/ disposal will be done so by licensed waste haulers transporting to licensed waste management facilities, using local facilities where practicable.

The estimated recovery rates in Table 16-10 are based on the ‘good practice quick win’ recovery rates set out in the ‘Achieving Good Practice Waste Minimisation and Management’ report published by WRAP (WRAP, ND). The overall recovery rate is calculated by tonnage.

Table 16-10 Estimated Main Types and Quantities of Non-hazardous Waste Generated During Construction and Demolition

Waste Type	Waste Classification	Total Amount (tonnes)	Potential Waste Management Route	Potential Standard Practice Recovery Rate (%)	Recovery (tonnes)	Potential Good Practice Recovery rate (%)	Recovery (tonnes)	Potential Best Practice Recovery rate (%)	Recovery (tonnes)
Bricks	Non-hazardous	269	Recycling offsite at licenced facility	75	202	85	229	100	269
Tiles & Ceramics	Non-hazardous	2	Recycling offsite at licenced facility	75	1.5	85	1.7	100	2
Concrete	Non-hazardous	1,245	Concrete crushed onsite and recycled as fill or recycling offsite at licenced facility	75	934	95	1.13	100	1,245
Inert	Inert	735	Recovery/ recycling offsite at licenced facility	75	55	95	698	100	735
Insulation	Non-hazardous	11	Recycling or energy recovery offsite at licenced facility	12	2.4	50	10	75	15
Metals	Non-hazardous	72	Recycling offsite at licenced facility	95	68	100	72	100	72
Packaging	Non-hazardous	51	Recycling offsite at licenced facility	60	30	85	43	95	49
Gypsum	Non-hazardous	28	Recovery/ recycling offsite at licenced facility	12	3.4	50	14	75	21
Plastics	Non-hazardous	9	Recycling offsite at licenced facility	60	5.4	80	7.2	95	8.6
Timber	Non-hazardous	59	Recycling or energy recovery offsite at licenced facility	57	34	90	53	95	56
Canteen/ Office/ Adhoc	Non-hazardous	16	Recycling offsite at licenced facility	12	1.9	50	8	75	12

Applying good industry practice to the management of non-hazardous waste generated by the Proposed Development's construction activities, it is anticipated that an overall recovery rate of 78% can be achieved. This exceeds the Government's 70% target for recovery of construction waste and the effects are therefore assessed as being **slight adverse**.

The estimated CDW waste arisings have been compared to the quantity of CDW collected in Ireland in 2018. Assuming all waste is removed from the Proposed Development site, the overall estimated CDW waste arisings would be **0.058%** of total national CDW arisings. Since this is <1% of total CDW arisings, the effect is considered to be **not significant**.

There is significant scope for re-use and recycling of surplus construction materials and waste onsite which will help achieve the aim of the site being a net zero import site for soil.

It is intended that all suitable stone recovered on the site will be reused as hardcore in the building construction

It is planned to reuse all spoil and excavated material onsite. Typically, excavated material that is unsuitable for use as engineering fill will be used where possible for landscaping and other uses throughout the site thus eliminating the need for offsite disposal.

The site has historically been used for agriculture and consequently it is anticipated that no soil contamination will be encountered. In the unlikely event of any evidence of soil contamination being found during work onsite, the appropriate remediation measures will be employed (See Chapter 05 – Land and Soils). Any work of this nature will be carried out in consultation with, and with the approval of the Environmental Department of KCC.

Other types of waste will be generated during construction including. canteen, office and staff welfare wastes and very small quantities of hazardous waste (e.g. oily waste and batteries from construction plant maintenance, waste paints and chemicals etc.). These have not been quantified however the quantities are anticipated to small in the context of national waste arisings. The capacity for waste to energy, composting, anaerobic digestion and landfill that is available nationally for these municipal-type wastes is likely to be sufficient to cover the estimated wasted generated by the Proposed Development. Waste generated by workers will be segregated at source into recyclable and residual streams, collected by a registered commercial waste management company, and transferred to a suitable licensed facility for recycling, recovery or disposal. There is a wastewater treatment plant (WWTP) onsite to treat operational wastewater.

16.5.2 Effects from Operational Waste on National Waste Plans and Policies and National Capacity

The estimated main types and quantities of waste generated during operation are shown in Table 16-11. This includes waste from the onshore elements of the Proposed Development, as well as MARPOL waste from the, FSRU, tugs and potentially from visiting LNG carriers.

Table 16-11 Estimated Waste Quantities from Operation

Waste Type	Waste Classification	Quantity per Year (m ³)	Potential Waste Management Route
Galley waste (garbage from FSRU, tugs and LNG carriers)	Non-hazardous	240	In accordance with MARPOL Annex V requirements, when in port waste all waste will be stored in suitable containers onboard. Periodically this will be transferred to shore and taken to a licensed waste management site by a licensed waste contractor. Waste from visiting LNG carriers will be managed as International Catering Waste and securely

Waste Type	Waste Classification	Quantity per Year (m ³)	Potential Waste Management Route
			transferred to a designated and licensed disposal site. Source segregation of recyclables (e.g. paper/ card, plastics, metal & glass) for non-ICW
General office waste from onshore activities	Non-hazardous	50	Source segregation of recyclables (e.g. paper/ card, plastics, metal & glass) Residual waste transported to licensed waste treatment facility (landfill or energy-from-waste)
Oily waste (waste from FSRU, tugs and LNG carriers, e.g. sludges from oily water separators)	Hazardous	900	In accordance with MARPOL Annex I the material will be transferred to shore to a licensed waste contractor for management or disposal at a licensed site.
Hazardous materials, e.g. chemicals from FSRU, LNG Terminal and CCGT	Hazardous	10	Export to hazardous waste management facility for recycling/ recovery or high-temperature incineration – delivery to an approved reception facility offshore
Sanitary waste from site washrooms	Not applicable (not subject to Waste Framework Directive)	Faecal wastewater ('black water'): 270 m ³ Other sanitary wastewater ('grey water'): 2430 m ³	Treated by onsite wastewater treatment plant (WWTP) and discharged, see Chapter 02 – Project Description.

Onshore, sanitary effluent (foul water) will be generated in:

- The workshop/ warehouse building,
- The nitrogen package control room; and
- The main control room.

Sanitary effluent (foul water) will be generated at the following locations on the site:

- The administration building;
- Central control/ operations building;
- Storage/ workshop/ canteen building; and
- Each turbine building.

All sanitary effluent will be pumped or fall by gravity to a wastewater treatment plant (WWTP) , see Chapter 02 – Project Description.

The effluent waste stream will be monitored for compliance with the IE licence emission limit values including pH, BOD and TSS and discharged, via the storm water outfall pipe, to the estuary. Details of the WWTP are provided in Chapter 06 – Water. A biological Wastewater Treatment System is proposed.

The automatic control system associated with the WWTP will sound an alarm if pH falls outside of expected range. This will alert the operator to take corrective action to remedy the problem. If the problem continues to go outside the pre-set range, this will automatically close the discharge valve and effluent will be diverted to a holding tank.

Table 16-12 Characteristics of Waste Water Treatment Plant Discharge

Parameter	Emission Limit Value
Volume	35 m ³ /day
pH	6 – 10
BOD	25 mg/l
Suspended Solids	35 mg/l
Ammonia	5 mg/l as N
Total Phosphorous	2 mg/l as N

The estimated operational waste arisings have been compared to the quantity of hazardous and non-hazardous waste collected in Ireland in 2018. Operational waste arisings would be 0.04% of total national waste arisings. Since this is <5% of total waste arisings, the effect is considered to be **not significant**.

16.6 Cumulative Impact Assessment

Cumulative impacts could arise when considering the 220 kV and medium voltage (10/ 20 kV) substation cables anticipated to be connected under the L1010 road in addition to the construction of the gas pipeline.

Detailed estimates of waste generation for these projects are not available, and are subject to a separate application.

Considering that other projects will compliance with relevant Irish policy and legislation, it is considered that cumulative impacts on waste management infrastructure capacity are unlikely to be significant during construction.

During operations, none of the projects are expected to generate large quantities of waste when considered in the context of the regional waste arisings, and cumulative impacts on waste management infrastructure capacity are unlikely to be significant during operation.

16.7 Mitigation Measures

Notwithstanding the impact from demolition and remediation waste on national waste plans and policies and national capacity being assessed as not significant, the following best practice measures will be implemented to manage the CDW produced by the Proposed Development:

- All wastes will be managed in accordance with Irish waste legislation, and in particular waste will only be transported by hauliers holding a valid collection permit, and will be transported to waste management sites which hold the necessary license, permit, certification or exemption.
- MARPOL Annex V waste (garbage) from LNG carriers or other vessels arriving from outside Ireland will be managed as International Catering Waste (ICW) and managed in accordance with the ICW license held by Shannon Foynes Port Company (current authorised disposal route is to Drehid Landfill, Co. Kildare).
- In accordance with EU and national policy and legislation the waste hierarchy (Figure 16-1) will be applied to all waste arisings. A Site Waste Management Plan (SWMP) will be developed and implemented for the Proposed Development and will, as a minimum include the following:
 - Statutory requirements, the Applicant’s corporate requirements, site-wide waste policy and mitigation and monitoring measures defined within this EIAR where applicable to waste management;
 - Waste types and procedures for classification, segregation, containment, storage, transportation and disposal. The Contractor will apply the principles of the ‘Waste Hierarchy’ (Prevention, Preparing for Re-use, Recycling, Other Recovery, Disposal) to minimise waste generation, maximise re-use of site-won materials onsite and minimise the need for disposal of waste. Where re-use is not possible onsite, alternative re-use and recycling options will be sought offsite with the final disposal option;

- Roles and responsibilities;
 - Training requirements;
 - Waste handling procedures;
 - Waste compound maintenance measures;
 - Emergency planning and response;
 - Monitoring, reporting and document control procedures; and
 - Corrective action process.
- As part of the document control procedures, a comprehensive docketing system (including waste transfer notes) will be detailed in the SWMP. The documentation to be maintained in relation to waste material removed from the site will include the following:
 - The names of the agent(s) and the transporter(s) of the wastes;
 - The name(s) of the person(s) responsible for the ultimate treatment of the wastes;
 - The ultimate destination(s) of the wastes;
 - Written confirmation of the acceptance and treatment of the hazardous waste consignments;
 - The tonnages and List of Wastes (LoW) code for the waste materials;
 - Details of each individual consignment dispatched from the Proposed Development site;
 - Description of waste (cell number/ AEC number, stockpile number or origin of waste)
 - Date and time of dispatch from the Proposed Development site
 - Name of haulage company
 - Details of contractor and haulier docket numbers
 - Vehicle registration number and driver name
 - Volume/ weight of waste removed
 - Name of waste receiving facility
 - Date and time of arrival at waste receiving facility
 - Details of any rejected consignments;
 - Waste transfer forms for hazardous wastes transferred from the site (stamped at receiving facility); and
 - The transfrontier shipment of waste forms (where exported).
 - The SWMP will include procedures for monitoring the overall CDW recovery rate.

Figure 16-1 Waste Hierarchy



16.8 Do Nothing Scenario

In the Do Nothing scenario, no project waste will be generated and hence there will be no impacts.

16.9 Residual Impacts and Effects

Following implementation of mitigation and monitoring measures, the residual effect significance on national waste plans and policies, and national capacity as a result of the waste generated from the Proposed Development is considered to remain **not significant**.

16.10 Transboundary Impacts

If necessary, transboundary shipments of waste will be carried out in accordance with the Basel Convention and will require approvals from the competent authorities in Ireland (Dublin City Council) and the receiving country. This may be required in the case of small quantities of hazardous waste for which there is no suitable management route in Ireland (e.g. waste chemicals). Any impacts associated with the management of waste at waste management facilities in countries outside of Ireland are not included in the scope of this assessment, since it is assumed that they will have been assessed and (where necessary) mitigated as part of the planning and permitting of these facilities.

16.11 Decommissioning Phase

As outlined in Chapter 02 – Project Description, in the event of decommissioning, measures will be undertaken by the Applicant to ensure that there would be no significant, negative environmental effects from the closed LNG Terminal and Power Plant. Examples of the measures that would be implemented are outlined in Section 2.11, Chapter 02 – Project Description. As a result, additional potential impacts and associated effects arising during the decommissioning phase are not anticipated above and beyond those already assessed during the construction phase. The majority of the physical assets onsite will comprise of steel, concrete or asphalt, all of which are capable of being recycled.

16.12 Summary

Assuming all waste is removed from the Proposed Development site, the overall estimated CDW waste arisings would be 0.058% of total national CDW arisings. The effect is to be considered **not significant**.

By applying good industry practice to the management of non-hazardous waste generated by the Proposed Developments construction activities, it is anticipated that an overall recovery rate of 78% could be achieved onsite which exceeds the Government's 70% target for recovery of construction waste.

The estimated operational waste arisings have been compared to the quantity of hazardous and non-hazardous waste collected in Ireland in 2018. Operational waste arisings would be 0.04% of total national waste arisings. The effect is also considered **not significant**.

Following implementation of mitigation and monitoring measures, the residual effect significance on national waste plans and policies, and national capacity as a result of the waste generated from the Proposed Development is considered to remain **not significant**.

Table 16-13 Summary

Proposed Development Stage	Aspect/ Impact Assessed	Existing Environment/ Receptor Sensitivity	Effect/ Magnitude	Significance (Prior to Mitigation)	Mitigation and Monitoring Measures (the Proposed Development design embedded environmental controls and all mitigation and monitoring measures detailed herein are included in the OCEMP)	Residual Effect Significance
Construction	Non-hazardous waste	Waste facility	N/A	Slight	The following best practice measures will be implemented to manage the CDW produced by the Proposed Development:	Slight
Construction	CDW waste arisings	Waste facility	N/A	Not Significant	<ul style="list-style-type: none"> • EU, National and Irish policy and legislation require the waste hierarchy (Figure 16-1) to be applied to all waste arisings. Widely implemented best practice is to adopt a Site Waste Management Plan (SWMP) to reduce the amount of waste generated and follow the waste hierarchy in for far as practicable. A SWMP will be developed and implemented for the Proposed Development and include the following details: <ul style="list-style-type: none"> – Statutory requirements, the Applicants corporate requirements and mitigation and monitoring measures defined within this EIAR where applicable to waste management; – Waste types and procedures for classification, segregation, containment, storage, transportation and disposal. This will include details on the measures to prevent impacts to the receiving environment. The Contractor will apply the principles of the ‘Waste Hierarchy’ (Prevention, Preparing for Re-use, Recycling, Other Recovery, Disposal) to minimise waste generation, maximise re-use of site-won materials onsite and minimise the need for disposal of waste. Where re-use is not possible onsite, alternative re-use and recycling options will be sought offsite with the final disposal option;. <ul style="list-style-type: none"> ▪ Roles and responsibilities; ▪ Training requirements; ▪ Waste handling procedures; ▪ Waste compound maintenance measures; ▪ Emergency planning and response; ▪ Monitoring, reporting and document control procedures; and ▪ Corrective action process. • As part of the document control procedures, a comprehensive docketing system (including waste transfer notes) will be detailed in the SWMP. The documentation to be maintained in relation to waste material removed from the site will include the following: <ul style="list-style-type: none"> – The names of the agent(s) and the transporter(s) of the wastes; – The name(s) of the person(s) responsible for the ultimate treatment of the wastes; 	Not Significant
Operation	Ballast Water	Shannon Estuary and waste facilities	N/A	Not Significant		
Operation	Non-hazardous and hazardous waste	Waste facility	N/A	Not Significant		Not Significant

Proposed Development Stage	Aspect/ Impact Assessed	Existing Environment/ Receptor Sensitivity	Effect/ Magnitude	Significance (Prior to Mitigation)	Mitigation and Monitoring Measures (the Proposed Development design embedded environmental controls and all mitigation and monitoring measures detailed herein are included in the OCEMP)	Residual Effect Significance
					<ul style="list-style-type: none"> - The ultimate destination(s) of the wastes; - Written confirmation of the acceptance and treatment of the hazardous waste consignments; - The tonnages and List of Wastes (LoW) code for the waste materials; - Details of each individual consignment dispatched from the Proposed Development site; <ul style="list-style-type: none"> ▪ Description of waste (cell number/ AEC number, stockpile number or origin of waste) ▪ Date and time of dispatch from the Proposed Development site ▪ Name of haulage company ▪ Details of contractor and haulier docket numbers ▪ Vehicle registration number and driver name ▪ Volume/ weight of waste removed ▪ Name of waste receiving facility ▪ Date and time of arrival at waste receiving facility - Details of any rejected consignments; - Waste transfer forms for hazardous wastes transferred from the Proposed Development site (stamped at receiving facility); and - The transfrontier shipment of waste forms (where exported). • The SWMP will include procedures for monitoring the overall CDW recovery rate. • Ballast water will be dealt with in line with the IMO ballast water management convention (see also Chapter 07 – Biodiversity) 	

16.13 References

Basel Convention, (1992). The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, 1992.

EC, (2008). European Commission, 2008. Directive 2008/98/EC on Waste (Waste Framework Directive).

EC, (2011). European Communities (Waste Directive) Regulations, 2011, S.I. No 126 of 2011.

EPA (2014). Environmental Protection Agency (EPA). National Hazardous Waste Management Plan, 2014-2020.

EPA, (2020a). Construction and demolition waste statistics for Ireland. Available at: <https://www.epa.ie/nationalwastestatistics/constructiondemolition/>

EPA, (2020b). Hazardous waste statistics for Ireland. Available at: <https://www.epa.ie/nationalwastestatistics/hazardous/>

EPA, (2020c) Municipal Waste Statistics for Ireland. Available at: [Municipal :: Environmental Protection Agency, Ireland \(epa.ie\)](https://www.epa.ie/nationalwastestatistics/municipal-waste-statistics/)

EPA, (2020d). Waste Infrastructure in Ireland. Available at: [Infrastructure :: Environmental Protection Agency, Ireland \(epa.ie\)](https://www.epa.ie/nationalwastestatistics/waste-infrastructure/)

Government of Ireland, (1992) Environmental Protection Agency Act 1992 (as amended).

Government of Ireland, (1996) The Waste Management Act 1996 (as amended).

Government of Ireland, (1997a). Waste Management (Planning) Regulations 1997.

Government of Ireland, (1997b) Litter Pollution Act 1997.

Government of Ireland, (1998) Waste Management (Movement of Hazardous Waste) Regulations 1998.

Government of Ireland, (2000). Planning and Development Act (as amended 2020).

Government of Ireland, (2003) The Protection of the Environment Act 2003.

Government of Ireland, (2004). Waste Management (Licensing) Regulations 2004.

Government of Ireland, (2007a). Waste Management (Collection Permit) Regulations 2007 (as amended).

Government of Ireland, (2007b). Waste Management (Facility Permit and Registration) Regulations 2007.

Government of Ireland, (2007c). Waste Management (Hazardous Waste) Regulations 2007 (as amended).

Government of Ireland, (2007d) Waste Management (Shipments of Waste) Regulations 2007 (as amended).

Government of Ireland, (2009). Waste Management (Food Waste) Regulations 2009 (as amended).

Government of Ireland, (2014)., Waste Management (Packaging) Regulations 2014.

Government of Ireland, (2015). Waste Management (Landfill Levy) Regulations 2015.

Government of Ireland, (2020). A Waste Action Plan for a Circular Economy – Irelands National Waste Policy 2020-2025.

IMO, (1973). The International Maritime Convention, 1973, The International Convention for the Prevention of Pollution from Ships (MARPOL) (as amended, including Annex VI which entered into force 19th May 2005).

Kerry County Council (KCC), (2015) Kerry County Development Plan 2015-2021. KCC.

SRWMP, (2015). Southern Region Waste Management Plan 2015-2021.

WRAP (ND) (The Waste and Resources Action Programme (WRAP), Achieving good practice Waste Minimisation and Management: Guidance for construction clients, design teams and contractors.

aecom.com