



Geological Survey Ireland,
Beggars Bush,
Haddington Road,
Dublin,
D04 K7X4
9th November 2017

NPF Submissions,
Forward Planning Section,
Department of Housing Planning and Local Government,
Custom House,
Dublin,
D01 W6X0

To whom it may concern,

This submission has been developed by Geological Survey Ireland in response to an invitation to consult on *'Ireland 2040 - Our Plan - Draft National Planning Framework'*.

Overview

Informing the National Planning Framework is a key priority for Geological Survey Ireland (GSI). GSI is the Republic of Ireland's earth science knowledge centre and is part of the Department of Communications, Climate Action and Environment (DCCAE). GSI is committed to providing free, open and accurate data and maps on Ireland's subsurface to landowners, the public, industry, and all other stakeholders, within Ireland and internationally.

In addition, GSI acts as a project partner in interpreting geoscience data and developing models and viewers to allow people to understand the characteristics of the State's subsurface. GSI pioneers research and product development relating to a diverse array of topics including bedrock and quaternary geology, groundwater, seabed mapping, natural disasters, and geogenic public health risks.

People's Health and Well-Being

GSI is well placed to provide decision-makers with information regarding healthcare issues that arise from underlying geological characteristics of an area, such as insights relating to **radon**. GSI have been working closely with the Office of Radiological protection and research institutes on this topic for several years. Radon is a known carcinogen; 86% of all radiation exposure is from natural sources – 55% of all exposure comes from radon. Ireland is ranked 8th of 29 OECD countries in terms of radon levels. This radiation can interact with lung tissue leading to DNA damage and development of lung cancer.

Up to 250 lung cancer deaths can be linked to radon each year and as such, considering the healthcare implications for the individuals involved as well as the cost to the State in terms of healthcare provision along with advanced notice in relation to the prevalence of radon, is a key contribution that GSI can make to wider society in terms of creating 'healthier places'.

Research published by Indecon Economic Consultants¹ on behalf of DCCAE indicates there is a significant economic cost to the State arising from lung cancer deaths. Table 1 outlines the **full economic impact of radon-related deaths to the Irish economy which is close to €341 million per annum.**

Table 1 Monetary Impact of Radon Cancer Cases Source: Indecon, 2017

Monetary Impact of Radon Cancer Cases, 2016	
Variable	Value
Number of Lung Cancer Cases Due to Radon	250
1 Year Survival Rate Lung Cancer	32.1%
Lung Cancer Deaths Due to Radon	170
Lung Cancer Survivors	80
Value of Statistical Life Year	€2 Million
Average Loss of Earnings for Cancer Diagnosis	€16,750
Cost of Lung Cancer Death Due to Radon 2016	€339.5 Million
Loss of Earnings Due to Radon-Induced Lung Cancer	€1,3 Million
Economic Impact of Radon-Induced Lung Cancer	€340.8 Million
<i>Source: Indecon analysis of EPA, Department of Health, Cancer Research UK, Irish Cancer Society</i>	

GSI has many existing datasets that make it possible to provide such insights, and further research is ongoing through programmes such as the TELLUS² survey which is the national ground and airborne geoscience mapping programme, collecting geochemical and geophysical data. This data is then used to inform the management of Ireland’s environment and natural resources. As will be indicated through this submission, the data arising from this programme has cross-cutting contributions which it can draw connections between land use management and the characteristics of the subsurface.

Integrated Land and Marine Development

Ireland’s offshore territory has the capacity to be a strong contributor to the State’s economy, as set out in the National Marine Plan, Harnessing our Ocean Wealth (HOOW, 2012) and subsequent updates. GSI is contributing to the achievement of this economic growth by providing data and expertise relating to the subsurface in marine and coastal environments. The sectors which GSI is contributing baseline data arising from its Applied and Surveying Programmes are outlined below:

- Offshore Renewable Energy
- Tourism (Marine & Coastal Heritage)
- Aggregates (Marine & Coastal)

In conjunction with the Marine Institute, and funded by DCCAE, GSI is comprehensively mapping Ireland’s marine territory through the INFOMAR³ (INtegrated Mapping For the Sustainable Development of Ireland’s MArine Resource) programme. The project follows on from the Irish National Seabed Survey (INSS) which began in 1997 and is now listed as a Key Enabler for HOOW. It concentrates on creating a range of integrated mapping products and maps of the seabed in the near-shore and shallow offshore area. The information arising from the INFOMAR project forms an invaluable evidence base for those tasked with developing the marine plan as it indicates the type of activities that are best located in different spatial locations around the State’s shoreline that relate to the seabed nature and depth. GSI is responsible for the mapping of inshore areas through the above project. The insights arising from this project are providing valuable data for local authorities

¹ Download Indecon report here: <https://www.gsi.ie/en-ie/publications/Pages/An-Economic-Review-of-the-Irish-Geoscience-Sector.aspx>

² <https://www.gsi.ie/en-ie/programmes-and-projects/tellus/Pages/default.aspx>

³ <http://www.infomar.ie/>

and statutory agencies charged with managing the uses that co-exist in inshore areas and their corresponding coastlines and support the development of a new Marine Spatial Plan.

As an example of input into marine and coastal planning, GSI is also a partner in the **Climate Heritage & Environments of Reefs, Islands and Headlands⁴ (CHERISH)** project, being undertaken under the Ireland-Wales InterReg Programme. The project will enhance cross-border knowledge and understanding of the impacts (past, present and near-future) of climate change, storminess and extreme weather events on the cultural heritage of reefs, islands and headlands of the Irish Sea. The project will target data and management knowledge gaps, by employing innovative techniques to discover, assess, map and monitor heritage assets on land and beneath the sea. It will raise awareness about the impacts of climate change on heritage, train the citizen scientist and widely disseminate the results. It will also develop best practice and guidance, making recommendations for future adaptation. Through this project, GSI can contribute knowledge and expertise to the appropriate agencies and decision-making bodies that are responsible for the funding and delivery of coastal defence schemes as well as advising project specific components of infrastructure designed to combat coastal erosion.

Offshore Renewable Energy

The most important component of an infrastructure project in marine and terrestrial environments is its foundation. The baseline foundation of infrastructure development is the data used to select an appropriate location for the project. Delivery of resilient infrastructure is dependent on the availability of highly accurate geospatial datasets. Investment in the acquisition and study of geospatial data is a necessity in terms of providing the infrastructure that will service existing and future economic growth on and around the island of Ireland. As a foundational piece for the development of marine infrastructure in Ireland, GSI, as operator of the INFOMAR programme, participate in the Offshore Renewable Energy Steering Group of DCCAE.

The potential contribution of the INFOMAR Programme to the evolution of Ireland's 'blue economy' is set out in table one below.

Table One: Estimated Value of the INFOMAR Programme By Sector (Source, PwC, 2008)

Option	'Do Nothing'	Option	'Do Nothing'	Option
Commercial				
Fishing Sector	2,083	15,610	156,102	95,404
Aquaculture	6,112	46,252	57,816	57,816
Biodiversity	1,028	7,783	11,118	11,118
Renewable Energy	6,671	20,013	40,026	40,026
Energy Exploration	0	0	64,887	49,309
Aggregate Industry	23,077	65,754	85,480	85,480
Knowledge Economy				
Research	2,226	8,111	16,222	10,193
Legislative				
Non-Compliance Fines	2,028	6,083	8,111	7,453
Total PV of Benefits	43,226	169,607	439,763	356,799

The range of sectors indicated in the table above is illustrative in terms of indicating the cross-sectoral reach of the INFOMAR programme. The information that is acquired by the programme's activities has a myriad of applications as baseline insights which go forward to inform decision makers and investors as to the feasibility of undertaking actions to generate economic growth on the basis of a comprehensive, accurate and evidence-based platform.

⁴ <http://www.cherishproject.eu/en/>

In terms of offshore renewable energy generation, this sector has a key role to play in the decarbonisation of Ireland's energy supply. The INFOMAR project is the first step in creating the conditions for this sector in terms of its mapping of the seabed and the shallow geological characteristics of Ireland's offshore. Given the fundamental necessity associated with the dataset for the offshore renewable energy sector, the acquisition of this information should be considered to be an integral part of the infrastructure development process and, by logical extension, constitute infrastructure in itself. Given the implications of the Marine Spatial Planning Directive, collaboration between GSI, the relevant statutory agencies and planning authorities will be instrumental to forming both national and sub-national marine spatial plans.

Sustainability

Knowledge of the subsurface in terms of the availability of resources proximate to areas where they are in demand will be key to addressing environmental pressures associated with development. Adverse impacts associated with urban expansion without regard to subsurface conditions include unanticipated disruption of groundwater flows that can cause wells to dry up, ingress of pollutants, damage to sites of historical interest or flooding of existing subsurface developments.

The trend towards urbanisation in Ireland's existing urban centres is creating momentum for the development of infrastructure and services in those areas to cater for an expanding population. GSI has been to the forefront of research regarding the manner in which knowledge of the subsurface can play a role in sustainably managing urbanisation in a sustainable manner.

An example of this research is the SUB-URBAN5 project that GSI is a research consortium member of. This is an EU COST Action, for a European network of Geological Surveys, Cities and Research Partners working together to improve how we manage the ground beneath our cities. Using the insights arising from this project and the available data, GSI can contribute to the National Planning Framework (NPF) through engagement with local planning authorities whose respective county and city development plans will give form to the high level policy outlined in the NPF.

Planning policy measures that are based on strong evidence bases will be required when decisions on the location of low carbon technologies are being considered. The implications of geohazards for renewable energy infrastructure are significant (as evidenced by the Derrybrien incident in 2003).

GSI is uniquely positioned to support the activities of local and national planning authorities by producing data and expertise in order to assess the potential geohazards that may negatively impact the development of sustainable energy infrastructure. GSI set up the Irish Landslides Working Group, in response to major landslides at Pollatomish and Derrybrien in 2003. This led to production of the report *Landslides in Ireland* and implementation of its main recommendations in the development of the [Landslide Susceptibility Map Viewer](#)⁵. This map indicates susceptibility to landslides occurring at a granular level nationally, based on slope and ground conditions and validated against the National Landslide database of GSI. Planning policy measures, such as land use zonings in County Development Plans (CDPs), may be informed by the availability of mapping and datasets such as the above. The overlaying of datasets may preclude certain types of development in areas where landslide susceptibility is present.

A diverse mix of renewable energy sources is required to decarbonise Ireland's energy mix. The data collected by GSI through its existing programmes (such as [INFOMAR](#)) can be drawn upon by government and industry in order to develop offshore wind energy infrastructure in optimum locations, in terms effective site selection as well as route planning for supporting infrastructure such as subsea grid connections.

⁵ <http://sub-urban.squarespace.com/>

⁶ <https://dcentr.maps.arcgis.com/apps/webappviewer/index.html?id=b68cf1e4a9044a5981f950e9b9c5625c>

Infrastructure

Beyond the investment in data acquisition outlined above, supporting the delivery of infrastructure projects that have the capacity to secure sustainable economic growth in an Irish context is a key priority for GSI. GSI's domestic infrastructure priorities are focused on enhancing Ireland's export capabilities across a range of key sectors, such as transport, utilities and energy. Investment in these sectors will enable the attraction of investment into Ireland, both in the Dublin area and in the regions.

GSI supports Geoscience Ireland (GI)⁷, an export-orientated business development cluster of over 30 'geo-scientific' consultancies and contractors. Investment in domestic infrastructure projects may benefit GI's member companies as they possess the requisite skills and expertise to deliver resilient infrastructure. Consequentially, the member companies may be able to use this experience in the acquisition contracts for infrastructure delivery and consultancy services overseas. In terms of infrastructure priorities, the list below outlines a number which may contribute to the infrastructural strengths of the State.

- Road (completion of the motorway network [notably the M20], National Primary Route 'Blackspot' remediation, North/South road links);
- Rail (expansion of rail freight capacity, increased capacity and speeds on intercity routes [especially between Dublin – Belfast]);
- Port (expansion of port infrastructure to receive increased cargo volumes from the continent in order to avoid supply chain disruption arising from post-Brexit customs barriers);
- Airport (increased capacity to serve predicted demand in access to Dublin as it capitalises on its position as a potential alternative to London);
- Water & Waste Water (expansion of wastewater treatment plants to deal with increasing volumes of waste water in order to comply with water frameworks directive limits; ensuring adequate and reliable potable water supplies), GSI's Groundwater programme can inform decision-makers on the development-related impacts on groundwater supplies; and
- Energy (enhancement of energy security by acquiring direct links to the Continent for energy transmission between national grids). This will require knowledge of the sea bed. The INFOMAR project is an exemplar of how this data can be acquired.

In terms of maintaining the State's existing infrastructure, the expertise of GI's member companies can contribute to upkeeping assets. GSI's programmes can also contribute to the maintenance of infrastructure by providing geotechnical and environmental insights on subsurface conditions which can help identify and rectify issues with infrastructural assets before they impact on the capacity of that infrastructure to serve society. Accurate geospatial data enables decision makers to prioritise funding delivery and maintaining infrastructure. As an enabler of infrastructural growth, geoscientific data acquisition is an integral part of infrastructural development. Data relating to the subsurface can be used as a baseline on which models of infrastructure delivery can be delivered. Such models can also include the implications of sea level rise.

Extractive Industries

The NPF will intersect with the spatial planning considerations associated with developing the State's mineral extraction sector, in terms of quarrying activities to support infrastructure development in addition to mining and mineral extraction.

⁷ <http://www.geoscience.ie>

Ireland has important extractive industries, including metallic minerals, non-metallic minerals and fossil fuels. Zinc and lead production are significant economic sectors in Ireland. The total turnover and GVA for zinc and lead production is incorporated in Table 2 below (zinc and lead activities supported the employment of 1,262 full-time equivalent persons and had an output of over €550m) in 2016. GSI provide datasets to support exploration and development for the extractive industry, from basic geological mapping to the Tellus Programme of airborne geophysical and ground geochemistry surveys.

Table 2 Economy Wide Impacts of the Extractive Industry Source: Indecon, 2017

Economic Impacts of the Extractive Industry - 2016			
All Mining and Quarrying	Output (€ million)	GVA (€ million)	Employment (FTE)
Direct Impacts	939.9	282.9	3,633
Indirect and Induced Impacts	716.3	359.2	4,189
Economy-Wide Impacts	1,656.2	642.1	7,822

Source: Indecon analysis

The extraction of non-metallic minerals also supports the construction of buildings and roads. The overall economy-wide impacts of these areas are €557.4m in terms of output, €233.3m GVA and 2,632 FTEs and this includes the direct, indirect and induced impacts. Given the extent of housing and other construction requirements in Ireland, employment in this sector which currently amounts to over 2,600, is likely to expand. The economic impact of all mining and quarrying industries in terms of turnover is shown in Table 2, with turnover estimated to be €940m in 2016. Having regard to the strategic nature of the extractive industry, GSI is positioned to contribute data and insights to national, regional and local planning authorities as they shape planning policies that facilitate the sustainable development of Ireland’s natural resources.

GSI can actively contribute to national, regional and local government authorities in drafting planning policies and plans that take account of locally available aggregates which can be harnessed to support infrastructure development such as housing and roads related development. GSI maintains the **Directory of Active Quarries and Pits in Ireland**⁸ which includes information for each site on:

- Location of active sand and gravel pits, crushed rock quarries and dimension stone quarries
- Contact details for quarry operators
- Details on the activities and processing carried out on-site
- A list of products available from each quarry or pit

GSI has developed a National Aggregate Potential Map, indicating not just location of quarries for both sand and gravel and crushed rock, but also mapping the potential areas for development of these resources. This is available as an online tool via gsi.ie. GSI also has ongoing programmes that focus on identifying potential sources of the **basic materials required for infrastructure development**. The outputs of these programmes have the capacity to inform local planning authorities in the formation of their plans. This collaboration will ensure that aggregates can be sustainably exploited and will not be sterilised by unsympathetic forms of development taking place in close proximity.

⁸ <https://www.gsi.ie/en-ie/publications/Pages/Quarry-Directory.aspx>

Groundwater

Groundwater is a major natural resource and supplies up to one third of Ireland's drinking water. Public water supplies in some counties come entirely from groundwater, and some counties rely mainly on surface water. Two thirds of Group Water Schemes use wells and springs. In rural areas not served by Public or Group Water Schemes, groundwater is usually the only source of supply and there are more than 100,000 private wells and springs in use. With such a large proportion of the country relying on groundwater it is essential that this resource is properly protected. This can be achieved through appropriate land use planning and practice. Research published in 2017 by Indecon estimates that the value of groundwater resources to the Irish economy is between €300 million and €500 million per annum. Consequently, understanding this resource in the context of the NPF, and subsidiary planning policies, is vitally important in terms of supporting rural development and economic activity. GSI has a number of projects which actively contribute to understanding this resource that have relevance to the NPF. In order to support the Water Framework Directive and Clean Drinking water, GSI have produced several national planning tools including a National Groundwater Vulnerability Map in conjunction with the EPA.

Another example of groundwater related planning is the 'GWflood'⁹ project. This initiative is a groundwater flood monitoring and mapping programme aimed at addressing the knowledge gaps surrounding groundwater flooding in Ireland. The programme was initiated in response to the unprecedented groundwater floods of winter 2015/2016 and is a collaborative effort combining the karst groundwater expertise of GSI and Trinity College Dublin. Arising from this project, GSI will provide the data and analysis tools required by local and national authorities to make scientifically-informed decisions regarding groundwater flooding. Such outputs will be of direct relevance to the NPF and its subsidiary plans and policies as applied at regional, county and local level and will inform the next round of the OPW Catchment Flood Risk Assessment and Management (CFRAM) programme

Geoheritage and Geotourism

GSI identifies and documents important geological heritage sites through its nationwide Geoheritage programme of County Site Audits, which enables their recognition and integration within county development plans. GSI provides maps and baseline data on these geosites and inputs to the planning system through environmental impact assessments, county and regional plans, and national schemes and route planning such as for flood relief and Eirgrid. Awareness of these geosites through GSI's knowledge and data provision can help inform policy on land use zonings in county development plans. With their added heritage and educational value, these important sites can be integrated into residential 'green spaces' within the anticipated growth of peripheral urban zones.

The Geoheritage Programme promotes geological heritage with full cognisance of competing interests of multiple land users, and has developed guidelines for addressing geological heritage in the extractive industry in partnership with Irish Concrete Federation. GSI also supports geotourism through its data and grant aid to the three Irish UNESCO Global Geoparks and other geoheritage projects. Geoparks, in particular, as geologically significant areas that the local communities promote through sustainable tourism, culture and education, are places known to promote health and well-being. GSI's support and expert input into publically-accessible interpretation of the geological story helps demonstrate the place of geology in natural and cultural heritage and its relevance to society. The 2017 Indecon report has estimated that the economy-wide impact of the Geotourism sector in Ireland was worth €661 million in 2016, and supported nearly 8,800 FTEs.

⁹ <https://www.gsi.ie/en-ie/programmes-and-projects/groundwater/projects/gwflood/Pages/default.aspx>

Table 3 Economy-Wide Impact of the Geotourism Sector: Indecon, 2017

Table 2.14: Economy-Wide Impacts - 2016			
	Output (€ million)	GVA (€ million)	Employment (FTEs)
Fee paying Geo Heritage Sites	59.8	37.6	794
Free Geo Heritage Sites	13.0	8.1	172
Geoscience Activities	588.1	369.8	7,801
Total	660.9	415.5	8,767
<i>Source: Indecon analysis</i>			

In relation to marine heritage and tourism, The INFOMAR project is also mapping the location of shipwrecks in Irish coastal waters. This resource is invaluable for historical purposes as it catalogues centuries of marine heritage. The location and identification of these wrecks enables the relevant statutory authorities to protect these sensitive locations from inappropriate development in the marine environment. Beyond the intrinsic value of this data from a heritage perspective, the locations of these wrecks may become a component of marine heritage-related tourism initiatives.

Summary

The purpose of this submission is to articulate the manner in which GSI is assisting planning at present and can further assist the development and operation of the NPF over the envisioned timeframe that it will operate. The cross cutting nature of GSI's remit and the programmes that it operates directly relate to critically important land use planning areas that form the core of the NPF.

Yours Sincerely,



Koen Verbruggen
 Director
 Geological Survey Ireland