DRAFT

Translated version. If the translated English version should not match the Danish version, the Danish version will take precedence.

PLAN AND ENVIRONMENTAL IMPACT ASSESSMENT FOR THE ESTABLISHMENT OF A PERMANENT REPOSITORY FOR DANISH LOW AND INTERMEDIATE LEVEL WASTE

SUMMARY REPORT

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MINISTERIET FOR SUNDHED OG FOREBYGGELSE

RAMBOLL

DRAFT

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1. Background

An inter-ministerial working group was tasked with reviewing three possible solutions for the handling of Danish low and intermediate level radioactive waste. The solutions are: a permanent repository in Denmark, medium-term storage in Denmark and exporting all the waste.

On 13 March 2003, the Danish Parliament (Folketinget) decided that decommissioning of the nuclear facilities at the Risø Research Centre should be progressed as quickly as possible. Parliament also decided that in parallel with the closure the government should start to compile a research report on a Danish permanent repository for low and intermediate level waste.

Since its establishment, the Risø Research Centre has acted as a central collection station for all radioactive waste in Denmark. The waste comes from research activities at Risø, the healthcare sector and industry. When the decision was taken in 2003, in parallel with the closure of the nuclear research facility, the intention was to set up a permanent repository able to take the waste from decommissioning, the radioactive waste stored at Risø plus the waste generated elsewhere in the country for many years to come.

The research report on a Danish permanent repository for low and intermediate-level waste describes the types and quantities of waste, the overall principles for protecting people and the environment, including safety criteria and analyses, the general principles behind the choice of location and design of the repository, and the future process. The research report was submitted to Parliament in January 2009 (Report no R 4). The research report forms the basis for drawing up a plan for the establishment of a permanent repository for Danish low and intermediate level waste.

As part of the work under the auspices of the inter-ministerial working group, the Ministry of Health sent out a draft *'Plan and environmental impact assessment for the establishment of a permanent repository for Danish low and intermediate level waste'* for public consultation; cf. Section 8 of the Environmental Impact Assessment Act. The environmental impact assessment was presented to the public from 2 October to 5 December 2014.

1.1. Purpose and contents of the plan

The plan deals with only one of the three alternatives examined, a permanent repository in Denmark for Danish low and intermediate-level radioactive waste.

The aim of the plan is to define the overall framework for the positioning and establishment of a permanent repository to hold Danish low and intermediate-level waste. The plan covers six alternative locations and a zero alternative involving continued storage at Risø.

The six possible sites are:
1. Østermarie-Paradisbakkerne, Bornholm Regional Municipality;
2. Rødbyhavn, Lolland Municipality;
3. Kertinge Mark, Kerteminde Municipality;
4. Hvidbjerg, Thyholm, Struer Municipality;

5. Thise, Salling, Skive Municipality;
6. Skive Vest, Skive Municipality.

The areas defined for all locations are larger than the area needed for a permanent repository (estimated at 150 m x 150 m), so by far the greater part of the sites will not be used.

1.2. Environmental impact assessment process

According to the Strategic Environmental Assessment Act (Consolidated Act no. 939 of 3 July 2013), the plans and programmes of public agencies establishing the framework for future facilities or land-use are subject to environmental assessment, in which the authority assesses whether the plan or programme could have a significant impact on the environment. In accordance with this, the Danish Ministry of Health, chairing the inter-ministerial working group, has to arrange for an environmental impact assessment of the plan.

The different stages in the environmental impact assessment process for the plan for a permanent repository are briefly discussed below.

1.2.1. Scoping phase

In the introductory scoping for the environmental impact assessment, the most significant and general environmental impacts were selected for further examination. According to Section 4(3) of the Act, affected authorities should be consulted before a final decision is taken to carry out an environmental impact assessment. Under Section 7(4) of the Act, affected authorities should also be consulted before a view is taken on the comprehensive and detailed information to be included in the strategic environmental assessment (SEA) report.

On this basis, affected authorities etc. were invited to take part in consultation on the scoping, and had the opportunity to offer suggestions for specific issues to be incorporated into the subsequent SEA report.

The German, Polish and Swedish authorities were also notified of the plan, cf. Espoo Convention on possible transboundary effects, and were also invited to send comments on the scoping.

In the course of consultations on the scoping report, 36 responses were received from the following authorities etc.:
the Ministry of Higher Education and Science; the Ministry of Defence; the Ministry of Housing, Urban and Rural Affairs; the Ministry of Ecclesiastical Affairs; the Ministry of Economic Affairs and the Interior; the Ministry of Culture; the Danish Emergency Management Agency; the Danish Energy Agency; the Danish Agency for Culture; Bornholm Museum; Holstebro Museum; Lolland-Falster Museum; Salling Museum; East Funen Museums; Diocese of Copenhagen; Diocese of Lolland-Falster; Diocese of Funen; Diocese of Viborg;
Brøndum-Hvidbjerg Parish Council (Skive Vest); Ibsker Parish Council; Bornholm Deanery; South Denmark Region; Capital Region; Struer Municipality; Skive Municipality; Kerteminde Municipality; Lolland Municipality; Bornholm Municipality; Roskilde Municipality; MORADS; BOMA; Lolland against Nuclear Waste; Atom; the Waste Group

in Kerteminde; the Danish Society for Nature Conservation; the Danish Society for Nature Conservation
– Lolland section; and the Association of Waterworks in Denmark.

Five responses from the following countries were also received via the Espoo consultation process:
Finland, Lithuania, Sweden, Germany and Poland.

The responses were dealt with in a consultation note, which can be found on the Ministry's website[1].

1.2.2. The strategic environmental assessment (SEA) report

The plan for a permanent repository sets out a number of high-level conditions for establishing a permanent repository within a few relatively large areas, referred to below as the 'planned sites'. The SEA report contains a description and assessment of the probable major effects of the plan on the environment if the plan is implemented.

The demand for quality and depth in the information in the SEA report should be viewed in the light of what can reasonably be expected based on the current state of knowledge and the use of normal assessment methods, and the level of detail in the plan.

The purpose of the plan is to establish the general framework for the establishment of a permanent repository in Denmark. The plan therefore sets out the general conditions for implementing a future project. It does not provide a basis for carrying out a very detailed environmental impact assessment with precise calculations of the expected impact. There is thus a close correlation between the level of detail in the plan and the contents and level of detail of the environmental impact assessment.

The intention was to gather together the information obtained in the preliminary studies and use the environmental impact assessment to identify potential environmental impacts that can be reduced by laying down additional guidelines in the plan. The plan was drawn up at an early stage of the overall process. If the further planning for a permanent repository continues, it is important to ensure that all subsequent plans conform to the guidelines defined in the plan. This means, as is pointed out in the plan, that a concrete project proposal and more detailed environmental studies will be produced.

The SEA report describes the environmental status and the overall effects on the environmental factors selected in the scoping phase. It also suggests mitigation measures that can reduce or completely avert the effects, and makes proposals for a monitoring programme.

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[1] Environmental impact assessment of the plan for the establishment of a permanent repository for Danish low and intermediate level waste, consultation note – scoping: http://www.sum.dk/Temaer/~/media/Filer%20-%20dokumenter/Slutdepot-H-oktober-2014/Hoeringsnotat-scoping.ashx

1.2.3. Summary report

When the final plan is published, there should be a summary report in place in accordance with Section 9(2) of the Environmental Impact Assessment Act. This should cover the following:

- How environmental issues are included in the plan (see section 2).
- How the SEA report and comments from the public consultation phase have been taken into account (see section 3.)
- Why the plan has been chosen from the alternatives presented (see section 4).
- How the authority intends to monitor the major environmental impacts from implementing the plan (see section 5).

1.2.4. Parallel processes

In parallel with the planning for a permanent repository, the two other solutions for handling the waste will be examined, namely an intermediate storage facility and export. The process is outlined below:

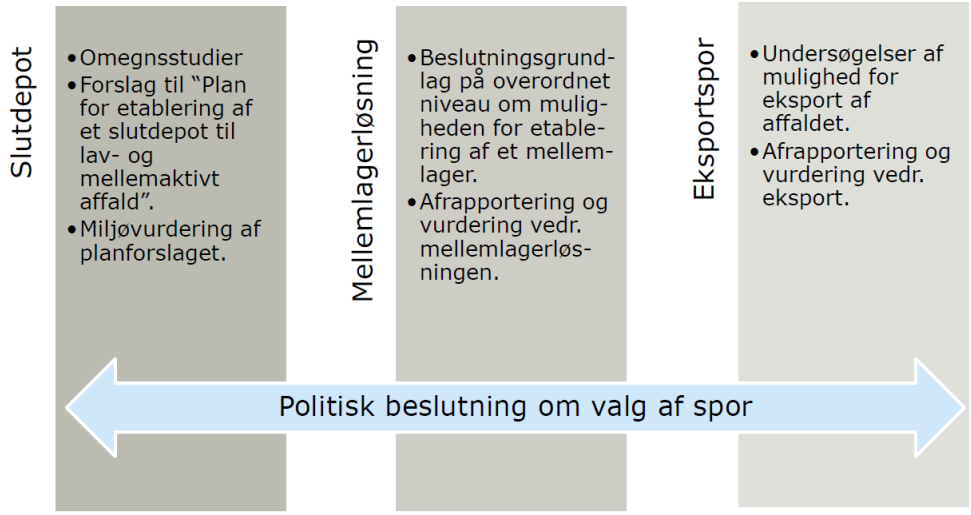

Figure 1 Outline of the three different suggested solutions.

[Legend:

Permanent repository
- Local area studies
- Proposed 'Plan for the establishment of a permanent repository for low and intermediate level waste'
- Environmental impact assessment of the proposed plan

Intermediate storage
- High-level research report on the possibility of establishing an intermediate storage facility
- Reporting and evaluation of the intermediate storage solution

Export option
- Studies of the possibility of exporting the waste
- Reporting and evaluation of the export option

1.2.5. Later phases

The strategic environmental assessment takes place before the project stage and hence before an environmental impact assessment (EIA), and thus also at an earlier point in the decision-making process. An EIA is undertaken for specific construction projects before the developer has permission to start on the project, and will be carried out for two projects if it is decided to pursue the studies for a permanent repository.

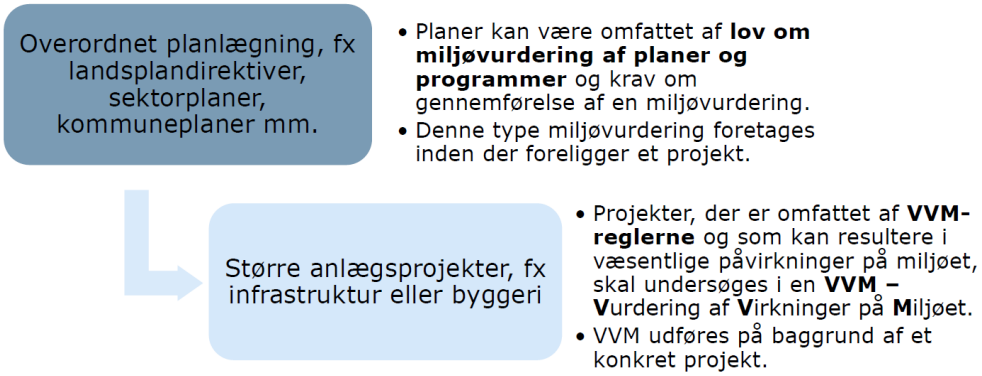

Figure 2 Strategic environmental assessment and EIA of projects.

[Legend:

Overall planning, e.g. country planning directives, sectoral plans, municipal plans etc.

Major construction projects, e.g. infrastructure or building

- Plans may be covered by the **Strategic Environmental Assessment Act** and requirement to carry out an environmental impact assessment
- Projects covered by the **EIA rules** which may result in significant impact on the environment must be examined in an **E**nvironmental **I**mpact **A**ssessment
- EIA based on a concrete project

This environmental impact assessment is therefore not a substitute for an EIA of a specific facility, cf. Section 11 of the Environmental Impact Assessment Act. In a possible later EIA study, all environmental factors will therefore be revisited at a more detailed level. In such an EIA phase it will therefore be possible to examine in more detail the environmental impact of an actual project in a specific location by way of additional field studies, calculations etc.

If it is decided to continue with the permanent repository process, proposals for a project planning permit (projekteringslov) will be drawn up on the basis of the material produced earlier, including the strategic environmental assessment. The project planning permit will reserve the sites and underpin project design, thorough investigations (incl. EIA), a public consultation phase etc.

Based on work done under the project planning permit, it will be possible to take a policy decision at the end of 2017 on the final design, position etc. of the facility, then proposals for a construction permit (anlægslov) will be produced, to allow the actual construction work on the repository to get under way.

2. Incorporation of environmental considerations

This section discusses how environmental considerations have been incorporated into the 'Plan and environmental impact assessment for the establishment of a permanent repository for Danish low and intermediate level waste'; cf. Section 9(2) point 1 of the Environmental Impact Assessment Act.

The SEA report has been produced in parallel with the draft plan and, in this connection, the most important high-level mitigation measures have been incorporated into the plan guidelines. The guidelines are discussed in Table 1 in section 3.2.10, and state whether mitigation measures have been defined for every guideline.

Based on the consultations held, guideline no 14 has also been amended to make it clearer that it also covers radioactive waste and protection of the environment in the broad sense, including the soil:

Original guideline:

> ***No 14. Safeguarding against seepage of other harmful substances****Some of the radioactive waste will also be harmful to the environment in other ways, possibly containing hazardous waste in the form of heavy metals. This must be taken into account when constructing and operating the repository.*

New guideline:

> ***No 14. Safeguarding against seepage of other harmful radioactive substances:*** *Some of the radioactive waste will also be harmful to the environment in other ways, possibly containing hazardous waste in the form of heavy metals. The design of any future facility will be based on specific safety analyses, so it is likely that all limits for impact on people and the environment, including the soil, will be complied with at all times with respect to both radioactive and other hazardous substances.*

3. The public consultation phase

This section describes how the responses received in the consultation phase have been dealt with by the Ministry of Health, cf. Section 9(2) point 1 of the Environmental Impact Assessment Act.

3.1. Responses received

3.1.1. Danish responses

During the public consultation phase, 41 Danish responses to the plan and the associated strategic environmental assessment were received from:

A. Ministries:

1. Danish Ministry of Ecclesiastical Affairs
2. Danish Ministry of Economic Affairs and the Interior

B. Agencies:

1. Danish Emergency Management Agency
2. Danish Competition and Consumer Authority

3. Danish Road Directorate

C. State-recognised museums:

1. Holstebro Museum
2. Lolland-Falster Museum (two responses received)
3. Roskilde Museum
4. East Funen museums – the Viking Museum Ladby

D. Diocesan authorities and parish councils:

1. Diocese of Copenhagen
2. Diocese of Lolland-Falster
3. Diocese of Funen

E. Regions:

1. Capital Region of Denmark

F. Municipalities:

1. Struer Municipality
2. Skive Municipality
3. Kerteminde Municipality
4. Lolland Municipality
5. Bornholm Regional Municipality
6. Roskilde Municipality

G. Others

1. Citizens' Group against Nuclear Waste on Thyholm
2. MORADS
3. BOMA
4. Lolland against Nuclear Waste
5. Citizens' Group against Nuclear Waste in Kerteminde Municipality
6. Danish Society for Nature Conservation
7. Association of Waterworks in Denmark
8. NOAH - Renewable Energy
9. Danish Centre for Environmental Assessment, Department of Social Development and Planning, Aalborg University
10. Ren Energi Oplysning (Clean Energy Information – REO)
11. Kirsten Vestergaard Andersen, Aalborg
12. Lalandia
13. Kaj Jensen, Thyholm
14. Knuthenborg Safari Park
15. NÆRSAMFUND Association
16. Østersøbadet Landowners' Association
17. Fehmarn Belt Development
18. Association of Cottage Owners in Lolland Municipality
19. Jørgen C. Marcussen
20. Anne Marie Marcussen
21. John Clausen

3.1.2. International response to consultation – Espoo

The Espoo Protocol ('Protocol on Strategic Environmental Assessment') is a protocol to the UN Convention on Environmental Impact Assessment in a Transboundary Context, popularly known as the 'Espoo Convention'. The protocol requires the parties to carry out a strategic environmental assessment of certain plans and programmes that could have a significant impact on the environment, including health and wellbeing, and to inform the relevant neighbouring countries if

it is believed that the plan or programme could have a significant transboundary impact on the environment.

The SEA report states that no significant transboundary impact has been identified. Subsequent planning and project design phases will ensure that the project itself does not carry the risk of any significant transboundary effects.

The SEA report was presented for consultation in Germany, Sweden and Poland. The responses are summarised in Annex 4, where they are split into the following groups:

H. Germany (141 responses)
I. Sweden (6 responses)
J. Poland (1 response)

3.1.3. Treatment of responses to consultation

All the responses have been examined and will be incorporated into the subsequent decision-making process. Annex 1 provides a brief summary of the key concerns in each of the Danish responses, while the international responses are summarised in Annex 4.

Some of the responses include suggestions for other activities, project designs or studies. These different views have been noted and may form part of the deliberations on a possible future permanent repository.

In order to provide a clear answer to the responses to consultation, the individual answers are first broken down into high-level topics, as a number of issues recur in many of the responses; see section 3.2. For each high-level topic, there is a brief summary of the content of the responses concerning the topic in question, followed by an overall answer.

Apart from these general topics, there are a number of responses that focus on local concerns. An overview of these is given in section 3.3.

The complete responses to consultation can be found in Annex 2 (Danish) and Annex 5 (international).

3.2. High-level topics

The responses include both site-specific remarks and a number of comments of a more general nature which recur in many of the responses. The general remarks are grouped by high-level topic and initially answered together. Then the site-specific remarks are dealt with.

Generally speaking, the majority of the responses express opposition to the establishment of a permanent repository within each of the six potential sites, based on a number arguments which are discussed under the general headings below and also specifically for each site.

3.2.1. The Ministry's handling of the process

Summary of responses to consultation

Process

Many of the responses express dissatisfaction with the government's handling of the process and find that the government has not met expectations in terms of making the process clear and transparent, generating distrust of the material produced.

The process is not therefore regarded as impartial or adequate. For this reason, it is recommended that the whole process should be halted, as the plan has been drawn up on false assumptions. It is recommended instead that a broader commission should be set up with representatives from a much wider group comprising national and international stakeholders. Reference is made, for example, to experience from Sweden, the USA, the UK and Germany.

Many of the responses emphasise that all three options (permanent repository, intermediate storage and export) should be examined at the same level. The intermediate storage solution and export abroad should thus have been described as alternatives to a permanent repository, in order for the environmental impact assessment to comply with Section 7 of the Environmental Impact Assessment Act. There are complaints that the intermediate storage and export solutions have not been examined in parallel with the permanent repository. There are suggestions for exporting a small part of the radioactive waste.

Involvement of neighbouring countries

A number of the German responses to consultation note that the Danish SEA report does not comply with the applicable rules in the Espoo Protocol, and that the German public were denied their legal right to participate in the Danish process. Some also point out that the German public were not given any opportunity to take part in the scoping (definition of the report) or to attend public meetings. There is a general feeling that the Danish Ministry of Health failed to consider requirements laid down in the Espoo Convention and the Espoo Protocol at an early stage in the process.

Communication

Many of the international responses to consultation complain that most of the references are in Danish, and that the whole of the SEA report has only been translated into English. This makes it hard for citizens to obtain sufficient information.

Voluntary principle

It is pointed out that the Danish process is not based on the voluntary principle.

Answer

Process

The process is currently at the plan level and not the project level. The public have therefore been brought in at a stage in the process where it is still possible to adjust or modify the plan or discard it altogether. The consultation process and the environmental impact assessment mean that the decision whether or not to adopt the plan can be taken on an informed basis. If it is decided to proceed with the draft

plan, there will be a further consultation process in connection with the EIA study for the specific project.

It has been explained to the municipalities etc. on several occasions that an independent panel of international experts will be called in to review the process and the technical issues associated with the establishment of a permanent repository, including safety analyses etc. If it is decided to proceed with the permanent repository option, the panel of experts will be involved in the project design phase, once there is a concrete project and a specific location to assess.

The Environmental Impact Assessment Act requires the authority to identify, describe and evaluate 'reasonable alternatives'. In this context, the six potential sites are treated as equal alternatives. Along with reasonable alternatives, the 'zero alternative' also has to be described and assessed. This is the situation in which the plan is not implemented and no other action is taken. The zero alternative thereby serves as a basis for comparison in the EIA, which the potential impact of each alternative location is weighed against. The zero alternative is thus a tool used in an SEA report, and does not imply that continued storage at Risø will be chosen as a solution if the plan for a repository is not implemented.

The political basis for the environmental impact assessment is the decision from 2003 and 2009 on the establishment of a permanent repository. An intermediate storage solution or export of all or part of the waste are not reasonable alternatives where the task is to produce a plan for a permanent repository and an environmental impact assessment of possible locations for a permanent repository. Both the intermediate storage solution and the option of exporting part of the waste are being addressed by the Ministry in a parallel process and will form part of the overall research report before a decision is taken on the path to be pursued; see description in section 1.2.4.

Involvement of neighbouring countries

The international stakeholders were consulted before the plan was adopted and so have been involved at an early stage in the process in compliance with the Espoo Protocol and the EU's SEA Directive. The international stakeholders were consulted concurrently with the national consultation on the plan in Denmark and hence given the opportunity to comment. It should be noted that the process is still at the planning stage and that no decision has been made on a specific location or on the design of a future waste repository.

Communication

Neither the Espoo Protocol nor the SEA Directive contain any rules on language requirements. The 'Non-technical summary' has been translated into English, German and Polish for the respective populations. The technical part (the SEA report) has been translated from Danish into English – the international working language.

The SEA report concludes that the plan will not have any significant transboundary environmental impacts. This conclusion is summarised in the 'Non-technical summary', which has been translated into English, German and Polish as noted above. The SEA report itself contains more in-depth information on the background to this assessment and environmental impact assessments in general. The whole of the SEA report is available in English.

Voluntary principle
It is true to say that the six locations discussed were not selected on the voluntary principle. Rather, they were selected on the basis of the physical conditions, whereby the geological conditions in particular were a crucial factor.

It would be most desirable for the final location to be chosen in agreement and understanding with a local area and the municipality concerned, but if this is not possible, it may be necessary for Parliament to take a decision against local wishes.

3.2.2. Description of waste types

Summary of responses to consultation
Classification
Many of the responses to consultation ask about the quantity of existing waste and the classification and quantity of future waste. It should noted that the classification of the waste is deficient and not restrictive enough; compare e.g. the Swedish rules. For example, Danish Decommissioning (DD) makes no distinction between short and long-lived waste.

It is also pointed out that the classification of the waste should be in place before a location is chosen – and that the classification should be aligned with the Swedish methods.

Toxic substances
Lead, cadmium, beryllium and uranium pose a major risk to health and the environment for many generations to come. We should therefore apply the principle of caution and proceed with the intermediate storage solution.

Answer
Classification
Denmark follows the IAEA's guidelines for classifying the waste. Classification of the waste does not define how the waste should be stored. Before a repository can become a reality, safety assessments should be conducted to document whether the repository complies with the reference doses in effect at any given time (in operation and after closure), and other applicable environmental rules. The safety analyses in the preliminary studies were based on general data on the geology and intended design and placement of a repository, and the radioactivity levels in the waste estimated at the time. The preliminary studies showed that environmental rules and reference doses could be adhered to within the limits of the model.

It is not the classification as such, but the data on the radioactive isotopes (half-lives, radioactivity etc. (i.e. figures)), together with data on the man-made and natural barriers etc., that is crucial to the outcome of the safety assessments, and hence in determining whether a given repository solution can be approved.

Toxic substances
Toxic substances are covered by the safety analyses in the same way as radioactive substances.

3.2.3. Description of the repository

Summary of responses to consultation

Lifetime

The plan and the SEA report do not give convincing answers to the question whether the repository can encase the stored materials for the whole period in which they may be harmful, and there are calls for details of the sustainability of the repository after a longer period than the 300 years described in the plan. It is not considered that the repository types enable the waste to be placed sufficiently deep, and there has been no input from foreign experts.

Repository depth

It is also felt that the degree of hazard associated with the waste is not clearly stated, including whether the term 'deep geological storage' means 30, 50 or 100 m. A greater distinction should also be made between the different types of repository in assessing their impact. In fact, a repository 300-500 metres deep should be used.

Climate protection

With regard to climate, the guideline states that any future facility must be designed to allow for future climate change up to the year 2100. There are calls for a risk assessment over a longer time horizon, considering that the materials may affect the surrounding environment for an extended period.

Monitoring

In this connection, the SEA report also states that in some cases, a 'safeguard' means leaving it to future generations to secure the facility, which does not tally with the mantra in the 2003 decision that 'every generation should clean up after itself'.

Closing off of land

There is uncertainty as to the amount of space the repository could take up, and whether the whole of the planned site will be included.

Answer

Lifetime

The purpose of a repository is to 'prevent, delay and contain' emissions from the repository. The idea behind a permanent repository takes in the combination of 'prevention, delay and containment', and the fact that the waste is decaying. The preliminary studies set a suitable period at a minimum of 300 years. The safety analyses need to show that the repository is *safe for all time,* i.e. no doses over the permitted levels at any time in the future, not just in the so-called lifetime of the repository. There has been no international review of the preliminary studies, but *Studsvik* contributed to the actual work.

Repository depth

The preliminary studies discuss only near-surface and intermediate-depth repositories, Plus the possibility of a deeper bore hole. Safety analyses and assessments are meant to show whether a chosen depth is safe in a given location.

Climate protection
The Intergovernmental Panel on Climate Change (IPCC) has produced models of climate change at the global level out to 2100. The Danish Meteorological Institute (DMI) has calculated and projected climate change in Denmark on the basis of the IPCC models out to 2100, including estimated changes in temperature, precipitation, wind, storm conditions and sea levels. The IPCC has not produced any projections further into the future, but believes that temperatures and sea levels will continue to rise after 2100, although the amount will depend entirely on future emissions of CO_2 into the atmosphere. An EU stress test will be carried out once there is a project proposal, precisely to assess the robustness of a facility in relation to climate protection.

Monitoring
It is true that the SEA report states that the period after closure includes an initial monitoring phase. It will then be decided how long the repository should be actively monitored by the supervisory authorities. There is therefore no question of future generations having to clean up after us, but there may be a need for monitoring, which will naturally go hand in hand with the requirement for the facility to be safe in the future, as described above.

Closing off of land
An area of approx. 150 x 150 metres will be needed to establish a permanent repository, so only a small part of the designated planned sites may be used. The final demarcation and placement of the actual project site will be determined in the subsequent planning and project design phases.

3.2.4. Positioning of the repository

Summary of responses to consultation
Choice of location
Many of the responses to consultation ask about the choice of sites, and why no sites have been chosen in Zealand, nearer to the capital or closer to large towns.

Coastal location
There is criticism of the coastal location and the increased risk of flooding and seepage into surface water and the sea, and the consequent risk of transboundary impact.

Answer
Choice of location
The sites were identified from a geological screening of the country based on criteria in the research report (e.g. thick impermeable clay strata of great horizontal extent) and ignoring Areas of Special Drinking Water Interests (OSD areas) and NATURA 2000 areas – in both cases, important areas for drinking water and nature. These areas cover most of Zealand.

The studies also disregarded the four largest cities, Copenhagen, Aarhus, Odense and Aalborg, because of the concentration of large population groups. Based on the screening, 22 sites were identified and recommended for further work. Finally, six sites were identified that were considered better than the other 16 based on the following criteria: thickness of (ice-age) moraine layers (as thin as possible), thickness of older impermeable clay layers (as thick as possible), disturbances in

the ice-age strata (as few as possible), disturbances in the older strata (as few as possible), areas of drinking water interests (as few interests as possible), and regional groundwater reservoirs (as few as possible).

Coastal location
Any future project will undergo a number of safety analyses to show that there is an acceptable level of protection for people and the environment and that it will be possible at any time to demonstrate compliance with the specified reference doses when in operation and after closure, as described in plan guideline no 6 on radiation protection. This is also true of the risk of seepage into the sea in the event of sea-level rises or accidents, for example.

Plan guideline no 6. Radiation protection:
The establishment of a permanent repository for radioactive waste in Denmark must comply with Council Directive 2013/59/Euratom of 5 December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation, Council Directive 2011/70/Euratom of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste, the IAEA's 'Fundamental Safety Principles' and related guides and standards, and other relevant Danish law. Among other things, the Directives ensure that radioactive waste is handled in a way that provides for an acceptable level of safety for people and the environment, and safeguards future generations against unreasonable burdens; cf. also 'Research report on a Danish permanent repository for low and intermediate level waste'. These and other relevant considerations (including the possibility of transboundary impact) will be addressed by ensuring that any future facility is designed and operated so to be able to demonstrate compliance with the reference doses specified at all times when in operation and after closure, for those periods and for potential incidents (accident scenarios). Documentation of this will be provided in the form of safety analyses for the facility and its use.

3.2.5. Handling of waste

Summary of responses to consultation
The description of the obligations in the Waste Convention and the Waste Directive is deficient, in that a significant part of the declaration on the handling of radioactive waste in the Convention has been omitted. This appears to be cited in the SEA report as a reason not to include the other two options.

Answer
The adoption of parliamentary resolution B48 defined the framework for handling the radioactive waste from decommissioning the nuclear facility at Risø, with the decision to produce a research report on the establishment of a permanent repository for low and intermediate-level waste in Denmark, so as to safeguard future generations against unnecessary burdens. For the 'special waste', the possibility of an international solution in accordance with the applicable international agreements and obligations was to be examined.

The adoption of Council Directive 2011/70/Euratom of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste did not affect these decisions. The references in the response to 'transboundary movement' and transfer for processing and refinement concern

processes whereby the radioactive waste is transported between countries and returned to the country of origin on completion of processing. These references therefore do not address the question of a repository.

3.2.6. Degree of detail in the plan and the environmental impact assessment

Summary of responses to consultation
Many responses criticise the level of the assessments and of the plan itself in terms of detail, consideration of the specific site and use of experience from similar projects.

It is stated, for example, that the SEA report seems superficial, as it has been drawn up on the basis of the existing data and too many detailed descriptions have been deferred to a possible subsequent EIA phase.

It is not possible to evaluate the impact on nature, for example, when there is no specific location. It is therefore surprising that the report should conclude that there will be no impact on nature.

Many of the headings (municipal plan, national parks, population, industry, tourism, recreational areas, health and radiation protection, socio-economic aspects, surface water and soil) are so similar that it is not possible to distinguish between them.

Answer
It is true that SEA report is based primarily on existing knowledge and studies, and that the report takes a high-level view in terms of both analysis and assessment. The reason for this is that the high-level nature of the plan provides no basis for carrying out more detailed studies in the form of e.g. field work, drilling or stakeholder analyses (interviews etc.). In the Ministry's view, this sort of detailed study requires a more detailed plan or a concrete project within a smaller area than the 'gross' areas available today.

The purpose of carrying out an environmental impact assessment, despite its general character, was both to identify significant impacts to be expected from implementing the plan and summarise existing data and input from public meetings, and to establish whether, based on the topics analysed, any of the sites could be considered more suitable locations for a possible future permanent repository.

As pointed out in one response, the effects on nature cannot be addressed in detail at this level, as the final placement within the gross areas is not known. Nevertheless, nature is covered in the strategic environmental assessment. The reason for this is that the plan guidelines are intended to ensure that there is no impact on Natura 2000 areas, i.e. that any future repository will be able to satisfy this condition. The guideline on nature is also intended to minimise the impact on interconnected nature areas. When the final project is in place, account will be taken of protected nature areas and protected species in line with the relevant legislation, and of any possible conflict with these conservation interests. The plan therefore does not ignore the applicable legislation.

At this stage, the general guidelines in the plan for a permanent repository are considered able to highlight potential conflicts before a decision is taken to proceed with the permanent repository solution. The final placement, details of the design of the facility, the choice of repository type, the construction methods and choice and use of materials etc. will have a bearing on the degree of impact. The SEA report therefore refers to a possible later EIA phase, in which a more detailed evaluation of the impact of a specific project can be made.

As described in the responses to consultation, a number of environmental impacts do not differ noticeably from each other when one views the sites as a whole. However, this is not to say that there are no local differences in the demarcation of the sites or their potential impact. On the other hand, it is felt that the differences are not such that they will have a significant influence on priorities.

3.2.7. Socio-economic consequences

Summary of responses to consultation
The assessment of the socio-economic effects is common to the six sites, and cannot provide any background to the choice of location as a more detailed examination has been deferred to the EIA phase. No particular view has been taken as to the consequences, but public concerns are presented instead. Many of the responses to consultation state, for example, that the description of the socio-economic factors is not sufficiently complete or thorough. Particular stress is placed on the impact on tourism, fishing, agriculture and food production.

In their responses, the stakeholders express satisfaction with the analysis of their concerns about the negative social consequences a possible permanent repository could have for the area.

The stakeholders feel, however, that the SEA report attributes the uncertainty and mistrust associated with the establishment and operation of a permanent repository for radioactive waste to ignorance on the part of the stakeholders, and suggests that the solution is simply a matter of more information and closer dialogue with the public. People have looked into the potential risks and that is why there are concerns.

The stakeholders also point to a need for much greater openness about the process for the different options and for an explanation why questions about the intermediate storage solution always receive evasive answers.

No comparable studies of socio-economic effects have been used that might show the impact of locating a permanent repository. Instead, the stakeholders feel that the report suggests that the affected municipalities' and the stakeholders' own expressions of uncertainty and concern will provide a breeding ground for and reinforce the negative social consequences.

Answer
As noted in many of the responses to consultation, the socio-economic effects are also set out at a general level and are based mainly on the public meetings held and comments from stakeholders received during the consultation process.

There has been no in-depth analysis and evaluation of the socio-economic effects, but the SEA report points out that, regardless of the choice of final location, there is a risk of significant impact on socio-economic conditions. This may be reflected in a fall in exports of food products (fishing and agricultural production), turnover in general, tourism, people moving to the area etc.

It is not felt that any comparison can be made on this basis between the six sites if one looks only at socio-economic factors. Rather, these high-level analyses are used to emphasise that great stress is laid on the socio-economic aspects in all six areas, and that the subject will carry great weight in the subsequent process.

The SEA report highlights the need for knowledge among the stakeholders, and underlines the crucial bearing this could have on the impact on social conditions if a permanent repository is established. This is based on an analysis of notes from the public meetings and responses to consultation submitted by the stakeholders. In all, the stakeholders make 731 statements that indicate a need for greater knowledge. These knowledge gaps are not concentrated around a few specific topics, but are related to as many as 35 different identifiable topics:

- Assessment of the radioactivity in the waste
- Differences between intermediate storage and a permanent repository.
- Decision-making process behind a permanent repository vs. other solutions
- The undefined quantity of waste
- Handling of new radioactive waste after the closure of the repository in 30 years' time
- The filling process; frequency of deposits, carriage methods/transport, transport costs, risk of other waste being placed in the repository for reasons of convenience
- Risks of groundwater contamination
- Failure to make use of Danish and foreign experts – no second opinion.
- Method of burying the waste versus surface repositories
- Insufficient discussion of the intermediate storage solution and suspected agenda to force through the permanent repository solution indicate a need for knowledge/information about the future process.
- Impact on the environment – including flora and fauna
- Handling of high-level radioactive waste
- Procedure for handling high-level waste in e.g. Sweden
- Criteria for selection of the final location
- Method behind a permanent repository
- Integration of the permanent repository into the surroundings
- Climate adaptation of the repository
- Success rate for permanent repositories/experience of permanent repositories in other places
- Unsuitability of Risø as a location
- Containment of the material in a permanent repository
- Risk of seepage from a permanent repository
- Uncertainty about the procedure in the event of seepage
- Risk of leaks during transport
- Radiation risk from a possible permanent repository
- Ability to comply with blasting rules when blasting granite on Bornholm
- Availability of relevant staff to operate a permanent repository
- Evacuation plans in the event of a leak/accident
- Concerns about the risk of earth tremors
- Impact on the immediate environment, including buildings in the vicinity
- Reversibility of the repository
- Protection against unauthorised access or deliberate damage etc.
- Effect on drinking water supplies in the future
- The part of the waste that does not decay but remains toxic
- Checks on buried waste
- Knowledge of studies of the export solution

In light of this, the SEA report concludes that the gaps in knowledge are broad and diffuse in nature – rather than being focused on a few specific issues – and it is noted that they are widespread among the stakeholders. For example, the analysis shows that a large proportion of the stakeholders have stated that they have insufficient knowledge of the project and its possible impact, and that they therefore seek more information and dialogue.

An analysis of notes from public meetings and responses to consultation from the stakeholders also shows that 722 statements contain expressions of concern. These concerns are spread across 53 topics:

- Assessment of the radioactivity in the waste
- Fears of being ignored and misled by the Ministry
- Decision-making process behind a permanent repository
- Credibility of the announcement of no more than 30 years in operation
- Handling of new radioactive waste after the closure of the repository in 30 years' time
- The filling process; frequency of deposits, carriage methods/transport, transport costs, risk of other waste being placed in the repository for reasons of convenience
- Risks of groundwater contamination
- Method of burying the waste versus surface repositories
- Concerns at the lack of a parliamentary debate
- Foreign experts brought in too late
- Insufficient discussion of the intermediate storage solution – and hidden agenda to force through the permanent repository solution
- Limited movement into the area and increased depopulation
- Impact on tourism
- Impact on infrastructure
- Impact on agriculture
- Impact on fishing
- Impact on the environment – including flora and fauna
- Handling of high-level radioactive waste
- Criteria for the selection of the final location – and whether they are reasonable
- Integration of the permanent repository into the surroundings
- Climate adaptation of the repository
- Success rate for permanent repositories/experience of permanent repositories in other places – that this is not used or possessed
- Effect on business and sales of goods – also including tourism
- Effect on social conditions
- Impact on the local 'brand'
- Risk of leaks during transport
- Radiation risk from a possible permanent repository
- Ability to comply with blasting rules when blasting granite on Bornholm
- Availability of relevant staff to operate a permanent repository
- Evacuation plans in the event of a leak/accident
- Reduced investment in the local area
- Effect on local development activities
- Impact on property prices
- Concerns about the risk of earth tremors
- Impact on the immediate environment, including buildings in the vicinity and protected ancient monuments etc.
- Impact on protected areas
- The undefined quantity of waste
- Reversibility of the repository
- Protection against unauthorised access or deliberate damage, terrorism etc.
- Transboundary character of the permanent repository – also affects neighbouring countries
- Effect on drinking water supplies in the future
- The part of the waste that does not decay but remains toxic
- Possibility of making the SEA report more complete
- Effect on rental income from holiday homes
- Whether the local area should be viewed in a more regional context, e.g. on Bornholm, where the whole island's 'brand' and economy could be hit
- Lack of experience in Denmark of handling

- Dumping in outlying regions of Denmark
- Containment of the material in a permanent repository
- Models as a basis for calculation
- Risk of seepage from a permanent repository
- Uncertainty about the procedure in the event of seepage
- high-level radioactive waste
- Checks on buried waste
- Whether the export solution has been adequately examined

In light of this, the SEA report concludes that the level of concern is pronounced, broadly based among the stakeholders, and general rather than concentrated on a few issues.

The SEA report thus highlights the need for open and dialogue-based involvement of the stakeholders in the future, so that the stakeholders' need for knowledge and their concerns can be addressed and taken into account in the future work to choose a location and implement a possible specific repository solution. This sort of inclusive process involving the stakeholders will help to counteract the negative social consequences. The question of involving the stakeholders will form part of the deliberations on the future process if it is decided to proceed with a permanent repository.

Apart from the general issues discussed above, the stakeholders emphasise in their responses to consultation a concrete need for openness in the decision-making process to choose between the parallel options: the permanent repository solution, the intermediate storage solution and the export solution. The different stages in the continuing process are covered in the process plan, which can be viewed on the Ministry website at http://www.sum.dk/Temaer/Slutdepot/Procesplan.aspx. As can be seen from the plan, a political decision on the choice of option is expected at the beginning of 2015.

The stakeholders also point out that no use was made of experience from comparable solutions in drawing up the SEA report. It was not part of the intention of the strategic environmental assessment to cover international experience of permanent repository solutions. This sort of experience-gathering requires both an actual literature review and a more qualitative discovery and gathering of experience, drawing on experts and organisations or authorities with similar experience. It should be noted, however, that international findings were incorporated into the preliminary studies of the repository concept etc.

3.2.8. Assessment of seismic activity

Summary of responses to consultation
Many of the responses observe that the subject of seismic activity is not included in the SEA report, even though it was suggested during the scoping phase.

Answer
Denmark, and particularly Danish waters, are regularly hit by very small earth tremors. Very few of these are powerful enough for people to feel the weak vibrations. It does sometimes happen that Danish earth tremors are powerful enough for people to notice the vibrations, but actual damage to buildings caused

by vibrations from earth tremors is very rare. There have however been a few historical examples of minor damage.

Seismicity in Denmark is very low, including the sites on Bornholm, Lolland, and Funen, but it is slightly higher in northwest Jutland, where the sites on Thyholm and Salling are located, than in the rest of the country. The vast majority are strength 4 or less on the Richter scale.

The risk of earth tremors is dealt with in the risk and safety analyses to be carried out with the detailed studies to be conducted if and when two sites have been selected, so it is not covered in the environmental impact assessment.

3.2.9. Mitigating measures

Summary of responses to consultation
Many of the responses state that there are no concrete mitigation actions to address the socio-economic effects, and people are sceptical about the possibility of averting a fall in food exports, for example, via information alone.

Answer
The Environmental Impact Assessment Act includes requirements for a description of: *'Measures planned to prevent, limit and, as far as possible, offset any significant negative impact on the environment from implementing the plan or programme'.*

It was not the intention to suggest that the socio-economic effects can be mitigated by information alone. Tackling the socio-economic risks will require us to work openly in the future, in terms of both knowledge and communication, based on in-depth analysis and close collaboration with the stakeholders concerned, as described in the answer to point 3.2.7.

The question of involving the stakeholders will form part of the deliberations on the future process if it is decided to proceed with a permanent repository, and in this connection, proposals for mitigation measures linked to a concrete project may be drawn up.

3.2.10. Environmental impact assessment of the plan guidelines

Summary of responses to consultation
It is pointed out that the SAE report only covers designated areas and does not directly assess the guidelines given in the plan. This is seen as a shortcoming in the strategic environmental assessment, as it is primarily the guidelines that define the framework for future construction permits. It also lacks a description of whether the environmental impact can be reduced by preventive measures, and whether these may require an amendment to the guidelines.

Answer
It is true that there is no systematic discussion of every single guideline in the strategic environmental assessment. Each guideline defines either where a permanent repository can be placed, what type and quantity of waste can be stored there, or what type of repository can be established, with specific requirements for protecting selected environmental conditions etc. The SEA report comments at several points on the implications of the guidelines in terms of the

area taken up and the direct and indirect environmental impacts resulting from the transport and storage of the waste.

The guidelines are set out in the plan itself and in section 3.2 of the SEA report. Table 1 briefly outlines how the guidelines are incorporated into the strategic environmental assessment:

Table 1 Summary of how the guidelines are handled in the strategic environmental assessment.

Treatment in the SEA report	Guidelines in the plan
The description of the types of waste that can be stored provides a basis for a whole series of assessments, as it has a bearing on e.g. the sustainability of the repository, the risk of seepage, the consequences of transport and accidents etc. The types of waste described in the guideline are also included in the existing background reports, including the safety analyses.	1. **Types of waste:** The repository should be able to hold all Danish low and intermediate level, short and long-lived radioactive waste from operations, research activities and the decommissioning of the Risø research facility, including the special waste – such as irradiated experimental fuel – if no other solution for this waste is found. The repository should also be able to accommodate the waste category 'tailings and contaminated concrete' where there is no other solution for this material, and waste from external users such as hospitals and universities. It should also be possible to receive and store potential waste, e.g. radioactive waste from hospitals, industry, etc. if it is decided to keep the repository open for a number of years, cf. also 'Research report on a Danish permanent repository for low and intermediate level waste'.
The three repository types that could be established also have a special bearing on the assessment of the impact on water, and are used in the summary diagrams in the sections concerning the impact on water, e.g. table 8.11 in section 8.6.	2. **Repository types:** The following types of repository may be established after closer examination in a subsequent project design phase: a. A near-surface repository (on the ground and down to max. 30 m below ground). b. A near-surface repository in combination with a bore hole for some parts of the long-lived waste. c. An intermediate depth repository (30–100 m underground).
The specified requirements for the geological conditions are mainly used to assess the impact on water; see e.g. table 8.11 in section 8.6. The geological conditions have been regularly assessed in terms of the groundwater conditions and the surface water as the plan and the SEA report have been drawn up and the environmental impacts have been identified. Mitigation measures have been incorporated into the guideline, to ensure minimal impact on	3. **Geological requirements:** a. The terrain within the repository site finally chosen should be predominantly flat, horizontal and stable. b. Deposits from the surface down to the greatest possible depth should be homogeneous and low-permeable. On the surface, clayey till should dominate, but this cover of clayey till should be as thin as possible over most of a site. It should be possible for the deposits to enclose or underlie a repository, which is best achieved if there are thick, low-permeable layers of great thickness and significant horizontal extension within the sites. c. A near-surface repository concept (0–30 m below ground) could be a combination of clayey till on top and more low-permeable strata immediately below. The aim is to be able to get down to the particularly impermeable layers as quickly as possible. If the

Treatment in the SEA report	Guidelines in the plan
ground and surface water, and hence also on soil, the population and health.	repository is placed at surface level, the clayey till should be as thin as possible. d. The intermediate depth repository concept (30–100 m below ground) should always be in the low-permeable strata. e. If part of the waste is placed in a bore hole, it will always be located in the low-permeable layers. The depth of the bore hole will depend on the depth and extension of the geological layers.
The area needed is a fundamental piece of basic information used throughout the assessments of the geographical extent of the impacts, e.g. in assessing whether it is possible to prevent any impact on a given environmental aspect simply by the final choice of location within the 'gross' area.	**4. Area required:** An area of around 2-3 ha. (20,000-30,000 m^2) will be required. As such, the facility will occupy an area of approx. 150 x 150 metres, or a corresponding total area within the much larger designated gross areas.
Like the area required, the demarcation of the site is a fundamental piece of basic information used throughout the strategic environmental assessment. The sites are treated as equal alternatives in the SEA report.	**5. Location:** The permanent repository should be located within one of the 6 designated areas: 1) Østermarie-Paradisbakkerne, Bornholm Regional Municipality; 2) Rødbyhavn, Lolland Municipality; 3) Kertinge Mark, Kerteminde Municipality; 4) Hvidbjerg, Thyholm, Struer Municipality; 5) Thise, Salling, Skive Municipality and 6) Skive Vest, Skive Municipality.
The guideline therefore provides a basis for assessing the impact on the population and health, and it is assumed that a repository cannot be established if it cannot be shown to comply with the applicable environmental and radiation protection standards.	**6. Radiation protection:** The establishment of a permanent repository for radioactive waste in Denmark must comply with Council Directive 2013/59/Euratom of 5 December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation, Council Directive 2011/70/Euratom of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste, the IAEA's 'Fundamental Safety Principles' and related guides and standards, and other relevant Danish law. Among other things, the Directives ensure that radioactive waste is handled in a way that provides for an acceptable level of safety for people and the environment, and safeguards future generations against unreasonable burdens; cf. also 'Research report on a Danish permanent repository for low and intermediate level waste'. These and other relevant considerations (including the possibility of transboundary impact) will be addressed by ensuring that any future facility is designed and operated so to be able to demonstrate compliance with the reference doses specified at all times when in operation and after closure, for those periods and for potential incidents (accident scenarios). Documentation of this will be provided in the form of safety analyses for the facility

Treatment in the SEA report	Guidelines in the plan
	and its use.
It is assumed in the SEA report that there will be no significant impact on Natura 2000 areas as a result of the plan. The impact on other protected or designated nature areas is also considered to be small. The guideline does not mean that there is no impact on natural conditions, and the ultimate impact will depend on the placement of the final project.	**7. Natural landscape:** The future facility cannot be located within Natura 2000 areas. Nor should the plan entail any significant impact on adjacent Natura 2000 areas. If possible, the location of the facility should take into account identified interconnected nature areas, wildlife corridors and the like, as identified in the respective municipal plans.
Reference is made to the guideline in the sections on impact on the cultural heritage. The degree of impact thus reflects the fact that consideration for the cultural heritage has been incorporated into the plan.	**8. Cultural heritage:** Protected areas and ancient monuments must be taken into account in placing the repository. If possible, the facility should therefore be located outside protected areas and should not conflict with protected ancient monuments. During the construction phase, the provisions of the Museums Act will apply, ensuring that due consideration is given to finds of cultural and historical value.
The guideline means that there will be no conflicts with the beach protection belt and that conflicts with other protection lines will be limited – it is therefore used in the assessment of biodiversity and cultural heritage.	**9. Building and protection lines:** It is assumed that the facility will not be situated within the beach protection belt and that, as far as possible, it will not be located within building and protection lines for churches, ancient monuments, forests, lakes or rivers.
Reference is made to the guideline in the assessment of the impact on groundwater. The guideline means that a repository cannot be placed inside Areas of Special Drinking Water Interests and that consideration must be given to significant groundwater and drinking water interests.	**10. Groundwater:** The facility must not be located in an Area of Special Drinking Water Interests (OSD). The location should take account of the major groundwater and drinking water interests within Areas of Drinking Water Interests (ODs). Where groundwater lowering is required, consideration must be given to the water table and water quality in nearby watercourses and lakes.
The guideline ensures that the design of the repository will take account of climate protection. This aspect is a major factor in assessing the risk of conflicts with rises in sea level, and also gives rise to recommendations in the SEA report not to place the repository in low-lying areas.	**11. Climate:** The future facility shall be designed to allow for expected climate change up to the year 2100. This will be based on calculations of future scenarios from the Danish Meteorological Institute (DMI), with the following results: a temperature increase of 1.2°C, +/- 0.2°C, by 2050 and an increase of 2.9°C, +/- 0.3°C, by 2100, with more precipitation in winter and more extreme rainfall and storms. Consideration should also be given to a possible rise in sea levels of max. 1.5 metres above normal up to 2100, and the conditions that could arise from flooding during extreme storms.
This guideline is closely linked to guideline no 11, in that it also	**12. Low-lying areas and potential wetland areas:** To ensure that the facility is climate-proof, among other reasons, it is

Treatment in the SEA report	Guidelines in the plan
helps to reduce the risk of flooding of the repository.	assumed that the facility will not be located within designated low-lying areas and potential wetland areas.
The aim of the guideline is to ensure that the design and use of the facility take account of the risk of intrusion, vandalism etc. This point is incorporated into the plan because of a number of comments from stakeholders concerning the securing of the facility, the risk of terrorism etc.	**13. Security:** The design and use of the future facility must prevent unauthorised access to the radioactive material stored there, including the prevention of damage, loss, theft or transfer of radioactive materials.
This guideline has been included in the plan because it has been emphasised that some of the radioactive waste will also be hazardous in other ways, in the form of heavy metals, for example. (The guideline has also been expanded as a result of the public consultation; see section 2).	**14. Safeguarding against seepage of other harmful substances** Some of the radioactive waste will also be harmful to the environment in other ways, possibly containing hazardous waste in the form of heavy metals. This must be taken into account when constructing and operating the repository.

3.3. Site-specific responses to consultation

3.3.1. Bornholm

Four Danish responses to consultation were received (D1, E1, F5 and G3) plus responses from Germany and Poland, specifically relating to conditions on Bornholm. The general comments in the responses to consultation are discussed in section 3.2.

Biodiversity

Summary of responses to consultation

Nature

People comment in a lack of detailed guidelines on consideration for Natura 2000 areas, wildlife corridors and interconnected nature areas identified in the municipal plans. Nature is a living and dynamic thing, and it is observed that the municipalities should not be responsible for safeguarding conservation interests.

It is pointed out a materiality assessment should be produced in relation to the impact on the Natura 2000 areas. The 'Randkløve' Natura 2000 area is not mentioned.

Marine environment

There are concerns about pollution of the Baltic Sea with radioactive materials, and the resulting adverse effect on fishing. The Baltic already has a high level of radioactive pollution.

Answer

Nature

Natura 2000, wildlife corridors and interconnected nature areas are described at a high level in both the plan and the SEA report. The guideline includes the following:

> ***Plan guideline no 7, Nature:*** *The future facility cannot be located within Natura 2000 areas. Nor should the plan entail any significant impact on adjacent Natura 2000 areas. If possible, the location of the facility should take into account identified interconnected nature areas, wildlife corridors and the like, as identified in the respective municipal plans.*

If it is decided to continue with the planning and project design for a permanent repository, account must be taken of the applicable planning and legal requirements in effect at the time. The SEA report contains an analysis of the environmental status in 2014, and this analysis needs to be updated if a facility is to be established, to ensure that changed natural conditions are recorded and conserved.

No materiality assessment has been carried out because there is no precise location for the facility and because there is insufficient knowledge of a possible future project. It was therefore felt that there was no basis for undertaking such an assessment. If a future facility cannot comply with the plan guideline not to impact Natura 2000 areas in a significant way, it will not be established. In connection with further planning and location of the permanent repository, a materiality assessment will be carried out to look at the potential impact on nearby Natura 2000 areas, in accordance with Article 6(3) of the Habitats Directive. If the impact assessment shows that we cannot rule out the possibility of the project harming a Natura 2000 area, the project cannot be approved or permitted.

The Directive contains an exception provision, in Article 6(4). According to the exception provision, a project that could damage a Natura 2000 area can still be carried out if:

1) there are imperative reasons of overriding public interest, including those of a social or economic nature,
2) there is no alternative solution causing little or no damage, and
3) all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected have been taken. The European Commission should be notified of exceptions in matters concerning non-priority species.

In very rare and limited cases, it is possible to dispense with protection; if so, compensatory measures are required. Where there are priority species or habitats present, the Commission must be informed beforehand.

However, the opt-out provision cannot be applied in this case, because plan guideline no 7 explains that the plan must not have any significant effect on adjacent Natura 2000 areas.

Work on Natura 2000 impact assessment is generally included as part of a EIA study.

The Randkløve Natura 2000 area is not mentioned in the SEA report because of its distance from the planned site, but it has been noted that any later process should also take account of the potential impact on this area.

Marine environment
As described in section 3.2.4, any future project will undergo a number of safety analyses to show that there is an acceptable level of protection for people and the environment, as described in plan guideline no 6 on radiation protection. This is also true of the risk of seepage into the Baltic and the resulting risk of transboundary impacts.

Population and health
Summary of responses to consultation
Risks associated with transport by water are not adequately covered, and it should be noted that the risks from transport by sea are greater than with transport by road.

Answer
The SEA report states that the National Institute of Radiation Protection (SIS – part of the Danish Health and Medicines Authority) has carried out a feasibility study using model calculations to determine potential radiation doses from the transport of radioactive waste from the current storage at Risø to a future permanent repository for low and intermediate level waste.

The study shows that there are differences in radiation doses as a function of distance and means of transport, for example. The calculated radiation doses from accident-free transport of the Danish radioactive waste from Risø to a future permanent repository do not however place any restrictions on the location of this repository.

Selected questions related to the basis for this preliminary study, and are dealt with separately in Annex 3.

Landscape and geology
Summary of responses to consultation
Designated coastal zone and landscape
There is an error in the description of the size of the area that lies inside the designated coastal zone. There is no description of the design and safeguards against the impact on landscape assets.

It is pointed out that the granite is full of fractures, so one cannot guard against water penetration.

Fractures
Reference is also made to responses to consultation from the scoping phase relating to the examination of the impact on the landscape and on Ibskirke from a lowering of the groundwater level.

Answer
Designated coastal zone and landscape
The comment on the designated coastal zone is correct, and it means that the area outside the designated coastal zone is therefore smaller than stated in the SEA

report. This does not alter the assessment made in the SEA, and as mentioned earlier, there will be a requirement to justify a coastal location; cf. planning act (planloven) if it is intended to place a future facility within the designated coastal zone.

The SEA report includes an evaluation of the designated coastal zone and designated landscape features. This evaluation will be further qualified in a future EIA phase when the design has been determined.

The impact on the landscape is described in relation to other planning, in the form of designated landscapes of special value and the designated coastal zone. During the project design phase and the EIA, further assessments will be carried out, including an actual landscape analysis around the projected facility, and an assessment of mechanical tremors and possible changes in the water table, as described in the consultation note on the scoping report.

Fractures
The bedrocks on Bornholm are cut through with fractures but, based on the existing information, the designated area is less fractured, as can also be seen from the fact that the area is designated as an Area of Limited Drinking Water Interests, and that the volumes of water pumped up are modest. A discussion of fracture patterns and groundwater can be found in the local area report (GEUS no 1, 2012), which analyses the conditions based on studies in a number of bore holes. If the area is included in the future work, these matters will be covered by the risk and safety analyses to be carried out.

Climate
Summary of responses to consultation
Respondents question the level of detail in the climate assessment, and the fact that reference is made to the later phases – why are the responses from Sweden, Germany and Poland in particular not used where they are critical of e.g. the level of detail, the risk of spreading to neighbouring countries etc.?

Answer
See answers in section 3.2.4 on climate, and section 3.2.6 on the level of detail.

Water
Summary of responses to consultation
Calculations should be made of the concentrations of the stored materials that could end up in the sea (or the soil and the air).

Concerns are expressed about the groundwater in the operational phase because of subsurface fracture systems, unpredictable flow lines and seawater penetration.

Answer
Calculations of this kind are not carried out in this initial phase of planning, but any future project will be subject to more detailed studies, including EIA and safety analyses, as also mentioned in section 3.2.6,
With regard to the comments on fracture systems and flow lines, see answer to the comment on *Landscape and geology* concerning *'Fractures'* in this section.

Soil

Summary of responses to consultation

There is a lack of consistency in the assessment of discharges of pollutants into the soil, with reference made to the EIA phase while also stating that the impact is judged to be small.

Answer

The impact on the soil is covered at a high level in the strategic environmental assessment. It is assumed that there will be a series of physical barriers in place in the form of the geology and the repository itself. It is also assumed that the repository cannot be established if it could cause unacceptable environmental impacts. The impact on the soil is therefore judged to be 'small'. This assessment will be qualified in an EIA phase, to ensure that the project can be implemented within the plan guidelines.

This response to consultation has brought about an addition to guideline no 14 to make it more comprehensive and to cover protection of the soil also – see section 2.

Tangible goods

Summary of responses to consultation

It is observed that most of the site is agricultural land. There is no assessment of indirect effects arising from a decline in sales of agricultural products.

Answer

The SEA report refers in Table 8.13 to the assessment of the socio-economic aspects with regard to the effect on agricultural sales and not the area to be closed off. The assessment of the socio-economic aspects concludes that there may be an impact on food production, for example. At this stage of the planning, no more detailed studies have been undertaken to determine the economic significance of this effect. See also the answers in sections 3.2.6 and 3.2.7.

Cultural heritage

Summary of responses to consultation

There are undoubtedly cultural assets in the area, and the museum will therefore be involved in the EIA phase.

Answer

Bornholm Museum will be contacted in connection with a possible EIA phase, with a view to carrying out archive checks and preliminary investigations.

3.3.2. Rødbyhavn

Twelve responses to consultation were received (C2, D2, F4, G4, G12, G14, G15, G16, G17, G18, G19, G20) plus a large number of responses from Germany, specifically relating to conditions at Rødbyhavn. The general comments in the responses to consultation are discussed in section 3.2.

Biodiversity

Summary of responses to consultation

It is observed that the strategic environmental assessment does not refer to the Fehmarn Belt environmental report, including planned areas for natural replacement.

Answer
The description of the natural conditions is based on the applicable planning and legislative background. If it is decided to proceed with the planning and project design for a permanent repository in the area, and updated and more detailed analysis of the natural environment will be produced, also covering any newly-established nature areas.

Population and health
Summary of responses to consultation
Concerns are expressed about the implications for tourism and food production, as the area is already badly hit by depopulation. This also applies to tourism and industry in the whole Fehmarn region.

It is pointed out that the section on tourism around Rødby is based on out-of-date information, and that many of the attractions mentioned are no longer there, while new ones have been added. Efforts are being made to exploit the features of the area and its special position in relation to the experience of nature, activities, cultural tourism, pilgrimage routes and cycle paths.

There are concerns about the transport of radioactive waste through Germany.

Answer
The updated details of attractions in the municipality show that there is still a high level of local activity linked to the tourist industry. This therefore does not alter the conclusion in the SEA report, which states for example that there could be a significant impact on socio-economic conditions, including the tourist industry. See also section 3.2.7 on the socio-economic effects.

Comments on the plan for cycle paths etc. have been incorporated into the SEA report.

There will be no transport of waste through Germany. Any future permanent repository will only hold Danish radioactive waste.

Landscape and geology
Summary of responses to consultation
Geology
Concerns are expressed about the lack of knowledge in relation to the geological conditions in the planned site. It is noted that the description of the Paleocene clay is incorrect, as this is described as 'the undisturbed continuous Paleocene clay strata'. There is also very limited knowledge of the salt-diapir tectonics around Rødbyhavn.

Landscape
There is a need for a landscape analysis of the relevant area around Rødby and Rødbyhavn, describing the distinctive features of the area.

Answer

Geology

The geological conditions are described in the local area report for the site (GEUS no 2, 2012), which incorporates all relevant existing data of importance within the area, including the studies carried out in connection with the Fehmarn Belt Fixed Link and raw material surveys in the area. There is also mention of the salt structure conditions.

If it is decided to proceed with the planning for a permanent repository in the area, more detailed geological and geotechnical studies will be carried out to determine the suitability of the geological conditions.

Landscape

The impact on the landscape is described in relation to other planning, in the form of designated landscapes of special value and the designated coastal zone. During the project design phase and the EIA, further assessments will be carried out, including an actual landscape analysis around the projected facility.

Climate

Summary of responses to consultation

Respondents point to the risk of leaving it to future generations to prevent flooding by raising the dyke. If there is a breach in the dyke, this will have incalculable consequences with flooding of the hinterland.

Answer

Maintenance and possible raising of the dyke to cater for future rises in sea level must be undertaken constantly, whether a permanent repository is established or not. Moreover, any repository will be designed in a way that allows for changes in the climate; cf. guideline no 11, Climate.

Water

Summary of responses to consultation

It is considered unacceptable that there could be a risk of rising sea levels, breaches of the dyke, pollution of groundwater and floodwater.

Answer

A description of the effects of changes in sea level, extreme weather events and saline groundwater is included in the local area report for the site (GEUS no 2, 2012) based on existing data. These descriptions thus form part of the basis for the strategic environmental assessment.

Among other things, it is pointed out that there should be some modelling of the conditions if the area is still to be included. More detailed studies should therefore be carried out when there is a project. As described in the plan guidelines, requirements have been defined for e.g. the geological conditions, radiation protection, nature, groundwater, climate and seepage of other environmentally harmful substances, and a repository cannot be built before it has been shown that it meets these high-level environmental requirements as well as the more specific requirements arising out of the safety analyses, environmental approval and EIA.

Soil

No comments.

Tangible goods

Summary of responses to consultation

Concerns are expressed about the development and future prospects of the municipality – with particular reference to development plans and prospects connected with the Fehmarn Belt Fixed Link.

Answer

This comment has been noted – see also answer 3.2.7 on socio-economic conditions.

Cultural heritage

Summary of responses to consultation

Reference is made to the preliminary studies carried out in connection with the Fehmarn Belt Fixed Link EIA study. These analyses and other sources show that the area is rich in physical cultural heritage.

The studies state that the area is rich in cultural-historical assets and that it is an interesting area from an archaeological point of view. It is pointed out that any future construction work will be subject to Section 27 of the Museums Act, and that it is advisable to carry out a preliminary study before work starts. There is also a description of the cultural environments by Rødby Fjord and around the Lungholm estate.

Answer

The plan guidelines on cultural heritage includes the following:

Plan guideline no 8, Cultural heritage: *Protected areas and ancient monuments must be taken into account in placing the repository. If possible, the facility should therefore be located outside protected areas and should not conflict with protected ancient monuments. During the construction phase, the provisions of the Museums Act will apply, ensuring that due consideration is given to finds of cultural and historical value*.

Implementation of the plan thus assumes that the construction work will be carried out in compliance with the Museums Act, and it is also expected that a preliminary study will be carried out if a specific site is designated for the establishment of a permanent repository. Once there is a specific project site, information from earlier studies, including the Fehmarn EIA, can be included.

The SEA report includes an assessment of the impact on the landscape, based on an evaluation of the vulnerability of landscapes related, among other things, to the designated coastal zone. The ultimate visual impact on the landscapes will depend on the position, the repository type and design, and mitigation measures such as landscaping and planting.

3.3.3. Kertinge Mark

Four Danish responses to consultation were received (C4, D3, F3 and G5), specifically relating to conditions at Kertinge Mark. The general comments in the responses to consultation are discussed in section 3.2.

Biodiversity

Summary of responses to consultation

The strategic environmental assessment states that the 'gross' areas are so large that it is considered possible to locate the repository without any conflict with Section 3 areas. It is therefore proposed that the Section 3 areas should be removed from the planned sites. The same applies to the beach protection belt, which should also be removed to avoid conflict.

Kertinge Nor has already been adopted as a scientific reference area. The description of Natura 2000 is too limited and should also include the waters around Romsø and the east coast of Hindsholm.

Answer

If it is decided to build a repository, account must be taken of the applicable planning and legal requirements, including the beach protection belt and Section 3 areas. The natural conditions may change over time, and the project must comply with the guideline on the beach protection belt and Section 3 areas, and the boundaries of the planned site.

The details of the reference area have been taken note of. If it is decided to proceed with the permanent repository, more concrete assessments of the potential impact of the project will be carried out, to ensure that there is no significant impact on Natura 2000 areas. In this connection, account will be taken of the real geographical extent of any impact, so it may be necessary to look at more Natura 2000 areas than are presented in the SEA report, including those around Romsø and Hindsholm.

Population and health

Summary of responses to consultation

It is noted that a location at Kertinge Mark will affect close to 180,000 people. Placing a permanent repository at Kertinge Mark is therefore judged to conflict with the original guidelines for the selection of sites, given that the Hindsgavl peninsula, for example, was ruled out on grounds of population density.

It is questioned why radiation protection is not included as a factor in the assessment of the different sites, when it is also stated that the same requirements apply when it comes to safety assessments and official permits.

The responses to consultation provide additional knowledge of tourism and settlement.

Answer

The official requirements for radiation protection and safety, including reference doses, are universal and apply to all locations. Documentation of compliance with these requirements is a necessary condition for the establishment of a repository. The Hindsgavl peninsula was not ruled out on grounds of population density; see answer to 3.2.4.

The knowledge of tourism and settlement presented here has been noted. The additional information means that the assessment in the SEA report can be endorsed, as there will still be a risk of significant impact on socio-economic conditions.

Landscape and geology
No comments.

Climate
No comments.

Water
Summary of responses to consultation
The groundwater conditions under Kertinge Mark are seriously under-analysed, and there is not felt to be any basis in the Water Supply Act (Lov om vandforsyning) to order individual well-owners to switch to the public water supply. It is also felt that the assessment of the impact on groundwater should be changed to 'significant'.

Answer
The groundwater conditions at Kertinge Mark are known from drillings, and because of the geological structure comprising thick impermeable clay overlaid with moraines (ice age strata), no large groundwater reservoirs have been recorded at Kertinge Mark, although local supplies from wells may form the basis for small-scale provision.

The two new bore holes drilled in 2012 did not find any groundwater reservoirs. The local area report for the site (GEUS no 3, 2012) suggests that attention should be given to the groundwater reservoir for Kerteminde Vandforsyning, but this reservoir is outside the site.

Soil
No comments.

Tangible goods
No comments.

Cultural heritage
Summary of responses to consultation
The museum points out that they are working to have the Ladby ship added to the UNESCO world heritage list, and it is feared that a permanent repository will make this impossible. There are also plans in hand to extend the Viking Museum Ladby. It is assumed that any future facility will be located outside the immediate vicinity of the Ladby ship (the buffer zone).

It is assumed that the repository will be located away from sight lines to churches.

Answer
The details of the UNESCO application do not alter the view in the SEA report of effects on socio-economic conditions, as it is felt, among other things, that the plan could have an impact on visitor numbers and tourism. It is noted that the plan could *also* have an impact on the UNESCO application.

The comments on the buffer zone and the expansion of the museum have been noted, and these considerations will be included in the later planning.

The comment concerning church sight lines and church surroundings is noted. The SEA report states that there is a risk of impact on the surroundings of Kølstrup church if the facility is placed within the designated protection zone. Every effort will be made to take account of this in the future process.

3.3.4. Thyholm

Four Danish responses to consultation were received (C1, F1, G1 and G13), plus German responses, specifically relating to conditions at Thyholm. The general comments in the responses to consultation are discussed in section 3.2.

Biodiversity
Summary of responses to consultation
(see 'Water', which sets out the concerns about Limfjord)

Population and health
Summary of responses to consultation
There are number of concerns about the impact on the population and socio-economic conditions.

Answer
Refer to the descriptions in section 3.2.7.

Landscape and geology
No comments.

Climate
No comments.

Water
Summary of responses to consultation
Concerns are expressed about the groundwater because of the complex geological structures. These include the risk of seepage into the groundwater or Limfjord of e.g. lead, cadmium and beryllium.

Respondents remark on the production areas surrounding Thyholm and the depth of the waters. Concerns are expressed about seepage of toxic heavy metals into the groundwater or Limfjord.

Answer
These substances will be covered by the safety analyses in the same way as other hazardous substances.

The designated site does not contain any major groundwater reservoirs. The area is classed as an 'Area with limited or no drinking water interests'. The groundwater reservoir for Thyholm Private Fælles Vandværk will of course be taken into account, but this is 1.5 km to the south of the site. (see local area report GEUS no 4, 2012).

Soil
No comments.

Tangible goods
No comments.

Cultural heritage
Summary of responses to consultation
There are several registered ancient monuments in the area, and it is recommended that a preliminary study of the site should be carried out.

Answer
The museum will be contacted in connection with a possible EIA phase, with a view to carrying out archive checks and preliminary investigations.

Other comments
With regard to comments on seismic activity, refer to section 3.2.8.

3.3.5. Skive West and Thise

These two sites in Skive Municipality are dealt with together. Two Danish responses to consultation were received (F2 and G2), plus German responses, specifically relating to conditions at Skive Vest or Thise. The general comments in the responses to consultation are discussed in section 3.2.

Response G2 refers to a number of articles and reports. The content of these articles is briefly outlined below. The references are to the section of the summary report in which the general problems are discussed:

- http://www.information.dk/517345: Information: German nuclear expert Gerhard Schmidt, opposes a Danish permanent repository. *(See sections 3.2.1, 3.2.2 and 3.2.5)*
- http://noah.dk/oko-institut-kritiserer-plan-for-risoe-affald/oeko-instituts-working-paper-on-the-danish-inventory-of-radioactive-waste-november-2014/: The German 'Öko-Institut' is critical of the Danish permanent repository concept for low and intermediate level waste from Risø. There is a working paper from one of the experts at the Institute, Gerhard Schmidt. The paper opposes the Danish permanent repository concept in almost all areas, particularly with regard to the classification of the waste. *(See sections 3.2.2, 3.2.3 and 3.2.5)*
- http://www.dr.dk/nyheder/regionale/bornholm/2014/10/22/131350: Ellen Margrethe Basse, professor of environmental law at Aarhus University, finds that the Health Ministry's new environmental impact assessment of a permanent repository for nuclear waste from Risø is superficial. The EIA only deals with a permanent repository, and does not look at the possibility of intermediate storage or export of the waste outside Denmark.*(See sections 3.2.1 and 3.2.6)*
- http://www.dcea.dk/digitalAssets/91/91122_potentielt-depot-for-radioaktivt-affald---sp--rgeunders--gelse-til-borgere-i-de-ber--rte-omra--der--anbefalinger-og-resultater.pdf: DCEA, Lone Kørnøv at al.: The questionnaire sent to citizens and politicians in the designated locations is intended to gather knowledge of people's perception of the problem, their attitudes, concerns, information needs and involvement in the process and experience of it, and their input to the scoping in the environmental impact assessment.*(See sections 3.2.1, 3.2.6 and 3.2.7)*
- http://www.mkg.se/mkgs-yttrande-om-dansk-slutforvarsplan: MKG, the 'Swedish NGO Office for Nuclear Waste Review'. MKG is very critical in many areas of the way Denmark intends to handle the radioactive waste.*(See sections 3.2.1, 3.2.2, 3.2.3 and 3.2.5)*

- http://www.quia.com/files/quia/users/annealbinus/Comments_Waste: Paul H. Gudiksen, Ph.D. Environmental scientist (retired), San Francisco Bay Area. Contains e.g. proposals to keep the waste at Risø for an interim period of 50-100 years.*(See sections 3.2.3, 3.2.4 and 3.2.7)*
- http://polweb.nethotel.dk/Produkt/PolWeb/Sog/Showfile.asp?p=skive&id=51802: Response to consultation from Skive Municipality dated 25 November 2014 (see Annex 2 to this summary report).*(See sections 3.2.1, 3.2.7 and 3.2.8)*
- http://noah.dk/wp-content/uploads/2014/10/etikrapport.pdf: Atomaffaldsdeponering i etisk perspektiv (Storage of nuclear waste – an ethical view) by Niels Henrik Hooge, Anne Albinus, Bendy Poulsen and Kirsten Jacobsen. *They recommend waiting instead of rushing through a permanent repository.The nuclear waste should be placed in intermediate storage.(See sections 3.2.1, 3.2.5 and 3.2.7)*

Biodiversity
No comments.

Population and health
Summary of responses to consultation
There are number of concerns about the impact on the population and socio-economic conditions.

Answer
Refer to the descriptions in section 3.2.7.

Landscape and geology
Summary of responses to consultation
There is great uncertainty as to the extent of the different reserves in the area and the geological strata.

Answer
The geological conditions are discussed on the basis of existing data in the local area reports for the sites (GEUS no 5 and no 6, 2012). There has also been correspondence on this with the local museum, Museum Natur, explaining and describing the background to the assessment of the composition, thickness and extent of the geological strata.

If one or both of the sites should be designated for the continuing process, detailed geological, geophysical and groundwater studies will be carried out to determine the risk and safety conditions for the permanent repository.

Climate
No comments.

Water
Summary of responses to consultation
Skive Municipality needs all of the groundwater resources that exist within the municipality.

Answer
It is crucial for Skive Municipality to be able to exploit its groundwater resources. There is also a discussion of all known large groundwater reservoirs in the local

area reports (GEUS no 5 and no 6, 2012), also noting that there are smaller local water reserves. The conditions for classification as OSD areas and NFIs are also mentioned.

Soil
No comments.

Tangible goods
No comments.

Cultural heritage
No comments.

Other comments
With regard to comments on seismic activity, refer to section 3.2.8.

3.3.6. Risø

Two Danish responses to consultation were received (C3 and F2), plus German responses, specifically relating to conditions at Risø. The general comments in the responses to consultation are discussed in section 3.2.

Biodiversity
Summary of responses to consultation
It is felt that there is a major risk of seepage, and instead of just a 'possible' risk, it should be 'probable'. There is no assessment of the degree of impact on Natura 2000 from rises in sea levels and extreme weather events.

Answer
On the above basis, it was not possible to undertake a more in-depth assessment of the degree of impact, but it is judged that, as a result of rising sea levels and extreme weather events, there will be a risk of seepage from the site at Risø into Roskilde Fjord. The establishment of a permanent repository at Risø is not an option in the present plan. If it is decided to retain the existing store at Risø, this must be maintained to ensure that it is still safe. This also applies to a possible risk of impact on the 'Roskilde Fjord' Natura 2000 area, which will be investigated in more detail if necessary.

Population and health
Summary of responses to consultation
The response to consultation contains additional information on planning matters, including the fact that municipal planning framework 7.E.2 contains options for institutions and that a local plan has been adopted for the Research Park, which provides for homes and facilities for children. There are also calls for an assessment of planning conditions and a decision on the number of inhabitants.

Answer
The details of the municipal planning framework and the local plan have been noted. The zero alternative is not considered to conflict with these plans, as there is to be no further expansion. The health of the population is monitored all the time, and the current measured values for emissions are well below the specified

emission thresholds. This monitoring will continue throughout the lifetime of the store, and therefore takes account of possible new residential areas.

The population figures were not given in the SEA report – they can be seen in the table below:

The breakdown and number of inhabitants is as follows (Statistics Denmark 2014):
Risø Huse: (not reported by Statistics Denmark)
Veddelev: approx. 1,150
Store Valby: approx. 400
Roskilde town: approx. 50,000

The population figures provide a picture of closeness to settlements, both smaller villages and the town of Roskilde itself. This does not alter the assessment in the SEA report of the impact on the population, including health and socio-economic aspects, and this is based on the current measured values for emissions, which are well below the specified emission thresholds.

The strategic environmental assessment uses the analysis of the overall planning conditions in its evaluation of the specific environmental conditions where this is relevant – e.g. conflicts between socio-economic impacts and the municipalities' overall development goals for tourism. This is why there is no assessment section under 'Planning conditions'.

Landscape and geology
No comments.

Climate
Summary of responses to consultation
Acknowledge that climate and extreme events are included in the assessment.

Water
Summary of responses to consultation
See comment on seepage and impact on biodiversity.

Soil
No comments.

Tangible goods
No comments.

Cultural heritage
No comments.

Other comments
Summary of responses to consultation
Seismic activity has been recorded, which could perhaps be seen in relation to the fault zones in the area. It would be problematic from a safety standpoint not to take this into account in any view of the zero alternative.

Roskilde Municipality has general questions about the significance of Risø as the zero alternative and points out that the facility at Risø was established as an interim solution.

Answer
It is true that two fault zones running north-south, the Risø fault and the Roskilde fault, have been recorded, both of great regional extent. The Risø area was not included in the local area studies, where the six sites were assessed in terms of the risk or earth tremors. As described in section 3.2.8 on seismic activity, seismicity is low all over Denmark and it is also expected to be low in the area around Risø, but there are regional differences. Seismic activity and the risk of earth tremors will be included in the risk and safety analyses to be carried out with the detailed studies if it is decided to proceed with the permanent repository solution.

The Ministry affirms that the environmental impact assessment does not cover the question of permanent storage at Risø. The EIA for Risø only covers the assessment of the zero alternative, i.e. a situation in which the proposed plan is not adopted and the waste remains in its present location, which must then be maintained so that it remains safe. It is thus assumed in the zero alternative that the official requirements on radiation protection and safety, including reference doses, will remain unchanged. It is not the intention to implement the zero alternative.

4. Alternatives

4.1. Six alternative sites

The SEA report discusses six possible locations for a permanent repository, all treated as equal alternatives. It does not single out one or more preferred suggestions.

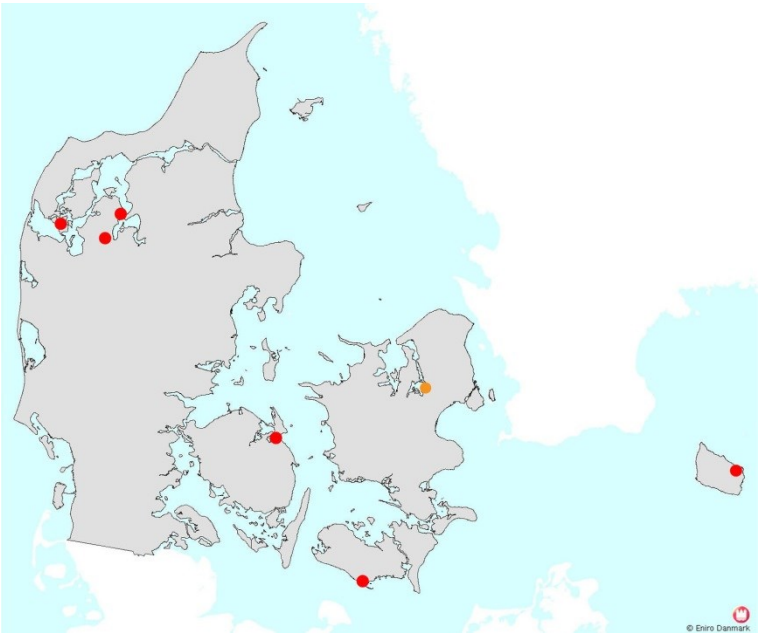

Figure 4-1 Map illustrating the six potential sites for a permanent repository and the zero alternative at Risø marked in yellow.

4.2. Zero alternative

The environmental impact assessment also includes the ‘zero alternative’. This is the situation in which the plan is not implemented. In this context, the ‘zero alternative’ is defined as continued storage at Risø. The six potential sites and the zero alternative are marked on Figure 4-1.

The zero alternative is defined as a situation where the existing and future radioactive waste remains stored at Risø in the buildings and facilities in existence today. It is assumed that the official requirements on radiation protection and safety, including reference doses, should remain unchanged after 2023. The zero alternative therefore does not cover the establishment of a permanent repository, but provides a basis for comparison in the EIA.

Moreover, no other alternatives are discussed in the environmental impact assessment, such as other possible uses of the sites or alternative methods of storing the waste, including an intermediate storage solution, which are dealt with separately in a number of parallel studies.

4.3. Choice of alternatives

The SEA report pointed out that there are local differences in environmental conditions and potential impact within each site and between the six sites. It is felt that, for individual environmental factors, there is a risk of significant impact if the plan were to be implemented, and there should be a particular focus on these matters in any subsequent EIA process.

It is felt that it is not possible on the basis of the SEA report alone to select one or two sites that seem better suited to house a permanent repository. Plan guideline no 5 concerning potential sites is therefore unaffected.

5. Monitoring

According to Section 9(2) point 3 of the Environmental Impact Assessment Act, the authority must monitor the major environmental impacts of the plan. The monitoring programme from the strategic environmental assessment will be retained.

The purpose of the monitoring programme is to be able to assess whether implementing the plan will produce the expected effects on the environment, and whether it is necessary to mitigate any impact that has not been foreseen. Where possible, it is therefore proposed to monitor the expected significant effects of the plan on the environment.

A monitoring programme will also be drawn up for any future project, to be planned on the basis of the actual situation and the chosen repository type and the geology etc. in the area. It has therefore not been defined at this time how the project itself will be monitored and exactly what this will involve.

5.1. General

The plan contains a number of guidelines which not only provide the overall framework for establishing a permanent repository but are also intended to prevent or mitigate any potential impact on the environment. In the later planning and project design phases, action will therefore be taken to ensure that the plan guidelines are complied with. It will also be determined whether the guidelines in the plan and the proposed mitigation measures are sufficient to ensure that there will be no significant environmental impact from implementing the plan.

5.2. Population and health

Safety criteria and analyses
The reference dose will be used, together with model calculations, to set quantitative limits for annual emissions of radioactive substances into the air and water from a repository, to ensure that the calculated radiation dose for the critical group does not exceed the reference dose. Measurements of the current emissions and a comparison of these with the specified emission limits will constitute the actual check that the operation of a permanent repository in the operational period complies with the dose criterion.

The period after closure includes an initial monitoring phase. It will then be decided how long the repository should be actively monitored by the supervisory authorities. It will therefore be natural to define a reference dose for emissions for the projected development of the repository corresponding to the dosage criterion that currently applies to checks on the release of materials from the nuclear facilities at Risø. Release of such materials means that they are regarded as non-radioactive material which is no longer covered by checks by the nuclear supervisory authorities. It is therefore suggested that the reference dose for the projected development of the repository be set at 0.01 mSv per year, in line with the current dosage criterion for release laid down in Ministry of Health Order No 192 of 2 April 2002 on exceptions from the Act on the use etc. of radioactive substances (Lov om brug m.v. af radioaktive stoffer).