Radioactive Waste Management

SEARCH AREA EVALUATION REPORT

Mid Copeland Search Area and the adjacent inshore area

PREPARED FOR: Copeland GDF Working Group
SITE REFERENCE: Mid Copeland

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.

Discussions with RWM were initiated by a number of Interested Parties in the Borough of Copeland. As part of these initial discussions, RWM undertook initial evaluation work to understand whether the areas identified by the various Interested Parties had the potential to host a GDF.

The initial evaluation work, presented in RWM's Initial Evaluation Reports, suggested that, based on the information considered, there was potential for a GDF to be hosted within the Borough of Copeland.

A Copeland GDF Working Group (the 'Working Group') subsequently formed as a consequence of the initial discussions with RWM and the initial evaluation work. In line with the UK Government's Working with Communities Policy [i], the Working Group has identified two Search Areas, namely:

- Mid Copeland Search Area (as defined later in this report); and
- South Copeland Search Area (as defined in separate report).

This Search Area Evaluation report relates to the Mid Copeland Search Area and the adjacent inshore area to Copeland Borough. As agreed by the Working Group, those areas of Copeland Borough that are currently located within the boundary of the Lake District National Park are excluded from consideration to host a GDF.

The Search Area is the geographical area within which RWM will seek to eventually identify potentially suitable sites to host a GDF. Defining the boundaries of the Search Area is also important in order to identify appropriate membership for the Community Partnership. As RWM completes it's investigations the Community Partnership will refine and review the Search Area.

The Search Areas that have been identified are derived from the areas first put forward and considered as part of RWM's initial evaluation work. This high level Search Area Evaluation Report is intended to compliment the conclusions of RWM's initial evaluation work, whilst maintaining a focus on the identified electoral wards which encompass the Search Area and the adjacent inshore area to Copeland Borough.

This report is supported by information which has been collated from readily available sources such as: RWM National Geological Screening (NGS), Office for National Statistics, Natural England and Copeland Borough Council. It is envisaged that if a Community Partnership were to form then a further review of available information will be conducted as part of RWM's initial investigation works.

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Executive Summary

The Copeland GDF Working Group (the 'Working Group') has been formed in accordance with the requirements set out in the UK Government's Working with Communities policy[1] (the 'Policy') and have begun to raise the awareness in Copeland of the GDF Siting Process.

RWM has previously carried out initial evaluations in areas of the Borough of Copeland and has determined that those areas had potential to host a Geological Disposal Facility (GDF).

In accordance with the requirements set out in the Policy, the Working Group has identified a Search Area from the areas first put forward by Interested Parties for consideration. The Search Area comprises the two Copeland Borough Council electoral wards of Gosforth & Seascale and Beckermet (the 'Mid Copeland Search Area'). The inshore area adjacent to the Borough of Copeland also remains under consideration. As agreed by the Working Group, those areas of Copeland Borough that are currently located within the boundary of the Lake District National Park are excluded from consideration to host a GDF.

This Search Area Evaluation Report follows the same approach as RWM's initial evaluation work, and focuses on the identified electoral wards which encompass the Mid Copeland Search Area and adjacent inshore area to Copeland Borough.

The evaluation of this area has been based on the six 'siting factors' of Safety and Security, Community, Environment, Engineering Feasibility, Transport and Value for Money. More information on the siting factors can be found in RWM's published document 'Site Evaluation – how we will evaluate sites in England' [ii].

Based upon work in the UK and overseas RWM has identified three broad types of potential host rock for a GDF. Existing geological Information, as compiled in the National Geological Screening (NGS), shows that all three generic rock types, Lower Strength Sedimentary Rocks (LSSR), Evaporite and Higher Strength Rocks (HSR) are present within the Mid Copeland Search Area and the adjacent inshore area[2], within the depth range of interest[3] (200 – 1,000 metres below the NGS datum[4]). These warrant further investigation of their potential to host a GDF.

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[1] *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.*

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

[3] *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.*

[4] *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 of valleys. This is to ensure that rocks identified as potentially suitable will be below nearby valleys.*

As part of this further high level evaluation RWM has considered the safety and security relating to construction, operations and post-closure aspects of a GDF in the Mid Copeland Search Area and adjacent inshore area and no fundamental constraints have been identified at this stage. A number of characteristics have been identified for early consideration and investigation including ground conditions, access to potential underground environments from possible locations for a surface facility, the presence of faults & aquifers and any impacts from historical mining and related activities.

A GDF is expected to bring substantial benefits to the community which hosts it and wider area. 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.

RWM has considered the community aspects of a GDF in the Mid Copeland Search Area. There have been nuclear facilities located along the coast within the Mid Copeland Search Area for many decades. There are existing considerable nuclear skills and expertise in the local workforce as well as a local community that is familiar with the nuclear industry, including relating to the management of radioactive waste at Sellafield and the Low Level Waste Repository (LLWR). The Sellafield nuclear site directly employees around 11,000 people, and indirectly there are thousands more within the supply chain who provide services at the site. The local plan [iii] for Copeland highlights the need to respond to the decommissioning of Sellafield and the delivery of a GDF in the area could align to the local plan aspirations.

The Nuclear sector is a recognised priority at the regional level Cumbria Strategic Economic Plan 2014-2024 [iv], with the aim of using the nuclear and the energy sector to diversify and grow the regional economy. Furthermore the development of a GDF could be aligned with existing local plans and supported by a developed Community Partnership vision. In addition, the community would benefit from opportunities to use significant community investment funding for locally important priorities early in the siting process. The delivery of a GDF in Copeland could help retention and redeployment of transferable nuclear capability between ongoing and future missions, as set out in the Cumbria Nuclear Prospectus [v]. These aspects warrant the further investigation of the willingness of the community to host a GDF.

The existing tourism economy of Copeland, and 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 point of interest alongside the existing tourist destinations.

With respect to the environment siting factor large parts of the Mid Copeland Search Area are excluded from being considered as they are within the Lake District National Park boundary. In addition, parts of the Mid Copeland Search Area and adjacent inshore area off the coast are designated due to their nature conservation and heritage interests. RWM understands and fully supports the priority given to respecting these protected areas. At this stage, with no specific sites for the surface facilities of a GDF identified, it is not possible to assess the specific potential impacts of delivering a GDF on the environment. Therefore 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 Mid Copeland Search Area and adjacent inshore area on such designated areas and the natural environment.

With respect to engineering feasibility, there is likely to be some flexibility in terms of where the surface facilities of a GDF could be located, 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. Matters such as ground stability and associated engineering aspects would need to be considered in greater detail should the area progress to identifying siting options and RWM would want to ensure sustainability and good design practices.

With respect to the transport siting factor, nuclear materials have been safely transported within Copeland Borough for many decades along existing transport networks to both the Sellafield and LLWR sites. Therefore the Mid Copeland Search Area benefits from an existing rail network that is directly connected to the Sellafield nuclear site, where approximately 80% of the waste to be disposed of in a GDF is located. The delivery of a GDF in the area could provide an opportunity to improve the existing local rail network and this may facilitate the potential for increased commuter services in the locality.

The Mid Copeland Search Area has a coastline with access to good port and harbour facilities, and it may be possible to transport freight to the area via sea. The option of sea transport via a dedicated sea facility could be explored further with the community as a potential benefit to address any adverse transport issues. Similarly, the use of existing facilities could be explored. If sea transport were to be utilised there could be additional benefits that could be realised as a consequence of infrastructure upgrades that may be required.

To support the development of a GDF in the Mid Copeland Search Area and adjacent inshore area, there is likely to be a requirement for upgraded transport infrastructure to support the movement of construction materials, related tunnelling arisings, personnel and the inventory for disposal. This could bring benefits for local communities, which are currently under-served by the existing road and rail networks in the Copeland region. This could provide the additional benefit of making some parts of the area more attractive for development and inward investment.

A GDF could provide an opportunity to support solutions to existing coastal challenges around fluvial / coastal flood risk and potential climate change effects. A GDF, and its related infrastructure, could provide some local solutions, as flood risk mitigation measures may be needed for the construction and operation of a GDF. Also, wider mitigation measures could potentially be delivered from the significant additional investment which will be available to a community that eventually hosts a GDF.

In terms of value for money, given the early stage in the siting process, there are many uncertainties that would influence the overall programme cost and delivery schedule. However, nothing has been identified at this early stage which suggests that a GDF could not be delivered in the Mid Copeland Search Area and adjacent inshore area in a way which secures value for money.

Based on a review of readily available information relevant to each of the six siting factors, initial findings indicate that the Mid Copeland Search Area and the adjacent inshore area to Copeland Borough have the potential to host a GDF.

This evaluation work, using readily available information, has not confirmed that the Mid Copeland Search Area and adjacent inshore area is suitable to host a GDF. Rather it has developed an understanding of whether the area holds any potential to host a GDF, together with early identification of known constraints and uncertainties.

Should the Mid Copeland Search Area and adjacent inshore area be considered further in the siting process, then further investigations and analysis, drawing on additional sources of information and data will be required to enhance the understanding of the implications of delivering a GDF in the area. RWM will work collaboratively with communities to understand what is important to them and feed this into assessments and evaluations relating to potential for areas and sites to host a GDF.

1. Introduction

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.

Discussions with RWM were initiated by a number of Interested Parties in the Borough of Copeland. As part of these initial discussions, RWM undertook initial evaluation work to understand whether the areas identified by the various Interested Parties had the potential to host a GDF. This initial evaluation work, presented in RWM's Initial Evaluation Reports, suggested that, based on the information considered, there was potential for a GDF to be hosted within the Borough of Copeland

These discussions resulted in the establishment of a Copeland GDF Working Group (the 'Working Group') to start initial engagement and identify a Search Area(s) within Copeland. If the identified Mid Copeland Search Area continues in the siting process a Community Partnership will be set up as the main vehicle for dialogue with communities within the Search Area and neighbouring communities.

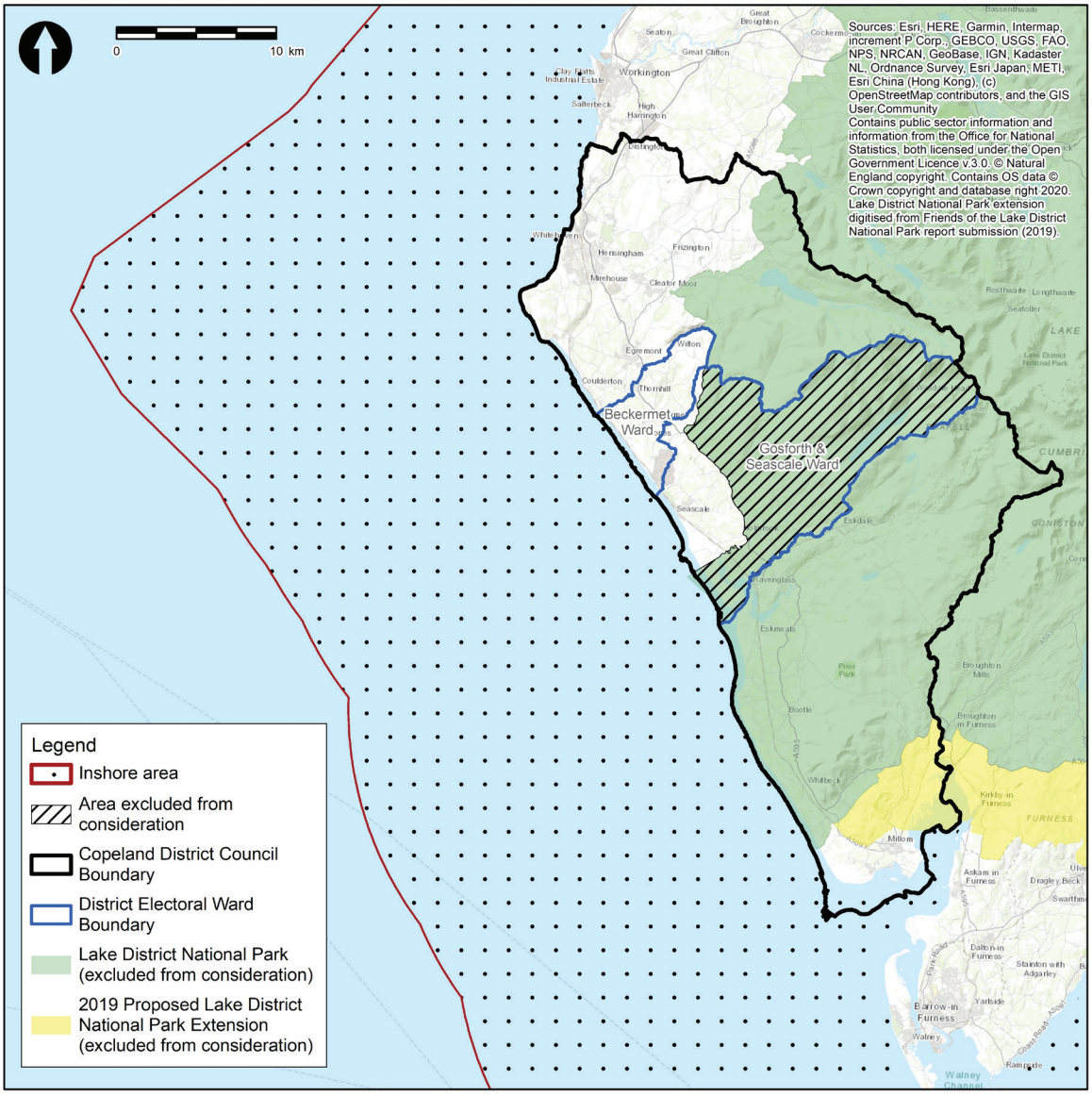
In line with the UK Government's Working with Communities Policy (the 'Policy'), the Working Group has identified and proposed two Search Areas from the areas first put forward for consideration.

This Search Area Evaluation relates to the Mid Copeland Search Area , which is referred to in this report as the 'Mid Copeland Search Area' and comprises the two Copeland Borough Council electoral wards of Gosforth & Seascale and Beckermet. The inshore area adjacent to the Borough of Copeland also remains under consideration and is included within the scope of this report[5].

Figure 1 shows the electoral wards which encompass the Mid Copeland Search Area and adjacent inshore area to Copeland Borough.

[5] *A separate Search Area Evaluation report has been produced for the other Search Area that was identified.*

Figure 1: Copeland Borough Council electoral wards of Gosforth & Seascale and Beckermet comprising the Mid Copeland Search Area and adjacent inshore area to Copeland Borough included for consideration.



The Policy provides that the Search Area is the geographical area within which RWM will seek to eventually identify potentially suitable sites to host a GDF. Defining the boundaries of the Search Area is important in order to identify appropriate membership for the Community Partnership. As noted above, the inshore area adjacent to Copeland Borough also remains under consideration.

Paragraphs 6.21 and 6.22 of the Policy state that:

> *6.21. "An early task for the Working Group will be to identify a Search Area. The Search Area is the geographical area within which RWM will seek to identify potentially suitable sites to host a GDF".*
>
> *6.22. "The Search Area will be derived from the area first put forward for consideration by the interested party and will be defined using district or unitary council electoral ward boundaries, depending on the administrative arrangements in place for the particular area. The Search Area will, therefore, encompass all the electoral wards within which RWM will be able to consider potential sites. For areas which include potential for development under the sea bed, the Search Area will comprise only that area on land."*

The Mid Copeland Search Area that has been identified by the Working Group is derived from within the areas first put forward and considered as part of RWM's initial evaluations. The initial evaluations were completed prior to the formation of the Working Group. This further high level Search Area Evaluation is intended to compliment the conclusions of RWM's initial evaluation work to confirm whether the Search Area has potential to host a GDF, whilst maintaining a focus on the identified electoral wards which encompass the Search Area and adjacent inshore area to Copeland Borough.

This report is underpinned by information which has been collated from readily available sources such as RWM National Geological Screening (NGS), Office for National Statistics, Natural England and Copeland Borough Council. It is envisaged that if a Community Partnership were to form then a further review of available information will be conducted as part of RWM's feasibility studies.

The evaluation work is not designed to confirm whether or not the Mid Copeland Search Area and adjacent inshore area is suitable to host a GDF but rather whether it has any potential.

Identifying a suitable site will take several years due to the need to properly identify, investigate, and assess potential GDF host sites and ensure that communities involved in the siting process have a full understanding of how the GDF project might affect them.

2. Search Area

2.1 Search Area Purpose

The purpose of the Search Area is defined in the Policy. It is the geographical area on land (based on district electoral ward boundaries) within which RWM will seek to identify potentially suitable sites to host a GDF. Defining the boundaries of the Search Area is also important in order to identify appropriate membership for the Community Partnership.

The Search Area may evolve over time. If the area progresses through the siting process, any Community Partnership that may form is likely to review and refine the Search Area as RWM completes its investigations. The Search Area will also change to reflect any future changes to relevant electoral ward boundaries. The Community Partnership may consider, under some circumstances, to include electoral wards that have limited potential to host a GDF (e.g. due to geological constraints, environmental features, engineering design limitations, etc.) but which they wish to be included in the community dialogue as they may be impacted by the development.

In some cases, to understand the implications of delivering a GDF, studies will need to be undertaken outside of the Search Area, for example, to assess any potential impact that the construction or operation of a GDF may have on the wider areas.

2.2 Mid Copeland Search Area

The Working Group has identified a Search Area from the areas first put forward by Interested Parties for consideration. The Search Area comprises the two Copeland Borough Council electoral wards of Gosforth & Seascale and Beckermet (the 'Mid Copeland Search Area'). As agreed by the Working Group, those areas of Copeland Borough that are currently located within the boundary of the Lake District National Park are excluded from consideration to host a GDF. The inshore area adjacent to the Borough of Copeland also remains under consideration.

The Mid Copeland Search Area identified by the Working Group, the considered adjacent inshore area to Copeland Borough and the area within the Lake District National Park excluded from consideration are shown in **Figure 2**.

The Search Area considered in this report was identified by the Working Group through a workshop where the geological attributes of the electoral wards were presented, discussed and considered as well as surface features of the Borough of Copeland. The matters considered included relevant environmental, community and other factors and included information on features such as landscape designations, heritage assets, ecological designations, transport and flooding.

The Working Group also considered feedback received during its early engagements with the public and stakeholders in Copeland. This included feedback relating to community factors, environmental and landscape impacts, community wellbeing, socio-economic data and safety. The Working Group was also mindful of the location of St Bees coast and its local sensitivity, as well as the commitment that had already been made to exclude the Lake District National Park and the proposed extension from the area under consideration to host a GDF.

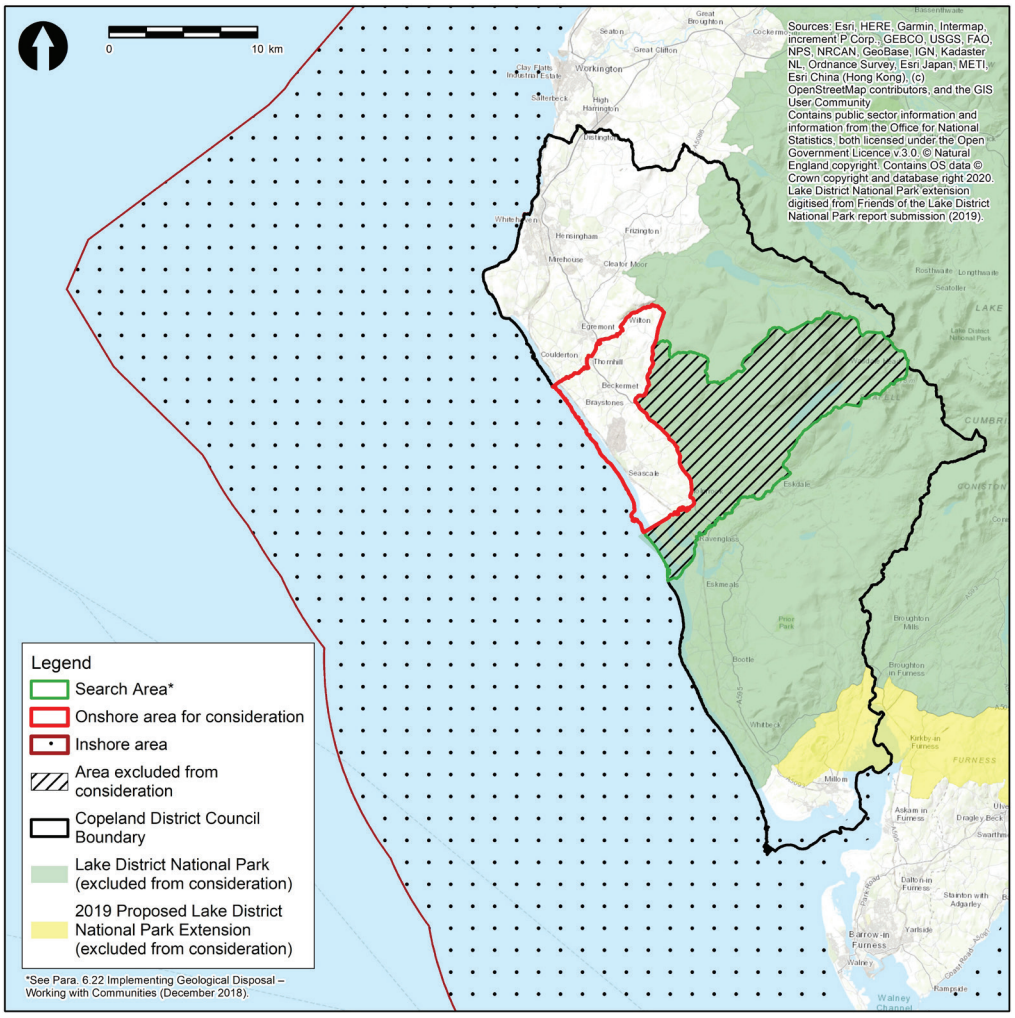
The Mid Copeland Search Area and adjacent inshore area to the Borough of Copeland covers the westerly part of West Cumbria, encompassing coastal areas and fell country and is bounded to the west by the Irish Sea.

The settlements of the Mid Copeland Search Area are comprised of several small villages and hamlets including Drigg, Seascale, Beckermet and Thornhill. The Sellafield site, which is the main regional employer lies within the Mid Copeland Search Area. The largest settlement in the Borough is Whitehaven, located approximately 10 kilometres to the north.

The Mid Copeland Search Area lies within the administrative areas of Copeland Borough Council and Cumbria County Council.

There are plans to reorganise the County Council and the six District Councils into two new unitary councils. As the Policy defines the Search Area by district or unitary electoral wards, any changes to electoral ward boundaries will be reflected in the Search Area, which will be reviewed and refined by the Community Partnership.

Figure 2 : Mid Copeland Search Area, considered adjacent inshore area to Copeland Borough and the area within the Lake District National Park excluded from consideration.



The Policy confirms that the Mid Copeland Search Area will comprise only that area on land and as such, the adjacent inshore area off the coast of Copeland is outside of the boundary of the Mid Copeland Search Area. The geology below the adjacent inshore area off the coast may be accessible from a surface site on land and the Working Group is interested in understanding the potential for the underground facility of a GDF to be hosted in the deep geology beyond the coastline and so the inshore area adjacent to the Borough of Copeland remains under consideration and is considered in this report.

During discussions with the Working Group, it was agreed that those areas of Copeland Borough currently located within the boundary of the Lake District National Park will be excluded from any consideration to host a GDF. People who live in these areas will continue to be engaged as part of the local community.

Therefore, whilst the Mid Copeland Search Area, which in line with the Policy must be defined using the existing district or unitary electoral ward boundaries, does appear to include land within the Lake District National Park, a GDF will not be sited within or beneath the Lake District National Park. These areas are excluded from consideration.

This Search Area Evaluation Report has considered the Working Group identified Mid Copeland Search Area and the adjacent inshore area to Copeland Borough. Those areas of Copeland Borough that are currently located within the boundary of the Lake District National Park are excluded from consideration to host a GDF.

3. RWM Evaluation Process

3.1 Evaluation Approach

RWM's approach to evaluation follows the intent set out in the Policy. There are many requirements derived from legislation, certain policy documents and guidance that RWM will need to satisfy to successfully investigate potential areas and sites, and to subsequently construct, operate a GDF, as well as requirements that relate to the period after closure. These requirements are discussed in RWM's report 'Site Evaluation - How we will evaluate sites in England' which describes its approach in more detail.

RWM looked at international GDF projects and UK infrastructure projects of similar size and complexity, to identify a series of Siting Factors. The six Siting Factors we have selected set out the broad topic areas that we will need to consider throughout the siting process as we assess and evaluate areas and sites. These Siting Factors are: -

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

The Siting Factors are underpinned by more detailed 'Evaluation Considerations' which will be used to guide the evaluations and discussions with communities. These are presented in RWM's *'Site Evaluation - How we will evaluate sites in England'* published document with examples of typical matters that RWM assesses under each Evaluation Consideration provided in Annex B of the published Site Evaluation document.

A key focus of this initial Search Area Evaluation has been on the geological context of the Mid Copeland Search Area and adjacent inshore area and to explore further the conclusions reached in the initial evaluations in order to better understand the potential to host a GDF.

At this early stage in the siting process RWM has drawn upon existing readily available information to inform RWM's technical specialists.

4. Search Area Evaluation

4.1 Safety and Security

Based on the review of readily available information relating to the Safety and Security Siting Factor, RWM has concluded that the Mid Copeland Search Area and the adjacent inshore area have potential to host a GDF.

Safety after Closure – geological understanding

It is essential that a GDF remains safe both during the period in which it is constructed and operated and 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'.

Safety is of paramount importance to RWM. The consent based, flexible approach to finding and identifying a suitable site for a GDF together with a willing community is designed to ensure, above all, that the site which is selected is safe and secure for people and the environment, now and in the future.

A GDF will use a multi-barrier system in which engineered barriers work together with natural barriers provided by the geology to isolate and contain wastes for the time required for the radioactivity associated with them to naturally reduce and to prevent any harmful levels of radioactivity returning to the surface. It is essential that a GDF is safe during the period in which it is constructed and operated and also in the future once it has been closed.

Post-closure safety assessment requires detailed examination of the geological environment to understand if a GDF could be designed to provide the required high level of safety through the combined use of engineered barriers and the geological environment.

At this early stage, some of the gathered information is summarised here to explain the current view of RWM. The geological information that has informed this early evaluation work was obtained from the National Geological Screening (NGS) exercise and also includes, but is not limited to, local borehole data, petroleum exploration boreholes within the adjacent inshore area, geophysical surveys, historical mining records and local geological information.

Key aspects of the geology that relate to safety after closure are the rock type, rock structure, groundwater, natural processes and resources. More detailed work that looks at and acquires additional sources of information and data would be undertaken in due course, if the Mid Copeland Search Area and adjacent inshore area were to be considered further in the siting process.

Rock type

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.

All three of these potential host rocks (LSSR, Evaporite and HSR) occur within the depth range of interest (200 to 1,000 metres below NGS datum) within the Mid Copeland Search Area. LSSR and Evaporites occur within the depth range of interest (200 to 1,000 metres below NGS datum) in the adjacent inshore area.

There are well developed disposal concepts for all three of the potential host rock types (LSSR, Evaporites and HSR) found in the Mid Copeland Search Area and adjacent inshore area. Based on its own 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 would be assessed by the UK's independent regulators.

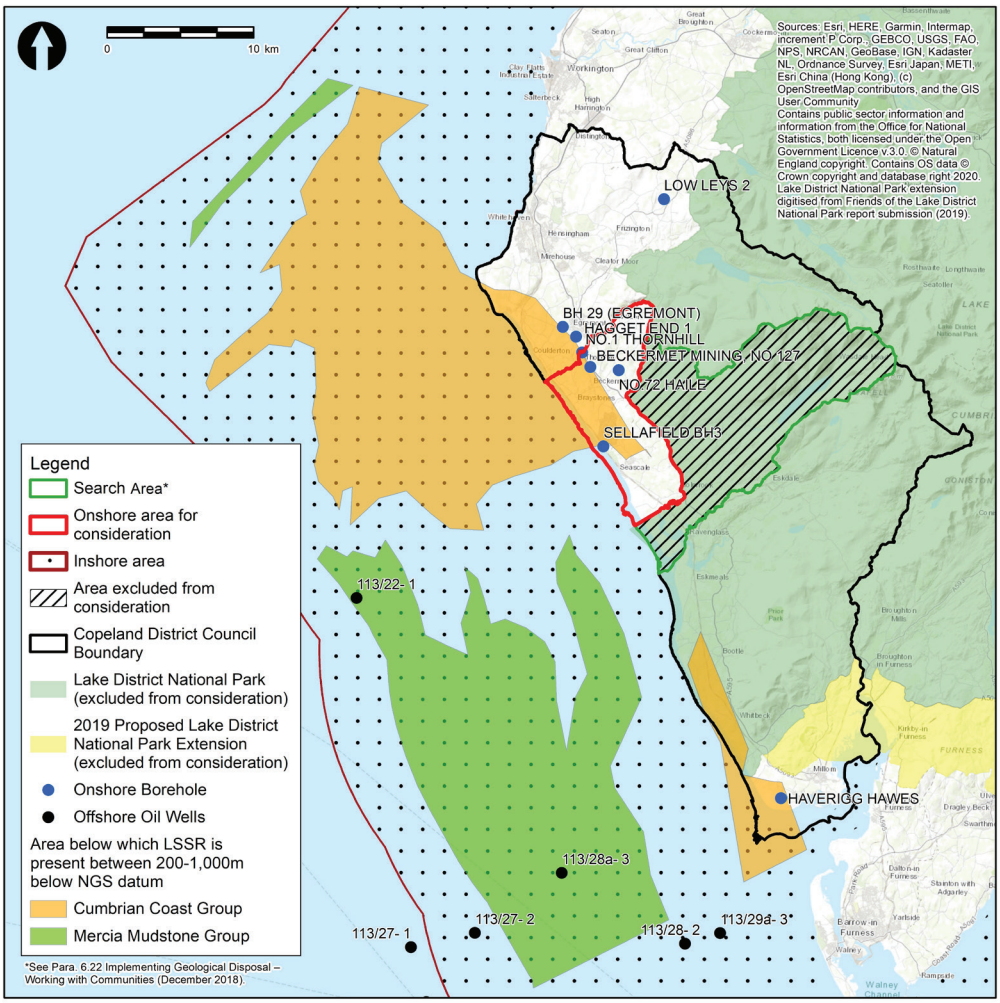
Lower Strength Sedimentary Rocks (LSSR)

Much of the area off the coast, within the adjacent inshore area, is underlain by clay-rich rock layers and rock salt layers. The Triassic Mercia Mudstone Group is widespread off the coast and is dominated by mudstone and evaporites. The extensive mudstone units are known to act as a barrier to groundwater movement and have the potential to act as LSSR host rock where they are sufficiently thick.

The Permian Cumbrian Coast Group is also found on the coast within the Mid Copeland Search Area and extending into the adjacent inshore area. The Cumbrian Coast Group comprises mudstones with minor sandstones and evaporites. The mudstones are of variable thickness, but may exceed 100 metres, thinning onshore. These mudstones are comparable to those of the Mercia Mudstone Group and may also have suitable properties to act as an LSSR host rock.

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 are likely to reseal, particularly under the weight of hundreds of metres of overlying rock. 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 are suitably contained for hundreds of thousands of years.

Figure 3 : Areas where LSSR are present.



NB please note although the Lake District National Park is not under consideration the geology has been included to aid an understanding of the overall geological picture of the area.

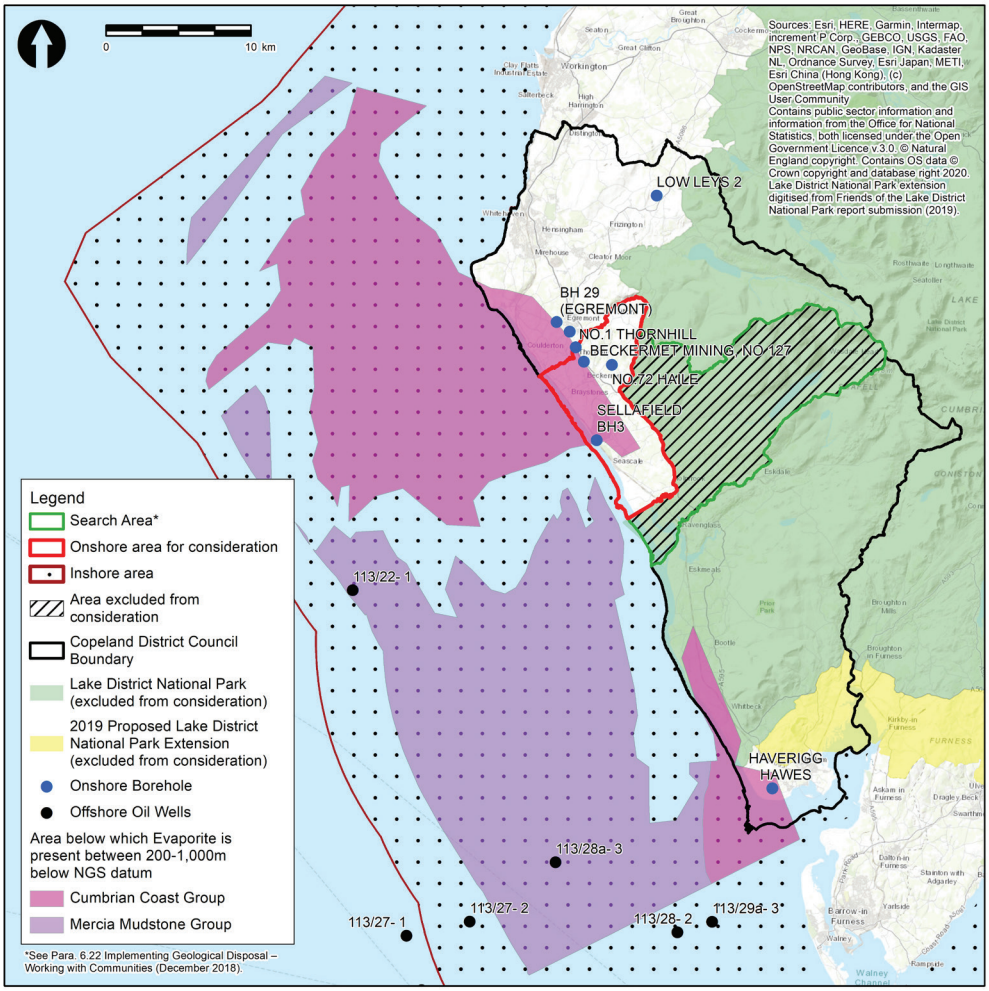
Evaporites

In the inshore area adjacent to the Borough of Copeland, the Mercia Mudstone Group contains a series of evaporite units containing rock salt (halite) layers. These rock salt layers may have the properties and thickness required of potential evaporite host rocks. The Permian Cumbria Coast Group below the Mercia Mudstone Group also contains other halite layers which may be potential evaporite host rocks.

Rock salt has the following key properties that make it potentially well-suited for hosting a GDF:

- it is made of interlocking crystals of salt with very few gaps in between them. This makes it difficult for water, gas and other fluids to pass through, even over geological time scales;
- rock salt environments are extremely dry making them particularly well suited for radioactive waste disposal. This dry state leads to low corrosion rates of waste packages, reduces gas generation rates and means little water is available to transport radionuclides away from a GDF; and
- rock salt can be squeezed into different shapes under relatively low pressures and over relatively 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.

Figure 4 : Areas where Evaporite is present



NB please note although the Lake District National Park is not under consideration the geology has been included to aid an understanding of the overall geological picture of the area.

In a situation where the clay-rich 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. Geological properties which may influence the potential for gas to migrate away from a GDF will need further investigation if the Mid Copeland Search Area and adjacent inshore area progresses through the siting process.

Higher Strength Rocks (HSR)

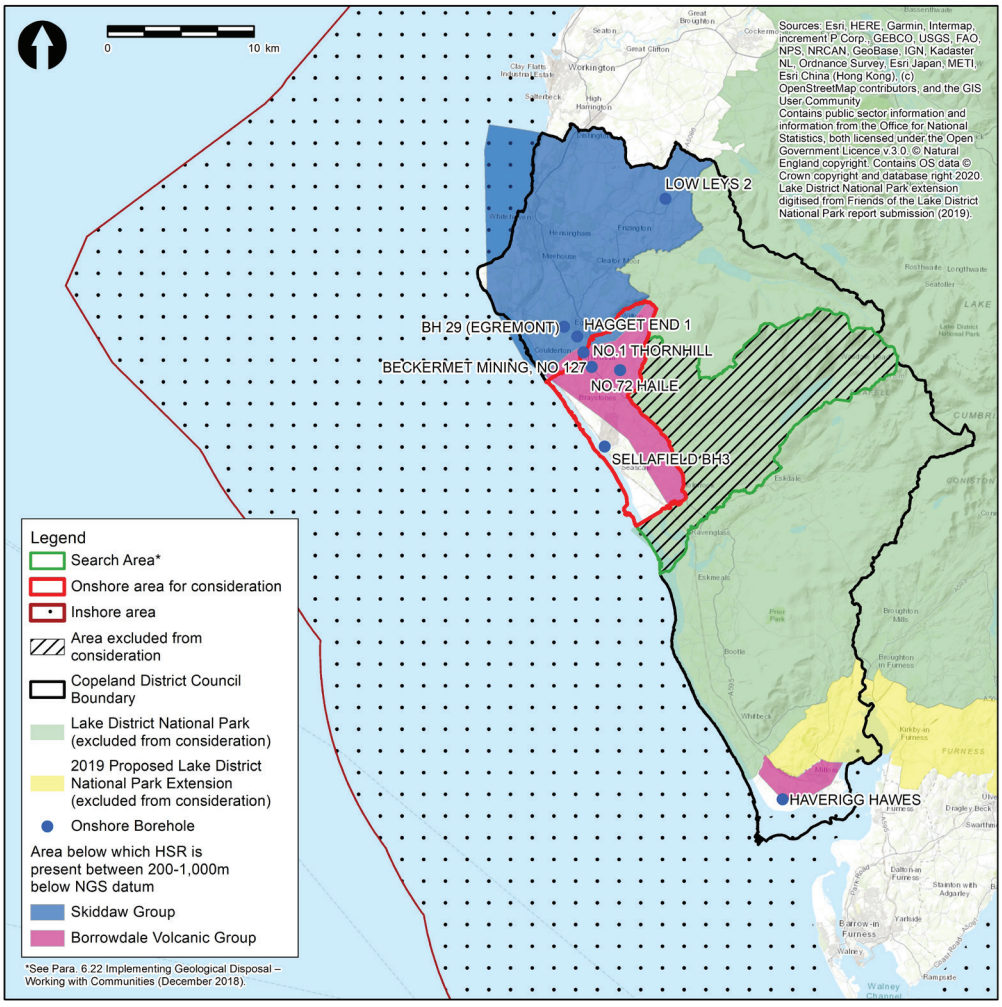
Most of the Mid Copeland Search Area is underlain by potential HSR. There are a number of basement rocks with potential to act as HSR hosts which are described below.

The Borrowdale Volcanic Group is around 6,000 metres thick and was produced during explosive volcanic activity. Although the varied rock types in these volcanic formations would have had very different properties when first erupted, they have been extensively compacted and metamorphosed and are now more uniform and the tuff deposits have been largely transformed to green slates. The large volumes of rock with relatively uniform properties therefore make these volcanic rocks potential HSR host rocks.

The Skiddaw Group form a sequence of mudstones and sandstones approximately 5,000 metres thick. They have been folded and heated to a high temperature such that the predominant rock type is slate and are therefore potential HSR host rocks.

HSR, such as granites, are potentially suitable because they are strong so they can easily support the tunnels and caverns that make up a GDF. The bulk of HSR has no gaps between the crystals and so groundwater only flows through cracks. Depending on the nature of these cracks and the surrounding geology and groundwater, HSR rocks can be suitable to host a GDF.

Figure 5 : Areas where HSR is present



NB please note although the Lake District National Park is not under consideration the geology has been included to aid an understanding of the overall geological picture of the area.

Given the exclusion of the Lake District National Park from consideration, it may be that there is reduced siting options for a GDF within HSRs to be developed. This is a matter that will require further consideration should the Mid Copeland Search Area progress through the siting process.

A simplified column of rock types present in the Borough of Copeland is presented in **Table 1** below showing the oldest and deepest rocks at the bottom, with progressively younger rock units towards the top.

Table 1: Sequence of major rock types present based upon the BGS Regional geological visualisation models. Only rock units occurring in the depth range 200-1,000 metres below NGS datum are included.

	Geological Period (age in millions of years)	Geological Unit	Dominant Lithology	Rock Types of Interest[6]		
				LSSR	HSR	Evaporite
Younger sedimentary rocks	Triassic (201.3 – 251.9)	Mercia Mudstone Group	mudstone and siltstone with evaporite deposits of anhydrite, gypsum and halite	✓		✓
		Sherwood Sandstone Group including St Bees sandstone	sandstone, siltstone and mudstone			
	Permian (251.9 – 298.9)	Cumbrian Coast Group	mudstone and sandstone with evaporite deposits of anhydrite, gypsum and/or halite; limestone in east	✓		✓
		Appleby Group	sandstone and conglomerate			
Older sedimentary and related rocks	Carboniferous (298.9 – 358.9)	Warwickshire Group	sandstone and siltstone with mudstone	✓		
		Pennine Coal Measures Group	mudstone, siltstone, sandstone and coal			
		Carboniferous Limestone Supergroup	limestone with mudstone, siltstone and conglomerate			
Basement	Devonian (358.9 – 419.2)	Lake District Batholith (in part)	granite		✓	
	Silurian (419.2 – 443.8)	Windermere SuperGroup	weakly metamorphosed (highly compacted) mudrock with siltstone and sandstone		✓	
	Ordovician (443.8 – 485.4)	Lake District Batholith (in part)	granite		✓	
		Borrowdale Volcanic Group	weakly metamorphosed lavas and pyroclastic rocks		✓	
		Skiddaw Group	weakly metamorphosed (highly compacted) slates and sandstones		✓	

NB please note this table refers to all major rock types found in Copeland and is not specific to this Search Area and has been included to aid an understanding of the overall geological picture of the area.

[6] *For the purposes of the National Geological Screening exercise, 'Rock Types of Interest' were defined as host rock types and the surrounding rocks that are expected to contribute to the safety of a Geological Disposal Facility (GDF).*

Rock structure

The term "rock structure" describes natural geological features, that could affect the safety of a GDF or the ease with which a GDF could be constructed in a given geological environment. The present understanding of the Borough of Copeland 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 within the adjacent inshore area. Faults may act as barriers to or pathways for groundwater movement, depending upon their characteristics. Understanding the rock structure and its complexity within an area is a highly important aspect that is required to characterise any potential site. It will inform the effect of long-term evolution on safety, and hence the design and constructability requirements of a GDF.

Groundwater

The term "groundwater" describes all types of subterranean water. Mining in the area may have changed the original patterns of groundwater movement and shallow groundwater may now circulate to greater depths within the depth range of interest than it did before mining took place. In the vicinity of this mining area deep exploration boreholes may also influence the connectivity between shallow and deep groundwater, which would also need to be considered during the siting process.

If this area progresses through the siting process, more information will need to be sought about the groundwater chemistry and groundwater movement; however, it is unlikely that such information would be available until later on in the siting process, through direct samples taken from boreholes. Similarly, further information will be required to explore the location and nature of groundwater and aquifers in the Mid Copeland Search Area and adjacent inshore area.

Dense brines may be present within the potentially suitable rocks in the depth range of interest in the inshore area. Where dense brines are present it is likely that groundwater movement is limited and isolated from shallower, fresher groundwater and the surface.

Natural processes

The term "natural processes" include earthquakes, glaciations and sea level changes. One of the benefits of geological disposal of radioactive waste is that the waste is isolated and therefore protected from future natural processes which occur at the surface. Therefore, whilst a GDF would need to be sited and designed to take account of natural processes which may occur during its operational lifetime, there is no reason to suggest that the Mid Copeland Search Area and adjacent inshore area should be excluded from the siting process on the basis of the area's susceptibility to natural processes alone.

Resources

Resource attributes relate to geological resources present or suspected to be present at depth. It covers both deep-mined or intensely drilled areas and the presence of potentially exploitable resources (coal, hydrocarbons, metal ores and industrial minerals). Many resources that have been exploited in the past are considered relevant because exploration for new resources often takes place around sites of past exploitation. Therefore, there is a risk of inadvertent human intrusion in the future or potential sterilisation of the resources which may permanently prevent the extraction of mineral resources for future generations. 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. Mining activities may also affect groundwater movement, as noted in the groundwater discussion above. RWM would need to assess the extent of existing and future exploration and operational activities to ensure the integrity of the GDF would not be compromised.

Some of the area has been mined to depths below 100 metres (e.g. iron around Egremont). In these areas the mining is likely to have affected the way in which water moves through the rock. Also, possible exploration in the future in these areas means that it is more likely that future generations may disturb a facility. These known resources would need to be taken into account in the siting of a GDF.

Part of the adjacent inshore area has Petroleum Exploration and Development Licences to allow companies to explore for oil and gas. It is not known whether these licence areas will be exploited. There are also Coal Authority Licence Areas off the coast allowing companies to explore for coal. This exploration is currently at an early stage and it is not known whether reserves in these licence areas will be exploited. RWM would continue to monitor how exploration progresses throughout the GDF siting process.

Historical information

It is also recognised that there is geological information relating to parts of the wider Copeland region 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 will have resulted in the production of potentially relevant sub-surface surveys and studies. If the Mid Copeland Search 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 enhance RWM's 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 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 volumes of rock 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.

Construction and Operational Safety

The initial findings of RWM as part of this evaluation work indicate that there are no fundamental constraints relating to construction and operational safety matters which would prevent the Mid Copeland Search Area and adjacent inshore area from being considered further in the siting process. There are, however, a number of characteristics that have been identified that would need to be investigated further should the Mid Copeland Search Area and adjacent inshore area progress through the siting process.

Some parts of the Mid Copeland Search Area are prone to flooding, with sources of flooding including rivers, the sea and flash flooding due to extreme rainfall. This will present challenges in these parts to the construction and consequent operation of the surface based elements of a GDF and the drilling of deep boreholes to characterise the geological environment. Further work would need to be done to understand the potential impact of flood risk when considering locations for the surface facilities and accessways, including potential effects of climate change and coastal erosion.

RWM would look to work collaboratively with relevant stakeholders to consider the potential, and the implications of, locating the surface facilities of a GDF in areas more resilient to flood risk, taking account of the effects that climate change may have. RWM would also seek to investigate the possibility of introducing design features to mitigate the impact of flooding on the surface site, as well as opportunities to implement wider flood protection schemes that could benefit the area. This is an important matter that would need collaborative working with relevant stakeholders, including the community, the Environment Agency and Lead Local Flood Authorities.

In parts of the Mid Copeland Search Area and adjacent inshore area, mining and other minerals extraction has historically taken place. The presence of mine workings near a GDF could present geotechnical hazards during the construction and operation of a GDF. More information would be sought about the historic and future planned mining activities in the Mid Copeland Search Area and adjacent inshore area, if this area were to progress through the siting process. Understanding the rock structure including the presence of faults within an area is an aspect that will also need further study.

Locating a GDF in the vicinity of other nuclear licensed sites such as Sellafield and LLWR would need to be considered in due course if this area progresses through the siting process. This would be an important issue for discussion with the UK's independent nuclear regulators and other key stakeholders. Sellafield is the UK's most complex nuclear site, covering approximately six square kilometres with operations including decommissioning, spent nuclear fuel management and the safe management and storage of nuclear waste, including a significant proportion of the likely inventory for disposal. Under the Radiation (Emergency Preparedness and Public Information) Regulations 2019, the Sellafield site has a detailed emergency planning zone and plans which cover on-site and off-site emergencies. RWM would need to undertake further work, with Sellafield and other stakeholders, to understand the constraints that these emergency preparedness arrangements could have on the construction and operation of a GDF.

In addition to Sellafield located at Seascale, there are two other known Upper Tier COMAH sites (Control of Major Accident Hazards) in the region. Such locations would need to be consulted if this area progresses through the siting process to ensure that risks posed to and from a GDF development can be considered.

It is noted that Carlisle Lake District Airport (outside the Copeland Borough) is located to the north east of the City of Carlisle. RWM would need to do more work to understand the impact that flight paths and any future development plans for the airport would have on the siting of a GDF. RWM would also need to consider the impact of military aircraft low flying areas and tactical training areas. 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.

RWM would engage with all the relevant stakeholders and the wider community to understand the implications of such matters should the Mid Copeland Search Area and adjacent inshore area progress through the siting process.

Security

Many of the considerations highlighted above in the context of Safety apply equally in the context of Security, and RWM would need to consider these issues further should the Mid Copeland Search Area and adjacent inshore area progress through the siting process.

RWM will need to meet expectations set from the Office of Nuclear Regulation in respect of safeguards, an important part of nuclear non-proliferation treaty compliance set by the International Atomic Energy Agency upon signatory member states. The purpose of such agreements is to ensure that nuclear materials acquired for peaceful purposes are not diverted for military purposes.

The initial work undertaken indicates that there are no fundamental constraints relating to security, or nuclear safeguards, which would prevent the Mid Copeland Search Area and adjacent inshore area being considered further in the siting process for a GDF.

4.2 Community

Based on the review of readily available information relating to the Community Siting Factor, RWM has concluded that the Mid Copeland Search Area and the adjacent inshore area have potential to host a GDF.

The community information that has informed this early evaluation work was obtained from public domain sources and local authority publications. Some of the gathered information is summarised here to explain the current view of RWM. Further work that looks at progressively more detailed and wider suite of information would be undertaken in due course if this area progresses through the siting process.

In Cumbria there are currently two tiers of local government consisting of Cumbria County Council and six District Councils, of which the Mid Copeland Search Area lies within the administrative boundary of Copeland Borough Council. Copeland Borough Council has 33 councillors representing 17 wards and 29 parish councils.

There are plans to reorganise the County Council and the six District Councils into two new unitary councils. As the Policy defines the Search Area by district or unitary electoral wards, any changes to electoral ward boundaries will be reflected in the Search Area.

The Mid Copeland Search Area considered in this report comprises two electoral wards, namely; Beckermet and Gosforth & Seascale, with a total population of approximately 6,000.

There are nine Parish Councils either within or partially within the Mid Copeland Search Area: Beckermet with Thornhill, Drigg & Carleton, Gosforth, Haile & Wilton, Irton with Santon, Ponsonby, Seascale, Wasdale, and Loweride Quarter (partial).

Several of these Parishes lie partly or wholly within the National Park, which has been excluded from consideration for hosting a GDF. As the Search Area must be drawn using the existing electoral ward boundaries, which overlap with the National Park, these areas will not be considered for hosting a GDF but the communities within them will still be included in discussions as part of those electoral wards.

Economic Growth

The evaluation work completed to date has identified some current priorities and aspirations for the wider Copeland region that the delivery of a GDF could contribute towards.

The current Copeland Local Plan 2013 – 2028[7], sets out the strategic objectives for economic opportunity and regeneration covering:

- growth and diversification of the local economy;
- generating good employment opportunities;
- improving education and skill levels in the borough;
- increasing revenue from tourism; and
- responding to the decommissioning of Sellafield.

Copeland Borough Council has several strategic documents which seek to deliver a vision of economic growth whilst securing its financial capability within the area.

A GDF would provide direct and indirect employment opportunities over a very long period of time. There would be hundreds of well-paid jobs every year for over a century with further opportunities for the local supply chain. Local projects could benefit from Community Investment Funding and public facilities and infrastructure could be improved over the long-term.

The strategic economic plans for the Copeland region identify a desire to attract engineering, scientific sectors and research and development investment into the area as well as being a centre for nuclear excellence. The delivery of a GDF would appear aligned to such preferences.

Copeland was described by the Borough Council in the 2016-2020 Growth Strategy as the "Centre of Nuclear Excellence" [vi]. The nuclear sector, and its supply chain, is the major employer within the area, employing over 60% of all employees in Copeland. Approximately 11,000 people are directly employed by Sellafield on site [vii], with thousands more in the local supply chain, including small and medium sized enterprises. Many of these individuals are in highly skilled engineering and scientific jobs. Every job at Sellafield sustains a further 2.8 jobs in the wider economy.

Over the construction and operational period of a GDF, the decommissioning at Sellafield may present a challenge for large scale employment in the future, both directly and through the supply chain. As an additional large employer providing well-paid jobs within the Copeland region over a long period of time, a GDF would have the potential to offset some of these challenges. RWM would look to work with relevant stakeholders, including Sellafield and the Nuclear Decommissioning Authority, to review the employment profile over the coming years and identify the impact of Sellafield decommissioning on the local area and how a GDF could be aligned to see if employment continuity could be maintained.

More widely, RWM would look to work collaboratively to gain a further insight into existing priorities and aspirations as well as relevant work that may have been completed in the community and the possibilities for alignment. The 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 this important heritage in the delivery of a GDF.

[7] *Copeland Borough Council is currently preparing a new local plan.*

Irrespective of its location, a GDF will result in an increase in direct and indirect employees to the area which will require goods and services from local businesses and services. There may be an opportunity for RWM to ensure that the supply chain recruits and procures from the local workforce, where this is possible, to further enhance the benefits to the local area, and the long timescales for the project may help prepare for these opportunities locally. However, it is recognised that RWM will need to work collaboratively with the existing community to avoid consequential detriment to other local businesses and supply chains.

Tourism

The tourism economy is of local importance and RWM recognises the need to treat the features and assets that support it sensitively. There may be an opportunity to create a local GDF/scientific centre of excellence, which itself could become a tourism point of interest alongside 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 Äspö in support of the Swedish spent fuel repository programme host approximately 20,000 visitors per year.

Skills and Training

The existing supply chain in Copeland 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.

The delivery of a GDF has the potential to provide a number of different opportunities to retain and develop skills within the local community, for example by delivering STEM activities within schools, projects to increase aspiration, career mentoring and skills and training courses for local residents. A GDF could result in an increase in a wide range of opportunities through delivery of modern apprenticeships and skills training to develop the site-specific design, the construction and subsequent operation and management of this major piece of infrastructure.

Housing

Copeland Borough has been identified as one of the top 10 most affordable places to live in the UK [viii] although an increasing number of second homes, has meant that many residents find it difficult to access housing.

The delivery of a GDF could require additional homes for workers involved in the construction and operational phases over a long period of time. RWM would seek to work closely with the district council and other relevant stakeholders to agree a local worker housing strategy that complements the overarching housing strategy for the area.

The siting, investigation, construction and management of a GDF would be developed and delivered in partnership with communities, to ensure that it is sensitive to the local environment and the priorities of the local community. RWM would seek to work collaboratively though a Community Partnership, to ensure that local priorities and concerns are understood, considered and addressed.

Previous Siting Process

Copeland Borough Council was a key member of the partnership that engaged with 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)[ix] – A Framework for Implementing Geological Disposal'. Three Cumbrian local authorities: Allerdale Borough, Copeland Borough and Cumbria County Council engaged 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, and initial screening of the area's geology by the British Geological Survey (BGS). In a 2012 opinion poll, there was net support (51%) within Cumbria for continuing the process when it ended in 2013 [x].

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, which 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.

4.3 Environment

Based on the review of readily available information relating to the Environment Siting Factor, RWM has concluded that, with appropriate mitigation, the Mid Copeland Search Area and adjacent inshore area have potential to host a GDF.

The environmental information that has informed the evaluation work was obtained from key documentation and national data sets which are publicly available. Some of the gathered information is summarised here to explain RWM's current view. More detailed work that looks at a wider suite of information would be undertaken in due course, if the Mid Copeland Search Area and adjacent inshore area progresses in the siting process.

The delivery of a GDF to safely and securely dispose of higher activity radioactive waste would be one of the largest environmental infrastructure projects in the UK. However, all developments have the potential to generate both positive and negative impacts on the environment. At this stage, with no specific sites for the surface facilities of a GDF identified, it is not possible to assess the specific potential impacts of delivering a GDF at a particular location. That will come at a later stage in the process.

A number of key environmental constraints have nonetheless been identified in the Mid Copeland Search Area and adjacent inshore area. Two of these are considered to be particularly noteworthy at this stage in the siting process, namely: the ecological designated sites and the landscape designations. These designations would influence the deliverability of a GDF in the Mid Copeland Search Area and adjacent inshore area and would have particular implications for the location of surface infrastructure. If the Mid Copeland Search Area and adjacent inshore area progresses through the siting process, RWM would look to work collaboratively with all relevant stakeholders to consider the environmental constraints and the implications of delivering a GDF at a specific site or sites in the area.

The local tourism economy is extremely important. It is influenced by the landscape and recreation opportunities and the broader wildlife interest as well as cultural heritage assets within the wider area. RWM would seek to work collaboratively to ensure that local priorities and concerns are understood and influence the work that may be undertaken.

Landscape Designations

The Lake District is England's largest National Park and is designated as a UNESCO World Heritage Site. Legislation and planning policy provide a very high degree of protection to National Parks and strict tests and requirements apply to any development proposals which could impact a National Park.

A large part of the electoral wards that make up the Mid Copeland Search Area is within or abuts the Lake District National Park. The Working Group has agreed that those areas of the Copeland Borough that are currently located within the boundary of the Lake District National Park would be excluded from any consideration to host a GDF (either surface or sub-surface) from the outset.

The Mid Copeland Search Area and adjacent inshore area is ecologically rich and diverse and is a key asset to the Cumbria and Copeland economy in terms of tourism and outdoor recreation. The Lake District National Park is considered to present a potentially substantial constraint on the siting of a GDF, even though the GDF will not be situated within the National Park's boundaries. This is due to potential indirect effects from both the built development itself (e.g. visual impact) and associated activities (e.g. traffic movement through the park) which will be key concerns that will need to be considered in more detail if this area progresses.

The Lake District National Park Authority is the planning authority for the land within the designated boundary of the Lake District National Park . The Lake District National Park Local Plan [xi] contains a policy (Policy 29 'Waste Management'), which states that *'We will not support a geological disposal facility for radioactive waste in or under the Lake District National Park.'*

Outwith the Lake District National Park, Copeland Borough Council has designated a number of areas as being 'Landscapes of County Importance'. Relevant to the Mid Copeland Search Area is the Copeland West Landscape of County Importance.

Ecologically Designated Sites

The Borough of Copeland hosts a large number of designated sites for nature conservation, including Ramsar sites, Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Sites of Special Scientific Interest (SSSIs) and areas of county and local significance for wildlife, with the designated areas often overlapping and extending beyond the borough boundaries. There are also two national nature reserves in the area, Hallsenna Moor (within the Mid Copeland Search Area) and High Leys (just outside the Mid Copeland Search Area).

There are three Marine Conservation Zones, both along the coast and offshore. Two of which are located within immediate inshore area of the Mid Copeland Search Area. The main threats identified to habitats in these areas are activities that physically disturb the seabed, such as demersal fisheries, marine pollution through organic enrichment and increased bottom water temperature due to climate change.

There are no Ramsar sites located within the Mid Copeland Search Area. Morecambe Bay and Duddon Estuary SPA is located in the south western part of the Mid Copeland Search Area. The SPA is an internationally important site for seabirds and waterbirds (both breeding and non-breeding) including three Annex I[9] species in the breeding season and six Annex I species in the non-breeding season[10].

The Hallsenna Moor National Nature Reserve, located in the Mid Copeland Search Area, is one of the few remaining lowland heath and peatland habitats in Cumbria. Drigg Dunes and Gullery, Ravenglass Local Nature Reserve is located in the most southern part of the Mid Copeland Search Area, within the Lake District National Park. There is Ancient Woodland and Special Roadside Verge designated areas scattered throughout the Mid Copeland Search Area.

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[8] *Copeland Borough Council is the planning authority for the area outside the National Park and Cumbria County Council also has relevant planning functions, such as for minerals and waste planning.*

[9] *Annex I of the Birds Directive lists 193 species and sub-species which are: in danger of extinction; vulnerable to specific changes in their habitat; considered rare because of small populations or restricted local distribution; requiring particular attention for reasons of the specific nature of habitat.*

[10] ***https://designatedsites.naturalengland.org.uk/Marine/MarineSiteDetail.aspx?SiteCode=UK9020326&HasCA=1&NumMarineSeasonality=25&SiteNameDisplay=Morecambe%20Bay%20and%20Duddon%20Estuary%20SPA#backgroundinfo*** *(21/06/21).*

Parts of the Mid Copeland Search Area and surrounding area are designated as SPA and SA under the Conservation of Species and Habitats Regulations 2017. There are 13 SSSI located within the Mid Copeland Search Area. The majority of the SSSIs in the Mid Copeland Search Area are designated due to biological interests. However, several have features of geological interest.

If the Mid Copeland Search Area and adjacent inshore area progresses through the siting process, RWM would work with the local authorities, the community and relevant stakeholders to understand and investigate the sensitivities of the area's natural environment.

RWM would seek to establish whether the delivery of a GDF could be aligned to relevant environmental objectives and consider the implications of delivering a GDF in the Mid Copeland Search Area and adjacent inshore area for the assets that should be conserved and enhanced, in compliance with relevant legislation and policy. There may be opportunities to provide environmental enhancements in the Mid Copeland Search Area and adjacent inshore area as part of the delivery of a GDF through the provision of biodiversity enhancements, improving ecological networks or improving public access, if this was deemed appropriate.

There is potential for a GDF to support the Local Nature Recovery Strategy in Cumbria, including with enhancement and expansion of priority habitats in the area. Key actions for these areas include expanding and joining up existing habitats, land management changes and green infrastructure provision. The Cumbria Wildlife Trust undertakes a range of wildlife conservation projects which could be supported by the GDF programme. Current projects include restoring biodiversity on sand dunes, peatland and hay meadow restoration[11]. There is also a range of local wildlife groups that could be engaged to identify opportunities for biodiversity improvements in the local area including West Cumbria Swift Group (based in the Gosforth/ Seascale area), Cumbrian Amphibian and Reptile Group and Cumbrian Badger Group. This potential could be explored further if the Mid Copeland Search Area progresses through the siting process.

Flood risk and Coastal Change

The Mid Copeland Search Area is generally at low risk of fluvial flooding throughout. There are however Environment Agency designated areas of high risk Flood Zone 3 located along the rivers, including along the Riven Ehen, River Irt, River Mite and River Bleng.

Settlements of Gosforth, Seascale, Beckermet, Holmrook and Calder Bridge are located in close proximity to the areas designated at high risk. In 2009 and 2012 major flood events affected the Copeland Area with several residential properties being flooded after high rainfall events.

In terms of coastal flooding, the area within Flood Zone 3 does not extend to properties within the settlements located on the coast, however some properties located on the coast within Seascale are located within Flood Zone 2 (medium probability of river or sea flooding)[12].

[11] *https://www.cumbriawildlifetrust.org.uk/about (29/06/21).*

[12] *https://flood-map-for-planning.service.gov.uk/ (16/07/21).*

The Copeland Borough Council's Draft Strategic Flood Risk Assessment [xii] (2018) identified localised flooding issues. The Environment Agency identifies that there are areas within designated Flood Zones 2 and 3[13] in the Mid Copeland Search Area.

The National Policy Statement for Geological Disposal Infrastructure (NPS) [xiii] notes that 'Development consent should not be granted for development where any part of the surface infrastructure of a geological disposal facility is located in Flood Zone 3b'[14]. The NPS further notes that 'Development consent should only be granted for development in respect of deep boreholes where those boreholes are located in whole or in part in Flood Zone 3b where there are no other reasonable alternative locations'[15], and that 'Whilst the surface facilities of a geological disposal facility should take account of Flood Zones, an applicant is not precluded from developing the underground parts of a geological disposal facility beneath Flood Zones'[16].

Given Copeland's coastal location and number of waterbodies, the Mid Copeland Search Area is considered to be particularly vulnerable to environmental changes brought about by climate change.

Coastal and estuarine habitats in Copeland include sand dunes and salt marshes that act as the primary defence against coastal flooding and erosion. Natural coastal processes including erosion and accretion are changing the profile of the coast where there are no sea defences. In different areas, estuarine tidal flooding or direct coastal flooding are the two main drivers of coastal change.

If the Mid Copeland Search Area progresses, RWM would look to work collaboratively with stakeholders (including environmental regulators) to understand the local challenges related to flooding, and the implications of future climate change for both the local community and the delivery of a GDF.

There could be opportunities to deliver flood and / or coastal protection measure as part of the delivery of a GDF that could benefit the wider area, protecting not only homes and businesses, but also protecting, and enhancing existing ecological habitats. There could be potential for the spoil that would be generated as part of the construction of a GDF to be used to support such benefits. This would be an area for further work and discussion later in the siting process, if the Mid Copeland Search Area progresses, as RWM would need to consider the volume and characteristics of spoil that may be generated and work collaboratively with stakeholders to understand the implications of reusing the material generated.

[13] *Zone 3 can be sub-divided into 3a and 3b. 3a is defined as having a 1 in 100 or greater annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year. 3b is defined as the functional floodplain that would be susceptible to flooding from rivers or the sea during any event up to and including the 1 in 20 (5%) year event (or more frequently), taking full account of any defences which may offer protection to the area. Flood zone 2 is defined land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% – 0.1%) in any year.*

[14] *NPS para 5.8.20.*

[15] *NPS para 5.8.20.*

[16] *NPS para 5.8.20.*

Other matters

There are 14 Scheduled Monuments in the Mid Copeland Search Area. These range in age, from several Bronze Age cairns, the ruins of the medieval Calder Abbey, a Roman fort at Ravenglass, and an 18th century packhorse bridge at Drigg Holme. Notable sites include Mecklin Park Cairnfield, an area rich in burial mounds, standing stones and possible hut circles.

If the Mid Copeland Search Area progresses through the siting process, RWM would seek to establish whether the delivery of a GDF could be aligned to relevant objectives relating to the historic environment and consider the implications of delivering a GDF in the area for the cultural and heritage assets that should be conserved and enhanced, in compliance with relevant legislation and policy.

The Borough's Integrated Assessment Scoping Report [xiv] notes that the biological and chemical quality of the rivers and streams of Copeland has remained good/fair or improved in the past five years, indicating a potential upwards trend in the overall water quality of the rivers. However, it also highlights that recent WFD monitoring suggests the ecological status of estuaries and coasts in Copeland is poor and the chemical status of groundwater varies from poor to good because of human activities which are causing localised pollution and/or other harmful effects.

There are various waterbodies within the Mid Copeland Search Area including lakes, main rivers and groundwater bodies (including principal and secondary aquifers) which provide important water resources for communities, industry and wildlife. The overall WFD status of the majority of the waterbodies within the Mid Copeland Search Area is 'moderate' with most failing on chemical status (including the River Calder and River Ehen). Siting of the GDF would need to consider potential impacts on these resources, including on quantitative, ecological and chemical status. Potential implications of future climate change on the flood risk of any future development should also be considered.

Seascale WFD Protected Bathing Water site and the River Ehen designated Sensitive Area for Eutrophic Rivers are located within the Mid Copeland Search Area. The Cumbria WFD Coastal Water is located to the west of the Mid Copeland Search Area and the Esk Transitional Water is located on the southern boundary of the Mid Copeland Search Area.

Based on currently available data, there are no significant air quality or noise issues in the Mid Copeland Search Area.

Individual matters that would require further consideration in due course, for example the noise implications associated with the programme of site characterisation and construction of a GDF, would need to be considered, both in terms of the impacts on noise sensitive premises, areas and on designated sites and wildlife.

4.4 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 Mid Copeland Search Area and the adjacent inshore area have potential to host a GDF.

Design and Construction

A GDF would require a suitable location for both the surface and sub surface facilities, linked by a sloping tunnel and/or vertical shafts. Consideration has been given to whether the surface and sub surface environments in the Mid Copeland Search Area and adjacent inshore area have the potential to host a GDF together with the potential to link the surface facilities to the sub surface infrastructure.

A desktop review of key documentation has been completed. This evaluation has also been informed by national data sets which are publicly available. More detailed work that looks at a wider suite of information would be undertaken later in the siting process if the Mid Copeland Search Area and adjacent inshore area progresses through the siting process.

Based on the current geological understanding, there are several layers of potentially suitable host rocks under the Mid Copeland Search Area and adjacent inshore area. There are potential challenges with constructing accessways in mixed ground conditions which are understood to exist in the Mid Copeland Search Area and adjacent inshore area, including challenges such as traversing through faults, aquifers and historical mining areas. Based on current estimates of inventory, it is anticipated that there could be a sufficient volume of host rock to dispose of the potential inventory for disposal.

However, further work will be required to understand the depth, thickness and suitability of the potential host rocks in due course. Understanding the rock structure including the presence of faults within an area is an aspect that will also be required.

Surface facilities

At this stage, when no specific surface sites for a GDF within the Mid Copeland Search Area have been identified, it is not possible to assess the precise implications of the surface facilities required as part of the delivery of a GDF. This would take place at a later stage in the siting process.

The GDF surface facilities would require in the region of one square kilometre of land, however the precise layout and land requirements will need to be determined in due course. 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.

The surface facilities may be split across more than one site if required in response to relevant surface constraints or local priorities. However, splitting the site also has the potential to increase the adverse impacts of a GDF, for example it may increase vehicle movements or increase the visual impact of development. The full implications of splitting the surface facilities would be considered if this approach were to be pursued.

One of the potential challenges identified at this early stage relates to possible tidal and fluvial flooding. RWM would need to work with the community, the district council, the county council (with respect to its role as the Lead Local Flood Authority) as well as the Environment Agency and other stakeholders to ensure that the development of a GDF and any associated infrastructure would be sensitive to the issues relating to all sources of flooding.

Further work in respect of matters such as ground stability and associated engineering aspects would need to be considered in greater detail should the area progress to identifying specific sites and RWM need to ensure sustainability and good design practices.

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 mitigation or habitat creation or enhancement and other potential infrastructure schemes. The potential opportunities would need to be considered further if the Mid Copeland Search Area progresses through the siting process as the potential for reuse would be dependent on the volume and characteristics of spoil generated as well as the construction schedule.

Whilst no specific surface sites have been identified, based on the available information, there is no reason to suggest that it would not be possible to find a suitable location within the Mid Copeland Search Area.

Sustainable Design

RWM will apply 'good design' to a GDF in order to meet the sustainable infrastructure objectives as described in Section 4.5 of the NPS, which confirms that applying 'good design' to geological disposal infrastructure projects should produce sustainable infrastructure that is sensitive to place, efficient in the use of natural resources and energy used in their construction and matched by an appearance that demonstrates good aesthetics as far as possible. It should also mitigate any existing adverse impacts wherever possible, for example, in relation to the environment.

A good design would also be one that sustains the improvements to operational efficiency for as many years as practicable, taking into account capital cost, economics and environmental impacts.

4.5 Transport

Based on the review of readily available information relating to the Transport Siting Factor, RWM has concluded that the Mid Copeland Search Area and the adjacent inshore area have potential to host a GDF.

Publicly available information regarding the transport infrastructure has been reviewed to determine current transport links and any issues likely to affect the ability to carry out all potential transport operations related to construction and operation of a GDF safely and securely to inform this early evaluation work. More detailed work that looks at a wider suite of information would be undertaken later in the siting process, if the Mid Copeland Search Area and adjacent inshore area progresses through the siting process.

Nuclear materials have been safely transported within Copeland Borough for many decades along existing transport networks to both the Sellafield and LLWR sites. Therefore the Mid Copeland Search Area benefits from an existing rail network that is directly connected to the Sellafield nuclear site, where approximately 80% of the waste to be disposed of in a GDF is located.

Although the surface location is currently unknown, transport links to and from a GDF will be vital throughout the lifetime of the facility. Transport will be required for the following:

- transportation of excavated material (this also includes backfill and spoil required for reuse as backfill or surface bunds);
- construction materials for underground and surface facilities and associated infrastructure;
- delivery of plant and equipment;
- radioactive waste to be disposed of in the GDF; and
- personnel during boreholes, construction and operation.

During its operational phase, a GDF will receive different types of radioactive waste packages from across England and Wales for emplacement at the facility. RWM has developed a range of transport containers that will be used to safely transport radioactive waste packages to a GDF. It is recognised that approximately 80% of the waste currently resides at Sellafield.

Rail

The Mid Copeland Search Area is connected to the national rail network via the Cumbrian Coast Line (CCL) which runs from Carlisle to Carnforth, Lancashire through the Copeland towns of Whitehaven, St. Bees and Millom before continuing east to Ulverston, Grange-over-Sands and Carnforth, where it connects with the West Coast Main Line (WCML). As the use of rail in preference to road is a key part of the RWM Transport Safety Strategy[17], it would be preferable to connect a GDF to the existing rail network.

[17] *https://rwm.nda.gov.uk/publication/geological-disposal-transport-safety-strategy/?download.*

Lines such as the CCL are at the heart of the communities which they serve, often being the only form of public transport within rural areas. They play a critical role in providing connectivity both within and outside Cumbria through connecting people to educational facilities, key services and leisure and tourism opportunities. The rail line forms a vital transport artery supporting sustainable travel for the tourism economy and also links people with key employment sites along the line; the most significant of these currently being the Sellafield site. Currently on this line there are 11 daily freight train paths in one direction. Current freight usage on the CCL includes:

- transport of nuclear materials from nuclear licensed sites nationwide to the Sellafield nuclear site;
- movement of low level waste (LLW) to the low level waste repository (LLWR);
- support to major construction activities on various nuclear licensed sites in Cumbria;
- freight movements to/from the ports of Workington and Barrow; and
- the operation of the oil terminal at Dalston.

It should be noted that the Sellafield site is accessible via the CCL, so if a GDF was to be located in this area, the line would likely provide a suitable option for movement of radioactive waste.

It is anticipated that the majority of transports for a GDF will meet the existing requirements on the rail network. Therefore, this area offers a rail network that is already considered to be largely suitable for use. Depending on location of a GDF in relation to the existing railway infrastructure, intermodal transfers may be required, or a dedicated branch line may need to be constructed.

If this Mid Copeland Search Area were to progress through the siting process, the implications of developing a GDF on the future usage of the CCL will need to be considered as the line is currently nearing capacity, noting that some upgrades are currently planned that would increase line speed and overall capacity. RWM would work with relevant stakeholders to understand the improvements that are planned and schedules for their delivery.

It should be noted that the topography within the Mid Copeland Search Area may pose a challenge in providing rail access to proposed GDF surface facilities. In general, potential sites adjacent to the existing rail corridor may be more suitable. Potential sites away from the existing rail corridor will need to be assessed on a site-by-site basis.

Road

The M6 is the nearest motorway to the Mid Copeland Search Area, approximately 30 miles (approximately 60 minutes) to the east. There is a strategic road route running through the Mid Copeland Search Area, via the A595 Strategic Route and the A66 Strategic Route, to Junction 40 of the M6 at Penrith. To the south of Calder Bridge, in the Mid Copeland Search Area, the A595 is a non-strategic route, but provides a route to the A5092 and onwards via the A590 Strategic Route to Junction 36 of the M6.

Although there are sections of dual carriageway, most of the strategic roads are single carriageway. The transport situation is affected by the Cumbrian topography and the location of estuaries, which limit the road network that can traverse from the M6 to the Mid Copeland Search Area. Additionally, visitors to the Lake District National Park (approximately 16.4 million visitors per year) also require access to these limited roads.

It is acknowledged in the Copeland Local Plan that the local road network is limited and requires improvement, similarly the Britain's Energy Coast Masterplan for West Cumbria acknowledges that the local road network is limited and requires improvement. The Cumbria Local Enterprise Partnership is committed to investing in infrastructure to support growth with west of M6

strategic connectivity a priority. The A595 is a particular route of concern in the local community. This road is the main artery to the Sellafield nuclear site, running via Whitehaven and through to Allerdale. The LEP is committed to infrastructure investment to support growth, including A595 corridor enhancements.

A number of local B roads are present in the area, connecting to the A595. If a GDF was to be located away from the A595, the use of these local roads would be required. Discussions may be required with the local communities regarding the use and possible upgrade of these roads and further consideration on the possible implications of delivering a GDF on the road network would be needed if extensive use of the road network is necessary.

As such the Mid Copeland Search Area would be sensitive to increased traffic requirements and therefore use of the road network would need to be investigated further with the appropriate stakeholders.

Sea

The Mid Copeland Search Area offers good opportunities for the transport of excavated spoil, construction materials and radioactive waste packages by sea. The area has good access to two established ports, at Barrow and Workington, via both road and rail. This offers potential for sea transport for movements of construction materials, spoil and radioactive packages which could bring additional benefits through any required infrastructure upgrades as well as reducing the impact of land-based transport infrastructure. Whitehaven has been a port in the past but has since been converted into a marina and is not, therefore seen as a viable option.

Part of the Port of Barrow, to the south of the Mid Copeland Search Area, is owned and operated by Nuclear Transport Solutions. The quay has two berths for cargo operations and was designed as the home port for the spent fuel shipments to Sellafield. The berth is rail-connected and linked to the main line via Salthouse junction situated at Cavendish dock. This port has been used for the shipment of radioactive materials therefore it has all the security requirements for Category I nuclear materials and would be suitable to receive the radioactive transport packages sent to a GDF.

The Port of Workington (approximately 15 miles to the north and in Allerdale Borough) is owned and operated by Cumbria County Council. The main cargo handling area consists of an extensive quay frontage (773 metres) providing 7 berths plus a roll-on-roll-off facility. All berths are rail-connected, linking to the main rail line. The Port Authority also operates its own locomotives on the site's extensive internal rail system. The port could accommodate the majority of the anticipated transport packages and construction requirements that RWM would require to deliver a GDF.

The established ports, at Barrow and Workington, are both accessible from the Mid Copeland Search Area by road and by rail and it is understood that both ports would be able to handle the majority of expected radioactive transport packages and construction requirements, although it should be noted that the majority of radioactive waste to be sent to the GDF is currently at Sellafield, within the Mid Copeland Search Area, and so would not require transport by sea.

Transport Safety and Security

Mid Copeland Search Area and wider region has transport networks that connects to port facilities that have experience of handling radioactive transports. Based on understanding of the current transport modes and routes within and connecting to the Mid Copeland Search Area and adjacent inshore area, the evaluation concludes there is potential to support safe and secure transport operations for a GDF.

4.6 Value for Money

Based on the review of readily available information relating to the Value for Money Siting Factor RWM has concluded that the Mid Copeland Search Area and the adjacent inshore area have potential to host a GDF.

Given the early stage in the siting process, there are many uncertainties that would influence the overall programme cost and delivery schedule. RWM will keep these under close review should the Mid Copeland Search Area and adjacent inshore area progress through the siting process.

It is recognised that the Sellafield nuclear site, where a large proportion of the waste likely to be disposed of in a GDF is currently located, is situated near Seascale, within the boundary of the Mid Copeland Search Area. The possibility of developing the surface facilities of a GDF near to Sellafield has the potential to recognise a number of efficiencies with transporting the waste packages for disposal, although this would need further consideration.

The inshore geology for the GDF disposal area at depth could be in HSR, LSSR or Evaporite, the construction costs for the illustrative GDF designs in these potential host rocks would need to be considered further, if this area were to progress through the siting process.

If the subsurface elements of the GDF are located in the adjacent inshore area off the coast of Copeland Borough and some distance from the surface locations, then the additional length of the underground accessways will increase the initial construction cost and schedule duration, impacting the date of first waste emplacement, and potentially reducing the construction and disposal operations productivity and further increasing ongoing construction and operations costs. However, as no specific locations have been identified at this stage, this will require further consideration in due course.

There are some matters that could increase the initial GDF construction duration and costs, including aquifers near the surface, coastal and/or river flood risk mitigation measures and faulting near the surface. The local utilities (electricity distribution, water and drainage) may require significant upgrades to service the GDF.

Notwithstanding the uncertainties highlighted above, nothing has been identified at this early stage in the siting process which suggests or indicates that a GDF could not be delivered in the Mid Copeland Search Area and adjacent inshore area in a way which secures value for money, or that the cost of doing so would be particularly high relative to other locations that may be considered for hosting a GDF.

5. Conclusion

Having considered the readily available information, and particularly the National Geological Screening outputs, RWM has concluded that the Mid Copeland Search Area and adjacent inshore area have potential to host a GDF.

This Search Area Evaluation Report expands on RWM's Initial Evaluation work that has already been completed in respect of parts of the Copeland Borough, and uses readily available information relevant to the identified Mid Copeland Search Area and adjacent inshore area to confirm RWM's understanding of the potential to host a GDF.

This report presents the findings of work to evaluate the potential of the Mid Copeland Search Area and adjacent inshore area to host the GDF considering the six identified Siting Factors set out in RWM's Site Evaluation document.

At this stage, nothing has been identified which would prevent the development of a GDF in the Mid Copeland Search Area and adjacent inshore area and therefore **RWM has concluded that the Mid Copeland Search Area and adjacent inshore area have the potential to host a GDF.**

It is important to note that these evaluations have not confirmed that the Mid Copeland Search Area and adjacent inshore area are suitable to host a GDF. Further work would be required to establish this.

6. Potential Future Work

If this Mid Copeland Search Area were to move forward in the siting process, RWM would work collaboratively with the local community, the Community Partnership (if formed) and relevant stakeholders on the following areas:

- RWM as a priority would work with the Community Partnership to identify initial study areas in which potential siting options may be considered. To support these siting options desk based data gathering, fields surveys and initial assessment work will be undertaken within the Mid Copeland Search Area and wider region if appropriate.
- Following stakeholder engagement and regulatory approvals, RWM would commission data gathering and initial assessment work within the adjacent inshore area to Copeland Borough (e.g. seismic and environmental surveys).
- Existing and future aspirations for the area and how delivery of a GDF could be aligned to relevant local priorities.
- The sensitivities of the local natural environment and the potential implications of delivering a GDF in the Mid Copeland Search Area and adjacent inshore area, 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 wider region and the transport related implications of the development of a GDF in the Mid Copeland Search Area. This could include consideration of the potential to transport freight via sea, road and rail 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 in the Mid Copeland Search Area.
- The existing flooding related challenges in the area, the implications of future climate change and how this may influence the delivery of a GDF in the Mid Copeland Search Area.
- How the delivery of a GDF in the Mid Copeland Search Area 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.

Glossary

Area for Consideration
As parts of the electoral wards that make up this Search Area overlap with areas that have already been excluded, the 'Area for Consideration' is the remaining geographical area within which RWM will seek to identify potentially suitable sites to host a GDF.

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.

Disposal Concept
A high level description of the engineered and natural barriers required to ensure that the radioactivity in the wastes is sufficiently contained so that it will not be released back to the surface in unacceptable amounts that may cause harm to people and the environment.

Engineered Barrier System
The combination of the man-made engineered components of a disposal facility, including the waste packages / disposal containers, buffer, backfills and seals.

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.

Host Rock
The rock in which a disposal facility is located.

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)
An exercise undertaken by RWM that brings together high level geological information from across the country relevant to the design of a GDF.

Nuclear Decommissioning Authority (NDA)
A non-departmental public body established by the Energy Act 2004 to ensure the safe and efficient cleanup 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. The area under consideration will change during the course of the process. Initially it will be the area that is the subject of discussions between RWM and the interested party. Once the Working Group identifies the Search Area, it will be the Search Area; and once the Search Area is narrowed down to the Potential Host Community, it will be the Potential Host Community.

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.

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

BBC. *Tories in historic by-election Copeland win as Labour holds Stoke.* February 2017.

Borderlands. *Inclusive Growth deal – The Borderlands Partnership.* 2021.

Britain's Energy Coast: a Masterplan for West Cumbria.

British Geological Survey GeoIndex Onshore - GeoIndex - British Geological Survey (bgs.ac.uk) *British Geological Survey - Managing Radioactive Waste Safely: Initial Geological Unsuitability Screening of West Cumbria Commissioned Report CR/10/072.*

BGS. *National Geological Screening: Northern England - Minerals and Waste Programme Commissioned Report CR/17/097.* 2018.

Connecting Cumbria. *When and Where.* 2021.

Copeland Borough Council. *Copeland Borough Council line-up unveiled.* 2020.

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

Copeland Borough Council. *Council's new Executive appointed at AGM.* 2020.

Copeland Borough Council. *Committee structure.* 2020.

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

Copeland Borough Council. *Strategic Nuclear and Energy Board meeting.* August 2019.

Copeland Borough Council. *Copeland Local Plan 2013-2028.* December 2013.

Copeland Borough Council, *Copeland Local Plan 2013 – 2028, Core Strategy and Development Management Policies DPD,* Adopted December 2013.

Copeland Borough Council. *Housing Strategy* 2018-2023.

Copeland Borough Council, *Integrated Assessment of the Copeland Local Plan – Integrated Assessment Scoping Report – Consultation Draft,* January 2018.

Copeland Borough Council. *Cumbria Business Growth Hub.* 2020.

Copeland Borough Council, *Strategic Flood Risk Assessment (SFRA),* August 2007

Copeland Borough Council. *Your Councillors.* 2020.

Copeland Borough Council Partnership Plan. *A strategy for sustainable communities in Copeland 2011.*

Corporate Change in the Cumbrian Economy: *First Quarter (Jan.-Mar.)* 2020.

Cox, *Cumbria Joint Public Health Strategy: Tackling the Wider Determinants of Health and Wellbeing,* 2009.

Cumbria Constabulary. *Crime and community safety strategic assessment Cumbria 2017 – 2018.* 2017.

Cumbria County Council, *Cumbria Landscape Character Guidance and Toolkit Part One – Landscape Character Guidance,* 2011.

Cumbria County Council. *County Council Local Committee for Copeland.*

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

Cumbria Council, *Cumbria Council Coastal Strategy – Engagement Summary Document,* 2019.

Cumbria LEP. *Cumbria Infrastructure Plan.* May 2016.

Cumbria LEP. *Brexit Analysis.* December 2018.

Cumbria LEP. *Cumbria's Local Industrial Strategy.* March 2019.

Cumbria LEP. *The Four Pronged Attack – Cumbria Strategic Economic Plan 2014-2024.* March 2014.

Cumbria Intelligence Observatory. *Household Income, Cumbria and Districts.* 2017.

Cumbria Intelligence Observatory. *IMD.* 2019

Cumbria Intelligence Observatory. *A Statistical Summary of Copeland.* March 2020.

Cumbria Local Enterprise Partnership - Clean Energy Sector Panel, *Cumbria: Nuclear Partnership – Energising the Energy Coast,* 2020.

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

Cumbria Wildlife Trust, *The Cumbria Biodiversity Action Plan – Working together to protect Cumbria's Wealth of Wildlife,* 2001.

Cumbria Tourism. *Cumbria Tourism at the heart of our visitor economy* **www.cumbriatourism.org** 2020.

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.

Department for Environment Food & Rural Affairs, *Marine Strategy Part Two: UK Marine Monitoring Programmes,* 2014.

Department for Environment Food & Rural Affairs, *Marine Strategy Part Three: UK programme of measures,* 2015.

Department for Environment Food & Rural Affairs, *Marine Strategy Part One: UK Updated Assessment and Good environmental Status,* 2019.

Environment Agency, *Derwent and West Cumbria Abstraction Licensing Strategy – A Licensing Strategy to Manage Water Resources Sustainably,* 2013.

Environment Agency, *Water for Life and Livelihoods Part 1: North West River Basin District – River Basin Management Plan,* 2015.

Friends of the Lake District. *Geological Disposal of Radioactive Waste.* March 2019.

Geology of the west Cumbria district: memoir for 1:50000 geological sheets 28 (Whitehaven), 37 (Gosforth) and 47 (Bootle). 1997.

GOV.UK. *Committee on Radioactive Waste Management.* 2020.

Halcrow Group Ltd, *North West & North Wales Coastal Group, North West England and North Wales Shoreline Management Plan SMP2 – Main SMP2 Document,* 2011.

HM 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.* December 2018.

HM Government, *Marine Strategy Part One: UK Initial Assessment and Good Environmental Status,* 2012.

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

Lake District National Park Authority. *The Partnership's Plan 2020-2025.* 2020.

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

Natural England, *National Character Area Profile: 7 West Cumbria Coastal Plain,* 2014.

News & Star. *Council to open up discussions on underground nuclear waste repository, though 'not in the Lake District'.* July 2020.

Ofcom. *Connected Nations 2018. Wales Report.* December 2018.

Office for Budget Responsibility (OBR). *Coronavirus Scenarios.* 2020.

Oil and Gas Authority, UK National Data Repository - ***https://ndr.ogauthority.co.uk/.***

ONS. *Lower layer Super Output Area population estimates,* 2019.

ONS. *Business Counts.*

Oxford Economics. *The Economic Impact of Sellafield.* June 2017.

Radiation Free Lakeland. *No Geological Nuclear Dump Under the Irish Sea, Cumbria or Anywhere.* 2021.

RWM, Initial Evaluation Report: Copeland Area together with the adjacent inshore area. 2020.

RWM, Initial Evaluation Report: South Copeland Area together with the adjacent inshore area. 2020.

RWM, Initial Evaluation Report: Inshore area near to the Low Level Waste Repository 2020.

RWM. *National Geological Screening Guidance.* 2016.

RWM. *National Geological Screening – Northern England – Regional Geology.* 2018.

RWM. *National Geological Screening – Northern England Sub-regions 3, 4 and 5.* 2018.

RWM, *Site Evaluation – How we will evaluate sites in England – A Public Consultation, Version E1,* December 2018.

Resolution Foundation. *Ageing, Fast and Slow.* 2019.

Rock Solid. *Lakes Against Nuclear Dump.* 2021.

Sellafield Ltd. West Cumbria: *Opportunities and Challenges 2019.* February 2019.

Strategic Nuclear and Energy Board. *The Sellafield Transformation and Programme and Project Partners Framework.* 2019.

The Guardian. *Cumbria rejects underground nuclear storage dump.* 30th January 2013.

The Guardian. *Mass protest planned over Lake District 'commercialisation'.* 14th January 2020.

Thinkbroadband. *Local Broadband Information.* September 2020.

Trading Economics *United Kingdom GDP From Agriculture.* September 2020.

UK Trade Policy Observatory, *"Which Manufacturing Sectors are Most Vulnerable to Brexit?"*. 2018.

West Cumbria Mining. *Planning Application Update.* May 2020.

West Cumbria Mining. *How will waste be treated?* 2020.

Whole Life Consultants Ltd. *Construction skills gap analysis for the Cumbria LEP.* May 2018.

WSP. *West of M6 Strategic Connectivity Study: Options Appraisal Report.* 2016.

Mapping Data

Mapping Data

Dataset	Source
Geology	National Geological Screening Guidance – RWM 2016 National Geological Screening – Northern England – Regional Geology – RWM 2018 National Geological Screening – Northern England Sub-regions 3, 4 and 5 - RWM 2018 National Geological Screening: Northern England - Minerals and Waste Programme Commissioned Report CR/17/097 – BGS 2018 British Geological Survey - Managing Radioactive Waste Safely: Initial Geological Unsuitability Screening of West Cumbria Commissioned Report CR/10/072 Contains British Geological Survey materials © UKRI [2021]
Inshore Area	Marine Management Organisation, December 2020
Environment & Heritage	Natural England Open Data, August 2019, © Natural England copyright
Boreholes	British Geological Survey GeoIndex Onshore - GeoIndex - British Geological Survey (bgs.ac.uk) (accessed 2021)
Hydrocarbon wells	Oil and Gas Authority, UK National Data Repository - https://ndr.ogauthority.co.uk/ (accessed 2021)
Unitary Authority Boundaries Ward Boundaries	OS Boundary Line Open Data (accessed 2021) Ordnance Survey data © Crown copyright and database right
Lake District National Park proposed extension	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. RWM. Site Evaluation – *How we will Evaluate Sites in England,* February 2020.

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

iv. Cumbria Strategic Economic Plan 2014-2024.

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

vi. Copeland Borough Council, Corporate Strategy 2016 – 2020.

vii. The Economic Impact of Sellafield, Oxford Economics, June 2017.

viii. Copeland Borough Council. Housing Strategy 2018-2023.

ix. British Geological Survey - Managing Radioactive Waste Safely: Initial Geological Unsuitability Screening of West Cumbria Commissioned Report CR/10/072.

x. The Final Report, West Cumbria Managing Radioactive Waste Safely Partnership, August 2012.

xi. Lake District National Park Authority, Pre-Submission Lake District Local Plan 2020-2035, April 2019.

xii. Copeland Borough Council, Strategic Flood Risk Assessment (SFRA), August 2007.

xiii. National Policy Statement for Geological Disposal Infrastructure (NPS) ***https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/814491/national-policy-statement-geological-disposal-infrastructure.pdf.***

xiv. Copeland Borough Council, Integrated Assessment of the Copeland Local Plan – Integrated Assessment Scoping Report – Consultation Draft, January 2018.

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