

Initial Evaluation Report

**East Riding of Yorkshire Area
and Adjacent Inshore Area**



**Nuclear Waste
Services**

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Preface

Society has benefitted from nuclear technology for over sixty years through electricity generation, defence, medicine, research, and industry. These benefits have been realised through processes that generate waste products. Most of this waste is low in radioactivity and is disposed of safely every day, however, some waste can remain more radioactive for many years. Currently this type of waste is held safely in stores on the surface, mainly within the country's existing nuclear sites, but this is only an interim measure. The UK needs a permanent solution and having reaped the benefits of nuclear technology, it is our responsibility to deal with the waste.

As set out in the UK Government's Working with Communities Policy [i] (the "Policy"), the UK Government, along with many of the world's major nuclear nations, believes the safest option is to dispose of this higher activity radioactive waste in a Geological Disposal Facility (GDF), where the waste is packaged and isolated in a series of vaults and tunnels deep underground in suitable rock. Indeed, many countries with a similar radioactive waste legacy already have well developed programmes in place to build GDFs as the most responsible long-term option (for example, Finland, Sweden, France, Switzerland and Canada).

Radioactive Waste Management Limited (RWM), trading as Nuclear Waste Services (NWS), is a wholly owned subsidiary of the Nuclear Decommissioning Authority, has been given the responsibility for implementing geological disposal of higher activity radioactive waste in the UK. As the delivery body for a GDF, NWS is responsible for safety, security, and environmental protection throughout the lifetime of the programme.

Providing a permanent solution for the UK's higher-activity radioactive waste is a UK Government priority and is the right thing for today's society and for future generations. Without action now, we would be extending unnecessarily the environmental risk and costs of handling this waste above ground and leaving future generations to deliver a permanent solution.

The development of a GDF is a multi-billion pound investment and one of the country's largest and most important infrastructure and engineering projects. The project will span many generations and provide the community that hosts it with great economic development opportunities and growth potential for over 100 years.

We are already working in partnership with communities across the country, exploring the potential for them to host a GDF and the impacts and potentially transformational benefits the GDF programme could provide to a consenting host community. Working together, we will help shape a community's vision of how it could benefit from the investment, infrastructure and employment along with associated education and training opportunities that a GDF could bring over future decades. This is a hugely important, challenging, and exciting project for the country and for the community that elects to host a GDF.

This report has been developed by NWS as part of the process to identify a suitable site for a GDF within a willing host community.

It summarises work that NWS has undertaken as part of Initial Discussions being held with the Invest East Yorkshire in response to paragraph 6.15 of the 'Policy' which states that during Initial Discussions:

"Under all scenarios RWM will undertake initial work to understand whether the land identified has any potential to host a GDF."

Paragraph 6.15 goes on to say:

"At this point discussions may remain confidential (subject to disclosure requirements contained in information law legislation, including the Freedom of Information Act 2000 and the Environmental Information Regulations 2004), though they should be made public at the earliest opportunity if the interested party and RWM decide to move forward."

Invest East Yorkshire are the interested party as described in the Policy.

Executive Summary

This Initial Evaluation Report (IER) has been developed by Nuclear Waste Services (NWS) as part of the process to identify a suitable site for a Geological Disposal Facility (GDF) within a willing host community. This report summarises initial work that NWS has undertaken as part of Initial Discussions being held with Invest East Yorkshire, the Interested Party, in response to paragraph 6.15 of the UK Government's Working with Communities Policy [i] (the 'Policy') which states that during Initial Discussions:

"Under all scenarios RWM [now NWS] will undertake initial work to understand whether the land identified has any potential to host a GDF."

This report is based on existing readily available information, to understand if there may be potential for a GDF to be located in the administrative area of the East Riding of Yorkshire (ERoY) Unitary Authority and adjacent inshore area. The initial evaluation work is not designed to confirm whether or not this area is suitable to host a GDF. The overall siting process will take several years due to the need to identify and properly investigate potential sites to host a GDF, and to ensure that communities involved in the siting process have an understanding of how the GDF project might affect them.

Following discussions with the Interested Party it was agreed the initial evaluation was to be focused on the ERoY Unitary Authority and the adjacent inshore area. The area considered as part of this IER therefore comprises the following:

- The entire onshore administrative area of ERoY Unitary Authority, and
- the adjacent inshore area up to 22.2km off the coast¹.

Together they are referred to in this report as the 'ERoY and adjacent inshore area'.

The Interested Party were particularly interested to understand if areas in the south of the region such as around Goole or the southern parts of Holderness hold potential as there may be the opportunity for alignment with some of the existing economic priorities for the region.

¹ The inshore is defined as the UK Territorial Waters which extend up to 12 nautical miles (22.2 kilometres) from the Mean Low Water Mark.

A GDF would have both surface and underground facilities. The surface facilities would be linked to the larger underground GDF disposal facilities by sloping tunnels and/or vertical shafts. The primary purpose of the surface facilities would be to receive solid waste packages from the transport network and transfer them to the underground facilities and to support the ongoing construction programme. It is important to note the sub-surface area of a GDF would not necessarily be directly underneath the surface facilities and can be offset by a several kilometres. This means there is also an opportunity for the sub-surface facilities to be located in appropriate geological settings deep in the rock beneath the seabed in the inshore.

This IER is based on the approach set out in the NWS published Site Evaluation document “*Site Evaluation - How we will evaluate sites in England*” [iii] and is structured around the six Siting Factors of:

- Safety and Security
- Community
- Environment
- Engineering Feasibility
- Transport
- Value for Money

In this IER, NWS has considered the possibility of the sub-surface elements of a GDF being located at depth, which also includes consideration of locating the sub-surface elements in the deep geology beyond the coastline as well as below the land surface. At this early stage in the siting process NWS has only drawn upon existing readily available information to inform a desktop study by its technical specialists.

A GDF is expected to bring substantial benefits to the community which hosts it. It will be a major investment, with the creation of significant and long term opportunities for thousands of skilled, well-paid jobs for up to the estimated 175 year lifetime of the facility. It will create more than 4,000 jobs on average each year within the first 25 years. Most of these skilled, well-paid jobs will be created within the area and the impact in terms of direct and indirect employment and skills development will be felt across the region.

In addition to direct employment at the facility, a GDF will generate indirect employment in the supply chain and induced employment by boosting local spending power. Job creation will continue throughout the lifetime of a GDF. More than one generation will benefit from this large scale infrastructure project as it provides an opportunity for continuous employment, and a chance for communities to upskill and reskill [i].

Given the scale of a GDF, it is possible that there may be a need to upgrade the local transport infrastructure, which could bring significant benefits to local residents and businesses and assist in making the area more attractive for inward investment. In addition, the community would benefit from opportunities to use Community Investment Funding, of initially up to £1 million annually and potentially rising to £2.5 million annually for locally important priorities early in the siting process. The UK Government has also committed in the Policy to providing significant additional investment to the community that hosts a GDF.

Based on a review of readily available information relevant to each of the six siting factors, initial findings indicate that ERoY and the adjacent inshore area, has potential to host a GDF and could as a result gain the significant benefits a GDF could provide for the surrounding communities and economies.

Safety and Security

Existing geological information, as compiled in the National Geological Screening exercise [iiii], shows there are potential Low Strength Sedimentary Rocks (LSSR), such as mudstones, claystones and siltstones, and Evaporites, such as halites, which are potentially suitable as host rocks for a GDF, present throughout the ERoY Area within the depth range of interest. No Higher Strength Rocks (HSR) are interpreted to be present in the ERoY Area within the depth range of interest.

There are well developed disposal concepts for the potential host rock types (LSSR and Evaporites) found in the ERoY onshore and inshore areas. For example, the geology of the Holderness area is dominated by LSSR, including the Ancholme Group which is absent across most of the ERoY Area, occurring only in the southeast corner around Patrington. Based on NWS's work and similar work carried out overseas, such as the French Industrial Centre for Geological Disposal, or Ciego, which is a site with Ancholme Group geology identified as being favourable for the construction of a deep geological disposal facility. NWS has confidence that a GDF design could be developed which would provide the required high level of safety required to satisfy the UK's strict regulatory regimes.

If the area progresses through the siting process the potential LSSRs and Evaporites will need to be further investigated as part of the site characterisation process along with many other geological features (properties of potential host rocks, faults, rock structures, groundwater regime, mineral resources, oil and gas reserves, etc.).

To the north of the ERoY there are some major faults present. If the area progresses through the siting process, the nature of these features will need to be further investigated.

There are a number of aquifers in the area and the groundwater regime of the local area will need to be evaluated as part of the site characterisation process if the area progresses through the siting process.

The onshore area of ERoY is covered by Petroleum Exploration and Development Licences (PEDL). Currently there are no known fields inshore, however to the north and south of the area there are small hydrocarbon fields. In the offshore area, there is active exploration and exploitation of hydrocarbons. NWS will continue to monitor how any oil and gas exploration in the area progresses to understand how they may influence the siting of the GDF. The North Sea Transition Authority offered a Carbon Capture and Storage licence that extends from the Lincolnshire coast to just south of Bridlington spanning most of the inshore area. There are Coal Authority Licence Areas, immediately off the coast and in the Humber Estuary. It is not known whether coal can be exploited commercially in this area, but it would need to be considered during the siting process.

Community

The main economic sectors in the locality are public Administration, Education, and Health. However, the largest proportion of businesses are in the Construction, Professional, Scientific and Technical and Agriculture, Forestry and Fishing sectors. The ERoY Area does not appear to have a strong energy sector supply chain. However, there is growing investment in local energy training facilities and skills.

The ERoY does not have an established nuclear sector covering civil nuclear power and defence. However, it should be noted that Goole was previously considered as a potential location for a STEP (Spherical Tokamak for Energy Production) fusion plant.

The ERoY has a population with an older demographic than the national average, but there is a substantial working age population of those aged between 40 to 65 with higher level of education. The ERoY has a stronger rural and coastal heritage which correlates within the population structure and the lower deprivation rates within the region, however, there are a number of urbanised areas with potential for regeneration.

The ERoY Council adopted a Local Plan in 2016. The Local Plan comprises a series of documents which jointly form the local plan for the ERoY. These include:

- Strategy Document
- Allocations Document
- Bridlington Town Centre Area Action Plan

The vision of the Local Plan is set out within the Strategy Document which identifies a set of 21 objectives to provide the guiding principles for managing development over the plan period. A number are relatable to a GDF and include the following:

Objective 11: Grow, strengthen, modernise and diversify the local economy, including the East Riding's Town and District Centres, and support both existing and emerging economic sectors and clusters.

Objective 14: Support a wide portfolio of energy infrastructure and businesses, and maximise the potential of renewable and low carbon energy generation whilst minimising adverse impacts, including any cumulative landscape and visual effects.

The development of a GDF and associated community funding and Significant Additional Investment could help deliver these objectives if it were tailored to support these strategic priorities.

Environment

The ERoY contains a diverse range of landforms that give particular areas of distinctive character. The landscape includes the chalk uplands of the Yorkshire Wolds; meandering rivers and streams of the Vale of York; watery raised mires of the Humberhead levels; coastal plain of the Holderness; and broad expanse of the Humber Estuary and its surroundings.

Along the ERoY coast the landscape changes from the dramatic chalk cliffs of Flamborough Head in the north, through the clay cliffs of Holderness, to the nationally unique Spurn Head at the southern tip of the coast. Two sections of the coast, at Flamborough and Spurn Head are designated as Heritage Coast and are protected for their special scenic and environmental value.

The ERoY has a rich and varied biodiversity that is both nationally and internationally important, it contains a number of areas and sites of statutory protection by both national and international legislation. There are no Areas of Outstanding Natural Beauty (AONB) or National Parks within the ERoY, however, part of the Yorkshire Wolds is being considered for designation as an AONB. NWS would seek to work with the community and relevant stakeholders to understand the natural environment in greater detail and how it could deliver significant biodiversity net gain through the project.

The development of a GDF would be subject to a Flood and Coastal Erosion Risk Assessment considering a range of climate change predictions for sea level rise to assess possible long-term effects on local flood risk and coastal change. The design of the GDF would incorporate appropriate mitigation measures to protect against flood risk to the GDF and to ensure there were no adverse impacts on flood and coastal change risks elsewhere as a result of the project.

Engineering Feasibility

At this stage no specific potential sites for the surface facilities of a GDF have been identified, but there is no reason to suggest that it would not be possible to find a suitable location, within the ERoY Area. It would be important to ensure the delivery of sensitively and appropriately designed buildings and security arrangements that are sympathetic to the character of the local area. NWS would seek to work collaboratively with the community to ensure that their preferences are taken into account.

By applying 'good design' principles NWS would seek to ensure that the delivery of a GDF is sensitive to the local area, efficient in the use of natural resources and energy used in construction, and that the designs of surface facilities are sympathetic to the local environment, as far as practicable.

The construction and continued operations of a GDF would result in the generation of excavated spoil and there may be opportunities to reuse the spoil locally, for instance in support of flood or coastal change mitigation projects, or habitat creation or enhancement and other potential infrastructure schemes.

Transport

Throughout the lifetime of a GDF, and irrespective of where it is situated, transport links to the proposed facility would be vital. Transport would be required for construction materials for the underground and surface facilities and associated infrastructure; radioactive waste for disposal; movement of spoil and backfill materials, this may also include materials for surface bunds and site flood mitigations, if required, and personnel during all phases of the design, construction, operation and eventual closure of a GDF.

The ERoY Area is supported by good existing transport infrastructure. The area is serviced by the M62/A63 Strategic route, which runs east to west through the south of the ERoY Area. The M62 provides good connections to the wider Strategic Road network including the M18 and the A1(M). The railway provisions to the area are good with a number of rail lines and dedicated freight lines. There is also historic rail infrastructure within the ERoY, for example the historic Hull to Withernsea line, which if reinstated could possibly provide new community connections.

There are very good existing port facilities in the region which include the Port of Hull and the Port of Goole. These could offer the potential for sea transport for movements of spoil, construction materials and radioactive waste packages during the construction and operation of a GDF. Using sea transport could present benefits, for example, through required port and connecting infrastructure upgrades, as well as reducing the impact of land-based transport. These changes could have the additional benefit of making the area more attractive for

supplementary development and inward investment supporting the objectives of the ERoY Local Plan. NWS will work with stakeholders to understand any potential infrastructure needs and where a GDF development could support them.

NWS would also consider the existing transport infrastructure and potential transport options and how community benefits could be realised as a consequence of any infrastructure upgrades that may be required.

Value for Money

At this early stage in the siting process there are many uncertainties that would influence the overall programme cost and delivery schedule. However, at this stage there is nothing to suggest NWS would not be able to secure value for money in delivering a GDF in the ERoY and adjacent inshore area.

Conclusion

This initial work has confirmed that the ERoY and adjacent inshore area holds potential to host a GDF, together with early identification of known constraints and uncertainties. Further analysis drawing on additional sources of information and data will be required if the ERoY Area, including the adjacent inshore area, is considered further in the siting process.

NWS would work in partnership with the local community and relevant stakeholders to improve our current understanding of aspirations for the area and how delivery of a GDF could be aligned to local priorities. NWS would also wish to focus on the sensitivities of the local natural environment and options for improving it, together with the implications of future climate change.

Next Steps

The next part of the siting process as set out in the UK Government's Working with Communities Policy ², would be to begin discussions with the community through the formation of a Working Group involving NWS, the Interested Party, an independent chair and facilitator, and other local stakeholders. All Relevant Principal Local Authorities have been invited to join the Working Group. Such a Working Group is a first step to begin engagement on the siting process within the community.

An early task for the Working Group would be to identify a Search Area. The Search Area is the geographical area within which NWS would seek to identify potentially suitable sites to host a GDF. The Policy confirms that a Search Area is to be delineated using district or unitary electoral ward boundaries and would potentially be considered in more detail by NWS and a Community Partnership if one were to be subsequently formed.

² Implementing Geological Disposal – Working with Communities, An updated framework for the long-term management of higher activity radioactive waste. HM Department for Business, Energy and Industrial Strategy (December 2018).

Community Investment Funding of up to £1 million annually for each community that forms a Community Partnership will be made available. This investment will rise to £2.5 million annually per community for those communities that progress to the stage of deep borehole investigation (which will be needed to assess the potential suitability of a site). The Community Investment Funding can be used to fund projects, schemes or initiatives that provide economic development opportunities, enhance the natural and built environment, or improve community well-being.

A community can be withdrawn from the siting process at any time up until it has taken the Test of Public Support. The decision on whether to withdraw the community will be taken by the relevant principal local authorities on the Community Partnership. NWS can also choose to withdraw from the siting process for technical reasons or to prioritise available funds. The relevant principal local authorities on the Community Partnership will also take the decision on if or when to hold a Test of Public Support in order to seek the community's views on hosting a GDF, once site-specific proposals have been developed sufficiently to provide clarity on what is actually being proposed. A positive Test of Public Support is required before NWS is able to proceed with the statutory licensing, environmental permitting and development consent application process to build a GDF.

1. Introduction

Objective of this Report

This IER has been developed by NWS as part of the process to identify a suitable site for a GDF within a willing host community. It summarises initial work that NWS has undertaken as part of Initial Discussions being held with Invest East Yorkshire, the Interested Party, in response to paragraph 6.15 of the 'Policy' which states that during Initial Discussions:

“Under all scenarios RWM (now NWS) will undertake initial work to understand whether the land identified has any potential to host a GDF.”

Paragraph 6.15 goes on to say:

“At this point discussions may remain confidential (subject to disclosure requirements contained in information law legislation, including the Freedom of Information Act 2000 and the Environmental Information Regulations 2004), though they should be made public at the earliest opportunity if the interested party and RWM decide to move forward.”

This report is based on existing readily available information, to understand if there may be potential for a GDF to be located in the East Riding of Yorkshire (ERoY) Area.

The initial evaluation work is not designed to confirm whether or not the ERoY Area is suitable to host a GDF. The overall siting process will take several years due to the need to identify and properly investigate potential sites to host a GDF, and to ensure that communities involved in the siting process have an understanding of how the GDF project might affect them.

Additional information and resources regarding geological disposal and the siting process is available online [ii].

East Riding of Yorkshire Area

Following discussions with the Interested Party it was agreed the initial evaluation would look at the whole of the ERoY Unitary Authority and the adjacent inshore area. The area considered as part of this Initial Evaluation therefore comprises the following:

- The entire onshore area of ERoY Unitary Authority, and
- the adjacent inshore area up to 22.2km off the coast³.

Together they are referred to in this report as the 'ERoY and adjacent inshore area'.

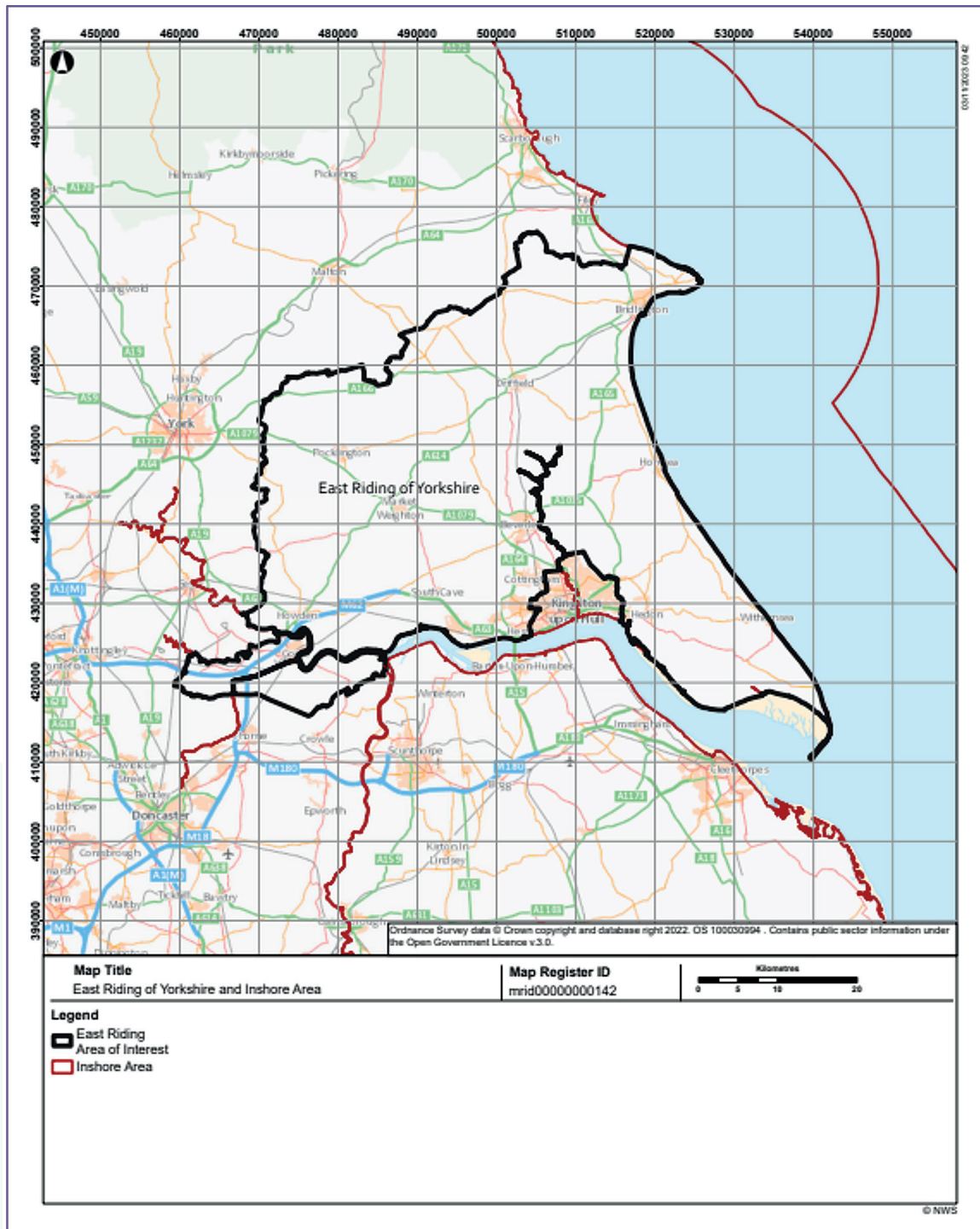
The Interested Party were particularly interested to understand if areas in the south of the region such as around Goole or the southern parts of Holderness hold potential as there may be the opportunity for alignment with some of the existing economic priorities for the region.

The ERoY is a ceremonial county in the former Yorkshire and Humber region of north east of England (see Figure 1). The area covers approximately 2407km² and has an overall population of 342,200.

The ERoY unitary authority is bordered by the unitary authorities of North Yorkshire to the north, York to the west, and City of Hull, North Lincolnshire and North East Lincolnshire to the south. The borough of the City of Doncaster is to the south west and the county of Lincolnshire is to the south east. The entirety of the ERoY is bound to the east by the North Sea. The main settlements in the ERoY are the towns of Bridlington and Beverley with populations of 35,400 and 30,800 respectively. There are several smaller towns and villages within the ERoY, including Driffield, Goole, Pocklington, Brough, Hedon, Market Weighton and Howden.

³ The inshore is defined as the UK Territorial Waters which extend up to 12 nautical miles (22.2 kilometre) from the Mean Low Water Mark.

Figure 1: East Riding of Yorkshire and Adjacent Inshore Area.

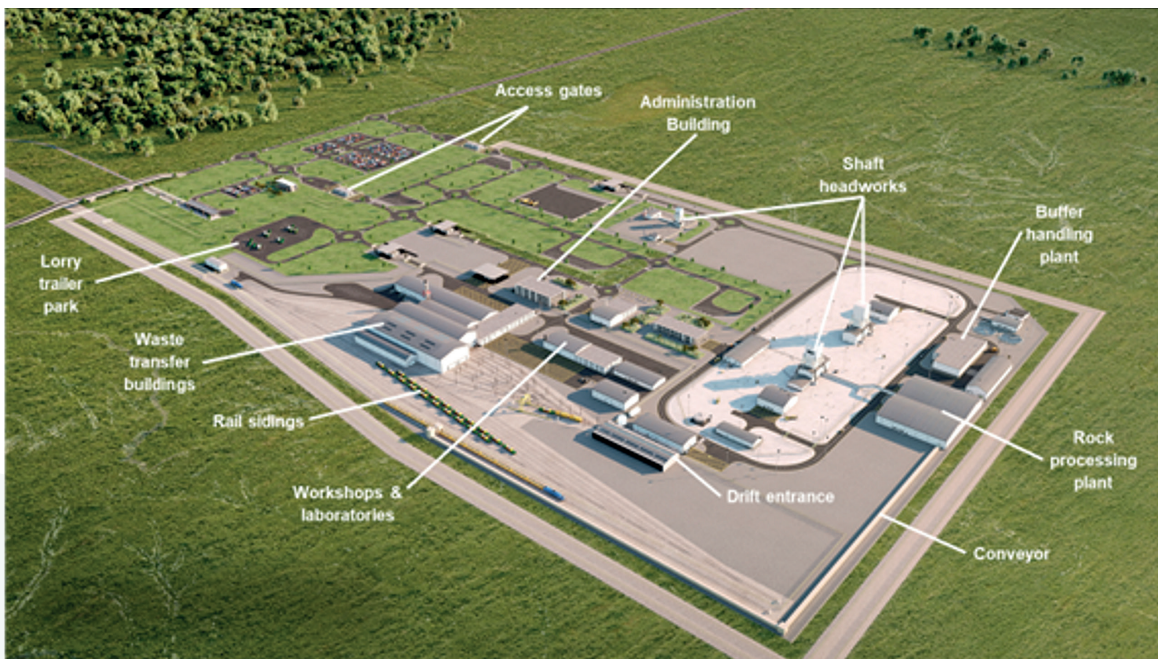


Geological Disposal Facilities

A GDF would have both surface and underground facilities. The surface facilities would be linked to the larger underground GDF facilities by sloping tunnels and/or vertical shafts. The primary purpose of the surface facilities would be to receive solid waste packages from the transport network and transfer them to the underground facilities.

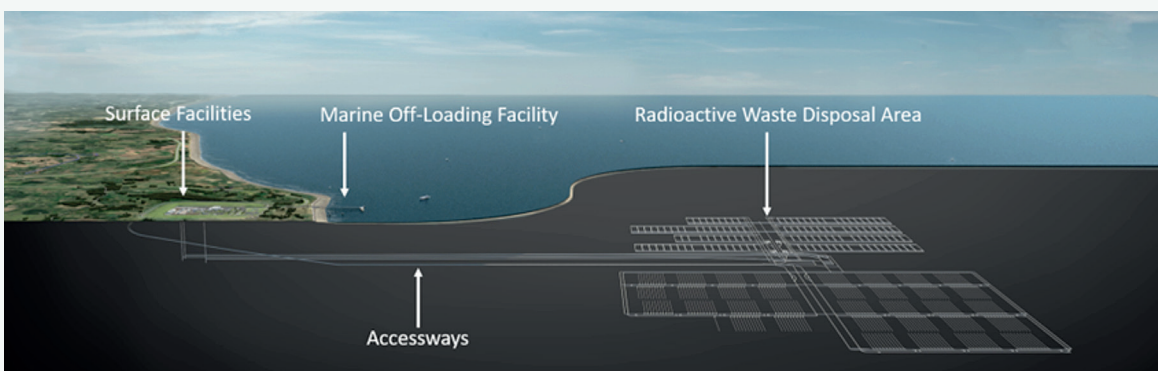
The layout of GDF surface facilities would depend on a particular site, how much space was available, and the arrangement of existing infrastructure. There is also potential to locate some of the buildings such as offices and stores off-site in nearby locations. GDF surface facilities could require up to 100 hectares of land depending on how the site was laid out and if any of the facilities were located off-site, the specific land requirements would need to be worked out later in the process. NWS would seek to ensure that the delivery of a GDF is sensitive to the local area and that the designs of surface facilities are sympathetic to the local environment, as far as practicable.

Figure 2: Illustration of Potential GDF Surface Facilities.



It is important to note the sub-surface area of a GDF does not necessarily need to be directly underneath the surface facilities and can be offset by a several kilometres. This means there is an opportunity for the sub-surface facilities to be located in appropriate geological settings deep in the rock either beneath the land, or the seabed in the inshore, or both.

Figure 3: Illustration of potential Sub-surface GDF Facilities Beneath the Seabed.



Evaluation Approach

The work presented in this IER is based on the approach set out in the Policy and the NWS published Site Evaluation document “Site Evaluation - How we will evaluate sites in England” [iii].

The Site Evaluation document draws upon the existing legislative, policy and regulatory requirements that NWS will need to satisfy to successfully deliver a GDF and identifies six ‘Siting Factors’ setting out the broad topic areas that NWS needs to consider as it assesses and evaluates areas and sites. These Siting Factors have then been broken down into a series of ‘Evaluation Considerations’ to provide greater clarity on the matters that NWS will consider.

This Initial Evaluation Report is structured around the six Siting Factors:

- Safety and Security
- Community
- Environment
- Engineering Feasibility
- Transport
- Value for Money

2. Initial Evaluation

Safety and Security

Based on the review of readily available information relating to the Safety and Security Siting Factor, NWS has concluded that the ERoY and adjacent inshore area has potential to host a GDF.

It is essential that a GDF is safe during the period in which it is constructed and operated but it must also remain safe for hundreds of thousands of years after it has been closed and sealed. Safety after closure is often referred to as 'long-term safety' or 'post-closure safety'.

The geological environment is an important consideration to safety after closure as engineered barriers work together with the geology to provide this protection.

Based upon work in the UK and overseas NWS recognises three broad types of potential host rock for a GDF.

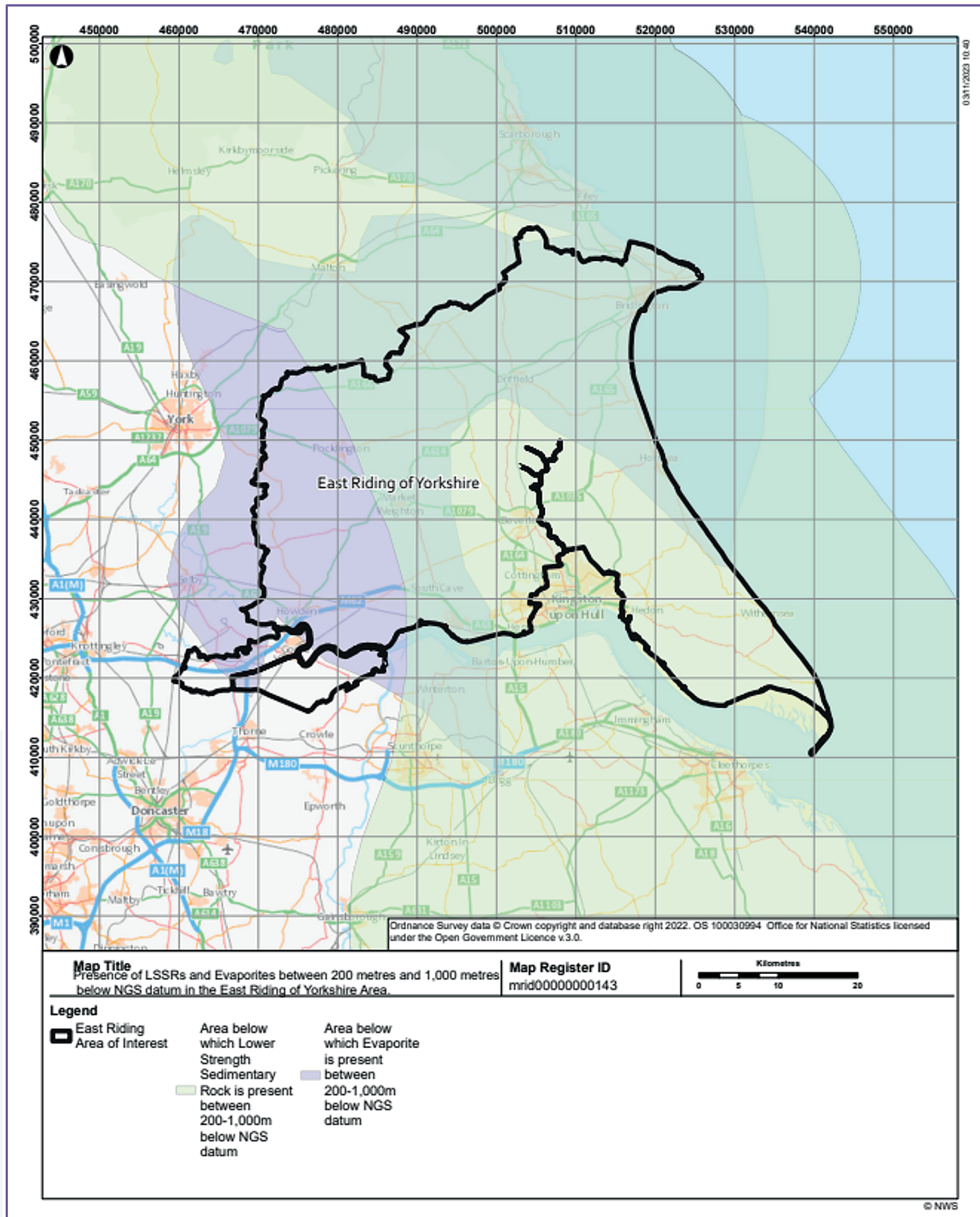
- Lower Strength Sedimentary Rocks (LSSR), like clays and mudstones.
- Evaporites, such as rock salt.
- Higher Strength Rocks (HSR), like granites and slates.

There are potential Evaporites and Lower Strength Sedimentary Rocks (LSSR) present in the ERoY and adjacent inshore area, within the depth range of interest⁴ (200 – 1,000 metres below the NGS datum⁵). There are no known Higher Strength Rocks within the depth range of interest anywhere in the ERoY.

4 The depth range of interest for a GDF is 200 metres to 1,000 metres below the NGS datum (see the NGS web page (<https://www.gov.uk/guidance/about-national-geological-screening-ngs>). Although screening has focused on the 200 to 1,000 metres depth range, which is consistent with Government Policy and the National Geological Screening Guidance, NWS recognises that some rock types may be suitable as host rocks where they occur at depths greater than 1,000 metres.

5 NGS datum is a level that has been used to enable the production of maps showing the rock types of interests at depths of 200 metres to 1,000 metres below the surface. In flat lying areas the use of the lands surface is acceptable, however in mountainous and hilly areas this can be misleading. This is because there could be potentially suitable host rocks that appear to be more than 200 metres below the surface, but they are actually higher than, or level with, nearby valleys. To avoid this, a model was developed that consists of flat surfaces between the bases of valleys. This is to ensure that rocks identified as potentially suitable will be below nearby valleys.

Figure 4: Presence of LSSRs and Evaporites between 200 metres and 1,000 metres below NGS datum in the East Riding of Yorkshire and Adjacent Inshore Area.



LSSR, or clay-rich rocks, are internationally recognised as potentially suitable for hosting a GDF. This is because these rocks are rich in very small clay particles, which only allow water to pass through them very slowly. In addition, the high clay content means that any cracks that form in these rocks may reseal, particularly under the weight of hundreds of metres of overlying rock. As a result, there is often almost no movement of water through these rocks. These attributes, together with the engineered barrier system, would contribute to a situation where radionuclides and other non-radioactive materials could be suitably contained for hundreds of thousands of years. There are four groups of younger LSSRs within the depth range of interest across most of the ERoY. These groups comprise several sedimentary rocks from Cretaceous to Triassic in age and include members of the Ancholme group, the Lias Group, and the Mercia Mudstone Group. The geology of the Holderness area is dominated by LSSR, for example, the Ancholme Group, which is absent across most of the ERoY area, occurring only in the southeast corner around Patrington and adjacent inshore. Around Patrington the Ancholme Group is approximately 150m thick (at a depth of 350 to 500m from surface) and is less well constrained in the inshore area but likely be of comparable thickness or greater.

Some of the clay-rich rocks in this area contain a series of evaporite units containing rock salt (halite) layers. Rock salt has several properties that make it potentially well-suited for hosting a GDF. Firstly, they are made of interlocking crystals of salt with very few gaps in between them. This makes it very difficult for water, gas and other fluids to pass through it, even over geological time scales. Secondly, rock salt can be squeezed into different shapes under relatively low pressures and over short time scales. This can make rock salt a potentially self-sealing unit, which may be beneficial to the post closure safety case. Thirdly, rock salt typically has favourable thermal characteristics which would allow heat generated from the waste to be conducted away by the rock.

There are well developed disposal concepts for the potential host rock types (LSSR and Evaporites) found in the ERoY onshore and inshore areas. Based on NWS's work and similar work carried out overseas, such as the French Industrial Centre for Geological Disposal, or Ciego, which is a site with Ancholme Group geology identified as being favourable for the construction of a deep geological disposal facility. NWS has confidence that a GDF design could be developed which would provide the required high level of safety required to satisfy the UK's strict regulatory regimes. This would be presented in safety cases which will be assessed by the UK's independent regulators.

The present understanding of the onshore and inshore areas indicates that there are a number of major faults (defined as faults that offset adjacent rock layers by 200 metres or more) as identified in the NGS exercise. This is not unusual, faults are very common in the underground environment. Faults may act as barriers to, or pathways for, groundwater movement, depending upon their characteristics, and these would need to be considered during the siting of a GDF should the ERoY progress through the siting process.

There is little information on groundwater in ERoY in the depth range of interest for a GDF, 200 to 1,000 metres below NGS datum, although there is information on groundwater in aquifers above 200 metres. The ERoY Area includes Principal, Secondary A, Secondary B and Secondary (undifferentiated aquifers). This means that the bedrock comprises permeable layers that can support water supplies and may form an important source of base flow to rivers. While these rocks are designated Principal, Secondary A, Secondary B and Secondary (undifferentiated) aquifers when at the surface, where they occur at greater depths groundwater is likely to be saline and not suitable for water supply. Groundwater from depths greater than 400 metres is unlikely to be suitable as drinking water anywhere in the UK.

Some of ERoY has been exploited for minerals in the past. Deep mine workings or the presence of exploration boreholes may influence the connectivity between shallow and deep groundwater. The groundwater regime will need to be considered during intrusive site characterisation, if the area progresses through the siting process. ERoY is covered by petroleum exploration and development licenses (PEDL) in the onshore. Currently there are no known fields in the onshore, however to the north and south of the ERoY Area there are small hydrocarbon fields. In the offshore area, beyond the 22.2km limit of UK territorial waters, there is active exploration and exploitation of hydrocarbons. Outside the area, in the Vale of Pickering and a smaller area in North West Lincoln, prospective shale gas areas have been identified. The North Sea Transition Authority offered a Carbon Capture and Storage licence that extends from the Lincolnshire coast to just south of Bridlington spanning most of the inshore area. NWS will need to continue to monitor these programmes.

There are Coal Authority License Areas, immediately off the coast and in the Humber Estuary. It is not known whether coal can be exploited commercially in this area, but it would need to be considered during the siting process.

In the offshore area, beyond the 22.2km limit of UK territorial waters, existing gas fields are being used to store gas. Onshore within the ERoY, salt caverns are used to store gas at Hornsea and Aldbrough. These caverns are hosted within the Zechstein salt and usually below 1,000m depth. NWS will need to continue to monitor these programmes and any other potential uses of the subsurface that could have future impacts on GDF siting.

It is recognised that there may be geological information relating to parts of the wider area that was generated through historical surveys and studies previously commissioned with respect to operational and historic oil and gas exploration and mining activities. If the ERoY were to progress to a point where a Community Partnership is formed, NWS would need to review and revisit existing available information. NWS would need to be mindful of the purposes of the historic surveys and studies, and any legislative and regulatory changes that may have occurred in the intervening years. Such additional information could enable NWS to enhance our understanding of the geological environment of the ERoY.

The initial evaluation work has considered other matters included within the Safety and Security Siting Factor and the work completed to date indicates that there are no fundamental constraints relating to construction and operational safety or security matters which would prevent the ERoY, from being considered further in the siting process. There are, however, a number of matters relating to the Safety and Security Siting Factor that would need to be investigated further should this area progress through the siting process.

Based on the review of readily available information relating to the Safety and Security Siting Factor, NWS has concluded that the ERoY has potential to host a GDF.

Community

Based on the review of readily available information relating to the Community Siting Factor, NWS has concluded that the ERoY and adjacent inshore area has potential to host a GDF.

The construction and operation of a GDF has potential to provide direct and indirect employment opportunities over a very long period of time and to support a diverse economy in the ERoY.

A GDF is expected to bring substantial benefits to the community which hosts it. As a major infrastructure project, a GDF is expected to generate thousands of well-paid jobs over the 175 year lifetime. It will create more than 4,000 jobs on average annually within the first 25 years. Most of these skilled, well-paid jobs will be available to within the host community and the impact in terms of direct and indirect employment and skills development will be felt across the region. A GDF would also complement the broader energy sector/manufacturing developments in nearby areas.

In addition to the construction, engineering and other technical skills that would be required to build and operate a GDF, a number of other associated services would be needed from the supply chain in areas such as facilities management, hotels and catering and potential opportunities to enhance growth in the food/agriculture, tourism and transport sectors could be significant.

A GDF could assist the ERoY and the wider region to be a centre of skilled engineering and low carbon technologies for the longer term as well as helping to diversify local employment. The development of a GDF could support the recognised importance of young people to the area's future by providing them with the opportunity to stay and succeed through potential education and skills partnerships. This would be aligned to local objectives to promote economic diversification and growth in engineering and manufacturing sectors. A GDF could support the economic development and regeneration agenda in the ERoY, particularly around the main urbanised areas which have been identified to be more deprived in terms of social infrastructure, employment and wellbeing.

There may be an opportunity to create a GDF/scientific centre of excellence, which itself could generate significant visitor traffic and even become a tourism point of interest alongside the existing assets. For example, the French counterpart to NWS has developed an Environmental Observatory, an Environmental Specimen Bank and a Technological Exhibition Facility within the area in which it is intending to construct its GDF. The facilities in France attract over 10,000 visitors per year. Similarly, facilities constructed at Äspö in support of the Swedish spent fuel repository programme host 20,000 visitors per year.

ERoY has a population with an older demographic than the national average, but there is a substantial working age population of those aged between 40 to 65 with higher level of education. The ERoY has a stronger rural and coastal heritage which correlates within the population structure and the lower deprivation rates within the region, however, there are a number of urbanised areas with potential for regeneration.

It is acknowledged that there could be a need for additional homes for workers involved in the construction and operation of a GDF in the area. NWS would work closely with relevant stakeholders on this matter, for example it could consider the need to agree a local accommodation plan that complements the overall housing strategy for the area.

Deciding on a suitable site for a GDF will take several years. This means that there is a real opportunity to consider how a GDF could benefit the community over the long-term. There will be a wide range of support available to allow communities that wish to explore more fully what a GDF might mean for them. The process of building a Community Vision by the Community Partnership will help to identify and articulate what is important within the community and how it will align with local and regional economic and social priorities.

The ERoY Council adopted a Local Plan in 2016 which is currently being updated in response to changes in the new National Planning Policy Framework, issues identified in the inspector's report on the Local Plan examination and the monitoring of current Local Plan policies and updates to the Evidence Base.

The ERoY Council Local Plan comprises a series of documents which jointly form the local plan for the district. These include:

- Strategy Document
- Allocations Document
- Bridlington Town Centre Area Action Plan

In addition, jointly with Hull City Council, ERoY Council have prepared a Joint Waste Plan and Joint Mineral Plan.

The vision of the Local Plan as set out within the Strategy Document is as follows:

“By 2029, the East Riding will be characterised by economically prosperous, vibrant and distinctive urban and rural communities in which residents and visitors can enjoy a high quality of life and businesses can thrive. The economy will have grown, and the varied towns and villages, and the rich and diverse landscapes, heritage assets, countryside, coastal areas and habitats that give the East Riding such character will continue to be valued by residents and visitors alike. Growth and new development will have been delivered in a sustainable manner, making the most efficient uses of land, buildings, resources and infrastructure. Investment in infrastructure will have taken place as required to support this growth, benefiting both new and existing residents. Overall, development will have

ensured that people are connected to housing, services, facilities, high quality public transport services and economic opportunities to meet their everyday needs, and will have complemented and supported regeneration initiatives underway in both the East Riding and City of Hull...”

To achieve the above vision, the strategy document identifies a set of 21 objectives to provide the guiding principles for managing development over the plan period. Those most relatable to a GDF and this report include the following:

Objective 2: Promote sustainable development to improve opportunities for all, with a particular focus on meeting the needs of disadvantaged communities and supporting regeneration of the East Riding and the City of Hull.

Objective 3: Maintain the character of smaller settlements and rural areas, whilst ensuring new development that supports their continued vitality, responds to local housing needs, realises opportunities for appropriate rural economic diversification and retains or enhances valued community facilities.

Objective 11: Grow, strengthen, modernise and diversify the local economy, including the East Riding’s Town and District Centres, and support both existing and emerging economic sectors and clusters.

Objective 13: Encourage a thriving and sustainable tourism and visitor economy, enhancing the tourism accommodation offer and making use of town centres, seaside resorts, coastal areas and the countryside, including the area’s natural features and the rich heritage of the landscape, nature conservation sites and built environment.

Objective 14: Support a wide portfolio of energy infrastructure and businesses, and maximise the potential of renewable and low carbon energy generation whilst minimising adverse impacts, including any cumulative landscape and visual effects.

Objective 17: Recognise, protect and enhance the international, national and local importance of the East Riding’s natural environment and biodiversity, including nature designations of all levels, Priority Habitats and Species, high quality landscapes, such as the Yorkshire Wolds, networks of green infrastructure and supporting opportunities for appropriate recreation.

Objective 18: Value the special character of the East Riding’s settlements by ensuring that development reinforces their distinct identity, avoids coalescence and protects their landscape settings and natural assets.

Objective 19: Recognise, protect and enhance the international, national and local importance of heritage assets, maximising their potential in contributing to the economic well-being of the area and to the quality of life of its communities.

Objective 20: Support the vitality of settlements by seeking to protect and/or enhance community facilities and services, including education, health care, recreation, cultural and sports facilities.

As part of Objective 14 which is more relevant to the nature of a GDF, and specifically, in relation to economic development and the potential sites with employment provision, the Strategy Document states within Policy C1, that:

“Hedon Haven, Bridgehead (Hessle), Melton and Capitol Park (Goole) are of particular importance to the East Riding economy. These sites are identified as Key Employment Sites in Policy S3 and will be safeguarded from alternative forms of development. They are located along the East-West Multi-Modal Transport Corridor and have the potential to cater for significant inward investment and indigenous business growth. This makes them critically important to the competitiveness and economic growth of the East Riding.”

Policy EC5 – Supporting the energy sector, the strategic document recognises the UK will need around 30-35GW of new electricity generation capacity over the next two decades as many coal and nuclear power stations, built in the 1960s and 1970s, reach the end of their lives and are set to close. Albeit, the UK targets for energy security via a variety of technologies, the strategic document recognises that fossil fuels will continue to be an important component, and the Humber has a growing role as an ‘energy corridor’ for gas, oil and coal imports, as well as for the storage of gas and Carbon Capture and Storage.

The ERoY does not have an established nuclear sector covering civil nuclear power and defence. However, it should be noted that Goole was previously considered as a potential location for a STEP (Spherical Tokamak for Energy Production) fusion plant and the University of Hull has a PET (Positron Emission Tomography) Research Centre.

A review of the above local policy documents shows that the hosting of a GDF would likely have potential to deliver a transformational effect to both the local and regional economies that would align with the local policy objectives set out above and could, in addition, enhance sectors of the local and regional economy, namely, manufacturing and engineering, the low carbon sector, tourism/visitor economy and food and agriculture.

In addition, Community Investment Funding that is made available during the early site evaluation community partnership stage and throughout the siting process could be directed towards initiatives in support of the above local and regional objectives.

Based on the review of readily available information relating to the Community Siting Factor, NWS has concluded that the ERoY has potential to host a GDF.

Environment

Based on the review of readily available information relating to the Environment Siting Factor, NWS has concluded that, with appropriate mitigation, the ERoY and adjacent inshore area has potential to host a GDF.

The delivery of a GDF to dispose of higher activity radioactive waste safely and securely will be one of the largest environmental infrastructure projects in the UK. All major developments can have both positive and negative impacts on the environment. At this early stage in the siting process, it is not possible to assess the specific impacts of delivering a GDF in the ERoY on the local environment.

The ERoY contains a diverse range of land-forms that give particular areas of distinctive character. These are described through the National Character Areas (NCA) as indicated on the National Character Assessment Areas plan. The landscape includes the chalk uplands of the Yorkshire Wolds; meandering rivers and streams of the Vale of York; watery raised mires of the Humberhead levels; coastal plain of the Holderness; and broad expanse of the Humber Estuary and its surroundings. Along the ERoY coast the landscape changes from the dramatic chalk cliffs of Flamborough Head in the north, through the clay cliffs of Holderness, to the nationally unique Spurn Head at the southern tip of the coast. Two sections of the coast, at Flamborough and Spurn Head are designated as Heritage Coast and are protected for their special scenic and environmental value.

These rich and diverse landscapes, open spaces and coastal areas are a source of attraction to local people and visitors. This includes an extensive (1,600km) Public Rights of Way (PRoW) network, for example, the Yorkshire Wolds National Trail and the Trans Pennine Trail. There are also areas of high landscape quality that are of local importance, including parts of the Yorkshire Wolds and the Lower Derwent Valley and at Flamborough Headland and Spurn Head.

The East Riding of Yorkshire Landscape Character Assessment identifies six Important Landscape Areas (ILA):

- The Yorkshire Wolds;
- Heritage Coast at Flamborough;
- Heritage Coast Spurn;
- River Derwent Corridor;
- Lower Derwent Valley and Pocklington Canal;
- Thorn, Crowle and Goole Moors.

There are no Areas of Outstanding Natural Beauty (AONB) or National Parks within ERoY, however, part of the Yorkshire Wolds is being considered for designation as an AONB. Natural England are currently in the process of consultation and are asking for opinions on the landscapes and heritage of the Yorkshire Wolds to assess its potential for a designation. Consultation for the nomination closed in July 2022, further statutory consultation is scheduled to take place during autumn 2023, after which a decision will be confirmed by DEFRA. However, at the time of writing, no decision has been published. If confirmed, it is expected that the designation will be implemented in summer 2024.

As part of the AONB designation process an Area of Search has been selected based on the Yorkshire Wolds National Character area with a loosely constrained boundary, this forms the starting point for the designation work. The Area of Search is not a proposed AONB boundary, and it is likely only part of the area will qualify for AONB designation. A Provisional Candidate Area has been selected which identifies the part of the Yorkshire Wolds landscape which may have the potential to be designated as an AONB. The siting of a GDF would need to consider the potential AONB and its indicative boundaries.

The ERoY has a rich and varied biodiversity, it contains a number of areas and sites of statutory protection by both national and international legislation (Figures 3 & 4). There are thirteen Local Nature Reserves (LNRs), three National Nature Reserves (NNRs), one Marine Conservation Zone (MCZ), fifty Sites of Special Scientific Interest (SSSI), two RAMSAR's, five Special Areas of Conservation (SACs) and six Special Protection Areas (SPAs). Two further SACs are located within 10km of the ERoY administrative boundaries, including Strensall Common SAC and Hatfield Moor SAC.

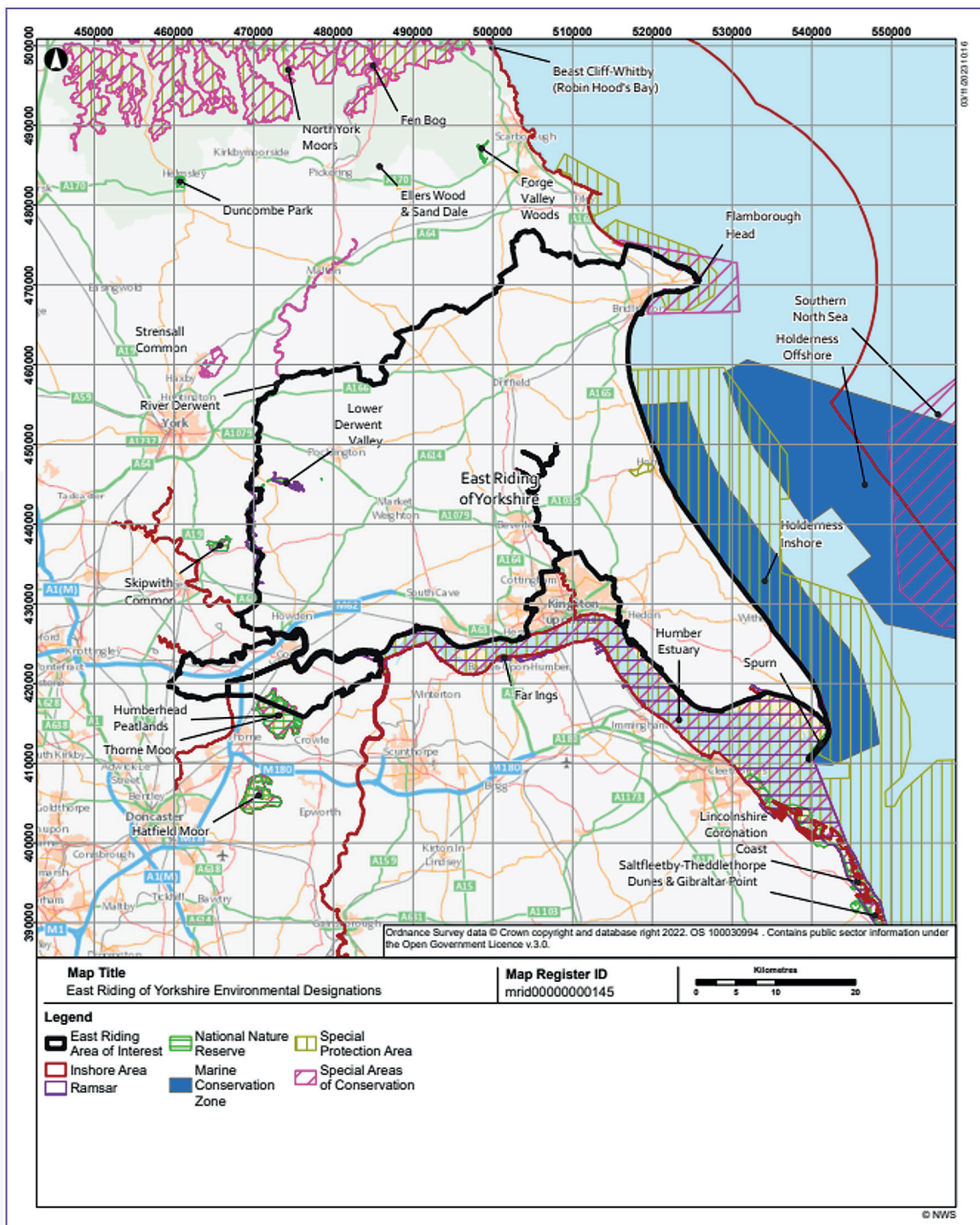
The composite site of Thorne and Hatfield Moors SPA is located along the southwestern edge of the ERoY boundary with Doncaster Local Authority. It qualifies for international protection due to the breeding population of Nightjars that use the site for nesting and feeding.

The Flamborough Head SAC is located to the north of ERoY near Bridlington. It is an internationally protected habitat featuring reefs, vegetated sea cliffs and submerged or partially submerged caves. The Flamborough and Filey Coast SPA support the UK's largest mainland seabird colonies. Originally designated as Flamborough Head and Bempton Cliffs SPA, this designation was extended in 2016 to provide further protection to seabirds and the terrestrial cliff environment of Filey Brigg. The revised SPA protects the inshore waters around the seabird breeding cliffs, from mean low water to 2km inshore. It also includes the RSPB reserve at Bempton cliffs, the Yorkshire Wildlife Trust Flamborough Cliffs Nature Reserve and the East Riding of Yorkshire Council Flamborough Head Local Nature Reserve.

The River Hull Headwaters (SSSI) support scarce plants such as flat-staked pondweed and river water-crowfoots as well as valuable trout fisheries and rich invertebrate communities.

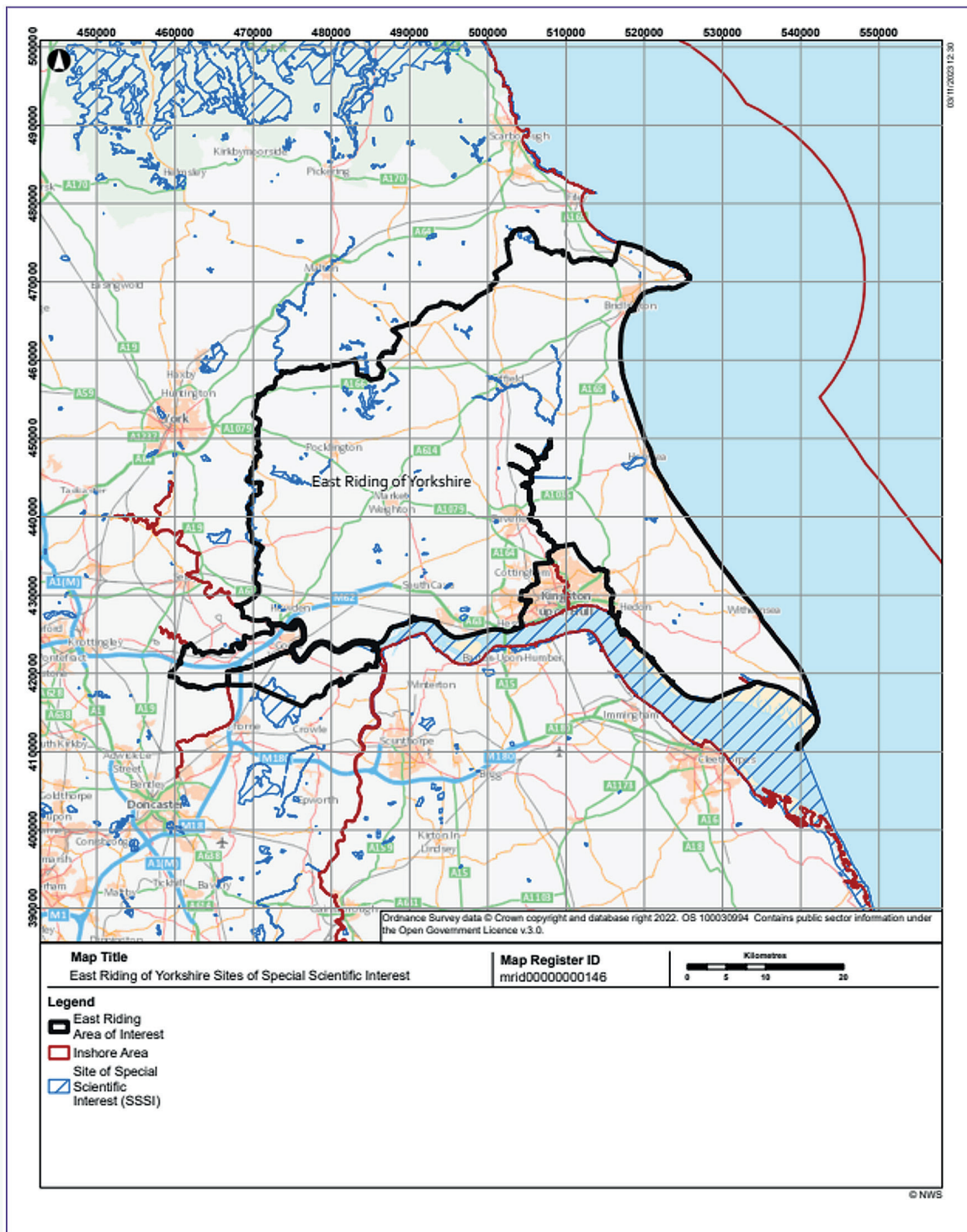
Hornsea Mere is one of England’s largest natural lowland lakes and is designated as a SSSI on account of its wintering wildfowl and an SPA due its internationally important numbers of wintering Gadwall.

Figure 5: ERoY and Adjacent Inshore Area Environmental Designations.



The Humber Estuary is a SSSI, SAC, SPA and RAMSAR site as well as containing statutory Wildfowl Refuge. The SPA and SAC together forms the Humber Estuary European Marine Site. Its mudflats, sandflats, saltmarshes and foreshore grazing marshes are of international importance for waterfowl and waders.

Figure 6: ERoY and Adjacent Inshore Area Sites of Special Scientific Interest.



The Greater Wash SPA lies along the east coast and forms an inshore and offshore designated site. This SPA lies along virtually all the eastern boundary of the EROy and the seaward boundary lies approximately 14 nautical miles (nm) from the shore at its furthest extent and is driven by the distribution of red-throated diver along the length of the SPA.

Further offshore, there is the Southern North Sea SAC and the Southern and Northern North Sea Marine MCZs which are important marine habitats for birds, fish and mammals.

The East Riding has a rich and diverse historic environment, containing outstanding buildings of national importance, such as Beverley Minster and Burton Constable Hall (both Grade I), alongside more local landmarks that act as place makers. In terms of designated heritage assets within the EROy the Historic England Register lists the following:

- 344 Scheduled Monuments;
- 2,411 Listed Buildings (Grade 1 – 105, Grade II* - 168, Grade II – 2138);
- 7 Registered Parks and Gardens;
- 108 Conservation Areas; and,
- The Registered Battlefield at Stamford Bridge.

It is recognised that the local tourism economy is influenced by the natural character of the area, as well as cultural heritage assets. These sensitive wildlife habitats and cultural assets are very important locally and NWS would work collaboratively to ensure that local priorities and concerns are understood and influence the work that may be undertaken.

The primary fluvial/tidal flood risk in the EROy is associated with the Humber estuary, River Hull, River Derwent, Market Weighton canal, River Ouse and Dutch Rivers (See Figure 6). Whilst the majority of the EROy District is within Flood Zone 1, a significant proportion of the area, around the River Hull Catchment, is within Flood Zone 3 as identified within the East Riding of Yorkshire Strategic Flood Risk Assessment, November 2019. These areas are illustrated on Figure 6 below. Much of EROy is defended against fluvial and coastal flooding. As such, a lot of the flood risk posed to the area is residual as a result of flood events exceeding the standard of protection afforded by the defence or defence pumping failure, or flood behind the defences due to local runoff or groundwater.

Coastal flood risk will also be influenced by coastal erosion and, in some areas, this may introduce areas to risk of flooding where localised high ground or smaller sea cliffs are eroded away. This effect may be accelerated by climate change (e.g., sea level rise), or as a result of changing wave climate.

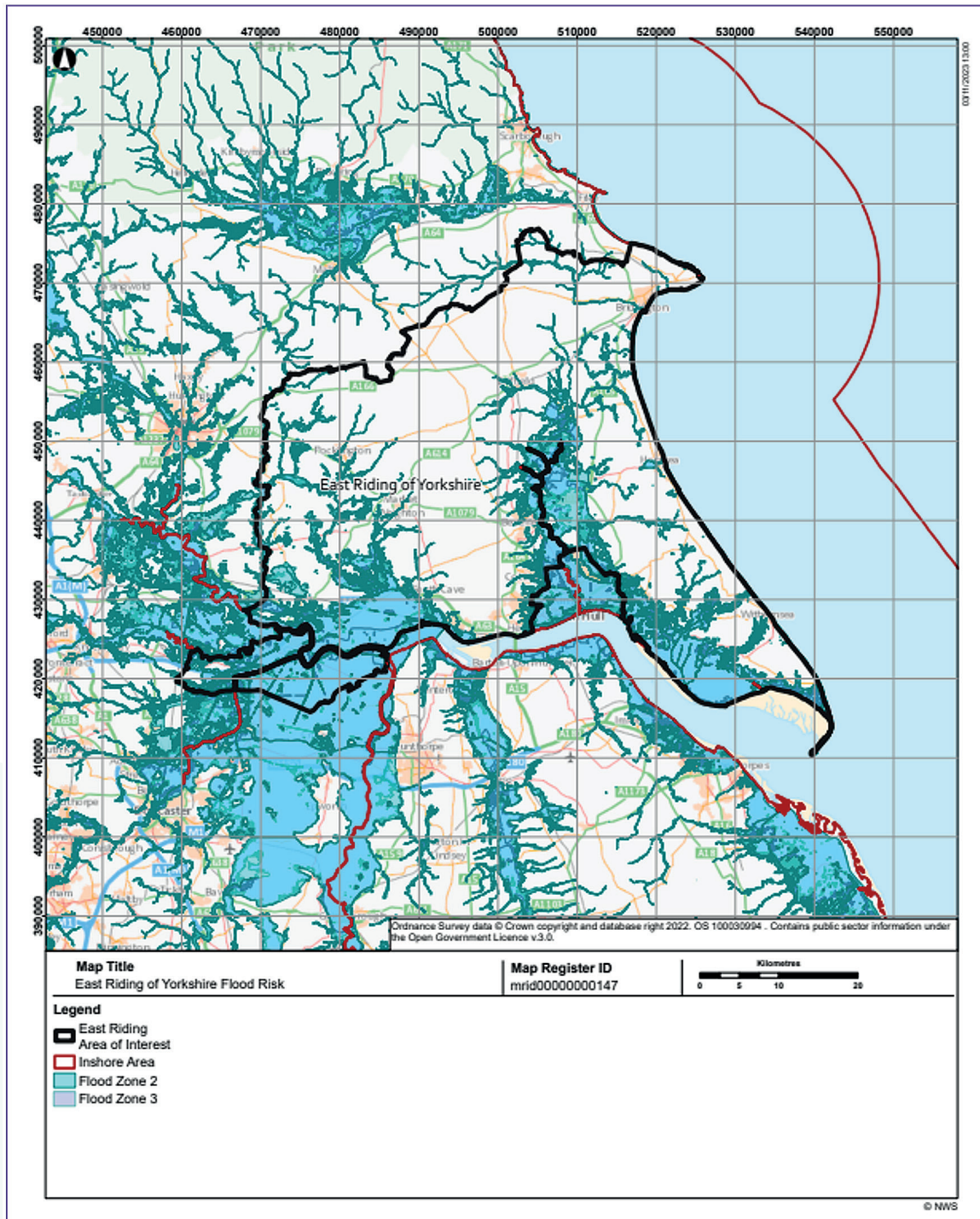
While coastal flooding is a significant risk at the southern end of the ERoY, the majority of the coastline is made up of higher cliffs, which prevent coastal flooding. These cliffs are however, subject to rapid coastal erosion as a result of their boulder clay geology resulting in some of the highest rates of coastal erosion in northern Europe. As a result there is locally significant potential risks to the life, health, property, business and economy of the population.

NWS would seek to work with the local authorities, the community, and relevant stakeholders, to understand the natural environment in greater detail and consider the implications of delivering a GDF in the ERoY on the natural assets that should be conserved and enhanced, in compliance with relevant legislation and policy. There may be additional opportunities to provide environmental enhancements as part of the delivery of a GDF, such as the provision of biodiversity enhancements, improving ecological networks, improving public access, etc. where appropriate.

The development of a GDF would be subject to a Flood and Coastal Erosion Risk Assessment considering a range of climate change predictions for sea level rise to assess possible long-term effects on local flood risk and coastal change. The design of the GDF would incorporate appropriate mitigation measures to protect against flood risk to the GDF and to ensure there were no adverse impacts on flood risks elsewhere as a result of the project.

Based on the review of readily available information relating to the Environmental Siting Factor, NWS has concluded that the ERoY has potential to host a GDF.

Figure 7: ERoY Flood Risk.



Engineering Feasibility

Based on the review of readily available information relating to the Engineering Feasibility Siting Factor, NWS has concluded that, with appropriate design measures, the ERoY including the adjacent inshore area has potential to host a GDF.

Based on the current geological understanding of the ERoY, there are several potentially suitable LSSR and Evaporite host rocks present within the depth range of interest. However, there is uncertainty over the nature of the superficial geology and potential host rocks, including faulting and fracturing characteristics. If the ERoY moves forward in the siting process, NWS would need to undertake further work to characterise and determine whether the LSSRs and Evaporites understood to exist in the area, may be suitable for hosting a GDF.

There are several major faults in the area which may act as barriers to or pathways for groundwater movement, depending upon their characteristics. This is not unusual as faults are common in the underground environment. The influence of faults and fracturing on groundwater movement would need to be evaluated during site characterisation. NWS's designs would need to take account of the impact of faults on both the GDF and the shafts and tunnels that might be constructed to access it.

There is potential for elevated radon in the region due to the underlying geology. Also, the extent and levels of any contamination associated with historical land use or mining in the ERoY would need to be understood. Hence, further work will need to be undertaken to assess any related implications on the design, construction and operability of a GDF.

Accessways through water bearing strata has certain risks and dewatering and injected ground improvement products could be needed, in much of the area there is in the region of 400m of overlying water bearing strata (Chalk). Chalk tunnelling techniques tend to involve using sealed slurry Tunnel Boring Machines (TBMs) operating under pressurised conditions where high groundwater pressure and high permeability coexist. This has various implications for safety management in construction, it can be achieved with significant ground treatment in order to enable maintenance interventions. However, if water pressures get above 20bar (200m hydrostatic) and dewatering is impractical then there is little precedent of TBMs that have been designed to resist such pressures.

The GDF surface facilities could require in the region of one square kilometre of land, however the precise layout cannot be determined at this stage and more specific land requirements will need to be assessed in due course. These surface facilities would be linked to the sub-surface facilities by sloping tunnels and/or vertical shafts. The layout of GDF surface facilities would depend on the

geography of a particular site, how much space is available, and the arrangement of existing infrastructure. There could also be the potential, to consider whether some of the ancillary facilities, such as offices and stores could be located off-site in nearby locations.

NWS would work collaboratively to develop safe and secure surface facility designs and identify a potential location for a GDF that responds to local priorities and the natural environment. The construction and continued operations of a GDF would result in the generation of excavated spoil and there may be opportunities to reuse the spoil locally, for instance in support of flood mitigations, or habitat creation or enhancement and other potential infrastructure schemes.

By applying 'good design' principles NWS would seek to ensure that the delivery of a GDF is sensitive to the local area, efficient in the use of natural resources and energy used in construction, and that the designs of surface facilities are sympathetic to the local environment, as far as practicable.

At this stage no specific sites for the surface facilities of a GDF have been identified, but there is no reason to suggest that it would not be possible to find a suitable location, within the EROy. It would be important to ensure the delivery of sensitively and appropriately designed buildings and security arrangements that are sympathetic to the character of the local area. NWS would seek to work collaboratively with the community to ensure that their preferences are taken into account.

Based on the review of readily available information relating to the Engineering Feasibility Siting Factor, NWS has concluded that the EROy has potential to host a GDF.

Transport

Based on the review of readily available information relating to the Transport Siting Factor, NWS has concluded that the ERoY and adjacent inshore area has potential to host a GDF.

Throughout the lifetime of a GDF, transport links to the proposed facility will be vital. Transport would be required for construction materials for the underground and surface facilities and associated infrastructure; radioactive waste for disposal; movement of spoil and backfill materials (this may also include materials for surface bunds and site flood mitigations, if required), and personnel during all phases of the design, construction, operation, and eventual closure of a GDF.

The ERoY has a good existing transport network that has potential to host a GDF. The ERoY is serviced by the M62/A63 Strategic Route, which runs east to west through the south of the district. There are good connections to the wider Strategic Road network including the M18 which joins the M62 near Goole and runs south to the A1(M) at Doncaster.

A number of non-strategic, local A roads and B roads are present in the area connecting to the Strategic Road network; however it should be noted that they may be considered quite limited when compared to the Strategic Road network and would likely need enhancing.

The railway provisions to the main centres of population in the area are good. The ERoY is served by three main rail links; the line from Hull to Leeds, Manchester and Liverpool, the Hull to Doncaster line (via Goole and Brough) and the Hull to Scarborough line (via Beverley, Driffield and Bridlington). These connect the main settlements in ERoY with other centres in the Yorkshire and Humber area and the rest of the country. There is also historic rail infrastructure within the ERoY, for example the historic Hull to Withernsea line, which if reinstated could possibly provide new community connections.

There are existing good port facilities within and close to ERoY which offer potential for sea transport for movements of spoil, construction materials and radioactive packages during the construction and operation of a GDF. The Port of Hull is located on the north bank of the River Humber and is owned and operated by Associated British Ports. It is located in the Hull City Council area, and although it is not within the East Riding of Yorkshire, it is adjacent to the area. It has a diverse range of capabilities including docks, dry docks, riverside terminals and specialist all weather off-loading facilities. The port handles 9.7 million tonnes of cargo each year. Direct rail access to the quayside is provided by parts of the port. The port is adjacent to the A63 Strategic Route, which provides onwards access to the M62.

There are two very capable ports situated within or adjacent to the ERoY which are accessible by both road and by rail, that could support the construction and operation of a GDF. The Port of Goole is located to the west in ERoY, on the River Ouse. Principally a bulk cargo port, it has a number of capabilities including a number of docks, dry docks, and covered off-loading facilities. The port handles 1.5 million tonnes of cargo each year. In addition to a rail freight terminal, the port offers direct rail access to the quayside at some of the docks. The port is just 2 miles from Junction 36 of the M62, connected by the A161. The Aire and Calder Navigation inland waterway connects to the River Ouse at the Port of Goole. Keady Port is located on the River Trent approximately 5 miles south of ERoY. The port has a single general cargo berth with a frontage of 60m. The port is located half a mile away from the South Humberside Main Line railway and has good access to the strategic road network, situated 3.5 miles from the M180 strategic route.

The delivery of a GDF may offer opportunities to further improve the existing good transport infrastructure to support the necessary construction and operational activities. This could also enhance local connectivity for the community and benefit local businesses and potentially the tourism sector. This could include improvements to both the local road network and the local rail network. NWS would seek to work with relevant stakeholders to understand any improvements that are planned and the schedules for delivery.

Based on the review of readily available information relating to the Transport Siting Factor, NWS has concluded that the ERoY has potential to host a GDF.

Value for Money

Based on the review of readily available information relating to the Value for Money Siting Factor, NWS has concluded that the ERoY and adjacent inshore area has potential to host a GDF.

At this early stage in the siting process there are many uncertainties that would influence the overall programme cost and delivery schedule. However, at this stage there is nothing to suggest NWS would not be able to secure value for money in delivering a GDF in the ERoY and adjacent inshore area.

3. Conclusion

Having considered the readily available information, and particularly the National Geological Screening outputs, NWS has concluded that the ERoY and adjacent inshore area has potential to host a GDF.

This IER presents the findings of work to evaluate potential of the ERoY against the six identified Siting Factors set out in the published Site Evaluation document. In undertaking this evaluation NWS has used high level, existing and readily available information.

This is the first stage of evaluation and further work drawing upon additional sources of information and data would be required if this area was to be considered further in the siting process. However, at this stage nothing has been identified which would prevent the development of a GDF in the ERoY and therefore **NWS has concluded that the ERoY has potential to host a GDF.**

This initial work has developed the understanding of whether the ERoY holds any potential to host a GDF, together with early identification of known constraints, uncertainties and opportunities for further work if it progresses through the siting process. **However, it is important to note that these initial evaluations have not yet confirmed whether the ERoY is suitable to host a GDF** and further work would be required to establish this.

4. Potential Future Work

If the ERoY moves forward in the siting process, NWS would work collaboratively with the local community and relevant stakeholders to further understand these and other matters:

- Further development of the geological and groundwater understanding of the ERoY area through site characterisation and further studies once a Search Area has been established.
- The sensitivities of the local natural and cultural environment and the potential implications of delivering a GDF and whether there could be alignment with local environmental objectives and potential to deliver environmental enhancements to designated areas and sites.
- Existing and future aspirations for the area, and how delivery of a GDF could be aligned to local and regional priorities.
- How the delivery of a GDF could affect existing residents and businesses and how NWS could support all people living in and around the area by adding real value through the whole siting process, such that benefits could start to be realised in the near future including through the use of Community Investment Funding.
- The existing transport related challenges of the area and the transport related implications associated with the development of a GDF. This could include consideration of potential to transport freight to the area via sea and how wider benefits could be realised from any infrastructure upgrades that may be required to support a GDF.
- How NWS could work collaboratively with all relevant stakeholders to develop safe and secure design solutions and identify potential locations for a GDF that are sensitive to local priorities and the legislative, policy and regulatory frameworks within which NWS must operate.

5. Next Steps

If the area progresses in the siting process to further explore potential to host a GDF, discussions will need to be considered more widely with the community, through a Working Group involving NWS, ERoY Council, an independent chair and a facilitator, plus other organisations (as appropriate). All relevant principal local authorities have now been invited to join the Working Group although, as this early part of the process is essentially about fact-finding and exploratory discussions, it is not a requirement that local authorities join. Such a Working Group is just a preliminary step to begin engagement, scope out an area to be considered in more detail by a Community Partnership and to get that partnership body established. The process and steps are set out in more detail in the UK Government's Working with Communities policy.

An early task for the Working Group would be to identify a Search Area. The Search Area is the geographical area within which NWS would seek to identify potentially suitable sites to host a GDF and any supporting infrastructure and would be defined by electoral ward boundaries.

The Working Group would also start to gather information about the people and organisations in the area that are likely to be affected or have an interest in a GDF with a view to identifying members for a formal Community Partnership. Further information can be found in NWS's Community Guidance document [iv].

This Community Partnership would provide a vehicle for sharing information with the community and for finding answers to the questions the community may have about geological disposal, the siting process and how they, as a community, could benefit. If it is to be successful, it will be important for a Community Partnership to be respectful of a wide range of opinions and should aim for membership that is reflective of the community Search Area.

A community can be withdrawn from the siting process at any time up until it has taken the Test of Public Support. The decision on whether to withdraw the community will be taken by the relevant principal local authorities on the Community Partnership. NWS can also choose to withdraw from the siting process for technical reasons or to prioritise available funds. The relevant principal local authorities on the Community Partnership will also take the decision on if or when to hold a Test of Public Support in order to seek the community's views on hosting a GDF, once site-specific proposals have been developed sufficiently to provide clarity on what is actually being proposed. A positive Test of Public Support is required before NWS is able to proceed with the statutory licensing, environmental permitting and development consent application process to build a GDF.

Glossary

Community Guidance

Guidance that NWS (RWM) has developed to provide information, help and advice in support of the policy frameworks that exist in England and Wales. It is for anyone who is interested in learning more about geological disposal and the process for identifying a site for a GDF.

Community Partnership

The partnership between the members of the community, at least one Relevant Principal Local Authority and NWS.

Geological Disposal Facility (GDF)

A geological disposal facility is a highly engineered facility capable of isolating radioactive waste within multiple protective barriers, deep underground, to ensure that no harmful quantities of radioactivity ever reach the surface environment.

Initial Discussions

Early contact with an Interested Party to help them to find out more about the Siting Process; to understand whether a site/area put forward has any potential to host a GDF; and to help them to decide whether they want to seek to form a Working Group and open up a wider discussion.

Interested Party

The group, organisation, or individual(s) who first started discussions with NWS.

Inshore Area

The inshore is defined as the UK Territorial Waters which extend up to 12 nautical miles (22.2 kilometres) from the Mean Low Water Mark.

Inventory for Disposal

The specific types of higher activity radioactive waste (and nuclear materials that could be declared as waste) which may need to be disposed of in a GDF.

National Geological Screening (NGS)

The National Geological Screening provides a high-level summary of the existing geological information of relevance to the safety of a GDF to inform initial discussions with communities.

Nuclear Decommissioning Authority (NDA)

A non-departmental public body established by the Energy Act 2004 to ensure the safe and efficient clean-up of the UK's public sector, civil nuclear legacy. The NDA has statutory responsibility for decommissioning and cleaning-up 17 UK sites and the associated liabilities and assets. It reports to the Department for Business Energy and Industrial Strategy (BEIS); for some aspects of its functions in Scotland, it is responsible to Scottish Ministers.

Nuclear Waste Services (NWS)

Radioactive Waste Management Limited trading as Nuclear Waste Services (NWS). Nuclear Waste Services (NWS) specialises in managing, treating and safely disposing of UK radioactive waste. Formed in January 2022, NWS integrates the expertise of LLW Repository Limited (LLWR), Radioactive Waste Management Limited (RWM), which manages the GDF Programme and is the GDF Developer and the Nuclear Decommissioning Authority (NDA) group's Integrated Waste Management Programme (IWMP).

Policy – The Working with Communities Policy

'Implementing Geological Disposal – Working with Communities', an updated framework for the long-term management of higher activity radioactive waste, HM Department for Business, Energy and Industrial Strategy (December 2018).

Potential Host Community

The Potential Host Community is the community within a geographical area that could potentially host a GDF.

Radioactive Waste Management Ltd (RWM)

A wholly-owned subsidiary of the Nuclear Decommissioning Authority, established in 2014 for the purpose of delivering geological disposal and providing solutions for the management of higher activity waste. Trading as Nuclear Waste Services (NWS) from January 2022.

Relevant principal local authorities

A principal local authority is a district, county or unitary authority. Relevant principal local authorities will be the principal local authorities that represent people in all or part of the area under consideration, whether the Search Area or the Potential Host Community.

Right of Withdrawal

The ability for a community or NWS to withdraw from the siting process.

Search Area

The Search Area is the geographical area encompassing all the electoral wards within which NWS will be able to search for potential sites. For areas which include potential for development under the seabed, the Search Area will comprise only that area on land.

Test of Public Support

A mechanism to establish whether residents of the Potential Host Community support the development of a GDF within their community.

Working Group

The Working Group is formed in the early part of the GDF siting process in order to gather information about the community and provide information to the community about geological disposal before a Community Partnership is formed. It comprises the Interested Party, NWS, an independent facilitator, an independent chair and any relevant principal local authorities that wish to join.

Sources of Information Used to Support Initial Evaluations

- DEFRA, <https://magic.defra.gov.uk/MagicMap.aspx> (accessed 2023)
- East Riding of Yorkshire Council 2023, www.eastriding.gov.uk (accessed 2023)
- Geological Survey: Commissioned Report CR/17/092, 2018
- Natural England, <https://nationalcharacterareas.co.uk> (accessed 2023)
- Natural England, www.yorkshire-wolds-designation-project.org (accessed 2023)
- Nuclear Waste Services, Site Evaluation: How we will evaluate sites in England. 2022
- RWM, National Geological Screening Guidance, 2016
- RWM, Eastern England, Regional Geology, 2018
- RWM, National Geological Screening – Eastern England- Subregion 2, 2018
- RWM, National Geological Screening – Eastern England- Subregion 4, 2018
- RWM, National Geological Screening- North East Region - Minerals and Waste Programme, British
- Wright, J.K., The Market Weighton High in the 21st century –new understanding of a long-standing problem, *Proceedings of the Yorkshire Geological Society*, 64, 25p. 2021

Mapping Data

Dataset	Source
District Borough Unitary Ward Region	OS Boundary Line Open Data (accessed 2023) Ordnance Survey data © Crown copyright and database right
Geology	National Geological Screening Guidance - RWM 2016 National Geological Screening – Eastern England - Regional Geology - RWM 2018 National Geological Screening – Eastern England Sub-regions 2 and 4 - RWM 2018 National Geological Screening: Eastern England - Minerals and Waste Programme Commissioned Report CR/17/092 - BGS 2018
Topographic	ESRI UK (accessed 2023)

Endnotes

- i Department for Business, Energy and Industrial Strategy. Implementing Geological Disposal – Working with Communities, An updated framework for the long-term management of higher activity radioactive waste. 2018.
- ii Nuclear Waste Services. Geological Disposal Facility - Creating Jobs & Skills: A First Look. 2022.
- iii Nuclear Waste Services. Site Evaluation - How we will Evaluate Sites in England. 2022.
- iiii Radioactive Waste Management. National Geological Screening Guidance. 2016.
- v Nuclear Waste Services. Geological Disposal - a programme like no other. www.gov.uk/guidance/geological-disposal. 2020.
- vi Nuclear Waste Services. Community Guidance for England. 2022.



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Nuclear Waste Services is a joint trading name of LLW Repository Limited (Company Registration No. 05608448) and Radioactive Waste Management Limited (Company Registration No. 08920190). Both of these companies are registered in England and Wales with their registered office located at Pelham House, Pelham Drive, Calderbridge, Cumbria CA20 1DB.