Gas Networks Ireland

Strategic Environmental Assessment

Scoping Report

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1 Introduction

1.1 Introduction

Gas Networks Ireland (referred to hereinafter as GNI) is preparing the Network Implementation Plan (referred to hereinafter as NIP) for the period 2020 - 2023. The NIP will set out the critical infrastructure to be developed over this period, while also setting out the policy and objectives which GNI will focus on over this period.

Arup has been appointed by GNI to carry out a Strategic Environmental Assessment (SEA) and Appropriate Assessment (AA) of the NIP.

This scoping document sets out the scope of the SEA and provides information to allow consultation with defined statutory bodies on the scope and level of detail to be considered in the assessment. Throughout the document a series of 'scoping questions' have been included to focus responses which will allow the SEA to address any issues or concerns that have been raised during the scoping process.

1.2 Overview

GNI prepares an annual rolling Network Development Plan (NDP) each year, which provides a view of how the gas network may develop over a ten-year period.

The NDP outlines a number of capital projects which will be delivered over the coming years (in the short, medium and long-term), including future proposed large capital projects and proposed new technologies. The NDP is a strategic plan which is high-level in nature.

GNI is in the process of preparing a second plan, the NIP. The purpose of the NIP is to set out in more detail, the manner in which the short-term capital investment proposals identified in the NDP will be developed in the Plan area over the three-year plan period 2020 - 2023. This will include greater detail on the capital investment proposals included in the NDP, including their locations, nature, extent etc. As the NIP is more project-specific than the higher-level NDP, it is subject to SEA, under the provisions of the SEA Directive (Refer to Section 1.3.4 for information on SEA Screening).

The study area of the NIP is illustrated in **Figure A1** in the Appendix**.**

1.3 SEA Process

1.3.1 Legislative Background

Directive 2001/42/EC of the European Parliament and of the Council on the Assessment of the Effects of Certain Plans and Programmes on the Environment, (also known as the Strategic Environmental Assessment Directive), was transposed into Irish Law by the European Communities (Environmental Assessment of Certain Plans and Programmes) Regulations 2004 (S.I. No. 435 of 2004) as amended by S.I. No 200 of 2011. It provided a statutory basis for the making of the Planning and Development (Strategic Environmental Assessment) Regulations 2004 (S.I. No. 436 of 2004) as amended by S.I. No. 201 of 2011. These Planning and Development Regulations, S.I. No. 436 of 2004 and S.I. No. 201 of 2011, amended articles and schedules to the Planning and Development Regulations, (S.I. 600 of 2001).

Under the Directive (2001/42/EC) SEA is required on plans and programmes which are likely to have significant effects on the environment, in the following eleven sectors:

- Agriculture;
- Forestry;
- Fisheries;
- Energy;
- Industry;
- Transport;
- Waste Management;
- Water Management;
- Telecommunications; and
- Tourism, Town and Country Planning or Landuse.

1.3.2 SEA Process

The objective of the Strategic Environmental Assessment (SEA) Directive is ‘to provide for a high level of protection of the environment and to contribute to the integration of environmental considerations into the preparation and adoption of plans … with a view to promoting sustainable development’ (Article 1 SEA Directive). It is a systematic, on-going process for evaluating, at the earliest possible stage, the environmental quality and consequences of implementing certain plans and programmes on the environment.

The SEA process is comprised of the following steps:

- Screening: Decision on whether or not SEA of a Plan or Programme is required. This stage has been completed (Refer to Section 1.2.4 below);

- Scoping: Consultation with the defined statutory bodies on the scope and level of detail to be considered in the assessment. This is the current stage of the SEA process to which this report relates;
- Environmental Assessment: An assessment of the likely significant impacts on the environment as a result of the Plan or Programme;
- Preparation of an Environmental Report;
- Consultation on the Draft Plan or Programme and associated Environmental Report;
- Evaluation of the submissions and observations made on the Draft Plan or Programme and Environmental Report; and
- Issuance of an SEA Statement identifying how environmental considerations and consultation have been integrated into the Final Plan or Programme.

SEA is intended to inform decision-making and needs to 'test' systematically the performance of the plan as a whole and its individual objectives and policies against SEA criteria.

It is noted that under EIA and Planning and Development legislation, certain projects taking place within the plan area arising during implementation of the Plan may require an Environmental Impact Assessment.

1.3.3 SEA Guidance

The SEA methodology for the Draft Plan is based on legislative requirements and Department of Environment, Heritage and Local Government (DoEHLG) / Environmental Protection Agency (EPA) guidance. The EPA's SEA Pack (Version 20/03/2018) was also used as a source of information during the scoping process along with published EPA SEA Scoping Guidance.

1.3.4 SEA Screening

The screening process allowed GNI to identify at the earliest possible opportunity whether the development of the Draft Plan required an SEA and facilitated the assessment findings to be factored into the plan development process.

The NIP was screened for SEA (refer to the SEA Screening Report) in accordance with the SEA Directive. Following this assessment, it was concluded that the NIP falls within the requirements of the SEA Directive in that:

- The NIP is subject to preparation and adoption by a National Authority;
- The NIP is required by legislative, regulatory or administrative provisions;
- The sole purpose of the NIP is not to serve national defence or civil emergency nor is it a financial/budget Plan or co-financed by the current Structural Funds/Regional Development Funds Programme;
- The NIP is prepared for the energy sector;

- The NIP is considered to provide a framework for development consent for projects listed in the EIA Directive; and
- The NIP is a national level plan which is not restricted to the use of small areas at a local scale only, nor is it a modification of a Plan/Policy.

In accordance with the EPA methodology, it was determined that SEA is required, in accordance with the SEA Directive and that the NIP should be taken forward to Stage 2 - SEA Scoping.

1.3.5 SEA Scoping

The main objective of the Scoping Stage is to identify the key environmental issues that may arise as a result of the Draft Plan, so they may be addressed appropriately in the Environmental Report. There are a number of tasks at this stage:

- Determine the key elements of the Draft Plan to be assessed;
- Determine the environmental issues to be assessed;
- Collect and report on relevant international, national and local plans, objectives and environmental standards that may influence or impact on the Draft Plan;
- Develop draft environmental objectives, indicators and targets to allow the evaluation of impacts; and
- Identify reasonable alternative means of achieving the strategic goals of the Draft Plan.

The output of this process is the Scoping Report which will inform statutory consultees and relevant stakeholders about the key environmental issues and the key elements of the Draft Plan. In addition, the Scoping Report can be used as a tool to generate comments from stakeholders on the scope of and approach of to the SEA.

Similarly, the Scoping Stage also allows input from the environmental authorities and relevant stakeholders on the Appropriate Assessment (AA) process.

1.4 Appropriate Assessment

1.4.1 Introduction

An AA is an assessment based on best scientific knowledge, by a person with ecological expertise, of the potential impacts of the plan on the conservation objectives of any Natura 2000 site (including Natura 2000 sites not situated in the area encompassed by the Draft Plan or scheme) and the development where necessary, of mitigation or avoidance measures to preclude negative effects.

1.4.2 Legislative Background

Special Areas of Conservation (SACs) designated under the Habitats Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora) and Special Protection Areas, designated under the Birds Directive (Council Directive 79/409/EEC on the conservation of wild birds), form a pan-European network of protected sites known as Natura 2000.

The Habitats Directive sets out a unified system for the protection and management of SACs and SPAs. Article 6(3) and 6(4) of the Directive set out key elements of the system of protection, including the requirement for AA of any plan or project likely to have a significant effect on an SAC or SPA.

A Habitats Directive Assessment can comprise of up to four stages as outlined in the European Commission Guidance document (2001) and in Section 1.4.2 of this report.

Any draft land use plan (development plans, local area plans, regional planning guidelines, schemes for strategic development zones) must be screened (Stage 1) for any potential impacts on Natura 2000 sites.

Following screening, if it is found that the Draft Plan may have an impact on the conservation objectives of a Natura 2000 site or that an impact cannot be ruled out then an AA of the plan must be undertaken (Stage 2).

Progression to Stage 2: Appropriate Assessment triggers a mandatory requirement for SEA as specified in Article 3 of the SEA Directive which states that an environmental assessment shall be carried out for all plans and programmes, "which, in view of the likely effect on sites, have been determined to require an assessment pursuant to Article 6 or 7 of Directive 92/43/EEC" (the Habitats Directive).

1.4.3 Appropriate Assessment Process

The Appropriate Assessment (AA) is a requirement of the EU Habitats Directive (92/43/EEC) as transposed into Irish law through the European Communities (Natural Habitats) Regulations, 1997 (S.I. No. 94 of 1997). The purpose of the AA is to determine whether the Draft Plan has implications for any Natura 2000 sites in the region and to ascertain whether there will be adverse impacts on the integrity of these sites. The AA will follow guidance from the European Commission and directions from the DoEHLG.

The standard series of stages of AA as laid out in the EU Guidance are as follows:

Stage 1 Screening: This stage examines the likely effects of a project, either alone or in combination with other projects, upon a Natura 2000 site and considers whether it can be objectively concluded that these effects will not be significant. If the effects will be significant the AA progresses to stages 2-4;

Stage 2 Appropriate Assessment: In this stage, the impact of the project is considered on the integrity of the Natura 2000 site with respect to the conservation objectives of the site and to its structure and function;

Additionally, where adverse impacts are identified, this stage includes an assessment of the potential mitigation of those impacts;

Stage 3 Assessment of Alternative Solutions: This stage examines alternative ways of implementing the project that, where possible, avoid any adverse impacts on the integrity of the Natura 2000 site; and

Stage 4 Assessment where no alternative solutions exist and where adverse impacts remain: Where imperative reasons of overriding public interest (IROPI) exist, an assessment to consider whether compensatory measures will or will not effectively offset the damage to the Natura site will be necessary.

It is noted that Projects taking place over the plan area within the lifetime of the plan may also require Appropriate Assessment screening with respect to the requirement for Habitats Directive, as required by Article 6 of the Habitats Directive

1.4.4 AA Screening

AA screening will be undertaken as part of the Draft Plan preparation and should it be found that the Draft Plan may have an impact on the conservation objectives of a Natura 2000 site or that an impact cannot be ruled out then an AA of the Draft Plan must be undertaken (Stage 2).

Any impacts on relevant habitats, water quality and hydrology which might result from the Draft Plan's implementation will be assessed as part of AA Screening.

All necessary stages of AA will be undertaken on the Draft Plan. This process will be carried out in parallel with the SEA process and will feed into the alternatives considered as part of the SEA.

2 The Draft Network Implementation Plan 2020 - 2023

2.1 Background

As outlined in Section 1.2, GNI prepares an annual rolling NDP each year, which provides a view of how the gas network may develop over a ten-year period.

The publication of this NDP satisfies the requirements of Article 22 of EU Directive 2009/73/EC, Article 11 of the EC (Internal Market in Natural Gas and Electricity) (Amendment) Regulations 2015, Section 19 of the Gas (Interim) (Regulations) Act 2002, as amended, and Condition 11 of its Transmission System Operator (TSO) and Distribution System Operator (DSO) licences.

The purpose of the NDP is to assess the gas network's capacity based on existing and forecast supply and demand in order to guarantee the adequacy of the gas transmission system and security of supply. The NDP outlines a number of capital projects which will be delivered over the coming years, including future proposed large capital projects and proposed new technologies. The NDP is a strategic plan which is high-level in nature.

The purpose of the NIP, which is the subject of this SEA, is to set out in more detail, the manner in which the short-term capital investment proposals identified in the NDP will be developed in the Plan area over the three-year plan period 2020-2023. This will include greater detail on the capital investment proposals included in the NDP, including their locations, nature, extent etc. The Plan provides for short term capital investment projects including the provision of AGI (Above Ground Installation) upgrade works, new AGIs, new pipelines, CGI (Centralised Gas Injection) and CNG (Compressed Natural Gas) facilities. **Figure 2.1** provides an overview of the Plan hierarchy and key differences between the NDP and NIP, and relationship between the same.

The SEA Directive requires that reasonable alternatives be assessed in order to demonstrate how the preferred strategy performs against other forms of action. Alternatives must be developed, described and assessed within the SEA process, with the results presented in the Environmental Report.

Alternatives will be assessed as part of the Plan development process and will be discussed in the Environmental Report.

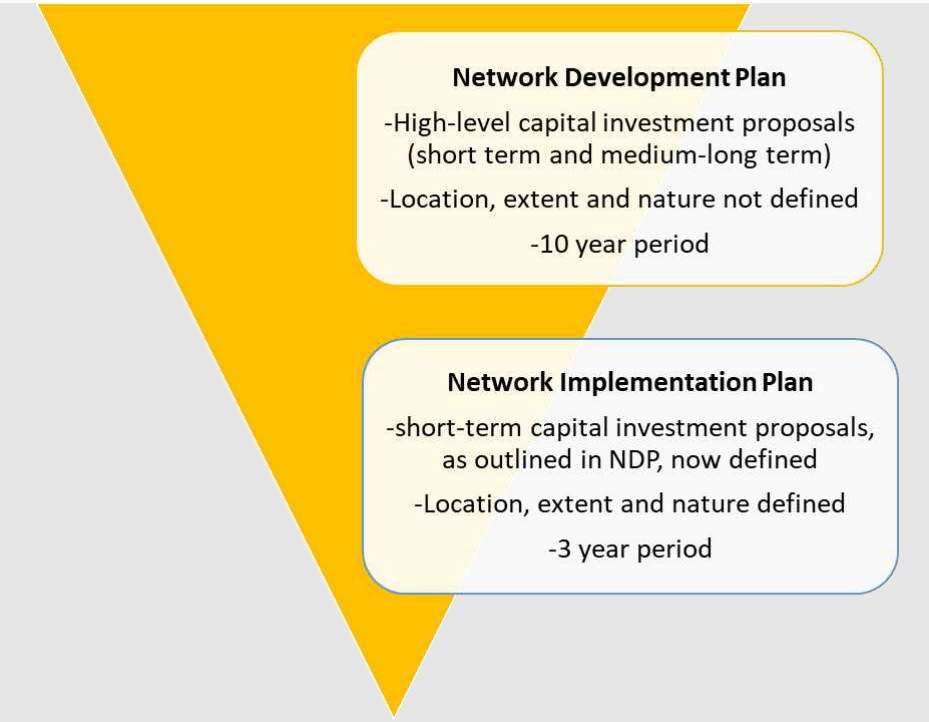

Figure 2.1: Plan Hierarchy

2.2 Extent of Plan Area

GNI maintains over 14,390 km of gas pipelines and two sub-sea interconnectors.

The GNI transmission network includes onshore Scotland, interconnectors and the onshore ROI network. The interconnector (IC) sub-system comprises of two subsea interconnectors between ROI and Scotland; and compressor stations at Beattock and Brighouse Bay. The interconnector system connects to Great Britain's (GB) National Transmission System (NTS) at Moffat in Scotland. It also supplies gas to the Northern Ireland (NI) market at Twynholm and the Isle of Man (IOM) market via the second subsea interconnector (IC2).

The NIP Plan area is identified in **Figure 2.2.**

Figure 2.2: NIP Plan Area

3 Relationship with Other Relevant Plans and Programmes

3.1 DCCAE 2019, Ireland's Climate Action Plan 2019

The Climate Action Plan sets out an ambitious course of action over the coming years to address the issue of climate disruption on Ireland's environment, society, economic and natural resources. The plan builds on the policy framework, measures and actions set out in the National Mitigation Plan, Project Ireland 2040 and the draft National Energy and Climate Plan.

The Plan outlines the current state of key sectors including Electricity, Transport, Built Environment, Industry and Agriculture and charts a course towards ambitious decarbonisation targets.

With regards to renewable electricity, the plan cites the need for natural gas in the renewable mix in order to sustain electricity supply when intermittent renewable electricity supplies are low (e.g. wind/solar).

3.2 DCCAE 2019, Electricity & Gas Networks Sector Climate Change Adaptation Plan

This first Adaptation Plan for the energy networks (electricity and gas) sector was prepared under the National Adaptation Framework in 2019. This Plan is the first step towards reducing vulnerability and building resilience in this sector.

The Plan discusses a number of the measures to be put in place in order to ensure the sector is less vulnerable to climate change in the future. GNI will play a role in this Adaptation Plan. A number of adaptation measures are to be adopted, including, but not limited to:

- Natural gas in transport (e.g. via the Causeway Project); and
- Renewable gas (e.g. biomethane production and injection into existing gas network).

Gas Networks Ireland will contribute towards the Climate Change Adaptation Plan through the facilitation of the measures above. In the event of an incident, GNI has a Business Continuity Plan, and a Severe Weather Contingency Plan. These Plans, as discussed in the Electricity & Gas Networks Sector Climate Change Adaptation Plan will ensure the gas and electricity network sector will be more resilient to severe weather incidents caused by climate change.

3.2.1 CRU 2019, Strategic Plan 2019 - 2020

The Commission for the Regulation of Utilities (CRU) have developed a Strategic Plan for the 2019 - 2021 period as a guiding framework for the CRU's planning, resourcing, prioritisation, monitoring and reporting activities.

The 2019 - 2021 Strategic Plan documents the CRU's commitment to deliver a secure, low carbon future at least cost.

It demonstrates our commitment to a co-operative approach with our stakeholders to ensure safe outcomes, sustainability (including environmental and economic), reliability and efficiency across the sectors we regulate.

In accordance with the Energy Act 2016 and the Water Services (No.2) Act 2013, a copy of the CRU 2019 - 2021 Strategic Plan was submitted to the Minister for Communication, Climate Action and Environment and the Minister for Housing, Planning and Local Government.

As outlined in the Strategic Plan, it is an objective of the CRU to:

- *"Ensure utility network policies and infrastructure development deliver a low carbon future whilst supporting competitiveness and security of supply; and*
- *Deliver market policies that support a low carbon future whilst supporting competitiveness and security of supply."*

3.2.2 GNI 2018, National Development Plan 2018

The Gas Networks Ireland National Development Plan (NDP) 2018 provides a view of how the gas network will develop over a ten-year period. The Plan sets out the assessment of the future demand and supply position for the natural gas industry in the Republic of Ireland.

The Plan provides an overview of the planning and development of the gas network, which can involve long lead times in the delivery of infrastructure projects.

3.2.3 DCCAE 2018, Draft National Energy and Climate Plan 2021 - 2030

In accordance with the Governance of the Energy Union and Climate Action Regulation, Ireland was required to submit the first Draft National Energy & Climate Plan (NECP) 2021 - 2030 to the European Commission by

the end of 2018. A final version of the NECP was to be submitted by the end of 2019. Ireland has been slightly delayed with this process and as of the time of writing this SEA Scoping report, the draft NECP had yet to be submitted to the Committee. The draft Plan went out for public consultation, which ended in 2019.

The first draft is the first step in the process of putting together the final National Energy and Climate Plan and further iterations of the plan will take into account additional policies and measures and the Climate Action Plan 2019.

This first draft of the NECP takes into account energy and climate policies developed to date, the levels of demographic and economic growth identified in the Project 2040 process and includes all of the climate and energy measures set out in the National Development Plan 2018 - 2027.

According to the first draft NECP consultation, there is support for expansion of the gas network including carbon capture and storage, biomethane grid injection, a LNG terminal, compressed natural gas stations, power-to-gas and a hydrogen transmission network.

There is general support for improved and increased gas and electrical infrastructure through efficient and effective projects, wide implementation of smart grid technology and a proposal for a new system to take projects from inception to delivery.

3.2.4 DHPLG 2018, National Planning Framework

The Department of Housing Planning and Local Government (DHPLG), on behalf of the Government, has prepared and published the National Planning Framework under Project Ireland 2040, the overarching policy and planning framework for the social, economic and cultural development of our country.

The National Planning Framework states that "*In order to support the National Planning Framework, additional electrical grid strengthening will be required for parts of the border subject to the necessary planning consents to enhance energy security through further reductions in dependence on fossil fuels, moving towards wind, gas with carbon capture and sequestration, biomass and other renewable sources.*"

National Policy Objective (No. 47) of the NDP states:

"*In co-operation with relevant Departments in Northern Ireland, strengthen all-island energy infrastructure and interconnection capacity, including distribution and transmission networks to enhance security of electricity supply."*

3.2.5 DCCAE 2017, National Energy Efficiency Action Plan for Ireland #4 2017–2020

Article 24 of the EU Energy Efficiency Directive requires Member States to submit a National Energy Efficiency Action Plan (NEEAP) every three years. Ireland's 4th NEEAP was produced in early 2017. It provides a comprehensive overview on

- The progress made towards the above targets;
- The measures in place to ensure the targets are met; and
- The strategies and policies in place across the residential, commercial, transport and public sector.

According to the National Energy Action Plan for Ireland, *"a number of projects (undertaken and planned) by Gas Networks Ireland will further improve energy efficiencies and reduce emissions. These include replacement of Waterbath heaters and boilers with high efficiency boilers and new control technology; a pilot project to install a CHP unit (at a Pressure Reduction Installation) and the feasibility of the installation of CHP will be determined based on the outcome of this pilot."*

3.2.6 DTTAS 2017, National Policy Framework on Alternative Fuels Infrastructure for Transport in Ireland - 2017 to 2030

The National Policy Framework on Alternative Fuels Infrastructure for Transport in Ireland: 2017 to 2030 represents a first step in communicating a longer-term vision for the Irish transport sector. It sets an ambitious target that by 2030 all new cars and vans sold in Ireland will be zero emissions (or zero emissions capable) with the use of fossil fuels vehicles rapidly receding.

The Framework outlines the main fuel options that could provide alternatives to oil in transport namely: electricity, hydrogen, biofuels, and natural gas, in the forms of compressed natural gas (CNG), liquefied natural gas (LNG), and liquefied petroleum gas (LPG). It is likely that electricity will fuel the majority of passenger cars, commuter rail and taxis; while, natural gas and biofuels will play an increasingly important role for larger vehicles such as heavy goods vehicles and buses. Hydrogen use is also anticipated to increase its penetration across the entire fleet spectrum in the coming decades but not in the short-term.

The Framework strongly advocates for a switch to natural gas use in Ireland, stating: "*in Ireland, making a transition to gas would be beneficial for a number of reasons:*

- *Natural gas vehicles (NGVs) produce up to 20% lower carbon emissions per unit of energy produced than diesel in terms of kilometres travelled;*
- *Natural gas could provide greater long-term competitiveness in the freight sector. The use of domestically sourced lower price natural gas would be more economically sustainable;*
- *The price of gas continues to be cheaper than diesel or petrol for similar energy outputs, providing considerable scope for reducing fuel costs and improving transport cost efficiency;*
- *There is considerable health benefits associated with the use of gas as a propellant through improved air quality and significantly reduced local pollutants (NOx, SOx and PMs) in cities;*
- *There would be considerable energy security benefits through the use of indigenous gas supplies, particularly biogases; and*
- *The use of natural gas in transport could lead to greater use of the gas network, which could impact positively on gas network charges."*

3.2.7 DCCAE 2015, White Paper on Energy: Ireland's Transition to a Low Carbon Energy Future 2015 - 2030

The Government's energy White Paper sets out a vision and a framework to guide Irish energy policy between 2015 and 2030 and outlines a transition to a low carbon energy system for Ireland by 2050. Its objective is to guide a transition to a low carbon energy system, which provides secure supplies of competitive and affordable energy to our citizens and businesses.

The White Paper states that "oil and natural gas will remain significant elements of Ireland's energy supply between now and 2035". However, the White Paper recognises that there is a clear link between oil and gas production and consumption and global climate change.

The White Paper commits Ireland to radically reducing our GHG emissions by 2050. Ireland has embarked on a firm course to sustainability, mindful of the need to balance competitiveness and security of supply. Oil and gas will contribute to security of supply through the period of transition, on a declining basis over time. This curtailment (and, in the longer term, elimination) of oil and gas in our energy mix will be accomplished gradually in the coming decades through a range of reduction and substitution measures using more sustainable alternatives.

As outlined in the paper, "*providing natural gas and electricity network infrastructure is essential for the proper functioning of the markets and for the provision of secure supplies. These networks will play an important role in the transition*".

3.2.8 DCCAE 2010, National Renewable Energy Action Plan

Article 4 of Directive 2009/28/EC on renewable energy requires each Member State to adopt a national renewable energy action plan (NREAP). Ireland's NREAP sets out our national targets for the share of energy from renewable sources to be consumed in transport, electricity and heating and cooling in 2020. The plan demonstrates how the Member State will meet its overall national target established under the Directive.

Ireland published the NREAP in July 2010. Following on from the NREAP, all Member States must submit a report on progress to the European Commission every two years. The latest report was published in February 2018, and the final report must be submitted by 31 December 2021.

4 Environmental Baseline and Issues

4.1 Introduction

A brief assessment of the current state of the environment and key environmental issues for the NIP boundary is summarised in this report. A full description will also be included in the SEA Environmental Report. GIS is used extensively to provide regional information.

Where data gaps are found for particular aspects of the environment, the significance of these data gaps will be evaluated and clearly stated. It will also be stated whether these gaps can be addressed during the SEA process.

The baseline environment is assessed under the following headings:

- Biodiversity including Flora & Fauna;
- Population and Human Health;
- Land and Soils;
- Water Resources;
- Air and Noise;
- Climate Change and Resilience;
- Archaeological, Architectural & Cultural Heritage;
- Landscape and Visual; and
- Material Assets.

In accordance with S.I. 436 of 2004 (as amended) consideration will be given to whether the environmental effects, both positive and negative, of the Draft Plan are likely to be significant.

4.2 Population and Human Health

4.2.1 Population Baseline

Population Distribution

This section provides an overview of the population dynamics and socio-economic characteristics of the NIP area.

Census 2016 results showed that the population of the Republic of Ireland stood at 4,761,865 in April 2016, an increase of 173,613 since April 2011. This represents an increase of 3.8% over the five years or 0.8% on an annual average basis.

Figure A2 in the Appendix illustrates the population density in the Republic of Ireland (RoI).

In 2016, there were 2,985,781 people in Ireland living in urban areas. As can be seen in **Figure 4.1**, this represents 62.7% of Ireland's population.

Population growth between 2011 and 2016 was centred around cities, including Dublin, Cork and Galway. The population of Dublin city and suburbs increased by 5.6% between 2011 and 2016, the population of Cork city and suburbs grew by 5.1% and the population of Galway city and suburbs grew by 4.1%. In contrast, the population of rural areas grew by 2%, compared to 4.9% in urban areas. **Figure 4.1** illustrates the level of urbanism in Ireland from 1966-2016.

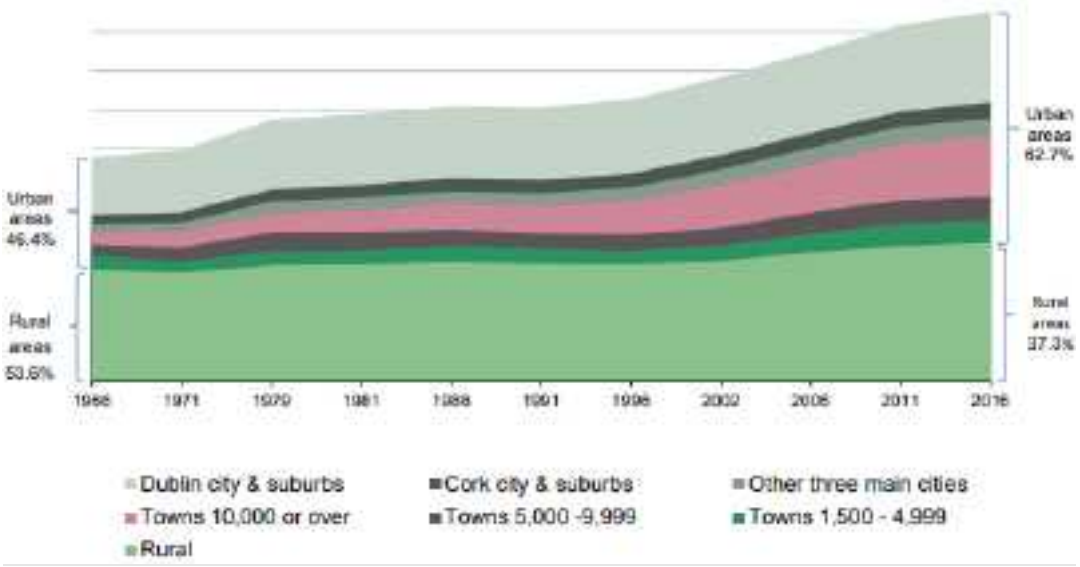

Figure 4.1: Urbanisation 1966 - 2016 (CSO 2016)

Energy Demand

Between 2005 and 2017, TPER (total primary energy requirement) for natural gas across Ireland grew by 23%, from 3,503 Kilotonne of Oil Equivalent (ktoe) to 4,315 ktoe. Over the same time period, the share of natural gas increased from 22.1% to 29.8%. **Figure 4.2** illustrates the total primary energy requirements in Ireland from 2005-2017**.**

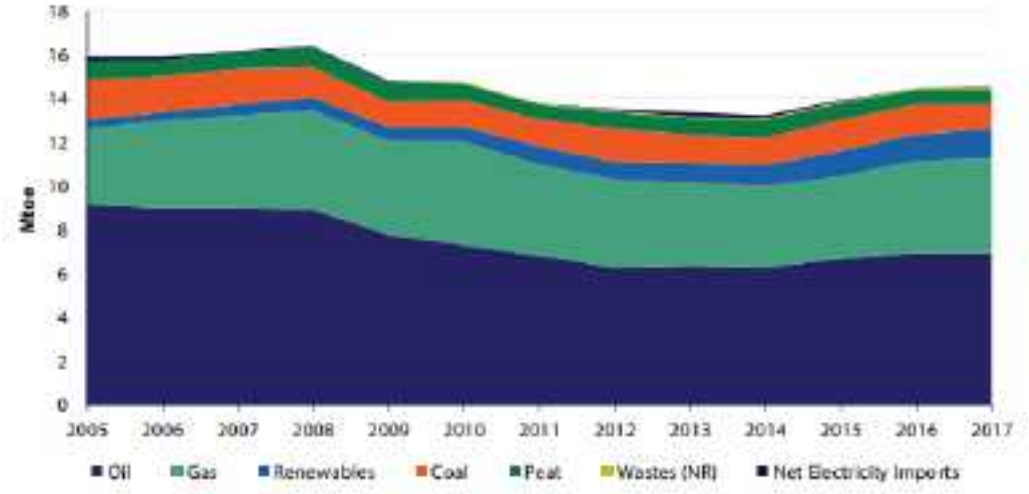

Figure 4.2: Total Primary Energy Requirement, Ireland 2005 - 2017 (SEAI 2018)

Energy Use for Heat

Central heating used by occupied permanent housing units at the time of the 2016 Census reveals that Fossil Fuels topped the responses with oil, natural gas and coal being used to heat almost 4 out of 5 Irish homes.

There was a clear urban/rural split between the two main fossil fuel types. In rural areas, 65.4 per cent of households used oil to heat their homes while in towns and cities 51.4 per cent of homes used natural gas. Only 13,691 dwellings in rural Ireland used natural gas while 45,975 burned coal and a further 75,956 burned peat. Wood or wood pellets were burned by 33,976 dwellings. A total of 23,174 homes did not have any central heating. Refer to **Figure 4.3** for the breakdown of energy use for heat in Ireland.

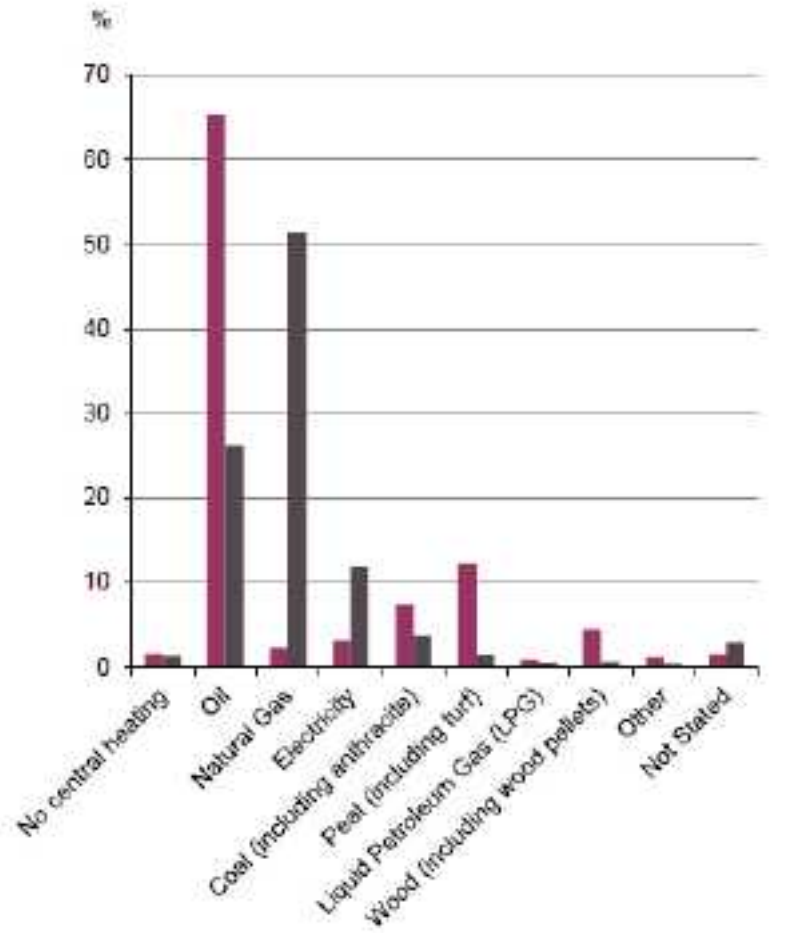

Figure 4.3: Energy Use for Heat- Ireland 2016

Gas Demand

GNI has over 688,000 natural gas customers in 175 population centres, in 21 counties throughout Ireland. Of the 668,000 customers, GNI supplies gas to 30,000 businesses. GNI is responsible for connecting all customers to the network, regardless of their supplier.

Figure A3 in the Appendix illustrates residential gas consumption in the RoI and **Figure A4** in the Appendix illustrates non-residential gas consumption in the RoI.

Already, analysis from SEAI has shown that since 1990, the share of high carbon content fuels in electricity generation, such as coal and oil, has been reducing with a corresponding rise in the relatively lower carbon natural gas and zero carbon renewables.

As renewable gas is injected into the network, the heating sector can be decarbonised at scale and without relying on customer behaviour change. The Low Carbon Energy Roadmap for Ireland has noted that *'Fossil fuels are incompatible with a low carbon economy and, while their use will be greatly diminished, natural gas may still be required in electricity generation.'*

As a result of this necessity to move towards a low carbon economy, action 29 of the National Mitigation Plan is to '*Commission study on the wider economic costs and benefits – including in the areas of climate, decarbonisation and rural development – of potential extensions of the Irish Natural Gas network, and related funding options*.'

4.2.2 Human Health Baseline

Life Expectancy

Ireland is within the top 10 countries in Europe for life expectancy, as can be seen below in **Figure 4.4**. Life expectancy in Ireland is continuing to increase, currently standing at 83.6 years for women and 79.9 years for men. Male life expectancy in Ireland has increased by 3 years and female life expectancy by almost 2 years since 2006. This improvement is largely due to lower mortality and better survival from conditions such as heart disease and cancer affecting older age groups. The contribution of modern health services to this achievement, while difficult to quantify, has been of unquestionable significance.

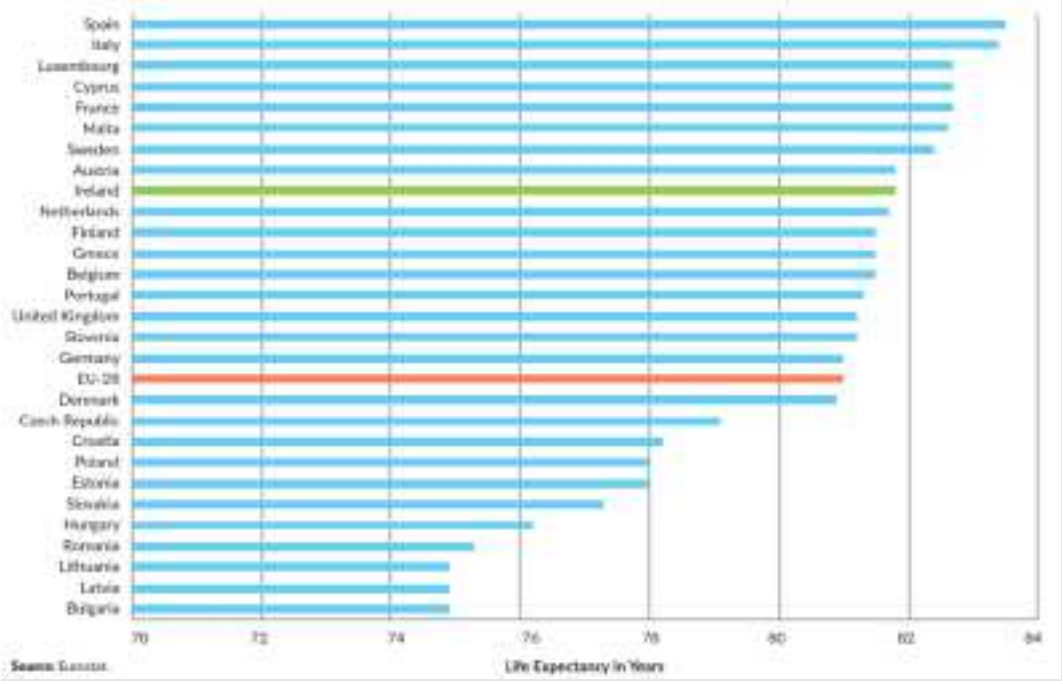

Figure 4.4: Life Expectancy at Birth for EU-28 Countries, 2016 (Eurostat 2016)

National Trends

Population health at the national level presents a picture of decreasing mortality rates and high self-perceived health over the past ten years.

Mortality rates across all major causes have declined since 2008. Age-standardised death rates for cancers and circulatory system diseases, the major causes of deaths in Ireland, have declined by 11% and 32% respectively over the past ten years. Lifestyle factors such as smoking, drinking, levels of physical activity and obesity continue to be issues which have the potential to jeopardise many of the health gains achieved in recent years. However, inequalities in health are closely linked with wider social determinants including living and working conditions, issues of service access, and cultural and physical environments.

The 2016 Census records data on the self-perceived health status of the population. The results show that 87% of the population felt they had 'good' or 'very good' health.

Individual Health

Individual health is determined predominantly by the conditions in which people are born, grow, work, live, and age. According to the World Health Organisation there are a 'wider set of forces and systems shaping the conditions of daily life. These forces and systems include economic policies and systems, development agendas, social norms, social policies and political systems.'

Disabilities in Ireland

The number of people with a disability increased by 47,796 between 2011 and 2016 and stood at 643,131 in April 2016, accounting for 13.5% of the population. There were 331,551 females (51.6%) and 311,580 males (48.4%) with a disability.

Radon Levels

Radon is a naturally occurring radioactive gas formed in the ground by the radioactive decay of uranium, which is present in all rocks and soils. It is the greatest source of exposure to ionising radiation for the general public in Ireland and the leading cause of lung cancer after smoking. It is estimated that exposure to radon accounts for approximately 13% of all lung cancers in Ireland, which equates to some 250 lung cancer cases each year.

High radon concentrations can be found in any part of the country; however, as can be seen in **Figure A5** in the Appendix, certain areas have been identified which are more prone to radon as High Radon Areas.

4.2.3 Key Issues

- Increase in demand for electricity supply due to future predicted increases in population and economic growth;
- Increased urbanisation will result in population clusters and resulting disproportionate demands on energy infrastructure and consumption;

- Continuity of supply re. availability of resources and increased demand;
- Switch to renewable energy use; and
- Impacts of pollution from construction work or from the operation of new developments or installations.

4.3 Biodiversity including Flora & Fauna

4.3.1 Baseline

As the National Implementation Plan area reaches across the entire land and waters of Ireland, the subject area supports a wide range of habitat types.

Ireland lies on the western edge of the European continental shelf. Ireland's territorial waters extend to the outer edge of the continental margin, covering an area of 880,000km^2. The territorial area of Ireland covers an area of 84,421km^2 comprised of low central plains surrounded by coastal mountains.

Ireland has a rich diversity of ecosystems and wildlife in its terrestrial, freshwater and marine environments. Irelands natural habitats have evolved over millions of years and support globally important populations of birds, mammals, invertebrates, plants and fungi. According to the Irish Wildlife Trust, Ireland is host to over 50 species of mammals, 400 species of birds, 4,000 plant species and 12,000 insect species.

The marine habitats surrounding our island are home to whales, dolphins, vast colonies of seabirds, abundant fish and cold-water coral reefs, as well as rich algal and invertebrate communities. On land, there is a wealth of species in our mountains, peatlands, turloughs, woodlands, grasslands, lakes, rivers, and coastal habitats. Ireland is also relatively rich in bryophytes, algae, lichens and non-marine molluscs.

Natura 2000 is an EU-wide network of nature protection areas established under the 1992 Habitats Directive. The aim of the network is to assure the long-term survival of Europe's most valuable and threatened species and habitats. It is comprised of Special Areas of Conservation (SACs) designated by Member States under the Habitats Directive, and also incorporates Special Protection Areas (SPAs) which they designate under the 1979 Birds Directive. It also applies to the marine environment.

Ireland is required under the terms of the EU Birds Directive (2009/147/EC) to designate Special Protection Areas (SPAs) for the protection of endangered species of wild birds. Ireland's SPA Network encompasses 154 sites, over 5,700km^2 of marine and terrestrial habitats.

Ireland is also required under the terms of the EU Habitats Directive (1992/43/EEC) to designate Special Areas of Conservation (SACs) for the protection of certain habitats and species. Ireland's SAC Network encompasses an area of 13,500km^2 across more than 400 sites.

Natural Heritage Area (NHA) are designated sites, protected under the Wildlife Amendment Act (2000). These areas are considered important for the habitats present or which holds species of plants and animals whose habitat needs protection. In addition, there are 630 proposed NHAs (pNHAs), which were published on a non-statutory basis in 1995 but have not since been statutorily proposed or designated. These sites are of significance for wildlife and habitats and are subject to limited protection

Figure A6 in the Appendix illustrates the Designated sites in the RoI.

Current Status & Trends

EU Member States are required to monitor habitats and species that are considered threatened across Europe and are listed in the Habitats Directive. The National Parks and Wildlife Service (NPWS) reported in 2013 that only 9% of the habitats considered threatened and protected under the Habitats Directive are in favourable status. The Habitats of most pressing concern in Ireland are those that have reduced range and/or area, notably raised bogs and species-rich grasslands.

Red Lists identify species in most need of conservation interventions. Of 185 birds that breed and/or winter in Ireland, 37 are on the Red List and 90 on the Amber List, based on conservation status. Red-Listed breeding species include the barn owl, corncrake, grey partridge, grey wagtail and red grouse. Red-Listed breeding and wintering species include the curlew, dunlin, golden plover and Bewick's swan. Two birds of prey that have recently been reintroduced, the white-tailed eagle and the golden eagle are both Red Listed.

Member States are required to monitor habitats and species that are considered threatened across Europe and are listed in the Habitats Directive (92/43/EEC). The conservation status of habitats and species is assessed at a national level, not just in Special Areas of Conservation2 (SACs). The most recent report of the National Parks and Wildlife Service (NPWS, 2013) provides an overview of the status of Ireland's 58 natural habitats and 61 native species.

The current status and trends of Ireland's habitats are presented in **Figure 4.5.** (NPWS, 2013). As indicated in **Figure 4.5** some 91% of habitats in Ireland are of 'bad' or 'inadequate' status**.** The habitats of most pressing concern are those that have reduced range and/or area, notably raised bogs and species-rich grasslands.

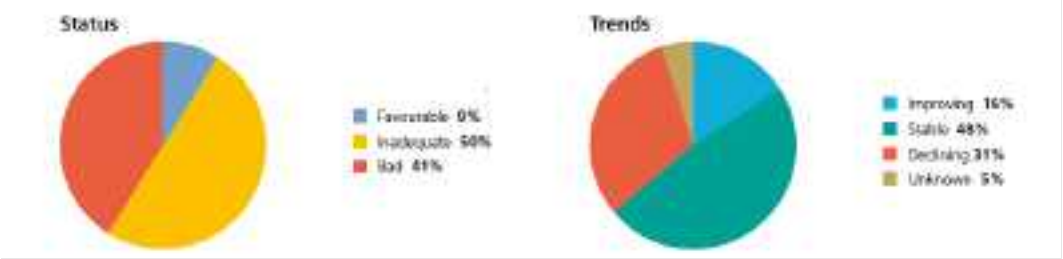

Figure 4.5: Overall Assessment Results for the Status and Trends in Habitats protected under the EU Habitats Directive in Ireland 2007 - 2013

The current status and trends of Ireland's species are presented in **Figure 4.6** (NPWS, 2013). As indicated in **Figure 4.6** some 52% of species in Ireland are of 'favourable' status. One of the species of greatest concern is the pollution-sensitive freshwater pearl mussel, as only a few rivers have populations with even near-adequate recruitment.

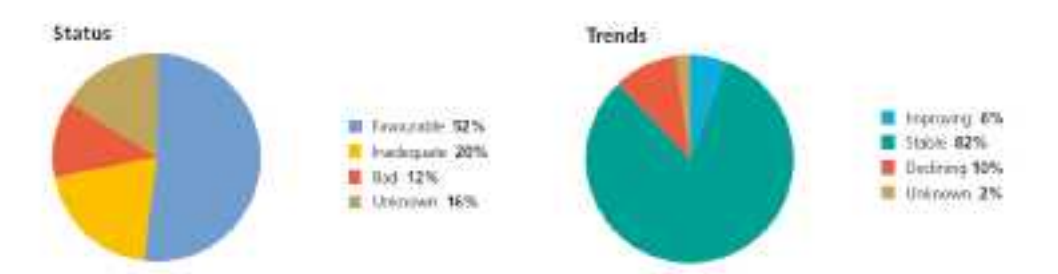

Figure 4.6: Overall Assessment Results for the Status and Trends in Species protected under the EU Habitats Directive in Ireland 2007 - 2013

4.3.2 Key Issues

- Habitat removal or degradation due to development/installation of gas network infrastructure, or habitat fragmentation due to linear infrastructure;
- Water pollution due from development or installation works including run-off from construction vehicles etc. The continuing deterioration of high-quality rivers is of great concern, particularly as species such as salmon, trout and the declining freshwater pearl mussel require and depend on high quality water and river habitat;
- Changing land use, direct impact and unsustainable exploitation pressures evident across different habitats;
- Climate change is also likely to have some effect on Irish species and habitats;
- Infrastructure upgrades and development works which take place within protected sites will need to be cognisant of habitats and species present, in order to mitigate potential negative impacts; and
- Infrastructure upgrades and development works which take place within the Irish sea or Northern Ireland will need to ensure compliance with relevant legislation, in order to mitigate any potential transboundary impacts on biodiversity.

4.4 Soils and Geology

4.4.1 Soil Baseline

There are ten main Great Soil Groups occurring in Ireland. These soils include Podzols, Brown Podzolics, Brown Earths, Grey Brown Podzolics and Blanket Peats (zonal soils), the Gleys and Basin Peats (hydromorphic soils) the Rendzinas, (calcimorphic soils), Regosols and Lithosols.

Podzols are generally poor soils with high lime and fertiliser requirements. They form in hill and mountain areas where reclamation and cultivation are not feasible. As a result, they are often used for forestry.

Brown Podzolic soils are similar to podzols, however they are less depleted than podzols. Due to their desirable physical characteristics, Brown Podzolics are often devoted extensively to cultivated cropping and pasture production.

Brown Earth soils are relatively mature, well-drained, mineral soils possessing a rather uniform profile, with little differentiation into horizons. These are amongst the most extensively cultivated soils.

Grey Brown Podzolic soils are usually formed from a calcareous parent material, which counteracts the effects of leaching. The lighter textured Grey Brown Podzolics are good all-purpose soils, while the heavier textured members are highly suited to pasture production, responding well to manurial and management practices.

Gleys are soils in which the effects of drainage impedance dominate and which have developed under the influence of permanent or intermittent waterlogging. Most gleys have poor physical conditions which make them unsuitable for cultivation or for intensive grassland farming. Their productive capacity is also affected by restricted growth in spring and autumn.

Rendzinas are shallow soils, usually not more than 50 cm deep, derived from parent material containing over 40% carbonates. The use range of Rendzinas is often limited by their shallow depth. They are suited mostly to extensive grazing but where sufficiently deep they can also be excellent tillage soils.

Regosols and Lithosols are formed mostly from the alluvial deposits of rivers and from shallow stony deposits respectively. Regosols can have a wide use range but they are often subject to flooding hazards. For this reason, they are mostly used for grazing. Lithosols generally have bare rock outcropping at frequent intervals and many also have steep slopes. Their use-range is usually limited to rough grazing.

An overview of the soil types in the RoI can be seen below in **Figure A7** in the Appendix**.**

There are six key degradation processes that can impact on soils in general. This includes soil sealing, erosion, organic matter decline, compaction, salination and landslides. EPA research has shown that the main soil quality pressures in Ireland appear to relate to surface sealing (urbanisation). Human activity is also a significant driver of degradation through poor (or inappropriate) land management practices. However, in Ireland, the overall area of artificial surfaces remains low compared with that in other EU Member States.

4.4.2 Geology Baseline

The geology of Ireland is relatively diverse, when considering the land surface area.

The bedrock of Ireland contains a wide variety of rock types which have originated at different periods of geological time.

The counties Cavan and Monaghan are mainly underlain by Lower Palaeozoic shales, grits and greywackes, whilst counties Louth and Meath are mainly underlain by limestones or marginally younger shales and siltstones.

The South East of Ireland consists predominantly of Lower Palaeozoic sedimentary (mudstones, siltstones and greywackes) and igneous rocks (rhyolites, andesites and basalts). These have been intruded and metamorphosed during the Caledonian Orogeny by the Leinster Granite, which dominates the area's topographic elevation (Wicklow Mountains).

The South and South West are dominated by Old Red Sandstone and some shales in the west, whilst the easternmost part is more variable with sandstones, shales and limestones occurring in a series of gentle synclines and anticlines formed during the Hercynian Orogeny. North of these, in northern Kerry, western Limerick and western Clare there are a series of Upper Carboniferous sediments, mainly shales and grits, sitting on top of comparatively pure limestones.

West Galway and West Mayo are characterized by granite in the South (Caledonian Orogeny) and a combination of Lower Palaeozoic and late Pre-Cambrian metamorphic rocks north of this. In the North, most of county Donegal is underlain by a complex series of rocks comprising schists (metamorphosed from mudstones and muddy sandstones), and quartzites (from sandstones). These have been intruded by a series of granites during the Caledonian Orogeny.

The centre of Ireland is dominantly underlain by carboniferous limestones, which vary from very pure to impure shaley varieties. Within this large area there are two types of rock giving rise to pronounced topographic relief. The first and more frequent consist of Lower Palaeozoic shales and sandstones and Old Red Sandstones. The second consist of younger Carboniferous rocks, predominantly shales, siltstones and sandstones.

Figure A8 in the Appendix provides an overview of the geology of Ireland.

The Irish Geological Heritage (IGH) Programme of the Geological Survey of Ireland (GSI) aims to identify, protect and promote the best of this heritage, along with its partners in the National Parks and Wildlife Service (NPWS).

Figure A9 in the Appendix illustrates the site of geological heritage in Ireland.

4.4.3 Key Issues

- Disturbance to soils and geology during new development or infrastructure installation;
- Development or installation that takes place without sufficient surveying and assessment of the potential for the presence of karsified limestone under or adjacent to the site has the potential to give rise to problems both for the structures and for the receiving environment, particularly if storage or piping infrastructure is caused to leak by a geological collapse;

- Impacts of pollution from construction work or from the operation of new developments or installations; and
- Managing the impact of construction and development on soil functions, such as absorbing rainwater is vital. Climate change has the potential to increase soil erosion rates through hotter, drier conditions that make soils more susceptible to wind erosion, coupled with intense rainfall incidents that can wash soil away. Soil erosion can also have off-site effects which result from the movement of sediment and agricultural pollutants into watercourses. This can result in increased silting of watercourses, disruption to ecosystems and contamination of drinking water supplies.

4.5 Water Resources

4.5.1 Baseline

Ireland has abundant surface water resources, with over 70,000km of river channel, 12,000 lakes, 850km^2 of estuaries and 13,000km^2 of coastal waters. Groundwater is also abundant, occurring almost everywhere and supplying 20-25% of water supplies nationally. The quality of Irish groundwater and surface waters is among the best in Europe. Refer to **Figure A10** and **Figure A11** in the Appendix for the river and lake features in Ireland.

Rivers

Results from the most recent EPA water quality report indicate that between 2014 and 2017, 1,298 (56%) of the river water bodies were in high or good biological quality (**Figure 4.7**). The remaining 1,018 (44%) river water bodies were of moderate, poor or bad quality.

River biological quality fell by 3% since 2013 – 2015. Some 197 river water bodies have improved while 269 have declined, resulting in a net decline of 72 water bodies. A total of 1,838 river water bodies have remained at the same class when compared with their 2013 – 2015 survey results. This represents a decline in the number of river water bodies in high and good quality and an increase in moderate and poor quality. The number of river water bodies in bad quality fell from five in 2013 – 2015 to two (Aughboy_010 in Wexford and Ahavarraga Stream_010 in Limerick) in 2015 – 2017. This is a dramatic improvement from the historical high of 91 in the period between 1987 and 1990. **Figure 4.7** illustrates the national river biological quality between 1987 and 2017.

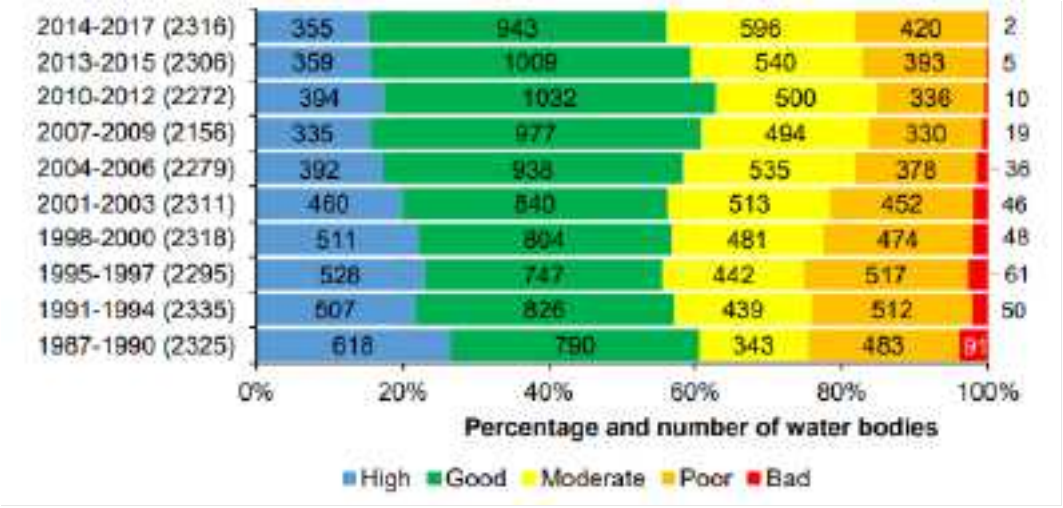

Figure 4.7: National River Biological Quality (Q value) between 1987 and 2017 (EPA 2018)

Refer to **Figure A12** in the Appendix for the existing water quality status of rivers in Ireland. **Figure A13** in the Appendix illustrates the Water Framework Directive risk status of rivers in Ireland.

Lakes

Of the 224 lakes that were monitored, 109 (49%) were in high or good ecological quality and the remaining 115 (51%) lakes were less than good quality. Thirty-four lakes improved in quality, while 26 lakes deteriorated between 2013 – 2015 and 2015 – 2017. This indicates a 1% decline in good or better quality compared to 2013 – 2015 and a decline of 4.7% of lakes since status assessments began in 2007 – 2009. **Figure 4.8** illustrates the national lake biological quality between 2007 and 2017.

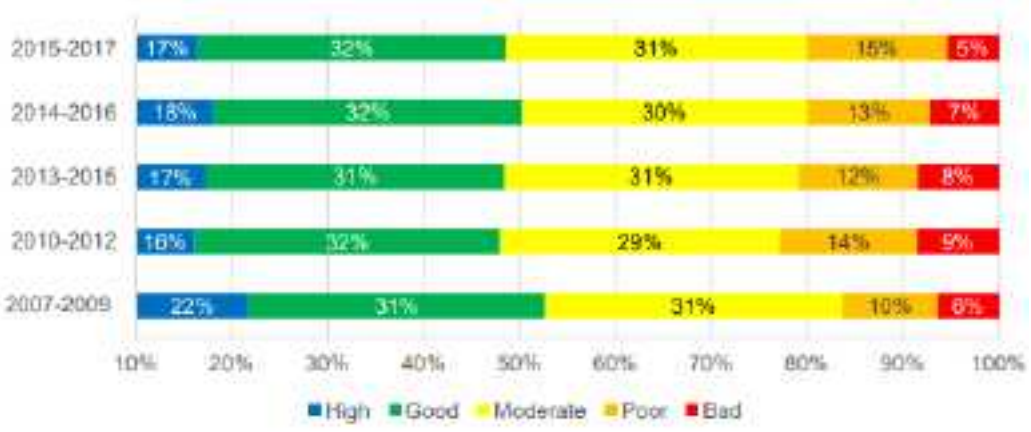

Figure 4.8: National Lake Biological Quality (Q value) between 2007 and 2017 (EPA 2018)

Refer to **Figure A14** in the Appendix for the existing water quality status of lakes in Ireland. **Figure A15** in the Appendix illustrates the Water Framework Directive risk status of lakes in Ireland.

Groundwater

Ireland's groundwater resource accounts for approximately 25% of drinking water nationally. Furthermore, it is also a contributor to many rivers, lakes and estuaries around the country. As such, impacts on groundwater can have significant ecological and social implications. There are a total of 513 groundwater bodies in Ireland. Refer to **Figure A16** in the Appendix for groundwaters features in Ireland.

Groundwater Vulnerability is a term used to represent the natural ground characteristics that determine the ease with which groundwater may be contaminated by human activities. Groundwater vulnerability exhibits a range of vulnerability ratings classified by Low risk up to Moderate, High, Extreme and 'X', where the rock is exposed near the surface or comprised of karst. Refer to **Figure A17** in the Appendix for the groundwater vulnerability in Ireland.

Groundwater Quality is generally of 'good' quality, in accordance with the Water Framework Directive Status. Refer to **Figure A18** in the Appendix for the groundwater quality status in Ireland.

Refer to **Figure A19** in the Appendix for the Water Framework Directive groundwater risk status in Ireland.

Marine

As can be seen below in **Figure 4.9,** Ireland's marine environment is one of the largest in the European Union (EU) and is nearly 10 times its land area. The coastline is at the interface between the land and sea, with shallow estuaries that extend into the coastal zone and out to the continental shelf to the west, which plunges to depths of over 4,000 metres.

The temperate waters that surround Ireland are highly productive and provide a sustaining foundation for a rich mosaic of marine life, including hundreds of species of invertebrates and fish, 24 species of whales and dolphins, breeding colonies of both the common and grey seal and some of the largest breeding populations of seabirds in western Europe.

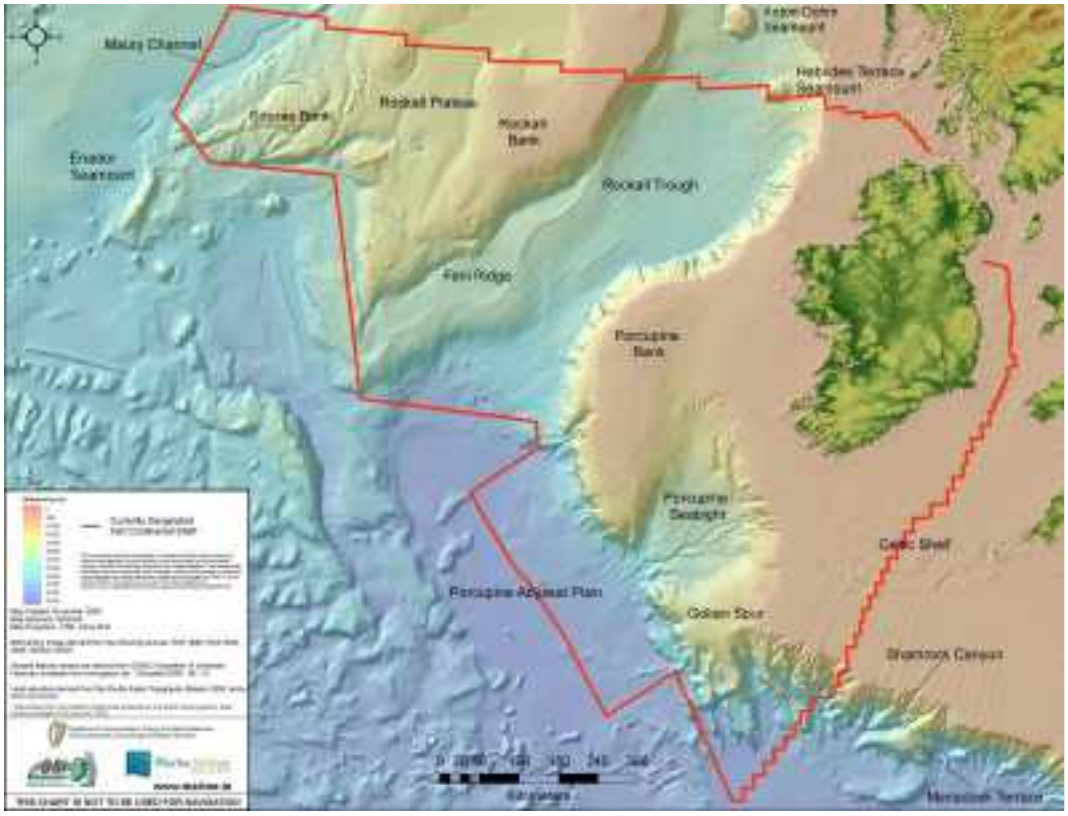

Figure 4.9: Irish Continental Shelf (Marine Institute 2014)

Flooding

The Eastern & Midland Region is affected by fluvial, coastal and pluvial flooding. In both urban and rural areas there is a significant fluvial risk along the main river catchments and their tributaries including the Liffey, Boyne, Broadmeadow, Barrow and Shannon. The expansion of the greater Dublin area over the last two decades has left drainage infrastructure under pressure and the integrated nature of flooding emanating from the hydraulic connectivity between rivers, storm drainage and the coastal interface is a known issue in many parts of the city.

Agricultural land along the main rivers has also been impacted by flooding most notably along the banks of the Shannon where due to the flat terrain flooding can propagate inland up to 1km in some locations. Coastal settlements along the Irish Sea have also been impacted by tidal flooding and wave overtopping.

The fluvial flood risk in the Southern Region is characterised by the substantial river catchments including the Shannon, Nore, Barrow, Slaney, Blackwater, Suir and Lee as well as smaller steeper catchments draining to various points of the coastline. Historically these have caused widespread fluvial flooding to urban and agricultural areas in this region. The southern region coastline has also been impacted by coastal flooding including Cork City and Waterford City and coastal erosion is also an issue particularly along the Wexford coast. Combined fluvial, pluvial and coastal flooding is an issue in Cork City and other coastal communities.

The main river catchment in the Northern & Western Region is the Shannon and its tributaries which cause significant flooding to urban areas along its length and the surrounding rural landscape. The remaining river catchments drain from upland rural areas to the Northern and Western coasts affecting urban areas and agricultural lands. Coastal flooding and erosion affects a number of coastal communities along the Atlantic Coastline. Pluvial flooding is a risk in urban areas but to a lesser extent than other regions. Groundwater flooding is also most prevalent in the west of Ireland in karst limestone areas with rural and urban communities in South Galway, Mayo and Roscommon most affected.

4.5.2 Key Issues

The gas transmission network is, in the main, very resilient to weather events as it is an underground network. However, an increase in extreme flooding events may impact transmission pipelines traversing flood plains. Interconnector transmission pipelines may, as they come onshore, be subject to the effects of the projected rise in sea levels and the associated increased risk of coastal erosion which may result in a requirement to install additional coastal defences. Increased river bank erosion where a pipe traverses a river can cause depth of cover and exposure issues for transmission pipelines which require remediation works to reinstate the appropriate depth of cover over the pipeline. In very extreme cases of summer drought there may be a potential risk that soil compaction and ground movement may occur that could impact both transmission and distribution pipelines.

4.6 Air and Noise

4.6.1 Air Quality Baseline

Ireland Air Quality

Air pollution impacts human health, contributes to climate change and damages ecosystems.

The European Environment Agency estimates that there were 1,180 premature deaths in Ireland in 2016 due to poor air quality, mainly due to cardiovascular disease, with over 500,000 premature deaths across the wider EU. The WHO has described air pollution as the ‘single biggest environmental health risk’.

Ireland’s air quality currently is good, relative to other EU Member States, but maintaining this standard is a growing challenge. While monitoring stations show that Ireland continues to meet all EU air quality standards, localised air quality issues do arise. Ireland’s good air quality is largely thanks to the prevailing clean Atlantic air and the absence of large cities and heavy industry.

Ireland benefits from prevailing weather patterns which typically bring relatively clean south-westerly Atlantic air over the country. Under certain conditions, typical weather patterns can be disrupted, and pollutant emissions build up in the air.

These conditions can occur at any time of the year, but the impact on air quality can be particularly severe during winter, when the combination of cold still weather, increased emissions associated with a higher heating demand, particularly from solid fuels, can lead to high concentrations of pollutants with a consequent increased risk to human health.

The intensity of the severe "smog" problems in Ireland which occurred in the 1980s/early 1990s has been significantly reduced primarily due to the ban on the selling, buying or burning of 'smoky' coal in certain urban areas. Incrementally tighter vehicle emission standards in recent decades have reduced emissions from vehicles, though the 'real world' emissions have been significantly higher than emission standards and so reductions have not been as great as anticipated. Reductions have also been offset to some degree by the increase in numbers of vehicles on the roads.

Air Quality Monitoring

The Environmental Protection Agency (EPA) manages the national ambient air quality monitoring network. The EPA monitors air pollutants levels and compares them to EU legal limit values and World Health Organisation (WHO) guideline values. The following pollutants are assessed by the EPA:

- Particulate matter – $PM_{2.5}$ and PM_{10};
- Nitrogen oxides (NO_2 & NO);
- Sulphur dioxide (SO_2);
- Ozone (O_3);
- Carbon monoxide (CO);
- Benzene and ozone precursors;
- Benzo(a)Pyrene, a Polycyclic Aromatic Hydrocarbon (PAH) – both in PM_{10} and deposition;
- Heavy metals - both in PM_{10} and deposition;
- Chemical composition of $PM_{2.5}$; and
- Mercury.

Ambient air quality monitoring carried out by the EPA in 2018 shows that Ireland met all the legal requirements under the CAFE Directive by being within statutory limit and target values. All dioxin levels recorded in the 2018 survey remain low and compare favourably with those from previous surveys and from other EU countries.

However, the WHO air quality guidelines are stricter, and Ireland is above these guideline values for some key pollutants, including particulate matter (PM_{10} and $PM_{2.5}$), ozone and NO_2. Ireland is also above the EEA reference level for PAH – Polycyclic aromatic hydrocarbons which are pollutants produced from solid fuel burning.

The Department of Communications, Climate Action and Environment is currently developing Ireland's first National Clean Air Strategy.

This Strategy will provide the framework for a set of cross-Government policies and actions to reduce harmful emissions and improve air quality and public health to meet current and future EU and international obligations.

4.6.2 Noise Baseline

According to WHO, noise is the second greatest environmental cause of health problems (after air quality). Excessive noise can seriously harm human health, including mental health, and interfere with people's daily activities at school, at work, at home and during leisure time. It can disturb sleep, cause cardiovascular and psychophysiological effects, reduce performance and provoke annoyance responses and changes in social behaviour.

In Ireland, noise issues are typically considered across three categories: neighbourhood noise, environmental noise, and noise from EPA- and local authority-regulated sites. Local noise issues, including those from neighbours and local commercial facilities, represent by far the largest source of noise complaints in this country, and are dealt with by local authorities. Environmental noise from major infrastructure including roads, railways and airports is governed by the EU's Environmental Noise Directive (2002/49/EC). The preparation of strategic noise maps is a major task associated with this directive and this is currently under way in Ireland. Finally, noise issues can arise at facilities regulated by the EPA and local authorities.

Quiet Areas

It is important to identify and protect quiet areas. In addition to controlling excess noise, it is also important to identify and protect those areas which are substantially unaffected by man-made noise. Accessibility to quietness is highly important to the health of both wildlife and humans. This is particularly so in urban environments, leading to the concept of Relatively Quiet Areas. These are areas, such as local parks, green and blue areas, which are characterised by their proximity to areas with high noise levels and are valued by the public as a perceived area of tranquillity. A recent report from the EEA on quiet areas in Europe provides a first assessment of potential quiet areas in Europe's open country (EEA, 2016a).

The key messages from the report are that noise pollution is having a major adverse impact on human health across Europe, and that protecting those areas that are not yet affected by noise will bring significant health and wellbeing benefits.

4.6.3 Key Issues

- Local air quality, particularly in small Irish towns with a high dependence on coal, turf and wood for home heating, can be poor at times, and communities need much better local-level air quality information. The move to a low-carbon and resource-efficient economy should also lead to better air quality, provided that there is strong regulation and control of the burning of renewable fuels, such as wood and biomass, which in themselves can give rise to air pollution problems;

- Radon – a naturally occurring radioactive gas – is a risk to human health which also needs to be highlighted and brought more to people's attention. Some of our citizens are living in houses that may be making them sick, although they are not aware of it. Householders, institutions and businesses need to investigate and remediate building stock where a radon risk is determined;
- Localised air pollution and noise pollution are both likely to occur when construction takes place if suppression techniques are not introduced, and when traffic is queuing for long periods of time; and
- After poor air quality, noise nuisance is the second largest environmental source of human health morbidity and mortality in the EU. National planning for infrastructure and urban spaces must factor in appropriate protections for the population against noise impacts.

4.7 Climate Change and Resilience

Observed and Projected Impacts

Climate Change is the universal challenge which will impact on our future environment, economy and the way our communities function.

Observations show that Ireland's climate is changing in terms of sea level rise, increases in average temperature, changes in precipitation patterns and weather extremes. The observed scale and rate of change is consistent with regional and global trends and these changes are projected to continue and increase over the coming decades. Climate change will have diverse and wide-ranging impacts on Ireland's environment, society and economic development, including managed and natural ecosystems, water resources, agriculture and food security, human health and coastal zones. **Table 4.1** outlines the observed and predicted climate change impact in Ireland (National Climate Adaptation Framework).

Table 4.1: Observed and Predicted Climate Change Impacts

	Observed Impact	Predicted Impact
Temperature	Temperatures have increased by 0.8ºC since 1990; an average of 0.075ºC per decade.	Average temperatures will rise by between 1 ºC and 3ºC by 2100 compared to the 1961- 2000 average.
Precipitation	An increase in average annual rainfall, especially in the West with regional sessional differences.	Wetter winters in the west, drier summers in the south- east with between 5-25% less rainfall in 2021 to 2060 compared with 1961-2000 period.
Extreme Events	A decrease in storm frequency but increased storm intensity.	Slightly fewer storms but more intense with a northward shift in storm tracks.
Sea Levels	During the satellite era, a sea level rise of 3.5cm per decade	A rise of 60cm to 2100; however, considerable melting of land ice could intensify this impact.

Irish per capita Green-house Gas (GHG) emissions are among the highest in Europe and the extent of the challenge to reduce greenhouse gas emissions in line with our international commitments under the Paris Agreement as well as to meet our more immediate EU obligations is well understood by Government (National Adaptation Framework, 2019).

In 2017, Ireland's greenhouse gas emissions were 60.7 million tonnes of carbon dioxide equivalent, as can be seen in **Figure 4.10** The energy sector accounted for 19.3% of Ireland's greenhouse gas emissions in 2017. The agriculture sector accounted for 33.3%, transport accounted for 19.8% Industry, commercial and public services accounted for 14.6%, residential accounted for 9.5%, while wastes accounted for 3.6%.

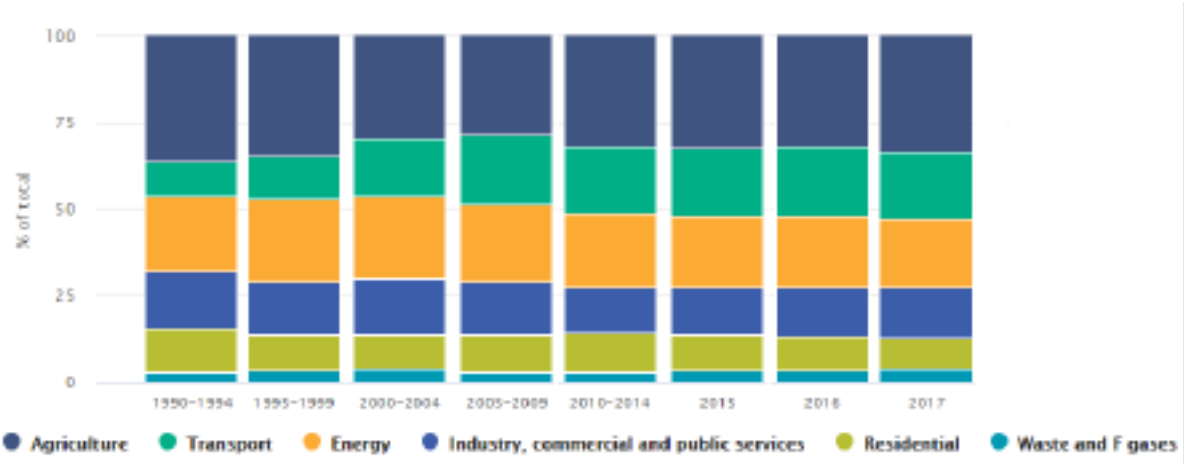

Figure 4.10: Total National Emissions (Source: Environmental Protection Agency, 2019)

Emissions have reduced compared to the peak average annual emissions of 68.8 million tonnes in 2000-2004, however these levels are 7.9% higher than peak average annual emissions of 56.3 million tonnes in 1990-1994. Since the recovery following the economic crisis, emissions have risen since 2011. Growth in the Irish economy, increases in transport and increases in agricultural activity have all led to increases in emissions.

4.7.1 Key Issues

- Critical infrastructure: water, energy, communications, transport and emergency services are at risk from a range of projected changes, including sea-level rise, increasing temperatures, changing rainfall patterns and extreme weather events;
- Increasing population and a growing economy will result in in increased demand on energy, and subsequently increased GHG emissions;
- The agri-food sector is forecast to continue to grow and decarbonising it is very difficult. The heating and transport sectors are also challenging to decarbonise;
- Emerging and new clean energy technologies in Ireland will require support to become economically mature and self-sustaining. Similar to other clean energy technologies, a variety of measures will be required to enable the gas network and networked gases to maximise their contribution towards meeting the decarbonisation challenge;
- Temperature changes may lead to increased energy demand over time (e.g. for heating and cooling); Gas transmission and distribution networks need to have enough capacity available to ensure that extreme cold weather events can be accommodated without restricting the supply of gas;
- Other gradual changes such as increased or more frequent rainfall may increase wear and tear on infrastructure;
- Extreme weather events may have immediate impacts such as electricity blackouts with associated social and economic consequences;
- Infrastructure such as electricity and gas networks play an essential role in ensuring social and economic wellbeing. Risks to this infrastructure both from extreme weather events (such as flooding) and gradual climate change could have significant economic and social consequences and it is important therefore to future proof the efficient functioning of our energy system;
- Climate change may have an impact on the level of degradation of critical gas assets that are above ground. This would reduce the life of assets and therefore increase the required frequency of refurbishment and replacement of the affected assets; and
- The gas transmission network is, in the main, very resilient to weather events as it is an underground network. However, an increase in extreme flooding events may impact transmission pipelines traversing flood plains. Interconnector transmission pipelines may, as they come onshore, be subject to the effects of the projected rise in sea levels and the associated increased risk of coastal erosion which may result in a requirement to install additional coastal defences. Increased river bank erosion where a pipe traverses a river can cause depth of cover and exposure issues for transmission pipelines which require remediation works to reinstate the appropriate depth of cover over the pipeline. In very extreme cases of summer drought there may be a potential risk that soil compaction and ground movement may occur that could impact both transmission and distribution pipelines.

4.8 Archaeological, Architectural & Cultural Heritage

4.8.1 Archaeological Baseline

The Irish landscape is one of the oldest man-made landscapes in the world, dating back to 3500 B.C. when megalithic tombs were constructed. These include dolmens and passage graves such as Newgrange, Co. Meath. During the Iron Age (after 500 B.C.), large circular stone forts were built, usually on hilltops such as Dun Aengus on the Aran Islands. In early Christian times, Ireland's architecture once more flourished – for example in the Round Towers, which are considered unique to Ireland and formed part of important monastic sites such as Glendalough or Clonmacnoise. The most spectacular surviving early Christian site is Skellig Michael (c. 6th-8th c A.D.), on the Great Skellig Island in the Atlantic Ocean, which was inhabited by Irish monks.

Record of Monuments and Places

A record of archaeological heritage is maintained on the 'Record of Monuments and Places' which was established under Section 12 of the National Monuments (Amendment) Act, 1994 (No. 17 of 1994). Structures, features, objects or sites listed in this Record are known as Recorded Monuments.

The Record of Monuments and Places (RMP) comprises a list of recorded monuments and places and accompanying maps on which such monuments and places are shown for each county. Refer to **Figure A20** in the Appendix for the Recorded Monuments and Places in Ireland.

The National Monuments Service of the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs will advise on the protection applying to any particular monument or place under the National Monuments Acts by reason of it being entered in the Record of Monuments and Places and should be consulted if there is any doubt as to the status of the site.

Archaeological Survey of Ireland

The Archaeological Survey of Ireland (ASI) is a unit of the National Monuments Service. The ASI was established to compile an inventory of the known archaeological monuments in the State. The information is stored on a database and in a series of paper files that collectively form the ASI Sites and Monuments Record (SMR)

Sites and Monuments Record

The SMR contains details of all monuments and places (sites) where it is believed there is a monument known to the ASI pre-dating AD 1700 and also includes a selection of monuments from the post-AD 1700 period. There are in excess of 138,800 archaeological monuments within the SMR.

4.8.2 Architectural Heritage Baseline

Irish architecture is world-renowned for its Georgian period (1714 - 1830), during which many architectural masterpieces were constructed such as the Palladian-style Castletown House (1729) in County Kildare and Dublin's neo-classical Custom House (1791). Dublin's elegant Georgian townhouses, generous squares and leafy parks also come from this period. Many masterpieces can be found on the university campus of Trinity College Dublin, such as the Old Library (1712) and the Provost's House (1759). Irish architects also made important international contributions in the 18th and 19th centuries. In 1792 James Hoban (1758-1831) won the competition to design The White House for U.S. President George Washington.

One of Ireland's most famous architects from the early 20th century is Eileen Gray (1878 - 1976). A pioneer of the Modern Movement, Gray lived in Paris where she designed furniture as well as her house E1027 in Roquebrune-Cap-Martin. The National Museum of Ireland holds many of Gray's iconic furniture designs and architectural models. Today, the work of Irish architects is transforming cities all over the world – from Europe to China and South America where Grafton Architects' design for a new university campus in Lima won them a 'Silver Lion' at the 2012 Venice Architecture Biennale.

Architectural Heritage

As defined by the Heritage Act, 1995, 'architectural heritage' includes all structures, buildings, traditional and designed, and groups of buildings including streetscapes and urban vistas, which are of historical, archaeological, artistic, engineering, scientific, social or technical interest.

The National Inventory of Architectural Heritage (NIAH) is a state initiative under the administration of the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs and established on a statutory basis under the provisions of the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous ProA1visions) Act 1999. Refer to **Figure A21** in the Appendix.

The purpose of the NIAH is to identify, record, and evaluate the post-1700 architectural heritage of Ireland, uniformly and consistently as an aid in the protection and conservation of the built heritage. NIAH surveys provide the basis for the recommendations of the Minister for Arts, Heritage, Regional, Rural and Gaeltacht Affairs to the planning authorities for the inclusion of particular structures in their Record of Protected Structures (RPS).

4.8.3 Cultural Heritage Baseline

The cultural heritage of Ireland includes a wide array of monuments, objects, landscapes and structures that were produced by the inhabitants of Ireland over the last nine to ten thousand years. The Heritage Act 1995 defines the national heritage of Ireland as including monuments, archaeological objects, heritage objects, architectural heritage, flora, fauna, wildlife habitats, landscapes, seascapes, wrecks, geology, heritage gardens and parks and inland waterways.

When we exclude the natural heritage categories such as flora, fauna, wildlife habitats, seascapes, geology and the natural inland waterways (but not the engineered examples) we are left with: archaeological objects, heritage objects, architectural heritage, landscapes, wrecks, heritage gardens and parks and engineered inland waterways such as canals. Landscapes are included because the landscape of Ireland, since the arrival of people in the Mesolithic and especially since the Neolithic farming revolution, has been totally altered by people and is now a cultural artefact.

4.8.4 Key Issues

- The installation or development of gas network infrastructure, in particular linear infrastructure increases the potential to interact with known or previously unknown archaeological sites and features. Cumulatively, this results in negative impacts on the overall cultural heritage environment; and
- Continued development resulting from the unprecedented economic growth of the past decade and increasing population has increased pressure on sites or features of heritage interest.

4.9 Landscape and Visual

4.9.1 Baseline

Irish Topography

The island of Ireland consists of a large central lowland of limestone with a relief of hills and several coastal mountains. The mountain ridges of the south comprise old red sandstone separated by limestone river valleys. Elsewhere granite predominates, except in the north east which is covered by a basalt plateau. The central plain contains glacial deposits of clay and sand. It is interrupted by low hills and has large areas of bog and numerous lakes.

Landscape Character

Landscape character is a distinct and recognisable pattern of elements that occurs consistently in a particular type of landscape. Particular combinations of geology, landform, soils, vegetation, land use, field patterns and human settlement create character. Character makes each part of the landscape distinct and gives each its particular sense of place. Whether we value certain landscapes for their distinctiveness, or for other reasons, is a separate question.

Increasingly, it is recognised that the assessment of landscape character should also encompass coastal and seascape character, acknowledging the fact that the character of the coast and of marine areas affects the land and vice versa.

Irish Land Cover

CORINE is a pan-European land use and land cover (LULC) mapping programme and is the main source of national-scale LULC information.

The most recent LULC assessment in 2012 found that agriculture is the primary LULC type within Ireland (67% national land cover), followed by wetlands (16%) and forestry (9%).

The Irish landscape has experienced continual land cover changes for centuries, but there has been a relatively high rate of land use change by European standards since the early 1990s. For example, the area under forestry has by 2 per cent between 1990 and 2012. The area of wetlands has also reduced by 3% from 1990 to 2012. Artificial surfaces (residential and industrial buildings, roads etc.) increased by 1% between 1990 and 2012. Refer to **Figure A22** in the Appendix which illustrates the CORINE land-use classifications of Ireland.

4.9.2 Key Issues

The following issues will be considered during the plan preparation:

- Impacts of proposed developments or installations on designated protected landscapes, heritage landscapes and protected views;
- Impacts of proposed developments or installations on landscape character; and
- Impacts of proposed developments or installations on the ecological components of the landscape.

4.10 Material Assets

The term ‘Material Assets’ refers to all infrastructure and local services including; transportation, water supply, wastewater treatment and discharge, waste management services, and energy supply, etc.

4.10.1 Transportation

Roads

The total length of the national road network in Ireland is 5,306km. National primary roads comprise 2,649km in length and national secondary roads comprise 2,657km and motorways comprise 916km. Other road infrastructure is comprised of local roads, minor roads and unclassified urban roads. Transport Infrastructure Ireland (TII) operates, maintains and improves the national primary and secondary road network in Ireland, while local authorities manage the urban and remote sections of dual carriageway, regional and local roads.

Vehicular traffic is by far the most common mode of travel in Ireland. In 2017, the national vehicle fleet was made up of 2,675,879 vehicles consisting of the mix presented in **Table 4.2**. Private cars consist of the major share at 77% followed by goods vehicles at 13%. **Table 4.2** provides an overview of the national vehicle fleet.

Table 4.2: National Vehicle Fleet, at 31st December 2017 (DTTAS 2017).

Description	Number of Vehicles	Fleet Share (2016)
Private Cars	2,066,112	77%
Goods Vehicles	349,143	13%
Tractors & Machinery	89,366	3%
Motorcycles	39,873	2%
Other Vehicles	131,385	5%
All Vehicle Types	2,675,879	100%

Rail

There are over 2,400km of railway lines across Ireland, of which 17% is either disused or dismantled. Iarnród Éireann is responsible for maintenance of the heavy rail intercity and regional network, which is used for both passengers and freight. Transport Infrastructure Ireland is responsible for the light rail Luas networks based in Dublin.

Airports

There are 10 main airports across Ireland: Cork Airport, Donegal Airport, Dublin Airport, Weston Airport, Galway Airport, Kerry (Farranfore) Airport, Ireland West Airport Knock, Shannon Airport, Sligo Airport and Waterford Airport. Cork, Dublin and Shannon are international airports.

Seaports

Twenty commercial ports exist nationwide; international ports include Shannon Foynes, Cork, Dublin Port and Drogheda. In addition, there are 15 international ferry ports, 99 local ferry ports and 48 fishing ports.

Public Transport

The Luas has experienced consistent passenger growth since 2009, with provisional figures indicating that 34.6 million passengers used this service in 2015, which is 9.2 million higher than in 2009.

Bus vehicle kilometres increased by 39% from 1998 to 2008, before falling back by 10% from 2008 to 2012. The total kilometres operated remained constant between 2013 and 2014 at 163.6 million vehicle km, with a small decline in both Dublin Bus and Bus Éireann public service obligation (PSO) services balanced by a small increase in other services.

Cycling

The number of journeys on the Dublin Bikes scheme, which began operations in Dublin in 2009, increased from 1.2 million in 2010 to 4.1 million in 2015. There are now similar schemes in operation in Cork, Limerick and Galway. The number of journeys in 2015 was 289,426 in Cork, 40,118 in Limerick and 19,934 in Galway.

4.10.2 Water Supply

Irish Water is the national water utility, as set up in July 2013, under the Water Services Act 2013. Irish Water is responsible for the production, distribution and monitoring of drinking water from Ireland's public water supplies.

The breakdown of drinking water supply types in Ireland is displayed in **Table 4.3** below. There are 973 public water supplies, which is a relatively large number for our population, but is reflective of our dispersed settlement patterns.

Irish Water is responsible for the monitoring of public water supplies and Local Authorities are responsible for monitoring of group water schemes and regulated small private supplies. **Table 4.3** outlines the drinking water supply types in Ireland.

Table 4.3: Drinking Water Supply Types in Ireland (EPA 2016).

Supply Type	Supplier/Supplying	No. of Supplies	Population %	Supervisory Authority
Public Water Supplies	Irish Water	973	81.9	EPA
Public Group Schemes	Local Group	512	1.9	Local Authorities
Private Group Schemes	Local Group	421	4.2	Local Authorities
Small Private Supplies	Commercial/ Public Activity	1,758	0.9	Local Authorities
Exempted Supplies	Individual Supplier	170,000	11.1	Exempted

The EPA publishes an annual Public Supply Drinking Water Report and Private Supply Drinking Water Report, which provide an overview of the quality of drinking water in public and private supplies. The reports are based on the assessment of monitoring results reported to the EPA by Irish Water and the Local Authorities.

Results from the 2018 Public Supply Drinking Water Report show 99.9% compliance with microbiological standards and 99.6% compliance with chemical standards, based on over 124,000 sample results. However, a number of issues have been identified that need to be addressed. There was an increase in detections of the parasite Cryptosporidium, high levels of disinfection by-products were found in the sample results, there were persistent pesticide failures and there are a large numbers of lead pipe connections in properties.

Although these results show that the majority of public water supplies are safe, there are still a number of public water supplies which are in need of upgrade, replacement or improved operational control. As of January 2020, 52 public water supplies were listed on the Remedial Action List. These public water supplies collectively supply water to 1,128,847 customers.

The 2018 Private Supply Drinking Water Report (EPA, 2019) analysed the drinking water quality of public group schemes, private group schemes, and small private supplies. The results showed 100% compliance with microbiological standards for public group schemes, 95.4% compliance for private group schemes and 95.4% compliance for small private supplies.

4.10.3 Wastewater Treatment & Discharge

Irish Water operates a network of wastewater treatment plants across Ireland, as can be seen in **Figure 4.11**. Irish Water has sole responsibility for operating and maintaining the public sewer network. The wastewater treatment plants vary in size according to the population of the area they serve. Despite the variation in size, the processes used to treat wastewater are generally the same.

Figure 4.11: Irish Water, Wastewater Treatment Plants.

The EPA Report 'Urban Waste Water Treatment in 2018' provides an overview of urban waste water treatment in Ireland during 2018. It focuses on the most important issues that Irish Water needs to address to protect the Irish environment from the harmful effects of waste water discharges.

This report found that the number of priority areas where treatment needs to improve dropped from 132 to 120 in the past year. Improvements are needed at these 120 areas to eliminate raw sewage, prevent water pollution, protect freshwater pearl mussels, bathing waters and shellfish waters and meet EU standards. Treatment at 21 of the 169 large urban areas in Ireland failed to meet EU standards. These 21 areas produce over half of Ireland's urban waste water. Sewage from the equivalent of 77,000 people in 36 towns and villages is released into the environment every day without treatment.

4.10.4 Waste Management Services

Ireland's waste management practices, infrastructure and regulation have matured significantly over the last 20 years. This change has been driven by EU and national legislation, national policy and economic initiatives. Government policy focusses on waste as a resource and the virtual elimination of landfilling.

The current and future focus is on circular economy - preventing waste, reuse, maximising recycling and using waste as a fuel in replacement of fossil fuels: all elements of the strategy to boost competitiveness, foster sustainable economic growth and generate new jobs.

More residual waste is now used as a fuel (energy recovery) than disposed to landfill. Segregation and separate collection of food waste from households has been legislated for since 2013 and municipal waste recycling at composting and anaerobic digestion facilities has increased as a result. Ireland is reliant on export markets for the treatment of residual and recyclable and hazardous wastes.

Waste accepted at landfill dropped from 1.7 million in 2016 to 1 million in 2017. This reduction was due construction and demolition wastes being recovered rather than disposed. Municipal waste was the largest component of waste accepted at landfill in 2017.

In 2017 and 2018 five landfills accepted municipal waste, however in 2019 only three landfills accepted municipal waste. In 2016, more than half of municipal waste generated was either landfilled or incinerated to recover energy, only 41% was recycled. Municipal waste accepted at landfill decreased from over 744,000 tonnes in 2016 to approximately 685,000 tonnes in 2017.

4.10.5 Energy Supply

Energy use in Ireland increased by 0.5% in 2017, while the gross domestic product (GDP) grew by 7.2% and gross national income (GNI) grew by 3%.

Indigenous energy production in Ireland reached a new record of 4,909 ktoe in 2017, driven by natural gas production from the Corrib gas field and to a lesser extent by increased renewables.

As can be seen below in **Figure 4.12**, the increase in indigenous energy production at Corrib has reduced Ireland's energy import dependency from 88% in 2015 to 66% in 2017.

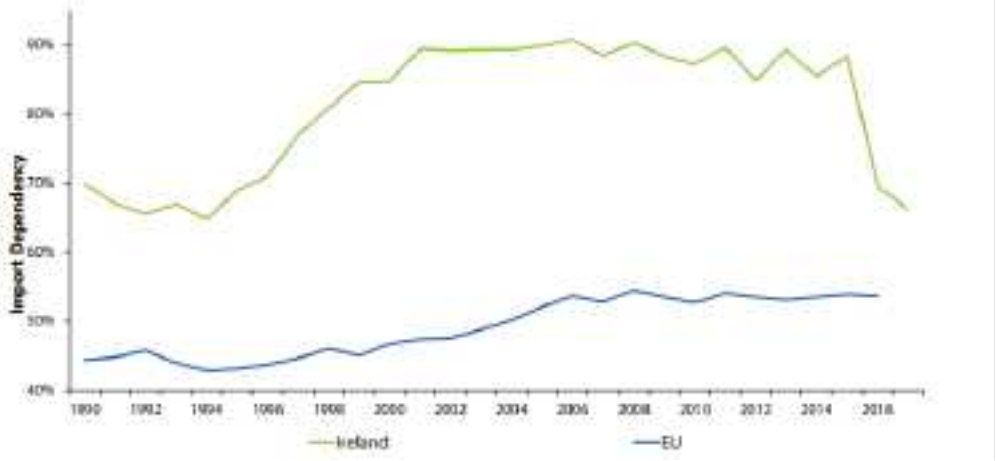

Figure 4.12: Import Dependency of Ireland and EU Average 1990 - 2016 (SEAI 2018)

After Corrib became operational, indigenous gas production met over 55% of Ireland's gas needs. Prior to that, over 95% of Ireland's natural gas needs were imported, via the two gas interconnectors from Great Britain.

Final energy use increased in all sectors with the exception of the residential sector. Transport continues to dominate as the largest energy-consuming sector, with a 43% share of final consumption. Transport energy use increased by 2%. Industrial energy use increased by 3.4% driven by a 7.6% increase in output as measured by value added. Residential energy use fell by 2.9%, however when adjusted for weather, it actually increased by 0.2%. Final energy use in the commercial and public services sector increased by 4.2%, however on a weather corrected basis the increase was 7.4%.

Final consumption of electricity increased by 1.1% to 26 TWh. At the same time, there was a 1.1% reduction in the fuels used in electricity generation. Renewable electricity generation accounted for 30.1% of gross electricity consumption. Wind generation account for 25.2% of the electricity generated making it the second largest source of electricity generation after natural gas.

4.10.6 Key Issues

The following issues will require consideration during the plan preparation:

- As the population increases and the economy grows, the demand on energy will increase;
- Increased urbanisation will result in population clusters and resulting disproportionate demands on energy infrastructure and consumption;
- Continuity of supply re. availability of resources and increased demand;
- Transition to low-carbon economy, including the injection of Biomethane into the Natural Gas Grid in Ireland;

- Achievement of a sustainable balance between public and private transport modes during the construction phase of planned developments;
- Ensuring the construction or operation of developments do not negatively impact drinking water supply; and
- Reduction waste production during the construction stages, recovering and reusing wastes rather than landfill.

4.11 Sensitivity Mapping

In order to identify where most sensitivities within the Country occur, a number of the environmental sensitivities described above were weighted and mapped overlapping each other. The weighting system applied is adopted from the EPA report 'GISEA Manual Improving the Evidence Base in SEA', as follows:

- High Population Density: 10 points;
- Areas of High Radon Levels: 10 points;
- SACs and SPAs: 10 points;
- NHAS: 10 points;
- pNHAs: 5 points;
- Soils Peat and River Alluvium: 10 points;
- Protected Structures: 10 points;
- Recorded Monuments: 10 points;
- Geological Heritage Areas: 10 points;
- Surface Water Status Bad and Poor: 10 points;
- Surface Water Status Moderate, Good and High: 5 points;
- Ground Water Status Bad and Poor: 10 points;
- Ground Water Status Moderate, Good and High: 5 points;
- GSI Inner Source Protection Areas: 10 points;
- GSI Outer Source Protection Areas: 5 points;
- Groundwater Vulnerability Extreme or Rock: 10 points;
- Groundwater Vulnerability High: 5 points; and
- Groundwater Vulnerability Moderate or Low: 0 points.

The scores for each are added together in order to determine overall vulnerability as shown in **Table 4.4** below.

Table 4.4: Environmental Sensitivity Overlay Mapping Vulnerability Classes

Overlay Results	Category
0-5	No sensitivity (i.e. areas without any environmentally sensitive features)
10-15	Low-sensitivity areas
20-25	Moderate-sensitivity areas
30-35	Elevated-sensitivity areas
40-45	High-sensitivity areas
50-60	Extreme-sensitivity areas
>65	Acute-sensitivity areas (i.e. severe sensitivity due to a significant number of overlapping environmental aspects and a clear likelihood of cumulative effects)

This classification assumes that the sensitivity of an area increases significantly when two or more highly sensitive environmental factors overlap. A score of 5 represents one sensitive environmental factor occurring. A score of 10 indicates two sensitive or one highly sensitive factor; a score of 20 encompasses four sensitive, two highly sensitive or one highly sensitive and two sensitive environmental factors, and so on. In light of this categorisation, each pixel reflects a sensitivity score which determines the relative sensitivity to impact of those lands.

Refer to **Figure A23** in the Appendix for the environmental sensitivity of Ireland.

The outcome of sensitivity overlay mapping will be used to inform the Draft Plan.

SCOPING QUESTION NO. 2
Are there any other significant environmental issues that should be considered?

SCOPING QUESTION NO. 3
Are there any environmental issues that should be scoped out of the SEA at this stage?

5 Environmental Objectives, Indicators and Targets

5.1 Introduction

The preceding sections have outlined the key environmental issues relating to the Draft NIP and outlines relevant plans and programmes which are likely to affect or be affected by the same. Based on that information a series of draft SEA objectives, indicators and associated targets have been developed as set out below.

5.2 Draft Objectives and Targets

A range of draft environmental objectives have been established for the Draft NIP and accompanying SEA. The draft objectives take into account the findings of the "Environmental Challenges and Emerging Issues for Ireland" as set out in Chapter 13 of EPA Ireland's Environment 2016 (EPA, 2016). The draft objectives are outlined in **Table 5.1** along with a preliminary list of targets.

Table 5.1: Draft Objectives and Targets

Draft Objectives	Draft Targets
Biodiversity	
Protect, conserve, enhance where possible and avoid loss of diversity and integrity of the broad range of habitats, species and wildlife corridors. To achieve the conservation objectives of European Sites (SACs and SPAs) and other sites of nature conservation. Conserve and protect other sites of nature conservation including NHAs, pNHAs, National Parks, Nature Reserves, Wildfowl Sanctuaries as well as protected species outside these areas as covered by the Wildlife Act. To minimise and, where possible, eliminate threats to biodiversity including invasive species.	Siting of development of infrastructure installation on non-sensitive sites. Maintenance of favourable conservation status for all habitats and species protected under the Habitat Directive. No loss of protected habitats and species during the lifetime of the Plan. Improve/maintain protection for protected sites and species. Improve/maintain protection for important wildlife sites, particularly urban wildlife corridors. Prevent the introduction of new invasive or alien species. Control/ manage new invasive species. Ensure new development is set back from rivers.
Population and Human Health	
Protect, enhance and improve people's quality of life through energy provision.	Minimise population exposure to high levels of noise, vibration and air pollution.

Draft Objectives	Draft Targets
Protect human health from hazards or nuisances arising from incompatible development. Provide all of the energy services required to sustainably meet future housing demands.	No significant deterioration in human health as a result of environmental factors. No spatial concentrations of health problems arising from environmental factors. Maintenance of gas supply to meet the energy needs of the population, while commencing a shift towards renewable energy use.
Land & Soil	
Minimise the excavation and movement of soils within site works. Minimise the consumption of non-renewable deposits on site. Minimise the amount of waste to landfill from site. Conserve, protect and avoid loss of diversity and integrity of designated habitats, geological features, species or their sustaining resources in designated ecological sites.	Prevent pollution of soil through adoption of appropriate environmental protection procedures during construction, installation and maintenance works on site. No incidences of soil contamination. Ensure appropriate management of existing contaminated soil in accordance with the requirements of current waste legislation. Limit the amount of excavation in sensitive locations for example peat excavation in wind farm sites. Minimise the consumption of non-renewable sand, gravel and rock deposits. Preference for development on brownfield site over green field.
Water	
Maintain or improve the quality of surface water and groundwater (including estuarine) to status objectives as set out in the Water Framework Directive (WFD). Implement appropriate sustainable drainage systems (SuDS) in the County. Reduce the impact of polluting substances to all waters and prevent pollution and contamination of ground water by adhering to aquifer protection plans and to maintain and improve the quality of drinking water supplies. Protect and enhance the status of aquatic ecosystems.	Support the achievement of "good" ecological and chemical status/potential of waterbodies by 2015 in accordance with the Water Framework Directive. Demonstrate an on-going status improvement and an upward trend in water quality. Minimise flood risk through appropriate management of flood vulnerable zones. Promote sustainable drainage practices to improve water quality and flow. Maintain water quality, no pollution or contamination issues in our rivers and lakes.

Draft Objectives	Draft Targets
Promote sustainable water use and water conservation in the plan area and to maintain and improve the quality of drinking water supplies. Protect flood plains and areas of flood risk from development through avoidance, mitigation and adaptation measures.	
Air & Noise	
Protection of ambient environment through the implementation of European, national and regional policy and legislation relating to air quality, greenhouse gases, climate change, light pollution noise pollution and waste management.	Maintain ambient air quality. Minimise air and noise emissions during construction and operation of new developments.
Climate and Resilience	
Comply with relevant national climate change targets e.g. Ireland's Climate Action and Low Carbon Development Act 2015, the and EU 2030 and 2050 Emissions and Renewable Energy Targets and the Paris Agreement Targets.	Achieve a reduction in greenhouse gas emissions. Increase the amount of gas from renewable sources that is introduced to the network. Growth in the level of fuel switching from high-carbon fuels to gas, in both heating and transport. Promote minimisation of greenhouse gas emissions to the atmosphere. To achieve a 30% reduction on GHG emission levels (compared with 2005 levels) by 2050.
Archaeological, Architectural and Cultural Heritage	
Promote the protection and conservation of archaeological, architectural and cultural heritage, specifically those buildings identified on the Record of Protected Structures, and Recorded Monuments in Ireland.	Maintenance and enhancement of archaeological heritage- including entries to the Record of Monuments and Places and unknown archaeology- and the context of the above within the surrounding landscape where relevant. Maintenance and enhancement of entries to the Record of Protected Structures and/or their context within the surrounding landscape where relevant.
Landscape and Visual	

Draft Objectives	Draft Targets
Ensure no significant disruption of historic/cultural landscapes and features. Ensure no significant visual impact from developments/installations. Ensure no significant disruption of high landscape values.	Improve protection for landscapes of recognised quality. Ensure development and infrastructure installations are sensitive to its surroundings. Ensure no significant disruption of historic/cultural landscapes and features.
Material Assets	
Make best use of existing infrastructure and phase the significant future growth of Ireland in line with the capacity and delivery of the sustainable development of new physical infrastructure. Promote use of renewable energy sources and support energy conservation initiatives including the development of low carbon business practices and buildings. Minimise effects upon the existing and planned infrastructure.	High levels of energy demand growth are accommodated. Secure and competitive supplied of gas and are maintained. Increase in renewable energy developments. To achieve a 30% reduction on GHG emission levels (compared with 2005 levels) by 2050. Improve efficiencies of energy infrastructure.

5.2.1 Draft SEA Indicators

An array of SEA Indicators will be further developed during compilation of the environmental baseline. Preliminary draft indicators are highlighted in **Table 5.2.**

Table 5.2: Draft SEA Indicators

Item	Draft SEA Indicator
Biodiversity	• Number and extent of Designated Sites; • Achievement of favourable conservation status of designated sites; • Population and range of Designated Species; and • Achievement of the Objectives of Biodiversity Plans and County Development Plans.
Population & Health	• Census population data; • % increase in housing (number and type); and • Improved trends in perceived health status.
Land & Soil	• Incidences of soil contamination; • Rates of re-use/recycling of construction waste; • Rates of brownfield site and contaminated land reuse and development; and • Rates of greenfield development.

Item	Draft SEA Indicator
Water Resources	• Compliance of surface waters with national and international standards; • Achievement of the Objectives of the River Basin Management Plan; • Amount of new developments within flood plains; • Level and location of flooding; and • Annual costs of damage related to flood events.
Air & Noise	• Air quality indicators- National and region-specific emission data; and • Compliance with national standards.
Climate Change & Resilience	• Levels of greenhouse gas emissions; • Number of energy/renewable energy production facilities; and • Rates of energy/renewable energy consumption.
Heritage	• Achieving the objectives of development plans regarding heritage protection; and • Range and extent of areas of heritage potential.
Landscape & Visual	• Range and extent of Amenity Landscapes; • Rates of development within designated landscapes; • Rates of urban expansion; and • % change of land use from rural to urban.
Material Assets	• Location/level of infrastructure; • Achievement of development plan objectives; and • No. of renewable energy developments granted planning permission.

SCOPING QUESTION NO. 4
Do you have any comments regarding the draft SEA environmental objectives, targets or indicators?

6 What Happens Next?

6.1 Introduction

Throughout this document, a range of questions have been posed for comment.

All responses to these questions will be assessed and will be used by the SEA team to refine and develop the Environmental Report and SEA Statement. Responding to these questions will allow the SEA team to address any issues or concerns that have been raised during the scoping process.

An Environmental Report will be produced incorporating the comments received and the inputs from all scoping responses. This report will identify all pertinent environmental objectives to comply with a range of legislation, plans and programmes that must be addressed by the SEA in order to contribute to the sustainable socio-economic development and protection of the environment of the NIP.

6.2 Statutory Consultation

Article 13A(4)(a) of S.I. 201 of 2011 sets out the five government bodies which must be consulted in relation to scoping of the Strategic Environmental Assessment as follows:

"*Where, following consideration under sub-article (2), a determination under sub-article (3) has not been made by the planning authority, the authority shall give notice in accordance with paragraph (b) to the following environmental authorities and planning authorities: –*

(i) the Environmental Protection Agency;

(ii) the Minister for the Environment, Community and Local Government;

(iii) where it appears to the planning authority that the plan or programme or modification of the plan or programme, might have significant effects on fisheries or the marine environment, the Minister for Agriculture, Marine and Food, and the Minister for Communications, Marine and Natural Resources;

(iv) where is appears to the competent authority that the plan or programme or amendment to a plan or programme, might have significant effects in relation to the architectural or archaeological heritage or to nature conservation, the Minister for Arts, Heritage and Gaeltacht Affairs; and

(v) any adjoining planning authority whose area is contiguous to the area of a planning authority which prepared a draft plan, proposed variation or local area plan."

A copy of this scoping document will be forwarded to the relevant environmental authorities and planning authorities and the responses will be incorporated into the Environmental Report.

References

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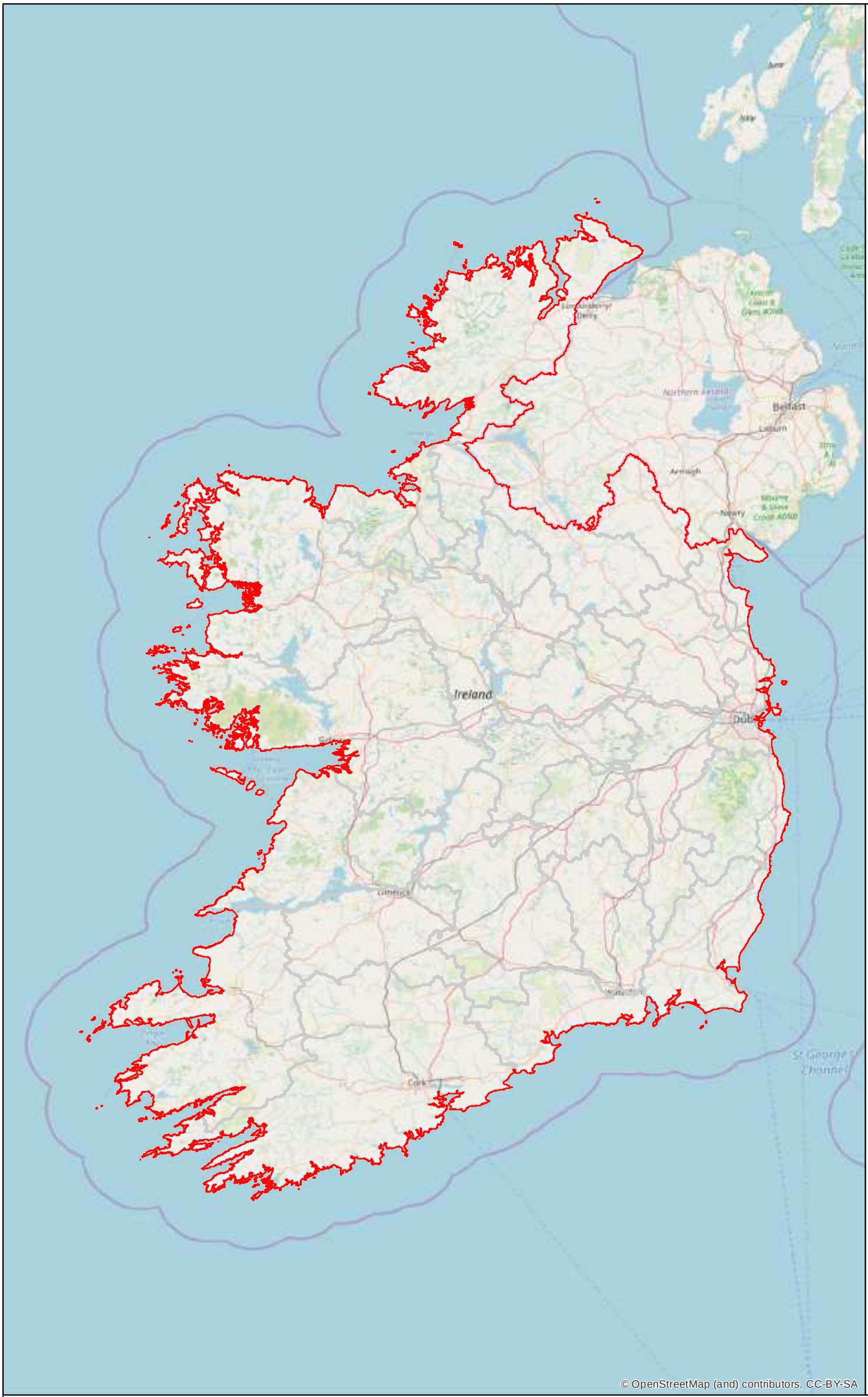
Appendix

GIS Figures



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Issue	Date	By	Chkd	Appd
	27/03/2020	RD		

Project Title
Gas Networks Ireland - Network Implementation Plan

Scale
1:1,750,000

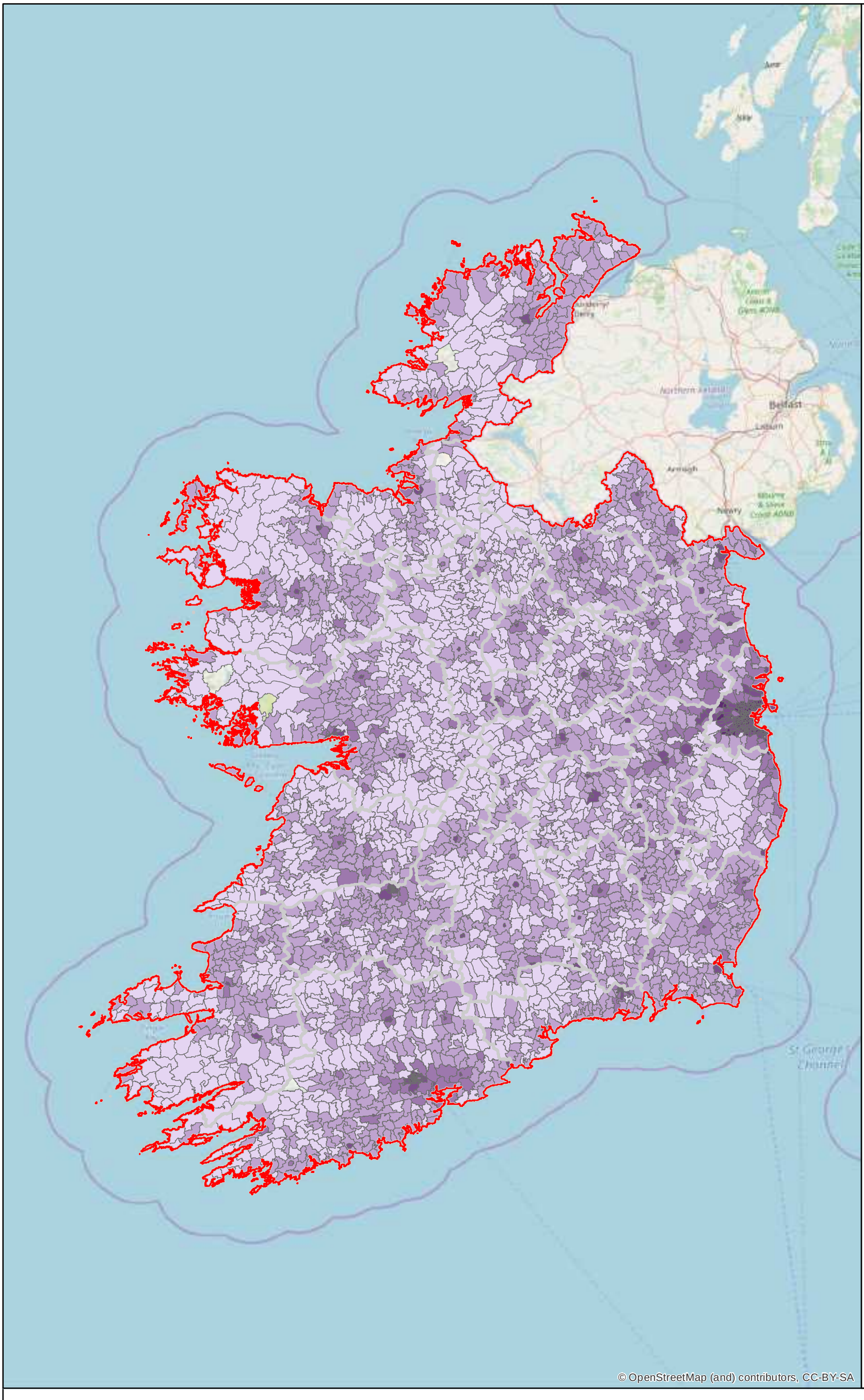
Date

Drawing Title
Study Area

Drawing Status

Figure No.
Fig A1

Issue



Legend

Republic of Ireland Boundary

County Boundaries

Population Density (km2)

- 0.557267 - 20.449346
- 20.449347 - 130.316452
- 130.316453 - 737.129882
- 737.129883 - 4088.656585
- 4088.656586 - 22599.669509

Kilometers

0 12.5 25 50

Irish Transverse Mercator
EPSG: 2157

Client

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	27/03/2020	RD		

Project Title: Gas Networks Ireland - Network Implementation Plan

Scale: 1:1,750,000

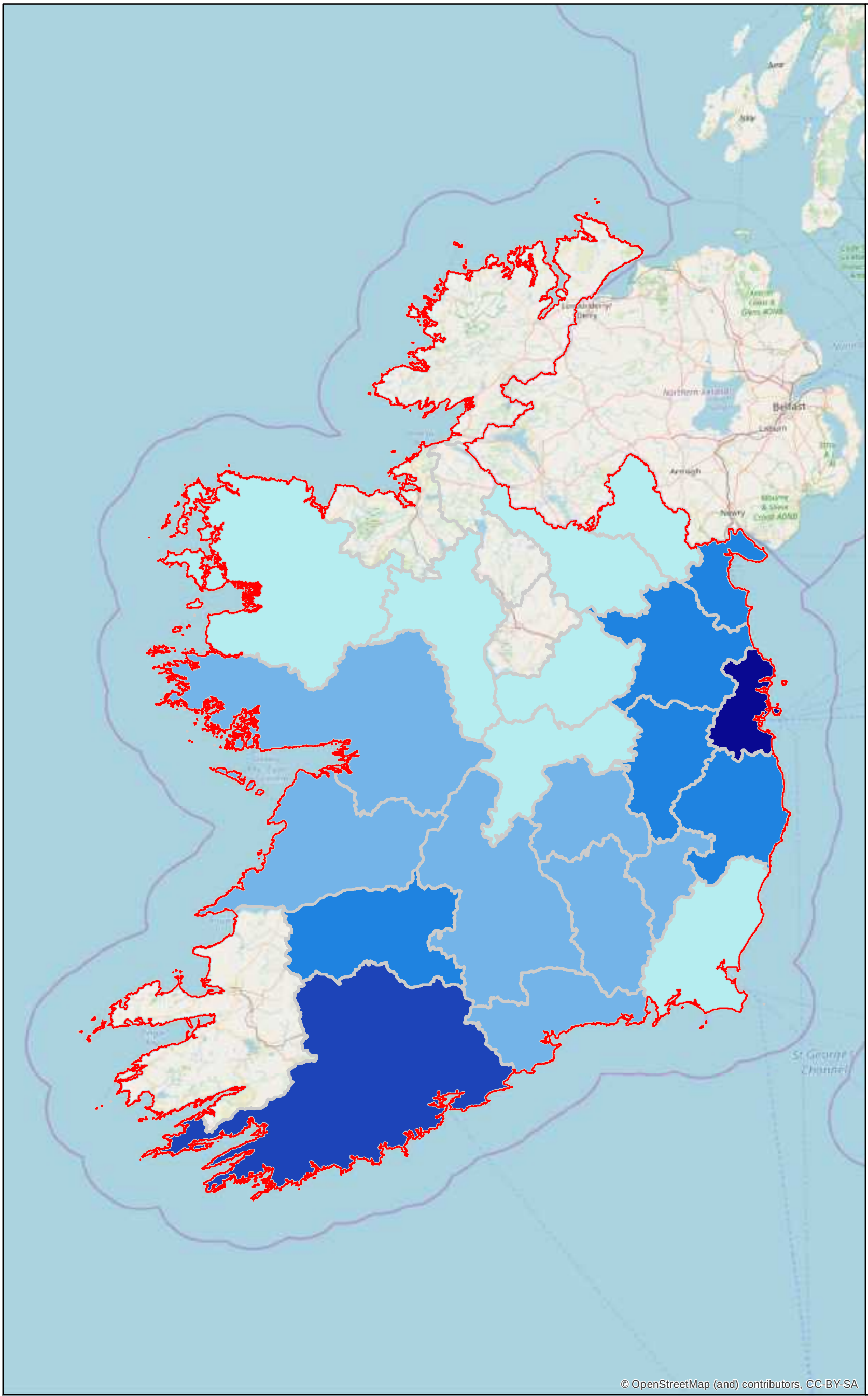
Date:

Drawing Title: Population Density

Drawing Status:

Figure No.: Fig A2

Issue:



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Issue	Date	By	Chkd	Appd
	27/03/2020	RD		

Project Title
Gas Networks Ireland - Network Implementation Plan

Drawing Title
Gas Consumption - Residential

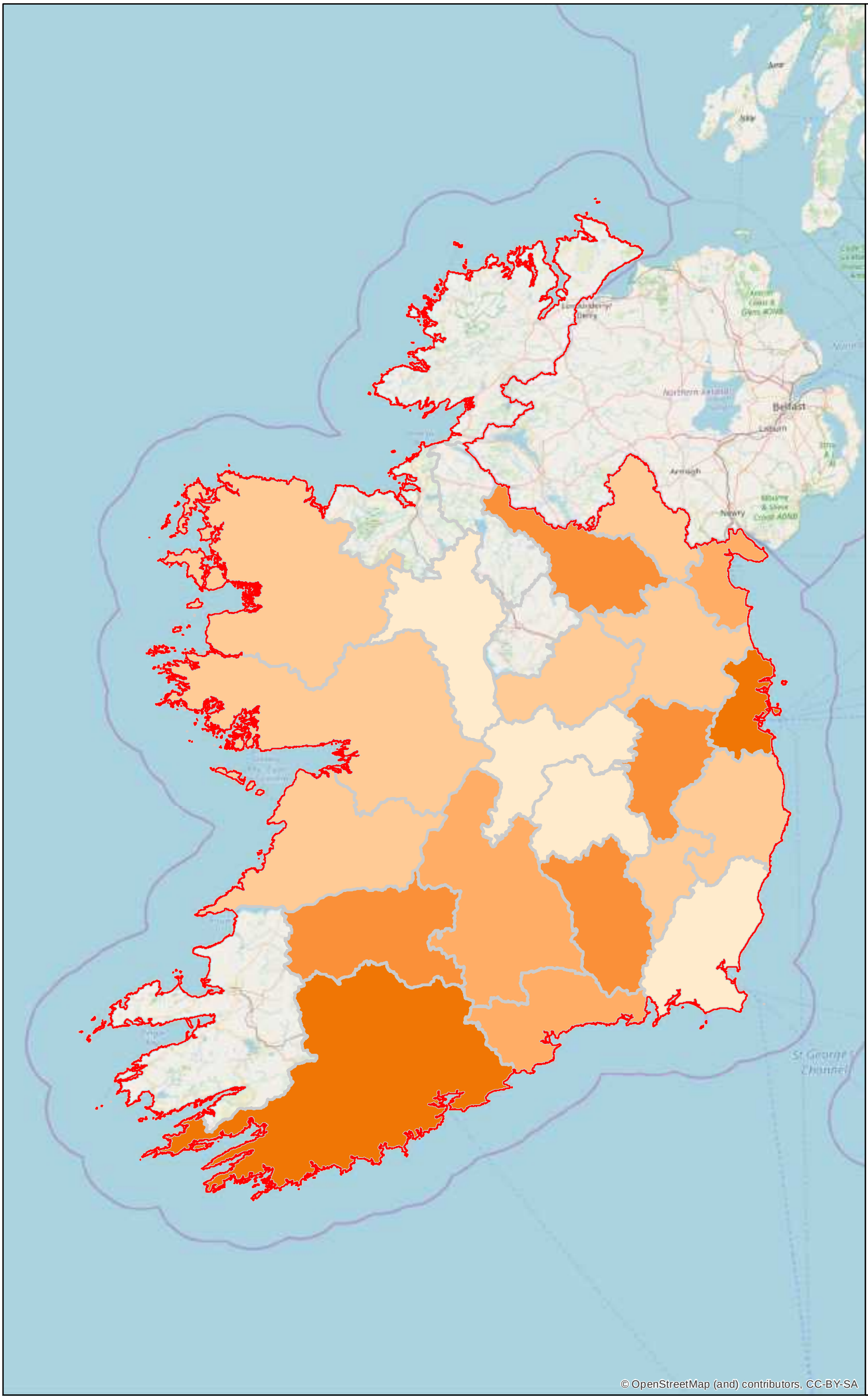
Scale
1:1,750,000

Drawing Status

Date

Figure No.
Fig A3

Issue



Legend

Republic of Ireland Boundary

County Boundaries

2016 Consumption (GWh)

- 0 - 83
- 84 - 290
- 291 - 479
- 480 - 799
- 800 - 4040

Kilometers

0 12.5 25 50

Irish Transverse Mercator
EPSG: 2157

Client

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Issue	Date	By	Chkd	Appd
	27/03/2020	RD		

Project Title: Gas Networks Ireland - Network Implementation Plan

Drawing Title: Gas Consumption - Non-Residential

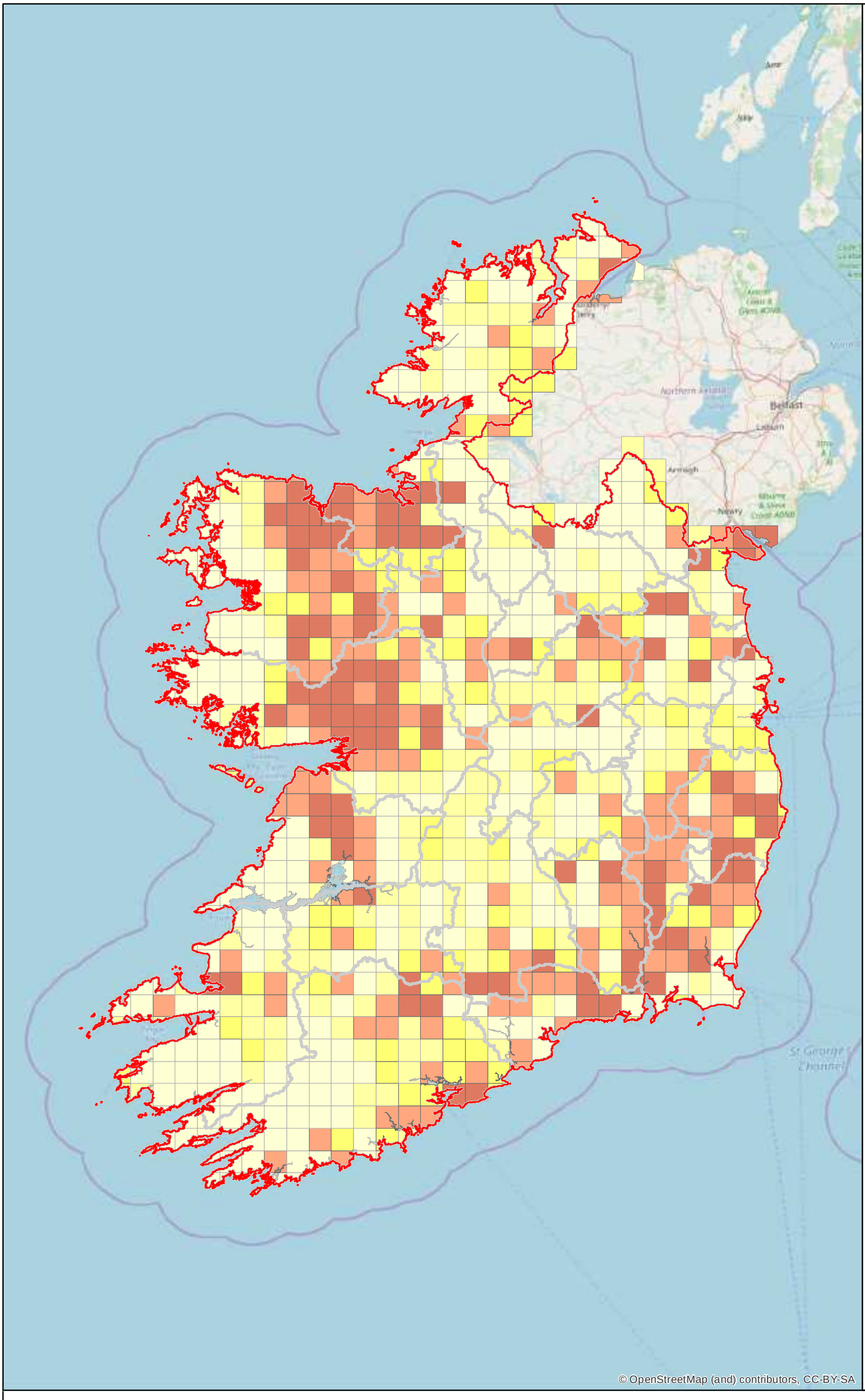
Scale: 1:1,750,000

Drawing Status:

Date:

Figure No.: Fig A4

Issue:



Legend

Republic of Ireland Boundary

County Boundaries

Radon Levels

- < 1%
- 1% - 5%
- 5% - 10%
- 10% - 20%
- > 20%

Kilometers

0 12.5 25 50

Irish Transverse Mercator
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	27/03/2020	RD		

Project Title: Gas Networks Ireland - Network Implementation Plan

Scale: 1:1,750,000

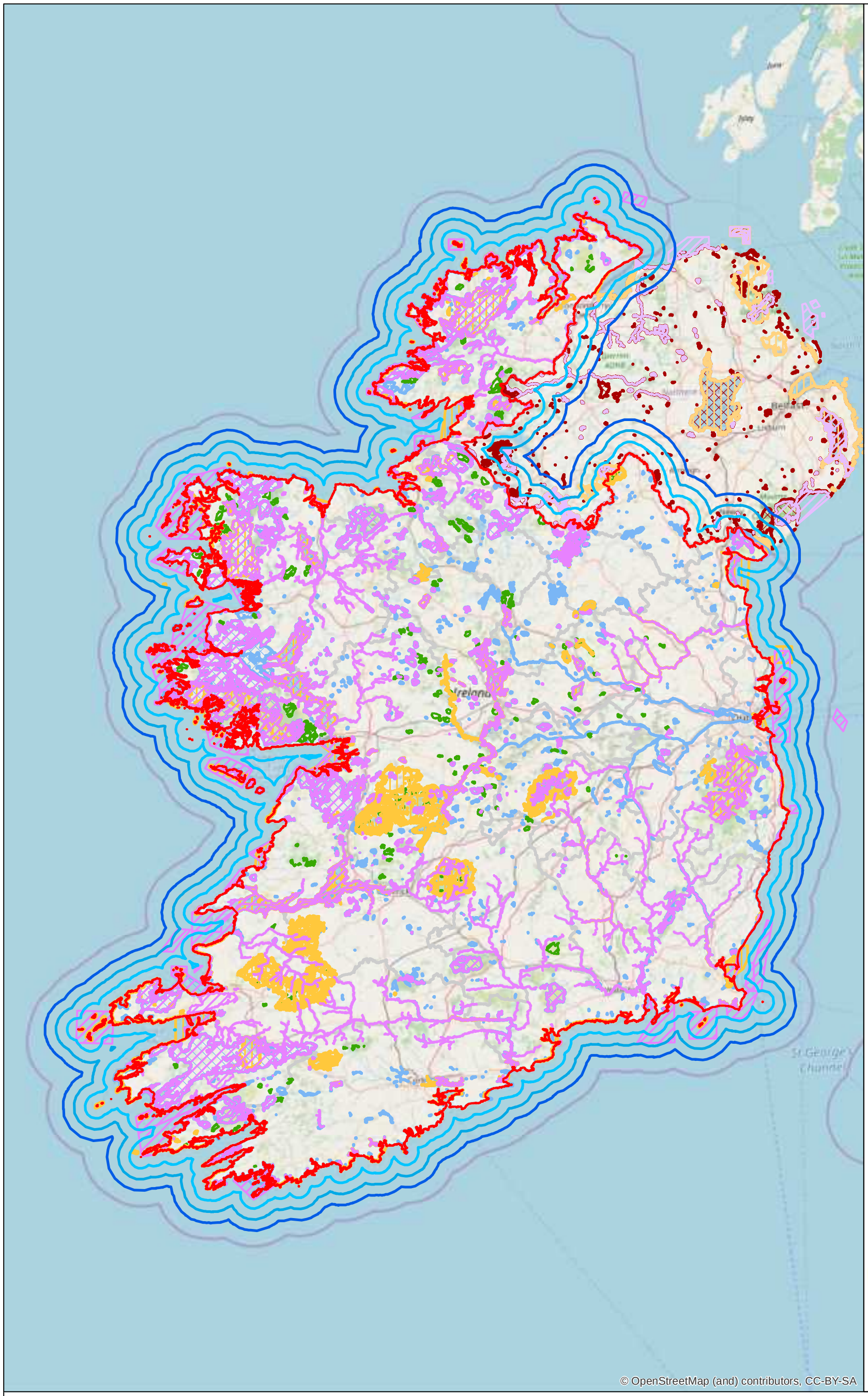
Date:

Drawing Title: Radon Levels

Drawing Status:

Figure No.: Fig A5

Issue:



Legend

- Republic of Ireland
- 15km Buffer
- 10km Buffer
- 5km Buffer
- Special Areas of Conservation (SAC)
- Special Protection Areas (SPA)
- Natural Heritage Area (NHA)
- Proposed National Heritage Areas (pNHA)
- Special Area of Conservation (NI)
- Special Protection Area (NI)
- Area of Special Scientific Interest

County Boundaries

Kilometers
0 12.5 25 50

Irish Transverse Mercator
EPSG: 2157

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Issue	Date	By	Chkd	Appd
	27/03/2020	RD		

Project Title
Gas Networks Ireland - Network Implementation Plan

Scale
1:1,750,000

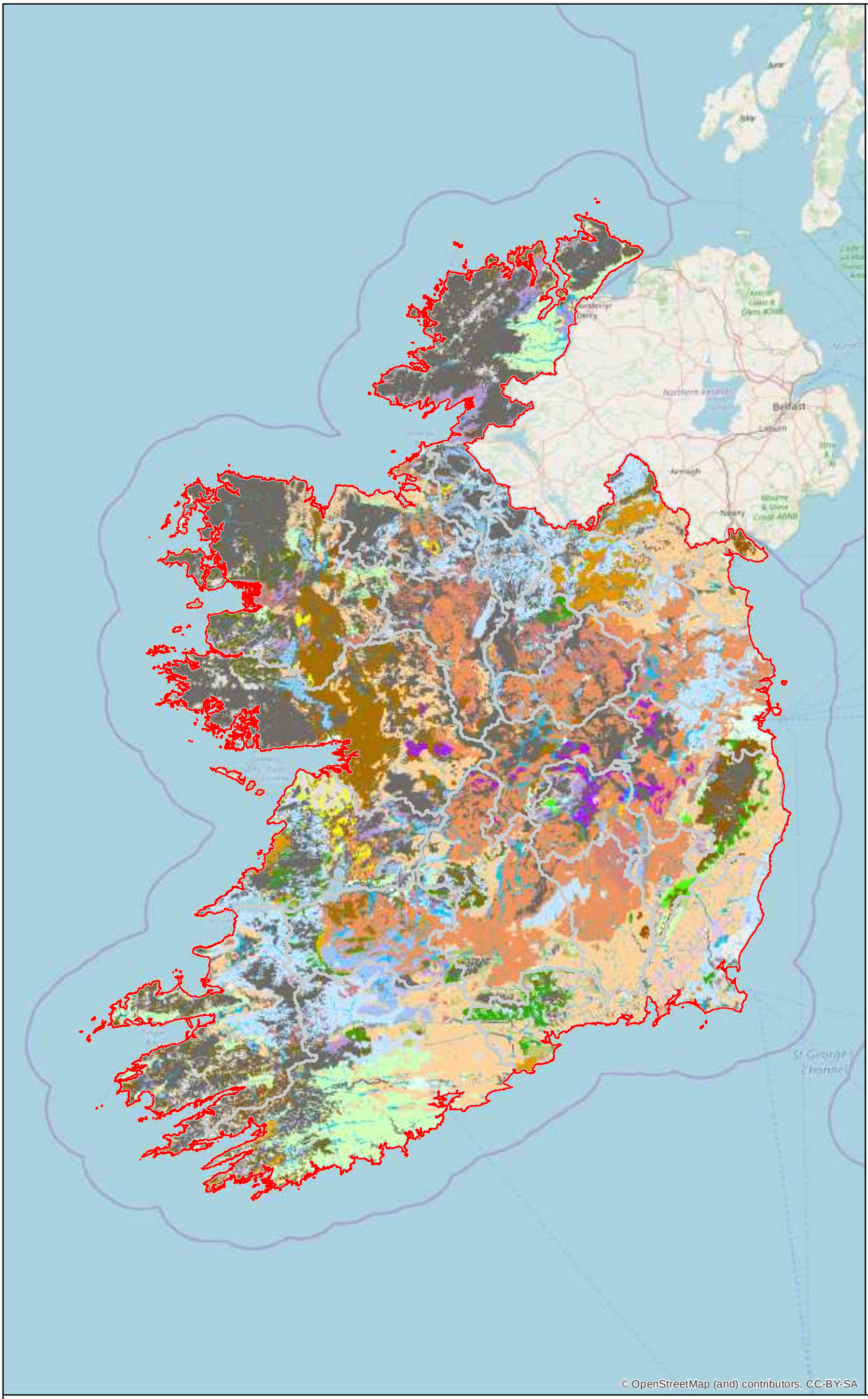
Date

Drawing Title
Ecological Designated Sites (including Natura 2000 sites)

Drawing Status

Figure No.
Fig A6

Issue



Legend

Republic of Ireland Boundary

County Boundaries

Soils (ISIS)

- 0360a - Burren
- 0360c - Crush
- 0410a - Carrigvahanagh
- 0410b - Bantry
- 05LAK - Lake
- 05MAR - Marine
- 05RIV - River
- 0600a - Kilpierce
- 0650a - Mylerstown
- 0660c - Puckane
- 0660d - Puckane
- 0660e - Ballywilliam
- 0700a - Macamore
- 0700b - Kilrush
- 0700c - Drumkeeran
- 0700d - Straffan
- 0700f - Newport
- 0700h - Kilrush
- 0760a - Gortaclareen
- 0760c - Howardstown
- 0760e - Ballinamore
- 0760f - Driminidy
- 0800a - Black Rock Mountain
- 0800c - Ballycondon
- 0843b - Knockastanna
- 0843e - Glenary
- 0843f - Glenary
- 0900a - Cooga
- 0900b - Kiltealy
- 0900e - Ross Carbery
- 0900f - Clonin
- 0900g - Cupidstownhill
- 0900h - NBP4
- 0920a - Clonegall
- 0960c - Borrisoleigh
- 0960d - Knockaceol
- 0960e - Knockboy
- Beach/Sand dune
- 1000a - Elton
- 1000c - Elton
- 1000g - Elton
- 1000x - Elton
- 1030a - Crosstown
- 1030b - Rathowen
- 1100a - Clonroche
- 1100c - Clashmore
- 1100d - Ballyvorheen
- 1100e - Ballylanders
- 1100h - Borris
- 1100l - Kennycourt
- 1100m - Kill
- 1100n - Clashmore
- 1100q - Mullabane
- 1100s - Broomhill
- 1130a - Moord
- 1130b - Duarrigle
- 1150a - Baggotstown
- 1150b - Ballincurra
- 1150c - Faoldroim
- 1160a - Ashgrove
- 1160c - Schull
- 1xx - Peat
- Island
- Rock
- Salt marsh
- Tidal marsh
- Urban
- Water body

Kilometers
0 12.5 25 50

Irish Transverse Mercator
EPSG: 2157

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	27/03/2020			

Project Title: Gas Networks Ireland - Network Implementation Plan

Scale: 1:1,750,000

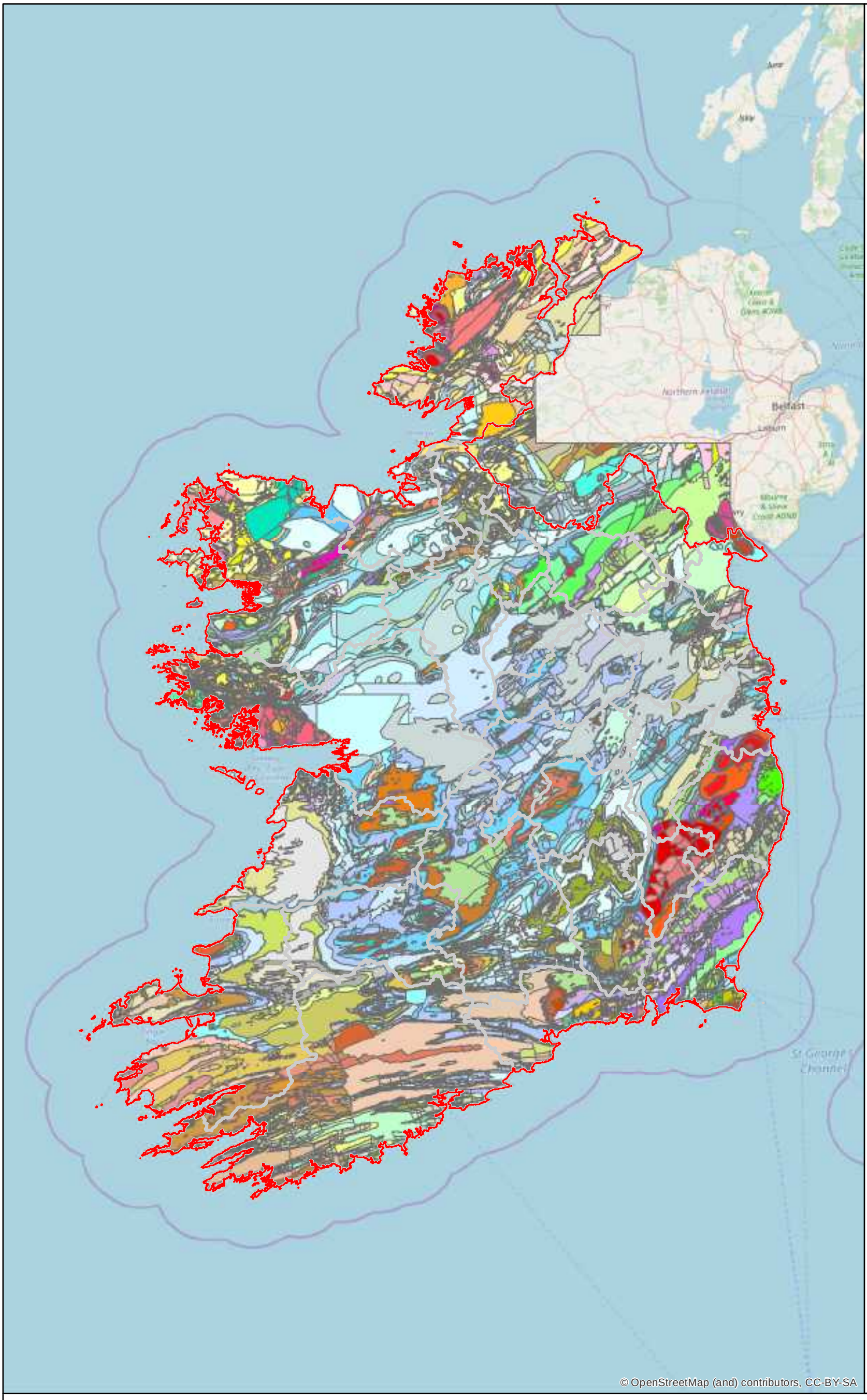
Date

Drawing Title: Soils

Drawing Status

Figure No.: Fig A7

Issue



Legend

Republic of Ireland Boundary

County Boundaries

Complete legend for bedrock geology can be seen overleaf

Kilometers

0 12.5 25 50

Irish Transverse Mercator
EPSG: 2157

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Issue	Date	By	Chkd	Appd
	27/03/2020	RD		

Project Title: Gas Networks Ireland - Network Implementation Plan

Scale: 1:1,750,000

Date:

Drawing Title: Bedrock Geology

Drawing Status:

Figure No.: Fig A8

Issue:

Legend

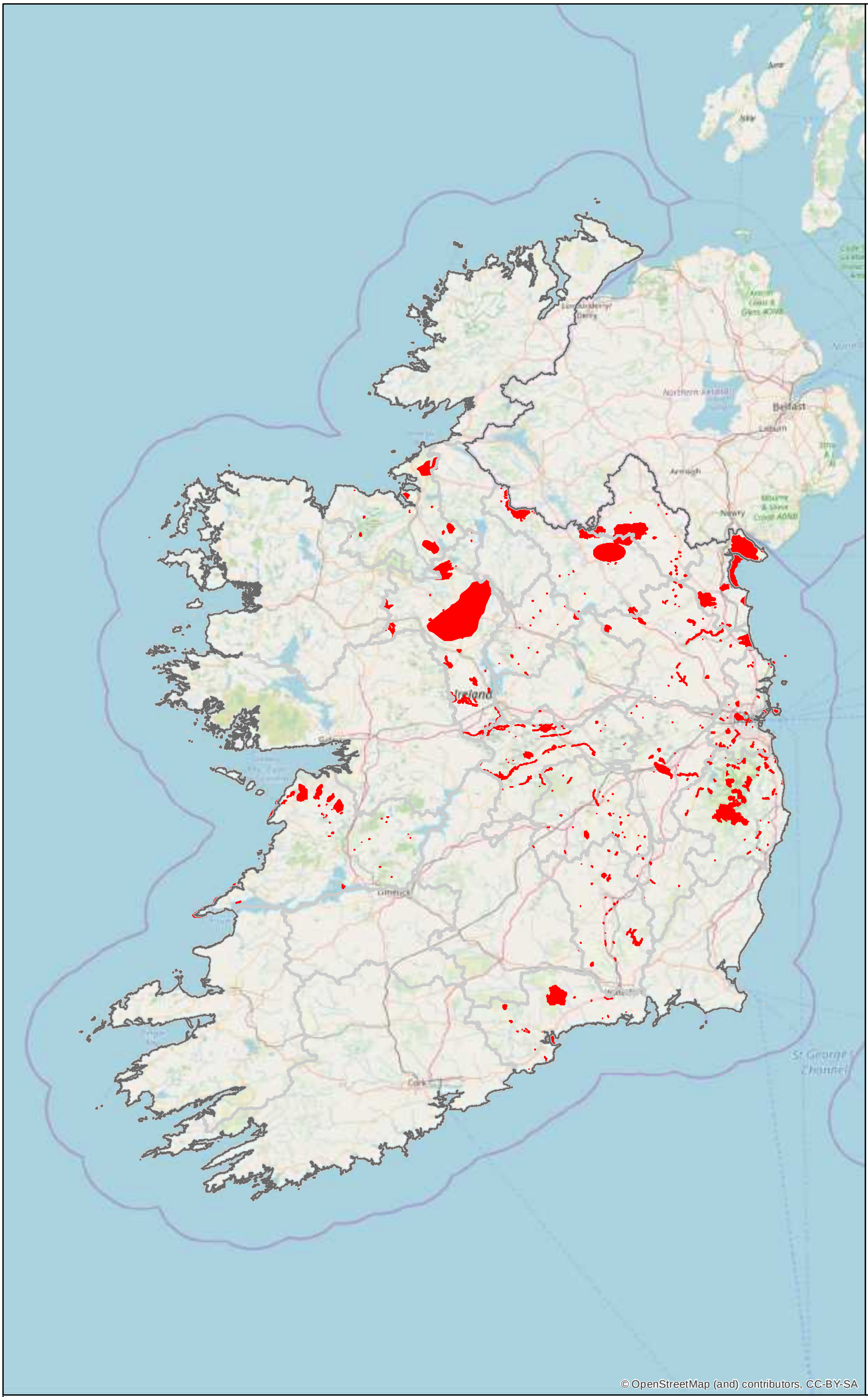
Republic of Ireland Boundary

County Boundaries

Bedrock Geology

<all other values>
Kilmore Formation
Achill Head Formation
Addergoole River Formation
Aghyaran & Killygordon Limestone Fo
Lifford Volcanic Member
Marble unit
Aghaward Formation
Aghamore Formation
Altan Limestone Formation
Old Road Member
Annagh Division (undifferentiated)
Ards Pelite Formation
Ards Quartzite Formation
Ardvarney Formation
Arva Granodiorite
Balbriggan Formation
Bangor/Corslieve Formation
Carrafull Member
Owenmore Member
Ballycong Limestone Formation
Belcamp Formation
Belderg Formation
Bellagarvaun Formation
Benmore Formation\ Broad Haven Form
Benmore Formation
Ballybeg Park Limestone Formation
Boultypatrick (Grit) Formation
Briska Boulder Bed Formation
Bangor Church Banded Member
Bangor Reservoir Dolomitic Schist M
Broad Haven Formation
Broomfield Formation
Brittstown Formation
Ballyhean Formation
Bryanstown Formation
Derravaragh Cherts
Liscarton Formation
Meath Formation
Stackallan Member
Moathill Formation
Ardenagh Formation
BALLYCOGLY GROUP
Blackhall Formation
Booley Bay Formation
Bray Head Formation
in Bray Head Formation
Bray Group
Cahore House Formation
Cahore Point Formation
Cullentra Formation
Cross Lake Formation
Cullenstown Formation
Devils Glen Formation
in Devils Glen Formation
Drumleck Formation
Elsinore Formation
Glascarrig Formation
Gaskins Leap Formation
Hippy Hole Formation
Kiln Bay Formation
Newtown Formation
Polldarrig Formation
Ballynacarrig Member
Pipers Gut Formation
Carnes Formation
Roney Formation
Carrysalia Formation
Shelmaliere Formation
Ardnasillagh Formation
Aghmacart Formation
Aughnanure Oolite Formation
Aille Limestone Formation
Aille and Barney Fms (undifferentia
Westport Oolite
Allenwood Formation
Armagh Group
Athassel Limestone Formation
Basal clastics
Ballyadams Formation
in Ballyadams Formation
Ballysteen Formation
Bullockpark Bay Member
in Bullockpark Bay Member
Lisduff Oolite Member
Ballynash Member
in Ballysteen Formation
in Ballysteen Formation
Ballina Limestone Formation (Lower)
Ballina Limestone Formation (Upper)
Banagher Sandstone Formation
Basal Beds
Ballycar Formation
Doobally Sandstone
Bellavally Shale Formation
Benbulben Shale Formation
Ballyglasheen Oolite Formation
Ballymore Limestone Formation
Ballymartin Formation
Borrisokane Formation
Boston Hill Formation
Boyne Formation
Ardmulchan Member
Beauparc Member
Kiln Hill Member
Bricklieve Limestone Formation
Bricklieve Limestone Formation (lower)
in Bricklieve Limestone Formation
Bricklieve Limestone Formation (upper)
Barney Limestone Formation
Bohoge Member
Kinturk Member
Ballyshannon Limestone Formation
Argillaceous limestones & calc. sha
Basal sandstones
Abbeytown Limestone
Newtownbutler Limestone Member
Red Hill Member
Bundoran Shale Formation
Mullynagowan Sandstone Member
Burren Formation
Aillwee Member
Aillwee member (lower)
Aillwee Member (upper)
Aillwee & Maumcaha Members
Ballard Member
Black Head Member
Fanore Member
Hawkhill Member
Maumcaha Member
Butlersgrove Formation
in Butlersgrove Formation
Ballynahone Micrite Formation
Boyle Sandstone Formation
Ballyness Formation
Ballyreagh Conglomerate Formation
Caherduggan Limestone Formation
Camillan Sandstone Formation
Capnagower Formation
Carraun Shale Formation
Doagh Limestone Member
Castlebar River Fm. / Lough Akeel F
Cong Canal Formation
Cong Limestone Formation
Carrickaness Sandstone Formation
Claragh Sandstone Formation
Cooldaragh Formation
Cloghan Sandstone Formation
Clonlusk Formation
Cloonagh Limestone Formation
Cracoean Reef Member
Clogrenan Formation
Kilmore Slump Member
Clashavodig Formation
Clogher Valley Formation
Copstown Limestone Formation
Courtmacsherry Formation
Cork Red Marble Formation
Cregg Limestone Formation
Coranellistrum Formation
Croane Formation
Croghan Limestone Formation
Crosspatrick Formation
Crows Point Formation
Crufty Formation
Cruicetown Group (undifferentiated)
Culmore Formation
Dartry Limestone Formation
Ballagh Limestone Member
Knockmore Reef, bedded facies
Knockmore Limestone Member
Legacurry Member
Cam Limestone Member
Carrickmacsparrow Limestone Member
in Dartry Limestone Formation
in Dartry Limestone Formation
Drumchorick Siltstone Formation
Dinantian Limestones (undifferentia
Drumgesh Shale Formation
Drumman More Sandstone Formation
Donabate Formation
Downpatrick Formation
Dargan Limestone
Dromkeen Limestone Formation
Dirtoge Limestone Formation
Duncormick Formation
Durnish Formation
Durrow Formation
Edenderry Oolite Member
Feighcullen Formation
Fennor Formation
Ferbane Mudstone Formation
Fingal Group (undifferentiated)
Fearnaght Formation
Fortwilliam Oolite Member
Glenade Sandstone Formation
Glencar Limestone Formation
Greyfield Formation
Hazelwood Limestone Formation
Herbertstown Formation
Herbertstown Limestone Formation
Holmpatrick Formation
Hore Abbey Limestone Formation
Ilaunagappul Formation
Johnstown Red Marble Formation
Keenaghan Shale Formation
Killin Formation
Killuney Conglomerate Formation
Kinsale Formation
Cuskinny Member
Narrow Cove Member
Pigs Cove Member
Reenagough Member
Kilbryan Limestone Formation
Knockordan Limestone Formation
Knockmaa Formation
Knockroe Basalt Lava Flow Member
Knockroe Lithic Tuff Member
Knockroe Trachyte Lava Flow Member
Knockroe Vitric-Lithic Tuff Member
Knockseefin Volcanic Formation
Knockseefin Lava Flow Member
Knockseefin Lithic Tuff Member
Knockseefin Vitric Tuff Member
Kilsheelan Formation
Lane Formation
Laggangstown Formation
Lough Gur Formation
Loughshinny Formation
Mattock Member
Lismaline Micrite Formation
Little Island Formation
Lower Limestone Shale
Loughbeg Formation
Lispatrick Formation
Lisgorman Shale Formation
Leitrim Group
Lucan Formation
Boulder Conglomerate
Maam Formation
Malahide Formation
Meenymore Formation
Cammore Sandstone Member
Glen Member
Quarry Sandstone Member
Mellon House Formation
Mornington Formation
Milford Formation
in Milford Formation
Milverton Group (undifferentiated)
Moy Sandstone Formation
Mooretown Formation
Muckros Sandstone Formation
Mullaghfin Formation
Killala Oolite Member
Mullaghmore Sandstone Formation
Maydown Limestone Formation
Naul Formation
Navan Beds
Rockfield Sandstone Member
Oakport Limestone Formation
Burrishoole Member
Creagh Member
Lough Carra Member
Oldchapel Limestone Formation
Oldcourt Cherty Limestone Formation
OMahonys Rock Formation
Owenriff Member
Waterfall Member
Parsonage & Corgrig Lodge Formation
Platin Formation
Porters Gate Formation
Quinagh Formation
Rathkeale Formation
Rathronan Formation
Reenydonagan Formation
Retreat Siltstone Formation
Rickardstown Formation
Ringmoylan Formation
Rinn Point Limestone Formation
Rockfield Limestone Formation
Rockfleet Bay Limestone Formation
Rush Conglomerate Formation
Shanagolden Formation
Silverspring Formation
Slane Castle Formation
Slevoir Formation
Smugglers Cave Formation
Slievenaglasha Formation
Aylecotty Member
Cullaun Member
Ballyelly Member
Fahee North Member
Lissylisheen Member
Balliny Member
Turret Volcanic Member
Subulter Volcanic Formation
Suir Limestone Formation
Terryglass Formation
Tober Colleen Formation
Topped Mountain Formation
Barr Church Andesite
Transition Beds
Tullyallen Formation
Tubber Formation
Cregmahon Member
Castlequarter Member
Fiddaun Member
Finavarra Member
Newtown Member
Twigspark Formation
Tonweeroe Formation
Argillaceous Limestones (Visean)
Ulster Canal Formation
Visean Limestones (undifferentiated
in Visean Limestones (undiff)
Waulsortian Limestones
in Waulsortian Limestones
Wexford Formation
in Wexford Formation
Caledonain Cloonfad Felsite
Croaghgarrow Formation
Bills Rocks Formation
Cloonygowan Formation
Deer Park Complex
Deer Park Schist Formation
Farnacht Formation
South Achillbeg Formation
Achillbeg Conglomerate Member
Achillbeg Lighthouse Psammite Membe
Achillbeg School Black Slate Member
Serpentinite
Claudy Formation
Clashford House Formation
Clogherhead Formation
Clontail Formation
Carricktriss Formation
Ardagh Shale Formation
Annabella Formation
Ballinamallard Mudstone Formation
Bencroy Shale Formation
Bencroy Sandstone Member
Ballynahown Sandstone Formation
Balrickard Formation
Bregaun Flagstone Formation
Briscloonagh Sandstone Formation
Cabra Formation
Corratober Bridge Formation
Central Clare Group
Carrickleck Formation
Carrickleck Sandstone Member
Cloone Flagstone Formation
Clare Shale Formation
Clontrain Formation
Dergvone Shale Formation
Lacoon Flagstone Member
Donore Formation
Cruicerath Member
East Point Formation
Farranacliff Formation
Feale Sandstone Formation
Giants Grave Formation
Glenoween Shale Formation
Gowlaun Shale Formation
Gull Island Formation
Corn Hill Formation
Killeshin Siltstone Formation
Lackagh Sandstone Formation
Lackantedane Formation
Caherconreafy Member
Longstone Flagstone Member
Longstone Shale Member
Luggacurren Shale Formation
Middle Battery Formation
Namurian (undifferentiated)
Ross Sandstone Formation
Shannon Group
Shrough Formation
Tullig Sandstone
White Strand Formation
Walshestown Formation
Collon Formation
Craggagh Shale Formation
Lower Sandstone Member
Upper Sandstone Member
Creeslough Formation
Cranford Limestone Formation
Croaghaun Formation
Gubroe Quartzite Member
Croaghubbrid Pelite Formation
Croveenananta Formation
Trachyte
Clatterstown Formation
Culdaff Limestone Formation
Liscarroll Limestone Formation
Clay Gall Sandstone Formation
Coolbaun Formation
Swan Sandstone Member
Drumlish Conglomerate Formation
Lickfinn Coal Formation
Moanour Formation
Moyadd Coal Formation
Westphalian (undifferentiated)
Carrickdexter Formation
Conglomerate & pebbly sandstone
Bealtra volcaniclastic rocks
Beginish Island Intrusion
Ballymastocker Formation
Edergole Formation
Gortfinbar Conglomerate Formation
Raveagh Sandstone Formation
Basalt
Kilmore Formation
Old Red Sandstone (undifferentiated
Doogort Boulder Bed Formation
Doogort Beach Schist Formation
Doogort Dolomite Formation
Doogort Quartzite Formation
Doogort Road Formation
Doogort schist Formation
Derryharriff Formation
Denhamstown Formation
Lacka Sandstone Formation
Ballyferriter Formation
Bulls Head Formation
Ballymore Sandstone Formation
in Ballymore Sandstone Formation
Coumeenoole Sandstone Formation
Eask Sandstone Formation
Glashabeg Conglomerate Formation
Coosgorrib Conglomerate Member
Coosmore Conglomerate Member
Coosglass Conglomerate Member
Graffa More Formation
Keadew Formation
Sheegorey Member
Moygara Formation
Slea Head Formation
Trabeg Conglomerate Formation
Bird Hill Formation
Birreen Formation
Ballydavid Formation
Croaghmoyle Formation
Farran Sandstone Formation
Gortanimill Formation
Inch Conglomerate Formation
Kilmurry Sandstone Formation
Pigeon Rock Formation
Sauce Creek Formation
Slaheny Sandstone Formation
Doon-na-Dell Schist Formation
Doolough (per-alkaline) Granite Gne
Dooagh Schist Formation
Doonamo Formation
Aughernagalliagh Quartzite Member
Moyny Point Limestone Member
Ardane Formation
Ayle River Formation
Ballinskelligs Sandstone Formation
Ardnagluggen Sandstone Member
Doulus Head Conglomerate Member
in Ballinskelligs Sandstone Fm.
Ballytrasna Formation
Doon Lava Member
Mine Head Member
Carrigcleenamore Volcanics
Capard Formation
Cappagh Sandstone Formation
Cappagh White Sandstone Formation
Carrigmaclea Formation
Castlehaven Formation
in Castlehaven Formation
Cadamstown Formation
Clonaslee Member
Caha Mountain Formation
Coumaraglin Formation
Comeragh Conglomerate Sandstone Gro
Coumshingaun Conglomerate Formation
Carrigduff Volcanic Member
Coolnahorna Volcanic Member
Croughaun Formation
Devilsbit Formation
Glandahalin Formation
Galtymore Formation
Glenflesk Chloritic Sandstone Forma
Doo Lough Pebbly Sandstone Member
Lough Guitane rhyolites
Lough Guitane volcaniclastics
in GlenfleskChloritic Sandst Fm.
Glendossaun Member
Gun Point Formation
Gyleen Formation
Ballyknock Member
Ballyquinn Member
Ardmore Member
Harrylock Formation
Helvick Formation
Inshaboy Formation
Kilnafrehan Conglomerate Formation
Kiltorcan Formation
Knockmealdown Sandstone Formation
Keeper Hill Formation
Lack Sandstone Formation
Lough Acoose Sandstone Formation
Lough Acoose Sandst Form&Conglom&pe
Lough Muskry Formation
Lough Slat Conglomerate Formation
Old Head Sandstone Formation
Bere Island Member
Oldtown Bay Formation
Poulgrania Sandstone Formation
Pointagare Group
Scalpnagown Formation
Maghera Cornstone Member
Sherkin Formation
Sheskin Formation
Shanmullagh Formation
Slieve Mish Group
Slievereagh Conglomerate Formation
Slievenamuck Conglomerate Formation
St. Finans Sandstone Formation
in St. Finans Sandstone Formation
in St. Finans Sandstone Formation
Smerwick Group
Templetown Formation
Knockavellish Member
Brownstown Head Member
Beenlea Head Member
Toe Head Formation
Treanearla Formation
Duvillaun Formation
Valentia Slate Formation
in Valentia Slate Fm.
Extrusive Rhyolite Formation
Lough Eske Psammite Formation
Fahan Grit Formation
Cloghan Green Beds Member
Falcarragh Limestone Formation
Fahan Slate Formation
Finlough Formation
Fieldstown Formation
Fournocks Formation
Altered Fault Rock (igneous?)
Porphyritic-Megacrystic Granite
Magma Mixing-Mingling Zone
Gaugin Quartzite Formation
Glencolumbkille Limestone Formation
Glencolumbkille Pelite Formation
Glenisland Formation
Raheen Barr Volcanic Member
Cashel Member
Lough Darrdun Schist Member
Glencullin River Formation
Glen Lodge Formation
Greencastle Green Beds Formation
Glaspistol Formation
Gubastuckaun Formation
in Broadford Formation
Hilltown Formation
Hill Of Slane Formation
Ballygawley Tonalitic Gneiss
Porphyritic rhyolite
Ardara Granite, G1 variety
Ardara Granite, G2 variety
Ardara Granite, G3 variety
Barnesmore Granite, G1 variety - Cronamuck Granodiorite
Barnesmore Granite, G2 variety
Barnesmore Granite, G3 varieties of sheet complex
Syenite
Trachyte Breccias
Trachyte
Blackstairs Graiguenamanagh Granite Gneiss
Blackstairs Type 1 Granite
Blackstairs Type 2 Equigranular Granite
Blackstairs Type 2 Microcline Porphyritic Grani
Cloghmore Granodiorite
Corvock Granite
Costello Murvey Granite
Errisbeg Townland Granite
Callowfinish Granite
Murvey Granite
Carna-type
Roundstone Granite
Cuilleen-type
Minor Granitic Bodies
Crossdoney Granite
Newry Granite
Inish Granite
Knock Granite
Lettermore Granodiorites
Letterfrack granitic plutons
Lough Fadda Granodiorite
Lough Lurgan Granite
Barravore Aplogranite
Carrawaystick Aplite
Glendalough Adamellite
Glen of Imail Quartz-diorite
Percys Table Granodiorite
Type 1 granodiorite
Type 3 muscovite porphyritic
Type 4 muscovite/microcline porphyr
Type 2e equigranular
Type 2p microcline porphyritic
Omey Granite
Drogheda Granite
Shannapheasteen Granite
Type 1 Granite
Tullow Type 2 Equigranular Granite
Tullow Type 2 Sparsely Porphyritic Granite
Tullow Type 2 Microcline Porphyritic Grani
Ballynamuddagh Granite
Easky Adamellite
Lough Talt
Fanad Granite
Fanad Granite
Feldspar porphyry
Lough Nacorrussaun Metabasites
Rhyolite
Thorr Granite
Thorr Granite migmatitic facies
Rafts in Thorr Granite
Toories Granite
Tullagh Point Granite
Main Donegal Granite
Microgranite and related rocks
Inishderry Formation
Inishowen Head Grits and Phyllites
Inishkea Division (undifferentiated
Inver Schist Formation
Croghan Kinshelagh Granite
Quartz Diorite Gneiss & Granitic Gn
Metagabbro and Related Lithologies
Oughterard Granite
Feldspar Porphyry
Quartz porphyry and Felsite
Quartz Diorite Gneiss
Saltees Granite
Ballyconneely Amphibolite
Amphibolite (northeast Ox Mountains
Metabasite
Metadolerite or amphibolite
Serpentinite
Rathlin OBirne Granite
Rosses Granite G1 variety
Rosses Granite G2 variety
Rosses Granite G3 variety
Rosses Granite G4 variety
Carnsore Granite
Slieve Gamph Igneous Complex, equigranular
Slieve Gamph Igneous Complex, megacrystic
Slieve Gamph Igneous Complex, Muscovite Granite
Layered Gabbro
Layered Gabbro
Layered Gabbro
Layered Gabbro
Layered Gabbro
Hawaiite Lava
Vent Agglomerate
Early Gabbro
Granophyre
Trawenagh Bay Biotite Granite
Trawenagh Bay Biotite-muscov. Grani
Trawenagh Bay Biotite-muscov. Grani
Trawenagh Bay Aplogranite
Trawenagh Bay Transitional G1/G2 Gr
Basalt & Trachyte Lava
Cam Lough Breccia
Porphyritic Felsite
Porphyritic granophyre
Shanes Hill Rhyodacite
Vent agglomerate
Ballydeenlea Formation
Kanfinalta Formation
Knockerk Formation
Bockagh Member
Kennetstown Formation
Killadangan Formation
Kilnaleck Shale Formation
King's Hill Formation
Ardaturrish Member
Ardnamanagh Member
Keem Conglomerate Formation
Keem Limestone Formation
Keem Schist Formation
Killeter Quartzite Formation
Ulster White Limestone Formation
Lackan Formation
Lambay Volcanic Formation
Lough Brohly Quartzite Formation
Lough Brohly Schist Formation
Lower Crana Quartzite Formation
Lough Doo Formation
Slieve League Formation
Letter Formation
Lower Falcarragh Pelite Formation
Lough Foyle Succession
Pelitic unit in Lough Foyle Success
Lough Mourne Formation
Lower Palaeozoic rocks
Loughros Formation
Agglomerate
Andesite
Aplite
Hornblende diorite
Appinite suite
Appinite suite intrusive breccia
Basalt
Chert
diamictite
Dolerite
Dolerite and Gabbro
Diorite
Felsite
Marginal Porphyritic Granite
Gabbro
Granodiorite and diorite
Fine-grained foliated granite
in Cornagnoe Formation
Microgranite
Granite (undifferentiated)
Little Harbour Formation
Marble
Metadolerite
Metadolerite & Lithologically diver
Metadolerite
Metagabbro & orthogneiss suite
Monzogranite
Mudbank limestone
Oolitic limestone
Pegmatite
Rafts in Thorr Granite; pelite
Feldspar or Quartz Porphyry
Caledonian Pyroxene Diorite
in Lough Eske Psammite Formation
in Finnalaghta Formation
in Caha Mountain Formation
Rafts in Thorr Granite
Serpentinite
in Rathkenny Formation, in Central and Northern Belt, in Salterstwon Formation
Tectonic schist
Rafts in Thorr Granite; lithologically diverse
Volcanics
Volcaniclastic Rocks
in Lough Eske Psammite Formation, in Termon Formation
Undifferentiated pyroclastic rocks
Malin Schist Formation
Anaffrin Formation
Glennamong Member
Sraheens Lough Formation
Minnaun Sandstone Formation
Moyteoge Head Formation
Ashleam Bridge Dolomitic Formation
Ashleam Bridge Quartzite Formation
Ashleam Bridge Graphitic Member
Ashleam Bay Formation
Atlantic Drive Schist Formation
Barnanoraun Schist Formation
Connemara Marble Formation
Cullydoo Formation
Srahmore Quartzite Member
Srahmore Quartzite and Schist Membe
Derreen Marble Formation
Dooega Head Formation
Knockcorraun Formation
Knockcorraun Lough Marble Member
Portnahally Formation
Ashleam Head Formation
Attymass Group (undifferentiated)
Attymass Volcanic Formation
Attymass Formation (undifferentiated)
Lower Attymass Formation
Upper Attymass Formation
Bennabeola Quartzite Formation
Birreencorragh Schist Formation
Birreencorragh Quartzite Member
Ballynakill Schist Formation
Buckoogh Formation
Bunnafahy Conglomerate Formation
Bunaveela Lough Formation
Carrick OHara Formation
Corradrishy Quartzite Member
Cashel Schist Formation
Corradrishy Formation
Cleggan Boulder Bed Formation
Corraun Formation
Corraun Schist (Lower) Member
Corraun Quartzite Member
Corraun Schist (Upper) Member
Kildownet Quartzite Member
Cove Schist Formation
Derreen Schist Member
Mount Eagle Formation
Mount Eagle Schist Member
Glenlara Volcanic Formation
Curraghnagark Member
Doonweelin Member
Grit Unit (Curraghnagark Member)
Lakes Marble Formation
Leckee Quartzitic Formation
Kilmore Limestone Member
Liscarragh Formation
North Carrowgarve Formation
Ooghnadarve Formation
South Carrowgarve Formation
Skerdagh River Volcanic Formation
Glenlara Marble Member
Srahmore Lodge Dolomite Formation
Streamstown Schist Formation
Tawnyshane Tillite Formation
Slievenagark Member
Newantrim Member
Meelick Member
Callow Formation
Cornamona Marble Formation
Lough Kilbride Schist Formation
Lower Lismoran Formation
Upper Lismoran Formation
Westport Grit Formation
Mullyfa and Deele Formations
Undifferentiated Dalradian schists
Nakil Formation
Middle Nephin Group (Undifferentia
Nephin Formation
Argyle Group
Appin Group
Bencorragh Formation
Bunmahon Formation
Bohaun Volcanic Formation
Derry Bay Formation
Delaney Dome Meta-rhyolite Formatio
Derryveeny Formation
Derrylea Formation
Carricklea Grey Marble Member
Carricklea Pink Marble Member
Derrymore Formation
Dunabrattin Formation
Finny Formation
Glenummera Formation
Golam Formation
Gorumna Formation
Sedimentary lenses
Knock Kilbride Formation
Letterbrock Formation
Loch Faoilean Formation
Lettermullen Formation
Mount Partry Formation
Maumtrasna Formation
Mweelrea Formation
Slate Members
Rosroe Formation
Ryans Farm Formation
South Connemara Group
Sheeffry Formation
Skerd Formation
Tourmakeady Formation
Ballygreany Formation
Castleshane Formation
Carrickateane Formation
Shanmullagh Mill Formation
Aghfarrell Formation
Dowery Hill Member
Ballybro Formation
Butter Mountain Formation
Donard Andesite Member
in Butter Mountain Formation
Ballylane Formation
Ballylane Formation & Intermediate
Carracastle Formation
Gortnagleav Formation
Grahormack Formation
Horan Formation
Kilmacthomas Formation
in Kilmacthomas Formation
Muggorts Bay Formation
Milltown Formation
Oaklands Formation
Palace Member
Riverchapel Formation
Seamount Formation
TUSKAR GROUP
Tawnyinagh Formation
Arklow Head Formation
in Arklow Head Formation
Avoca Formation
in Avoca Formation
in Avoca Formation
Ballymoyle Formation
in Ballymoyle Formation
in Ballymoyle Formation
Ballynaclogh Formation
Caher Hill Formation
Campile Formation
Garraun Member
Newtown Head Member
in Newtown Head Member
in Newtown Head Member
Arthurstown Member
Ballyhack Member
in Ballyhack Member
Ross Member
in Ross Member
shale units in Campile Formation
in Campile Formation
in Campile Formation
Clashabeema Formation
Finnalaghta Formation
Kilmacrea Formation
in Kilmacrea Formation
Laragh Formation
Toberelatan Formation
Ballinatray Formation
Carrighalia Formation
Courtown Formation
in Courtown Formation
Grange Cottage Formation
Ooghnadirka Schist Formation
Tramore Limestone Formation
Tramore Shale Formation
Kildare Limestone Formation
Allen Andesite Formation
Coronea Formation
Grange Hill Formation
Red Island Formation
Northern Belt (undifferentiated)
Paragneiss, Migmatite and Hornfels
Oriel Brook Formation
Central Belt (undifferentiated)
Corderrybane Shale Formation
Drumagelvin Greywacke Formation
Kehernaghkilly Formation
Tullyraghan Shale Formation
Askingarran Formation
Ballyhoge Formation
Glencullen River Formation
Maulin Formation
Oldcourt Member
Brownsford Member
Ballybeg Member
in Ballybeg Member
Kilcarry Member
Monaughrim Member
in Monaughrim Member
Ballyneale Member
in Ballyneale Member
Knockree Member
Roundwood Member
in Maulin Formation
in Maulin Formation
Wicklow Head Formation
Ballymalone Formation
Conlanstown Formation
Slieve Gamph Igneous Complex, Acidic Lithologies
Slieve Gamph Igneous Complex, Basic Lithologies
Unassigned metasediment rafts
Ox Mountains Granodiorite
Adamellite
Slieve Gamph Igneous Complex, Tonalite
Port Askaig Formation
Dobbin Sandstone Formation
Mall Member
Drumarg Conglomerate Formation
Kinrovar Schist
Kingscourt Gypsum Formation
Pollacappul Formation
Glencalry Schist Member
Glenagh River Limestone Member
Lugnalettin Black Schist Member
Portrane Limestone Formation
Portrane Volcanic Formation
GREENORE POINT GROUP
KILMORE QUAY GROUP
Slishwood Division, Semi-pelitic biotite schists
Slishwood Division, Metalimestones
Slishwood Division, Cregg House Formation
Slishwood Division, Pelitic & semi-pelitic paragneiss
Slishwood Division, Psammitic Paragneiss
Killag Formation
Prioryland Formation
Castlerahan Formation
Raheen Barr Albite Schist Formation
Raheen Barr Quartzite Formation
Red Mans Cove Formation
Reelan Formation
Rhinns Complex of Inishtrahull etc.
Rathkenny Formation
Ridge Point Psammitic Formation
Rinmore Formation
Ballytoohy Formation
Bunnamohaun Siltstone Formation
Bouris Formation
Clogher Head Formation
Cregganbaun Formation
Croaghmarhin Formation
Coosglass Slate Formation
Derryheagh Formation
Drom Point Formation
Derrymore Glen Formation
Fairy Hill Conglomerate Formation
Foilnamahagh Formation
Ferriters Cove Formation
Glen Pebbly Arkose Formation
Glencraff Formation
Inishnabro Formation
Inishvickillane Formation
Kilbride Formation
Tonalee Member
Kill Sandstone Formation
Knockmore Sandstone Formation
Knockshigowna Formation
Landing Place Formation
Ben Levy Grit Formation
Lettergesh Formation
Gowlaun Member
Lough Mask Formation
Ardaun Lava Member
Mill Cove Formation
Lough Muck Formation
Lough Nacorra Formation
Salrock Formation
Strake Banded Formation
Inniskeen Formation
Salia Formation
Annagh Member
Salterstown Formation
Scotch Port Schist
Caherconree Formation
Sessiagh-Clonmass Formation
Clonmass Limestone Member
Port Limestone Member
in Sessiagh-Clonmass Formation
Pollareagh Member
Shanaghy Green Bed Formation
Foilcoagh Bay Member
Silurian (undifferentiated)
Ahenny Formation
Brownstown Member
Cornagnoe Formation
Cloonnamna Formation
Carrighill Formation
Dunmurry Formation
Glen Ding Formation
Glen School Formation
Guidenstown Formation
Inchacoomb Formation
Assaroola Member
Lough Avaghon Formation
Aghnamullen Member
Mullanalt Member
Cootehill Member
Lisbellaw Formation
Oghill Formation
Pollaphuca Formation
Rathclarish Formation
Rahilla Formation
Slieve Glah Formation
Slate Quarries Formation
South Lodge Formation
Shercock Formation
Taghart Mountain Formation
Tipperkevin Formation
Slieve Tooey Quartzite Formation
Ballindysert Formation
Ballyhest Member
Kilclooney Member
Ballygeana Formation
Broadford Formation
Broadford Formation & conglom & coa
in Broadford Formation
Garryduff Formation
Hollyford Formation
Slievemore Psammitic Formation
Slieve Bernagh Formation
Slieve Bernagh Formation & conglom
in Slieve Bernagh Formation
Slievemore Schist Formation
South Slope Quartzite Member
St. Marys Basalt
Snowtown Formation
Srah Formation
Srahlaghy Limestone Formation
Srahlaghy Quartzite Formation
Skerries Formation
Stags of Broad Haven Schist
St. Itas Formation
Cratloes Formation
Ballycar South Member
Glennagross Member
Annascaul Formation
Ballynane Formation
Cloonierin Formation
Derryfadda Formation
Kilanena Formation
Tawnaghmore Formation
Termon Granite
Granitic dykes assoc w Termon Grani
Termon Formation
Knockletteragh Member
Dolerite and Gabbro
Lower Basalt Formation
Ballymacadam Formation
Deerycreevy Sandstone Formation
Kingscourt Sandstone Formation
Mercia Mudstone Formation
Milltown Conglomerate Formation
Tooromin Shale Formation
Lough Neagh Group
Upper Crana Quartzite Formation
Upper Falcarragh Pelite Formation
White Island Bridge Formation

This is the legend for Fig A8 Bedrock Geology



Legend

Republic of Ireland Boundary

County Boundaries

Geological Heritage Site

Kilometers

0 12.5 25 50

Irish Transverse Mercator
EPSG: 2157

Client

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Consultant

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Issue	Date	By	Chkd	Appd
	27/03/2020	RD		

Project Title: Gas Networks Ireland - Network Implementation Plan

Drawing Title: Geological Heritage Sites

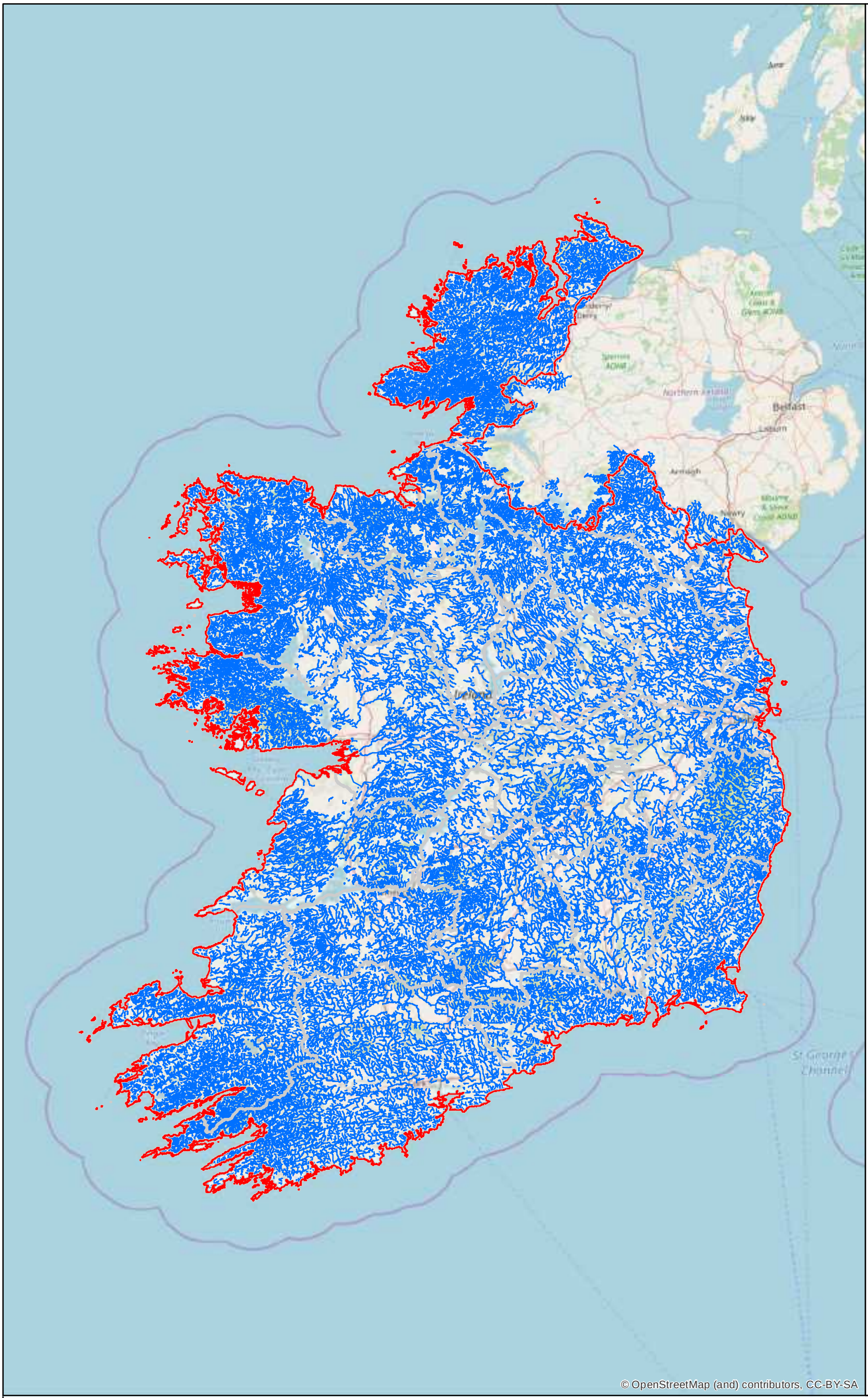
Scale: 1:1,750,000

Drawing Status:

Date:

Figure No.: Fig A9

Issue:



Legend

Republic of Ireland Boundary

County Boundaries

River Network

Kilometers

0 12.5 25 50

Irish Transverse Mercator
EPSG: 2157

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Issue	Date	By	Chkd	Appd
	27/03/2020	RD		

Project Title: Gas Networks Ireland - Network Implementation Plan

Drawing Title: Surface Water Features - Rivers

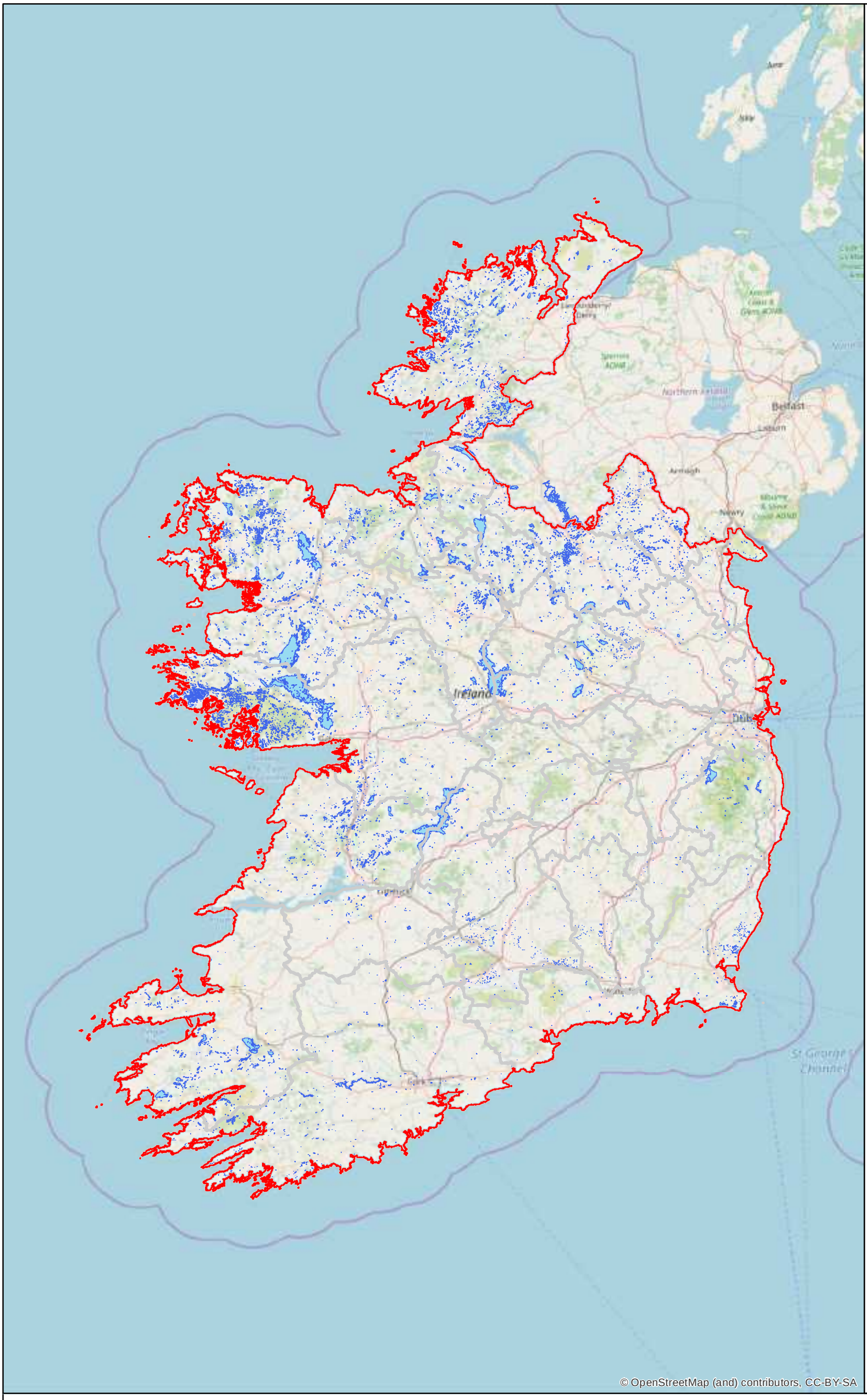
Scale: 1:1,750,000

Drawing Status:

Date:

Figure No.: Fig A10

Issue:



Legend

Republic of Ireland Boundary

County Boundaries

Lakes

Kilometers

0 12.5 25 50

Irish Transverse Mercator
EPSG: 2157

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Issue	Date	By	Chkd	Appd
	27/03/2020	RD		

Project Title: Gas Networks Ireland - Network Implementation Plan

Scale: 1:1,750,000

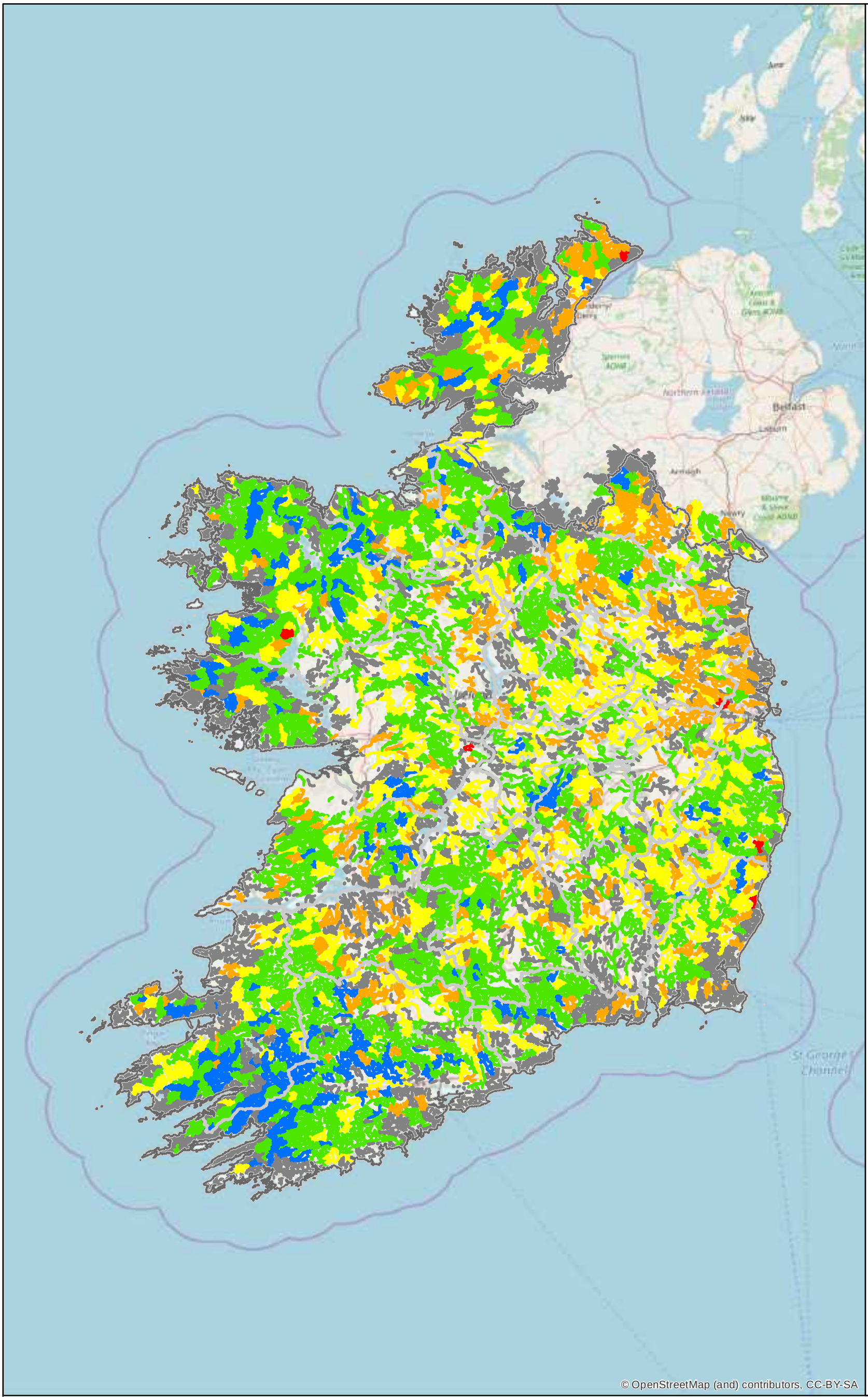
Date:

Drawing Title: Surface Water Features - Lakes

Drawing Status:

Figure No.: Fig A11

Issue:



Legend

Republic of Ireland Boundary

County Boundaries

River Waterbody WFD Status 2010-2015

- High
- Good
- Moderate
- Poor
- Bad
- Unassigned

Kilometers

0 12.5 25 50

Irish Transverse Mercator
EPSG: 2157

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Issue	Date	By	Chkd	Appd
	27/03/2020	RD		

Project Title: Gas Networks Ireland - Network Implementation Plan

Scale: 1:1,750,000

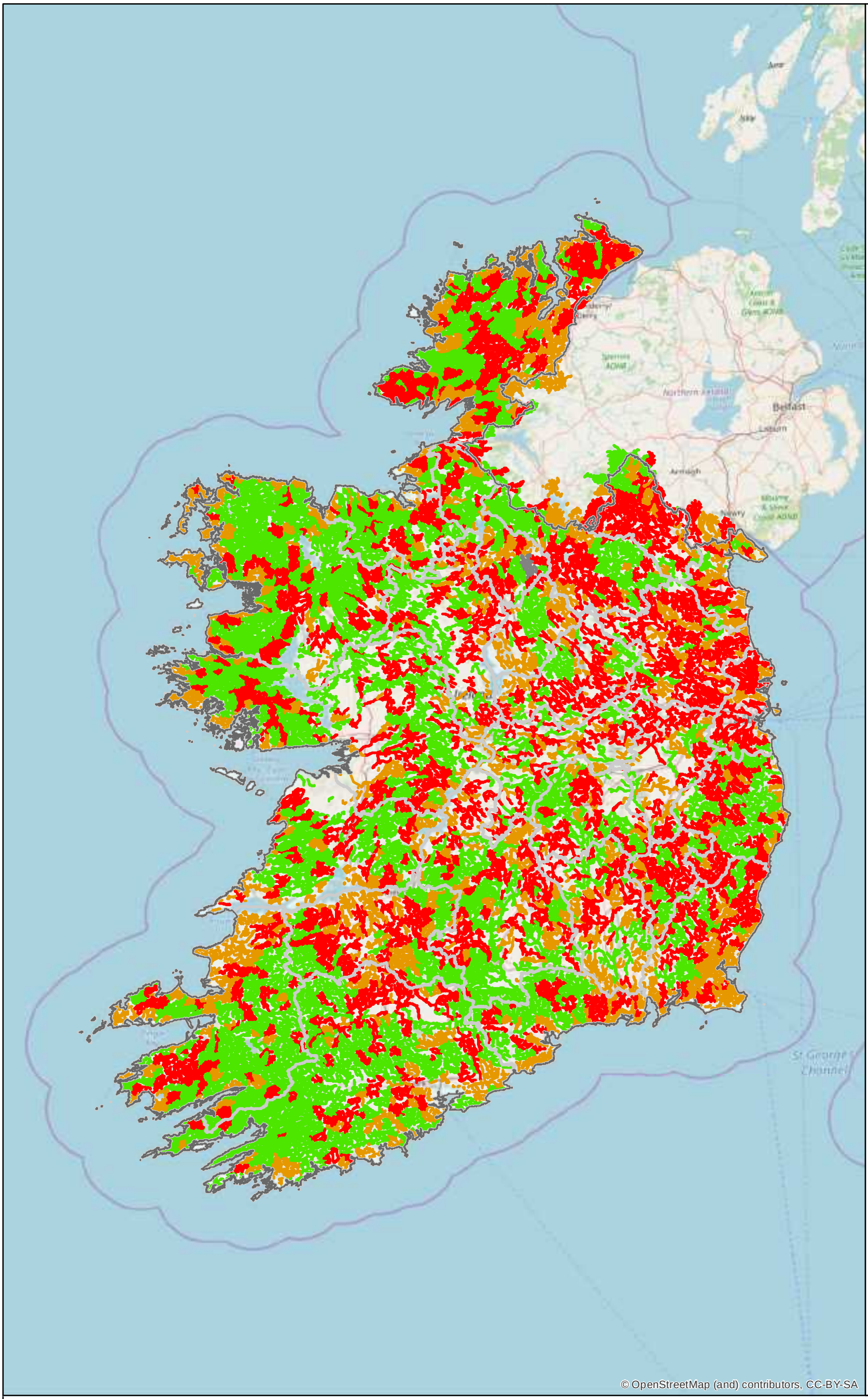
Date:

Drawing Title: River Waterbody WFD Quality Status 2010-2015

Drawing Status:

Figure No.: Fig A12

Issue:



Legend

Republic of Ireland Boundary

County Boundaries

River Waterbodies (Risk)

- <Null>
- At risk
- Not at risk
- Review

Kilometers

0 12.5 25 50

Irish Transverse Mercator
EPSG: 2157

Client

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Issue	Date	By	Chkd	Appd
	27/03/2020	RD		

Project Title: Gas Networks Ireland - Network Implementation Plan

Drawing Title: WFD Risk Status for Rivers

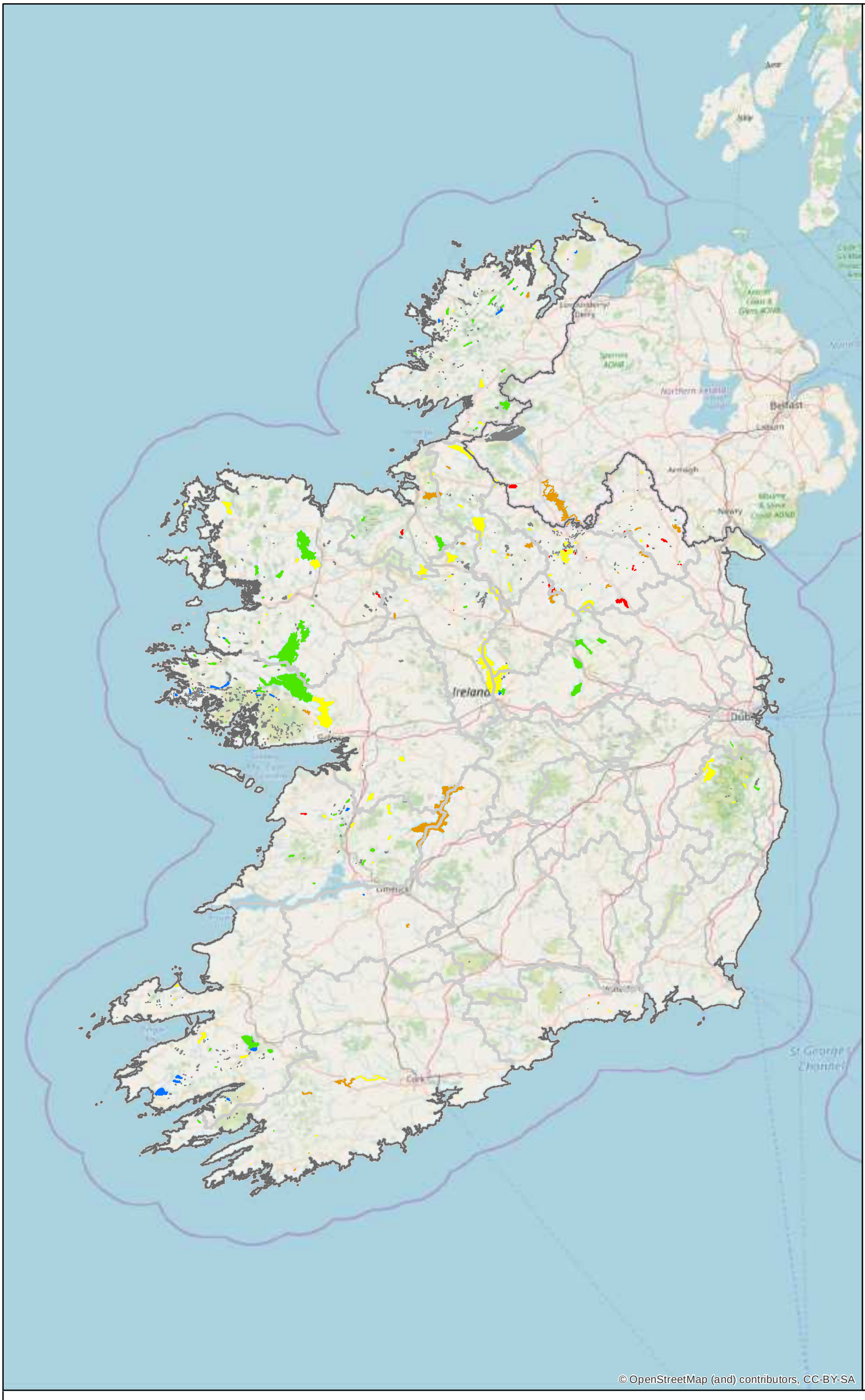
Scale: 1:1,750,000

Drawing Status:

Date:

Figure No.: Fig A13

Issue:



Legend

Republic of Ireland Boundary

County Boundaries

Lake Waterbody WFD Status 2010-2015

- High
- Good
- Moderate
- Poor
- Bad
- Unassigned

Kilometers

0 12.5 25 50

Irish Transverse Mercator
EPSG: 2157

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Issue	Date	By	Chkd	Appd
	27/03/2020	RD		

Project Title: Gas Networks Ireland - Network Implementation Plan

Scale: 1:1,750,000

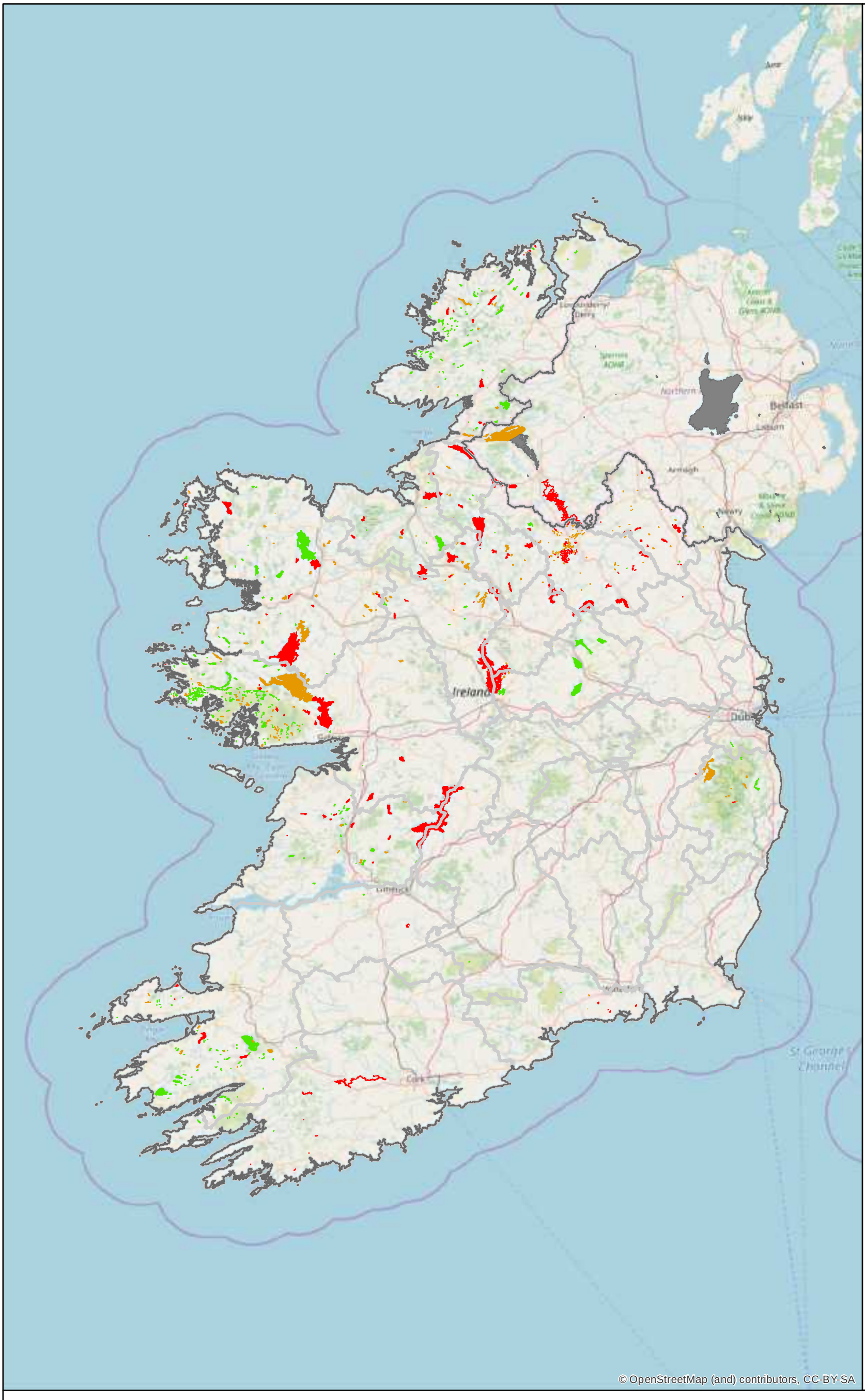
Date:

Drawing Title: Lake Waterbody WFD Quality Status 2010-2015

Drawing Status:

Figure No.: Fig A14

Issue:



Legend

Republic of Ireland Boundary

County Boundaries

Lake Waterbodies (Risk)

- <Null>
- At risk
- Not at risk
- Review

Kilometers

0 12.5 25 50

Irish Transverse Mercator
EPSG: 2157

Client

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Issue	Date	By	Chkd	Appd
	27/03/2020	RD		

Project Title: Gas Networks Ireland - Network Implementation Plan

Scale: 1:1,750,000

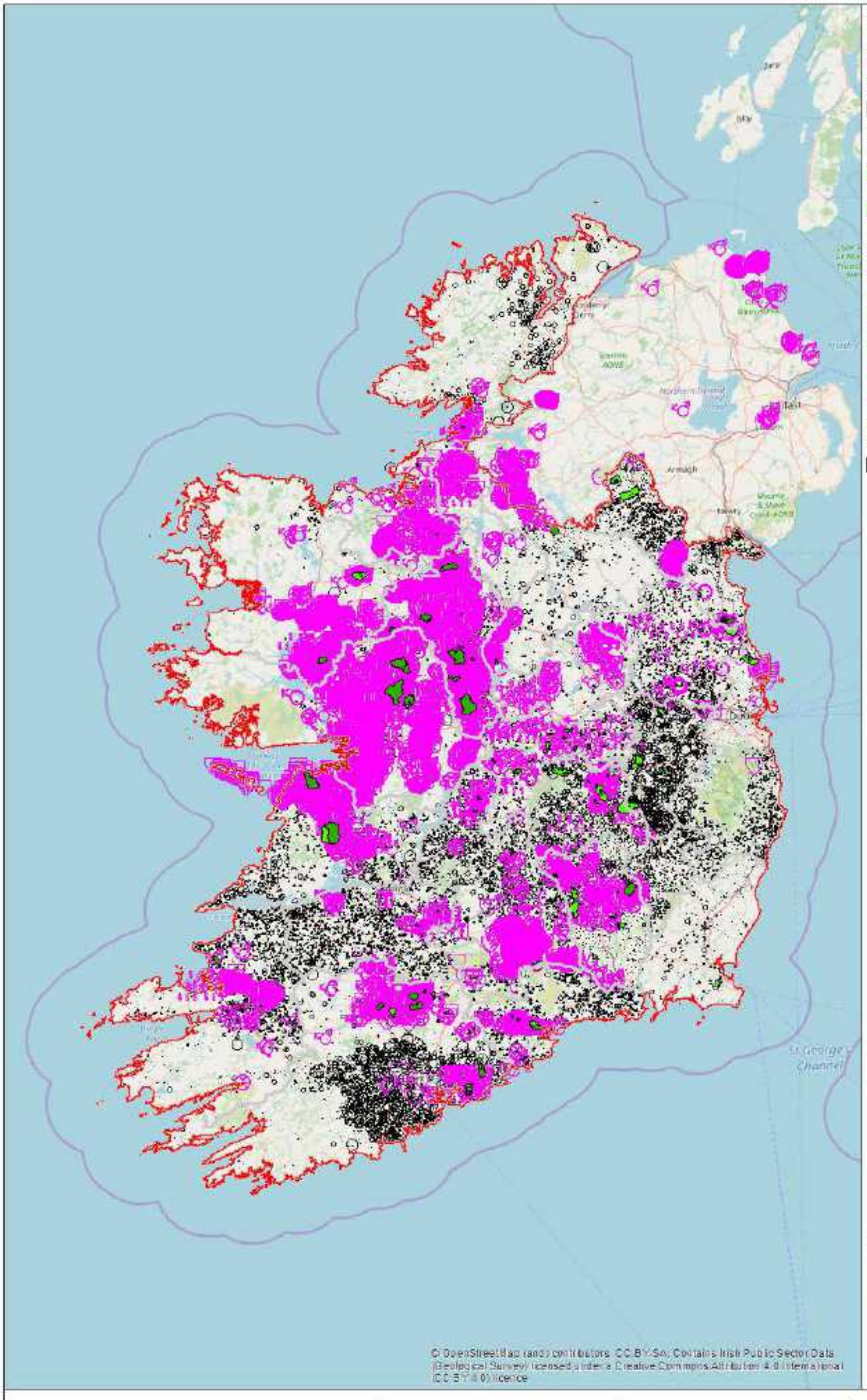
Date:

Drawing Title: WFD Risk Status for Lakes

Drawing Status:

Figure No.: Fig A15

Issue:



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Issue	Date	By	Chkd	Appd
	27/03/2020	RD		

Project Title
Gas Networks Ireland - Network Implementation Plan

Scale
1:1,750,000

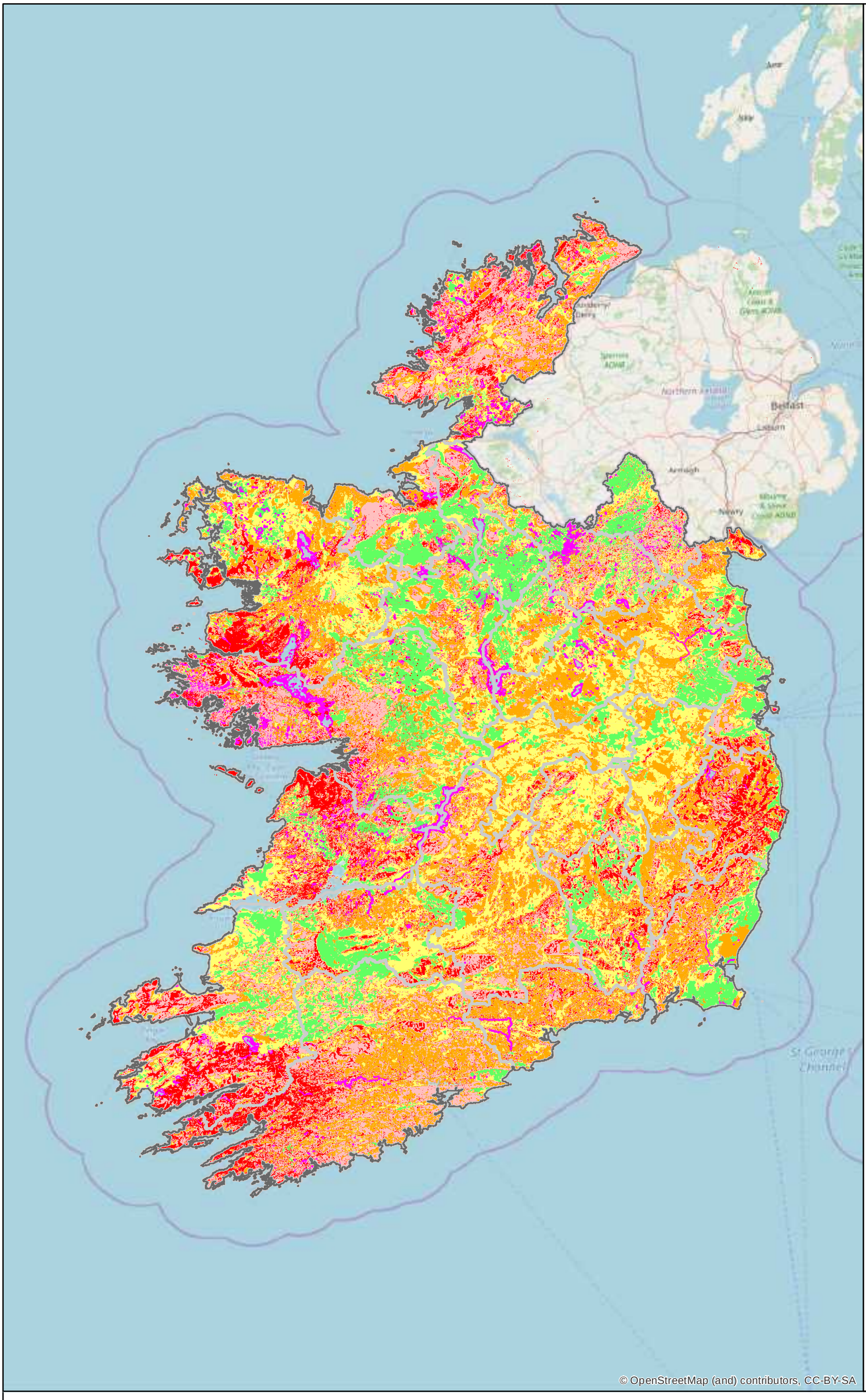
Date

Drawing Title
Groundwater Features and Public Supply Source Protection Zones

Drawing Status

Figure No.
Fig A.16

Issue



Legend

Republic of Ireland Boundary

County Boundaries

Groundwater Vulnerability

Rock at or near Surface or Karst

Extreme

High

Moderate

Low

Water

Kilometers

0 12.5 25 50

Irish Transverse Mercator
EPSG: 2157

Client

Gas Networks Ireland

Consultant

ARUP

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Issue	Date	By	Chkd	Appd
	27/03/2020	RD		

Project Title: Gas Networks Ireland - Network Implementation Plan

Drawing Title: Groundwater Vulnerability

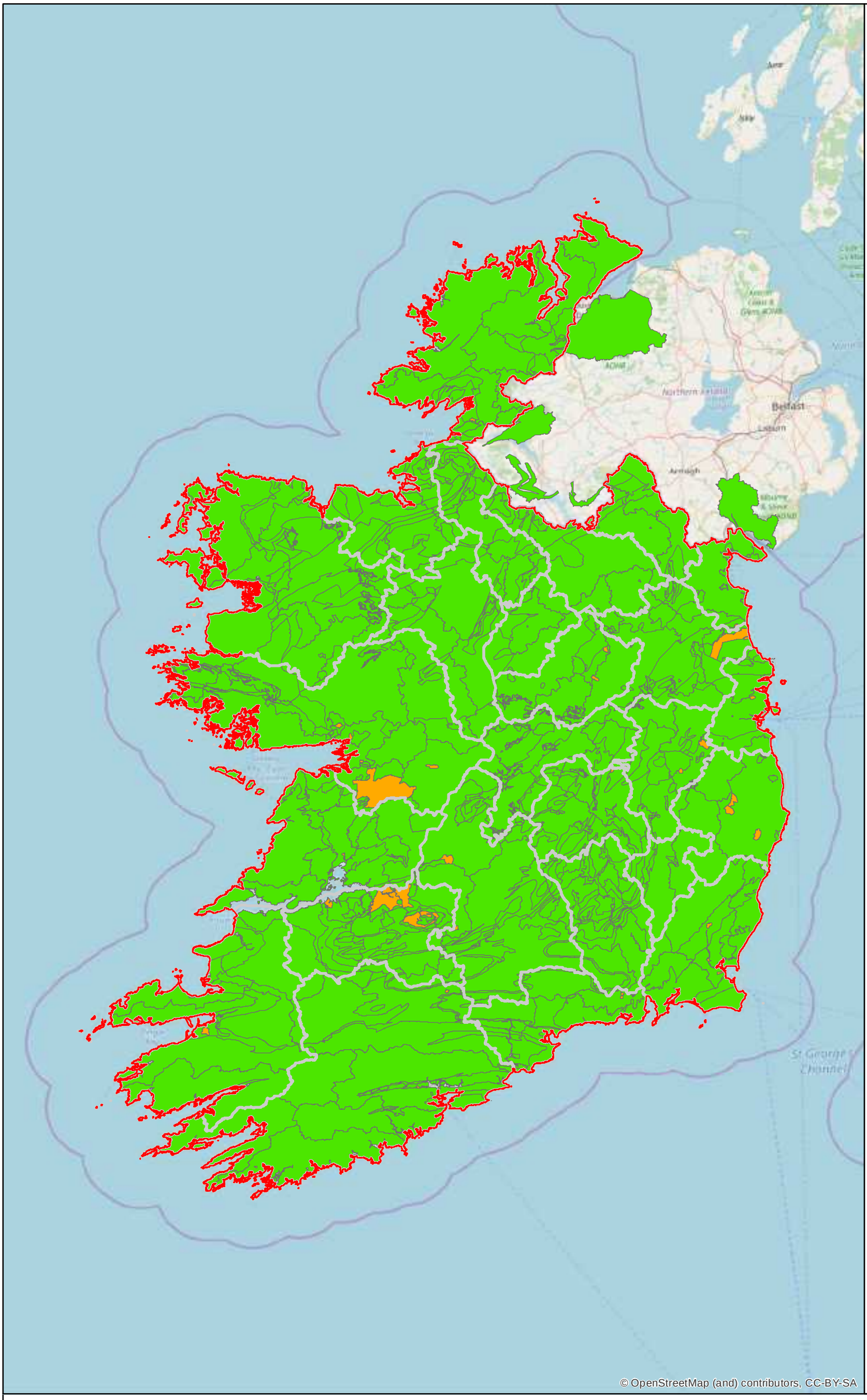
Scale: 1:1,750,000

Drawing Status:

Date:

Figure No.: Fig A17

Issue:



Legend

Republic of Ireland Boundary

County Boundaries

Ground Waterbody WFD Status 2010-2015

Good

Poor (GW)

Kilometers

0 12.5 25 50

Irish Transverse Mercator
EPSG: 2157

Client

Gas Networks Ireland

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Issue	Date	By	Chkd	Appd
	27/03/2020	RD		

Project Title: Gas Networks Ireland - Network Implementation Plan

Scale: 1:1,750,000

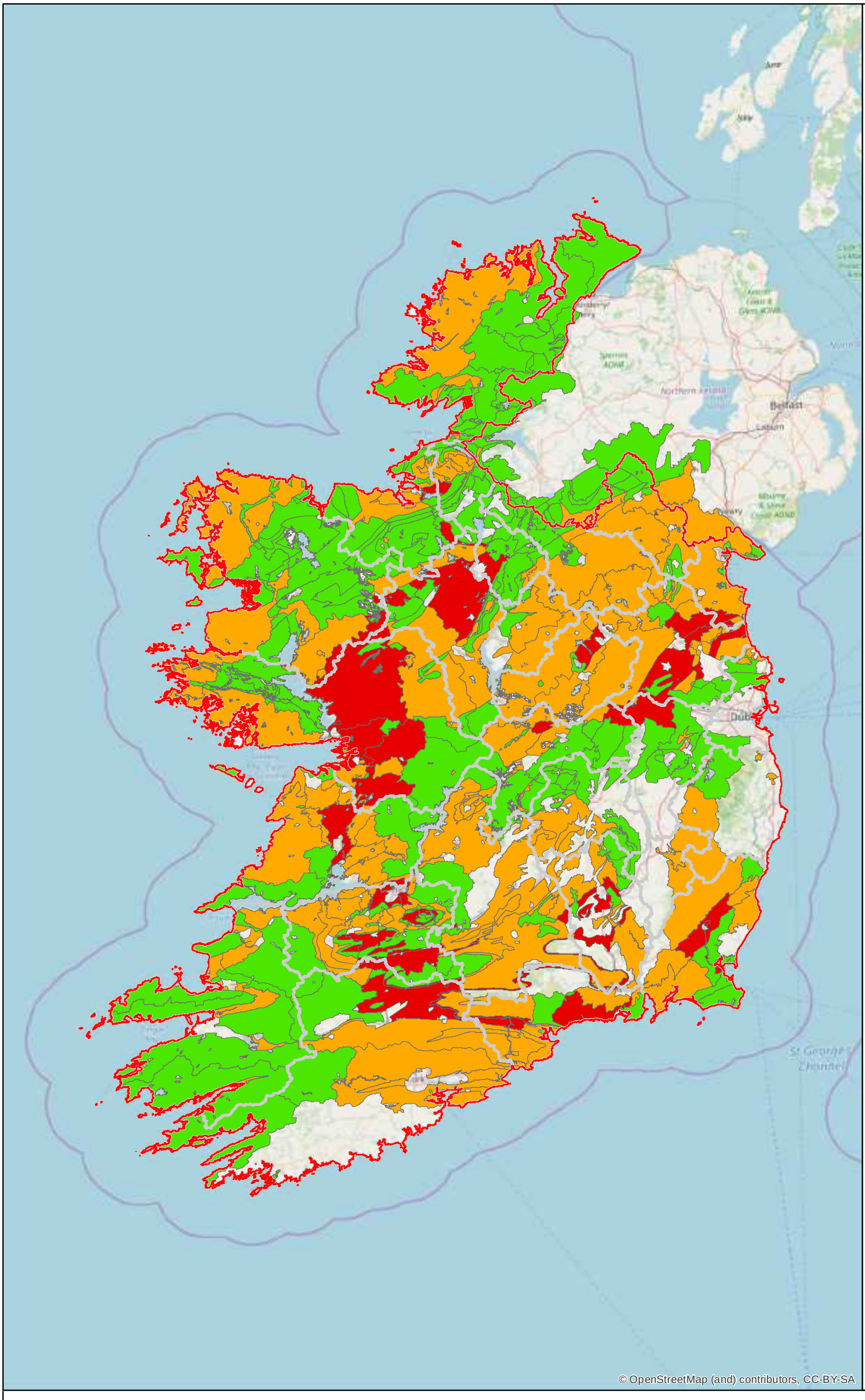
Date:

Drawing Title: Groundwater WFD Quality Status 2010-2015

Drawing Status:

Figure No.: Fig A18

Issue:



Legend

Republic of Ireland Boundary

County Boundaries

Groundwaterbodies (Risk)

At risk

Not at risk

Review

Kilometers

0 12.5 25 50

Irish Transverse Mercator
EPSG: 2157

Client

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Issue	Date	By	Chkd	Appd
	27/03/2020	RD		

Project Title: Gas Networks Ireland - Network Implementation Plan

Scale: 1:1,750,000

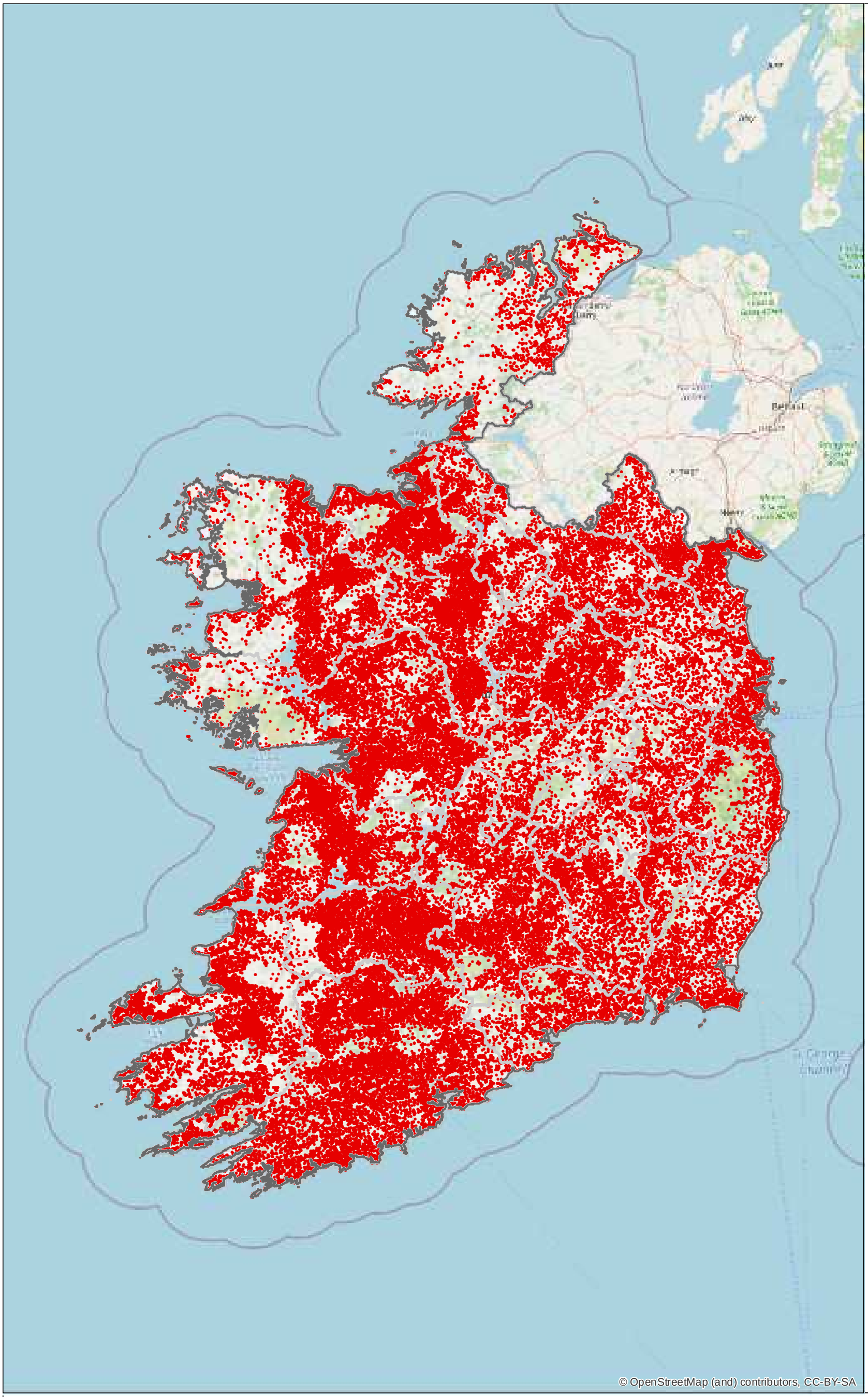
Date:

Drawing Title: WFD Risk Status for Groundwater

Drawing Status:

Figure No.: Fig A19

Issue:



Legend

Republic of Ireland Boundary

County Boundaries

Recorded Monuments

Recorded Monuments

Kilometers

0 12.5 25 50

Irish Transverse Mercator
EPSG: 2157

Client

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Issue	Date	By	Chkd	Appd
	27/03/2020	RD		

Project Title
Gas Networks Ireland - Network Implementation Plan

Scale
1:1,750,000

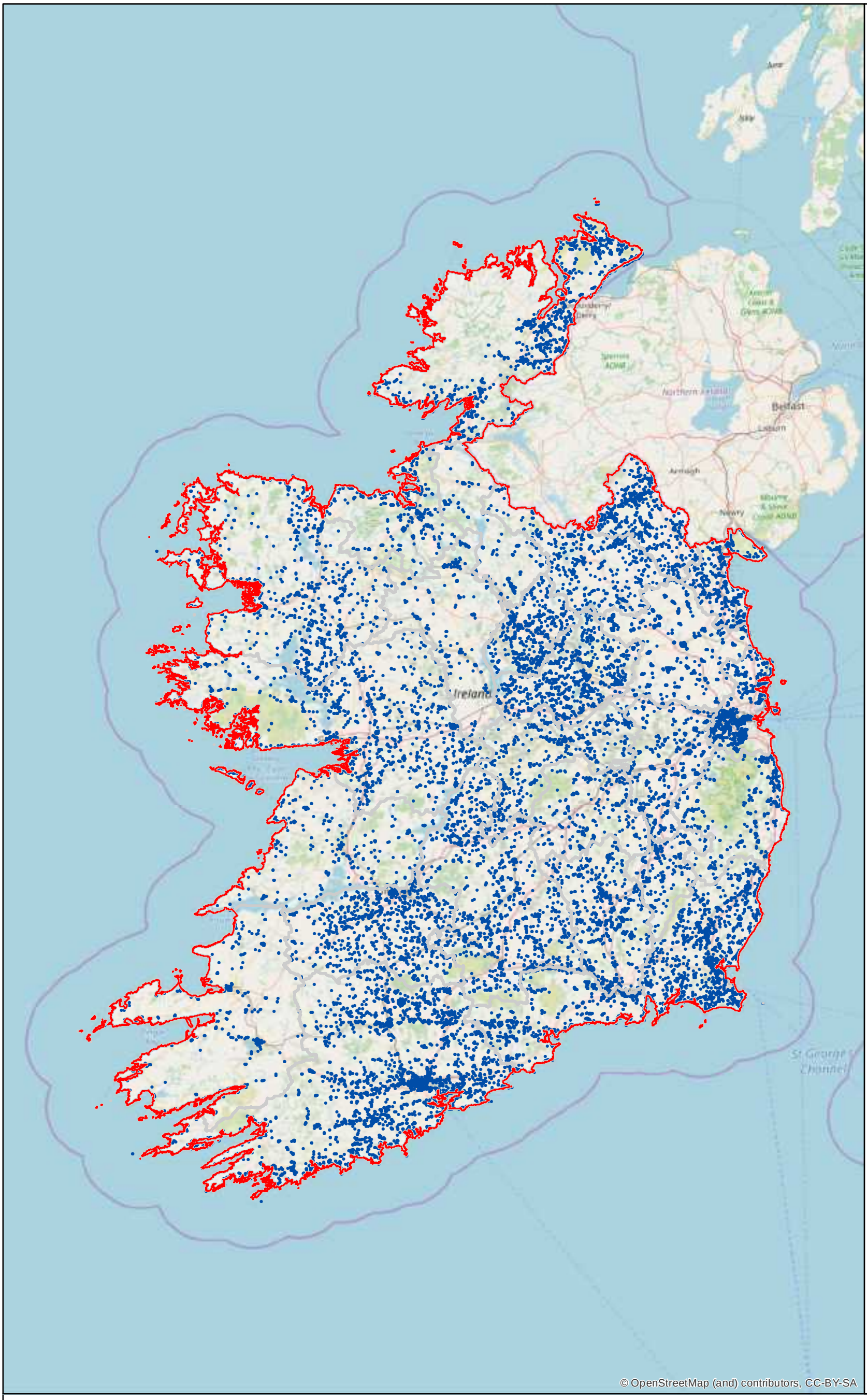
Date

Drawing Title
Recorded Monuments

Drawing Status

Figure No.
Fig A20

Issue



Legend

Republic of Ireland Boundary

County Boundaries

National Inventory of Architectural Heritage (NIAH)

National Inventory of Architectural Heritage (NIAH)

Kilometers

0 12.5 25 50

Irish Transverse Mercator
EPSG: 2157

Client

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Issue	Date	By	Chkd	Appd
	27/03/2020	RD		

Project Title: Gas Networks Ireland - Network Implementation Plan

Scale: 1:1,750,000

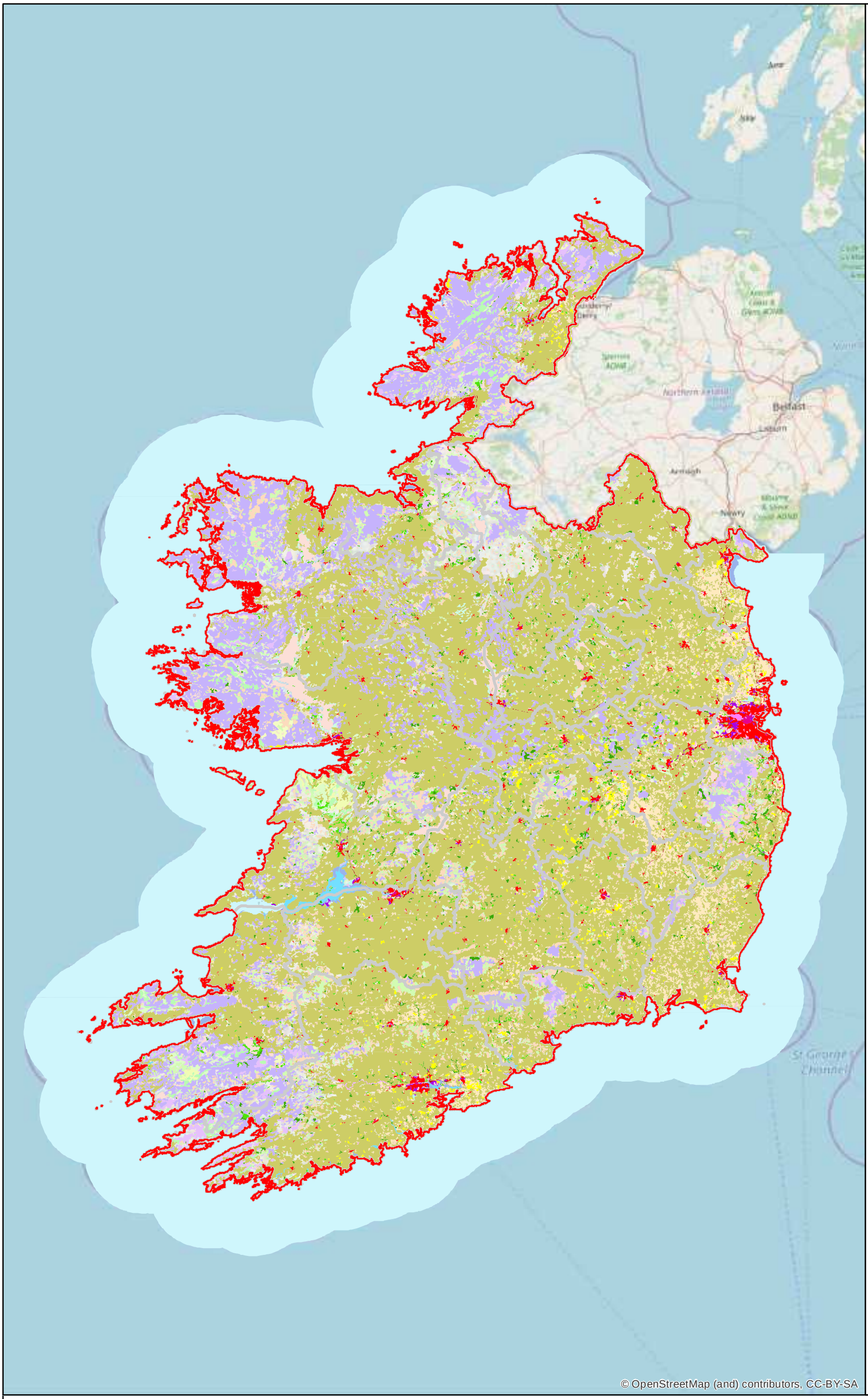
Date:

Drawing Title: National Inventory of Architectural Heritage Sites

Drawing Status:

Figure No.: A21

Issue:



Legend

Republic of Ireland Boundary

County Boundaries

CORINE Landcover 2018

- 111, Continuous urban fabric
- 112, Discontinuous urban fabric
- 121, Industrial or commercial units
- 122, Road and rail networks and associated land
- 123, Port areas
- 124, Airports
- 131, Mineral extraction sites
- 132, Dump sites
- 133, Construction sites
- 141, Green urban areas
- 142, Sport and leisure facilities
- 211, Non-irrigated arable land
- 222, Fruit trees and berry plantations
- 231, Pastures
- 242, Complex cultivation patterns
- 311, Broad-leaved forest
- 312, Coniferous forest
- 313, Mixed forest
- 321, Natural grasslands
- 322, Moors and heathland
- 324, Transitional woodland-shrub
- 332, Bare rocks
- 333, Sparsely vegetated areas
- 334, Burnt areas
- 411, Inland marshes
- 412, Peat bogs
- 421, Salt marshes
- 423, Intertidal flats
- 511, Water courses
- 512, Water bodies
- 521, Coastal lagoons
- 522, Estuaries
- 523, Sea and ocean

Kilometers
0 12.5 25 50

Irish Transverse Mercator
EPSG: 2157

Client

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Issue	Date	By	Chkd	Appd
	27/03/2020	RD		

Project Title: Gas Networks Ireland - Network Implementation Plan

Drawing Title: CORINE Landcover

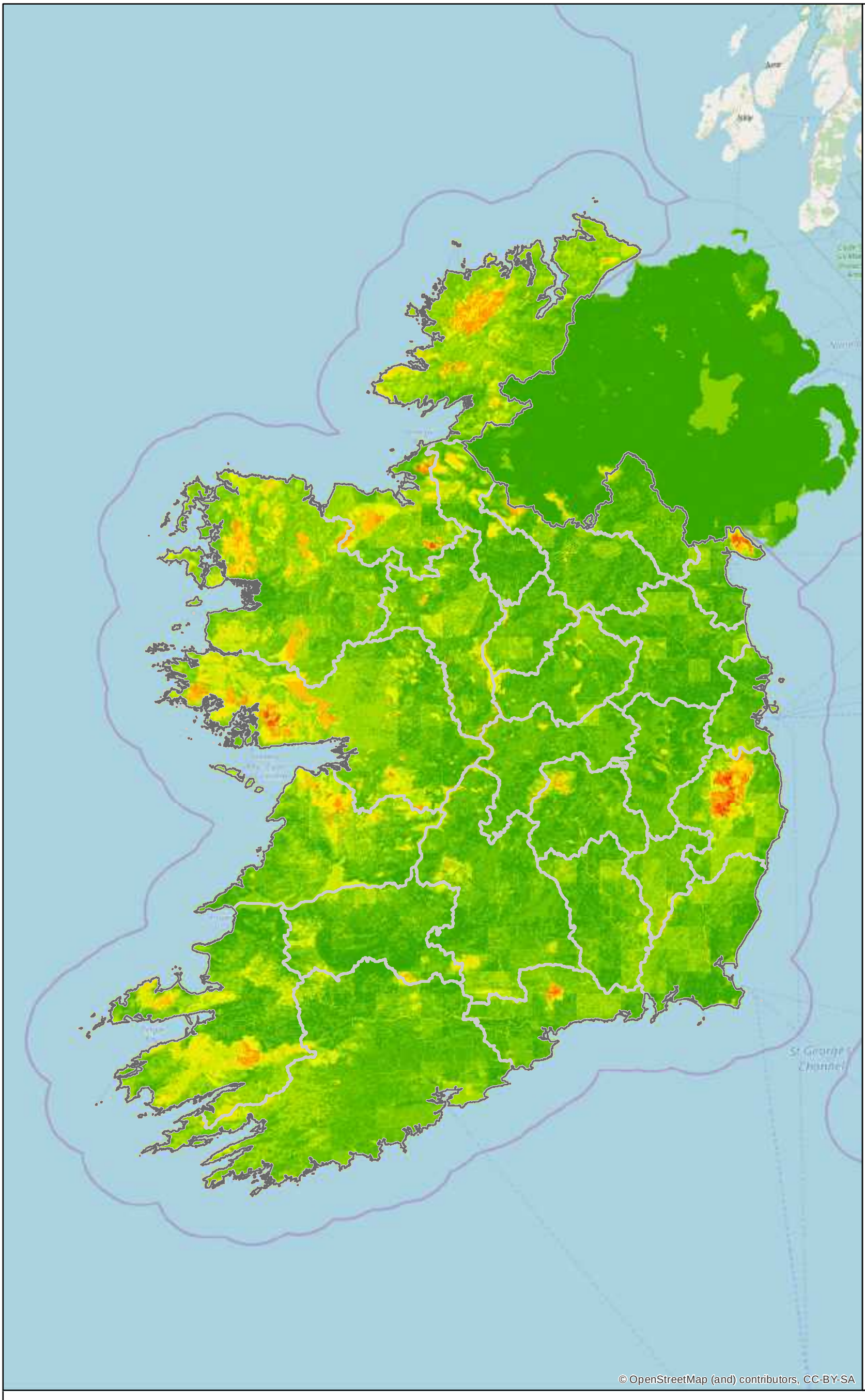
Scale: 1:1,750,000

Drawing Status:

Date:

Figure No.: Fig A22

Issue:



Legend

Republic of Ireland

County Boundaries

Environmental Sensitivity

- 0 - 5
- 5.01 - 10
- 10.01 - 15
- 15.01 - 20
- 20.01 - 25
- 25.01 - 30
- 30.01 - 35
- 35.01 - 40
- 40.01 - 45
- 45.01 - 50
- 50.01 - 55
- 55.01 - 60
- 60.01 - 65
- 65.01 - 80

Kilometers

0 12.5 25 50

Irish Transverse Mercator
EPSG: 2157

Client

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Issue	Date	By	Chkd	Appd
	27/03/2020	RD		

Project Title: Gas Networks Ireland - Network Implementation Plan

Scale: 1:1,750,000

Date:

Drawing Title: Environmental Sensitivity Map

Drawing Status:

Figure No.: Fig A23

Issue: