

Prepared for NFLA member authorities, March 2021

Cumbria, nuclear waste, a ‘Geological Disposal Facility’ and the proposed deep underground coal mine – an overview of the issues

i. Overview of Policy Briefing

This edition of the NFLA Radioactive Waste Policy has been developed for the NFLA Secretariat by the NFLA Policy Advisor to consider two separate, but potentially linked issues: – the beginnings of a new process for two local West Cumbrian Councils to consider if they might host a deep underground radioactive waste repository – usually referred to by the UK Government and the nuclear industry as a ‘geological disposal facility’; and the recent concern over the development of a deep underground coal mine also in West Cumbria, which is currently being considered by Cumbria County Council, and in a dramatic U-turn, has now been ‘called in’ by the UK Government. What are the issues of interest in this matter, and are the two proposed developments linked in any way?

1. Background and Recent History to a Deep Underground Radwaste Repository

On 30th January 2013, Cumbria County Council rejected the Government’s plans to undertake preliminary work on an underground radioactive waste dump in the County, (1) thus ending a process which had begun in 2008 with the publication of a White Paper - Managing Radioactive Waste Safely (MRWS) (2)

The County and its western district councils of Allerdale and Copeland were the only local authorities in the UK still involved in talks about potentially hosting a site that would ultimately become a ‘Geological Disposal Facility’. The West Cumbria Managing Radioactive Waste Safely Partnership was set up by the Councils “*to ensure that a wide range of community interests were involved in the discussions.*” The Partnership published its final report in August 2012. (3) The report was designed to help inform the three Councils’ decisions about whether to participate in the next stages of the siting process or not, but it did not make a final recommendation one way or another.

This was followed in July 2014 by the publication of another White Paper – Implementing Geological Disposal (4) which set out a renewed process for siting a Geological Disposal Facility including a national geological screening – led by Radioactive Waste Management Ltd. (RWM); establishing the policy framework for planning decisions in England; and developing a process of working with communities. The 2014 White Paper committed that the outputs from these three areas of work would be delivered before formal discussions begin between RWM and communities. (5)

The latest Geological Disposal Facility (GDF) siting process was launched in December 2018 with the publication of the government’s policy in England (6) (Wales January 2019 (7)) and the National Policy Statement (NPS) was designated in October 2019. (8) Another important milestone, according to RWM was approval by the Government of the next stage of the GDF

Programme Business Plan. (9) This should be read alongside the Annual Review 2019 – 20. (10) So, for over 2 years now, the UK Government has been calling on Local Authorities in England and Wales and other landowners to declare an interest in hosting a deep underground radioactive waste repository.

The Annual Review says during 2019-20 RWM entered into informal confidential discussions with a number of individuals and organisations across the country, to provide information and to explore whether a GDF may be consistent with the vision for their communities. The next stage is to move to Working Groups and a public declaration of interest in exploring the siting of a GDF without any commitment from that community.

Two Working Groups have now been formed in Cumbria - one in Copeland and one in Allerdale - to begin discussions about the potential for hosting a deep geological radioactive waste 'disposal' facility. (11)

There are three key differences compared to the last attempt to find a potential site in Cumbria. Firstly, the Lake District National Park will be excluded from the search area (but the Solway Coast Area of Outstanding Natural Beauty is not excluded); secondly, Cumbria County Council has lost its power of veto and thirdly, a substantial offshore area has been included – previously an area up to 5km from the shore was included, now the offshore area from 5km to 22km is included. (12)

As part of the process to identify a suitable site for a GDF within a willing community, RWM has undertaken initial discussions with four interested parties in Copeland and one in Allerdale. RWM carried out initial evaluations for each area proposed to determine if they have any potential to host a GDF. (13)

Eddie Martin, Leader of Cumbria County Council in January 2013 when it called a halt to the search in Cumbria said:

“The process appears to be designed to make it very simple to join, by allowing even individuals and landowners to express an interest, but very difficult to leave. The contrast between the openness and flexibility in joining, and the over-prescriptive and complex method of leaving is reminiscent of a timeshare scheme.”

The new process doesn't require an expression of interest from a local council. Even an individual can volunteer an entire borough – in fact anyone can volunteer anywhere. (14)

In July 2020, Copeland Council's Executive Cabinet voted to “open up discussions” on the possibility of building an underground nuclear waste repository in the borough. (15) In its statement the Council said that this decision does not presuppose support for a repository in West Cumbria. Instead, their engagement is intended to help understand more about the project and its implications, given that a number of expressions of interest have been received from other interested parties in the community.

In September 2020 RWM issued a report entitled “*A permanent Solution for higher activity radioactive waste*” which is described as setting out the challenge of delivering a Geological Disposal Facility (GDF). The report looks at the history, policy, and approach for delivering a GDF in the UK, in a single document “*as a reference point for stakeholders*”. (16)

The document makes great play of the “*huge opportunity for an area to transform its economic potential not just through the construction of a GDF, but also through the creation of hundreds of secure, highly skilled and paid jobs which will, in turn, depend on new social and educational facilities to support them. For the right community, in the right place, it could be truly transformational.*”

RWM Chief Executive, Karen Wheeler, says in the foreword:

“Without action now, we would be extending for decades the risks and costs of handling this waste above ground, and leaving future generations to deliver a permanent solution.”

In RWMs 2019-20 Annual Review the retiring Chief Executive, Bruce McKirdy said:

“It cannot be emphasised often enough: there is a pressing need to address our nuclear past, and we believe we are the generation who should take responsibility for this legacy.” (17)

But there is very little mention of the proposed nuclear future. It's worth noting, for instance, that in order to ensure that the performance of the bentonite buffer material to be placed around canisters in the GDF is not damaged by excessive temperatures, it will require spent fuel from an EPR – the reactor-type being built at Hinkley Point C and proposed for Sizewell C - to be cooled for around 140 years. (This number was revised upwards by 40 years following a correction to a thermal model used to estimate the cooling time required for spent fuel.) Given that EPR reactors are expected to have a life of 60 years, it will be 200 years before some of the spent fuel from new reactors can be disposed of in a GDF. (18)

RWM's literature focuses on the volume of nuclear waste, rather than its radioactivity, declaring, for instance that: *“even if all nuclear activities were to stop tomorrow, about 90% of this volume [with all new build stations coming to fruition] would still exist.”* But it is radioactivity which is important for determining the heat output of the waste and the amount of space taken up in the GDF – the repository footprint. According to Radioactive Waste Management Ltd, the radioactivity from existing waste (i.e. not including new reactors) is expected to be 4,770,000 Terabecquerels (TBq) in the year 2200. The radioactivity of the spent fuel alone (not including other types of waste) generated by a 16GW programme of new reactors is expected to be around 19,000,000TBq. The amount of radioactivity in the spent fuel from Hinkley Point C in the year 2200 would be 3,800,000TBq – or about 80% of the radioactivity in existing waste. (19)

RWM says for planning purposes, it is assuming that a GDF will be available to receive its first waste in the 2040s. (20) Then it will take around 90 years to emplace all existing waste before we can entertain the idea of beginning to emplace any spent fuel from new reactors. So, the idea that, in the words of the brochure, that: *“The sooner we make progress, the sooner we can remove this environmental burden from our society and future generations”* is absurd. As Professor Andy Blowers put is:

“Given the timescales involved there is no need to hurry towards a disposal solution that may, in terms of proving a concept and finding a site, be difficult to implement. Society can, and should, take its time in dealing with its nuclear legacy. Meanwhile the focus should be on managing it where it is rather than a premature search for new places and possibly new communities for deep disposal. The problem we already have is difficult enough and will only be compounded if new reactors are built extending the timescales for implementation for very long, unknowable periods in the future.” (21)

It also needs to be noted that a major process of local government reorganisation is taking place in Cumbria. This potentially may see the abolition of Cumbria County Council and its replacement with at least two unitary councils covering the country area. This matter is of real interest in this process given the County Council's ongoing scepticism of developing such a repository, as well as what the successor councils will do. It also has an impact on the separate decision-making for the Cumbrian coal mine development noted below, which is currently being run by the County Council as the planning authority.

2. Working Groups

According to the website established for the Copeland Working Group: “*Establishing a Working Group is just the starting point for engaging with the community in a process that will take several years. It does not presuppose support for any potential site; it’s about starting work to see if there are any areas that would be worth investigating further. If there are, any decisions made will be subject to community support.*” (22)

Similarly, the Allerdale Working Group website says: “*No potential site has been chosen and this first step is about engaging with people across the community and beginning to understand their views. It’s about looking to identify both a Search Area for further consideration and the initial membership for a larger Community Partnership that could take the discussion further with RWM. If a potentially suitable site were to be identified by a Community Partnership in due course, then the community around that site will get to choose if they want to host a GDF.*” (23)

3. Copeland Working Group

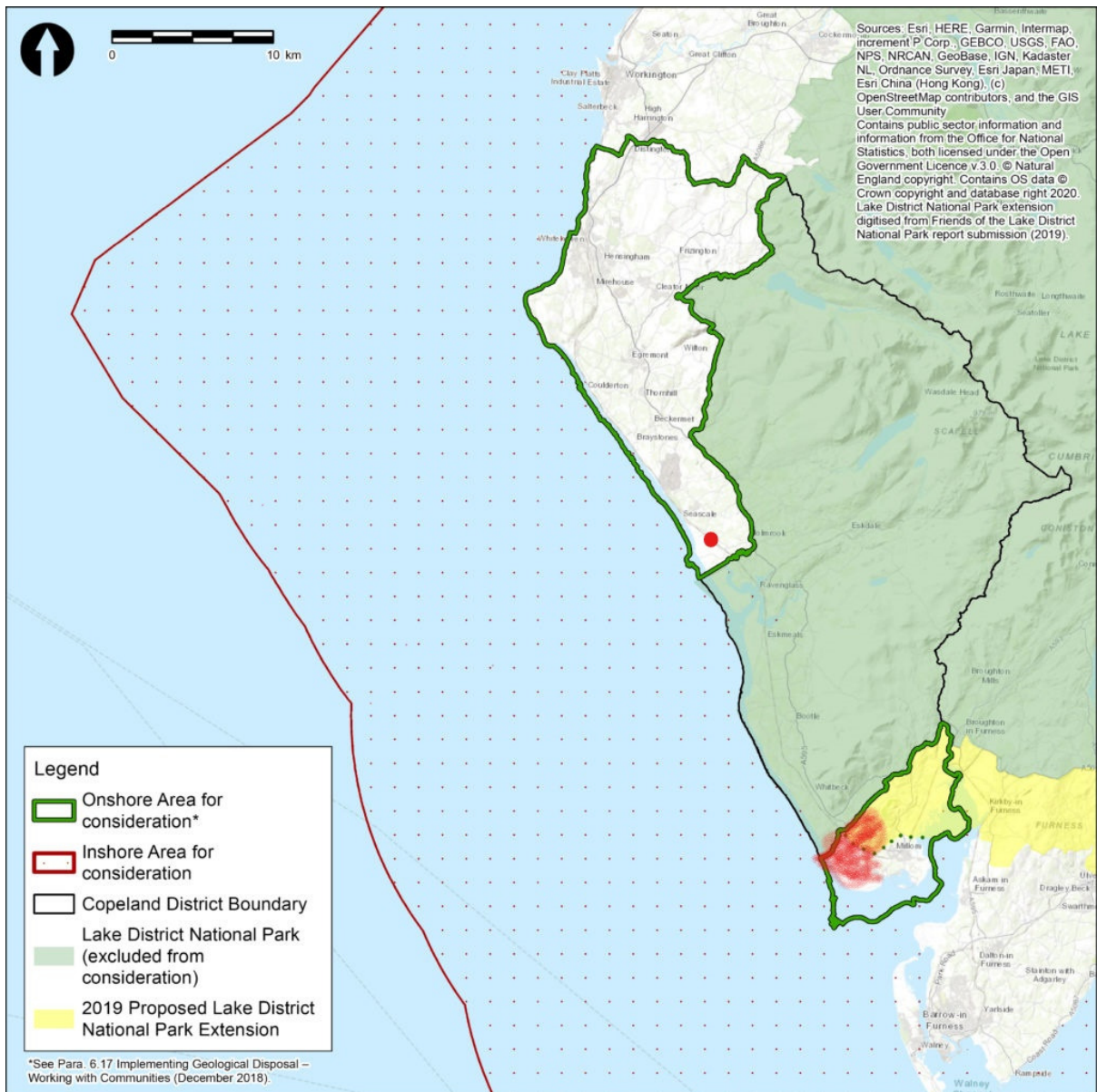
Mark Cullinan, former Chief Executive of Lancaster City Council, has been appointed as the independent Chair of the Copeland GDF Working Group. Other members of the Working Group include representatives from the three interested parties, RWM and Copeland Borough Council. Other groups and bodies could be invited to join, including representatives from the Cumbria Association of Local Councils (CALC).

The geographical area to be discussed will initially cover the whole of Copeland borough, but would exclude the Lake District National Park at the request of Copeland Borough Council and the three interested parties. The potential for underground facilities off the coast, accessed from land, will also be considered.

As part of the process to identify a suitable site for a GDF within a willing community, RWM has undertaken initial discussions with four interested parties, which each proposed an area of interest in Copeland. RWM carried out initial evaluations for each area proposed to determine if they have any potential to host a GDF. These are available below:

1. Inshore area near to the Low-Level Waste Repository.
<https://copeland.workinginpartnership.org.uk/wp-content/uploads/2020/10/Inshore-Area-IER-Report.pdf>
2. Ghyll Scaur Quarry and associated coastal plain together with the adjacent inshore area. <https://copeland.workinginpartnership.org.uk/wp-content/uploads/2020/10/Ghyll-Scaur-Quarry-IER-Report.pdf> \
3. Copeland Area together with the adjacent inshore area. (for Copeland Borough Council) <https://copeland.workinginpartnership.org.uk/wp-content/uploads/2020/10/Copeland-Area-IER-Report.pdf>
4. Copeland Area together with the adjacent inshore area (for a private company) <https://copeland.workinginpartnership.org.uk/wp-content/uploads/2020/10/Copeland-Area-Private-IER-Report.pdf>

RWM has concluded there may be potential to host a GDF in all of the proposed areas of interest. Therefore, both RWM and all interested parties have agreed to open discussion more widely in the community and formed the Copeland Working Group. The Copeland Working Group will initially consider the whole of the Borough of Copeland and adjacent inshore area up to 22km from the coastline, with the exclusion of the area within the boundary of the Lake District National Park and any future extension. (The Isle of Man is about 55km away and Northern Ireland 140km). In time, the Working Group will propose an area for further investigation. (24)



For reference: Woodhouse Colliery, the proposed coal mine, would be situated on the former Marchon Industrial site near Whitehaven, at the northern end of Copeland.

RWM says there are several clay-rich rock layers occurring within the depth range of interest in the Copeland Area and the adjacent inshore area off the coast. In addition, some of these clay-rocks contain a series of evaporite units containing rock salt (halite) layers. It is possible that these rock salt layers may be thick enough to host a GDF where the clay-rich rocks thicken and deepen off the coast to the south. High Strength Rocks, such as slates and granites, which are potentially suitable as host rocks for a GDF, are also present in the Copeland Area. Thus, all three of the main rock types that are potentially suitable for hosting a GDF can be found in the Copeland Area.

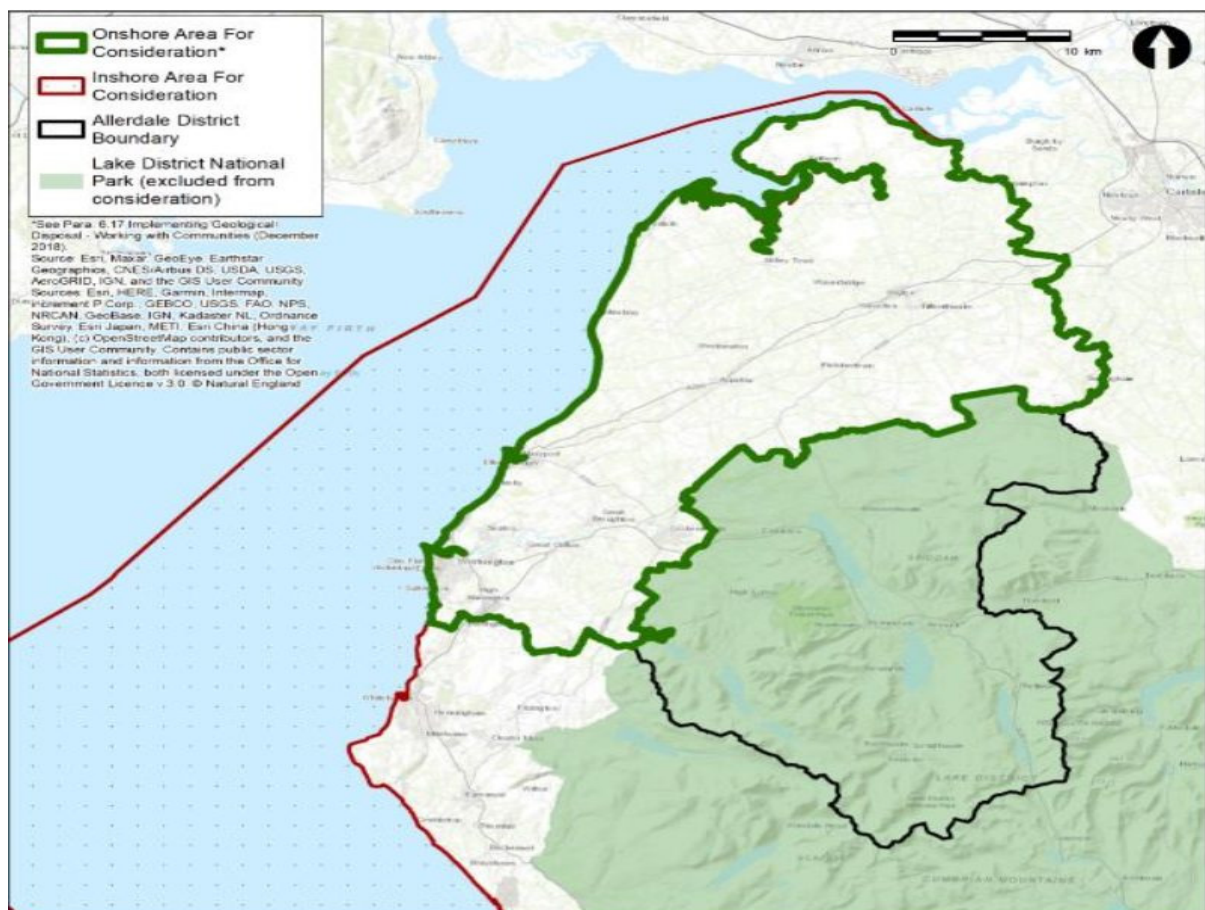
One of the interested parties involved was Irton Hall Ltd, which is keen to understand the potential for inshore development, extending below the seabed, accessed from the coastal strip near the area of the Low-Level Waste Repository site in Drigg (red dot on the map). Steve Cotterill, owner of Irton Hall Ltd said *“Our idea was the entry point to get the waste into the GDF as close as possible to Sellafield and we should look at the potential for the construction of the GDF itself, to be away from the coast and in rocks beneath the seabed.”* (25)

Apart from Copeland Borough Council, the other interested parties include GenR8 North Ltd which had general interest in seeing the GDF programme given proper consideration in West Cumbria as part of future infrastructure developments in the area. In addition, Dave Faulkner (Copeland resident and ex-Sellafield manager) suggested the area around a quarry near Millom. The wider area down to the coastal plain towards Haverigg was also considered (area roughly shaded red on the map). RWM said: “Again it led us very much to look at the geology of the inshore area in that big wide 20 kilometre corridor off the coastline, accessed again from land.” (26)

4. Allerdale Working Group

Jocelyn Manners-Armstrong, former Deputy Chair of the Yorkshire Dales National Park Authority, has been appointed as the independent Chair of the Allerdale GDF Working Group. Other members of the working group include Andy Ross, Director of GenR8 North Ltd, a Cumbrian based company, who specialise in land development and regeneration. This is the ‘interested party’ that came forward to RWM a year ago with a proposal to consider whether or not Allerdale had the potential to host a GDF. It doesn’t have a specific site in mind. RWM and Allerdale Borough Council are also represented on the group.

As part of the process to identify a suitable site for a Geological Disposal Facility (GDF) within a willing host community, RWM has undertaken some initial work to understand whether the land identified has any potential to host a GDF. The evaluation of has been based on the six ‘siting factors’ of Safety and Security, Community, Environment, Engineering Feasibility, Transport and Value for Money. Based on a review of readily available information relevant to each of the six siting factors, initial findings indicate that the Allerdale Area has the potential to host a GDF. As with Copeland RWM says all three of the main rock types that are potentially suitable for hosting a GDF can be found in the Allerdale Area. (27)

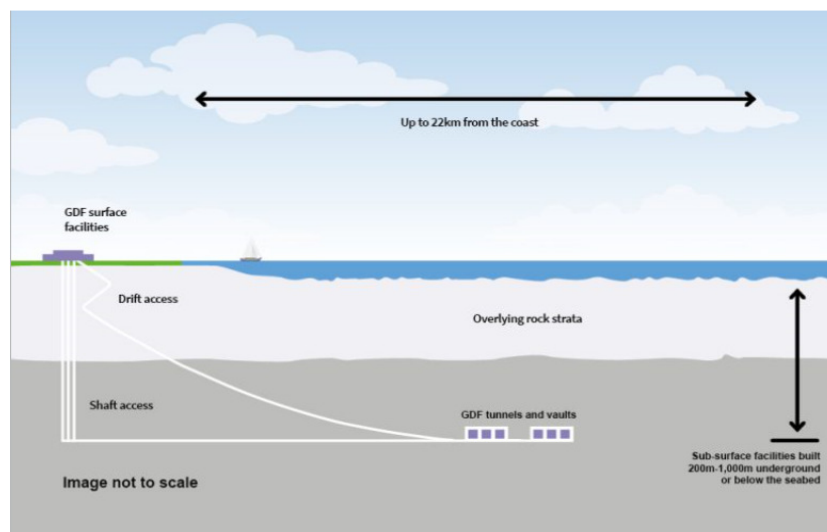


5. A GDF under the seabed?

RWM says if Working Groups ask it to look the under-seabed option: “we’re very willing to explore any areas that are identified, either close to the coast or extending up to the 22km outer limit of UK territorial waters. RWM is in the process of examining all the previous research relating to disposal under the seabed, and has commissioned further studies to understand in greater detail how to proceed with geological investigations, together with the design and construction of sub-seabed facility – if this is what we’re asked to explore.” (28)

RWM says exploring the suitability of rocks deep below the seabed off our coast has been a consideration for many years, and it is actively involved in research that would inform future decision-making if a sub-seabed location becomes of interest for a community.

Both the Allerdale and Copeland Working Groups will be looking at the potential for development of the underground facilities of a GDF off the coast, accessed from land, as well as sites under the land. A recent paper by Hipkins, Haszeldine, and McDermott, looks at assessment methodology to compare three different hydrogeological settings, including the original site of the proposed Rock Characterisation Facility at Sellafield and a site offshore in the East Irish Sea Basin. (29) Modelling of the Sellafield site shows that the pattern of regional groundwater behaviour matches previous model simulations. The mountains of the Lake District drive groundwater westwards. But the flow is blocked by the offshore dense ‘Irish Sea Brine’ regime forcing groundwater to flow upwards in the vicinity of the repository. This pattern of regional flow causes short and undesirable groundwater pathways, which progress directly to the surface.



In contrast environmental conditions in the East Irish Sea Basin create long groundwater pathways from the repository, which progress deeper into the earth rather than shallower. These characteristics are advantageous from a performance perspective as they allow more time for radionuclide decay. Such a site is seen as 4 times more advantageous for long-term waste containment and isolation than Sellafield.

However, the paper also emphasises the uncertainty inherent in this research: uncertainties in natural barrier performance; and uncertainties that arises from the modelling method. Uncertainty in natural barrier performance arises from uncertainty about the occurrence of future events such as earthquakes, glacial events and human intrusion. Then there is uncertainty which results from incomplete knowledge about the physical properties of a system such as the location or occurrence of a fault or permeability.

At various public meetings in Cumbria in the early 2010s, Professor Stuart Haszeldine of Edinburgh University, and Emeritus Prof David Smythe of Glasgow University, explained that more than enough information already existed to make a decision to exclude possible sites in Allerdale and Copeland. (30) So, despite the emphasis on the uncertainties, this research could push those looking for a suitable site for a GDF towards under the seabed off the coast of Cumbria.

Going offshore is likely to make retrieving packages once emplaced more difficult. Leaks from the repository downwards, and through faults, during the construction and emplacement phase, and later on by the outward leaks from the repository, once filled would all remain a concern.

As will be seen below in the discussion about the proposed coal mine, the likely disturbance of radioactively contaminated seabed sediments would also be a serious concern should construction of an under seabed GDF go-ahead.

6. West Cumbrian Coal Mine

West Cumbria Mining laid out plans to invest £14.7 million in finding high quality coking coal, which is exclusively used in steel production, in 2014. After finding and testing the coal under the seabed near Whitehaven the company developed £165 million proposals to extract 2.78 million tonnes of coking coal a year from Woodhouse Colliery. It would be the first new mine of its kind in the UK since 1987. The last operating deep coal mine, Kellingley Colliery in North Yorkshire, closed in 2016.

Cumbria County Council unanimously voted in favour of the plans in March 2019 citing "*the desperate need for jobs, particularly in deprived wards close to the proposed new mine*". This was despite objections from nearly 2,500 locals and campaigners. Green campaigners announced that they would launch a legal challenge.

Then in October 2020, Cumbria County Council approved, for the second time, the application by West Cumbria Mining. This time 12 councillors voted in favour of accepting the application, 3 were against and 2 abstained. One of the Councillors who voted in favour of the application said: "*I wasn't elected to do global issues. I was elected to do Cumbria issues*". Scientists and activists slammed the proposals, which they said jeopardised urgent UK efforts to reach net-zero greenhouse gas emissions by 2050. (31)

In an attempt to lessen the climate impacts of the mine, planners shortened its lifespan, saying that it must cease operations on 31st December 2049, the minute before the UK is legally obliged to reach its net zero emissions pledge. ***This is a blatant misreading of the Climate Change Act.***

Since the GDF would not start receiving waste until the 2040s, the two underground facilities would be unlikely to be operating at the same time for very long, if at all.

As part of the planning process, the decision went to the Secretary of State for Housing, Communities and Local Government, Robert Jenrick, to decide whether he would call for an inquiry. He confirmed in January 2021 that he would not call in the application. (32)

Following a letter sent to the Council by Lord Deben, Chair of the Committee on Climate Change on the matter, the Cumbrian council has put the plans on pause while they are "reconsidered" in reference to impacts on climate change. (33)

After a long chorus of criticism both nationally and internationally on the UK Government's inaction with this issue, it reversed its January decision by deciding to 'call in' the development

on the 11th March 2021. NFLA welcomes this decision and hopes the government will consider it carefully and in reference to some of the issues raised in this briefing. It will send a copy of this report to the Communities and Local Government Minister.

Clearly, this will be a massive issue for those concerned about the implications for carbon dioxide emissions and the UK Government's target of achieving net zero emissions by 2050. For more information on these specific issues NFLA recommends the following articles: Rebecca Willis's Website Blog of 10th October 2020: <https://www.rebeccawillis.co.uk/lessons-from-the-coalface-what-the-cumbria-coal-mine-story-tells-us-about-uk-climate-strategy/>
The Green Alliance Briefing: "The Case Against New Coal Mines": https://www.green-alliance.org.uk/resources/The_case_against_new_coal_mines_in_the_UK.pdf

For the NFLA, our focus here is on the nuclear implications of the proposed mine.

The proposal raises two issues. Firstly, anecdotal evidence from Cumbria suggests that nuclear dump supporters expect the construction of the coal mine to be extremely helpful for their campaign to promote a GDF for the area. At the very least the proposed mine could provide useful information about the geology of rocks underneath the Irish Sea. The mine could function as a 'Rock Characterisation Facility' to help build a case for an eventual GDF in the same area. It may even be feasible to use some shafts and tunnels to be used as access tunnels for nuclear waste disposal once coal extraction has ended. RWM claims that the coal mine would not meet the stringent requirements of the nuclear regulators for the actual emplacement of nuclear waste. (34)

For example, Marianne Birkby of Radiation Free Lakeland says if the Council gives the go-ahead to the coal mine "... they are embedding the means to deliver a Geological Disposal Facility (GDF) in Cumbria as well as the first coal mine in the UK in 30 years."

Birkby also expresses concern about the "...intimate relationship between WCM and the quango tasked with delivering a controversial Geological Disposal Facility ..." (35)

Mark Kirkbride - the Chief Executive Officer of West Cumbria Mining (WCM) Ltd since 2014 was appointed to the Committee on Radioactive Waste Management (CoRWM) in November 2019. CoRWM advises the Government on the long-term management of higher activity radioactive wastes. CoRWM say they see no conflict of interest in this appointment. However, NFLA notes that Mark Kirkbride is now Chair of a Sub-Group within the CoRWM which provides: "*Scrutiny of and advice to BEIS and RWM on technical site evaluation criteria and plans for site investigation and characterisation.*" (36)

Additionally, Steve Reece, Head of Site Evaluation at Radioactive Waste Management was previously Operations Director at West Cumbria Mining until June 2018. (37)

The second issue raised by the mine is possible seabed morphological changes and marine pollution implications of the sub-sea coal mining. WCM has identified a sub-sea area of the Irish Sea lying at least 8kms to the west of St Bees Head and extending offshore and southwards to within about 8km of the Sellafield site where it intends to extract approximately 3 million tonnes of coal per year until 2049. This extraction rate will eventually generate a huge subterranean void space. This raises the possibility of sea-bed subsidence in the area and the re-suspension of the heavily radioactively contaminated sea-bed sediments of the Cumbrian Mud Patch and surrounding sea-bed areas. This could generate elevated doses of anthropogenic radioactivity to coastal zone populations and sea users along both the Cumbrian coast and at "downstream" regions further afield.

Centuries of coal mining in parts of the region have left a legacy of surface collapse and instability. The area designated for the WCM workings appear to be poorly mapped so there may be a risk of running into, or close to, old workings of the West Cumbria coalfield which has a high density of faulting. Where new mining activity occurs close to old workings, the risk of subsidence and fault re-activation is increased.

Originally it was thought that soluble radionuclides discharged from Sellafield (such as caesium and tritium) would be diluted and dispersed whereas long lived, transuranic nuclides such as Plutonium, and Americium would leach out of the liquid phase and become preferentially adsorbed to the surface of sedimentary particles in the water column, sink to the seabed and remain permanently bound and immobilised in seabed deposits and therefore isolated from human populations and the environment. Unfortunately, it has since emerged that a proportion of such sediment associated radioactivity has, and is being actively transported around the Irish Sea while the remainder is temporarily “sequestered” in the seabed but subject to any future disturbance mechanisms such as storm, wave and seismic activity. In addition, a proportion of dissolved nuclides did not necessarily remain dissolved in liquid form in the water column, but could become incorporated into organic particles and deposited into sedimentary environments where they could be temporarily sequestered, but subsequently recycled back into the environment by dredging, trawling storm and seismic activity.

A recent report by Marine Consultant, Tim Deere-Jones concludes that:

“It is evident that any subsidence within the WCM designated seabed mining zone will generate some form and degree of seabed morphological distortion. It is equally evident that any such seabed distortion will remobilise previously sequestered seabed sediments, and their associated pollutants, which will subsequently be transported and re-distributed through the regional marine and coastal environments. It is inevitable that such re-mobilisation and re-distribution will expose marine wildlife and human coastal populations and stakeholders to some degree of exposure doses to those pollutants via a number of mechanisms and pathways.” (38)

A large proportion of the Sellafield-derived radionuclides disposed to sea have become associated with the sediment at two sites close to the waste disposal pipeline: the Irish Sea Mudpatch and the Esk Estuary. The Mudpatch is a belt of fine-grained sediments located ~10 km from the waste pipeline.

Daisy Ray and others highlight the fact that *“once mobilised, the radionuclides can be transported elsewhere in the Irish Sea ... Although waste discharges are continuing to decrease from the Sellafield site, the Mudpatch may continue to supply “historic” Sellafield-derived radionuclides to other locations. Indeed, recent data from Welsh and Scottish coastal areas suggest that the Mudpatch still acts as a source of radionuclides to UK coastal areas.” (39)*

7. Is there actually a need for Coking Coal?

Finally, it is worth noting that Lord Deben, Chair of the Climate Change Committee (CCC) has written to Robert Jenrick saying that:

“The decision to award planning permission to 2049 will commit the UK to emissions from coking coal, for which there may be no domestic use after 2035 ... Our recent Sixth Carbon Budget Advice [is that] Coking coal should only be used in steelmaking beyond 2035 if a very high proportion of the associated carbon emissions is captured and stored ... Coking coal use in steelmaking could be displaced completely by 2035, using a combination of hydrogen direct reduction and electric arc furnace technology ...” (40)

Andrew Warren, writing on the Business Green website, says the mine may soon “*turn out to be the biggest White Elephant in Cumbria since Sellafield.*” (41)

China's Ministry of Information and Technology is readying a five-year plan for all domestic steel mills — which together account for more than half of the world's steel production — to lower emissions by switching fuels to electric arc furnaces, and by recycling more scrap. The global production of zero emissions steel has already taken a massive step forward, with a world leading Swedish project completing the construction of a world-first fossil-free steel pilot plant in Luleå, Sweden. (42) Now it has been announced that H2 Green Steel will build a large-scale fossil-free steel plant in Northern Sweden to begin production in 2024. (43)

The steel industry across the globe is moving in the same direction. If it succeeds in truly greening its production processes, then the Cumbrian mine could become redundant way before 2049.

8. Summary and Conclusions

This NFLA Radioactive Waste Policy Briefing has sought to carefully consider the different issues around a deep-underground (potentially under-sea) radioactive waste repository and a deep underground coalmine, both of which are being mooted within west Cumbria. It has tried to see if there is a coincidence in their parallel development, whilst also considering some of the environmental, scientific, geological and technical issues that will have to be dealt with in regard to both of them.

Both developments have a political imperative behind them which is inevitably sensitive and controversial. It is now 57 years since the 1976 Flowers Report recommended the need to find solutions to the long-term management and storage of higher activity radioactive waste. This report also mentioned quite categorically that new nuclear power stations should not be developed until this issue was resolved. There have been various attempts to find a solution, but all have floundered for a complex range of reasons. RWM have said that other landowners and Councils outside of Cumbria are in active negotiation with them, but at present the debate has again come down to whether west Cumbria could be the location for a repository.

Within this debate comes the complication of a deep underground coal mine in the same general area of the county. This is also a controversial development, not just nationally but internationally, given the UK's zero carbon commitments and the plans for the COP26 climate change conference planned in Glasgow for later this year. Its proponents argue it is needed for the steel industry and will provide much-needed jobs. Its opponents see it as a backward step in the move towards a low carbon economy. NFLA hopes the decision by the UK Government to ‘call in’ the development will start the process of rejecting it for some of the reasons noted above in this briefing.

The core conclusions of this NFLA report are:

- Two Working Groups have now been formed in Cumbria - one in Copeland and one in Allerdale - to begin discussions about the potential for hosting a deep geological radioactive waste ‘disposal’ facility.
- A Geological Disposal Facility is not expected to be available to receive its first waste until the 2040s. It will then take around 90 years to emplace all existing waste before any spent fuel from new reactors can be emplaced. Given these timescales there is no need to hurry towards a disposal solution. The focus should be on managing existing waste where it is rather than a premature search for new places and possibly new communities for deep disposal.
- The problems the country already has with radioactive waste are difficult enough and will only be compounded if new reactors are built extending the timescales for

implementation for very long, unknowable periods in the future. In the year 2200 spent fuel from Hinkley Point C alone will contain about 80% of the radioactivity contained in waste that exists today.

- Both the Allerdale and Copeland Working Groups will be looking at the potential for development of the underground facilities of a GDF off the coast, accessed from land, as well as sites under the land. An offshore site could be as much as 22km off the coast.
- Going offshore is likely to make retrieving packages once emplaced more difficult. Leaks from the repository downwards, and through faults, during the construction and emplacement phase, and potentially later on by the outward leaks from the repository, once filled would all remain a potential concern. Centuries of coal mining in parts of the region have left a legacy of surface collapse and instability. Old mine workings appears to be poorly mapped so there may be a risk of running into, or close to, old workings of the West Cumbria coalfield which has a high density of faulting. Where new mining activity occurs close to old workings, the risk of subsidence and fault re-activation is increased.
- Apart from climate considerations the connections between the proposed coal mine and the search for a nuclear dump site raise several concerns. Connections between West Cumbria Mining and both CoRWM and RWM will inevitably raise suspicions that the mine proposal is being used to speed up the search for a dump site in an anti-democratic fashion.
- Both the coal mine and a potential under seabed repository have the potential to remobilise anthropogenic radionuclides currently immobilised in seabed sediments.

NFLA plans to share this report to its members, the LGA Nuclear Legacy Advisory Forum and the COSLA Scottish Councils Committee on Radioactive Substances, the UK and devolved governments in Scotland, Wales and Northern Ireland, as well as the Republic of Ireland and Isle of Man Governments. It will actively engage through the RWM Exchange group, of which the NFLA Secretariat is a member of, and it is also speaking with NGOs in the UK and Ireland over future engagement and discussion on these issues.

9. References

- (1) Guardian 30th Jan 2013 <https://www.theguardian.com/environment/2013/jan/30/cumbria-rejects-underground-nuclear-storage>
- (2) Managing Radioactive Waste Safely, DEFRA etc. June 2008
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/228903/7386.pdf
- (3) The Final Report of the West Cumbria Managing Radioactive Waste Safely Partnership, August 2012 [http://councilportal.cumbria.gov.uk/documents/s17780/7%20-%20Appendix%201%20-Executive Summary of the West Cumbria MRWS Partnerships Final Report August 2012.pdf](http://councilportal.cumbria.gov.uk/documents/s17780/7%20-%20Appendix%201%20-Executive%20Summary%20of%20the%20West%20Cumbria%20MRWS%20Partnerships%20Final%20Report%20August%202012.pdf)
- (4) Implementing Geological Disposal, DECC July 2014
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/332890/GDF_White_Paper_FINAL.pdf
- (5) See Implementing Geological Disposal BEIS December 2018 pp35-38
[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/766643/Implementing Geological Disposal - Working with Communities.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/766643/Implementing_Geological_Disposal_-_Working_with_Communities.pdf)
- (6) Implementing Geological Disposal BEIS December 2018
[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/766643/Implementing Geological Disposal - Working with Communities.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/766643/Implementing_Geological_Disposal_-_Working_with_Communities.pdf)
- (7) <https://gov.wales/sites/default/files/publications/2019-04/geological-disposal-of-higher-activity-radioactive-waste-guidance-for-communities.pdf>
- (8) National Policy Statement for Geological Disposal Infrastructure, BEIS 17th October 2019
<https://www.gov.uk/government/publications/national-policy-statement-for-geological-disposal-infrastructure>

- (9) RWM Business Plan 2020 – 23
[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/916521/RWM Business Plan 2020 23 Annex.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/916521/RWM_Business_Plan_2020_23_Annex.pdf)
- (10) RWM 10th Sept 2020
[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/916520/RWM Annual Review 2019 20 English.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/916520/RWM_Annual_Review_2019_20_English.pdf)
- (11) RWM 14th Jan 2021 <https://www.gov.uk/government/news/rwm-welcomes-launch-of-second-gdf-working-group>
- (12) Cumbria Trust 10th Nov 2020 <https://cumbriatrust.wordpress.com/2020/11/10/copeland-takes-the-first-step-towards-burying-nuclear-waste/>
- (13) See <https://copeland.workinginpartnership.org.uk/working-group-area/> and <https://allerdale.workinginpartnership.org.uk/working-group-area/>
- (14) Cumbria Trust 30th Jan 2021 <https://cumbriatrust.wordpress.com/2021/01/30/eddie-martin-cumbria-county-council-no-gdf-8th-anniversary/>
- (15) Whitehaven News 23rd July 2020
<https://www.whitehavennews.co.uk/news/18597671.council-opendiscussions-underground-nuclear-waste-repository-though-not-lake-district/>
- (16) Radioactive Waste Management 10th Sept 2020
[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/916070/A Permanent Solution for Higher - Activity Radioactive Waste.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/916070/A_Permanent_Solution_for_Higher_Activity_Radioactive_Waste.pdf)
- (17) RWM Annual Review 2019-20 p13.
[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/932253/RWM Annual Review 2019 20 English.pdf_safe.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/932253/RWM_Annual_Review_2019_20_English.pdf_safe.pdf)
- (18) Generic Design Assessment: Summary of Disposability Assessment for Wastes and Spent Fuel arising from Operation of the UK EPR, NDA, January 2014 see page 6.
<https://rwm.nda.gov.uk/publication/tn-17548-generic-design-assessment-summary-of-disposability-assessment-for-wastes-and-spent-fuel-arising-from-operation-of-the-uk-epr/>
- (19) Geological Disposal: An overview of the differences between the 2013 Derived Inventory and the 2010 Derived Inventory, RWM Ltd July 2015
<https://rwm.nda.gov.uk/publication/differences-between2013-and-2010-derived-inventory/>
- (20) See <https://www.gov.uk/guidance/geological-disposal>
- (21) Blowers, A. The Legacy of Nuclear Power Earthscan 2017. P 249
- (22) See <https://copeland.workinginpartnership.org.uk/working-group-area/>
- (23) <https://allerdale.workinginpartnership.org.uk/working-group-area/>
- (24) See <https://copeland.workinginpartnership.org.uk/working-group-area/>
- (25) In Cumbria 10th Dec 2020 <https://www.in-cumbria.com/news/18933996.irtion-hall-discusspossible-copeland-nuclear-disposal-facility/>
- (26) Whitehaven News 2nd Dec 2020
<https://www.whitehavennews.co.uk/news/18912358.inshoreareas-explored-copeland-nuclear-waste-disposal/>
- (27) Initial Evaluation Report: Allerdale Area together with the adjacent inshore area, RWM 2020
[http://allerdale.workinginpartnership.org.uk/wp-content/uploads/2021/01/RWM Evaluation Report CUMCC ALLBC IER.pdf](http://allerdale.workinginpartnership.org.uk/wp-content/uploads/2021/01/RWM_Evaluation_Report_CUMCC_ALLBC_IER.pdf)
- (28) RWM 25th Feb 2021 <https://nda.blog.gov.uk/2021/02/25/a-gdf-in-rock-deep-below-the-seabed-yes-it-could-work/>
- (29) Hipkins, E.V., Haszeldine, R.S. and McDermott, C.I., 2020. Comparing the prospectivity of hydrogeological settings for deep radioactive waste disposal. Hydrogeology Journal, pp.1-17
<https://doi.org/10.1007/s10040-020-02182-2>
- (30) See for example Carlisle News and Star 23rd Nov 2012
<https://www.no2nuclearpower.org.uk/news/24-november-2012/>
- (31) Coal Action 2nd October 2020 <https://www.coalaction.org.uk/2020/10/02/cumbrian-councillors-go-against-climate-consensus-and-approve-coking-coal-mine/>
- (32) Edie 7th January 2021 <https://www.edie.net/news/11/Cumbria-coal-mine--Government-refuses-to-block-UK-s-first-deep-coal-mine-in-three-decades/>
- (33) Guardian 9th February 2021 <https://www.theguardian.com/environment/2021/feb/09/county-council-to-reconsider-cumbria-coal-mine-application>
- (34) Letter sent by RWM Siting and Engagement Director to the Whitehaven News, 10th March 2021 (a copy of which was sent to the NFLA Secretariat by RWM).
- (35) Ecologist 4th Aug 2020 <https://theecologist.org/2020/aug/04/coal-and-nuclear-cumbria?s=09>

- (36) See <https://www.gov.uk/government/organisations/committee-on-radioactive-waste-management/about/our-governance#corwm-subgroups>
- (37) See <https://www.linkedin.com/in/steve-reece-7b47713b/?originalSubdomain=uk>
- (38) Briefing Paper: Radiological Implications of Potential Seabed Subsidence Seismicity & “Fault Re-activation” Beneath the Cumbrian Mud Patch: induced by “mass removal”, rapid extraction & void space creation, Tim Deere-Jones, Keep Cumbrian Coal in the Hole, June 2020 <https://keepcumbriancoalinthehole.wordpress.com/2020/06/11/briefing-paper-radiological-implications-of-potential-seabed-subsidence-seismicity-fault-re-activation-beneath-the-cumbrian-mud-patch-induced-by-mass-removal/>
- (39) Ray, Daisy and Leary, Peter and Livens, Francis and Gray, Neil and Morris, Katherine and Law, Kathleen A. and Fuller, Adam J. and Abrahamsen-Mills, Liam and Howe, John and Tierney, Kieran and Muir, Graham and Law, Gareth T.W. (2020) Controls on anthropogenic radionuclide distribution in the Sellafield-impacted Eastern Irish Sea. Science of the Total Environment, 743 <https://strathprints.strath.ac.uk/73556/>
- (40) CCC Letter to Robert Jenrick, 29th January 2021 <https://www.theccc.org.uk/publication/letter-deep-coal-mining-in-the-uk/>
- (41) Business Green 25th Feb 2021 <https://www.businessgreen.com/opinion/4027666/steel-industry-soon-little-cumbrian-coal>
- (42) Renew Economy 1st Sept 2020 <https://reneweconomy.com.au/world-first-fossil-free-steel-manufacturing-plant-completed-in-sweden-36577/amp/>
- (43) H2 Green Steel to build large scale fossil-free steel plant in Northern Sweden, Fuel Cell Works, 23rd Feb 2021 <https://fuelcellworks.com/news/h2-green-steel-to-build-large-scale-fossil-free-steel-plant-in-northern-sweden/>