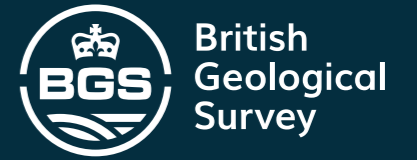




An Roinn
Geilleagair



GEOLOGICAL SURVEY OF NORTHERN IRELAND | STRATEGY

Geoscience for a brighter future

2025-2030



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Front cover image: Courtesy of Tourism Northern Ireland

GEOSCIENCE FOR A BRIGHTER FUTURE

Executive summary

To address key societal challenges, including climate change and the increasing demand for natural resources, the Geological Survey of Northern Ireland (GSNI) undertook an inclusive process to develop a five-year Strategy. This will meet the needs of our parent Government department, the Department for the Economy (DfE), as well as the wider public sector in NI, and at the same time help to address the challenges affecting Northern Ireland

The output of that process is “Geoscience for a Brighter Future: 2025–2030”, a forward-focused vision for the organisation that

will benefit every single citizen in Northern Ireland. This is an ambitious blueprint for driving the geoscience agenda across government and utilising this expert resource to improve the economy, protect the environment and enhance the lives of people in Northern Ireland.

Strategic objectives

Our four key strategic objectives are:

Society, economy and environment: GSNI will deliver geoscience research and evidence to meet the needs of government and improve the economy, environment, and sustainability of NI.

Unlocking the value of our data: GSNI will unlock the value of its archive through digital transformation of our data and delivery mechanisms.

Partners and customers: GSNI will build upon its status as a trusted partner and provider of impartial geoscience information to support decision-making processes and to engage the public.

People and assets: GSNI will invest in and develop its people and assets to provide innovative, efficient, and effective service delivery. Science and innovation The Strategy will be implemented over a five-year period,

subject to available resources.

The strategic objectives will be delivered through four science and innovation programmes.

Natural resources and energy transition: GSNI will carry out research and provide expertise to facilitate the transition to a low-carbon economy through the sustainable use of natural resources including critical raw materials, geothermal energy, and groundwater.

Environmental change and geohazards: GSNI will fortify its understanding of geoenvironmental change and geohazards to

determine the risks and potential impacts on wider economic, societal, and environmental systems.

Baseline geoscience and digital transformation: GSNI will undertake strategic geological mapping, unlock the vast information held within its archives, will invest in data delivery mechanisms and new data products and services, to underpin evidence-based, decision-making.

Science for society: GSNI will embed geoscience within society in Northern Ireland so that it can be used as an instrument for climate action and as a catalyst for economic, environmental and social development.

Our work programme will be fine-tuned in response to the Sustainable Development Goals (SDGs) of the

United Nations, whilst at the same time aligning to relevant UK and Northern Ireland specific policies for the benefit of the economy, environment and society.

Introduction

The Geological Survey of Northern Ireland (GSNI) is an office of the Department for the Economy (DfE) in Northern Ireland, staffed by scientists of the British Geological Survey (BGS), an arrangement that has existed since 1947.

GSNI provides professional, technical and scientific research, data services and archive management to inform the development of Northern Ireland's economy and to help protect the environment, both of which benefits the wider Northern Ireland society.

The world has changed since GSNI was established in 1947; climate change combined with increasing global population demands for clean energy, raw materials and water presents an increasing series of challenges and opportunities for our economy, the environment and for our society.

The majority of GSNI's work programme is developed with and delivered for the DfE on a three-year basis. However, with the ever-increasing demand for geoscientific data, information and advice, GSNI is working increasingly with other Government departments in Northern Ireland, and across the wider public sector. In addition, the need for solutions to address longer-term societal challenges means that consideration needs to be given to planning beyond the three-year cycle.

To help meet these challenges GSNI underwent a process to develop a five-year Strategy that will meet the needs of DfE, as well as the wider public sector in NI, and at the same time help to address the key societal challenges affecting Northern Ireland. The output of that process is "Geoscience for a Brighter Future: 2025 to 2030", a forward-focused vision for the organisation that will benefit every single citizen in Northern Ireland.

GEOSCIENCE FOR A BRIGHTER FUTURE

Our vision is to drive the contribution of geoscience to the economy, our society, and the environment, for the benefit of Northern Ireland.

Our goal is to deliver high quality geoscientific evidence and expert knowledge to inform the sustainable use of natural resources and sound environmental governance whilst helping society transition to a low carbon economy and adapt to a changing world.

Statutory objectives

GSNI was established under the Minerals (Miscellaneous Provisions) Act (Northern Ireland) 1959 which is online here.

This work programme for DfE and associated terms and conditions are detailed in a service level agreement (SLA) between DfE and UK Research and Innovation (UKRI). The same applies to SLAs with other public sector bodies.

UKRI is a non-departmental public body sponsored by the Department for Science, Information and Technology (DSIT) which governs the BGS and employs GSNI staff.

In addition to the standard Health Safety, Equality, and Information Request legislation that all public sector bodies in Northern Ireland must adhere to, there are a number of other specific pieces of legislation applicable to GSNI.

Activity	Legislation
Minerals	<ul style="list-style-type: none">Minerals (Miscellaneous Provisions) Act (Northern Ireland) 1959Mineral Development Act (Northern Ireland) 1969The Quarries (Northern Ireland) Order 1983
Abandoned mines	<ul style="list-style-type: none">Mineral Development Act (Northern Ireland) 1969
Petroleum	<ul style="list-style-type: none">Petroleum (Production) Act (Northern Ireland) 1964
National core repository	<ul style="list-style-type: none">Minerals (Miscellaneous Provisions) Act (Northern Ireland) 1959
Planning	<ul style="list-style-type: none">Planning Act (Northern Ireland) 2011The Planning (General Development Procedure) Order (Northern Ireland) 2015The Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 2015

Values statement

We act with integrity, impartiality and accountability whilst conducting our public service work.

We continue our development as geoscientists and seek external, accreditation for all our professional and technical capabilities.

We want to see our data, science and expertise openly available and applied to sustainable development with economic, environmental and social benefits for society.



Challenges and opportunities

The current political, economic, sociological, technological, legal and environmental context of GSNI presents a range of challenges and opportunities summarised below.

Climate Change

In recognition of the significant threat posed to the economy, the environment and across society, the UK was the first country in the world to establish a legally binding framework to reduce carbon emissions when it passed the Climate Change Act in 2008. It provided a comprehensive framework for climate change mitigation and adaptation, underpinned by legally binding emissions targets for 2050. Despite this ground-breaking progress in the UK, Northern Ireland did not pass specific climate change legislation until 2022.

The Climate Change Act (Northern Ireland) creates a target for net-zero greenhouse gas emissions by 2050 and requires the development and publication of five-year Climate Action Plans. Each of these must include policies and proposals from all Northern Ireland Government departments, annual greenhouse gas and air quality targets as well as soil and biodiversity targets.

The Act also tasks the Government departments of Northern Ireland with publishing plans for different sectors of the economy, setting out how specific sectors will contribute to the targets of the Act. These include sectoral plans for energy, industrial processes, transport, infrastructure, waste management, agriculture and fisheries.

Net Zero

The UK became the first major economy in the world to pass legislation to end its contribution to global warming by 2050 requiring the UK to bring all greenhouse gas emissions (GHGs) to net zero by 2050, compared with the previous target of at least 80% reduction from 1990 levels.

Prior to the establishment of the Climate Change Act (Northern Ireland) in 2022, the UK Committee for Climate Change (UKCCC) in its Sixth Carbon Budget Report in 2020 recommended that *“any climate legislation for Northern Ireland must include a target to reduce all GHGs by at least 82% by 2050 in line with the UK Net Zero goal”*. However, the Act goes much further and sets an ambitious target of at least 100% reduction in net zero greenhouse gas emissions by 2050 for Northern Ireland, along with

interim targets including an at least 48% reduction in net emissions by 2030.

In 2023, Northern Ireland generated 47.7% of its electricity from renewable sources. The Act, within its sectoral targets, requires at least 80% of electricity from renewable sources by 2030. Whilst this may be achievable, the heat and transport sectors of the energy system still rely heavily on fossil fuels and are more challenging than the power sector to decarbonise.

Energy Mix

In Northern Ireland, the number of households in fuel poverty is 24% (UK Government 2024), the highest of the UK devolved regions, mainly due to using oil or electricity, rather than natural gas, for heating in rural areas, as well as differences in regional income (UKCCC 2020).

In 2023, it was estimated there are approximately 330,000 gas connections across Northern Ireland, including homes and businesses. Considering that natural gas was only introduced to Northern Ireland in 1996, this is a significant achievement, especially as natural gas is recognised as being a transitional

fuel to the pathway to net zero. In addition, the modern gas network offers potential for the future injection of green hydrogen and biomethane to help deliver decarbonisation of the heating sector in Northern Ireland.

There is an opportunity for geothermal energy to form part of the solution through its direct use as a low-carbon energy source and the role it can play in optimising the electrification of heating and cooling. GSNI is actively researching the geothermal potential of Northern Ireland will continue to develop this research together with the DfE and with partners from across the island of Ireland.

In 2024, The UK Government committed to double onshore wind and quadruple offshore wind by 2030, part of its goal to fully decarbonise electricity by 2030. These are hugely ambitious targets considering that the UK is already leading the way in Europe with offshore wind production.

As part of the requirement for 80% of all electricity to be from renewable sources by 2030, the Northern Ireland Energy Strategy has targets for 1GW of offshore wind in Northern Ireland by the same year. This has the potential to generate enough electricity

to power over 1 million homes. To ensure that these targets are met, the DfE has established the Offshore Renewable Energy Forum (OREF), within which GSNI participates, together with other key stakeholder including DAERA and the Crown Estate. When all these mutual interests align to support offshore wind there is potential to reduce carbon emissions and create jobs.

Critical Raw Materials and the Circular Economy

To achieve both the UK and Northern Irish net zero targets, there is a requirement to decarbonise industry and supply chains. This transition will include the development and deployment of emerging and new technologies all of which will require the acquisition and use of critical raw materials and implementing a more circular economy.

Most minerals and metals are imported through complex and dynamic supply chains which can be adversely affected by geo-political events, so it has never been more important to understand the future critical raw material demands and supply chain vulnerabilities.

The UK Government published their first Critical Minerals Strategy in 2022 that sets out plans to secure supply chains by boosting domestic capability, attracting investment and playing a role in solving global challenges. The delivery of the UK Critical Minerals Strategy is being led by the Critical Minerals Intelligence Centre (CMIC), led by the BGS,

who are working with partners to gather and analyse intelligence on the supply and demand of critical minerals, including a national-scale assessment of the critical minerals within the UK.

In 2024, the Council of the European Union adopted the European Critical Raw Materials Act to support the expected increase in demand for critical raw materials. The Act aims to increase and diversify the EU's critical raw material supply, support circularity, and support research and innovation. Whilst the UK is no longer a member of the EU, the global connectivity of the critical raw materials supply chains, means that this is still an important piece of legislation.

Both the EU and the UK have published lists of critical raw materials with 34 named on the fifth EU list (2023) and 18 on the current UK list (2021). The main parameters in determining their criticality are economic importance and supply risk.

Research that has already been undertaken by GSNI believes Northern Ireland may have the geological potential to host eighteen of the top thirty on the EU list of CRMs and a number on the UK list. GSNI will continue to undertake research on CRM prospectivity to inform DfE's mineral licensing programme and the development of minerals policy.

Geoscience Industry and the Northern Ireland Economy

The value of the geoscience industry to the Northern Ireland economy, up until relatively recently, has almost gone unnoticed. However, the Ulster University Economic Policy Centre (UUEPC) was commissioned by the DfE in 2018 to research the sector's economic impact and the potential to benefit the economy further.

The results were significant; it directly accounts for a total of 34,000 jobs (4.6% share of Northern Ireland's total employment), aGVA of £2.1 billion (5.8% share of total Northern Ireland GVA) and 6,150 businesses (8.6% share of the total). In terms of Northern Ireland equivalents, the employment numbers are equivalent to the agriculture sector and the knowledge economy and the aGVA total is close to the GVA produced by construction.

Whilst these statistics are undoubtedly impressive, it is likely that the economic impact, including the savings of risk prevention, of the geoscience sector, now five years later, is much greater given the increasing demand for natural resources and the even greater need to address the impacts of climate change.

Green Energy Skills and Job Opportunities

In 2023, the DfE commissioned Energy and Utility Skills Group to investigate the skills required for a transition to an advanced zero emission, indigenous, diverse, energy secure and circular economy in Northern Ireland. The research covered eight relevant industries including: large scale energy production, infrastructure, domestic low carbon technologies and energy efficiency, industrial processes, circular economy, transport, agriculture, and fisheries. This research recognised that geoscientists were essential in most of these sectors and acknowledged that the educational pathways to achieve this in Northern Ireland were inadequate.

The development of a geothermal sector holds potential for low-carbon jobs in Northern Ireland. In Germany, where there is a growing geothermal industry, in addition to carbon savings, the utilisation of geothermal energy has created >22,000 jobs and provided an economic stimulus of €13.3 billion since 2000 (BMW data) (Agenda NI 2020).

Critical raw materials used for digital systems and devices, renewable energy and energy storage, electric mobility and autonomous vehicles also hold potential for low-carbon, skilled, high-value jobs in Northern Ireland.

Based on a sustainable, high-quality supply of groundwater from the Sherwood Sandstone in the Lagan Valley; Coca Cola invested £93.5m in its

manufacturing plant at Knockmore Hill in Lisburn, Co. Antrim, a 50,000 square metre facility employing more than 450 people. This is just one example from Northern Ireland's food and drinks industry of harnessing, off-grid, low-carbon, high-quality groundwater as a key ingredient for its products. GSNI is actively assessing the groundwater resource potential and monitoring the groundwater quality of Northern Ireland and plans to advance this in the next five years.

Increasing societal challenges require greater numbers of geoscientists to address them. The UK list of Skilled Worker visa: shortage occupations (HM Government 2020) include engineering geologists, hydrogeologists, geophysicists, geoscientists, geologists, geochemists, and senior resource geologists. This was mirrored in the Northern Ireland Skills Barometer (Ulster University 2019) highlighting a significant undersupply in Physical Environmental Sciences.

GSNI has been working since 2010 to address the absence of science in Northern Ireland's primary school curriculum. Its set of Key Stage 2 resources developed in partnership with teachers were accredited by the Northern Ireland Centre for Curriculum Examination and Assessment (CCEA). GSNI scientists also advise and provide content to CCEA for GCSE and A-Level subjects on the secondary school curriculum and work in collaboration with academics at many universities in the UK, Ireland, and Europe.

Despite what has already been achieved, GSNI is highlighting this as a strategic skills issue for Northern Ireland that needs proper consideration across several sectors and at multiple levels.

Environmental Change and Critical Infrastructure

Projected changes in rainfall patterns and extremes in temperatures because of climate change will have a significant impact on our built and natural environment. This will be especially the case for Northern Ireland's coastline as well as for much of our critical infrastructure including energy, transport, water and wastewater, and telecommunications. Such conditions are expected to increase susceptibility to a range of geohazards, both at the coast and further inland and whilst these are particularly apparent in urban settings, they can also occur in rural areas, where the impact on local communities can be particularly severe.

The BGS has estimated that the cost of mitigation of subsidence from shallow geohazards alone will be more than £1 billion across the UK and is expected to increase significantly over the next 30 years due to climate change. There has been little research into such impacts in NI but given the potential risk to the economy, environment, and society it is a serious issue.

GSNI is currently working with partners such as DAERA, DfI, Ulster University and the National Trust to assess the impacts of climate change on the coast,

and on shallow geohazards, such as landslides, further inland. Participating in groups such as the Northern Ireland Coastal Forum Working Group, led by DAERA and DfI, are a valuable mechanism for delivering such research.

Data

Good data underpins sound decision-making and open-data drives transparency. The guiding principles for scientific data management and stewardship advocates that data should be Q-FAIR (Findable, Accessible, Interoperable, Reusable and of the right Quality that is fit for purpose).

GSNI archives hold a wealth of information that must be reappraised against today's societal challenges, and we need to invest in new technologies and platforms to unlock these data assets and provide long term delivery mechanisms to support Northern Ireland's Open Data strategy. The importance of location data has been identified in the UK's Geospatial Strategy and this presents an opportunity for GSNI.

Our data assets, when combined with access to high quality earth observation data provides enhanced opportunities to derive new and innovative data products to address our ever-changing world.

GEOSCIENCE FOR A BRIGHTER FUTURE

Policy context

GSNI's Strategy has ambitious intentions to deliver significant change for the people of Northern Ireland. The Strategy has been aligned with the United Nations 2030 Agenda for Sustainable Development, providing a shared blueprint for peace and prosperity for people and planet, now and into the future.

The mechanism for achieving this Agenda is the 17 Sustainable Development Goals (SDGs). These recognise that ending poverty should go hand in hand with improving health and education, reducing inequality, and enhancing economic growth, all whilst tackling climate change and working to preserve our marine and terrestrial environments.

This overarching ambition aligns with GSNI's goal to deliver high quality geoscientific evidence and expert knowledge to inform the sustainable use of natural resources and sound environmental governance whilst helping society transition to a low carbon economy and adapt to a changing world.

Whilst the GSNI Strategy has been designed to contribute to the overall ambitions of the UN 2030 Agenda for Sustainable Development, there are a number of the SDGs that are especially relevant.



SDG2: Zero Hunger

Target 2.4 By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality



SDG4: Quality Education

Target 4.4 By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship



SDG6: Clean Water and Sanitation

Target 6.4 By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity

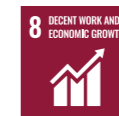
Target 6.5 By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate



SDG7: Affordable and Clean Energy

Target 7.2 By 2030, increase substantially the share of renewable energy in the global energy mix

Target 7.a By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology



SDG8: Decent Work and Economic Growth

Target 8.2 Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value added and labour-intensive sectors

Target 8.9 By 2030, devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products



SDG9: Industry, Innovation and Infrastructure

Target 9.1 Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all



SDG11: Sustainable Cities and Communities

Target 11.4 Strengthen efforts to protect and safeguard the world’s cultural and natural heritage

Target 11.5 By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations



SDG12: Responsible Consumption and Production

Target 12.2 By 2030, achieve the sustainable management and efficient use of natural resources

Target 12.b Develop and implement tools to monitor sustainable development impacts for sustainable tourism that creates jobs and promotes local culture and products



SDG13: Climate Action

Target 13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries

Target 13.2 Integrate climate change measures into national policies, strategies and planning

Target 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning



SDG14: Life below Water

Target 14.2 By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans



SDG15: Life on Land

Target 15.1 By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands.

GSNI’s cross-disciplinary and multi-sectoral Strategy is complementary and contributes to several other local, national and international policies, strategies and frameworks. These have been organised according to theme and summarised in the following table.

Theme	International
Economy	UK Net Zero Strategy: Build Back Greener (2021) 10X Economy – An Economic Vision (2021) Draft Approach to 10X Technologies and Clusters (2023) Draft Approach to 10X Place and Sub-Regional Economy (2023) Draft Green Growth Strategy and Delivery Framework (2020)
Minerals	UK Critical Minerals Strategy (2022) Draft Circular Economy Strategy for Northern Ireland (2023)
Energy	Powering up Britain: The Net Zero Growth Plan (2023) NI Energy Strategy – Path to Net Zero Energy (2021) Draft Offshore Renewable Energy Action Plan (2023)
Infrastructure	Industrial Strategy: Building a Britain fit for the future (2017) The Strategic Planning Policy Statement for Northern Ireland - Planning for Sustainable Development (SPPS) (2015) 11 x NI Council Local Development Plans
Environment	Draft Environmental Strategy for Northern Ireland (2019) Draft DAERA Strategy Framework: a living, working, active landscape valued by everyone (2019) Draft Marine Plan for Northern Ireland (2018)
Tourism	Draft Northern Ireland Tourism Strategy (2023)
Education	Skills for a 10X economy: Skills Strategy for Northern Ireland (2022)
Digital data	Unlocking the power of location: The UK’s Geospatial Strategy, 2020–2025 (2020)

GEOSCIENCE FOR A BRIGHTER FUTURE

Strategic objectives

GSNI's Strategy 2025–2030 has been designed to reflect our current position and help us achieve our vision for the future.

Our strategy focuses on using geoscientific research to address a wide range of social, economic, and environmental needs across Northern Ireland. It seeks to invest in and develop GSNI staff and assets and enhance our status with partners and customers. The strategy also places great emphasis on unlocking our data, which will not only support but also enhance all the other strategic objectives.

GSNI's strategic direction is focused on the delivery of four strategic objectives. The following pages set out how these will be delivered and the benefits that they will provide.

SOCIETY, ECONOMY AND ENVIRONMENT

GSNI will lead in the delivery of geoscience research and evidence to improve the economy, environment and sustainability of NI society

PARTNERS AND CUSTOMERS

GSNI will further enhance its status as a trusted partner and provider of impartial geoscience information to support decision-making processes and to engage the public.

PEOPLE AND ASSETS

GSNI will invest in and develop its people and assets to provide innovative, efficient and effective service delivery.

UNLOCKING THE VALUE OF OUR DATA

GSNI will unlock the value of its archive through digital transformation of our data and delivery mechanisms.

STRATEGIC OBJECTIVE 1

Society, economy and environment

We will deliver geoscience data and evidence to progress the economic and social ambitions of Northern Ireland, whilst protecting and enhancing its natural environment.

Benefits

- Responsible use of natural resources that supports the energy transition and contributes to green growth.
- Improved understanding of environmental change that leads to a more resilient and sustainable society.
- Increased monitoring reduces risk and protects both the natural environment and the public.
- Advanced understanding of the ground and beneath its surface supports resilient infrastructure and assists a just transition.
- An expanded geoscience research programme that supports evidence-based policymaking.

STRATEGIC OBJECTIVE 2

People and assets

We will recruit, develop and support our people and assets to provide high impact, innovative, efficient and effective public-good science.

Benefits

- Motivated, flexible and engaged staff with enhanced capabilities, skills and awareness.
- Maximised use, promotion and application of GSNI data for more efficient and inclusive public service delivery.
- Reduced carbon consumption and more sustainable ways of working.
- New, annual, capital funding and research programme lines to support innovative and efficient delivery and impact of geoscience programme portfolio.
- Improved visibility, integration and facilities to stimulate and inspire customers, partners and enhance staff morale.

STRATEGIC OBJECTIVE 3

Partners and customers

We will engage with and listen to the public and stakeholders to inform our work and help build trust and understanding, of geoscience and the GSNI. We will strategically influence and affect key decisions and policies on national geological issues in Northern Ireland.

Benefits

- Raised public awareness, knowledge and understanding of the role of geoscience in society.
- Enhanced organisational and professional profile, visibility and influence of GSNI.
- Direct provision for geoscience education to address known physical and environmental science skills gaps in Northern Ireland.
- Optimised strategic interdisciplinary alliances through increased collaboration.
- Co-operation, collaboration and benchmarking with Geological Surveys in Europe and in particularly with Ireland.

STRATEGIC OBJECTIVE 4

Unlocking our data

We will unlock the value of our paper records and physical collections in our archive through digital transformation of our data and delivery mechanisms.

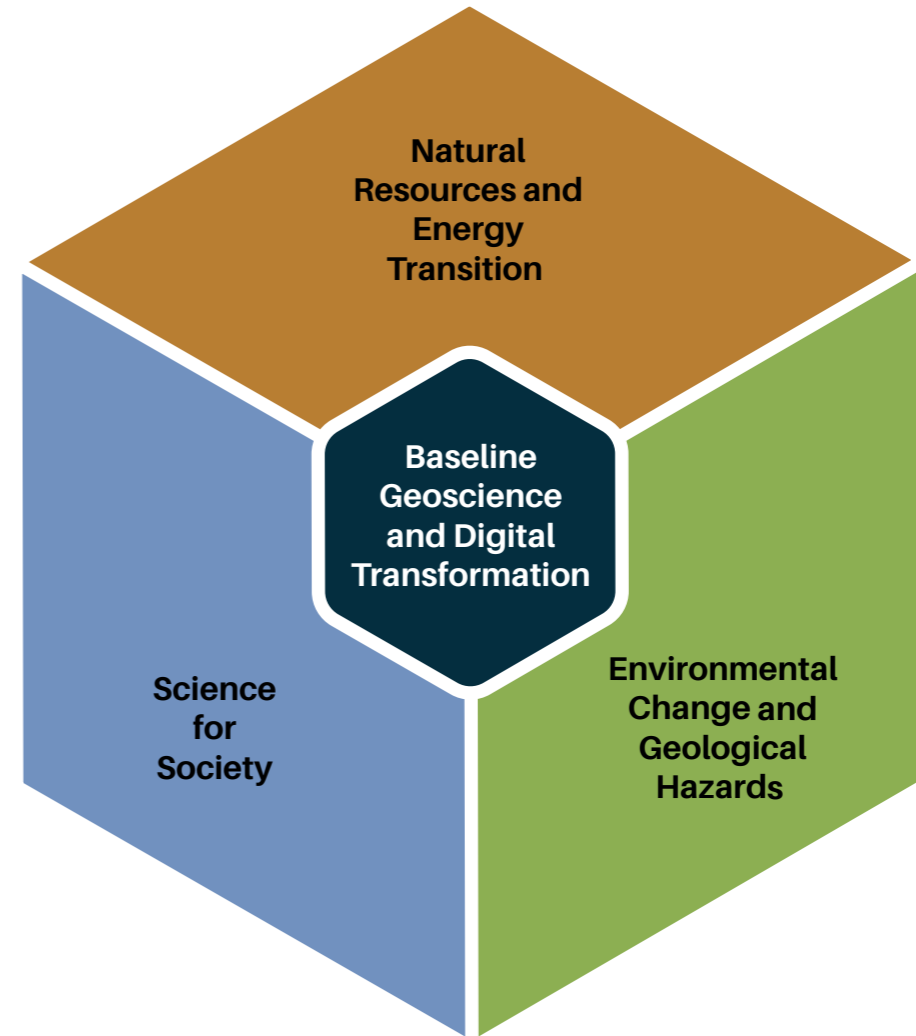
Benefits

- 'Q-FAIR' data: findable, accessible, interoperable and re-useable to ensure its widest uptake and play our part in the NI Open Data Strategy.
- Unlock analogue data from our physical and paper collections for application to current societal challenges and opportunities.
- Enable the integration of historic geological survey with modern earth-observation.
- Integrate GSNI's data with our data users and partner's data delivery platforms.

Science and innovation programmes

Over the next five years, GSNI will develop a range of Science and Innovation Programmes to help meet our current and future needs. This programme-based methodology will provide a coordinated approach to local, national and global challenges and is intended to capitalise on GSNI's strengths, building capacity where needed.

GSNI's Science and Innovation Programmes have been specifically designed to achieve optimal alignment of GSNI's science with stakeholder priorities as identified through stakeholder surveys and face-to-face engagement. This will help us to take advantage strategic partnerships and deliver a comprehensive range of benefits and impacts that will contribute to the social, economic, and environmental well-being of Northern Ireland.



Natural resources and energy transition

Challenge: How we use natural resources (e.g minerals, groundwater, energy) will change as we mitigate the effects of climate change. Natural resources are essential to life and the economy, but they are not evenly distributed in the Earth's crust. The energy transition relies on critical raw materials, sustainable use of groundwater resources and utilisation of low-carbon subsurface energy solutions. Understanding the distribution of these resources in NI, the subsurface properties and modelling of geological processes, is essential for sustainable development and to support the energy transition.

Desired Outcome

To acquire and make available geological information and expertise needed to inform decision making and policy development on the sustainable use of natural resources.

We will do this by:

1. Conducting research into critical minerals in NI for the transition to a low-carbon economy.
2. Demonstrating the potential for geothermal heating and cooling, mapping and modelling of geothermal resources and assessment of geothermal reservoir properties.
3. Contributing to the acquisition and dissemination of data and knowledge on geological storage and its potential in NI.
4. Characterising the properties and availability of groundwater resources to build a data-led evidence base for sustainable groundwater use.
5. Exploring the potential for the sustainable development of offshore renewable energy and resources in the marine environment.

Environmental change and geohazards

Challenge: Climate change is the most pressing environmental issue we face, impacting our coastline, infrastructure, built environment and natural ecosystems. We will increase understanding of our natural and built environment, geological hazard vulnerability and monitor its response to climate-driven challenges. We will deliver this by working in partnership to acquire information by integrating terrestrial and satellite data to monitor and analyse changes to our environment and its impacts.

Desired Outcome

Strengthen our understanding of the natural and built environment to characterise and monitor complex processes. We will deliver effective contributions for future challenges to support evidence based environmental change mitigation, adaption and resilience decision-making.

We will do this by:

1. Developing programmes to enhance geological hazard characterisation and monitoring to better understand risks, their impacts and their response to climate driven pressures.
2. Producing evidence-based decision-making tools to help manage the risks associated with environmental change and geohazards.
3. Implementing new assessments and monitoring networks to understand and characterise coastal change.
4. Delivering and managing disaster response and risk reduction activities including the abandoned mines emergency response plan.
5. Enhancing our knowledge of the role groundwater plays within integrated catchments in Northern Ireland.

SCIENCE INNOVATION PROGRAMME 3

Baseline geoscience and digital transformation

Challenge: Ensuring we have the right data and information to address both current and future challenges is essential, including data and information to support research and policy development in areas such as critical raw materials, geothermal energy, groundwater and geohazards. Good data underpins sound decision making and GSNI holds a wealth of digital and archive information that must be accessible to support today's geoscience challenges.

Desired Outcome

We will strategically expand our baseline geoscience data and unlock the information held in our archives to enable it to be used to inform evidence-based decisions about the world we live in.

We will do this by:

1. Re-assessing and improving GSNI's baseline mapping in support of GSNI's science and innovation programmes.
2. Investing in data collection, storage and delivery mechanisms, and encouraging and supporting its use.
3. Unlocking the GSNI archive by publishing our analogue archives and digitising our records and collections.
4. Maximising the potential of GSNI's core store by facilitating and enhancing the access to geomaterial collections.
5. Delivering new and innovative data products and services in support of GSNI's science and innovation programmes.

Science for society

Challenge: Northern Ireland faces several societal challenges that present an opportunity to demonstrate the key role that geoscience must play in addressing these. By communicating with stakeholders and the public and by strategically informing relevant government policy we can raise awareness of and begin to address these challenges.

Desired Outcome

We will embed geoscience within society in Northern Ireland so that it can be used as an instrument for climate action and as a catalyst for economic, environmental and social development. .

We will do this by:

1. Working with planning authorities to ensure that geoscience information is used to inform evidence-based decisions within the development management process.
2. Embedding climate action and sustainable development into all activities and ensuring that the role geoscience plays in achieving these is incorporated into relevant policies.
3. Supporting the growth of sustainable geological tourism and the promotion of Northern Ireland's geological heritage as a catalyst for sustainable development.
4. Encouraging increased recognition of the requirement to develop geoscience skills and education and their essential role for sustainable development.
5. Developing public engagement campaigns in a clear and transparent manner in support of GSNI's strategic objectives and science and innovation programmes.

Enabling the strategy

To deliver the GSNI Strategy, there are several key enablers that are essential.

People and culture

GSNI staff are talented, motivated and fully committed to the work of GSNI and its delivery of public-good science. However, to achieve the objectives of the GSNI Strategy it will be necessary to recruit, retain and develop individuals who are as committed as the existing staff, and who have the skills and the drive to deliver the requirements of the strategy.

GSNI can also call upon the extensive skill sets of our colleagues in the wider BGS to provide additional scientific advice and expertise to complement what is already available within GSNI.

GSNI has a strong leadership culture that is already effective in delivering the current work programme. To fully enable the delivery of the GSNI Strategy this should be further developed, empowering all staff to make their own contribution to the work of GSNI and play their role as part of the wider organisation. This should be encouraged through open and effective communication

between all staff and embedding the seven principles of public life and our core values into all that we do.

Partnerships

GSNI has developed an ambitious and challenging Strategy that will be delivered over the next 5 years. As a small organisation, it is essential that we capitalise on existing, and develop new strategic partnerships so that we can achieve our vision and deliver on our strategic objectives.

GSNI has a long history of working in strategic partnership with other organisations. This may take the form of a Memorandum of Understanding

such as the one that exists with Geological Survey Ireland, or as the Service Level Agreements that exist with the NI Environment Agency and NI Water. In many cases, there is simply an informal agreement to work on projects that are mutually beneficial for all organisations involved.

By working in partnership, GSNI adds value to our existing work programme, helps achieve a better appreciation of the work of GSNI, ensures geographic equity, new sectors, gains access to more customers and most importantly, shares resources so that we can

deliver more benefits through our public-good science.

Research and knowledge

GSNI has a long history of producing and publishing high-quality peer-reviewed research to support and inform decision-making. To support this function and to ensure that any research carried out aligns with the requirements of the GSNI Strategy, the GSNI Science Task Force (STF) has been established.

The STF has the following roles:

- Review current research science and ensure links into relevant NI government policies.
- Prioritise future research that aligns with and meets the requirements of the GSNI Strategy.

- Maximise the impact of our science; and ensure benefits for society.

To enable the effective delivery of the GSNI Strategy, the STF has developed the GSNI Research Framework that identifies research gaps and priorities to meet the needs of the strategic objectives and the science and innovation programmes.

Technology

GSNI have a range of scientific equipment including a scanning electron microscope and equipment for geophysical logging, groundwater monitoring and geochemical analysis. GSNI staff are skilled in using Earth observation techniques, implementing monitoring programmes and availing of the latest technological advances to support the understanding of

geoscience in Northern Ireland.

In addition to these GSNI can avail of the BGS laboratories, computing facilities and expertise to help deliver the GSNI Strategy.

Data and information

For over 75 years, the GSNI has been collecting high quality scientific data and publishing peer-reviewed research that provides a baseline of geoscience information for Northern Ireland. This is particularly evident through the award-winning TELLUS project with its high-resolution, regional-scale geophysical and geochemical surveys.

To enable the delivery of the GSNI Strategy, a programme of work is in place to unlock and enhance our archives. This will not only support the science and innovation

programmes described within but will make these available to support wider economic, environmental and societal development.

Implementing the strategy

This strategy sets out how GSNI will work with its stakeholders to use geoscience to help address key societal challenges affecting Northern Ireland. We will implement the strategy primarily through the design and delivery of the SLA work programme developed on a three-year basis with the DfE and reviewed every six months.

This will be complemented by the delivery of additional work programmes through SLAs with other NI public sector bodies and funded projects.

All GSNI's work is reported through a dedicated annual report, approved by the GSNI Science Advisory Committee, and published on the GSNI website.



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