Submarine Dismantling Project (SDP)

Strategic Environmental Assessment (SEA) Non-Technical Summary

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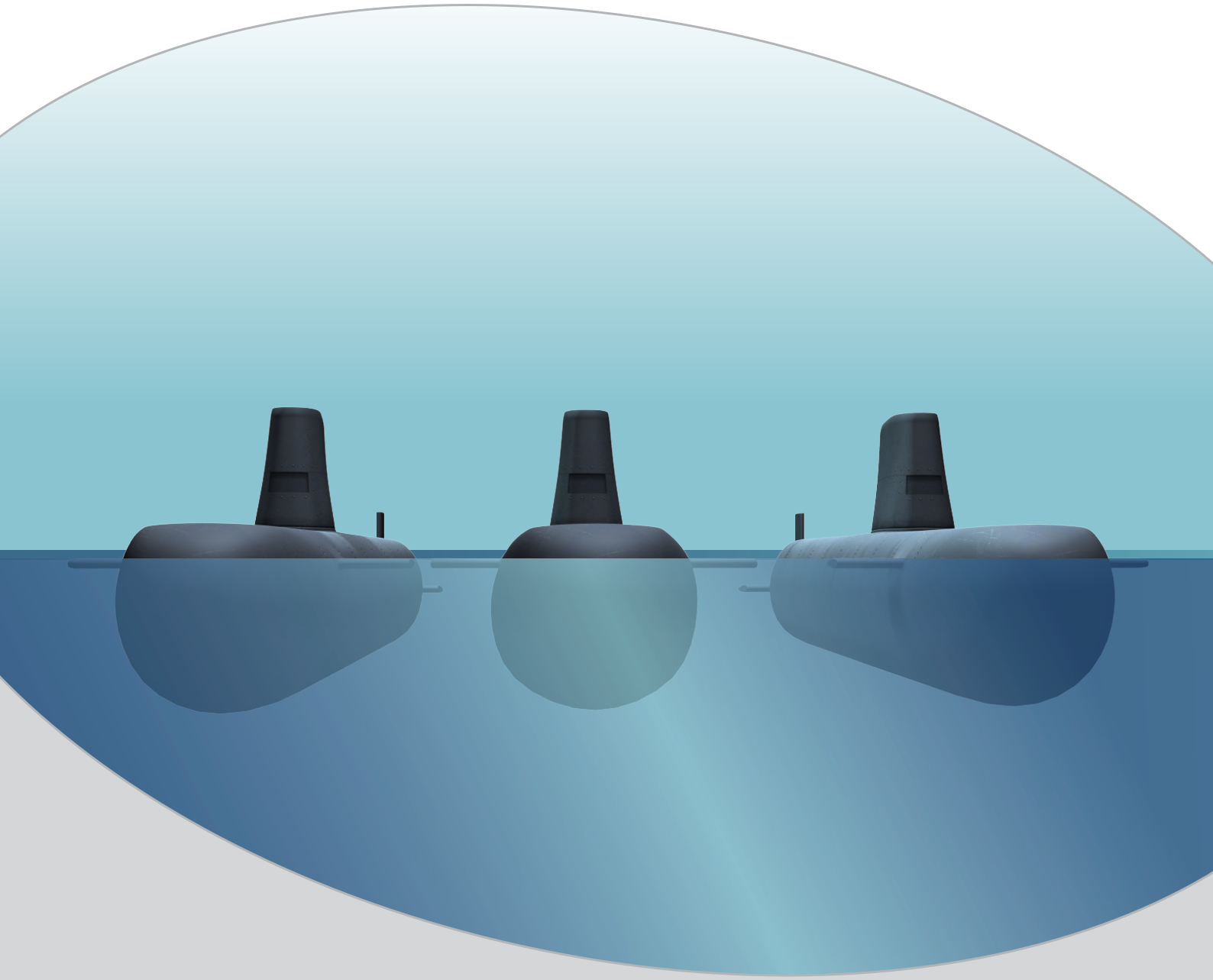

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MINISTRY OF DEFENCE

Document Revisions

No.	Details	Date
1	Version 1.0 following further MOD and SDP Advisory Group comments	25.07.11
2	Revised version 1.1 following further advisory group comments	5.8.11
3	Revised version 1.2 following MOD and SDP Advisory Group review	1.9.11
4	Revised version 1.3 (final draft) following MOD review	23.9.11
5	Version 2.0 (approved)	10.10.11

Preface

This report is the Non-Technical Summary of the Environmental Report for the Strategic Environmental Assessment (SEA) of the Submarine Dismantling Project. Its aim is to summarise the findings of the Environmental Report in a simple and clear format, which is accessible and understandable to the general public. These documents have been produced as part of the SDP Public Consultation; we would like your views on the approach we have taken, and on the findings.

The SEA has found that few of the numerous options put forward for submarine dismantling would have any potentially significant environmental effects. The proposed solution to submarine dismantling that the MOD is putting forward in the SDP public consultation has been found to have no likely significant environmental effects. The SEA also highlights a number of smaller, less significant positive and negative effects; this report describes them, and details the measures that should be taken to enhance the beneficial effects and avoid or minimise the negative ones. Throughout the project the MOD will remain committed to putting environmental issues at the heart of its decision making process.

1. Introduction

Seventeen nuclear-powered Royal Navy submarines are stored safely afloat at Devonport and Rosyth dockyards, having come to the end of their lives and left Naval service. Eventually, the remaining ten submarines currently in service (up to and including 'Vanguard' Class) will also come out of service and will be stored at Devonport. The Government has decided that indefinite afloat storage is no longer a suitable strategy, and that the redundant submarines should be dismantled. The **Submarine Dismantling Project (SDP)** has been set up to achieve this. The Ministry of Defence (MOD) is responsible for implementing the Submarine Dismantling Project, and is committed to dismantling the submarines in a way that is safe, environmentally responsible, secure, cost-effective and inspires public confidence.

Dismantling nuclear-powered submarines and managing the radioactive waste from them has a number of potential environmental effects. These potential effects have been identified and assessed using an established process known as a Strategic Environmental Assessment (SEA). The findings of the SEA have been used to inform the current public consultation on the SDP. This document summarises the main findings of the SEA in a non-technical format.

2. What is the Submarine Dismantling Project?

2.1 Introduction

The SDP is the MOD's project to deliver a timely and cost-effective solution for the dismantling of the UK's redundant, defueled, nuclear-powered submarines.
When a nuclear-powered submarine leaves service with the Royal Navy, the nuclear fuel is removed from the reactor and sent for long-term storage at Sellafield, Cumbria. This is specialised but routine work that has been carried out at the Babcock nuclear site at Devonport dockyard for many years, and will continue in the future (the facilities there are currently being upgraded). Defuelling is **not** part of the Submarine Dismantling Project. Serviceable equipment is removed for re-use, and the submarine is then laid up for long-term afloat storage. Until 2004, submarines were also defuelled at Rosyth, and seven submarines remain afloat there. The fuel will have been removed from all the submarines before they are dismantled.
Once the submarines have been defuelled, the majority of the remaining radioactivity is contained within the Reactor Pressure Vessel (RPV), the metal container within the reactor which houses the fuel. This radioactivity is mainly in steel components which have become radioactive by use over time. The RPV is contained within the Reactor Compartment (RC) towards the back end of the submarine (**Figure 2.1**). Submarines weigh between 5,000 and 16,000 tonnes, depending on the Class. Of this, the Reactor Compartment weighs approximately 700 tonnes (around 1,000 tonnes for the larger, 'Vanguard' Class submarines).

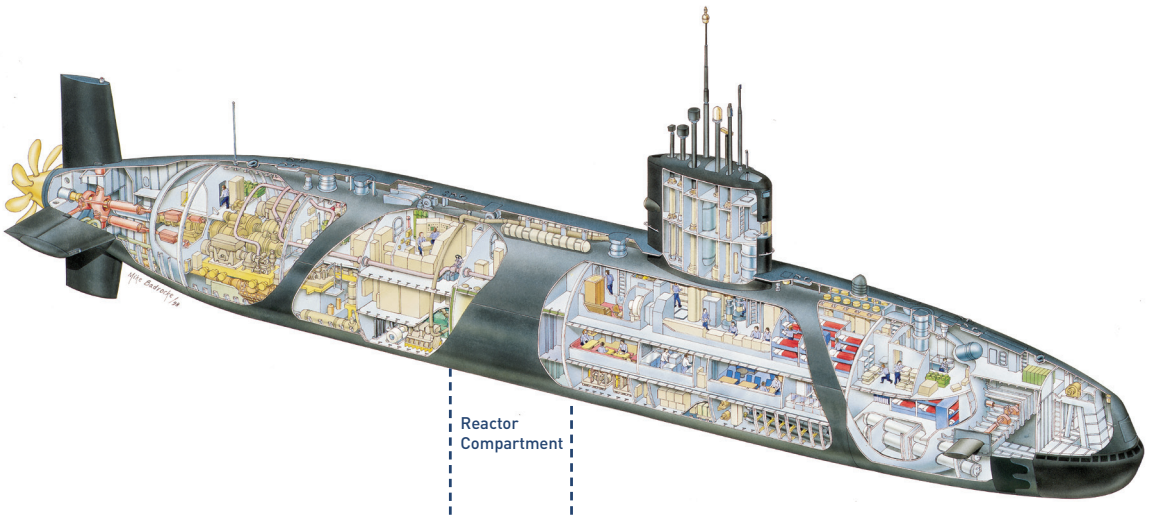


Figure 2.1 Cross-Section of a Royal Navy Submarine, showing the location of the Reactor Compartment (Crown Copyright - Navy News)

The design of both the Reactor Compartment and Reactor Pressure Vessel includes shielding to protect submariners from radiation during operation. These same internal safety barriers ensure that the submarine is safe to be stored afloat for a prolonged period.

Whilst afloat storage has proved to be a very safe arrangement for over 30 years, it does not fulfil MOD or wider Government long-term nuclear decommissioning policies, which require that decommissioning and disposal operations should be carried out as soon as reasonably practicable. Additionally, the capacity at Devonport for storing the submarines is expected to be reached around 2020 and the cost of maintaining the redundant submarines in a safe condition is increasing significantly as they age and increase in number. As such, the current situation is not sustainable and action is now required.

In general terms, dismantling a laid-up submarine will include the following key stages:

- **Initial Dismantling:** Radioactive material will be removed from the submarines. This comes in three forms - as Intermediate Level Waste (ILW), Low Level Waste (LLW) and Very Low Level Waste (vLLW). A description of these terms can be found in the glossary at the back of this document. The ILW will be made ready for storage, whilst the LLW will be disposed of in accordance with the UK's established Lower-Level Waste Strategy at existing facilities, such as the UK LLW Repository in Cumbria. If technically possible, the LLW will be processed further to remove and recycle any uncontaminated materials, in order to minimise the amount of LLW for disposal. vLLW carries such low levels of radioactivity that it can generally be managed in conventional waste streams.
- **Interim Storage:** The ILW does not have a current disposal route, so will have to be stored within the United Kingdom, until the UK's proposed Geological Disposal Facility (GDF) becomes available to the SDP, some time after 2040.[1]
- **Ship Recycling:** The remainder of the submarine hull, with the radioactive material removed, will then be transported and broken up at a conventional UK ship recycling facility. This is the way in which the MOD's redundant surface ships are already broken up and recycled.

The SDP will involve developing facilities to undertake the initial dismantling, and, if needed, to store the ILW. It will also involve transporting submarine hulls and waste materials, and eventually decommissioning and disposing of the facilities once no longer required.

Before decisions are made about how to go about this, the MOD is publicly consulting on its proposals for the following:

- How the radioactive material is removed from the submarines.
- Where the radioactive material is removed from the submarines.
- Which type of site is used to store the intermediate-level radioactive waste that cannot be disposed of until the proposed Geological Disposal Facility becomes available.

There are a number of viable options for each of these issues, and the SEA provides information on the potential environmental, social and health-related effects for each option.

1 You can find details about the Geological Disposal Facility from the Department of Energy and Climate Change, at http://mrws.decc.gov.uk/en/mrws/cms/home/What_is_geolog/What_is_geolog.aspx

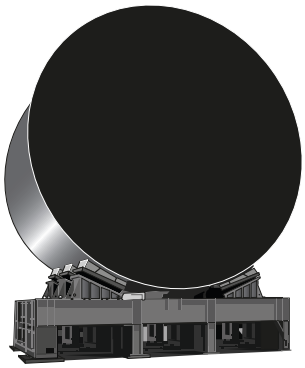
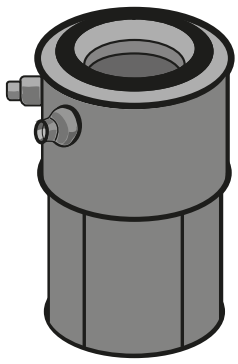
The principles of the SDP are that:

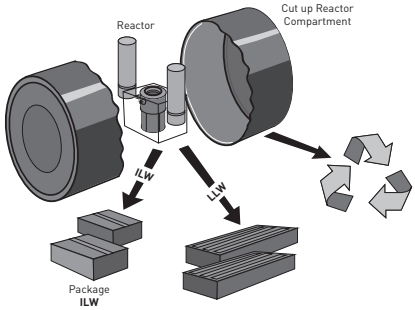
1. Continued afloat storage (known as the 'do minimum' option) is not a reasonable long term solution, due to both MOD and wider Government decommissioning policies, together with storage capacity constraints and long-term cost;
2. the redundant submarines cannot be dismantled or disposed of abroad, for defence and security reasons;
3. all submarines will already have been defuelled before they undergo dismantling, so there will be no nuclear fuel nor any associated High Level Waste to deal with;
4. the proposed Geological Disposal Facility is not expected to be available to the SDP until at least 2040, which means that some form of interim ILW storage will be necessary;
5. all dismantling work on the Reactor Compartment must take place at a site that holds an appropriate civil nuclear Licence, whether this is at a new or an existing facility (see the glossary for details)
6. much of the radiological work involved in dismantling (e.g. work involving radioactive materials) is already established practice in the UK, so there will be very few new technical procedures involved;
7. the non-radioactive front and rear sections (which form the bulk of each submarine) do not have to be dismantled at a nuclear Licensed site, and could be handled at a commercial UK ship recycling facility to give better value for money;
8. where possible, non-radioactive materials will be re-used or recycled (rather than be disposed of); and
9. the principles of legal compliance, adopting industry good practice, openness and transparency will be applied to the project.

2.2 Options for removing radioactive material from the submarines

The defuelled submarines need to be docked into an initial dismantling facility, where the radioactive material can be safely removed. Unless the submarines are dismantled in their current locations at Devonport and Rosyth, it follows that some of the submarines will need to be moved by sea to the initial dismantling facility.

Three technical options for dismantling the reactor compartments have been considered within the SEA:

	**i. Separate and store the whole Reactor Compartment 'RC Seperation'**. This would involve the Reactor Compartment (RC) being removed intact from each submarine. The rest of the submarine hull would be taken away and dismantled using standard commercial ship recycling processes. The Reactor Compartments (weighing around 700 to 1000 tonnes) would be stored intact on land until the proposed GDF becomes available to the SDP, at some point after 2040. Only at that point would the Reactor Compartments be dismantled and the intermediate level waste (ILW) packaged for transport to the proposed GDF. Low Level Waste (LLW) would be managed in accordance with the UK's LLW Policy and transported to a Licensed facility (such as the National LLW Repository in Cumbria), where uncontaminated materials would be separated to minimise the amount of LLW to be disposed of.
	**ii. Remove and store the Reactor Pressure Vessel 'RPV Removal'.** This would involve cutting into the Reactor Compartment and removing the 50-80 tonne Reactor Pressure Vessel and any contaminated components (such as pipes), which would be separated into ILW and LLW. The RPV and any associated ILW would be stored intact at the interim storage facility, and the LLW would be taken away to a Licensed LLW facility. The submarine hull would be transported to a UK ship recycling facility for breaking and recycling. Once the proposed GDF becomes available to the SDP, the stored RPVs would be cut up ('size reduced') into packaged waste, and transported to the proposed GDF in 3m^3 containers. There is the possibility that the proposed GDF might be able to accept RPVs intact; however it is too early to state with any certainty whether this could happen.



iii. Remove and size-reduce the RPV for storage as 'Packaged Waste'. This would involve removing and taking apart ('size-reducing') the Reactor Pressure Vessel straight away, packaging the ILW into GDF-compliant, 3m^3 containers, and placing them into interim storage. The LLW would again be packaged and transported to a Licensed facility, and the remainder of the submarine would be taken to a UK ship recycling facility for breaking.

Irrespective of the option chosen, the reactor will need to be dismantled and packaged **before** the ILW can be accepted into the proposed GDF, as the Reactor Compartments and RPVs ware expected (against current planning assumptions) to be too big to be disposed of intact. Therefore, the most significant difference between these options is when the RPV is size reduced and the ILW packaged into a form that the proposed GDF could accept. Storing either the RC or the RPV intact would only defer the point at which this is done; the assumption is that this would be when the proposed GDF becomes available for submarine ILW, some time after 2040.

2.3 Options for where to remove the radioactive material from the submarines

The initial dismantling facility/ies could be sited on:

- undeveloped, 'green-field' land;
- previously-developed 'brown-field' land (both of which would need to be Licensed for nuclear work);
- sites which hold an existing civil Nuclear Licence or military Authorisation.

These three categories have evolved from the two basic distinctions of either developing a new nuclear site, or using an existing facility.

Since sites on 'undeveloped' and 'previously-developed' land could potentially be anywhere in the UK, the MOD included these generic site options in the SEA process, and has used the results to inform the site selection process[2].

By contrast, there are only a small number of 'existing' nuclear Licensed or Authorised sites in the United Kingdom[3] that could realistically undertake initial submarine dismantling. For example, sites must have direct access to the sea, so inland locations would not be feasible. As a result, the MOD considered it reasonable to identify and name these sites, look at them in more detail and assess the potential environmental effects of undertaking SDP activities there. The process of identifying these candidate 'existing' sites has been completed.[4] These are:

- **Devonport Dockyard, Plymouth**
- **Rosyth Dockyard, Fife.**

The submarines could all be dismantled at either, or at both sites (this is known as the 'dual site' option).

2 An explanation of the indicative site selection process can be found in the document SDP - Our approach to decision making, February 2011 on the SDP web-site, http://www.mod.uk/DefenceInternet/MicroSite/DES/WhatWeDo/SDP/

3 See http://www.hse.gov.uk/nuclear/licensees/pubregister.pdf for the full list

4 An explanation of how we arrived at these sites can be found in the SDP Site Criteria and Screening Paper – available on the SDP website (http://www.mod.uk/DefenceInternet/MicroSite/DES/OurPublications/SDP/MOD+Studies/)

2.4 Options for storing the ILW

An interim storage facility will be needed to hold the ILW safely until the proposed GDF could accept it. Such a facility could again (in general terms) be built on:-

- Undeveloped, or 'green-field' land
- previously developed, or 'brown-field' land
- sites which hold an existing civil nuclear Licence or Authorisation.

The 'existing' Licensed or Authorised sites could either be at or close to where initial dismantling takes place (known as the 'point of generation'), or somewhere remote from it. At this stage, individual ILW storage sites cannot be identified, beyond those obviously at the point of generation. Instead, the public consultation will focus on the generic options for storing the ILW; namely storing it at the point of generation or at one or more 'remote' Licensed/ Authorised sites under the control of the MOD, commercial operators or the UK Nuclear Decommissioning Authority.
The SDP Consultation Document gives further details about the storage site selection process, and why the 'remote' sites cannot yet be named.

Storage of RCs at a site remote from the initial dismantling site has not been assessed as an integrated option. This is because our cost studies found that the additional costs associated with sea transport and dockside handling of RCs would make moving them to a different site for storage uneconomic.

The size and design requirements for the interim ILW storage facility will vary significantly, depending on how the reactors are dismantled. A facility of approximately 11,600m^2 will be needed to store 27 intact Reactor Compartments. By contrast, a much smaller facility of approximately 800m^2 will be needed to store the Reactor Pressure Vessels. Storing fully-packaged ILW will require a facility of around 1000m^2 (for comparison, a professional football pitch is about 7,140m^2).

3. The Strategic Environmental Assessment

This section describes the role and purpose of the SEA.

3.1 What is SEA?

Strategic Environmental Assessment (SEA) is the way in which the significant environmental effects of a strategic programme like the SDP can be assessed[5].

The purposes of the SEA are:

- to identify and assess the potentially significant environmental effects of the SDP options;
- to enable the public to comment on the potential effects and to suggest improvements;
- to ensure that the potential effects are properly considered throughout project planning and before major decisions are made, to suggest measures to avoid, reduce or manage damaging environmental impacts, and to enhance beneficial effects.

The results of the SEA have fed into our options assessment process, which has resulted in the proposals being put forward in this public consultation. The main stages of the SEA process (as applied to the SDP) are shown in **Box 1.**

Box 1 Stages of the SEA

Stage A	The proposed scope of the SEA assessment (essentially, the issues covered) was set out in a Scoping Report, which has been agreed with statutory and other government consultees. It can be found on the SDP website (http://www.mod.uk/DefenceInternet/MicroSite/DES/OurPublications/SDP/).
Stage B	The likely significant environmental effects of the SDP's 'reasonable options' have been assessed. This includes short- and long-term, direct and indirect effects, as well as cumulative effects (where multiple small effects add together to have a large combined impact) and synergistic effects (where effects add together to create an impact greater than the sum of their parts).
Stage C	An Environmental Report has been written detailing the results of the assessments, and proposing ways to improve the environmental performance of the SDP. This Non-Technical Summary describes what is in the Environmental Report.
Stage D	Public Consultation will take place on the SDP proposals (including the Environmental Report), after which the responses will be considered and integrated into the final decisions on how to proceed with the proposals. A post-adoption report will be published to show how MOD has taken the public's views on the SEA into account.
Stage E	The environmental effects of the selected options are monitored, largely through subsequent statutory assessments at project level.

5 SEA is a Statutory process (the Environmental Assessment of Plans and Programmes Regulations 2004) which applies to certain public plans and programmes. Although MOD activities are generally not subject to SEA, the SDP is using the process as a good practice measure, which will help inform the public consultation process.

3.2 Scoping the SEA

Stage A (SEA Scoping) provided an opportunity for the UK's Statutory Consultation Bodies and other Government Departments and Agencies to comment on the scope and the level of detail which should be included in the environmental assessment. Following two separate periods of Scoping, in June and December 2010, the final Scoping Report was published in March 2011 to show how the assessment would be undertaken.[6]

3.3 Reporting

Following agreement on the scope, the assessment was undertaken and the environmental report written, which has documented the likely significant environmental effects of the SDP proposals and suggest measures to minimise negative effects and enhance positive ones. It has also proposed ways in which the potential environmental effects of the SDP can be kept under review. This document is the plain-English summary of the Environmental Report.

3.4 What environmental issues have been assessed?

SEA requires that the environmental issues relevant to the proposed plan or programme are identified at the Scoping stage. Fourteen issues (summarised in **Table 3.1**) have been identified by reviewing relevant plans and programmes and assessing a wide range of baseline information. These issues are not presented in any order of priority.

Table 3.1 Environmental issues considered in the SEA

Biodiversity & Nature Conservation: This covers the potential effects of the SDP proposals on the natural environment, including effects on areas protected for their wildlife and conservation importance.
Population: The SEA has looked at potential effects on local communities, including issues such as disturbance, employment and training.
Human Health & Wellbeing: This covers potential effects on people's health and on health service provision. This includes health and safety issues for those working on submarine dismantling.
Health (Noise and Vibration): This has assessed the effects of noise and vibration on people and communities.
Soil & Geology: This looks at potential effects on soil, including contamination and the potential to disturb historic contamination. It also includes potential effects on any important geological features.
Water: This looks at potential effects on surface waters, groundwater systems and the marine environment, including the effects of planned and accidental discharges to water.
Air: This covers potential effects on air quality, including effects from construction, transport and of planned and accidental emissions into the atmosphere.
Climate Change & Energy Use: This looks at the likely impacts of climate change (such as changing sea levels, increased temperature and water availability), as well as on the SDP's energy use and greenhouse gas emissions.
Coastal Change & Flood Risk: This covers existing and future flood risks, as well as the effects of changing coastlines and land instability.
Transport: This covers the effects of transport, particularly through urban and other sensitive areas. This includes consideration of oversized, hazardous and/or radioactive materials.
Waste Management: This covers the type and amount of waste that the SDP may produce, and the effects this could have.
Materials & Land Use: This looks at possible effects on land use, on the use of finite resources such as minerals, and on the quality and environmental performance of buildings and facilities.
Cultural Heritage: This covers potential effects on the historic environment, including on cultural heritage, historic buildings and archaeological features.
Landscape & Townscape: This covers potential effects on the quality and attractiveness of landscapes and townscapes, as well as on public access to open spaces.

6 The SEA Scoping documents are available from the SDP website: http://www.mod.uk/DefenceInternet/MicroSite/DES/OurPublications/SDP/MOD+Studies/

3.5 How has the assessment been undertaken?

Each of the SDP's strategic options - **how** the radioactive materials should be removed from the submarines, **where** those materials should be removed, and **which type** of site is used to store the ILW - have been assessed for their potential impacts on the environmental issues listed in **Table 3.1**. The assessment was undertaken by a team of consultants at Amec[7] and includes the following:

- the potential environmental effects of both the generic and site-specific SDP options;
- the steps that could be taken to avoid or reduce any significant negative effects, and enhance positive effects;
- the assumptions and uncertainties that underpin the assessments;
- the timescales over which the potential effects could occur;
- the additional information that will be needed to address uncertainties and to undertake more detailed site-specific assessment in the future.

In total, the SEA has involved **35** individual assessments being made on all the project's options. The assessments have been recorded in colour-coded matrices to show the effects of each option. The key findings are summarised in this Non-Technical Summary.

SEA is not intended to provide a detailed assessment for individual sites, so the findings are relatively high-level. Whichever site(s) are finally chosen, further site-specific Environmental Impact Assessment (and possibly a site-specific Habitats Regulations Assessment) will be required, by law, before any development can take place. Environmental permits will also be required for the site(s) to operate. All of these will be public documents and open to comment. [8]

7 Amec Infrastructure and Environment (www.amec-ukenvironment.com), formerly known as Entec, is a UK-based multidisciplinary environmental and engineering consultancy. It has produced the SEA assessment for the MOD.

8 The main legislation is as follows: The Town & Country Planning (Environmental Impact Assessment) (Amendment) (England) Regulations 2008, and their devolved equivalent in Wales, Scotland and Northern Ireland; the Nuclear Reactors (Environmental Impact Assessment for Decommissioning) Regulations 1999; The Conservation of Habitats and Species Regulations 2010; the Environmental Permitting Regulations 2010 in England & Wales; the Radioactive Substances Act 1993 for Scotland & Northern Ireland.

4. What are the Potential Environmental Effects of the SDP Options?

4.1 The Potential environmental effects of the 'do minimum' option

The SDP has been developed because the 'do minimum' option of continuing to store the submarines afloat indefinitely is not acceptable. However, MOD firstly needed to assess what the environmental impacts of continued afloat storage might be, to provide a comparison for the assessment of the other options. The results are shown in Table 4.1 below.

Table 4.1 Assessment of the 'Do Minimum' Option on the Environment

A: Biodiversity & Nature Conservation	B: Population	C: Health and Wellbeing	D: Noise & Vibration	E: Geology & Soils	F: Water	G: Air	H: Climate Change & Energy Use	I: Coastal Change & Flood Risk	J: Transport	K: Waste Management	L: Land Use & Materials	M: Cultural Heritage	N: Landscape & Townscape
-/--	--/+	0	-	0	-	-/0	0	-/0	0	-/0	0	0	-

Score Key:	+ + Significant Positive effect	+ Minor positive effect	0 No overall effect	- Minor negative effect	- - Significant negative effect	? Score uncertain

NB: where more than one symbol is presented in a box it indicates that the SEA has found more than one score for the category. Where the scores are both positive and negative, the boxes are deliberately not coloured.

The 'do minimum' option effectively means no change to the status quo - submarines would continue to be stored afloat, but in increasing numbers. The biggest single issue is that this option does not deal with the legacy of nuclear waste, but leaves it to future generations to manage. It requires an indefinite financial commitment to the ever-increasing maintenance programme, which would be needed to keep the laid-up submarines in safe condition. The scale and open-ended nature of this commitment would limit the funds available for future public funding elsewhere, so having an obvious negative effect on communities. By contrast, there would be a small positive effect associated with the jobs that would be maintained by the ongoing maintenance requirements.

As the amount of maintenance steadily increases, there may be some minor, localised effects on air and water quality and noise levels in the long term.

New dockside infrastructure would eventually be needed at Devonport to accommodate the additional submarines. In addition to building the facilities, dredging would be required. This could affect water quality, create waste, increase noise, vibration and other disturbance. Changes to water quality could also affect the European-protected Plymouth Sound and Estuaries Special Area of Conservation. If the effects were not or could not be mitigated against, they could be significant.

The indefinite storage of twenty submarines at Devonport and seven at Rosyth would also present a striking image - this could be considered by some members of the local community to affect the attractiveness of their area.

Eventually submarine dismantling will still need to occur. In consequence, the range of effects described below could also be expected to occur at some future point for the do-minimum option. This would mean that the long term and cumulative effects of this option could be significant.

4.2 The potential environmental effects of removing radioactive material from the submarines

The potential environmental effects associated with the three technical options for removing the radioactive material were found to be similar. However, the scale of the effects and how long they would last varies considerably, depending on the following factors:

- **When work is undertaken.** Delaying the point at which the reactor is dismantled and the ILW is packaged will maximise the amount of radioactive decay that can take place, which will in turn minimise the radiological dose to workers.
- **The size of the initial dismantling facility.** The larger the facility, the greater the potential environmental effects of land-take and building would be.
- **The amount of transport required** to move the submarine prior to initial dismantling; to move the radioactive materials; and to take the residual submarine hull to a ship recycling facility.
- **Where the initial dismantling facility is located** and the characteristics of the local environment and local community.
- **What other developments** are taking place in the area. These could have a combined effect, alongside the SDP, on the environment.

The potential environmental effects of the dismantling options are summarised in Table 4.2 below. There are a number of assumptions that need to be made when undertaking such a strategic assessment, and these are set out in the Environmental Report. A full assessment of each option can also be found there.

Table 4.2 Assessment of the options for removing the radioactive waste from the submarines

Option Name	A: Biodiversity & Nature Conservation	B: Population	C: Health & Wellbeing	D: Noise & Vibration	E: Geology & Soils	F: Water	G: Air	H: Climate Change & Energy Use	I: Coastal Change & Flood Risk	J: Transport	K: Waste Management	L: Land Use & Materials	M: Cultural Heritage	N: Landscape & Townscape
Option 1: RC separation	--/?	+/-	0	-	-	-	0/-	-	0	0/-	+/-	-	-	-/--
Option 2: RPV removal	-	+/-	0/-	-	-	-	0	-	0	0/-	+/-	-	-	-
Option 3: Packaged waste	-	+/-	0/-	-	-	-	0	-	0	0/-	+/-	-	-	-

Score Key:	+ + Significant Positive effect	+ Minor positive effect	0 No overall effect	- Minor negative effect	- - Significant negative effect	? Score uncertain

NB: where more than one symbol is presented in a box it indicates that the SEA has found more than one score for the category. Where the scores are both positive and negative, the boxes are deliberately not coloured.

Option 1: Separate and store the whole Reactor Compartment 'RC Seperation'.

Separating and storing the RC has a number of negative effects, largely reflecting the size of the interim storage facility, at 11600m^2 would be far larger than for the other options.

The potential environmental effects include:

- The significant visual impact of the large facility needed to store the Reactor Compartments.
- The loss of land for the RC storage facility, and the knock-on effects this could have on drainage, natural habitats, the coastline, public access, archaeology and heritage features.
- If RCs or the residual front and rear sections of the submarines have to be moved by heavy lift ship as opposed to a submersible barge (which has yet to be determined), additional dredging might be needed at Devonport to accommodate this. Any such dredging could significantly affect the protected marine environment of Plymouth Sound.
- The potential effects of disturbance (particularly from noise, vibration and light pollution) on people, wildlife and sensitive historic features close to the proposed sites or along principal transport routes. This could be a particular issue during construction and decommissioning works.
- The potential for air, water and soil quality to be affected by construction and demolition of the dismantling and storage facilities.
- The creation of waste where there was none before (laid-up submarines are not classified as waste until they are broken up). This is the same across all the technical options.

The scale and duration of these potential effects need to be considered against the principal benefits of storing the Reactor Compartments:

- Maintaining a limited number of skilled jobs for the duration of dismantling, the majority of which will require specialist nuclear expertise (this is reflected in the positive score for 'population').
- This option has the lowest expected radiological dose to workers (noting that doses are predicted to be very low for all the technical options, with exposure estimates significantly or very significantly below statutory limits). This is because the Reactor Compartment would not be taken apart until some point after 2040, allowing maximum radioactive decay to take place.
- The risk of radioactive materials being accidentally discharged into the environment (where they could then affect people) is the lowest of three options for the same reason, noting the risk of this has to be minimised, whatever option is chosen.
- Dealing with the legacy of radioactive and non-radioactive waste by dismantling (and largely recycling) the submarines. This is the same across all options, and accounts for the positive score against Waste Management.

Option 2: Remove and store the Reactor Pressure Vessel 'RPV Removal'.

- No **significant** operational-related environmental effects were identified under this option, although a range of smaller negative effects was found. These potential effects are broadly similar in nature to those identified for separation of the Reactor Compartment, but on a smaller scale. They would be felt most during initial dismantling but reduced during subsequent processing, reflecting the fact the more processing would be undertaken "up-front" under this option.
- The radioactive dose to SDP workers, and the risk of accidentally discharging radioactive contaminants into the environment would be marginally higher than for RC separation during the initial dismantling phase, as the initial dismantling would be slightly more intrusive (although both worker doses and planned discharges are predicted to remain significantly below statutory exposure limits.) Most of the radioactivity is inside the RPV, so keeping it intact would only increase the occupational dose slightly.

The scale and duration of these potential effects need to be considered against the principal benefits of storing the Reactor Pressure Vessels:

- The most significant difference would be in the size of the RPV storage facility. At around 800m^2, this is the smallest

of the three proposed interim storage facilities, and would be over eleven times smaller than the RC facility. This would significantly reduce the potential environmental effects associated with land-take, building works, operation and eventual demolition.

- Heavy lift ships or barges would not be needed to move the submarines once the RPV has been removed, as the submarines will still float, and so could be towed. As a consequence, no additional dredging (which would damage the sea bed) would be needed. Ongoing maintenance dredging might still be required as a part of normal dockyard activities, but SDP would not be a contributing factor to this requirement.
- In the same way as storing Reactor Compartments, storing Reactor Pressure Vessels intact allows radioactive elements to decay substantially before they are processed and packaged into GDF-compliant containers. This will again reduce already low worker dose levels and the possible impacts of any accidental discharges during the latter stages of dismantling. Delaying the point of final dismantling also gives more time for size reduction technologies and techniques to be developed. There is the possibility that the proposed GDF might be able to accept RPVs intact; if this is the case, the environmental effects of 'size reducing' the RPV to packaged waste (described below) would be avoided.

Option 3: Remove and size-reduce the RPV for storage as 'Packaged Waste'.

- No significant operational-related environmental effects were identified under this option, although a range of smaller negative effects was found. These potential effects are broadly similar in nature to those identified for separation of the Reactor Pressure Vessel, but on a smaller scale.
- As the pressure vessel would be removed, taken apart fully and packaged straight away, potential environmental effects associated with operations would be greater in the short-term than the other technical options, where processing is split into two phases. There would be no effects in the longer term as the ILW would have already been processed and would be ready to go straight into the proposed GDF.
- Since this option involves the most intrusive work on the reactor prior to storage, both the radioactive dose to SDP workers and the risk of accidentally discharging radioactive contaminants into the environment as the result of an accident are slightly higher than for the RPV option. However, the occupational dose to workers and planned discharges are again expected to remain significantly below statutory exposure limits.
- There would be also no opportunity to benefit from the effects of delaying cut-up on radioactivity levels, since full processing would be undertaken prior to interim storage.

The following benefits of this option are:

- The $3m^3$ ILW containers are small enough to be transported safely by road or rail. As a result, there would be no need for any additional dredging and the environmental impacts that might bring.
- The interim storage facility for the fully-packaged ILW would have a footprint of approximately $1,000m^2$. As a result, the environmental impacts associated with building, operation and decommissioning this facility would be much smaller than they would be for Reactor Compartment storage on a similar site, but similar in size and nature to those for RPV storage. As the ILW packages could be moved by road or rail, the choice of location of the interim facility could in theory extend to any appropriately Licensed or Authorised site in the UK.

Conclusion: Storage of the Reactor Pressure Vessel (Option 2) and full dismantling to Packaged Waste (Option 3) have similarly minor environmental impacts; of the two, RPV storage performs slightly better. However, storing the intact Reactor Compartment (Option 1) has the potential for significant effects on biodiversity and landscape.

4.3 The potential environmental effects of developing SDP facilities on different types of site

The SEA has assessed the potential environmental effects of developing the initial dismantling and/ or the interim ILW storage facilities on one of the following three generic categories of land:

- **Undeveloped, 'green-field' sites -** land that has not previously been developed, or has been left long enough to revert back to a 'natural' state. There would be no existing dock, infrastructure or skilled workers available. The initial dismantling facility would have to be on the coast to allow access for the submarines.
- **Previously-developed, 'brown-field' sites -** land that is or has been developed. There should be a dock, roads, etc. but there would be no nuclear facilities or skilled workers to hand. Commercial shipyards would fall into this category.
- **'Existing,' nuclear Licensed and/ or Authorised sites -** where approved nuclear activities already take place, and all the facilities and skills needed would be available.

The potential effects of developing these types of site on the environment are summarised in Table 4.3 below. A full assessment of each of these options can be found in the Environmental Report.

Table 4.3 Assessment of the different types of development site

Option Name	A: Biodiversity & Nature Conservation	B: Population	C: Health & Wellbeing	D: Noise & Vibration	E: Geology & Soils	F: Water	G: Air	H: Climate Change & Energy Use	I: Coastal Change & Flood Risk	J: Transport	K: Waste Management	L: Land Use & Materials	M: Cultural Heritage	N: Landscape & Townscape
Option 1: Green-field Site	-/--	++/-	-	-/--	-	--	-	--	-/--	--	--	--	-/--	-/--
Option 2: Brown-field Site	0/-/--	++/--	-	-/--	+/0	-	-	-	+/0/-	-	-/--	+/-	+/0/-	+/-
Option 3: Licensed/ Authorised Site	0/-/--	+/-	-	-	0	-	-	-	+/0/-	-	-	+	+/0/-	+/0/-

Score Key:	+ + Significant Positive effect	+ Minor positive effect	0 No overall effect	- Minor negative effect	- - Significant negative effect	? Score uncertain

NB: where more than one symbol is presented in a box it indicates that the SEA has found more than one score for the category. Where the scores are both positive and negative, the boxes are deliberately not coloured.

Option 1: Building SDP facilities on undeveloped, 'green-field' sites

- As Table 4.3 shows, developing initial dismantling or interim storage facilities on undeveloped land is likely to have significant impacts on many aspects of the environment, due to the scale and duration of the work needed to develop the SDP facilities and the supporting infrastructure.
- Construction-related effects, such as noise, vibration, traffic, dust etc. could be more noticeable in an undeveloped location than in a developed one, although the community is likely to be rural and so quite dispersed, which would reduce the scale of potential disturbance.
- Undeveloped sites are more likely to support wildlife, be generally unpolluted and have a higher landscape quality when compared to either a 'brown-field' site or an 'existing' nuclear site (although this very much depends on the exact nature and characteristics of the site and surrounding area).
- By contrast, development on an undeveloped site could bring significant positive effects on the population because of local investment and job opportunities during construction and operation. This accounts for the significant positive score against the population objective.

Option 2: Building SDP facilities on previously-developed, 'brown-field' sites

- Developing facilities on previously developed sites is likely to have fewer negative impacts on the environment than Option 1; where there are negatives (e.g. for water, air, energy and transport), they are likely to be less significant. This reflects the assumption that most of the infrastructure needed (such as a dry dock or existing buildings) would already be in place, so new building activity, with the associated disturbance and risk of accident, would be more limited. Again, this ultimately depends on the site and what is around it.
- Development could bring significant benefits through local investment and the jobs created during operation and, to a lesser extent, development of the site. This accounts for the positive score in 'population.' By contrast, impacts on the local community (arising from noise and vibration, traffic and stress) could be significant if the land is already in a built-up area, with people living close by.
- Using previously-developed land is consistent with current government planning policy; development would provide an opportunity for any polluted land to be cleaned up, although this could create a large amount of waste for disposal. This accounts for the potential positive scores in soils and land use, and the negative score for waste.
- The potential effects on plants and animals will depend on the site. Previously-developed land could have very little wildlife interest; however it could also be very rich in wildlife. This is reflected in the neutral to significantly negative score for biodiversity.

Option 3: Adapting 'existing', nuclear Licensed or Authorised sites

- Of the three options, using an 'existing' nuclear site as opposed to developing a new one would make the best use of existing facilities and so need the least amount of new development. Land take and ground disturbance would be minimised, as reflected in the minor positive score for land use; fewer building materials (and hence energy) would be needed; disturbance to communities and wildlife would be more limited, and there would be less construction waste to deal with. As a result, this option has the lowest level of environmental impacts overall.
- Using an 'existing' site does have drawbacks. Such sites are generally within built-up areas, so there is potential for disturbance to local communities during construction and operation. As there would be less construction, there would be fewer construction jobs available. Any existing concerns in the community about radioactivity could be exacerbated, causing undue anxiety if not properly managed.

Conclusion: Using an existing, nuclear Licensed or Authorised facility (Option 3) for either initial dismantling or interim ILW storage will have the lowest overall environmental effects of the three generic land categories. Developing a previously-developed site has slightly higher effects; however, developing an undeveloped site will have the biggest impact on the environment and should be avoided. This conclusion supports the MOD's approach of only considering 'existing' sites at this stage, and not developing new sites for the SDP.

4.4 The potential environmental effects of removing radioactive material from the submarines at specific Sites

Two individual 'existing' Licensed/ Authorised sites have been proposed for initial dismantling:

- Devonport Dockyard in Devon
- Rosyth Dockyard in Fife.

Both locations are well-established dockyards with naval heritage and long-standing connections to the UK's nuclear submarine fleet. Both are coastal and are close to environmentally sensitive areas.

The SEA has assessed the different integrated options that cover the viable combinations of dismantling site, technical option and type of ILW storage site. Whilst the results of these multiple assessments are too complex to include in this Non-Technical Summary, the overall findings for undertaking initial dismantling using the different methods at the two sites are summarised in Table 4.4. Full details can be found in the Environmental Report.

Table 4.4 Assessment of the options for initial dismantling at Devonport and Rosyth

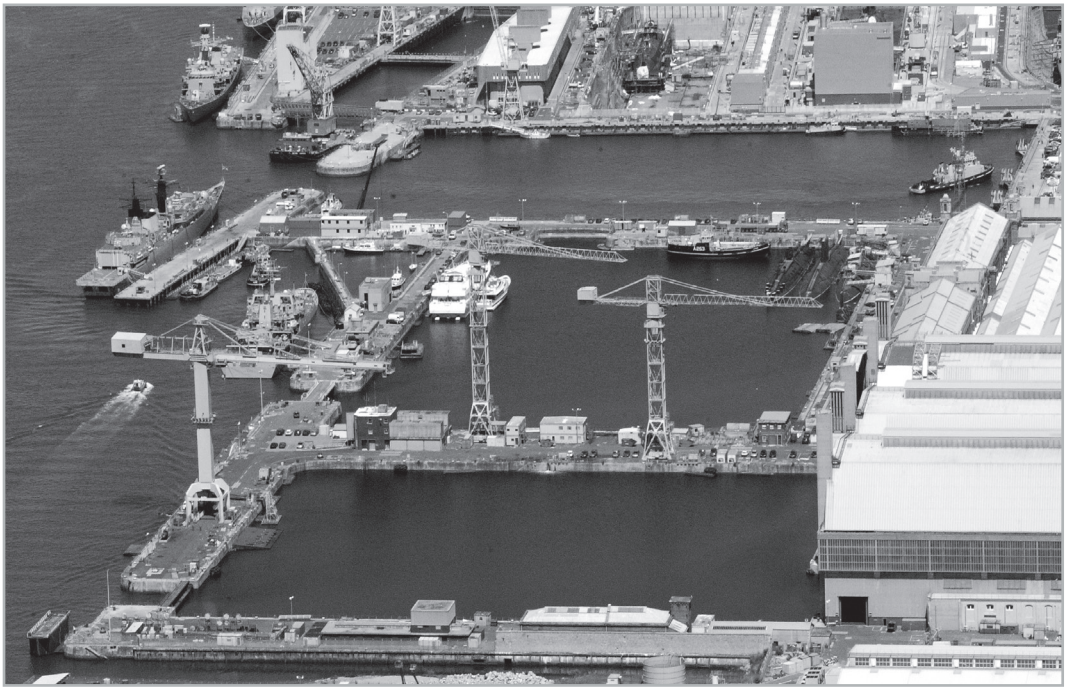
Site	Option	A: Biodiversity & Nature Conservation	B: Population	C: Health & Wellbeing	D: Noise & Vibration	E: Geology & Soils	F: Water	G: Air	H: Climate Change & Energy Use	I: Coastal Change & Flood Risk	J: Transport	K: Waste Management	L: Land Use & Materials	M: Cultural Heritage	N: Landscape & Townscape
Devonport	RC	-/--	+/-	0/-	0/-	0/-	0/-	0/-	-	-	0/-	++/-	+/-	-	-/--
	RPV	-	+/-	0/-	-	0/-	0/-	0/-	-	-	0/-	++/-	+/-	-	-
	PW	-	+/-	0/-	-	0/-	0/-	0/-	-	-	0/-	++/-	+/-	-	-
Rosyth	RC	0/-	+/-	0/-	0/-	0/-	0/-	0/-	-	-	0/-	++/-	+/-	-	-/--
	RPV	0/-	+/-	0/-	-	0/-	0/-	0/-	-	-	0/-	++/-	+/-	-	-
	PW	0/-	+/-	0/-	-	0/-	0/-	0/-	-	-	0/-	++/-	+/-	-	-

Score Key:	+ + Significant Positive effect	+ Minor positive effect	0 No overall effect	- Minor negative effect	- - Significant negative effect	? Score uncertain

NB: where more than one symbol is presented in a box it indicates that the SEA has found more than one score for the category. Where the scores are both positive and negative, the boxes are deliberately not coloured.

When considering the potential effects of the SDP options on either location, the characteristics and features of the sites become a critical factor in the assessment.

The assessment has found that, although there were many smaller environmental effects associated with undertaking submarine dismantling at both sites, the only significant potential effects were on biodiversity at Devonport (linked to the possible need to undertake additional dredging if the RC is separated), landscape at both sites (due to the potentially significant visual impact of the Reactor Compartments) and the major positive effect on waste associated with removing the legacy of laid-up nuclear-powered submarines at both sites. Although dismantling creates a significant amount of conventional waste, the fact that the submarines can be substantially recycled has minimised the impact on the waste objective, so preventing it from becoming a significant issue.



Devonport Dockyard

Rosyth Dockyard

Option 1: Devonport Dockyard

Devonport has a number of specific characteristics that mean environmental concerns will always be heightened when any new developments are proposed:

- Devonport dockyard is located in an urban and less advantaged part of Plymouth, with a steadily-growing population. This means that there are groups that could be sensitive to disturbance and the other potential effects of industrial activities living in close proximity to the site.
- Devonport dockyard is directly adjacent to The Plymouth Sound and Estuaries Special Area of Conservation, which under the EU Habitats Directive affords the highest level of environmental protection.
- Plymouth Sound has restricted water depth away from the main shipping channels, limiting the size of vessel that can be accommodated without additional dredging.
- There are five scheduled monuments and 85 listed buildings in Devonport dockyard, predominately at South Yard and Bull Point.
- There are a number of other approved or proposed developments in the area (such as the Energy from Waste Combined Heat and Power Facility at North Yard, the Princess Yachts development at South Yard and the civilian developments proposed in the Devonport Area Action Plan).

Separating the Reactor Compartment at Devonport could significantly affect biodiversity, since the Reactor Compartment and front/ rear ends of the submarines may need to be moved by a heavy-lift ship requiring deep water. Alternative transport arrangements that do not require additional dredging will need to be given preference to avoid damaging the European protected area. There is also a potentially significant environmental effect on landscape if the Reactor Compartments have to be kept on site, due to their size. Small-scale environmental impacts were identified on the twelve remaining environmental issues, largely related to disturbance during development and operation. None of them, however, were assessed as environmentally significant.

A small-scale positive impact on the population from maintaining jobs and preserving nuclear skills was identified; in addition, the removal of the laid-up submarines from Plymouth was positive in terms of waste management and the community.

The SEA did not find any likely significant impacts on community health from processing the submarines. Current discharges of radioactivity from Devonport are very low (the total annual radioactive dose to the public is less than 0.5% of the Statutory dose limit), and safety requirements mean that work on radioactive materials must be shown to be safe for both workers and the public. Any additional discharges would have to remain well within the legal limits set by the Office of Nuclear Regulation and the Environment Agency for work to proceed.

No environmentally-significant negative effects were found when the SDP was considered in conjunction with the other proposed developments in the Devonport area, although a number of more minor 'cumulative' effects were found. The SDP was found to have a significant positive effect on Population in conjunction with the Devonport Area Action Plan, due to the jobs supported in the dockyard and the investment in the area. Full details can be found in Section 6.8 of the Environmental Report.

Option 2: Rosyth Dockyard

Rosyth has the following relevant environmental characteristics:

- The dockyard is situated in a largely industrial and commercial area on the edge of Rosyth, and the nearest local housing is at some distance from the site.
- Rosyth is about 0.3 km from the edge of the Firth of Forth Special Protection Area, which is also an internationally-important wetland. Under the EU Birds Directive, the mudflats of the Forth Estuary are given the highest level of environmental protection.
- Rosyth is directly visible from the historic Forth Bridge.
- There are number of developments planned in the area, including the Rosyth Renewable Energy Plant, Rosyth International Container Terminal and the new Forth Crossing.

Developing SDP facilities at Rosyth was found to have potentially significant environmental effect on landscape if the Reactor Compartments have to be kept on site, due to their size.

The River Forth is deep enough to avoid the need for additional dredging, so consequentially any damage to the protected mudflats could be avoided and so the effects on biodiversity are lower than for Devonport.

A similar spread of small-scale impacts was identified for all thirteen remaining environmental issues; again, these were largely related to disturbance during building works and operations. The same small-scale positive effects regarding jobs and skills were also identified.

As for Devonport, the SEA did not find any likely significant impacts on community health from processing the submarines. Current discharges of radioactivity from the site are even lower than at Devonport, and the total annual radioactive dose to the public is again less than 0.5% of the dose limit. Safety requirements mean that any work on radioactive materials has to be safe; any additional discharges and would have to remain well within the legal limits set by the Office of Nuclear Regulation and SEPA for work to proceed.

No environmentally-significant negative effects were found when the SDP was considered in conjunction with the other proposed developments in the Rosyth area, although a number of more minor 'cumulative' effects were found. Potentially significant benefits on the population were found, due to investment and jobs supported. Full details can be found in Section 6.8 of the Environmental Report.

Conclusion: Given the greater environmental pressures and proximity to growing residential areas at Devonport, removing the radioactive materials from the submarines at Rosyth performs marginally better from an environmental perspective than removing the radioactive materials at Devonport. However these differences are not environmentally significant, unless the RC separation option is chosen.

4.5 The potential environmental effects of interim ILW storage

At this strategic stage of the SDP, it has not been possible to name candidate sites for storing the ILW from the submarines. The reasons for this are detailed in both the SDP consultation document and the Environmental Report. In general terms, we know that ILW could be stored at the point of generation (e.g. at Devonport or Rosyth), or it could be moved away and stored at one or more 'existing' nuclear Licensed or Authorised sites in the UK, owned by the MOD, Nuclear Decommissioning Authority or other commercial operators.

The potential environmental effects of building an interim ILW store have been assessed and are described, at a generic level, in Section 4.2 (the effects of removing radioactive material from the submarines) and 4.3 (the effects of developing SDP facilities on different types of land). These assessments concluded that storing Reactor Compartments at a new facility on undeveloped land would have the highest environmental impacts, whilst storing Reactor Pressure Vessels or packaged ILW at 'existing' Licensed or Authorised site(s) would have the smallest environmental effects and so would be preferable.

Once candidate ILW storage sites have been identified, further environmental assessment may be needed, which would then be used to inform subsequent siting decisions on the interim ILW storage element of the SDP.

4.6 Recommendations for avoiding or reducing potential environmental effects

The SEA proposes a range of measures that the MOD should consider to avoid possible damaging effects or, if not possible, to minimise or compensate for them. The measures proposed include:

- Avoiding development and/ or additional dredging in designated nature conservation sites, especially if this could damage the features for which the site is protected (e.g. mudflats or sandbanks that are important for birds).
- Minimising the size of new development to limit land-take, the use of natural resources and to reduce the risk of pollution and flood risk.
- Ensuring that a Construction Environmental Management Plan and Waste Management Plan are used during construction and that, once in operation, an Environmental Management System is put in place to avoid or minimise any damage to the environment or disturbance to local people. These must meet regulatory requirements and be consistent with industry good practice.
- Ensuring that UK Government standards for buying sustainably and efficient building design are included and enforced in all construction and operational contracts.
- Using rail and sea transport where possible, and managing road movements to minimise disturbance and congestion. Where unavoidable, movements by road should be controlled (e.g. by restricting operating/ delivery times and avoiding routes through built-up areas.)
- Maximising employment and training opportunities for local people.
- Keeping the local community and wider public informed as the project develops, in order to understand and respond to any public concerns.

4.7 Monitoring the environmental effects of the SDP

It will be important to monitor the SDP as it develops, to ensure that any of the potential environmental effects identified are minimised, and that no significant new ones occur (particularly if they have the potential to cause irreversible damage, or where monitoring would enable preventative action to be taken).

Proposals for monitoring the potentially significant effects of the SDP are set out in Section 7 of the Environmental Report.

5. What happens next?

This Non-Technical Summary provides a brief summary of the information presented in the Environmental Report.

The Environmental Report forms part of the Public Consultation on the SDP. This is a national consultation, with local events taking place around Rosyth and Devonport as well as nationally. MOD would like to hear your views on both the SDP proposals and the environmental report; details of how to do this can be found on page 23.

The views and representations received during the public consultation will be published once the consultation has ended. MOD will study the recommendations and will use them to help inform strategic decisions on the way forward.

Once the decisions have been taken by Ministers, MOD will publish a Post-Adoption Statement which will set out how environmental considerations and the views of those consulted have been taken into account in developing the SDP.

After the strategic decisions have been made, the SDP will move into the detailed planning stage; the findings of the SEA will be used to help design out damaging environmental impacts and incorporate benefits. This is also where more detailed site-specific assessments will be undertaken, as and when required.

In order to start work, the site owner(s) will also have to apply for environmental permits from the relevant Statutory Regulators. All of these involve public consultation, and so will provide an opportunity for people to review the detailed plans and to provide their views on the site-specific environmental effects that are identified at that point.

This Consultation: How to Give Us Your Views. We would welcome your views on this Non-Technical Summary and the Environmental Report. We are particularly interested to receive your views on the following questions:

1. **Do you think that the environmental report has captured the significant environmental effects of the SDP? If not, what potential effects do you think we have missed, and why?**

2. **Is there any other baseline of environmental information, relevant to the SEA that we have not included? If so, please provide details.**

3. **Do you agree with the proposed arrangements for monitoring significant effects of the SDP options, detailed in the Environmental Report? If not, what measures do you propose?**

4. **Do you agree with the conclusions of the Report and the recommendations for avoiding, reducing or off-setting significant effects of the SDP options? If not, what do you think should be the key recommendations and why?**

These questions are included in the SDP consultation proposals, of which this environmental report is a part. Copies of both documents are available electronically from www.mod.uk/submarinedismantling

Please provide your comments by **February 17th 2012.** Comments should be sent to:

Post: FREEPOST RSKJ-KRAH-YZRJ
Submarine Dismantling Project
C/o Green Issues Communications Ltd
30-31 Friar Street
Reading
RG1 1DX

Email: DESSMIS-SDP@mod.uk
Phone: 030 679 83793

All of the documents produced for this Consultation and further background information is available on the MOD website at: **www.mod.uk/submarinedismantling**

Information provided in response to this consultation, including personal information, may be subject to publication or disclosure in accordance with the Access to Information regimes (these are primarily the Freedom of Information Act 2000 (FOIA), the Data Protection Act 1998 (DPA) and the Environmental Information Regulations 2004).

If you want information that you provide to be treated as confidential, please be aware that, under the FOIA, there is a statutory Code of Practice with which public authorities must comply and which deals, amongst other things, with obligations of confidence.

In view of this it would be helpful if you could explain to us why you regard the information you have provided as confidential. If MOD receives a request for disclosure of the information, it will take full account of your explanation, but cannot give an assurance that confidentiality can be maintained in all circumstances. An automatic confidentiality disclaimer generated by your IT system will not, of itself, be regarded as binding on the Department.

The Department will process your personal data in accordance with the DPA and in the majority of circumstances this will mean that your personal data will not be disclosed to third parties.

Abbreviations and Glossary

Authorisation/ Authorised Site	Authorisations allow specific defence-related nuclear activity to take place. Such 'Authorised' sites are not subject to the Nuclear Installations Act (unlike civil nuclear sites) and so activities are not formally 'Licensed.' Instead, Authorisations are granted by the Defence Nuclear Safety Regulator, DNSR. However, the submarines will have to be dismantled on a Licensed site, regulated by the Office of Nuclear Regulation (part of the Health and Safety Executive).
'Brown-field' or previously-developed land	This term refers to land which is, or has, been previously been built upon or otherwise developed. Ideally, there should be sufficient existing infrastructure in place (such as a dock to accommodate the submarines), but there would be no nuclear facilities or specialist personnel available.
Consultation Bodies	The UK Statutory Consultation bodies for SEA are: • The Environment Agency (England and Wales); Scottish Environment Protection Agency (SEPA); Northern Ireland Environment Agency; • English Heritage; Historic Scotland; Cadw (Welsh Government historic environment service); • Natural England; Scottish Natural Heritage; Countryside Council for Wales; and • The Scottish Government and Welsh Government.
CoRWM	**Committee on Radioactive Waste Management** This independent committee provides scrutiny and advice to Government on the long term management of radioactive waste, including storage and disposal. See http://corwm.decc.gov.uk/ for more details.
Defuelling	The removal of spent (used) nuclear fuel from the submarines' reactor after it has left service. Submarines will have been defueled before they are dismantled.
GDF	**Geological Disposal Facility** The government's proposed long-term, below-ground facility for disposing of the UK's Higher-Activity Nuclear Waste (HLW and ILW). No site has yet been identified for the GDF. See http://mrws.decc.gov.uk/en/mrws/cms/home/What_is_geolog/What_is_geolog.aspx for more details.
'Green-field' or undeveloped land	This term refers to land that has not previously been developed (such as farmland), or which has been used but has reverted back to a largely 'natural' state (such as disused quarries). On such land, there would be no existing infrastructure or other resources suitable to undertake submarine dismantling or store ILW, so most or all the required infrastructure would need to be developed from scratch.
HRA	**Habitats Regulations Assessment** This is a statutory assessment, carried out on any plan or project that has the potential to affect a European-designated wildlife site. Because Rosyth and Devonport are close to such designated sites, a plan-level HRA has been undertaken for the SDP. The draft HRA report can be found as part of the supporting information to the public consultation at www.mod.uk/submarinedismantling.

ILW	**Intermediate Level Waste** This is radioactive waste with a radiological activity above 4 Giga Becquerels (GBq) per tonne of alpha, or 12 GBq/tonne of beta-gamma decay, but which does not generate enough heat to require it to be cooled during storage. By contrast, nuclear fuels are generally much more active, and have to be kept cool. The majority of ILW from submarines is metal in the RPV, with smaller quantities of organic materials, cement, graphite and ceramics.
Interim Storage	ILW is stored for an 'interim' period until a disposal route is available. Interim stores are designed for 100 years to provide safe and secure protection for waste packages. There are currently more than twenty such sites in the UK. A robust programme of interim storage will play an integral part in implementing geological disposal.
Initial Dismantling	The process whereby radioactive waste is removed from the laid-up submarines. This work has to take place on a site with an appropriate nuclear site Licence, issued by the Office of Nuclear Regulation (part of the Health and Safety Executive). There are three options for initial dismantling in the SDP - namely RC separation and storage, RPV removal and storage, and RPV removal and size reduction to Packaged Waste (explanation of these options are provided in this glossary).
ISOLUS	**Interim Storage of Laid-Up Submarines** The former name of the Submarine Dismantling Project. It was changed to the Submarine Dismantling Project in 2009.
Licence/ Licensed Site	A Nuclear Licence allows specific nuclear activities to take place at a specific site. Such 'Licensed' sites are subject to the Nuclear Installations Act (1965), with Licenses being granted by the Office of Nuclear Regulation Nuclear power stations and other civil activities are Licensed in this way, and any submarine dismantling site will require a civil License
Likely Significant Effect	A positive or negative effect that could reasonably be expected, and that would have a lasting and substantial change on the environment or community, due to its size, duration and/or frequency, and the importance of the affected site, species or feature. Examples would include the creation of more than 100 permanent jobs, damage to an internationally important conservation site or building work that increases the risk of serious flooding. The full set of criteria to be considered when determining significance is set out in Schedule 2 of the SEA Regulations.
LLW	**Low Level Waste** This is defined as radioactive waste that has below 4 Gbq per tonne of alpha activity and below 12 GBq per tonne of beta-gamma activity. It covers a variety of materials which arise principally as lightly contaminated miscellaneous scrap and redundant equipment. LLW from the MOD has an existing disposal route to the UK LLW Repository in Cumbria.
MRWS	**Managing Radioactive Waste Safely** This is the UK Government's published approach to managing the nation's radioactive wastes, irrespective of where they come from and their level of activity. The SDP will adhere to this approach. See http://mrws.decc.gov.uk/ for more details.
Minor Effect	The aim of SEA is to assess the likely significant effects of the plan or programme. The definition of a 'likely significant effect' is given above. By definition, a minor effect on the environment is one which is not severe enough to conform with this definition. Examples would include the creation of a few tens of permanent jobs, short-term and reversible effects on air or water quality, or disturbance to people or wildlife that would certainly be felt, but not cause any permanent change.

NDA	**Nuclear Decommissioning Authority** The Government agency responsible for delivering the safe and cost effective decommissioning the UK's publicly owned civil nuclear facilities and developing the UK's nuclear low level waste strategy and plans, and for managing the long-term arrangements for the UK's higher level radioactive wastes including spent nuclear fuels and ILW. The NDA manages the MOD's spent nuclear fuel on behalf of the government. See http://www.nda.gov.uk/ for more details.
PW	**Packaged Waste** The option for removing the radioactive materials from the submarines, whereby the Reactor Pressure Vessel is removed from the submarine, cut apart and cemented into approved containers for transport, interim storage and disposal in the proposed GDF. The project is working on the basis of using containers with an internal capacity of 3 cubic metres (known as '3m3 boxes').
Packaged Waste Storage	This term refers to storing the 3m3 boxes of ILW until the proposed GDF can accept it, some time after 2040.
RC	**Reactor Compartment** This is the central 'slice' of the submarine which contains the nuclear reactor (housed in the Reactor Pressure Vessel) and the primary circuit, which transfers heat to the boiler. Reactor Compartments typically weigh around 700 tonnes (1,000 tonnes for 'Vanguard' Class submarines), are approximately 10 metres in diameter, and are around nine metres long (depending on submarine type). The approximate location of the Reactor Compartment within the vessel is shown in Figure 1.
RC Storage	The option for removing the radioactive materials from the submarines, whereby the complete Reactor Compartment is separated from the rest of the submarine, sealed shut, and stored intact. This is the current approach used by the USA, France and Russia. RCs will be too large to fit into the proposed GDF intact. This means that each RC will eventually have to be dismantled further in to GDF-compliant containers before it can be disposed of.
RPV	**Reactor Pressure Vessel** The self-contained metal pressure vessel inside the Reactor Compartment which, prior to defuelling, contains the nuclear fuel. RPVs are between approximately 50 and 80 tonnes in weight, are approximately 2.5-3 metres in diameter, and are around 5 metres long (depending on submarine type).
RPV Storage	The option for removing the radioactive materials from the submarines, whereby the whole Reactor Pressure Vessel is removed from the submarine and stored intact. According to current plans, RPVs may be too large to fit into the proposed GDF intact, although we are exploring the opportunities to dispose of whole RPVs. If this is not possible, each RPV would eventually have to be cut apart ('size reduced') into packaged waste before it is disposed of.
SDP	**Submarine Dismantling Project:** www.submarinedismantling.co.uk
Ship Recycling	This is the process whereby the hull of the submarine (which forms the bulk of each vessel) are dismantled once the radioactive materials have been removed and they have been cleared for release by the Regulator. This does not have to be undertaken at the initial dismantling site, so could take place elsewhere in the UK. The issues associated with recycling the residual submarines are very similar to those for scrapping surface ships.

SEA	Strategic Environmental Assessment This is the type of Statutory assessment undertaken on certain public plans and programmes, to assess the potential environmental effects that they may have, and to identify ways to avoid or minimise damaging impacts and enhance positive ones. SEA gives the public the opportunity to see what those impacts might mean for them and comment on them, so that they can help shape the approach taken. SEA comes from the EU SEA Directive (2001/42/EC) and is enacted in the UK through the Environmental Assessment of Plans and Programmes Regulations 2004 (SI 2004 No. 1633).
vLLW	**Very Low Level Waste** This is radioactive waste with very low levels of radioactivity, which can be managed in conventional waste streams.

Submarine Dismantling Project (SDP)

Submarine Dismantling Consultation

#3112
MOD Abbey Wood
Bristol
BS34 8JH
DESSMIS-SDP@mod.uk
030 679 83793

All of the documents produced for this Consultation and further background information is available on our website at:

www.mod.uk/submarinedismantling

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