



Waterside Block 9
Developments Limited

Greenhouse Gas (GHG) Assessment

Waterfront South Central SHD Application,
Dublin, Ireland

18 November 2020

Project No.: 0524744

Document details	
Document title	Greenhouse Gas (GHG) Assessment
Document subtitle	Waterfront South Central SHD Application, Dublin, Ireland
Project No.	0524744
Date	18 November 2020
Version	1.0
Author	Holly Jeans
Client Name	Waterside Block 9 Developments Limited

Document history

Version	Revision	Author	Reviewed by	ERM approval to issue		Comments
				Name	Date	
Draft	1.0	Holly Jeans	M. Eddis and P. Rodgers	Peter Rodgers	February 2020	Draft for Client Review / Comment
Final	2.0	Holly Jeans	M. Eddis and P. Rodgers	Peter Rodgers	February 2020	

Signature Page

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Greenhouse Gas (GHG) Assessment

Waterfront South Central SHD Application, Dublin, Ireland



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Acronyms and Abbreviations

Name	Description
CO ₂ e	Carbon Dioxide equivalent emissions
EBRD	European Bank for Reconstruction and Development Bank
EIB	European Investment Bank
GHG	Greenhouse Gas Emissions
GWP	Global Warming Potential
IFC	International Finance Corporation
IPCC	International Panel on Climate Change
O&M	Operations and maintenance

OVERVIEW

The Greenhouse Gas Assessment (GHG-A) estimates the emissions contributing to climate change from the proposed development of Waterfront South Central, Dublin, Ireland, during its operational phase.

Scope 1 and 2 GHG emissions occurring during operation of the development primarily include emissions associated with the combustion of natural gas (Scope 1) and imported electricity (Scope 2).

Additional emissions sources relating to facilities management and any refrigerant losses have been excluded from the assessment due to insufficient data and the likelihood that these sources will not be material.

1. INTRODUCTION

The Greenhouse Gas Assessment (GHG-A) estimates the scope 1&2 GHG emissions contributing to climate change from the proposed development of Waterfront South Central, Dublin, Ireland, during its operational phase.

1.1 Assessment Objectives

The objectives for this assessment are:

- To undertake GHG modelling and calculation of the operational carbon footprint of the Waterfront South Central development.
- To contextualise annual emissions against international and national thresholds and policy.

To determine whether expected GHG emissions are deemed to be 'significant', in line with the reporting threshold set out in international guidance, including the International Finance Corporation (IFC) Performance Standard 3¹, the European Bank for Reconstruction and Development's GHG assessment methodology (EBRD)² and the Equator Principles (EP4)³.

1.2 Scope of the Assessment

The GHG assessment considers the emissions associated with the proposed development of Waterfront South Central, Dublin during its operational phase. These can be described as follows:

- Emissions associated with Waterfront South Central, Dublin are limited to the consumption of imported electricity and the combustion of natural gas across each of the units (mix of both commercial and residential).
- Additional emission sources relating to facilities management and any refrigerant losses have been excluded from the assessment due to insufficient data and the assumption that these sources will not be material.

1.3 Relevant Documents, Standards and Guidelines

The ESIA is undertaken in alignment with IFC Performance Standards and in accordance with the laws and regulations of Ireland.

1.3.1 Ireland's Commitments to GHG Emissions Reductions

Ireland has multiple climate change related policies, strategies, projects and programs in response to climate change impacts. An overarching policy through which Ireland is included, is the EU Nationally Determined Contributions submitted to the UNFCCC as part of COP21 held in 2015⁴. The EU NDC has committed to reducing GHG emissions by 40% by 2030 compared to emissions levels in 1990. This agreement was ratified by Ireland in 2016⁵.

In 2015, a policy titled 'Ireland's Transition to a Low-Carbon Energy Future 2015-2030' was introduced which states that the GHG emissions from the energy sector will be reduced by 80-95% by 2050 when compared to 1990 levels, and it will fall to zero or below by 2100. Additionally, in order to further assist the reduction of GHG emissions within Ireland, fossil fuels will only account for 19-30% of energy demand in Ireland by 2020 when compared to a 2015 baseline.

¹ https://www.ifc.org/wps/wcm/connect/corp_ext_content/ifc_external_corporate_site/home

² <https://www.ebrd.com/home>

³ <https://equator-principles.com/>

⁴ Source: <https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Austria%20First/LV-03-06-EU%20INDC.pdf>

⁵ Source: <https://www.dfa.ie/media/dfa/alldfawebsitemedia/treatyseries/2016/No.-20-of-2016.pdf>

In addition to the above policies, Ireland have developed a 'Project Ireland 2040' plan which encompasses their National Development Plan and the National Planning Framework. Under this project, and detailed within the 'Investing in the Transition to a Low-Carbon and Climate-Resilient society'⁶, €22 billion euros will be directed towards addressing the transition to a low-carbon and climate resilient society. From within the National Development Plan, €8.6 billion euros will also be directed towards investment in sustainable transport. These are efforts which hope to reduce the GHG emissions produced by Ireland over the period to 2030.

With the aim to assist the above transition, the Irish government have launched a €500 million euro Climate Action Fund which will support the delivery of transformational projects, such as those championed through the above policies.

1.3.2 IFC Performance Standards

The IFC's Performance Standard 3: Resource Efficiency and Pollution Prevention⁷ defines a reporting threshold for annual GHG emissions of 25,000 tonnes CO₂e, and requires clients to "...consider alternatives and implement technically and financially feasible and cost-effective options to reduce project-related GHG emissions during the design and operation of the project" alongside quantification of annual scope 1 and 2 emissions.

The client will implement technically and financially feasible and cost effective measures for improving efficiency in its consumption of energy, water, as well as other resources and material inputs, with a focus on areas that are considered core business activities. Such measures will integrate the principles of cleaner production into product design and production processes with the objective of conserving raw materials, energy, and water. Where benchmarking data are available, the client will make a comparison to establish the relative level of efficiency.

With specific reference to GHGs, the Standard states that:

The client will consider alternatives and implement technically and financially feasible and cost-effective options to reduce project-related GHG emissions during the design and operation of the project. These options may include, but are not limited to, alternative project locations, adoption of renewable or low carbon energy sources, sustainable agricultural, forestry and livestock management practices, the reduction of fugitive emissions and the reduction of gas flaring.

For projects that are expected to, or currently produce more than 25,000 tonnes of CO₂-equivalent annually, the client will quantify direct emissions from the facilities owned or controlled within the physical project boundary, as well as indirect emissions associated with the off-site production of energy used by the project. Quantification of GHG emissions will be conducted by the client annually in accordance with internationally recognized methodologies and good practice.

Therefore a requirement exists to undertake consideration of the emissions associated with the Waterfront South Central development.

1.3.3 European Investment Bank (EIB) Standards

The EIB's *Environmental and Social Handbook*⁸ has Climate Standards which require it's financing to be aligned with EU climate policy. Of particular note, the EIB is committed to: assessing and reporting the carbon footprint of EIB financed investment projects, their annual aggregate GHG emissions and savings. These are published in the EIB's Annual Report for each year of finance contract signature⁹.

⁶ Source: <https://assets.gov.ie/831/130718123107-8155042-Investing%20in%20the%20Transition%20to%20a%20Low-Carbon%20and%20Climate-Resilient%20Societ...pdf>

⁷ https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/policies-standards/performance-standards/ps3

⁸ European Investment Bank, *Environmental and Social Handbook*, 2018

⁹ European Investment Bank, *Environmental and Social Handbook*, 2013

1.3.4 European Bank for Reconstruction and Development Bank (EBRD) Standards

The EBRD's Protocol for Assessment of GHG Emissions¹⁰ sets out its methodology for how consultants should assess the GHG emissions from projects. The EBRD has assessed the impact on GHG emissions of its direct investments (loan and equity) since 2003. Summaries have been published in the Bank's annual Environmental or Sustainability Reports since that date. Although in most years all direct investment projects with emissions, or emissions savings, exceeding 25,000 tonnes CO₂e per annum have been assessed, the focus has been on large projects, i.e. those emitting greater than 100,000 tonnes CO₂e per annum, mainly in the energy and industrial sectors, which dominate the portfolio GHG footprint.

1.3.5 Equator Principles (EP4)

In November 2019, the updated version of the Equator Principles (EP), EP4, was adopted by the Equator Principles Association. This latest update represents the fourth iteration of the Principles since their inception in 2003. The intent of the Principles remains to set the financial industry benchmark for determining, assessing and managing environmental and social risk in Project Financing.

The EP Risk Management Framework (November 2019)¹¹ requires "all projects, in all locations, when combined Scope 1 and Scope 2 Emissions are expected to be more than 100,000 tonnes CO₂e annually, an alternatives analysis will be conducted to evaluate less Greenhouse Gas (GHG) intensive alternatives". In addition, the EP require that "the client (should) report publicly on an annual basis on GHG emission levels (combined Scope 1 and Scope 2 Emissions) during the operational phase for Projects emitting over 100,000 tonnes of CO₂e annually. Clients will be encouraged to report publicly on Projects emitting over 25,000 tonnes".

¹⁰ European Bank for Reconstruction and Development Bank, Protocol for Assessment of Greenhouse Gas Emissions, 2010

¹¹ https://equator-principles.com/wp-content/uploads/2017/03/equator_principles_III.pdf

2. BASELINE

Prior to the development of Waterfront South Central, the development site is understood to have been unoccupied. As a result, the baseline GHG emissions for the project have been set at zero.

2.1 National GHG Inventories for Ireland

The European Union's Effort Sharing Decision (ESD), published in 2009, outlines the emissions targets for each EU member state to achieve between 2013 and 2020 in relation to the member states emissions in 2005. Ireland's target has been set at -20% GHG emissions for 2020 when compared to its 2005 emissions levels.

The Environmental Protection Agency is responsible for reporting Ireland's greenhouse gas inventory every year on the 15th January and the 15th April to the European Commission and the UNFCCC respectively. Emissions reported on include CO₂, CH₄, N₂O, HFCs, PFCs, SF₆ and NF₃. They are classified into the following categories: Agriculture, Transport, Energy Industries, Residential, Manufacturing Combustion, Industrial Processes, F Gases, Waste, Commercial Services and Public Services.

Table 2-1 summarises Ireland's emissions from 1990 to 2017, compared with total global emissions (where available). In 2017 (most recent data year available), Ireland's annual GHG emissions were 60.7 million tonnes of carbon dioxide equivalent (MtCO₂e). The most recent year for which both national (Ireland) and Global GHG emission data is available is 2014, at which point annual emissions for Ireland amounted to 57.1 MtCO₂e¹², representing 0.125% of global emissions for the same year (global emissions amounted to 45,740¹³). All data referenced excludes emissions associated with LULUCF (land use land use change and forestry).

Table 2-1 World and Ireland GHG Emissions

		1990	2000	2010	2014	2015	2016	2017
Global	Total Mt CO ₂ e, excluding LULUCF	29,964	33,261	42,771	45,740			
Ireland	Total Mt CO ₂ e, excluding LULUCF	55.4	68.5	61.1	57.1	59.2	61.3	60.7
	% relative to 1990 base figures for Ireland	-	124	110	103	107	111	110

The data set out above are "final estimates of Ireland's greenhouse gas figures for the years 1990-2017 and were officially submitted to the European Commission on March 15th 2019 and the UNFCCC on April 15th 2019"¹⁴. Global GHG figures represent the latest data from the WRI¹⁵.

¹² https://di.unfccc.int/time_series AND <http://www.epa.ie/pubs/reports/air/airemissions/ghgemissions2017/>

¹³ <https://www.climatewatchdata.org/data-explorer/historical-emissions?historical-emissions-data-sources>

¹⁴ https://www.epa.ie/pubs/reports/air/airemissions/ghgemissions2017/Report_GHG%201990-2017%20April%202019_Website.pdf

¹⁵ <http://cait.wri.org/>

2.2 Impact Assessment Methodology

A traditional impact assessment is conducted by determining how the proposed activities will affect the state of the environment described in the baseline (*Section 2*). In the case of GHG emissions, this process is complicated by the fact that the potential impact of GHG emissions on the environment cannot be quantified within a defined space and time.

As mentioned, the greenhouse effect occurs on a global basis and the specific source of GHG emissions cannot be linked directly to the future potential impact on the climate or on the Waterfront South Central geography. In the absence of such causal links, this section presents a methodology that provides an appropriate and practical link between the GHG emissions of the Waterfront South Central development and the impact assessment process adopted for this assessment.

The magnitude of GHG emissions from the Waterfront South Central development has been compared to national and international (i.e. IFC) GHG emissions criteria¹⁶.

2.2.1 Determining Impact Magnitude

The magnitude of GHG emissions is defined as the tonnes of carbon dioxide equivalent (tCO₂e), emitted. GHG emissions which should be included in a GHG assessment, as stated by the GHG protocol Corporate Accounting & Reporting Standard, are the six greenhouse gases covered by the Kyoto Protocol. These are:

- Carbon dioxide (CO₂),
- Methane (CH₄),
- Nitrous oxide (N₂O),
- Hydrofluorocarbons (HFCs),
- Perfluorocarbons (PFCs), and;
- Sulphur hexafluoride (SF₆)

The quantity of GHG's emitted must be multiplied by the gas' global warming potential (GWP) to convert this into tonnes CO₂e.

In the absence of national laws relating to the magnitude of GHG emissions from project developments, international standards are used to place project emissions into perspective.

Table 2-2, shows a potential magnitude scale for project-wide GHG emissions that is derived from, and in line with, reporting thresholds adopted by a number of current international lender organisations or groupings, such as International Finance Corporation (IFC) standards¹⁷, the European Bank for Reconstruction and Development (EBRD)¹⁸ GHG assessment methodology and the Equator Principles (EP)¹⁹.

¹⁶ International Finance Corporation Performance Standard 3 – Resource Efficiency and Pollution Prevention (2012)

¹⁷ https://www.ifc.org/wps/wcm/connect/corp_ext_content/ifc_external_corporate_site/home

¹⁸ <https://www.ebrd.com/home>

¹⁹ <https://equator-principles.com/>

Table 2-2 Magnitude Scale for Project-Wide GHG Emissions

Project-Wide GHG Emissions / annum	Magnitude Rating
>1,000,000 tonnes CO ₂ e	Very Large (high)
100,000 – 1,000,000 tonnes CO ₂ e	Large (medium high)
25,000 – 100,000 tonnes CO ₂ e	Medium (medium low)
5,000 - 25,000 tonnes CO ₂ e	Small (low)
<5,000 tonnes CO ₂ e	Negligible

The IFC’s Performance Standard 3 defines a reporting threshold for annual GHG emissions of 25,000 tonnes of CO₂ equivalent (tCO₂e) and, as mentioned above, requires clients to “...*consider alternatives and implement technically and financially feasible and cost-effective options to reduce project-related GHG emissions during the design and operation of the project*”.

An annual GHG emissions threshold of 25,000 tCO₂e has also been adopted by the EBRD within its Environmental and Social Policy²⁰. This updated policy reduces the GHG reporting threshold, within projects that the EBRD supports, from 100,000 to 25,000 tCO₂e / year and requires annual client quantification and reporting of these emissions.

The Equator Principles require all projects, in all locations, to conduct an alternative analysis to evaluate less GHG intensive alternatives when combined Scope 1 and Scope 2 operational emissions are expected to be more than 100,000 tCO₂e annually. In addition, the Equator Principles require that “*the client (should) report publicly on an annual basis on GHG emission levels (combined Scope 1 and Scope 2 emissions) during the operational phase for Projects emitting over 100,000 tonnes of CO₂ equivalent annually. Clients will be encouraged to report publicly on Projects emitting over 25,000 tonnes.*”

2.2.2 Determining Significance

The receptor for GHG emissions is the global climate, and the natural and societal systems and infrastructure which the climate will influence.

In order to conclude whether the potential impact from GHG emissions is deemed significant or not, a risk classification approach is used. The approach is derived from classic risk assessment terminology which involves the expression of risk as the consequence of the event, multiplied by the likelihood of that event.

The GHG Assessment equivalent is the **magnitude** of the impact multiplied by the **likelihood** of the impact. Impact magnitude is a function of the potential intensity (i.e. volume of emissions), moderated by the extent and duration of that impact. Expressed mathematically impact significance is:

$$\text{Impact significance} = \text{magnitude (i.e. intensity + extent + duration)} \times \text{likelihood}$$

When considering GHGs, the intensity of potential impact is calculated based on project activity data and the appropriate emission factors whilst extent and duration of the potential impact will always be the same.

²⁰ EBRD Environmental and Social Policy, 2014. Available online at: <https://www.ebrd.com/downloads/research/policies/esp-final.pdf>

- The **intensity** of impact is a measure of the volume of GHG emissions released each year of operation, as a result of scope 1 and 2 project activities.
- The **extent** is international as it is the total stock of world GHG emissions (leading to the greenhouse effect) that are directly increased due to the impact of a project. The greenhouse effect is transboundary and so global emissions and national emissions are both directly affected.
- The **duration** of the impact is regarded as permanent as the persistence of carbon dioxide in the atmosphere ranges between 100 and 300 years²¹ and continues beyond the life of the a project.

Therefore, the magnitude of the potential impact is directly related to the intensity, or volume of emissions.

Likelihood of impact can be defined as 'Unlikely', 'Seldom/Occasional' or 'Likely', as set out in Table 2-3. In the majority of cases likelihood would be considered 'Likely', however there are some exceptions.

Table 2-3 Likelihood Definitions

Likelihood	Criteria
<i>Unlikely</i>	Reasonable to expect that the consequence will not occur at this facility during its lifetime.
<i>Seldom/Occasional</i>	Exceptional circumstances/conditions may allow the consequence to occur within the facility lifetime.
<i>Likely</i>	Consequence can reasonably be expected to occur within the life of the facility.

The magnitude of a potential impact and the likelihood have been assessed in combination to evaluate whether a potential GHG impact is significant and if so, its degree of significance. This is illustrated in Table 2-4.

Table 2-4 GHG Impact Significance Rating

		LIKELIHOOD		
		Unlikely	Seldom/ Occasional	Likely
MAGNITUDE	Very Large	Major	Major	Major
	Large	Moderate	Major	Major
	Medium	Minor	Moderate	Major
	Small	Negligible	Minor	Minor
	Negligible	Negligible	Negligible	Negligible

²¹ Carbon Dioxide Information Analysis Centre (CDIAC) - http://cdiac.ornl.gov/pns/current_ghg.html Last accessed: 30/01/2015

3. METHODOLOGY

3.1 GHG Emissions Calculations

GHG emissions arising from the operational phase of the Waterfront South Central development have been estimated based on data provided by Ronan Group.

The carbon footprint for the operational phase has been estimated using the documents listed below:

- Greenhouse Gas (GHG) Protocol: Corporate Accounting & Reporting Standard (World Resources Institute/World Business Council for Sustainable Development) ²²;
- Intergovernmental Panel on Climate Change (IPCC) 2006 GHG Inventory guidelines ²³;
- UK Government GHG Conversion Factors for Company Reporting ²⁴;
- IFI (Interim) Dataset of Harmonized Grid Factors (v.1.016) ²⁵; and
- IEA GHG grid emission factors 2019 (2017 data)²⁶

The GHG Protocol Corporate Accounting & Reporting Standard divides emissions into three ‘Scopes’, which are defined as:

- Scope 1 – direct emissions from sources owned or controlled by the company (e.g. project developer/landlord);
- Scope 2 – indirect emissions from the company’s (e.g. project developer/landlord) consumption of purchased energy (primarily electricity); and
- Scope 3 – indirect emissions an optional reporting category allowing for other indirect emissions associated with sources that are not owned or controlled by the company (e.g. by the project developer/landlord).

GHG emission estimates for Waterfront South Central, Dublin cover emission sources directly associated with the operation of the development (scopes 1&2). Indirect emissions (scope 3) are not included within this assessment. GHG emissions owned or controlled by tenants/owners of the residential units are likely to fall within the Scope 3 (indirect) category and therefore excluded from the significance calculation, whereas the developer/landlord may maintain ownership/control of the energy provided to the commercial/retail units, in which case these emissions would remain as scope 1 and scope 2.

Good practice dictates the use of actual activity data (e.g. litres of diesel consumed) for calculating a carbon footprint. Given that the estimation of a future carbon footprint for the development of Waterside South Central involves activities yet to begin, a number of assumptions have been made in order to forecast the activity data required to undertake the GHG-A. Calculation assumptions have been referenced within the relevant sections of this report and are set out within the calculation spreadsheets (*Appendix A*). It should be noted that limited detail around Waterside South Central, operation was available from Ronan Group at the time of the assessment. Calculations have therefore been undertaken on the basis of limited data and the following assumptions have been made:

²² Available online at : <https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf>

²³ Available online at: <https://www.ipcc-nggip.iges.or.jp/public/2006gl/>

²⁴ 2018 emission factors available online at: <https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2018>

²⁵ Available online at: http://greeninvestmentgroup.com/media/185865/ifi_interim_dataset_of_harmonized_grid_factors_v1-0-with-cover.xlsx

²⁶ Available online at: <https://pub.iges.or.jp/pub/iges-list-grid-emission-factors>

- Projections have been calculated on the basis of expected forward consumption figures provided by Ronan Group;
- It is understood that the residential units are only connected to electricity (no natural gas supply).
- At the time of the assessment, no firm electricity supply contracts were in place and as a result ownership/control of electricity could not be confirmed, however, it is assumed that the occupants of all of the residential units will be taking ownership/control over the electricity consumption associated with their units and therefore the associated GHG emissions are likely to fall within the scope 3 (indirect) category and excluded from the significance assessment.
- Although uncertain, it has been assumed that the developer/landlord could maintain ownership/control of the energy provided to the commercial/retail units, in which case these emissions would remain as scope 1 and scope 2 rather than becoming scope 3. For this reason, the GHG emissions linked to the electricity and natural gas supplied to these units have been included within the significance calculations. Ownership/control and the scope of emissions can be confirmed once the future occupants are known.
- Floor areas used are all Net Floor Area (NFA), as it is considered unlikely that the additional footprint included within the Gross Floor Area (GFA) total will be heated;
- It is understood that there was no plan to invest in on site renewables (e.g. solar panels), at the time of the assessment;
- It is understood to be the developers' aspiration that all electricity consumed within the Waterfront South Central development should be purchased on renewable energy contracts, however, it is the tenant of each unit that will make the application for electricity supply and therefore have the final decision on the type of electricity supply contract (i.e. standard grid mix or renewables, supply contract). On this basis, the projections have been made on the basis of electricity from standard grid mix contracts, however it is recognised that GHG emissions could potentially be lower than projected should renewable supply contracts be taken by occupants of the commercial/retail units.
- The electricity associated with the electric vehicle charging points is assumed to fall into the scope 3 (indirect) category as the electricity will fall within the ownership/control of the energy end user (the vehicle owner) rather than the developer/landlord.
- Life safety diesel generators will be kept in stand-by mode, associated fuel consumption will therefore be minimal under normal operating conditions.
- GHG emissions associated with refrigerant losses have been excluded from the assessment due to limited data on the management of refrigerant losses. However, it is understood that air cooling within the exhaust air heating pump systems is likely to be the responsibility of the unit owner and therefore GHG emissions associated with any refrigerant losses could be classified as scope 3 (indirect).
- No data was available on fuel consumption within facilities management vehicles or machinery (including machinery for maintaining the external areas), however it is understood to be minimal and likely to be the responsibility of a third party maintenance contractor (and therefore scope 3 GHG emissions). As a result, these GHG emissions have been excluded from this assessment;
- The rates of electricity and gas consumption per m² are assumed to be consistent across each of the three buildings.
- When assessing GHG emissions throughout the operational phase of the Waterfront South Central, development, we have assumed full, normal operability.
- Emission projections have been estimated on an *ex ante* basis

4. IMPACT ASSESSMENT

4.1 Operational Impacts

A full outline of data supplied, assumptions and calculations are provided within the calculation spreadsheets (*Appendix A*). In addition to this a full list of assumptions made is included within section 3.1. It should be noted that limited detail around the operational phase of the Waterfront South Central development was available from Ronan Group at the time of the assessment. Calculations have therefore been undertaken on the basis of limited data, assumptions and experience of previous GHG Assessment projects.

4.1.1 Waterfront South Central Site Operation Emissions

Ronan Group were unable to provide any data around anticipated O&M (Operations and Maintenance) fuel consumption or vehicle movements during operation. As a result, vehicle fuel consumption and additional sources relating to facilities management, including refrigerant losses, have been excluded from the assessment due to insufficient data and the likelihood that these sources will not be material.

4.1.2 Electricity and Natural Gas Consumption

The projected annual consumption of electricity and natural gas across the Waterfront South Central development have been provided by Ronan Group as a combined estimate for each of the three development blocks (blocks A, B and C), as set out in Table 4-1:

Table 4-1 Energy consumption projections

Building	Estimated combined energy consumption per annum (kWh/m ²)
Block A	1500
Block B	1500
Block C	3500

The estimated energy load for both electricity and natural gas was provided by Ronan Group for each of the three blocks within the Waterfront South Central development. Based on the load estimations, the split of energy consumption between electricity and natural gas was calculated (as a proportion of load), providing an estimated kWh/m² figure for each fuel type and development block.

Appropriate emission factors were applied in order to calculate the GHG emissions (CO₂e) associated with projected annual consumption of electricity and natural gas. UK Government GHG Conversion Factors for Company Reporting (v.1 - 2019) have been applied in order to calculate the emissions associated with natural gas consumption, whilst the latest IEA emission factors for Ireland (2017, published 2019) have been applied in order to calculate the emissions associated with electricity consumption. The IEA factors have been cross checked against the EF for Ireland included within the IFI (Interim) Dataset of Harmonized Grid Factors (V1.0), July 2016.

4.1.3 Accounting for the Energy Tariff Selection

It is understood that no on-site renewable energy generation (e.g. solar panels) was planned for the Waterfront South Central development at the time of the assessment.

It is the developers' aspiration that all electricity consumed within the Waterfront South Central development should be purchased on renewable energy tariffs, however, it is the tenant of each unit that will make the application for electricity supply and therefore have the final decision on the type of electricity supply contract (i.e. standard grid mix supply or renewables supply contract). On this basis, GHG projections have been made on the basis of electricity from standard grid mix contracts, however it is recognised that GHG emissions could potentially be lower than projected should renewable supply contracts be taken.

4.1.4 Exclusion of Residential Units

Approximately 93% of the total floor area across the three Waterside South Central blocks is made up of residential units, which comprise a mix of owner occupied (32%), rented (58%) along with social and affordable housing (10%).

It is assumed that the occupants of all of the residential units will be taking ownership/ control over the electricity consumption associated with their units (no natural gas is supplied to the residential units). It is therefore considered that GHG emissions associated with electricity consumption across the residential units will fall into the scope 3 (indirect emissions) category, and would therefore be excluded from the GHG significance calculation.

It should however be noted that at the time of the assessment no firm electricity supply contracts were in place and as a result ownership/ control could not be confirmed.

Although uncertain, it has been assumed that the developer/landlord could maintain ownership/control of the energy provided to the commercial/retail units, in which case these emissions would remain as scope 1 and scope 2 rather than becoming scope 3. For this reason, the GHG emissions linked to the electricity and natural gas supplied to these units have been included within the significance calculations. Ownership/control and the scope of emissions can be confirmed once the future occupants are known.

In order to determine the GHG emissions associated with the residential units, based on standard electricity supply contracts, estimated electricity emissions per m² floor area were calculated for the floor area occupied by residential units within each of the three blocks and then multiplied by the latest IEA emission factors for Ireland (2017, published 2019).

The GHG emissions associated with residential electricity consumption were subtracted from the total electricity consumption emissions (all units) in order to remove the scope 3, indirect emissions, associated with residential consumption from the total electricity emissions of each of the three blocks.

4.1.5 GHG Emission Summary

Total scope 1 and 2 GHG emissions associated with projected electricity and natural gas consumption for the operational phase of the Waterfront South Central development, have been calculated as set out in Table 4-2 (electricity) and

Table 4-3 (natural gas).

Table 4-2 Annual CO₂e Associated with Electricity Consumption

Item	Per annum (tCO ₂ e)
Total CO ₂ e associated with electricity consumption, supplied on a standard grid mix contract (for all units excluding residential, which are considered scope 3 and therefore excluded).	6,186

Table 4-3 Annual CO₂e Associated with Natural Gas Consumption

Item	Per annum (tCO ₂ e)
Total CO ₂ e associated with natural gas consumption (for all units excluding residential which do not have natural gas supply)	4,343

A summary of total scope 1 and 2, operational emissions (electricity and natural gas) is set out in Table 4-4. Aggregated emissions over an assumed 20 year project period are also provided.

Table 4-4 Total Estimated GHG Emissions Associated with Projected Electricity and Natural Gas Consumption

Total	Total annual GHG emissions (tCO ₂ e)	GHG emissions over 20 year project period (tCO ₂ e)
Total GHG emissions (combined electricity and natural gas)	10,529	210,578

Although uncertain, it has been assumed that the developer/landlord could maintain ownership/control of the energy provided to the commercial/retail units, in which case these emissions would remain as scope 1 and scope 2. For this reason, the GHG emissions linked to the electricity and natural gas supplied to these units have been included within the significance calculations

It is understood to be the developers' aspiration that all electricity consumed within the Waterfront South Central development should be purchased on renewable energy contracts, however, it is the tenant of each unit that will make the application for electricity supply and therefore have the final decision on the type of electricity supply contract (i.e. standard grid mix or renewables, supply contract). On this basis, the projections have been made on the basis of electricity from standard grid mix contracts, however it is recognised that GHG emissions could potentially be lower than projected should renewable supply contracts be taken by occupants of the commercial/retail units.

It is recognised that a proportion of the electricity consumed by the non-residential units may be supplied under renewable energy contracts which would reduce the GHG associated with this emission source. In addition, it is possible that some of the commercial/retail units may also take ownership/control of their energy supplies, which would change the associated GHG emissions to scope 3 (indirect) and further reduce the projected GHG emissions.

Projected annual operational GHG emissions of **10,529 tCO₂e or lower** have been calculated. Equating to estimated GHG emissions of 210,578 tCO₂e over a 20 year project period.

4.1.6 Contextualisation of GHG Emissions

Estimated annual operational GHG emissions from the Waterfront South Central development have been contextualised against national GHG values reported by the Irish Environmental Protection Agency to the European Commission and the UNFCCC in 2019 and the latest (2014) Global GHG figures from the WRI, as set out within Table 2-1.

Estimated annual emissions for the operation of the Waterfront South Central development equate to approximately 0.02% of the National GHG emissions for the Republic of Ireland (2014 data) and approximately 0.00002% of global emissions.

Table 4-5 sets out the estimated annual operational emissions from the Waterfront South Central development against emissions for the Republic of Ireland and global emissions.

Table 4-5 Comparison of Project, National and Global GHG Emissions

Comparison of Waterfront South Central, Republic of Ireland and Global GHG Emissions	
Waterfront South Central estimated annual operational scope 1 and 2 emissions	0.0105 million tonnes CO ₂ e
Republic of Ireland emissions 2014 (excluding LULUCF)	57.1 million tonnes CO ₂ e
Global emissions 2014 (excluding LULUCF)	45,740 million tonnes CO ₂ e
Republic of Ireland as % of 2014 Global emissions	0.12%
Waterfront South Central as % of 2014 national emission for Ireland	0.02%
Waterfront South Central as % of 2014 global emissions	0.00002%

5. SIGNIFICANCE OF PROJECT GHG EMISSIONS

The greenhouse effect occurs on a global basis and the point source of emissions is irrelevant when considering the potential future impact on the climate. CO₂ has a residence time in the atmosphere of approximately 100 years by which time emissions from a single point source have merged with other anthropogenic and natural (e.g. volcanic) GHG emissions. It is not possible to link emissions from a single source, such as the Waterfront South Central development, to particular impacts in the broader study area. Therefore, this study assesses the significance of GHG emissions from the Waterfront South Central development to contribute to climate change (based on IFC, EBRD and Equator Principles criteria) rather than the potential physical impacts of climate change.

5.1.1 Emissions Magnitude and Likelihood

Annual emissions projected for the operational phase of the Waterfront South Central development have been classified as having a **Small (Low)** magnitude, in line with a number of current international lender organisations (e.g. IFC, EBRD, EP), see Table 2-2.

The likelihood of emissions has been placed within the **Likely** category (see Table 2-3), meaning that “Consequence can reasonably be expected to occur within the life of the facility”.

Based on the assigned magnitude and likelihood ratings, estimated annual GHG emissions associated with the operational phase of the Waterfront South Central development are considered to be **Minor** (Table 5-1).

Table 5-1 Waterfront South Central GHG Emission Significance

		LIKELIHOOD		
		Unlikely	Seldom/ Occasional	Likely
MAGNITUDE	Very Large	Major	Major	Major
	Large	Moderate	Major	Major
	Medium	Minor	Moderate	Major
	Small	Negligible	Minor	Minor
	Negligible	Negligible	Negligible	Negligible

5.1.2 Emissions Significance

Based on the approach and equation set out in Section 2.2.2, projected scope 1 and 2 GHG emissions associated with operation of the Waterfront South Central development have been estimated and found to be Minor.

Based on the calculations undertaken within this assessment, annual operational emissions of the Waterfront South Central development were projected to be **10,529 tCO₂e** or lower (Table 4-4), which does not exceed the 25,000 tCO₂e annual significance threshold set out within IFC Performance Standard 3 (mirrored by EBRD’s 2014 Environmental & Social Policy and the recently revised Equator Principles - EP4).

As a consequence, it was identified that the projected annual emissions for the Waterfront South Central development are **not likely to be significant**. As annual operational scope 1&2 GHG

emissions are not likely to be significant, Ronan Group are not required to undertake an alternatives analysis or consider carbon reduction options in order to comply with the requirements of the internationally recognised standards.

6. MITIGATION MEASURES AND RESIDUAL IMPACTS

6.1 Operation

GHG emissions associated with the operation of Waterfront South Central development are primarily linked to the consumption of onsite natural gas and electricity.

Although project emissions have been categorised as Minor and Not Significant through this assessment, a number of best practice / efficiency measures, associated with commercial consumption of electricity and natural gas and residential consumption of electricity have been identified in order to illustrate areas for potential savings. A summary of the measures are set out in Table 6-1 Operational Mitigation Measures.

Table 6-1 Operational Mitigation Measures

<i>Impact</i>	<i>Mitigation Measures</i>
GHG emissions associated with onsite natural gas and electricity consumption	<p>A selection of generic GHG reduction measures which could be applied across the Waterfront South Central development are set out below:</p> <ul style="list-style-type: none"> ■ Adoption of GHG reduction and energy performance policies. ■ Implementing an integrated energy and carbon management strategy. ■ Considering renewable fuel sources as an alternative/addition to grid electricity. ■ Consider introducing a renewable energy target ■ Consider further investment in renewables to displace grid electricity ■ Establish operational targets for energy use, costs and carbon emissions. ■ Identification and implementation of energy efficiency initiatives across the development. ■ Showcase examples of energy efficiency good practice across the site. <p>In addition to the overarching GHG reduction measures, a selection of further energy efficiency measures are set out below:</p> <ul style="list-style-type: none"> ■ Implement an effective building energy management system to yield energy savings. ■ Use a high energy efficient HVAC system (heating, ventilation and air conditioning) to reduce energy usage. ■ Ensure that the insulation, ventilation, roofs and lofts, walls, windows, door and floors of the new business park buildings are all fitted to a high energy efficiency standard to reduce energy lost and energy required to heat and cool. ■ Encourage behaviour changes in residents/ employees/ visitors who use the development to switch off lights, turn down the thermostat and make other energy efficient choices. ■ Check appliances and boilers are working to the best possible energy efficient standard, consider changing appliances to meet these standards if they do not already.

- Use LED lightbulbs as well as sensors, timers and dimmers within the buildings.
- Fit double or triple glazed windows.
- Retrofit existing buildings with the above modifications where possible in order to reduce both energy loss and usage.

APPENDIX A

OVERVIEW OF GHG CALCULATION SHEETS

ERM has over 160 offices across the following countries and territories worldwide

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