

THE GEOLOGICAL SOCIETY OF LONDON

RESPONSE TO DECC CONSULTATION: REVIEW OF THE SITING PROCESS FOR A GEOLOGICAL DISPOSAL FACILITY

The Geological Society is the UK's learned and professional body for geoscience, with more than 11,000 Fellows (members) worldwide. The Fellowship encompasses those working in industry, academia and government with a broad range of perspectives on policy-relevant science, and the Society is a leading communicator of this science to government bodies, those in education, and non-technical audiences.

The changes to the siting process for a Geological Disposal Facility (GDF) proposed in the consultation document represent a significant step forward. We are pleased to see that lessons have been learned from the experience of attempting to implement the previous siting process, including points raised by the Geological Society, both in response to the May 2013 Call for Evidence and at earlier stages, regarding the use and communication of geoscience in the process. We continue to support the fundamental principles of the Managing Radioactive Waste Safely (MRWS) programme – that geological disposal should be the endpoint of management of the UK's higher activity radioactive waste, and that this should be achieved through a process of community voluntarism and partnership. We welcome the enhanced role for geoscience communication early in the process, which we believe is essential to building public understanding and confidence, and to successful implementation of a volunteer-led process.

A number of aspects of the proposed siting process are vague or insufficiently detailed. Much greater clarity is required regarding these aspects. Those relating to the initial public engagement and awareness-raising period must be more clearly stated when the new siting process is announced, otherwise there is considerable risk of its being derailed at the outset. Success in early stages of the process will also depend on communities understanding clearly and having confidence in what is planned for later stages.

Key points in this response are:

- Plans to provide geological information during the initial public awareness and engagement programme must be set out more clearly and in greater detail if the process is not to stall at an early stage. A mechanism should be established to address rapidly questions which are likely immediately to arise regarding this information from any community interested in engaging with the process.
- Geological information provided at this stage should address the functions of the geosphere in the multi-barrier model on which operation and long-term

performance of a GDF will depend, and how these functions might be provided by different geological settings. It is also important to raise awareness of why a GDF for the UK's radioactive waste is required in the first place.

- The proposed advocacy role of the Radioactive Waste Management Directorate (RWMD) of the Nuclear Decommissioning Authority (NDA) is welcome, but should be given greater substance and clarity in setting out the new siting process, not least to avoid real or perceived conflicts of interest.
- We do not believe a new body is required to oversee peer review or provision of scientific and technical advice in the siting process. We set out some observations and recommendations regarding how existing structures might best be used.
- Greater clarity is required regarding the preparation and use of local geological reports to be carried out by the British Geological Survey (BGS) during the 'learning phase'.

1. Do you agree that a test of public support should be taken before the representative authority loses the Right of Withdrawal? If so, what do you think would be the most appropriate means of testing public support, and when should it take place? If you do not agree with the need for such a test, please explain why.

- 1.1 We are not best placed to advise on the nature and timing of a test of public support. However, we note that deliberative models for testing public opinion (such as citizens' panels) provide greater opportunities than a referendum for members of the community to engage with those who have relevant specialist knowledge and experience. The outcome of such exercises is more likely to be informed and considered as a result.

2. Do you agree with the proposed amendments to decision making within the MRWS siting process? If not, how would you modify the proposed phased approach, or, alternatively, what different approach would you propose? Please explain your reasoning.

- 2.1 We welcome the proposal for an initial public engagement and awareness-raising period, and to provide relevant geological information at this stage in the process. However, this is not straightforward to achieve. The consultation document glosses over this matter. It is vital that in setting out the new siting process, Government explains in greater detail how this is to be done, and that it works with organisations that it wishes to engage in this work well in advance of any public announcement of policy. The Geological Society is holding a one-day

conference under the title 'Communicating Contested Geoscience: New Strategies for Public Engagement' on 20 June 2014, focusing on radioactive waste management, shale gas and carbon capture and storage (CCS). The discussions at that event are likely to be of value in informing strategies for geoscience communication, both at the start of the siting process and at later stages.

- 2.2 The consultation document glosses over the work required to put the 13 BGS Regional Guides into layman's terms and to provide simple 3D visualisations (paragraph 3.15). This is not a simple matter. It is implied that this job will be left entirely in BGS's hands. BGS has great relevant expertise and is the appropriate provider of source material for this exercise. They also have some experience and expertise in communication of that geology to non-specialists, but there is a wide range of relevant knowledge and research in geoscience communication which should also be brought to bear. This would also help to address any concerns which might be raised about the impartiality of information provided by BGS, given its close relationship with Government and its role later in the siting process. This is a crucial matter to get right, at the outset of the process, and it is an unnecessary risk to leave this entirely in the hands of one organisation. It is vital that others are involved
- 2.3 Providing summary information about regional geology during the initial public awareness and engagement period is likely quickly to give rise to demand for local information. Communities are also likely to want help interpreting the information, and to have the opportunity to discuss it. We recognise that it would not be possible to provide detailed local geological information across the whole country, but it is important to be prepared from the outset for inevitable questions and discussions, and to provide a mechanism for handling this, if the information is to be useful to communities. It is important also to consider the capacity of local communities and their representatives to absorb technical information provided to them, which will be limited both by financial constraints and by the likely lack of specialist knowledge of a wide range of fields among the individuals involved at a local level. Communities therefore need to be able to access funds to help them engage with specialists as appropriate throughout the process (including at this initial stage), and mechanisms for addressing their questions should be designed with a view to nurturing this engagement and developing communities' absorptive capacity as the process progresses.
- 2.4 Information should also be provided on the functions which the geosphere is expected to play in the multi-barrier GDF model, the kinds of geology that might be suitable for hosting a GDF, and how different geological settings could meet the geosphere service requirements. These geosphere functions should be

understood in relation to the functions of the engineered barriers, as the two are dependent on one another. Without this wider context, information about the regional (or even local) geology will be useless to communities. In other words, as well as being provided with information about GDFs and about the regional geology of the UK, potential communities should be informed about the relationship between the two. Communicating these matters effectively will also depend on continuing to build professional consensus and understanding of the processes and characteristics which are most important in demonstrating safety in various geological environments.

- 2.5 It is also important that public awareness-raising and engagement addresses the reasons that a GDF is a national need in the first place. Those closely involved in the process may overestimate levels of awareness among the general public about the existence of radioactive waste and the case for putting in place a long-term solution for its management. The reasons for a GDF being the preferred endpoint of that solution (as opposed to alternatives such as indefinite at or near the surface) should also be explained. This aspect of awareness-raising will be important not just to stimulate interest among potential host communities and to inform debate and decision-making in these communities, but also to improve the level of understanding among other communities which may be affected (and are likely to have a say) as the process moves forward. These include communities neighbouring that which might host a GDF, and those in areas through which waste may be transported.
- 2.6 We are pleased to see that hydrogeology and hydrogeochemistry are identified as top level factors in assessing geological suitability from an early stage in the process. The initial provision of geological information at the awareness-raising stage should outline the importance of these factors, along with other geosphere functions required for a GDF, even if it is not possible at that stage to describe the hydrogeology at a local level as part of the information provided on regional geology. For instance, it would be possible to say something about typical behaviours of water, gas and radionuclides in different geological settings, in general terms. Radionuclide retention in rock is too often glossed over, despite being a key function of the geosphere barrier.
- 2.7 Understanding geological uncertainty will be a key issue for successful implementation, and conveying this understanding at an appropriate level to non-specialists will be a significant challenge to effective communication about GDFs and the relevant geoscience. It is important to convey how geoscientists deal with uncertainty, and that uncertainty need not preclude effective and informed decision-making in moving through the early stages of the process.

2.8 The proposed initial public engagement and awareness-raising period is sensible, but this broad nationwide process will need to continue after the first year – in fact, throughout the process (which is not likely to be linear) – alongside more detailed work with any potential volunteer communities which have entered the process. It is evident from conversations with DECC and NDA that this is the intention, but it should be expressly stated.

2.9 Paragraphs 2.58-2.64 purport to set out the final steps in a decision to proceed with construction of a GDF, having identified the preferred site in a volunteer area. However, the consultation document does not say when, how or by whom a decision would be made between multiple communities and localities if more than one remains in the process at the end of the ‘focusing phase’. It is essential that these matters are made clear if potential volunteer communities are to have confidence in the process.

3. Do you agree with this approach to revising roles in the siting process set out in the White Paper? If not, what alternative approach would you propose and why?

3.1 In proposing the District Council (or equivalent) as the Representative Authority, the consultation document notes that a GDF would be situated in a comparatively small geographical area. This is true, but a suitable area might nonetheless cross political boundaries, which do not constrain the local geology. We note that if there is no provision for adjoining District Councils to act jointly in the process, some geologically suitable potential sites may be ruled out. However, we recognise that this may be a conscious choice, given the wish to simplify and clarify the status of the Representative Authority.

3.2 The more active awareness-raising role proposed for Government is welcome. The Geological Society also expects to play its part in aspects of this work, and is actively considering how it can best do so. The resources we have available for disseminating geological information and advice to support the MRWS programme are necessarily limited, and we cannot do this work alone. We would be pleased to discuss further how we can work with Government and others in this regard.

3.3 We welcome the proposed advocacy role for the NDA RWMD. However, the consultation document refers to it only in general terms, and at a national level. No detailed plans for engagement and awareness-raising are set out. The document gives the impression that NDA RWMD will be passive in this regard, and will wait to be approached by potential volunteer communities. Furthermore,

in discussions over recent months, DECC and NDA RWMD have indicated to us that they also expect to take on an advocacy role within the process at a local level, as it proceeds in potential host communities. This would be sensible, but in announcing the new siting process it should be made clear whether this is the case or not. Paragraph 2.73 is ambiguous, saying that NDA RWMD would be responsible for ‘taking forward the siting process’. This could be interpreted as neutral or advocacy-driven.

- 3.4 If NDA RWMD is to have an advocacy role at a local level, it is important that the powers and responsibilities of the Steering Group and its constituent members are more clearly identified, so that there is no scope for real or perceived conflict of interest in this regard.
- 3.5 Care should be taken also to avoid any real or perceived conflict of interest on the part of NDA RWMD in respect of its relationship with DECC. Government should unequivocally take responsibility for its proper role of managing policy-making processes, taking policy decisions and ensuring that implementation is consistent with policy. Our experience of the previous siting process was that in practice these functions were delegated in part to NDA. If it were to be perceived that this is happening in the new process, it could undermine public confidence both in Government policy and in NDA RWMD’s advocacy role.
- 3.6 Effective delivery of the proposed advocacy role for NDA RWMD will depend on significantly strengthening its geoscience (and geoscience communication) capacity. We welcome and support efforts currently underway to do this.
- 3.7 We agree that the regulators should have an enhanced role in public engagement. Construction of the safety case (depending in turn on understanding of the geology, engineering and other technical factors) will be an essential part of the underpinning of the decision-making process for siting, permitting and construction of a GDF. There is scope to communicate these aspects of the process to the public, in order to enhance understanding and build confidence – an approach which was not actively used in the old siting process. However, use of jargon and technical language familiar to regulators and other professionals will not be easily comprehensible to most members of the public and could be counterproductive. Communication with the public about regulation and its technical basis should be carefully considered, and should be informed by those with expertise in such communication.
- 3.8 The Geological Society participated in a meeting convened by the Royal Society to discuss the staging of technical input into the proposed siting process, and the options set out in the consultation document regarding peer review of technical

statements in the context of the siting process. We understand that a note of that meeting will be submitted in response to this consultation. The views of the Geological Society regarding peer review and related matters are outlined below.

- 3.9 The consultation document refers specifically to peer review of technical statements, but elsewhere in the document there are also references to wider requirements for scientific and technical advice to Government, potential host communities and other stakeholders. Discussions during the consultation period (including those at the Royal Society meeting and at the London stakeholder meeting) suggest that there is a risk of these needs being conflated. The various stakeholders in the process will have differing needs for technical advice and input, and these will vary over time. Peer review should typically be a dispassionate ‘arm’s length’ process, whereas it is likely that potential host communities will sometimes be looking for more interactive, informal engagement with individuals and institutions, building trust and confidence in their expertise over time.
- 3.10 As in the past, the Geological Society is willing (where it is competent and has the resources to do so) to identify appropriate individuals who might be invited in a personal capacity to peer review technical statements and work undertaken within the MRWS process. We would not ourselves undertake such review work. We expect to continue to comment from time-to-time on aspects of design and implementation of the process in which our Fellowship has expertise and experience, either in response to consultations or of our own volition. We also expect to play a part in communicating the relevant geoscience to the general public and to potential host communities, although what we can do will be limited by the resources available to do so.
- 3.11 We do not believe that there is any need to establish a new body to oversee peer review or provision of scientific and technical advice. CoRWM’s remit could be expanded to include a new role coordinating the identification of individuals to carry out peer review work, although we are unconvinced of the case for doing so because of its distance from the professional communities. It would not be capable of carrying out such peer review work itself, even with a changed membership, given the range of specialisms this will cover over time. (Such a role would in any case potentially be in conflict with its scrutiny function.) It is also unlikely to have sufficiently deep and broad expertise to identify suitable individuals to do review work in all cases. If it takes on a standing function in this regard, it would be advisable for CoRWM to work with other organisations such as the learned societies and national academies in carrying out any role in peer review within the process. Furthermore, it is important that all stakeholders, including representatives of potential host communities, retain the freedom to

seek advice directly from any source they wish, including the learned societies. As noted in paragraph 2.3 above, it is important that suitable funding is available to local communities to enable them to do this, and that mechanisms are developed to stimulate their effective engagement with specialists and allow them to grow their absorptive capacity for specialist information, judgment and advice.

- 3.12 There is a limited pool of individuals with in-depth geological expertise and experience relevant to radioactive waste management. Those who were directly involved in site investigation activities prior to 1997 are an aging and dwindling group (although there are of course a number of highly experienced people who have been closely involved in programmes overseas). It is vital that the professional and expert community who will provide technical inputs to the process – across academia, industry and government bodies – is replenished and strengthened. Sustained support will be needed across these sectors to help young professionals develop long-term careers in radioactive waste management and associated specialist disciplines.
- 3.13 Whichever organisations are asked for input, they are likely to depend on the same few key people. Some stakeholders, especially those critical of activity or decisions being undertaken within the siting process, may challenge the impartiality of experts acting in an individual capacity, irrespective of which organisations have helped to identify them. Experts with a history of involvement in the process, who often have the most relevant expertise and experience, are most likely to be subject to such challenge. Requests for peer review and other forms of technical advice on certain topics may be capable of being addressed by experts in relevant scientific specialisms with no previous involvement in radioactive waste management. More often, only those with direct experience (on which their technical expertise and professional judgment depends) will be capable of carrying out such work effectively. When approached in the past for advice about individuals who might undertake peer review work, the Geological Society has tried to identify a list of potential reviewers, including those with and without an extensive history of involvement in the process, recognising that it is not for us to make decisions about who should do the work. In doing so, we have set out our understanding of their expertise and experience, and of their suitability for the task.
- 3.14 We would be willing to discuss further any proposals to establish a standing group of peer reviewers to be built over time. This would not remove the need to identify individuals with appropriate expertise and experience case-by-case, and could be difficult to implement effectively. It is important to recognise the limited resources of organisations and individuals who might be called upon to play a

part in peer review and technical advice processes. If the level of activity in this area is to be increased, it must be adequately resourced.

- 3.15 Paragraph 1.56, setting out key messages from responses to the Call for Evidence, refers to 'proposals for the introduction of new independent bodies to ... peer review the process'. We have not seen the submitted evidence on which this comment is based, but the reference to peer reviewing the process is confusing. Our understanding is that *scrutiny* of the process itself continues to sit with CoRWM, and that paragraphs 2.84-2.85 refer to *peer review* of technical statements and work done (and, implicitly, provision of other forms of technical advice) within that process.

4. Do you agree with this proposed approach to assessing geological suitability as part of the MRWS siting process? If not, what alternative approach would you propose and why?

- 4.1 References to the local geological report to be prepared by BGS during the 'learning phase' are inconsistent and need clarification. At paragraph 3.11, the report is described as 'necessarily high level' but also 'detailed'. Paragraph 2.50 says that the preparation of the report would include application of current unsuitability criteria, and 'if necessary... new aerial geophysical investigations'. But paragraph 3.11 says that the report 'could include new aerial geophysical survey work, if appropriate'. The consultation document does not make clear the relevance of geophysical survey work (or investigations) and why it might be undertaken, rather than any other type of geoscientific investigation. Nor does it specify what would constitute its being either 'necessary' or 'appropriate', or on what grounds this judgment would be made, or who would make it.
- 4.2 The mention of the 'learning phase' report at paragraph 3.11 is introduced by saying that 'the UK Government would enable a rapid and transparent response to any community interested in learning more about the process', which would include the BGS local report. Experience in West Cumbria suggests that production and peer review of this report is unlikely to be quick. As noted above, it is important to consider how questions from interested communities arising from the generic geological (and other) information issued during the initial public engagement period can be effectively and rapidly addressed, before getting to the point of commissioning a BGS local report. There is likely to be a wish for local interpretation of the statements about regional geology, and for the opportunity for interaction and dialogue about geoscientific and other considerations. Rapid response on such questions is likely to continue to be required in the 'learning phase'. We would be happy to discuss further how this might be done.

- 4.3 Paragraph 2.51 refers to an assessment by members of the Steering Group as to whether there are 'reasonable prospects' of the area it represents being potentially suitable to host a GDF, to inform the decision as to whether to move from the 'learning phase' to the 'focusing phase'. This is a potentially valuable addition to the process. However, unless it is more clearly defined, the meaning of 'reasonable prospects', and the judgment as to whether this condition has been met, may be disputed among the Steering Group members and may come under challenge from other stakeholders, not least with regard to geology and geosphere functions. Prior to the decisions taken by the District and County Councils in January 2013, the West Cumbria MRWS Partnership sought reassurance on the prospects for identifying a geologically suitable site in the area. At a round-table discussion meeting organised by the Geological Society at their request, representatives of the Partnership recognised that these prospects were not possible to quantify. In the absence of any qualitative framework for making such an assessment, however, the (generally positive) views of individual experts about these prospects were difficult for the Partnership to put into perspective and were probably of limited value.
- 4.4 Paragraph 3.19 is confusingly written. It says that 'the geological assessment carried out by the BGS will provide sufficient information to make an early judgment on whether there are 'reasonable prospects' of any particular geological setting being suitable for a GDF', but also that 'extensive further investigations, during the 'focusing phase', would be required to assess this'. Such a definitive statement about the sufficiency of the BGS assessment for decision-making at that stage may be a hostage to fortune, especially in the absence of a clearer understanding of what would constitute 'reasonable prospects'. It would also be better to say that further work will be required during the 'focusing phase' to improve understanding of the suitability of potential geological settings, and to increase the level of confidence in whether a suitable site will be found.
- 4.5 We welcome the recognition at paragraph 3.20 that expert judgment, as well as the factual knowledge of experts, has an important role to play, particularly under conditions of uncertainty and incomplete information. This will continue to be the case throughout the process, not just in the 'learning phase'. It is important to be transparent about the sources and uses of expert judgment, and to address this matter during the initial public engagement period, to build public confidence and trust in the individuals and institutions involved. A robust and clearly described framework for assessing 'reasonable prospects' of a geologically suitable site to host a GDF being found, drawing on expert judgment, could add credibility to such an assessment and enhance community confidence in the outcome. The

success of this would also depend on clearly articulating the criteria by which such expert judgment would be made. The criteria would depend on the site, but could include dimensions of blocks of low permeability, gradient in hydraulic head, or whatever was appropriate to the type of geological setting. Appropriate criteria and guidelines could be set out at the beginning of the 'focusing' stage. It would be advantageous also to be able to demonstrate examples of geological settings that would not have 'reasonable prospects'. We would welcome the opportunity to discuss how such a framework might be developed.

4.6 The six high-level site selection criteria to be considered during the 'focusing phase' (paragraph 3.21) remain appropriate. Their application will raise the same challenges as were identified during the consultation on Stage 4 of the old siting process in 2011. As we noted then, geological suitability cannot be 'traded off' against other criteria – in fact, it informs and underpins them. The criteria are not independent of one another, and their application is not a 'zero-sum game'. A straightforward classical MCDA (Multi-Criteria Decision Analysis) treatment of these criteria would therefore be inappropriate. Our concern about this matter was set out in greater detail in our response to the 2011 consultation, and we would be pleased to discuss further how it might be addressed.

4.7 Paragraph 3.24 definitively states that surface-based investigations would 'provide sufficient information to identify a preferred site for further underground investigation'. There is every reason for optimism that this will be the case, and the siting process should be designed and implemented with a view to maximising the chances of such an outcome. But it would be better to be realistic about the favourable (but not certain) prospects of success in this regard, rather than give the impression that the outcome is predetermined.

5. Do you agree with this proposed approach to planning for a GDF? If not, what alternative approach would you propose and why?

5.1 We agree that the approach to planning permission for 'intrusive investigations' should be clarified. We note that there is some debate over whether 3D seismic investigations should be considered 'intrusive'. It would be helpful to set out in advance what types of investigation will be subject to planning permission. It would also be advisable wherever possible to proceed with any investigations, whether subject to planning permission or not, with the backing of local communities, to build and maintain public confidence and trust. The importance of winning and maintaining a 'social licence to operate' is well-established in the extractive industries, and this concept may also be useful in the context of radioactive waste management.

5.2 We are not best placed to comment on other aspects of the planning process.

6. Do you agree with this clarification of the inventory for geological disposal – and how this will be communicated with the volunteer host community? If not, what alternative approach would you propose and why?

6.1 Clarification of the inventory is welcome. The extent and nature of the inventory affects the geosphere functions required of a site, and hence the geological constraints. The inventory together with the geology of potential sites, among other factors, may also determine whether more than one site is needed.

6.2 Paragraph 3.59 proposes a limit on wastes arising from a new build programme to be accommodated in the current siting process, in addition to existing and legacy wastes, which will be helpful in establishing the geological requirements for potential sites. We note that limiting these new build wastes by power generation capacity does not fully constrain the inventory – this will also depend on the lifetime of the new build programme (that is, of the next generation of nuclear power stations and any subsequent generations).

7. Do you endorse the proposed approach on community benefits associated with a GDF? If not, what alternative approach would you propose and why?

7.1 The Geological Society is not competent to address this question.

8. Do you agree with the proposed approach to addressing potential socio-economic and environmental effects that might come from hosting a GDF? If not, what alternative approach would you propose and why?

8.1 Geoscience will of course be essential to building the safety case for construction, operation and post-closure behaviour of a GDF. We recognise that the socio-economic and environmental impacts addressed here relate principally to construction and surface operations. It is important to note that these considerations will also be informed by the geology, for example in determining the nature of construction work, and management of excavated materials. The proposed approach should be capable of accommodating such factors.

9. Do you have any other comments?

- 9.1 The consultation document refers throughout to a single GDF for the UK. We understand that it remains Government policy that more than one GDF might be required, depending on the inventory and on geological constraints at potential sites. This understanding was confirmed by DECC at its London stakeholder meeting for this consultation. This should be reflected in the language used to set out the new siting process.
- 9.2 'Retrievability' is a relative (and potentially ambiguous) concept. It would always be theoretically possible to retrieve emplaced wastes, although if this was attempted subsequent to final closure it would be more akin to a highly challenging mining operation. The difficulty, cost and risks which would be associated with retrieval will depend on the GDF concept and design and on geological setting, among other factors, and are likely to vary over the lifetime of a facility (pre- and post-closure). The statement at paragraph 1.32 that the process 'can be carried out in such a way that the option of retrievability is not excluded' is therefore meaningless. If it is intended to leave until a later stage the decision as to whether to keep a GDF open once waste operations cease, it would be better to say that the planning, design and construction should be carried out with due consideration for the practicability of retrieval of wastes, until such time as the decision has been made.
- 9.3 The Geological Society would be pleased to discuss further any of the points raised in this response.

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