Radioactive Waste Management

INITIAL EVALUATION REPORT:
Inshore area near to the Low Level Waste Repository

PREPARED FOR: A Private Company
SITE REFERENCE: Inshore Area near to the Low Level Waste Repository

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Preface

This report has been developed by Radioactive Waste Management Ltd (RWM) as part of the process to identify a suitable site for a Geological Disposal Facility (GDF) within a willing host community.

It summarises initial work that RWM has undertaken as part of Initial Discussions being held with a private company 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 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."

Context of this report

Discussions with RWM have been initiated by a number of Interested Parties in the Borough of Copeland. As part of these Initial Discussions RWM has undertaken initial evaluation work and produced four separate Initial Evaluation Reports to understand whether each of the areas identified by the various Interested Parties have any potential to host a GDF.

The Interested Party for which this Initial Evaluation Report applies expressed a particular interest in investigating the potential to host a GDF in the inshore area accessed from the coastal strip around the area of the existing site of the Low Level Waste Repository with attendant benefits for local infrastructure development and employment. The clear view from this Interested Party is that the Lake District National Park should be excluded from consideration.

A further Interested Party expressed a particular interest in the potential to host the surface facilities associated with a GDF on existing developed land in the south of Copeland, which could be re-purposed by the GDF development and support environmental mitigations. This Interested Party was also interested in understanding the potential for development in the inshore area accessed from the south of Copeland, with attendant benefits for local communities from local infrastructure development and employment.

Another Interested Party expressed a general interest in seeing the opportunity of the GDF programme given proper consideration in west Cumbria as part of future infrastructure developments in the area. The view from this Interested Party is that the Lake District National Park should be excluded from consideration.

In July 2020 the Executive of Copeland Borough Council agreed that, in recognition of the progress that RWM were making in their search for a suitable site and a willing community to host a GDF, and the potential 'route map' of the steps that they would need to take to establish a Working Group, the Council would open up discussions with RWM with a view to establishing a Working Group in Copeland to explore any potential suitable sites for consideration as a location for a GDF with the following conditions attached.

1. *"That those areas of the Borough currently within the boundary of the Lake District National Park are excluded from any consideration from the outset.*
2. *That in recognition of the current Working with Communities process which allows for a GDF to be located in an 'in-shore area,' that the in-shore area off the coast of Copeland is worthy of consideration.*
3. *That the Council wants to see a credible and independent Chair appointed to the Working Group and that all the Councils legitimate costs of engaging in the process are covered."*

Following the completion of initial evaluation work, RWM has concluded that there may be potential to host a GDF in all of the areas referred to above, as identified by the Interested Parties. Both RWM and all the Interested Parties have agreed they would like to take the next step, to open up discussions more widely in the community by forming a Working Group i.e. a single Copeland Working Group would be formed to include all four Interested Parties.

Although this report is focused on the area suggested by the private company to facilitate ongoing discussions, the geographical area to be discussed initially by the proposed Copeland Working Group will be the whole of Copeland Borough and the adjacent inshore area, with the exclusion of the area located within the boundary of the Lake District National Park. The Working Group will use this as a starting point from which it will propose a Search Area (or Search Areas) for consideration by a future Community Partnership (or Community Partnerships). The potential for development of the underground facilities of a GDF off the coast, accessed from land, will also be considered by the Working Group i.e. the potential inshore area.

Executive Summary

Following initial discussions with Radioactive Waste Management Ltd (RWM), a private company wishes to understand whether the inshore area off the coast near to the Low Level Waste Repository (LLWR) in Copeland Borough, has potential to host a Geological Disposal Facility (GDF). This area includes part, but not all, of the Copeland Borough Council electoral ward of Gosforth and Seascale.

This private company is one of four Interested Parties that have approached RWM to understand whether there is any potential for a GDF to be located in the Borough of Copeland. During Initial Discussions with all of the Interested Parties in the borough, the Interested Parties have agreed that those areas of the borough currently located within the boundary of the Lake District National Park should be excluded from any consideration to host a GDF from the outset. The Policy confirms that the process to find a suitable location for a GDF is consent based. As such, this position will be respected by RWM and this will inform the identification of any future Search Area by the Working Group.

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 hundreds of well-paid jobs each year for over 100 years in construction, engineering, administration, safety operations and project management. There is an opportunity for skills to be developed by people in the community and for the jobs to be undertaken by them. Given the scale of a GDF, it is likely it could require a significant upgrade to local transport infrastructure, which could bring significant benefits to local residents and businesses and make the area more attractive for inward investment. In addition, the community would benefit from opportunities to use significant community investment funding for locally important priorities early in the siting process. The Government has also committed in the Policy to providing significant additional investment to the community that hosts a GDF.

The evaluation of this area[1] has been based on the six 'siting factors' of Safety and Security, Community, Environment, Engineering Feasibility, Transport and Value for Money established by RWM following public consultation and which are discussed in RWM's published document *'Site Evaluation – How we will evaluate sites in England'.*

Based on a review of readily available information relevant to each of the six siting factors, initial findings indicate that the Area of Interest has the potential to host a GDF and could as a result gain the significant benefits a GDF could provide for the surrounding area and economies for over 100 years.

[1] *The area considered during this Initial Evaluation Report comprises of an area broadly two to three kilometres surrounding the LLWR and the adjacent inshore area off the coast (see figure 1). It is referred to in this report as the 'Area of Interest'.*

Existing geological information, as compiled in the National Geological Screening, shows there are several clay-rich rock layers occurring within the depth range of interest within the inshore area off the coast from the LLWR site. In addition, some of these clay-rocks contain a series of evaporite units containing rock salt (halite) layers. These rock salt layers may have the properties required of potential Evaporite host rocks and be thick enough to host a GDF. High Strength Rocks, such as granites, are potentially suitable as host rocks for a GDF are found onshore. However, the focus of this initial work has been on the potential host rocks that occur off the coast and it is understood that the HSR are not found in the inshore area within the depth range of interest. Notwithstanding this, all three of the main rock types that are potentially suitable for hosting a GDF can be found in the Area of Interest that is within the vicinity of LLWR. No fundamental constraints relating to construction, operational safety or security of a GDF in the Area of Interest have been identified at this stage.

The local area has a long association with the nuclear sector meaning that there is considerable nuclear skill and expertise in the local workforce as well as a local community that is familiar with nuclear issues, including those relating to radioactive waste. Approximately 11,000 people are directly employed by Sellafield Ltd at the Sellafield site, which is close to the LLWR site, with thousands more in the supply chain. Many of these individuals are in highly skilled engineering and scientific jobs. Sellafield is currently undergoing a transformation in operations, with a move into full decommissioning. The delivery of a GDF in the area could help the retention and redeployment of transferable nuclear capability between ongoing and future missions such as a GDF, as set out in the Cumbria Nuclear Prospectus.

The existing tourism economy of the wider area is highly valued, and it would be important to ensure that the natural, heritage and cultural features and assets that support and drive this economy are treated sensitively. Delivery of a GDF could provide the community with a real opportunity to create a GDF/scientific centre of excellence, which itself could become a tourist destination alongside the existing tourist destinations.

Large parts of the district electoral ward, within which the LLWR site is located, are within the Lake District National Park, which is the largest National Park in England and a World Heritage Site. The National Park is afforded the highest level of landscape protection due to its scenic beauty. As discussed above all the Interested Parties in the Borough of Copeland have confirmed that those areas of the borough currently located within the boundary of the Lake District National Park should be excluded from any consideration for hosting a GDF from the outset. In addition, parts of the Area of Interest are protected due to their nature conservation interests. RWM understands and fully supports the priority given to respecting these protected areas. However, at this stage, although a number of potential locations have been suggested no specific site for the surface facilities of a GDF has been identified, it is not possible to assess the specific potential impacts of delivering a GDF on the environment. RWM would seek to work with the community and relevant stakeholders to understand the natural environment in greater detail when considering the implications of delivering a GDF in the Area of Interest on such protected areas and the natural environment.

Nuclear materials transport, workforce commuting, and construction material routes have already been established in the wider area to nearby Sellafield and the LLWR site itself. Nuclear materials have been safely transported to and from the area for many decades. However, to support the development of a GDF in the Area of Interest, existing routes are likely to need improving. This could bring benefits for local communities, which are currently under-served by the existing road and rail networks in the wider region, and could have the additional benefit of making the area more attractive for development and inward investment. The Area of Interest that has been the subject of this initial evaluation work includes a coastline so the option of sea transport via a dedicated port facility nearby

could be explored further. Using sea transport could present additional benefits through required infrastructure upgrades, as well as reducing the impact of land-based transport, with further potential synergies with wider clean-energy opportunities on similar timescales as set out in the Cumbria Nuclear Prospectus.

This initial work has not confirmed the Area of Interest is suitable to host a GDF. Rather, it has developed an understanding of whether the Area of Interest holds any potential to host a GDF, together with early identification of known constraints and uncertainties. Further analysis, drawing upon additional sources of information and data, will be required if this area is considered further in the siting process.

If this Area of Interest moves forward in the siting process, RWM would work collaboratively with the local community and relevant stakeholders to enhance current understanding of the aspirations for the area and how delivery of a GDF could be aligned to local priorities. RWM would also wish to focus on the sensitivities of the local natural environment, together with the implications of future climate change. RWM would also consider the existing transport-related challenges of the area and potential transport options and how benefits could be realised as a consequence of any infrastructure upgrades that may be required.

The next part of the siting process for this area would take forward discussions with the community through the formation of a Working Group involving RWM, the private company, and other organisations as appropriate. An independent chair and facilitator would be appointed, and all relevant principal local authorities would be informed and invited to join the Working Group.

Following the completion of the initial evaluation work by RWM during Initial Discussions all of the Interested Parties in the Borough of Copeland have agreed that they would work together to form a single Working Group.

An early task for the Working Group would be to identify a Search Area. The Search Area is the geographical area within which RWM would seek to identify potentially suitable sites to host a GDF. The position that has been expressed by the Interested Parties with respect to the exclusion of the Lake District National Park will inform the identification of the Search Area. The Policy confirms that a Search Area is to be delineated using the district electoral ward boundaries.

The Working Group will start to gather information about the people and organisations in the area who are likely to be affected or have an interest in a GDF with a view to identifying members for a formal Community Partnership. This Community Partnership will 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 reflect, both in its composition and views, the community it is representing and be respectful of a wide range of opinions.

A community can withdraw from the siting process at any time up until it has taken the Test of Public Support required before a decision is made to seek development consent from the Secretary of State. Relevant principal local authorities on the Community Partnership will have the final say on when to undertake this Test of Public Support in order to seek the community's views on hosting a GDF.

1. Introduction

Objective of this Report

This Initial Evaluation Report has been prepared to help understand the potential a Geological Disposal Facility (GDF) to be located in the area that has been identified to inform ongoing discussions between a private company and Radioactive Waste Management Ltd (RWM) in respect of the siting process for a GDF[2].

It presents the findings of the initial evaluation work carried out by RWM to understand whether, based on existing readily available information, the area around the Low Level Waste Repository (LLWR) and the adjacent inshore area[3], referred to in this report as the 'Area of Interest', has any potential to host a GDF.

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

A wealth of additional information and resources is available online[4], including links to the UK Government's policy on geological disposal.

[2] *A GDF will have both surface and underground facilities. They will be linked by access tunnels and/or shafts, depending on the layout of these facilities. The underground facilities do not need to be located directly below the surface facilities – they could be separated by a distance of many kilometres. The precise layout and design of the facilities will depend on the inventory for disposal and the specific geological characteristics at the site in question.*

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

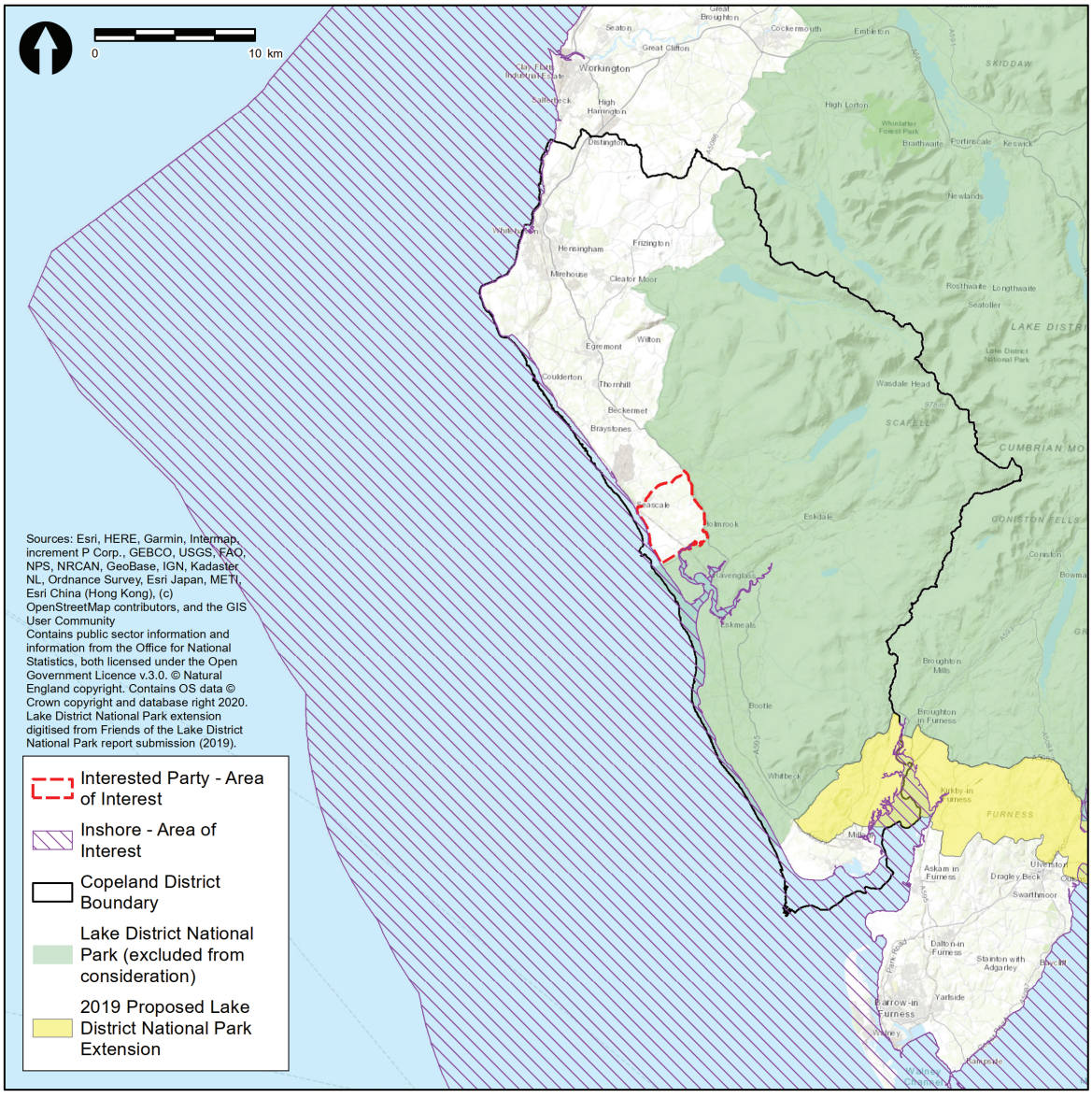
[4] ***https://geologicaldisposal.campaign.gov.uk.***

Area of Interest

A private company approached RWM to understand if the surface facilities associated with a GDF could be located near to the existing LLWR site that is near to the village of Drigg in Copeland, with the sub-surface elements (disposal tunnels and vaults) located off the coast deep beneath the seabed. Implicit in this approach is that no GDF would be located in or under the Lake District National Park. This is aligned to the position agreed by all the Interested Parties, following the completion of initial evaluation work, that those areas of the borough currently located within the boundary of the Lake District National Park should be excluded from any consideration to host a GDF from the outset. This position relating to the Lake District National Park will inform the identification of the Search Area by the Working Group.

The LLWR is located within the district electoral ward of Gosforth and Seascale. This initial evaluation work has focused upon an area broadly two to three kilometres surrounding LLWR (as shown on **Figure 1**).

Figure 1: Map of the area under consideration



The GDF surface facilities would require in the region of one square kilometre of land, however the precise layout and land requirements would need to be determined in due course, if the Area of Interest were to progress through the siting process. These surface facilities would be linked to the sub-surface facilities by a sloping tunnel and/or vertical shafts. The sub-surface area of a GDF does not have to be underneath the surface facilities and therefore could be offset by many kilometres, such that the sub-surface facilities could be located deep beneath the seabed in the inshore area. The private company made a specific request for consideration of this inshore option for the sub-surface facilities of a GDF.

Evaluation Approach

The work presented in this Initial Evaluation Report is based on the approach set out in the Policy and RWM's published Site Evaluation document 'Site Evaluation - How we will evaluate sites in England' [ii].

The Site Evaluation document draws upon the existing legislative, policy and regulatory requirements that RWM will need to satisfy to successfully deliver a GDF and identifies six 'Siting Factors' setting out the broad topic areas that RWM 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 RWM will take into account.

As such this Initial Evaluation Report is structured around the six Siting Factors, being:

Safety and Security

Community

Environment

Engineering Feasibility

Transport

Value for Money

A key focus of this initial evaluation has been the geological context of the Area of Interest. This is to underpin RWM's ability to understand whether the Area of Interest has the potential to host a GDF to the satisfaction of RWM itself, the local community, independent regulators, and other stakeholders.

In this initial evaluation, RWM has focused on the possibility of the sub-surface facilities of a GDF being located at depth hundreds of metres below the seabed off the coast within the inshore area.

At this early stage in the siting process RWM has only drawn upon existing readily available information to inform a desktop study by its technical specialists. A list of the information considered is appended to this report.

2. Initial Evaluation

Safety and Security

Based on the review of readily available information relating to the Safety and Security Siting Factor, RWM has concluded that the Area of Interest 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 man-made engineered barriers work together with the geology to provide this protection.

Based upon work in the UK and overseas RWM has identified three broad types of potential host rock for a GDF.

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

Two of these potential host rocks (LSSR and Evaporites) occur within the depth range of interest[5] (200 to 1,000 metres below NGS datum[6]) within the inshore area RWM has considered as a potential location for the sub-surface facilities as part of this initial work, although, it is recognised that HSR are found onshore.

Much of the area off the coast, within the adjacent inshore area, is underlain by clay-rich rock layers and evaporite layers. Lower Strength Sedimentary Rocks, 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 reseal, particularly under the weight of hundreds of metres of overlying rock.

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*[5] 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, RWM recognises that some rock types may be suitable as host rocks where they occur at depths greater than 1,000 metres.*

[6] 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 fine, 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 between the bases of valleys. This is to ensure that rocks identified as potentially suitable will be below nearby valleys.

As a result, there is often almost no groundwater movement through these rocks. These attributes, together with the engineered barrier system, would contribute to a situation where radionuclides and other non-radioactive materials would be suitably contained for hundreds of thousands of years.

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. First, 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 absorbs water vapour. That means that salt mine environments are extremely dry. In some parts of the world including the UK, documents, precious artefacts and priceless works of art are kept in salt mines for this reason. Thirdly rock salt can be squeezed into different shapes under relatively low pressures and over short time scales. This means that cracks and fractures in rock salt, which in other rock types might provide pathways for water and gases to flow, rapidly close up and 'seal' and therefore prevent movement of these fluids.

In a situation where the clay-rich rocks and evaporite layers are not in themselves suitable to host a GDF because they are either too thin or do not have suitable engineering properties, these layers may support the siting of a GDF being located within the deeper strong rocks, as they are likely to act as a barrier to any groundwater flow from depth.

There are well developed disposal concepts for the potential host rock types (LSSR and Evaporites) found in the inshore area that has been the focus on this initial work. Based on RWM's work and similar work carried out overseas, RWM has confidence that a GDF design could be developed which would provide the required high level of safety. This would be presented in safety cases which will be assessed by the UK's independent regulators.

The present understanding of the area indicates that there are a number of major faults (defined as faults that offset adjacent rock layers by 200 metres or more) both onshore and off the coast. 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 Area of Interest progress through the siting process.

It is recognised that there is geological information relating to parts of the wider area that was generated through historical surveys and studies that were previously commissioned with respect to the potential for the geological disposal of radioactive waste in this locality. Similarly, there are operational and historic mining activities that have resulted in the production of potentially relevant sub surface surveys and studies. If this area progresses to a point where a Community Partnership is formed RWM will review and revisit existing information that may be available. RWM would need to be mindful of the purposes of the historic surveys and studies, and legislative and regulatory changes that may have occurred in the intervening years, but this information could enable RWM to enhance the understanding of the geological environment of the area.

As part of the work that was carried out under the West Cumbria Managing Radioactive Waste Safely Partnership, the British Geological Survey undertook a high-level screening of the areas of Copeland and Allerdale Boroughs. This was a desk-based study that used existing information to rule out areas that could not host a facility due mostly to the known presence of natural resources, based on pre-determined criteria that formed part of that previous siting process. This work resulted in the exclusion of some parts of the area studied at that time. In addition, some areas were ruled out due to the presence of known aquifers, however, it was recognised that exploitable aquifer rock volumes do not

extend throughout the whole depth range of interest (between 200 and 1,000 metres) and therefore it might still be possible to construct a GDF in suitable rocks below aquifers. The presence of natural resources, whilst important to siting, may not automatically exclude an entire area from further consideration and would be evaluated in detail as part of a full site characterisation process.

The initial findings of RWM as part of this initial evaluation work indicate that there are no fundamental constraints relating to construction and operational safety or security matters which would prevent the Area of Interest being considered further in the siting process. There are, however, a number of matters relating to the Safety and Security Siting Factor that have been identified that would need to be investigated further, should the Area of Interest progress through the siting process.

The existence of LLWR and Sellafield and the implications of having another nuclear site in the vicinity (a GDF) is a matter that would need to be considered in more detail in due course. Sellafield is the UK's most complex nuclear site, covering approximately six square kilometres with operations including decommissioning, reprocessing of spent nuclear fuel (due to end in 2020), spent nuclear fuel management and the safe management and storage of nuclear waste, including a significant proportion of the likely inventory for disposal within a GDF. Under the Radiation (Emergency Preparedness and Public Information) Regulations (2019) Sellafield has a detailed emergency planning zone. RWM would need to undertake further work with Sellafield Ltd and other stakeholders, to understand the constraints that these arrangements could have on the construction and operation of a GDF.

RWM would also need to consider the impact of military aircraft low flying areas and tactical training areas as the wider area is known to be used extensively by the military for training purposes. Equally, the presence of firing ranges in and around the area is a matter that RWM would need to consider in greater detail in due course.

Community

Based on the review of readily available information relating to the Community Siting Factor, RWM has concluded that the Ares of Interest 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 wider area. This could be aligned to Copeland Borough Council's aspirations to promote the development of world class facilities, as well as being a centre of nuclear excellence.

Copeland has a long nuclear history and was described by the Borough Council in the 2016-2020 Growth Strategy as the "global heartland of the nuclear industry". At the centre of this heartland is Sellafield, which attracts around £2Bn of investment each year to support activities related to ongoing reactor operations support, spent fuel reprocessing and management of the UK's nuclear legacy [iii]. Approximately 11,000 people are directly employed by Sellafield Ltd on site [iv], with thousands more in the nearby supply chain, including small and medium sized enterprises. Every job at Sellafield sustains a further 2.8 jobs in the wider economy. Many of these individuals are in highly skilled engineering and scientific jobs. The nuclear sector, and its supply chain, is the major employer within the area, employing over 60% of all employees in Copeland Borough.

The existing supply chain is highly attuned to the needs of the existing nuclear industry, with a heavy focus on engineering and technical activities, manufacturing, specialised construction and professional services. Likewise, training and development programmes from apprenticeships to higher level skills and research and development programmes are also highly attuned to the needs of the nuclear industry.

It is recognised that Sellafield is currently undergoing a transformation in operations, with a move into full decommissioning. This could be a potential challenge for large scale employment in the future, both directly and through the supply chain. The delivery of a GDF has the potential to offset some of these challenges through the establishment of an additional large employer providing well paid jobs over a long period of time. RWM would look to work with relevant stakeholders, including Sellafield Ltd, to review the employment profile over the coming years and identify the impact of Sellafield decommissioning on the local area and how the delivery of a GDF could be aligned to see if employment continuity could be maintained.

The wider area benefits from a number of other industries where there may be potential synergies with the construction and operation of a GDF. Copeland has a long history in the mining industry and therefore it may be possible to draw upon the existing skilled and experienced workforce in the delivery of a GDF. Similarly, it may be possible to utilise the experiences of the offshore wind.

The existing tourism economy of the wider area is of local importance and it would be important to ensure that the features and assets that support and drive this economy are treated sensitively. Delivery of a GDF could provide the community with a real opportunity to create a GDF/scientific centre of excellence, which itself could become a tourist destination alongside the existing assets. For example, the French counterpart to RWM has developed an Environmental Observatory, an Environmental Specimen Bank and a Technological Exhibition Facility within the area in which they are intending to construct their GDF. These facilities in France attract over 10,000 visitors per year. Similarly, facilities constructed at Aspo in support of the Swedish spent fuel repository programme host 20,000 visitors per year.

It is acknowledged that there may be a need for additional homes for workers involved in the construction and operation of a GDF. RWM would work closely with the local authority and other relevant stakeholders to agree a local housing strategy.

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

Copeland Borough Council was a key member of the local partnership considering the previous siting process for a GDF. In 2008, following public consultation, the UK Government and Devolved Administrations of Wales and Northern Ireland published the White Paper 'Managing Radioactive Waste Safely (MRWS) – A Framework for Implementing Geological Disposal'. Three Cumbrian local authorities: Allerdale Borough, Copeland Borough and Cumbria County Council chose to engage with the MRWS process, covering the areas of Copeland and Allerdale only. The three councils formed and led their own West Cumbrian MRWS Partnership body, with broad membership from other neighbouring local authorities, business, farming, tourism and a range of other local groups.

There were three rounds of public and stakeholder engagement. In the final opinion polling carried out by IPSOS Mori in 2012, there was net support (68%) within the Borough of Copeland for continuing the process [v].

Allerdale Borough Council, Copeland Borough Council and Cumbria County Council subsequently made their decisions in January 2013 about whether or not to participate in stage 4 of the process. This would have allowed desk-based studies to address technical questions and further consultation to begin identifying potential sites, with an ongoing 'Right of Withdrawal'. Both Copeland and Allerdale Borough Council decided to participate further in the siting process whilst Cumbria County Council decided to withdraw. As it had previously been agreed with UK Government Ministers that both tiers of local government would need to agree to participate in stage 4 of the process for either Allerdale or Copeland to proceed, this resulted in the end of that site selection process in west Cumbria.

RWM will work with the community to understand and share the lessons learnt from the previous siting process in order to aid the effectiveness of the current siting process.

Environment

Based on the review of readily available information relating to the Environment Siting Factor, RWM has concluded that, with appropriate mitigation, the Area of Interest has potential to host a GDF.

The delivery of a GDF to safely and securely dispose of higher activity radioactive waste will be one of the largest environmental infrastructure projects in the UK. However, all major developments can have both positive and negative impacts on the environment. At this stage, although a number of potential locations have been suggested, no specific site for the surface facilities of a GDF has been decided upon, therefore it is not possible to assess the potential impacts of delivering a GDF on the environment.

The area that has been the focus of this initial evaluation work borders the Lake District National Park. The Lake District is England's largest National Park and designated as a World Heritage Site. Legislation provides a high degree of protection for National Parks. If this area progresses, future work to identify a Search Area will give due consideration to the need to provide a high level of protection to this landscape. The Lake District National Park Authority is in the process of updating their local plan. Of particular note is Policy 28, which states that *'We will not support a geological disposal facility for radioactive waste in or under the Lake District National Park.'* Whilst this local plan has not yet been adopted, it is apparent that the current view of the National Park Authority would be in conflict with the development of a GDF within or under the National Park. However, this would be aligned to the idea of considering a coastal surface site for accessing sub surface elements of a facility off the coast, deep beneath the seabed and is implicit in the area suggested by the Interested Party.

During Initial Discussions with all of the Interested Parties in the Borough of Copeland, the Interested Parties have agreed that those areas of the borough currently located within the boundary of the Lake District National Park should be excluded from any consideration for hosting a GDF from the outset. The Policy confirms that the process to find a suitable location for a GDF is consent based. As such, this position will be respected by RWM and this will inform the identification of any future Search Area.

Representations have also been made to have the boundary of the National Park extended in order to take in land currently outside the boundary of the National Park. Any future amendments to the boundary of the National Park that may come into effect would be recognised and respected should the Area of Interest progress through the siting process.

Parts of the Area of Interest, as well as the wider area are protected due to their nature conservation interest[7] and RWM understands and fully supports that these protected areas need to be respected. RWM 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 area on the natural assets that should be conserved and enhanced, in compliance with relevant legislation and policy.

There may be opportunities to provide environmental enhancements as part of the delivery of a GDF and RWM would work collaboratively to ensure that local priorities and concerns are understood and influence the work that may be undertaken.

Based on the initial evaluation work carried out, RWM has not identified any fundamental environmental constraints which would prevent the Area of Interest from being considered further in the siting process. However, more detailed investigations and assessments would be required with respect to a number of environmental matters which could have the potential to influence where the surface facilities of a GDF could be delivered, should the Area of Interest progress. For example, this area may be susceptible to tidal surges and significant sea-level rise is forecast for this area of the coast during the operational lifetime of a GDF. Such matters would need further consideration.

[7] *This includes areas that are protected under European and domestic legislation.*

Engineering Feasibility

Based on the review of readily available information relating to the Engineering Feasibility Siting Factor, RWM has concluded that, with appropriate design measures, the Area of Interest has potential to host a GDF.

Based on the current geological understanding of the Area of Interest, there are several layers of potentially suitable host rocks deep beneath the seabed under large parts of the adjacent inshore area. Based on current estimates of waste volumes it is anticipated that there would be sufficient volume to dispose of the potential inventory for disposal.

The GDF surface facilities would require in the region of one square kilometre of land and these would be linked to the sub-surface facilities by a sloping tunnel 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 be some flexibility in terms of where the surface facilities could be located, but the preference for the surface facilities to be located near to LLWR means that the availability of land could be constrained. RWM would work collaboratively to develop safe and secure designs of the surface facilities and identify a potential location for a GDF that responds to local priorities and the natural environment.

Flood risk would need to be considered in developing a GDF surface site to the south of the LLWR site. There would be an opportunity to consider potential surface locations to the west, north or east of the LLWR site outside of current flood risk zones. Further work would need to be done to understand flood risk and coastal erosion when considering particular locations for the surface facilities, including taking due account for the effects that climate change may have. The construction and continued operations of a GDF would result in the generation of excavated spoil and there could be opportunities to reuse the spoil locally, for instance in support of flood defences or habitat creation and enhancement and other potential infrastructure schemes.

By applying 'good design' principles RWM 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, although a number of potential locations have been suggested, no specific site for the surface facilities of a GDF has been identified, but there is no reason to suggest that it would not be possible to find a suitable location. 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. RWM would seek to work collaboratively with the community to ensure that their preferences are taken into account.

Several major faults with offsets of at least 200 metres are identified across the area. This is not unusual as faults are common in the underground environment. RWM'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 from the surface.

Transport

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

Throughout the lifetime of a GDF, transport links to the 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.

Nuclear materials, workers and construction material routes have already been established in the Area of Interest to nearby Sellafield and the LLWR. Nuclear materials have been safely transported to and from the area for many decades.

Existing routes may need to be enhanced to deliver a GDF. This could have significant benefits for local communities, as it is recognised that the wider area is relatively isolated from major transport links. The local council also acknowledges a local desire for improved transport and linking road and rail services. The delivery of a GDF may open up opportunities to provide sustainable transport infrastructure to support the necessary construction and operational activities that could also benefit local connectivity. This could include improvements to both the local road network and the local rail network, both of which have been identified as requiring improvements. RWM would seek to work with relevant stakeholders to understand the improvements that are planned and schedules for delivery.

It is recognised that Sellafield, where a large proportion of the waste likely to be disposed of in a GDF is currently located, is accessible via the local rail network that connects to the LLWR site. Therefore, if a GDF was linked to this same rail network it would provide the option to move waste packages on a route that has already been demonstrated as suitable. Given the proximity to Sellafield it may be possible to locate the surface facilities of a GDF such that there could be an opportunity to construct a dedicated inter-site transport route that could be used to transfer waste packages. The use of a dedicated transport route could offer a number of safety, security and operational benefits for the safe transport of a high proportion of the inventory for disposal.

This Area of Interest offers potential for sea transport for movements of spoil, construction materials and radioactive packages. The area has access to the port at Barrow-in-Furness and the port at Workington, albeit that both these ports are well outside the area subject to this initial evaluation work and the latter is also outside the Borough of Copeland. Both of these are understood to be potentially suitable to accommodate the majority of the expected transport packages and construction requirements that RWM would require to deliver a GDF. The utilisation of sea transport could bring additional benefits through any required infrastructure upgrades, as well as reducing the impact of land-based transport.

Value for Money

Based on the review of readily available information relating to the Value for Money Siting Factor, RWM has concluded that the Area of Interest 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 a GDF located in this Area of Interest would have particularly high costs relative to other locations.

It is recognised that Sellafield, where a large proportion of the waste likely to be disposed of in a GDF is currently located, is close to the Area of Interest. The possibility of developing a GDF in close proximity to Sellafield has the potential to reduce the costs associated with transporting the waste packages for disposal although this would need further consideration.

3. Conclusion

Having considered the readily available information, and particularly the National Geological Screening outputs, RWM has concluded that the Area of Interest has potential to host a GDF.

This Initial Evaluation Report presents the findings of work to evaluate the potential of the Area of Interest against the six identified Siting Factors set out in RWM's Site Evaluation document. In undertaking this evaluation RWM 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 of Interest were 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 Area of Interest and therefore **RWM has concluded that the Area of Interest has the potential to host a GDF.**

This initial work has developed the understanding of whether the Area of Interest 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 Area of Interest identified is suitable to host a GDF** and further work would be required to establish this.

4. Potential Future Work

If this Area of Interest were to move forward in the siting process, RWM would work collaboratively with the local community and relevant stakeholders on the following areas:

- Existing and future aspirations for the area and how delivery of a GDF could be aligned to local priorities;
- The sensitivities of the local natural environment and the potential implications of delivering a GDF, whether there could be alignment with local environmental objectives, and the potential to deliver environmental enhancements to designated areas and sites;
- The existing transport related challenges of the area and the transport related implications of the development of a GDF. This could include consideration of the potential to transport freight to the area via sea and how benefits could be realised as a consequence of any infrastructure upgrades that may be required;
- The implications of a GDF on Sellafield and the Low Level Waste Repository and the potential for alignment. RWM will also need to consider the implications of these sites for the delivery of a GDF;
- The existing flooding related challenges in the area, the implications of future climate change and how this may influence the delivery of a GDF;
- How the delivery of a GDF would affect existing residents and businesses and how RWM 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; and
- How RWM could work collaboratively with all relevant stakeholders to develop safe and secure potential design solutions and identify potential locations for a GDF that are sensitive to local priorities and the legislative, policy and regulatory frameworks within which RWM must operate.

5. Next Steps

RWM and the private company may continue to hold Initial Discussions to consider the implications of this report and other matters. These discussions may remain confidential, though they should be made public at the earliest opportunity if this Area of Interest progresses through the siting process.

Following the completion of the initial evaluation work by RWM during Initial Discussions, all of the Interested Parties in the Borough of Copeland have agreed that they would work together to form a single Working Group to further explore the potential to host a GDF.

An early task for the Working Group would be to identify a Search Area. The Search Area is the geographical area within which RWM would seek to identify potentially suitable sites to host a GDF. The position that has been expressed by the Interested Parties with respect to the exclusion of the Lake District National Park will inform the identification of the Search Area. The Policy confirms that a Search Area is to be delineated using the district electoral ward boundaries that are not aligned with the boundaries of the National Park. For the Area of Interest referred to in this report this would be Seascale and Gosforth Ward, the whole of which could benefit from Community Investment Funding should the area progress to for a Community Partnership.

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 RWM's Community Guidance document [vi].

As part of the preparation for the formation of a Working Group, RWM can provide support and advice on engaging with stakeholders and the wider public.

Glossary

Community Guidance
Guidance that 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 RWM.

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 RWM.

Inshore Area
The inshore is defined as the UK Territorial Waters which extend up to 12 nautical miles (22.2 km) 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.

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.

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 RWM to withdraw from the siting process.

Search Area
The Search Area is the geographical area encompassing all the electoral wards within which RWM 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, RWM, an independent facilitator, an independent chair and any relevant principal local authorities that wish to join.

Sources of Information used to support Initial Evaluations

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Copeland Borough Council - *Growth Strategy 2016 - 2020.*

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Copeland Borough Council - *Thriving Places Index 2019.*

Copeland Borough Council - *Copeland Local Plan 2017-2035 – Issues and Options, October 2017.*

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Cumbria County Council – *Council Plan 2018 – 2022.*

Cumbria County Council - *Millom and Haverigg Flood Investigation Report – 17th September 2017, June 2018.*

Cumbria Local Enterprise Partnership and Copeland Borough Council – *Cumbria Nuclear Prospectus: Energising the Energy Coast* – August 2020.

Cumbria Resilience Forum - *Cumbria Floods November 2009 – Learning from experience – Recovery phase de-brief report, April 2011.*

Department for Business, Energy and Industrial Strategy - *National Policy Statement for Geological Disposal Infrastructure – A framework document for planning decisions on nationally significant infrastructure, Presented to Parliament July 2019.*

Friends of the Lake District - *Lake District Peninsulas and Estuaries – A Proposal to Extend the Boundary of the Lake District National Park, June 2019.*

Lake District National Park Authority - *Local Development Framework – Core Strategy including Proposals Map, Adopted October 2010.*

Lake District National Park Authority - *Pre-Submission Lake District Local Plan 2020- 2035, April 2019 (and supporting documents).*

Local Government Association – *LG Inform.*

LLW Repository Ltd, *LLWR Plan 2018 – 2023.*

LLW Repository Ltd, *LLWR Environmental Safety Case. Assessment Calculations for Coastal Erosion for the LLWR 2011 ESC. QRS – 1443ZC-R1 Version 3,* April 2011.

RWM – National Geological Screening – Northern England Regional Geology (December 2018).

RWM – National Geological Screening – Northern England Sub-region 3 (December 2018).

RWM – National Geological Screening – Northern England Sub-region 4 (December 2018).

RWM – National Geological Screening – Northern England Sub-region 5 (December 2018.)

Sellafield Ltd - West Cumbria: Opportunities and Challenges 2019 – A community needs report.

West Cumbria Managing Radioactive Waste Safely Partnership - The Final Report (August 2012).

West Cumbria: Opportunities and Challenges 2019, Cumbria Community Foundation.

Mapping Data Endnotes

Mapping Data

OS Boundary Line Open Data, June 2017 Ordnance Survey data © Crown copyright and database right
Natural England Open Data, June 2019 © Natural England copyright
Lake District Peninsulas and Estuaries – A Proposal to Extend the Boundary of the Lake District National Park – Friends of the Lake District, June 2019

Endnotes

i. 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).

ii. Site Evaluation – How we will Evaluate Sites in England, RWM (February 2020).

iii. Cumbria Local Enterprise Partnership and Copeland Borough Council – Cumbria Nuclear Prospectus: Energising the Energy Coast (August 2020).

iv. The Economic Impact of Sellafield, Oxford Economics (June 2017).

v. The Final Report, West Cumbria Managing Radioactive Waste Safely Partnership (August 2012).

vi. Community Guidance for England, RWM (December 2018).

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