

Marine Licensing

Hinkley Point C Sediment Sample Plan SP1914

Pre-application advice and public consultation responses

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Glossary of acronyms used in this document

Acronym	Meaning
Cefas	Centre for Environment, Fisheries and Aquaculture Science is an executive agency, sponsored by the Department for Environment, Food & Rural Affairs (Defra). It collects, manages and interprets data on the aquatic environment, biodiversity and fisheries.
HPA, HPB, HPC	Hinkley Point A, B and C
IAEA guidelines/standards	<p>International Atomic Energy Agency: is the world's central intergovernmental forum for scientific and technical co-operation in the nuclear field. It contributes to international peace and security promoting safe, secure and peaceful uses of nuclear science and technology.</p> <p>IAEA (2003). Determining the suitability of materials for disposal at sea under the London Convention 1972: A radiological assessment procedure. TECDOC-1375, IAEA, Vienna.</p> <p>IAEA (2004). Sediment distribution coefficients and concentration factors for biota in the marine environment. Tech. Rep. Ser. No. 422, IAEA, Vienna.</p> <p>IAEA (2015). Determining the Suitability of Materials for Disposal at Sea under the London Convention 1972 and London Protocol 1996: A Radiological Assessment Procedure, IAEA-TECDOC-1759, IAEA, Vienna.</p>
ICRP	International Commission on Radiological Protection: a non-governmental international organization that provides recommendations and guidance on radiological protection concerning ionising radiation.
MACAA	Marine and Coastal Access Act 2009: UK legislation that outlines provisions for the management, sustainable development of the marine and coastal environment, marine planning and marine nature conservation. Among other things the MACAA creates a regulatory regime for marine licensing.
MLT	Marine Licensing Team
MMO	Marine Management Organisation- an executive non-departmental public body, sponsored by the Department for Environment, Food & Rural Affairs (Defra) that license, regulate and plan marine activities in the seas around England.
NRW PS	Natural Resources Wales Permitting Service
OBT	Organically Bound Tritium

OSPAR guidelines/standards	Oslo/Paris conventions regarding the disposal of waste at sea: OSPAR, 2014. OSPAR Guidelines for the Management of Dredged Material at Sea. OSPAR Commission Agreement 2014-06. And the further OSPAR, 2015 Interpretation of the dredged material guidelines regarding the sampling frequency for maintenance dredged material (§5.5 and 5.6 of OSPAR Agreement 2014-06). Commission agreement 2015-06
PSA	Particle Size Analysis is the determination of the size range of the particles in a sediment sample.
RIFE reports	Radioactivity in Food and the Environment reports are produced annually and give a detailed assessment of radioactivity in food and the environment and the public's exposure to radiation during a specific year. The reports bring together the nationwide monitoring programmes of the UK's food standard agencies and environment agencies. This monitoring is independent of, and is also used as a check on, the monitoring carried out by site operators. The reports are available at: https://www.gov.uk/government/publications/radioactivity-in-food-and-the-environment-rife-reports#history
UKAS	The United Kingdom Accreditation Service: is the UK's National Accreditation Body that assesses the technical competence and integrity of organisations that provide certification, testing, inspection and calibration services.

1. The Sample Plan

Any applicant proposing to dredge and/or dispose of sediment at sea must demonstrate that the material is suitable for safe disposal. Therefore, before any application for a licence is submitted, the sampling and analysis requirements must be agreed with NRW through a sampling plan.

The sediment intended for disposal must first be analysed for a range of physical and chemical properties, in line with OSPAR guidelines. In this case, because of the location of the dredge, the sediment will also need to be tested for relevant radionuclides as stated in internationally agreed IAEA guidelines.

On the 20th December 2019, EDF ENERGY submitted its sample plan (SP1914) to NRW for consideration via our Marine Licensing pre-application service. The plan detailed their proposed sampling and testing of sediment from the foreshore of the construction site of the Hinkley Point C power station in Somerset England.

The sample plan will be used to determine whether the material (up to 600,000 m³) to be dredged from the seabed is suitable for disposal at the designated dispersive disposal site within the Severn Estuary (Cardiff Grounds Disposal Site LU110).

NRW requested further clarifications on the plan which was subsequently provided by EDF ENERGY prior to the public consultation. The documents associated with this consultation (SP1914) can be obtained through our [online public register](#).

2. NRW's pre-application advice

NRW as the authority for the determination of any marine licence application for the disposal of dredged material in Welsh waters has considered the sample plan (SP1914) submitted by EDF ENERGY.

Having considered the documents submitted as well as the views of our technical advisors (Centre for Environment, Fisheries and Aquaculture Science (Cefas), ABPmer, Environment Agency and NRW technical specialist advisors) and members of the public (**ANNEX 1: Summary of Consultation Responses**), and having had regard to the relevant legislation, our pre-application advice is detailed below.

Pre-application advice: NRW agrees in principle with the sample plan submitted subject to the following changes:

1. OSPAR guidelines indicate that “the distribution and depth of sampling should reflect the size and depth of the area to be dredged”. Hence, any area that could be considered capital (or new-work) dredge should be sampled at depth with cores. Areas labelled as maintenance dredge in the sampling plan should only be considered as such if the intended dredged depth would not surpass the dredged depth of previous campaigns. Only within maintenance dredge areas would grab samples be considered sufficient to characterise the dredged material. Where this is not the case (i.e. dredging carried out deeper than previous campaign), then the area is considered a capital dredge and core samples will be required. We would require evidence of previous and intended dredged depths to support the use of core or grab sampling at each station.

2. PSA, chemical and radiological analysis depths: Paragraph 5.2 of OSPAR 2014 states: “A survey of the area to be dredged should be carried out. The distribution and depth of sampling should reflect the size and depth of the area to be dredged, the amount to be dredged and the expected variability in the horizontal and vertical distribution of contaminants. Core samples should be taken where the depth of dredging and expected vertical distribution of contaminants suggest that this is warranted.” However, OSPAR does not specify the depth of samples. Vertical subsamples for PSA and chemical analysis are commonly taken every meter down to the maximum dredged depth. However, in areas of contamination concern this can be reduced to every 0.5m. Given the location, we request all samples in depth (i.e. cores) to be subsampled for PSA and chemical analysis at sediment surface, 0.5m and each 1m interval below the surface to the maximum dredge depth. Subsamples for radiological analysis should be taken at sediment surface, 0.25m, 0.5m and at each 1m interval below the surface to the maximum dredge depth.

3. The sample plan submitted does not specify sampling methods. The sample plan must specify the specific grab and coring methods in the final sampling methodology. Bridgwater Bay is comprised of intertidal mudflats saltmarsh and flats and shingle ridges. If the seabed is soft muds/sands Day or Van Veen grabs should achieve a surface integral sample adequate for chemistry and particle size analysis. These grabs allow for the sampling of undisturbed surface sediments. A Hammond grab is not recommended as it mixes the sediment in its application to the seabed and does not provide a surface only sample. However, if the seabed is gravelly then the Shipek grab is good for getting surface integral samples for chemistry and particle size analysis.

4. Where EDF ENERGY intends to deviate from the chemical determinants as listed in Annex 1 of the OSPAR guidelines, a clear justification must be provided

5. OSPAR guidelines as part of the Tier 1 ‘strongly recommends’ the following assessments:

Determinant	Indicating
<ul style="list-style-type: none"> • grain size analysis (by laser or sieving methods) • percent solids (dry matter) 	<ul style="list-style-type: none"> • Cohesiveness, settling velocity/resuspension potential, contaminant accumulation potential
<ul style="list-style-type: none"> • density/specific gravity 	<ul style="list-style-type: none"> • Consolidation of placed material, volume <i>in situ</i> vs. after deposit
<ul style="list-style-type: none"> • organic matter (as total organic carbon) 	<ul style="list-style-type: none"> • Potential accumulation of organic associated contaminants

All assessments suggested by the guidelines must be conducted or clearly explained why these are not needed.

6. Figure 1, page 11 "Note that the area of the jetty berthing pocket dredge has yet to be finalised and the area shown is indicative". It is noted that the location of the jetty berthing is not part of the scope of this sample plan; however, the sample plan in relation to the disposal licence must characterise the sediment to be deposited at LU110 and be representative of the dredge area. All sampling should be completed within the footprint of the planned dredge areas, ensuring that the survey is fully representative of the material to be dredged. The sample plan must explain why the sampling survey proposed is fully representative of the dredged area and thus meets these requirements.
7. We support the approach that each general location has been treated as an individual dredge area for the purpose of the sampling plan rather than referring to total dredge volume. We would like to see this separation to be maintained as it allows for a better characterisation of the dredge material and for area specific decisions to be taken.
8. The chosen sample location for plutonium should be explained. Clear justification on the number of stations in relation to risk will need to be provided. In addition, each core chosen for such analysis will require subsamples to be taken from all depths. Alpha spectroscopy will be used to determine the plutonium (Pu-239+240) and americium (Am-241) isotopes. Alpha spectroscopy will be undertaken on cores which are also used for the gamma spectroscopy in line with ISO 18589¹, to enable direct comparison of results from each analysis. It is important to note that if evidence of enhanced activity was found in the initial screening of the sediment cores or enhanced activity of americium-241 in any core a more refined radiological assessment on the existing cores taken might be required as per IAEA *de minimis* levels stepwise evaluation procedure.
9. Specific to this location, we require the analysis of a limited number of samples for OBT/Tritium analysis in a targeted way. Clear justification on the number of samples in relation to risk will need to be provided. In addition, each core chosen for such analysis will require subsamples to be taken from all depths for OBT/Tritium analysis in line with ISO 18589¹.
10. We require the provision of evidence of any previous activity undertaken by EDF in the proposed dredge areas that could have disturbed the sediment to be dredged.
11. The grid ref error for station 15/16 must be corrected.
12. The following information must be included with any samples (irrespective of the laboratory to be used for analysis):
 - Clearly labelled samples;
 - Completed sample position sheets, including the latitude and longitude (decimal degrees and the projection i.e. WGS84) of each location and if core samples are required the depth at which each sample is taken;
 - Details of the method of sampling;

¹ <https://www.iso.org/standards.html>

- A map/chart detailing the sample locations
13. Surface samples should be taken from the upper layer of *in situ* sediment using a non-metallic / stainless steel scoop. To maintain the integrity of the samples they must be frozen and remain in the freezer until they can be dispatched. Ensure the samples are dispatched in a cool box - the cool box should not be placed in any other packaging.
 14. Samples should be kept until the application has been determined in case any further testing is required. The storage arrangements must ensure that there is no deterioration of the sample should further testing be required.
 15. The analysis must be carried out following established specific dredge material testing methods by approved² and UKAS³ accredited laboratories.
 16. To ensure consistency between laboratories it is expected that all analyses required will be undertaken from the same sample container. You should ensure that a sufficient sample is collected, in a single container, for all the analyses required.
 17. A non-technical summary clearly reasoning the approach taken as well as the evaluation of the risks driving the sample plan is needed.

3. Overview of OSPAR guide lines and IAEA procedures

The 1982 United Nations Convention on the Law of the Sea (UNCLOS)⁴ provides the framework within which States exercise their rights and obligations relating to maritime affairs, establishing rules governing all uses of the oceans (including estuaries (Article 1)). The International Maritime Organization (IMO) has a global mandate under UNCLOS, to regulate maritime issues. This includes the prevention and control of marine pollution from vessels and by dumping (disposal).

The two international treaties ratified by the UK that govern marine pollution are the 1972 Convention on the Prevention of Marine Pollution by Dumping of Waste and Other Matter (together with its 1996 Protocol) (the London Convention), and the Convention for the Protection of the Marine Environment of the North-East Atlantic (the OSPAR Convention). Both the London Convention/Protocol and the OSPAR Convention are concerned with protecting the marine environment from human activities, notably the pollution arising from those activities. The London Convention/Protocol is a widely applicable treaty which covers the marine waters of

² <https://naturalresources.wales/permits-and-permissions/marine-licensing/sediment-sampling-and-analysis/?lang=en>

³ https://www.ukas.com/browse-accredited-organisations/?org_cat=2464&parent=Testing%20Laboratories&type_id=2&cpage=3

⁴ United Nations Convention on the Law of the Sea 1982 (English): https://www.un.org/depts/los/convention_agreements/texts/unclos/unclos_e.pdf

the world. The OSPAR Convention is a regional sea convention that addresses pollution issues, including those covered by the London Convention/Protocol, at a regional level.

The London Protocol⁵ and the OSPAR⁶ Convention are relevant to any application for a marine licence for the dumping of waste at sea and dredging activities. The sea is defined in Article 1 of the convention and includes estuary areas. In this case, the Severn Estuary forms part of the OSPAR convention's Region III: Celtic Seas.

The OSPAR Convention and the London Protocol both have guidelines on human activities affecting the marine environment relevant to NRW's marine licensing functions and regard must be had to them. OSPAR publishes guidelines for the management of dredge material. These guidelines are harmonised with, but more prescriptive than the 'Specific Guidelines for the Management of Dredged Material' published under the London Protocol. They therefore provide the context in which NRW carries out the evaluation of dredged material and its suitability for disposal to sea.

Both the OSPAR Convention and the London Protocol are relevant to determination of an application submitted to NRW for a marine licence for the disposal of dredged material. The Marine and Coastal Access Act (MACAA) 2009 makes provisions for UK offshore (12-200 nautical miles) and English and Welsh inshore (0-12 nautical miles) waters on various aspects of the marine environment management including the licensing of marine activities. The MACAA imposes a legal obligation on NRW to comply with international law when exercising its licensing functions. Section 69(1) of the MACAA 2009 gives effect to the UK's obligations under the OSPAR Convention (and the London Protocol). Accordingly, when NRW determines a marine licence application (including its terms and any conditions on which it is to be granted), regard must always be had to:

- the need to protect the environment
- the need to protect human health
- the need to prevent interference with legitimate uses of the sea

Before an application for dredge disposal is submitted, the sampling and analysis performed to characterise the material must comply with guidelines established by OSPAR. However, due to the nature and location of the sediments to be dredged and disposed, the sediment needs to be also assessed for levels of radionuclides through

⁵ By Article 4 of the London Protocol, Contracting Parties agree that they shall prohibit the dumping of any wastes or other matter with the exception of those listed in Annex 1 and the dumping of wastes or other matter listed in Annex 1 shall require a permit. Contracting Parties shall adopt administrative or legislative measures to ensure that issuance of permits and permit conditions comply with provisions of Annex 2 to the Protocol. Particular attention shall be paid to opportunities to avoid dumping in favour of environmentally preferable alternatives.

⁶ Article 4 of the OSPAR Convention provides that contracting parties must take all possible steps to prevent and eliminate pollution by dumping or incineration of wastes or other matters. Annex II provides the details on this and sets out that certain wastes may be dumped, with authorisation by competent authorities of contracting parties. This includes dredged material. In the context of marine licensing, these obligations for the prevention and elimination of pollution by dumping or incineration are addressed through subsections 66(1), items 1, 2 and 3 of the MACAA 2009.

the radiological assessment procedure developed by the International Atomic Energy Agency (IAEA).

OSPAR and IAEA lists acceptable levels of radionuclides and other chemicals in dredged material to be permitted for disposal at sea. The guidelines have been designed to prevent pollution and to protect the marine environment. By section 71(6) of the MACAA 2009, NRW must not grant a licence to carry on any activity which is contrary to international law. As such, we must comply with the OSPAR Convention when deciding whether dredged material is safe for disposal at sea.

4. The Disposal Site: Cardiff Grounds LU110

There are a number of areas in Welsh inshore waters designated for the purpose of receiving dredged material, which mostly comprises of maintenance and capital dredge arisings. As described by OSPAR:

- Capital (or new-work) dredging involves enlarging or deepening existing channel and port areas or creating new ones; and for engineering purposes includes constructing trenches for pipes, cables, immersed tube tunnels, and removal of material unsuitable for foundations or for aggregate extraction, and for hydraulic purposes this involves increasing the flow capacity of the waterway;
- Maintenance dredging to maintain channels, berths or construction works, etc. at their designed dimensions (i.e. to counteract sedimentation and changes in morphology).

Cardiff Grounds (LU110) disposal site was designated in the 1980's and is located within the Severn Estuary, approximately 3 km off the South coast of Wales (Figure 1). The site is considered a dispersive disposal site and has received on average 650,000 tonnes per annum between 2009 and 2019 mainly from maintenance dredging, with its highest recorded disposal of 1,022,874 tonnes in 2011.

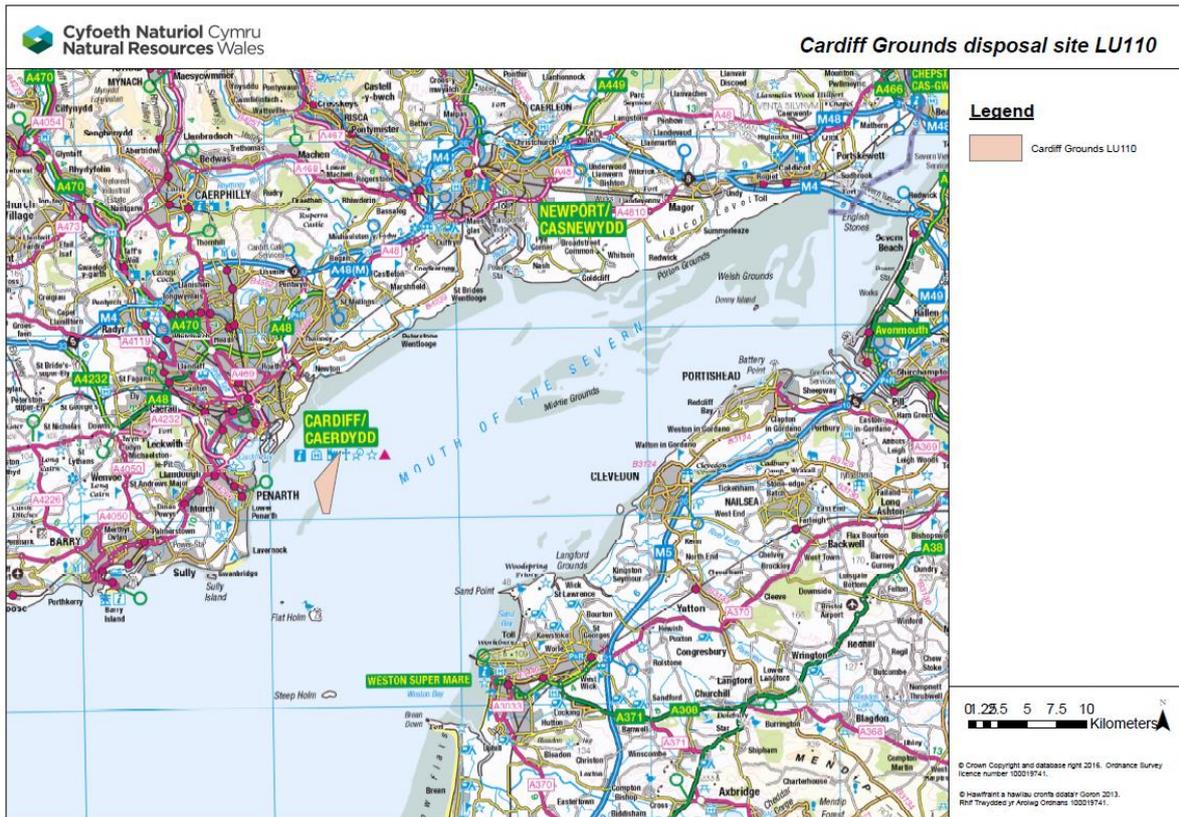


Figure 1 Cardiff Grounds disposal site location in the Severn Estuary

5. The Consultation

On the 5th February 2020 NRW started a six-week consultation on the proposed sample plan. This enabled engagement with the public and provided them with the opportunity to participate in decision-making process through the submission of representations on the proposed sample plan. The scope of the consultation was wholly focussed on the content of the proposed sample plan consisted of the following targeted questions:

- a) Is the sample plan in line with OSPAR guidelines?
- b) Is the radiological assessment proposed suitable and in line with IAEA's radiological assessment procedure?
- c) Will the sample plan provide enough information to understand whether the material can be deemed suitable for disposal at sea? Consider in your response:
 - a. Number of sampling stations and distribution (location and depth)
 - b. Sample methods used
 - c. Chemical analysis
 - d. Dredged material characterisation

Simultaneously, we consulted with technical advisors from ABPmer, the Environment Agency, Cefas, and NRW technical specialist advisors.

The consultation received a total of 151 public representations which have been analysed with the support of technical advisors. A summary of the public and technical representations and their consideration can be found on **ANNEX 1: Summary of Consultation Responses**.

ANNEX 1: Summary of Consultation Responses

The tables below summarise the responses received together with how they have been considered and addressed in the assessment of the sample plan.

In the section below we have presented the points raised by the technical consultees and anonymised and summarised the points raised on representations from members of the public. Public responses received from community and other organisations have been addressed separately.

1) Consultation Responses from Technical consultees

Response Received from ENVIRONMENT AGENCY	
Summary of issues raised:	NRW response
<p>The role of CEFAS is not clear in the summary document as it is described as ‘an executive agency of the UK Government’ although CEFAS is also working as a paid consultant acting on behalf of the developer (EDF ENERGY). This is implicit in the full report ‘TR502’.</p>	<p>Cefas role is understood.</p> <p>Cefas has sent the statement below:</p> <p>“Cefas, is an executive agency of Defra (Department for Environment, Food and Rural Affairs) and as such, we have a mandate from Defra and UK Government that any spare capacity should be made available to others such as Government departments and industry.</p> <p>We acknowledge that there could be a perceived conflict of interest in relation to our advice on dredge material assessment emanating from the new Hinkley Nuclear New Build project as members of Cefas staff are involved in the authorship of the Hinkley nuclear build application documents, working for EDF ENERGY. However, to mitigate the potential for a perceived impact, the lead for providing advice to NRW and Welsh Government on large infrastructure projects in Wales and the deputies do not engage in any delivery for EDF ENERGY projects.</p> <p>Cefas also adhere to strict procedures which limits contact between colleagues working on such projects. Therefore, it is our view that these mitigations are satisfactory in addressing any perceived conflict and as such these advisors can continue to provide impartial advice on this matter to NRW.”</p>

Chemical analysis and summary tables should make reference to full compound names detected (e.g. 'organotins' instead of 'tins')	Developer informed
Terms need to be used consistently: fish return and recovery system as "FRR" or "FRS".	Developer informed
Planned sampling window of between March and September 2020. Uncertain if sufficient time has been allowed to incorporate comments received through consultation to a revised plan.	Noted. This is for the developer to consider following receipt of our pre-application advice.
OSPAR guideline section 5.6 indicates that it may be possible to conduct an initial reduced assessment (sampling stations and determinants) to confirm the earlier analyses and provide enough information for permitting purposes. If a reduced sampling programme does not confirm the results do not match those of previous work, the full survey should be repeated.	Due to the location and public concerns we will not be satisfied with a reduced assessment.
Figure 1, pg 11 "Note that the area of the jetty berthing pocket dredge has yet to be finalised and the area shown is indicative". There is no mention as to if the related sample sites are also subject to change.	NRW notes that the location of the jetty berthing is not part of the scope of this sample plan; however, NRW will inform EDF ENERGY that the sample plan in relation to the disposal licence should characterise the sediment to be deposited at LU110 and represent the dredging conducted. All sampling should be completed within the footprint of the planned dredge areas, ensuring that the survey is fully representative of the material to be dredged.
What actions will be taken to mitigate against further damage to Sabellaria habitat after it has been encountered	Mitigation measures of grabs and cores are not relevant to the sampling plan. The impacts of sample collections will be assessed in the sediment sampling application. As the sampling will take place in English waters, the application for sediment sampling will be considered by the MMO and is not within the jurisdiction or responsibility of NRW.
Specific grab or coring methods should be identified in the final sampling methodology.	Information requested from developer.
No justification given for not completing chemical or PSA analysis on subsample depth 0.25 and 0.5 m.	Paragraph 5.2 of OSPAR 2014 states: "A survey of the area to be dredged should be carried out. The distribution and depth of sampling should reflect the size and depth of the area to be dredged, the amount to be dredged and

	<p>the expected variability in the horizontal and vertical distribution of contaminants. Core samples should be taken where the depth of dredging and expected vertical distribution of contaminants suggest that this is warranted.” However, OSPAR does not specify the depth of samples. Vertical subsamples for PSA and chemical analysis are commonly taken every meter down to the maximum dredged depth. However, in areas of contamination concern this can be reduced to every 0.5m. Given the location, <u>we request that all samples in depth (i.e., cores) to be subsampled below the sediment surface at 0.25m, 0.5m and at each 1m interval to the maximum dredge depth. The subsamples should be taken for PSA and chemical analysis (including radiological analysis).</u></p>
<p>The maximum volume of material for the full sampling campaign noted on the plan (9.43 m³) needs justification would be approximately ". What is the justification behind this volume?</p>	<p>The point raised is not relevant to the Welsh disposal application and is a matter for the MMO relevant to their determination of the English licence (i.e., impact of sample collection in English waters)</p>
<p>‘Subsampling methodology’ The section reads as a set of suggested guidelines rather than a prescribed method to be followed.</p>	<p>Developer informed. The methodology should be followed as described.</p>
<p>More justification on the number of samples proposed for Pu(239+240) is needed.</p>	<p>Our pre-application advice has sought an explanation from EDF ENERGY regarding the chosen sample location for plutonium and alpha emitting particles and the decision to take only one measurement at each location. We support further analysis for plutonium isotopes and alpha emitting particles in a focused manner proportionate to the risk. The chosen sample location for plutonium should be explained. Clear justification on the number of stations in relation to risk will need to be provided. In addition, each core chosen for such analysis will require subsamples to be taken from all depths.</p>
<p>OSPAR guideline ‘strongly recommended’ that density/specific gravity or organic matter (as total organic carbon) determinants to be conducted.</p>	<p>Included in our pre-application advice.</p>

<p>The OSPAR guideline recommend that normalised values of contaminants should be used to enable a more reliable comparison of contaminant concentrations in dredged material with those in sediments at deposit or reference sites.</p>	<p>Normalisation is a recommendation from OSPAR and not a requirement. The aim is to ensure an effective comparison (see Technical Annex I, OSPAR guidelines).</p> <p>The use of non-normalised data is required for the application of Cefas Action Levels. For metals, the premise for England and Wales is that the assessment of the quality of the dredge sediment is based on likelihood to cause harm. A partial digest is undertaken on samples to provide an indication of the quantity of the contaminant likely to be available to an organism. The levels indicated from the analysis are then compared to the Cefas Action Levels, which are based on the toxicity of the element in marine sediments. This provides the regulator with one line of evidence in determining their suitability for disposal at a designated site.</p> <p>The sieving and digestion process taken to normalise samples can dilute anthropogenic contaminants what can misrepresent the likely available elements to organisms. Hence, Cefas request a partial digest on un-sieved (whole) sediment).</p> <p>Therefore, in some instances normalisation can confound the results and OSPAR recognises this in their guidance: <i>“there is no evidence that normalised data are more appropriate for ecotoxicological interpretation than non-normalised data”</i>.</p>
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Response Received from ABPmer	
Summary of issues raised:	Summary of consideration / how this has been covered
<p>No specific disposal location has been identified, although previous works deposited material at the Cardiff Grounds licensed site (LU110). The sampling should provide information on the physical characteristics of the material to be dredged as well as the chemical and radiological</p>	<p>The sample plan does not need to specify the disposal site that will be used. Its purpose is to describe the sampling and analysis that is intended to be undertaken.</p>

<p>properties, so the character of the materials to be deposited at the point of disposal is known.</p>	
<p>The sample plan treats each general dredge location separately, so each general location has been treated as an individual dredge area for the purpose of the sampling plan rather than referring to total dredge volume. This method allows for better characterisation of the dredge material and for area specific decisions to be taken.</p>	<p>Included in our pre-application advice.</p>
<p>Capital and maintenance material should not dictate the location of cores or grabs but by assessment of the 'thickness' of material to be dredged. However, we agree with the total number of stations for each of the dredged areas to comply with the OSPAR guidance. Contingency built into the sampling plan will cover potential variations that could result in the dredging requirement.</p>	<p>OSPAR guidelines indicate that “the distribution and depth of sampling should reflect the size and depth of the area to be dredged” Hence, an area that could be considered capital (or new-work) dredge should be sampled in depth with cores. NRW points out that areas labelled as maintenance dredge in the sampling plan should only be considered as such if the intended dredged depth is not to surpass the dredged depth of previous campaigns. Only in maintenance dredge areas grab samples suffice to characterise the dredged material. Where this not to be the case (i.e. dredging to be conducted deeper than previous campaign), then the area will be considered of capital dredge and core samples will be required. EDF ENERGY needs to provide evidence of previous and intended dredged depths to support the use of core or grabs in each station.</p>
<p>The method of sampling and number of replicates is in line with good practice and consideration of potential damage to designated features has been accommodated.</p>	<p>Developer informed.</p>
<p>The sub-sampling with depth has been specified at set intervals. This, we believe, is acceptable for material with uniform characteristics. However, variance in levels can occur in line with changes in the characteristics of the different material layers. To better understand the suitability of the material for the disposal site, the sample interval could be adjusted, based on expert geotechnical assessment of the material obtained within the core.</p>	<p>The point is understood but due to the large number of samples it will not be technically feasible to change the sub-sampling plan to sample at the point of sediment layer change. The level of uncertainty within the survey specifications will impact licensing requirements (including number of cores/staffing/vessel hire etc), sampling/sub-sampling equipment, sample storage, transportation and laboratory analysis as there cannot be</p>

	a guarantee that the layers will contain enough sediment for the analysis.
The specification for chemical, radiological and PSA analysis is in line with OSPAR guidance, although we would also include chemical and PSA analysis at the 0.5 m depth, particularly where the seabed has not been previously disturbed, as historical contamination may be 'locked in' near to the surface.	Developer informed.
The sampling methodology and analysis conforms with best practice to avoid cross-contamination and deterioration of samples	Noted, no comment
The sampling analysis also conforms with the OSPAR guidance and IAEA guidance for the assessment of radiological effects. The analytical results will provide international standard information to allow assessment against Cefas Action Levels, to determine whether the materials will be suitable for disposal at sea	Noted, no comment
<p>With respect to the specific questions in the scope, ABPmer consider that:</p> <p>Overall the sampling plan does comply with the international OSPAR Guidance;</p> <p>The proposed sampling and analysis will provide information to allow analysis in accordance with the IAEA radiological assessment procedures; and</p> <p>Suitable information and evidence will be provided to determine whether the material is suitable for disposal at sea, without causing environmental harm.</p>	Noted, points considered indicated above

Response Received from CEFAS	
Summary of issues raised:	Summary of consideration / how this has been covered
In accordance with OSPAR Guidelines, samples should be taken to provide a good representation of the volume of material to be dredged. The distribution and depth of sampling should reflect the size and depth of the area to be dredged, the amount to be dredged and the expected variability in the horizontal and vertical distribution of contaminants.	Noted, no comment

<p>Chemical analysis: the applicant has proposed the number of samples from each dredge area based on the volume to be dredged, dredge type (maintenance or capital) and previous data. I am content that the number of samples, plus the indicative locations (locations cannot be specified at this stage but to ensure the samples are evenly spaced and representative) will be sufficient to characterise the material and assess the suitability for disposal to sea.</p>	<p>Noted, no comment</p>
<p>The number of core samples (and the number of sub samples at depth within each core) for radiological analysis is extensive and is much greater than is usually required to determine an initial conservative radiological assessment for dredging applications. Radionuclides from the nuclear industry from historical inputs are not expected to exist below 1m depth. The proposed sampling strategy will add further confidence to the outcome of the radiological assessment.</p>	<p>Noted, no comment</p>
<p>Samples must be taken at the surface (0 metres depth) and at the maximum dredge depth and at 1m intervals as per the applicant's proposal as indicated on the sample plan</p>	<p>Noted, no comment</p>
<p>"The following information must be included with any samples (irrespective of the laboratory to be used for analysis):</p> <p>Clearly labelled samples;</p> <p>Completed sample position sheet, including the latitude and longitude (decimal degrees and the projection i.e. WGS84) of each location and if core samples are required the depth at which each sample is taken;</p> <p>Details of the method of sampling;</p> <p>A map/chart detailing the sample locations"</p> <p>Surface samples should be taken from the upper layer of in-situ sediment using a non-metallic / stainless steel scoop. To maintain the integrity of the samples please ensure that they are FROZEN and remain in the freezer until they can be dispatched. Please ensure the samples are dispatched in a cool box - the cool box should not be placed in any other packaging</p> <p>Samples should be kept until the licences have been issued in case any further testing is required.</p>	<p>Included in our pre-application advice.</p>
<p>Analysis requirements: Based on previous data, analysis for all determinants at the maintenance dredge sites is over precautionary but no objection</p>	<p>Noted, no comment</p>
<p>The initial conservative radiological assessment requires that gamma spectrometry be undertaken to provide a generic assessment for dredging applications. The use of</p>	<p>Developer informed</p>

<p>alpha spectrometry will provide more sensitive results for both Pu-239+240 and Am-241, to compare with the much higher limit of detection of Am-241 (using gamma spectrometry) and the very conservative estimates determined for plutonium radionuclides. As with the extensive sampling strategy, this analytical strategy (by the addition of alpha spectrometry) will add further confidence and provide a much less conservative radiological assessment.</p>	
<p>The analysis should be carried out following established specific dredge material testing methods by laboratories which are approved for the suggested determinants is available at: https://naturalresources.wales/permits-and-permissions/marine-licensing/sediment-sampling-and-analysis/?lang=en. I consider that any results following these methods would be acceptable to support a marine licence application to NRW.</p> <p>To ensure consistency between laboratories it is expected that all analyses required will be undertaken from the same sample container. It is the applicant's responsibility to ensure that sufficient sample is collected, in a single container, for all the analyses required. Where Cefas analyses the samples, appropriate containers will be provided.</p>	<p>Developer informed.</p>

Response Received from NRW TECHNICAL SPECIALIST ADVISORS	
Summary of issues raised:	Summary of consideration / how this has been covered
The current sampling station locations are suitable to characterise the material for disposal, no sampling outside of the dredge areas is needed.	Noted, no comment
The chemical analysis determinants are correct. Dieldrin and DDT are missing but these can be omitted if there is no obvious source (e.g. agriculture).	Developer has been asked to justify chemical determinants that will not be measured.
The plans appear to be broadly in line with OSPAR guidelines. Although the range of analysis suggested by EDF ENERGY seems to be limited when compared to the outline provided in Technical Annex 1 of the OSPAR guidelines. Considering the nature of the guidelines I would've expected EDF ENERGY to have considered the broad range of analysis and if certain analysis were deemed unnecessary, would have highlighted the reasoning for excluding this	Developer has been asked to justify chemical determinants that will not be measured.
The sample plan will be suitable as following the OSPAR and IAEA guidance indicated on page 18	Noted, no comment
The number of sampling points appear to be in line with guidelines though, considering the statement on page 10 a strong justification for potential reduced sampling (if judged to be possible by EDF ENERGY) should be consulted on. It is welcomed the addition of ten samples as a contingency measure.	Noted, no reduction of sample stations will be accepted without a strong justification
Regarding the proposed locations on sampling points, further information would be welcomed on the practicalities on how EDF ENERGY intend on confirming the precise location. This could be wrapped up within a wider sampling methodology plan, which isn't given in detail within the sampling plan (other than what is outline in Section 2 & 3 We would welcome greater clarity in general and in particular on the sample methods to be used. There are analytical tests that have not been referenced on sediment characterisation	Developer informed.

2) Consultation Responses from Members of the Public and Community Organisations

The NRW PS received a total of 151 public representations, a series of which were either identical or form part of other representations (total of 126). All representations from individual members of the public have been grouped, summarised and addressed together. Public responses received from community and other organisations (total of 7) have been summarised and addressed separately.

The aim of the consultation undertaken was to assess the suitability of the sample plan. Many of the responses received were not in relation to the sample plan but associated with the potential subsequent application or related to matters outside the remit or powers of the NRW PS. This has been indicated throughout the analysis of the representations.

a) Representations from Community and Other Organisations

Representations were received from the following groups:

- i. Welsh Anti-Nuclear Alliance (WANA)
- ii. Barry Town Council
- iii. The Nuclear Free Local Authorities of Wales and England, CND Cymru and The Stop Hinkley Campaign Group
- iv. Children with Cancer UK
- v. Wilkinson Environmental Consulting
- vi. Low Level Radiation Campaign
- vii. Friends of the Earth, Barry

i. Response Received from WELSH ANTI NUCLEAR ALLIANCE (WANA) – 74

WELSH ANTI NUCLEAR ALLIANCE (WANA) - 74	
Summary of issues raised:	Summary of consideration / how this has been covered
Material suitability for disposal at sea: consistency is heavy clay more similar to construction material and does not comply with OSPAR	Sediment suitability for the selected disposal site is still to be assessed with the sample plan. The point is noted but is out of scope to the consultation and relates to the any subsequent disposal licence application.
Am has been detected in 2018. Man-made product and an indication of Pu presence.	Americium can be an indicator of plutonium in the environment, Americium also occurs naturally in uranium minerals, but only in trace amounts.

<p>Dose estimation is not adequate for alpha emitters - localised high exposure possible</p>	<p>The accuracy of dose estimation within internationally agreed guidance is a matter beyond the remit of this consultation and the jurisdiction of NRW.</p> <p>The dose estimation methods will be based on internationally accepted methodologies which take account of doses received from inhaled and ingested radioactive species, including alpha emitters. The international commission on radiological protection (ICRP) has published models for assessing radiation exposure from inhaling and ingesting radionuclides.</p> <p>The following exposure pathways are considered in the IAEA guidelines for members of the public without regards to the likelihood of these pathways resulting in actual exposures for a particular candidate material:</p> <ul style="list-style-type: none"> • External exposure to radionuclides deposited on the shore; • Ingestion of seafood caught in the area around the dumping site; • Inadvertent ingestion of beach sediments; • Inhalation of particles resuspended from beach sediments; • Inhalation of sea spray.
<p>The representation indicates the need to understand the behaviour of the disposed sediment, the sensitivities of marine species and bioaccumulation nature</p>	<p>Understanding the fate and behaviour of the dumped sediment is out of scope to the consultation and relates to the any subsequent disposal licence application.</p>
<p>The representation requests to take interests of Welsh communities first and sustainable development goals. Impacts of the disposal to other developments.</p>	<p>This designated disposal site can be used for the disposal of material arising from UK waters. The potential impacts of the disposal to other development is out of scope to the consultation and relates to the any subsequent disposal licence application.</p> <p>However, during the determination of any marine licence all relevant legislation is considered. Also as stated above, the MACAA imposes a legal obligation on NRW PS to comply with international law when exercising its licensing functions. Accordingly, when NRW PS determines a marine licence application, regard must always be had to:</p> <ul style="list-style-type: none"> • the need to protect the environment • the need to protect human health

	<ul style="list-style-type: none"> the need to prevent interference with legitimate uses of the sea
The representation suggests NRW has a lack of expertise and requests for independent expert advice from WG	NRW received advice from its internal technical experts (the Radioactivity and Industry Policy (R&IP) and All Wales Marine Advice Teams) and external technical consultees (the Environment Agency, ABPmer, and the advisory branch of Cefas) all of which are highly regarded in their field.
The representation requests explanation of the lack of baseline to the Welsh Coastline	<p>This is out of scope of the consultation and not a matter that can be resolved through the marine licensing process. The determination of any future disposal application will need to conclude the material is safe for disposal.</p> <p>Previous monitoring of Hinkley Point and RIFE reports (which will include historical monitoring near Cardiff as a result of AWE and GE/Amersham operations) are available to inform a baseline.</p> <p>Additionally, EDF ENERGY will need to report all PSA data collected in the dredged area to assess the depositional environment in the dredge area. Different sediment types have different settling velocities, which will affect the extent of transport and deposition. EDF ENERGY will need to demonstrate the nature of the material to inform an assessment (and decision) on the potential dispersal of sediment during dredging and disposal operations.</p>
When will the Gamma-Spec results be published?	<p>This aspect is out of scope to the consultation and relates to the any subsequent disposal licence application.</p> <p>Results from the analysis of samples collected will be made available at the point of application</p>
Representation indicates that in their views internal exposure risk grants the need to characterise the sediments for uranium and alpha emitters. Inhalation risks should also be assessed by the analysis undertaken.	<p>The accuracy of exposure pathways within internationally agreed guidance is beyond the remit of this consultation and the jurisdiction of NRW.</p> <p>However, our pre-application advice has sought an explanation from EDF ENERGY regarding the chosen sample location for plutonium and alpha emitting particles and the decision to take only one measurement for alpha emitters at each location. We support further analysis for plutonium isotopes and alpha emitting particles in a focused manner proportionate to the risk. The chosen sample location for plutonium should be explained. Clear justification on the number of stations in relation to risk will need to be provided. In addition, each core</p>

	<p>chosen for such analysis will require subsamples to be taken from all depths. The following exposure pathways are considered in the IAEA guidelines for members of the public without regards to the likelihood of these pathways resulting in actual exposures for a particular candidate material:</p> <ul style="list-style-type: none"> • External exposure to radionuclides deposited on the shore; • Ingestion of seafood caught in the area around the dumping site; • Inadvertent ingestion of beach sediments; • Inhalation of particles resuspended from beach sediments; <p>Standard dose assessment methodologies published by the International Commission on Radiological Protection (ICRP) will be used to assess the radiological impact of the disposal. These methods allow for doses from ingestion and inhalation to be assessed</p>
<p>The representation questions the capacity of the disposal site in Cardiff Grounds</p>	<p>The capacity of LU110 is out of scope of this consultation. Suitability and capacity of the disposal site relates to the any subsequent disposal licence application.</p> <p>At present, it is premature to make assumptions on the disposal site capacity. The applicant will have to consider the results of the sample analysis regime alongside the known characteristics of the disposal site (history of use, hydrodynamics etc.) to determine what proportion (and therefore quantity) of the dredged material is suitable for disposal at the intended disposal site. Only at this stage, can an assessment on the capacity be undertaken.</p>
<p>The representation requests the analysis of Organic Bound Tritium (OBT) and Pu analysis are needed</p>	<p>A clear distinction is needed between organically bound tritium (OBT) and tritiated water. Tritiated water is the only discharge from nuclear power stations as OBT (tritiated oils in this case) are incinerated. Tritiated water behaves in the environment in the same way as water. Once discharged it will readily get diluted. There is no evidence to suggest that the area of dredging could have elevated levels of OBT from direct input.</p> <p>Since discharges of OBT ceased from Cardiff, the levels of OBT in the environment have decreased dramatically (this is documented in annual RIFE reports). A published review (Hunt et al. 2010⁷) reviewed past monitoring data from Cardiff in order to compare the apparent enhancement of tritium</p>

⁷ Hunt, G.J., Bailey, T.A., Jenkinson, S.B. and Leonard, K.S., 2010. Enhancement of tritium on uptake by marine biota: experience from UK coastal waters. J. Radiol. Prot., 30(1):73.

	<p>concentrations on uptake by marine biota with bioaccumulation at other UK sites. The observed enhancement factor at Cardiff remained at least an order of magnitude greater than at the other sites studied (including Hinkley Point power stations). In most recent years, levels of OBT have continued to decline dramatically to the extent that bioaccumulation of OBT is now difficult to detect in the vicinity of Cardiff and consequently further afield. Although the scientific evidence suggests that OBT is unlikely to have any radiological significance at Hinkley Point, for the purpose of public reassurance, a limited number of samples will be analysed for OBT.</p> <p>The procedure adopted for radiological assessment follows Internationally agreed guidelines (IAEA, 2015) incorporating a stepwise evaluation procedure for the screening of sediment. The IAEA guidance also states that “candidate materials comprising sediments containing only relatively minor amounts of artificial radionuclides may not need to be subjected to an unnecessarily detailed or complex assessment”. By adopting the IAEA stepwise evaluation, it is possible to determine whether minor amounts of artificial radionuclides are present in the initial evaluation and then continue with the stepwise evaluation (if necessary).</p> <p>A limited number of samples will be analysed for OBT.</p>
<p>A full EIA of the application is requested</p>	<p>Noted. The sample plan is preapplication and as such the point raised is out of scope of this consultation. See position statement on our webpages. We expect EDF ENERGY to submit a Screening and Scoping opinion request to NRW and we will determine if the project requires an Environmental Impact Assessment in line with the Marine Works (Environmental Impact Assessment) Regulations 2007.</p> <p>If an EIA is not required, this does not diminish the level of scrutiny any disposal licence will be subject to. There is always a thorough assessment on all applications for a marine licence as required by the Marine and Coastal Access Act 2009. The MACAA imposes a legal obligation on NRW’s determination of a marine licence to always have regard to:</p> <ul style="list-style-type: none"> • the need to protect the environment • the need to protect human health • the need to prevent interference with legitimate uses of the sea

ii. Response Received from BARRY TOWN COUNCIL - 78

BARRY TOWN COUNCIL - 78	
Summary of issues raised:	Summary of consideration / how this has been covered
Understand the alternative disposal locations and consider costs of disposal to Barry's environment and economy	<p>This is out of scope of this consultation. The understanding of alternative disposal sites is a matter that relates to the potential subsequent disposal licence application if needed.</p> <p>However, as stated above, the MACAA imposes a legal obligation on NRW PS to comply with international law when exercising its licensing functions. Accordingly, when NRW PS determines a marine licence application, regard must always be had to:</p> <ul style="list-style-type: none"> • the need to protect the environment • the need to protect human health • the need to prevent interference with legitimate uses of the sea
Representation seeks reassurance that the sediment deposited in LU110 will not be reaching Welsh coastline in particular to Barry beaches	<p>Any risks from the dispersal of the sediment is out of scope of this consultation and would be considered during the determination of any subsequent disposal licence application.</p> <p>The sediment disposed to Cardiff Grounds will enter the Severn Estuary sedimentary regime. Whilst it is impossible to guarantee no single particle from LU110 will ever reach the Penarth/Barry coastline, material disposed will join the naturally highly dynamic region off Cardiff and move in a general North East direction towards the long-term sinks of the Newport Deep and River Usk marshes (Figure 3 for sands and Figure 4 for muds from Cannard, 2016⁸)</p>

iii. Response Received from CHILDREN WITH CANCER UK – 144

⁸ Cannard, Phil 2016. The Sediment Regime of the Severn Estuary. Literature Review. Bristol City Council. Available at: <http://sites.cardiff.ac.uk/secg/files/2016/02/The-Sediment-Regime-of-the-Severn-Estuary-Literature-Review.pdf>

CHILDREN WITH CANCER UK - 144

Summary of issues raised:	Summary of consideration / how this has been covered
<p>Representation indicates that there is not enough sampling proposed with no seawater to air radiation transfer study in Severn</p>	<p>The IAEA framework for pathways to be considered considers sea to land transfers. The following exposure pathways are considered in the IAEA guidelines for members of the public without regards to the likelihood of these pathways resulting in actual exposures for a particular candidate material:</p> <ul style="list-style-type: none"> • External exposure to radionuclides deposited on the shore; • Ingestion of seafood caught in the area around the dumping site; • Inadvertent ingestion of beach sediments; • Inhalation of particles resuspended from beach sediments; • Inhalation of sea spray.
<p>Representation indicates that common assessments are gamma radiation and x-rays but not alpha or beta emitting particles (e.g. Ra) which can become airborne. Inhaled can become lodged resulting in localised exposure</p> <p>The dose to specific organs can be difficult to determine particularly for inhaled/ingested exposure, indicating the difficulty of understanding environmental exposure</p>	<p>First the concentrations in sediment need to be understood, the IAEA guidelines consider the pathways to assess including the inhaled/ingested pathway (see above).</p> <p>The International Commission on Radiological Protection (ICRP⁹) has published, peer reviewed models which can determine doses to specific organs. These are the same models that clinicians use when considering administering radiopharmaceuticals to patients.</p> <p>However, this consultation relates to the sampling of the sediment to be dredged from Hinkley Point C, to understand the concentrations of contaminants in the material to be dredged/disposed.</p>
<p>The representation highlights that there is some indication of higher risk of childhood cancers in proximity of nuclear plants.</p>	<p>The point raised is beyond the remit of the consultation and NRW. It is a matter of Centre for Radiation, Chemical and Environmental Hazards through Public Health England/Wales.</p> <p>The Committee on Medical Aspects of Radiation in the Environment (COMARE) advises on the health effects of natural and man-made radiation</p>

⁹ <https://www.icrp.org>

	and has reviewed the evidence suggested in this representation in its 14 th report ¹⁰
The representation believes that the sample plan is not adequate as hot-spots of radiation are possible	The Environment Agency (Hinkley Point A&B environmental regulator) has stated that hot spots are plausible but are likely to be in close proximity to the outfalls of the Hinkley Point A and B sites. Based on the operator's monitoring data, there is no evidence to suggest that any exist. The proposed dredging site is over a 1 km away from these outfalls.
The representation state that soluble radioactive particles like Cs137 contaminate seawater and do require water analysis	Soluble chemical forms of radioisotopes can be transported by seawater, the fact they are soluble generally means that they are easily dispersed in the environment thereby lowering concentrations. Cs-137 levels detected in the environment around Hinkley Point are very low, see RIFE report.
<p>The representation highlights the <i>de minimis</i> concept in the 2015 IAEA guidance and disagrees with the evaluation of bulk radioactivity ignoring the effects inhaled or ingested particulates.</p> <p>The representation asks for enriched U and Pu to be added to the list of radionuclides tested due to the history of Hinkley Point reactors in the production of Pu for nuclear weapons</p>	<p>As stated above, IAEA guidelines do consider inhalation/ingestion pathways.</p> <p>It is a matter of public record (Hansard, 1958¹¹) that the Hinkley Point A reactors 'could' be used to produce plutonium for the weapons programme but there is no evidence that they have been used for such purpose.</p> <p>Our pre-application advice has sought an explanation from EDF ENERGY regarding the chosen sample location for plutonium and alpha emitting particles and the decision to take only one measurement for alpha emitters at each location. We support further analysis for plutonium isotopes and alpha emitting particles in a focused manner proportionate to the risk. The chosen sample location for plutonium should be explained. Clear justification on the number of stations in relation to risk will need to be provided. In addition, each core chosen for such analysis will require subsamples to be taken from all depths.</p>
<p>The representation requests the following further analysis:</p> <ul style="list-style-type: none"> • Cs 137 in seawater • aerosol radionuclide testing 	As stated above there is no suggestion to indicate the need for Cs 137 levels in seawater.

¹⁰ COMARE, 2011. Further consideration of the incidence of childhood leukaemia around nuclear power plants in Great Britain. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/304617/COMARE14threport.pdf

¹¹ <https://api.parliament.uk/historic-hansard/commons/1958/jun/24/atomic-power-stations-plutonium>

<ul style="list-style-type: none"> Only 0.4% of dredged are will be sampled with the proposed plan and suggests a min of 100 cores to get meaningful result and understanding 	<p>The aerosol testing is out of scope to the consultation and relates to the any subsequent disposal licence application.</p> <p>The sample plan conforms with the requirements set by OSPAR. There is not a clear reason or risk to support 100 samples to characterise the sediment to be dredged.</p>
Grid ref error for station 15/16	Developer has been informed.

iv. Response Received from THE NUCLEAR FREE LOCAL AUTHORITIES OF WALES AND ENGLAND, CND CYMRU AND THE STOP HINKLEY CAMPAIGN GROUP – 145

The Nuclear Free Local Authorities of Wales and England, CND Cymru and The Stop Hinkley Campaign Group – 145	
Summary of issues raised:	Summary of consideration / how this has been covered
Baseline data needs particularly of radionuclide on coastal environment along Severn/Bristol Channel	<p>This is out of scope of the consultation and not a matter that can be resolved through the marine licensing process. The determination of any future disposal application will need to conclude the material is safe for disposal.</p> <p>Previous monitoring of Hinkley Point and RIFE reports are available to inform a baseline.</p> <p>EDF ENERGY will need to report all PSA data collected in the dredged area to assess the depositional environment in the dredge area. Different sediment types have different settling velocities, which will affect the extent of transport and deposition. EDF ENERGY should demonstrate the nature of the material to inform an assessment (and decision) on the potential dispersal of sediment during dredging and disposal operations.</p>
Annual RIFE reports have raised concerns of presence of radioactive particles related to historical Magnox incidents	<p>Out of scope of this consultation. The Environment Agency is aware of an incident in the R1 fuel pond in the late 1960s which led to a release of fission products into the pond. The pond has now been treated and emptied of effluent and sludge. This has been discussed openly at Site Stakeholder Group meetings.</p> <p>No abnormal levels of radioactivity were detected and no environmental detriment or harm to the public could be demonstrated.</p>
The representation indicates that:	It is a matter of public record (Hansard, 1958 ¹²) that the Hinkley Point A reactors 'could' be used to produce plutonium for the

¹² <https://api.parliament.uk/historic-hansard/commons/1958/jun/24/atomic-power-stations-plutonium>

<ul style="list-style-type: none"> • Magnox reactors have been used for nuclear weapon plutonium generation • In Chapelcross "particles of irradiated Uranium" found 10 m of effluent in 1992 • There has been no specific sampling or analysis for such particles in around the pipeline or downstream of the Hinkley A & B stations 	<p>weapons programme but there is no evidence that they have been used for such purpose.</p> <p>Although the representation asserts that particulate uranium and plutonium settles in the environment near to nuclear power station outfalls, the proposed dredging site and sampling locations are some distance away.</p>
<p>Radioactive particles can be heterogeneously distributed in the environment and carry enough risk</p> <p>No report to date of any monitoring for these radioactive particles around Hinkley outfalls (previous sample plan has not looked for these)</p> <p>Representation request: to produce a comprehensive baseline for all radioactive particles and if found characterise these and their inhalation/ingestion risk</p> <p>If licence is granted, pre-dredge (baseline) and post discharge samples in coastal areas, particularly in intertidal sediments and areas with history of inundation in past 20 years</p>	<p>Discharges are always subject to regulation under the site's Environmental Permits and are not relevant to this consultation.</p> <p>The assessment procedure, carried out prior to disposal at sea, follows IAEA guidance (IAEA, 2015) that incorporate a stepwise evaluation procedure for screening sediments to determine if the sediment can be treated as 'non-radioactive' (i.e. <i>de minimis</i>) under London Convention 1972.</p> <p>The requirement for a baseline is out of scope of the consultation and not a matter that can be resolved through the marine licensing process. The determination of any future disposal application will need to conclude the material is safe for disposal.</p> <p>Previous monitoring of Hinkley Point and RIFE reports are available to inform a baseline.</p> <p>EDF ENERGY will need to report all PSA data collected in the dredged area to assess the depositional environment in the dredge area. Different sediment types have different settling velocities, which will affect the extent of transport and deposition. EDF ENERGY should demonstrate the nature of the material to inform an assessment (and decision) on the potential dispersal of sediment during dredging and disposal operations.</p> <p>From a radiological aspect, materials which can be regarded as 'non-radioactive' could be disposed of at sea. Monitoring and assessment of regulated radioactive waste discharges in the area, originating from a number of local nuclear establishments are published annually in the RIFE report series and are not regulated through a marine licence following the completion of disposal activities.</p>
<p>Representation claims evidence of substantial plutonium discharges between 1969 and 1984</p> <p>There is possibility of plutonium being</p>	<p>The Environment Agency is aware of an incident in the R1 fuel pond in the late 1960s which led to a release of fission products into the pond. The pond has now been treated and emptied of effluent and sludge. This has been discussed openly at Site Stakeholder Group meetings. Discharges are matter for Magnox Ltd, but the Environment Agency is aware of these</p>

<p>sequestered in the sediment through adsorption and flocculation.</p> <p>Disturbance of sediment on last dredge might complicate the picture particularly in the chronological deposition depth</p> <p>Representation requests for Pu to be analysed at various depths in 10-20cm intervals and at strategic locations.</p>	<p>historic events that may have led to higher levels the Hinkley Point A pond excursion in the late 1960s. The EA also prosecuted Magnox for poor maintenance of effluent filters at Hinkley Point A (and Bradwell) in June 2001. They (Magnox Electric) were fined £100,000 plus £28,000 costs. No abnormal levels of radioactivity were detected and no environmental detriment or harm to the public could be demonstrated.</p> <p>It is well established that polyvalent materials like plutonium have a greater affinity for the solid phase of sediments as they are reduced (i.e., more retained at depth where sediment is comparatively anoxic c.f. surface sediments).</p> <p>Although there is a possibility of dredging disturbing the chronological deposition, the initial dredge was not carried out at the outfalls, where the representation claims that such substances are likely to have accumulated in the environment.</p> <p>Our pre-application advice has sought an explanation from EDF ENERGY regarding the chosen sample location for plutonium and alpha emitting particles and the decision to take only one measurement for alpha emitters at each location. We support further analysis for plutonium isotopes and alpha emitting particles in a focused manner proportionate to the risk. The chosen sample location for plutonium should be explained. Clear justification on the number of stations in relation to risk will need to be provided. In addition, each core chosen for such analysis will require subsamples to be taken from all depths.</p>
<p>Representation believes that IAEA exposure pathways are basic and simplistic. Inhalation risk through sea-spray is overlooked and only considers external exposure</p>	<p>The accuracy of exposure pathways within internationally agreed guidance is a matter beyond the remit of this consultation and NRW's responsibilities.</p> <p>The following exposure pathways are considered in the IAEA guidelines for members of the public without regards to the likelihood of these pathways resulting in actual exposures for a particular candidate material:</p> <ul style="list-style-type: none"> • External exposure to radionuclides deposited on the shore; • Ingestion of seafood caught in the area around the dumping site; • Inadvertent ingestion of beach sediments; • Inhalation of particles resuspended from beach sediments; • Inhalation of sea spray.
<p>The representation uses Sellafield experiences to request analysis of isotopes of Cs, Am and Pu detected in saltmarsh and tide washed pastures.</p>	<p>The requirement for further testing on intertidal environments relates to a baseline and monitoring e.g. further RIFE monitoring. The matter is out of scope of this consultation.</p> <p>However, it is important to note that the level of characterisation and monitoring should be proportionate to the level of risk from the activity and the radionuclides present. The nature of the sediment to be deposited will be determined before it being allowed for disposal and only if it is deemed safe.</p>

The representation claims Tritium is present in the discharges of HPA and particularly HPB and disagrees with the dilution theory of tritium.

OBT can enter the body through ingestion, high levels have been reported on wildlife.

Representation request: that NRW initiates baseline of OBT in fine sediments in South Wales coastal areas, Somerset coast area and in areas to be dredged and in Bridgwater Bay, to characterise and understand the sediment OBT situation

This is out of scope of the consultation and not a matter that can be resolved through the marine licensing process. The determination of any future disposal application will need to conclude the material is safe for disposal.

Previous monitoring of Hinkley Point and RIFE reports are available to inform a baseline.

EDF ENERGY will need to report all PSA data collected in the dredged area to assess the depositional environment in the dredge area. Different sediment types have different settling velocities, which will affect the extent of transport and deposition. EDF ENERGY should demonstrate the nature of the material to inform an assessment (and decision) on the potential dispersal of sediment during dredging and disposal operations.

A clear distinction is needed between organically bound tritium (OBT) and tritiated water. Tritiated water is the only discharge from nuclear power stations as OBT (tritiated oils in this case) are incinerated. Tritiated water behaves in the environment in the same way as water. Once discharged it will readily get diluted. There is no evidence to suggest that the area of dredging could have elevated levels of OBT from direct input.

Since discharges of OBT ceased from Cardiff, the levels of OBT in the environment have decreased dramatically (this is documented in annual RIFE reports). A published review (Hunt et al. 2010¹³) reviewed past monitoring data from Cardiff in order to compare the apparent enhancement of tritium concentrations on uptake by marine biota with bioaccumulation at other UK sites. The observed enhancement factor at Cardiff remained at least an order of magnitude greater than at the other sites studied (including Hinkley Point power stations). In most recent years, levels of OBT have continued to decline dramatically to the extent that bioaccumulation of OBT is now difficult to detect in the vicinity of Cardiff and consequently further afield. Although the scientific evidence suggests that OBT is unlikely to have any radiological significance at Hinkley Point, for the purpose of public reassurance, a limited number of samples will be analysed for OBT.

The procedure adopted for radiological assessment follows Internationally agreed guidelines (IAEA, 2015) incorporating a stepwise evaluation procedure for the screening of sediment. The IAEA guidance also states that “candidate materials comprising sediments containing only relatively minor amounts of artificial radionuclides may not need to be subjected to an unnecessarily detailed or complex assessment”. By adopting the IAEA stepwise evaluation, it is possible to determine whether minor amounts of artificial radionuclides are present in

¹³ Hunt, G.J., Bailey, T.A., Jenkinson, S.B. and Leonard, K.S., 2010. Enhancement of tritium on uptake by marine biota: experience from UK coastal waters. J. Radiol. Prot., 30(1):73.

	<p>the initial evaluation and then continue with the stepwise evaluation (if necessary).</p> <p>EDF ENERGY will be required to analyse a limited number of samples for OBT.</p>
<p>The representation indicates that sea to land transfer of five radio isotopes (¹³⁷Cs, ²⁴¹Am, ²³⁸Pu, ²³⁹Pu and ²⁴⁰Pu) can happen during periods of onshore wind. The representation quotes Nuclear Free Local Authority (NFLA) as source of empirical evidence of the possible level of risk and indicates that IAEA protocols do not consider these pathways.</p> <p>The representation requests for NRW to consider the evidence presented and ask EDF ENERGY to monitor (baseline and post disposal) of all the radionuclides indicated in points above as a potential risk to human health and wildlife.</p>	<p>The pathways proposed by the internationally agreed IAEA guidelines should be applied to any assessment in a way that reflects the environment the assessment is covering.</p> <p>The accuracy of exposure pathways within internationally agreed guidance is a matter beyond the remit of this consultation and NRW's responsibilities. However, accidental inhalation and ingestion are pathways within the IAEA.</p> <p>The following exposure pathways are considered in the IAEA guidelines for members of the public without regards to the likelihood of these pathways resulting in actual exposures for a particular candidate material:</p> <ul style="list-style-type: none"> • External exposure to radionuclides deposited on the shore; • Ingestion of seafood caught in the area around the dumping site; • Inadvertent ingestion of beach sediments; • Inhalation of particles resuspended from beach sediments; • Inhalation of sea spray. <p>The requirement of a baseline and monitoring is out of scope of the consultation and not a matter that can be resolved through the marine licensing process. The determination of any future disposal application will need to conclude the material is safe for disposal.</p> <p>Previous monitoring of Hinkley Point and RIFE reports are available to inform a baseline.</p> <p>EDF ENERGY will need to report all PSA data collected in the dredged area to assess the depositional environment in the dredge area. Different sediment types have different settling velocities, which will affect the extent of transport and deposition. EDF ENERGY should demonstrate the nature of the material to inform an assessment (and decision) on the potential dispersal of sediment during dredging and disposal operations.</p>
<p>The representation refutes Cefas and industry models of plutonium content of Bridgwater Bay sediments using ²⁴¹Am as these are based on Sellafield environmental characteristics. The main reason quoted is that</p>	<p>It is acknowledged that the Sellafield environment is a different environment to that of the Bristol Channel. However, in terms of a first generic radiological assessment (as specified by the stepwise evaluation guidance by the IAEA) it is not necessary to address this issue unless the resulting doses of the generic assessment exceed <i>de minimis</i> (dose limits), in which case plutonium analyses in sediment may then be required (if appropriate) for a more detailed assessment.</p> <p>Also, in line with IAEA guidelines, the assessment procedure is required to determine if the candidate material is likely to</p>

suspended sediment load in Sellafield area is very different.

The representation indicates a lack of understanding of the fate and behaviour of disturbed sediments in dredged and deposited areas of previous dredge. It indicates that although RIFE and AEMR reports have shown a steady or decreasing tendency in radioactivity the last 2016-2018 have shown an increase

EDF ENERGY indicated that no dredging happened before samples were collected for previous dredging, but campaigners say other activities during the period between 2016-2018 (including the construction of a “barrier sea wall”, pile driving and seabed drilling) occurred that would have disturbed the sediment.

Representation requests for EDF ENERGY to investigate the fate and behaviour of these sediments prior to the dredge and disposal 2021 campaign

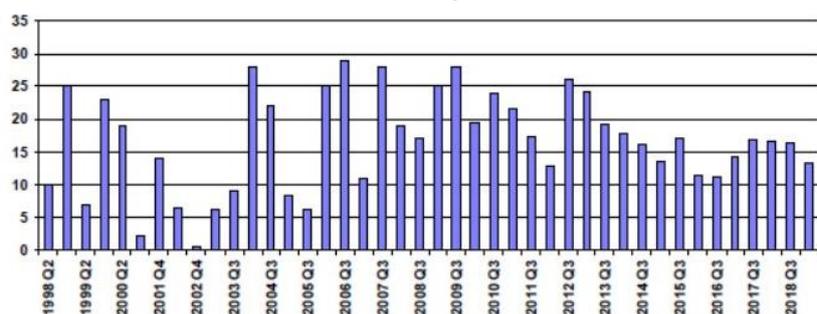
Landfall of dredged material is calculated by the campaign to be anywhere from the Gwent Levels to Barry

contain artificial radionuclides from any known sources. Sellafield released large quantities of waste (including Am-241 and plutonium radionuclides) in the 1970’s that far exceeded any releases from power generation facilities. These releases from Sellafield have since being transported all around the UK marine environment (and beyond) and are detectable at low levels and can be identified as being Sellafield-derived.

The calculated Pu-239+240 values can be considered overly conservative because the majority of Am-241 in sediments are not detected positively by gamma spectrometry. The values, using these detection limit to determine doses, are considerably higher than those expected from measurements by radiochemistry methods. Nevertheless, for public reassurance purposes, a limited number of samples will be analysed by alpha spectrometry.

Our pre-application advice has sought an explanation from EDF ENERGY regarding the chosen sample location for plutonium and alpha emitting particles and the decision to take only one measurement for alpha emitters at each location. We support further analysis for plutonium isotopes and alpha emitting particles in a focused manner proportionate to the risk. The chosen sample location for plutonium should be explained. Clear justification on the number of stations in relation to risk will need to be provided. In addition, each core chosen for such analysis will require subsamples to be taken from all depths.

There is no evidence of levels of radionuclides increasing in the areas around HP since the last dredging campaign. There has been an increase in the limit of detection and not in the presence of Am-241 in the environment. For those radionuclides that can be detected above a given limit of detection, there is no evidence of an increase but there is evidence of fluctuation. As an example, in the case of Cs-137 at the same location the EA monitoring data is below:



Site	Hinkley Point	Location Ref	275
Location	Stoford		
Nuclide	Caesium-137	Sample type	Sediment
Units	Bq/kg dry		

The Environment Agency is not aware of any activity occurring before samples were collected for previous campaign.

	<p>EDF ENERGY will be asked to provide evidence of any activity that could have disturbed the sediment to be sampled prior to the current dredging campaign.</p> <p>Understanding the fate and behaviour (including landfall of sediments) of the disposed sediment is out of scope of this consultation and relates to any subsequent disposal licence application.</p> <p>However, it is important to note that NRW will be the licensing authority for the disposal licence only. Any requests related to the dredging licence should be directed to the MMO.</p> <p>The sediment disposed to Cardiff Grounds will enter the Severn Estuary sedimentary regime. Whilst it is impossible to guarantee no single particle from LU110 will ever reach the Penarth/Barry coastline, material disposed will join the naturally highly dynamic region off Cardiff and move in a general North East direction towards the long-term sinks of the Newport Deeps and River Usk marshes (Figure 3 for sands and Figure 4 for muds from Cannard, 2016).</p>
<p>The representation requests for NRW to undertake their own analysis/research with the support of Welsh Universities rather than the Westminster agency Cefas. It raises questions regarding the independence of Cefas as it advises NRW/WG and works as consultant for EDF ENERGY.</p>	<p>NRW PS receives advice of a series of technical consultees including technical advisors of ABPmer, the Environment Agency, Cefas, and NRW technical specialist advisors.</p> <p>Cefas has sent the statement below:</p> <p>“Cefas, is an executive agency of Defra (Department for Environment, Food and Rural Affairs) and as such, we have a mandate from Defra and UK Government that any spare capacity should be made available to others such as Government departments and industry.</p> <p>We acknowledge that there could be a perceived conflict of interest in relation to our advice on dredge material assessment emanating from the new Hinkley Nuclear New Build project as members of Cefas staff are involved in the authorship of the Hinkley nuclear build application documents, working for EDF ENERGY. However, to mitigate the potential for a perceived impact, the lead for providing advice to NRW PS and Welsh Government on large infrastructure projects in Wales and the deputies do not engage in any delivery for EDF ENERGY projects.</p> <p>Cefas also adhere to strict procedures which limits contact between colleagues working on such projects. Therefore, it is our view that these mitigations are satisfactory in addressing any perceived conflict and as such these advisors can continue to provide impartial advice on this matter to NRW PS.”</p>

	All analysis must be carried out following established specific dredge material testing methods by approved ¹⁴ and UKAS ¹⁵ accredited laboratories.
<p>The representation questions the independence and aims of IAEA.</p> <p>The representation indicates that gamma spectrometry fails to detect all radionuclides: for example, it does not measure Pu as this must be estimated from Am using Sellafield observed ratio.</p> <p>Other beta emitters like ³H, OBT, etc will also be missed. The RIFE 2018 recognises Bridgwater Bay as a sink of historic radioactivity and analyses these radionuclides in their surveys in the area and the representation supports the use of alternative analytical methods. It requests that all samples should be tested with alpha, beta and gamma spectrometry and that all concentrations are reported however small.</p>	<p>IAEA produces internationally agreed standards and questions regarding its independence are a matter beyond NRW remit.</p> <p>The procedure adopted for radiological assessment follows Internationally agreed guidelines (IAEA, 2015) incorporating a stepwise evaluation procedure for the screening of sediment. The IAEA guidance states that “candidate materials comprising sediments containing only relatively minor amounts of artificial radionuclides may not need to be subjected to an unnecessarily detailed or complex assessment”. By adopting the IAEA stepwise evaluation, it is possible to determine whether minor amounts of artificial radionuclides are present in the initial evaluation and then continue with the stepwise evaluation (if necessary). This method of evaluation also provides a basis to adopt an appropriate scope of radionuclides required for the initial assessment, either measured by gamma spectrometry or those predicted for the assessment (e.g. plutonium radionuclides).</p> <p>Americium-241 is a radioactive daughter of Plutonium-241 and as such gamma spectrometry used to measure Am-241 will indicate the historic presence of Pu isotopes. However, as no radioactive equilibrium exists, Gamma spectrometry cannot measure Pu isotopes with confidence but will suggest the historic presence of Pu in the sample. We understand that Pu isotopes can only be reliably measured by radiochemical separation and alpha spectrometry.</p> <p>Our pre-application advice has sought an explanation from EDF ENERGY regarding the chosen sample location for plutonium and alpha emitting particles and the decision to take only one measurement for alpha emitters at each location. We support further analysis for plutonium isotopes and alpha emitting particles in a focused manner proportionate to the risk. The chosen sample location for plutonium should be explained. Clear justification on the number of stations in relation to risk will need to be provided. In addition, each core chosen for such analysis will require subsamples to be taken from all depths.</p> <p>As previously stated, tritiated water is unlikely to be an issue as it is extremely mobile in the marine environment. There has been extensive investigation of OBT in the Cardiff area due to discharges from the former Maynard Centre in Cardiff¹⁶. All</p>

¹⁴ <https://naturalresources.wales/permits-and-permissions/marine-licensing/sediment-sampling-and-analysis/?lang=en>

¹⁵ https://www.ukas.com/browse-accredited-organisations/?org_cat=2464&parent=Testing%20Laboratories&type_id=2&cpage=3

¹⁶ For example: Hunt, G.J., Bailey, T.A., Jenkinson, S.B. and Leonard, K.S., 2010. Enhancement of tritium on uptake by marine biota: experience from UK coastal waters. J. Radiol. Prot., 30(1):73.

	<p>analyses should be considered on the basis of the risk that they are intended to quantify. However, as stated above a small number of samples will be requested from EDF ENERGY for OBT.</p> <p>Results of analysis (or dose contributors, e.g. plutonium radionuclides) are currently reported for those radionuclides that are either positively detected or are below the level of detection (but likely to result in a dose which is significant for the purposes of a <i>de minimis</i> assessment). Where 'less than' is quoted it means that a statistically positive detection of the radionuclide cannot be made and the results are quoted as 'less than', providing greater transparency than 'not detected'.</p>
<p>Representation requests the use of the most up-to-date techniques available to produce accurate measurements of radionuclides. They request the counting times to be increased from 15h used by Cefas to 3 days to avoid missing random decay.</p>	<p>The sampling plan references the use of internationally-agreed methodologies for the assessment of the estimation of radiation doses. EDF ENERGY must use analysis techniques appropriate for the analysis being undertaken.</p> <p>Count times should be established based on the risk that a given radionuclide presents to the environment.</p>
<p>Representation requests that all samples at surface and depth to be analysed for Alpha-Spec</p>	<p>As stated before, analysis should be undertaken on a risk basis</p>
<p>Representation requests for PSA to be collected every 20cm and doubling the number of stations to one every 50m</p>	<p>OSPAR guidelines requires 16 – 30 stations to characterise a volume of sediment of 500,000 to 2,000,000 m³. The current sample plan is for 600,000 m³ of sediment and will collect 35 stations plus 10 contingency stations. NRW understand that this is above the requirements of OSPAR and is satisfied that the number of stations will be representative of the sediment to be dredged.</p>
<p>Severn Estuary cannot be considered 'sea' or 'marine' but transitional waters/'estuary' and as such LU110 is not located at sea, but in an estuary</p>	<p>OSPAR commission defines the North East Atlantic region as formed by 5 sub-regional areas. The Severn Estuary forms part of Region III: The Celtic Seas, which includes estuaries. Moreover, the Severn Estuary is one of the Marine Protected Areas identified under OSPAR in 2011.</p> <p>More information regarding the Severn Estuary can be found in the above sections (The Disposal Site)</p> <p>The term 'disposal at sea' is a common term to describe disposal of material within the marine environment, i.e. below mean high water springs. As such, the term is used to describe material being disposed of in the open ocean, estuaries, and riverine systems and regardless of the specific environment, the same standards and guidance (those provided by OSPAR, International Maritime Organisation, IAEA) are applied.</p>

	The standards and practices for monitoring and reporting (separately and together) radioactive substances and disposal at sea in OSPAR are under continuous review and updated to reflect best available science and describe the consensus of the 16 contracting parties (15 countries & the EU), and therefore the approach that NRW is following standard and best practice in the UK, EU and North East Atlantic.
The campaign disputes that the dredging is occurring inside the Severn Estuary but outside whilst the disposal site is located inside. As such, they indicate that the sediment to be disposed of will be imported from outside the estuary	The point raised is out of scope of the consultation and relates to any subsequent disposal licence application.
The representation requires NRW to treat the application as an EIA project	The sample plan is preapplication and as such the point raised is out of scope of the consultation. See position statement on our webpages. We expect EDF ENERGY to submit a scoping and Screening opinion request to NRW where NRW will determine if the project requires an environmental impact assessment in line with the Marine Works (Environmental Impact Assessment) Regulations 2007. There is always a thorough assessment on all applications for a marine licence as required by the Marine and Coastal Access Act 2009. The MACAA imposes a legal obligation on NRW PS on the determination of a marine licence to always have regard to: <ul style="list-style-type: none"> • the need to protect the environment • the need to protect human health • the need to prevent interference with legitimate uses of the sea

v. Response Received from WILKINSON ENVIRONMENTAL CONSULTING – 146

WILKINSON ENVIRONMENTAL CONSULTING – 146	
Summary of issues raised:	Summary of consideration / how this has been covered
The representation indicates that: <ul style="list-style-type: none"> • OSPAR is outdated, 	The points raised are beyond the remit of NRW.t. The UK has implemented and recognises OSPAR commitments and issues

<ul style="list-style-type: none"> IAEA is an industry led organisation (promotes nuclear energy) and gives little weight to the risk of inhaled/ingested particles 	<p>regarding its validity should be raised to the appropriate authority. IAEA produces internationally agreed standards and questions regarding its independence are a matter beyond NRW remit and should be raised with the appropriate authority.</p> <p>The following exposure pathways are considered in the IAEA guidelines for members of the public without regards to the likelihood of these pathways resulting in actual exposures for a particular candidate material:</p> <ul style="list-style-type: none"> External exposure to radionuclides deposited on the shore; Ingestion of seafood caught in the area around the dumping site; Inadvertent ingestion of beach sediments; Inhalation of particles resuspended from beach sediments; Inhalation of sea spray.
<p>The representation recommends the implementation of an independent expert support panel.</p>	<p>Noted</p>
<p>The sample plan is not enough in the view of the representation as it does not fully characterise the sediment to be dredged. Full assessment of all radionuclides and all alpha emitters such as Pu, Am, etc...</p>	<p>The level of characterisation should be proportionate to the level of risk from the radionuclides present. The nature of the discharges from the nuclear sites discharging into the Bristol Channel is understood and the characterisation programme should be proportionate to the level and risks. International guidance has been followed and additional information and analysis have been suggested. NRW will ensure that the sample plan will characterise the sediment to be dredged/disposed and that it is representative of the risk posed.</p>
<p>The representation indicates that NRW should consider the evidence that refutes the safe levels set by the ICRP, that dose risk is not a linear response but more complex relationship.</p>	<p>The accuracy of dose estimation and use of Linear No Threshold (LNT) models within internationally agreed guidance is a matter beyond the NRW remit. This should be directed to the appropriate government body.</p> <p>The EC framework for radiological protection is set out in the Basic Safety Standards Directive (Council Directive 2013/59/EURATOM). This directive is still the basis of the UK framework for radiological protection. The UK position is that the LNT model is appropriate for calculating risk from exposure to ionising radiation. Although alternative theories to those set out by</p>

	<p>the International Commission on Radiological Protection (ICRP¹) do exist these have not been recognised.</p> <p>The dose estimation methods will be based on internationally accepted methodologies which take account of doses received from inhaled and ingested radioactive species, including alpha emitters. The ICRP has published models for assessing radiation exposure from inhaling and ingesting radionuclides.</p> <p>First the concentrations in sediment need to be understood, the IAEA guidelines consider the pathways to assess including the inhaled/ingested pathway (see above).</p> <p>The ICRP has published, peer reviewed models which can determine doses to specific organs. These are the same models that clinicians use when considering administering radiopharmaceuticals to patients.</p>
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vi. Response Received from LOW LEVEL RADIATION CAMPAIGN – 149

LOW LEVEL RADIATION CAMPAIGN – 149	
Summary of issues raised:	Summary of consideration / how this has been covered
<p>The representation understands that the use of dose is inaccurate indicating as support the apparent higher incidence of childhood leukaemia and other cancers nearer nuclear power stations.</p> <p>The representation also points at uncertainties related to Linear no Threshold models quoting as examples the higher incidence of leukaemia for under 5yrs from bomb fallout, the dial painters' cancers due to Radium exposure, the inaccuracy of Life Span Studies used in Hiroshima/Nagasaki bomb detonations, higher incidence in childhood cancers closer to high voltage power lines.</p>	<p>The accuracy of dose estimation and use of Linear No Threshold (LNT) models within internationally agreed guidance is a matter beyond NRW remit. This should be directed to the appropriate government body.</p> <p>The EC framework for radiological protection is set out in the Basic Safety Standards Directive (Council Directive 2013/59/EURATOM). This directive is still the basis of the UK framework for radiological protection. The UK position is that the LNT model is appropriate for calculating risk from exposure to ionising radiation. Although alternative theories to those set out by the International Commission on Radiological Protection (ICRP¹) do exist these have not been recognised.</p> <p>The dose estimation methods will be based on internationally accepted methodologies which take account of doses received from inhaled and ingested radioactive species, including alpha emitters. The ICRP has published models for</p>

	<p>assessing radiation exposure from inhaling and ingesting radionuclides.</p> <p>First the concentrations in sediment need to be understood, the IAEA guidelines consider the pathways to assess including the inhaled/ingested pathway (see above).</p> <p>The ICRP has published, peer reviewed models which can determine doses to specific organs. These are the same models that clinicians use when considering administering radiopharmaceuticals to patients. Public Health England/Wales and COMARE are the Government advisory bodies responsible for looking at such links.</p>
<p>Alpha emitters should be measured as they can be resuspended by wave action and criticises 'the official view of the smaller particles is that the doses incurred from inhaling them are too small to cause detectable health effects' indicating that alpha emitters are inexpensive to detect using CR-39 Track Etch detectors</p>	<p>Alpha particles can be easily detected using CR-39 Track Etch detectors. Unfortunately, these methods detect the interaction of an alpha particle or a neutron with the detector but do not indicate any other information such as they type of isotope. It is the chemical form of a radioactive material that dictates how it is metabolised by the body, therefore measuring alpha particles alone will not provide useful information.</p> <p>The IAEA framework for pathways to be considered takes account of sea to land transfer – including inhalation.</p> <p>The following exposure pathways are considered in the IAEA guidelines for members of the public without regards to the likelihood of these pathways resulting in actual exposures for a particular candidate material:</p> <ul style="list-style-type: none"> • External exposure to radionuclides deposited on the shore; • Ingestion of seafood caught in the area around the dumping site; • Inadvertent ingestion of beach sediments; • Inhalation of particles resuspended from beach sediments; • Inhalation of sea spray.
<p>In the representation's view there is resistance by local and central government to accept evidence such as Kikk report findings and discussions regarding Bulton's publication</p>	<p>The inaccuracy of internationally agreed guidance is a matter of opinion and beyond the NRW remit. The issue needs to be taken to the appropriate government body.</p>

<p>Am and Pu are at higher concentrations in household dust of areas as possible indication of sea to land transfer suggesting links with hot-spots of leukaemia.</p>	<p>Sea to land transfer is a pathway addressed by the IAEA guidelines (see above)</p> <p>Americium-241 is a radioactive daughter of Plutonium-241 and as such gamma spectrometry used to measure Am-241 will indicate the historic presence of Pu isotopes. We understand that Pu isotopes can only be reliably measured by radiochemical separation and alpha spectrometry.</p> <p>Our pre-application advice has sought an explanation from EDF ENERGY regarding the chosen sample location for plutonium and alpha emitting particles and the decision to take only one measurement for alpha emitters at each location. We support further analysis for plutonium isotopes and alpha emitting particles in a focused manner proportionate to the risk. The chosen sample location for plutonium should be explained. Clear justification on the number of stations in relation to risk will need to be provided. In addition, each core chosen for such analysis will require subsamples to be taken from all depths.</p>
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vii. Response Received from FRIENDS OF THE EARTH, BARRY –151

FRIENDS OF THE EARTH, BARRY –151	
Summary of issues raised:	Summary of consideration / how this has been covered
<p>The representation indicates the legislation is wrongly referred and London Convention not OSPAR should be stated.</p>	<p>As indicated in the initial sections:</p> <p>The two international treaties ratified by the UK that govern marine pollution are the 1972 Convention on the Prevention of Marine Pollution by Dumping of Waste and Other Matter (together with its 1996 Protocol) (the London Convention), and the Convention for the Protection of the Marine Environment of the North-East Atlantic (the OSPAR Convention). Both the London Convention/Protocol and the OSPAR Convention are concerned with protecting the marine</p>

	<p>environment from human activities, notably the pollution arising from those activities. The London Convention/Protocol is a widely applicable treaty which covers the marine waters of the world. The OSPAR Convention is a regional sea convention that addresses pollution issues, including those covered by the London Convention/Protocol, at a regional level.</p> <p>The OSPAR Convention and the London Protocol have guidelines on human activities affecting the marine environment relevant to the North-East Atlantic region and NRW's marine licensing functions, and regard must be had to them. Both treaties apply simultaneously in this case (see section 2) however, the OSPAR commission encompasses the requirements of the London Protocol. OSPAR publishes guidelines for the management of dredge material. These guidelines are harmonised with, but more prescriptive than the 'Specific Guidelines for the Management of Dredged Material' published under the London Protocol. They therefore provide the context in which NRW carries out the evaluation of dredged material and its suitability for disposal to sea.</p> <p>Both the OSPAR Convention and the London Protocol are relevant to determination of an application submitted to NRW for a marine licence for the disposal of dredged material. However, it is more appropriate to use OSPAR guidelines for assessing requirements in an OSPAR region.</p>
<p>The exemptions for disposing at sea that are dismissed including alternative beneficial uses and not minimising environmental disturbance</p>	<p>The point raised is out of scope of the consultation.</p> <p>The sample plan recommends at the capital dredge sites, for depth samples to be taken, along with surface samples for particle size analysis which will provide a detailed description of the sediment. Following these results, the applicant will then be required to provide an assessment of the suitability of the material for alternative uses for disposal to sea (following the waste assessment guidelines) or, if no other options are available, the suitability of the material to be disposal of at a disposal site.</p> <p>The MACAA imposes a legal obligation on NRW PS to comply with international law when exercising its licensing functions. Accordingly, when NRW PS determines a marine licence application, regard must always be had to:</p> <ul style="list-style-type: none"> • the need to protect the environment

	<ul style="list-style-type: none"> the need to protect human health the need to prevent interference with legitimate uses of the sea
OSPAR guidelines referred as “OSPAR, 2014” should be referred as OSPAR, 2015 to reflect the changes implemented from the Agreement 2015-06	Noted. However, the guidelines are commonly referred as OSPAR 2014. OSPAR 2015-06 provides clarification on the interpretation of the sampling frequency for maintenance dredged (Paragraph 5.5 and 5.6 of the guidelines)
No explanation for extra dredging volume required and NRW should point out the lack of planning consent for the additional volume	<p>The point raised is out of scope of this consultation, which is solely on the suitability of the sampling plan.</p> <p>To clarify, the activity will require a licence for dredging from the MMO and a licence for disposal where NRW will be the authority if the chosen disposal site is within Welsh waters.</p>
The representation indicates that IAEA 2015 incorporates and replaces the IAEA 2003 guidance and questions the use of IAEA 2003	<p>In 2003 the International Atomic Energy Agency (IAEA) established a generic conservative approach for assessing the impact to the human environment from the disposal of sediment to the marine environment (IAEA-TECDOC-1375). It included a method to account for the bioaccumulation of radioactivity in the marine environment.</p> <p>In 2006 this IAEA methodology was fully adopted in the UK using the following peer review of the published procedure:</p> <p><i>”McCubbin and Vivian (2006). Dose assessments in relation to disposal at sea under the London Convention 1972: judging de minimis radioactivity, Cefas Environment report RL05/06”.</i></p> <p>In 2015 the IAEA updated the model and guidance. The updated model includes the same generic approach to assess the impact on the human environment, but also added a similar approach for assessing the impact to marine flora and fauna.</p> <p>In the UK, this updated IAEA methodology for marine flora and fauna has not yet been adopted.</p> <p>However, the Environment Agency has assessed the dose rates to marine flora and fauna (reference organisms and feature species) for regulated radioactive waste discharges, concluding that the radiation dose to the worst affected organism was less than the agreed dose guideline (40 $\mu\text{Gy h}^{-1}$).</p>
The representation indicates that IMO should be the authority and its 2015	IMO 2015 is indicating the adoption of IAEA 2015: “This guidance reproduces relevant sections of the work of the International Atomic

<p>guidance and <i>de-minimis</i> approach takes precedence to the IAEA 2015</p>	<p>Energy Agency (IAEA) to develop a concept of <i>de minimis</i> for the purposes of the London Convention 1972, set forth in IAEA-TECDOC-1068 (1999) and the subsequent IAEA-TECDOC-1375 (2003) and IAEA-TECDOC-1759 (2015).” The sample plan follows IAEA 2015 in line with the statements above.</p>
<p>The representation indicates that the summary of dredging campaign 2018-19 does not comply with OSPAR reporting. There has been a failure to minimise dispersion of mud - licence required spreading of disposed materials - not reported by EDF ENERGY; and there have been reports of ships depositing sediment outside licenced area</p>	<p>The point raised is out of scope of this consultation, which is solely on the suitability of the sampling plan.</p> <p>If interested parties believe that operators are in breach of their licence conditions, then this should be reported directly to Marine & Fisheries Enforcement (Welsh Government). NRW is not the enforcement authority for marine licences and this duty is retained by Welsh Government.</p>
<p>Need for an EIA: the representation indicates that EDF ENERGY had agreed the project should have been EIA in 2018 and therefore the sample plan should represent a pre-application to inform an application; however, this is not within EIA regulations. The project needs to be considered in its totality</p>	<p>The point raised is out of scope of the consultation.</p> <p>The sample plan is required in advance of any licence for disposal. It is pre-application to inform a licence application, whether EIA or not.</p> <p>See position statement on our webpages. We expect EDF ENERGY to submit a Screening and Scoping opinion request to NRW and we will determine if the project requires an environmental impact assessment in line with the Marine Works (Environmental Impact Assessment) Regulations 2007.</p> <p>However, ground investigation works (and licensable survey in general) are required to inform the gathering of information in an Environmental Statement. The legislation does not encompass those works in the requirement for EIA. Moreover, the enacting of the sample plan is through an application to the MMO for a licence to collect the samples.</p>
<p>The representation indicates NRW has communicated its intention to ignore the licence for LU110 and take each application on its own merits.</p>	<p>The point raised is out of scope of the consultation.</p> <p>The representation has misinterpreted the email sent in response to its request. Our email of the 11th February to you read: “this disposal site is ‘designated’ by Welsh Government and further information on its designation should be requested from them. The area has been used since the mid-1980s and each marine licence application for disposal at the site is assessed on its own merits.” Indicating that the disposal site does not have a licence but that developers can</p>

	<p>apply for a licence to dispose on the site. These applications will be assessed on its own merits.</p>
<p>The representation requests that capital dredging be considered construction material and subject to waste legislation. It also indicates that the maximum capacity of disposal site be considered based in anecdotal information from fishing vessels that indicate the site is becoming shallower.</p>	<p>The point raised is out of scope of this consultation and would be considered as part of any future disposal licence application.</p> <p>A pre-requisite, to answer whether the material dredged is suitable for disposal at any site is the need to establish the exact character of the material. Detailed PSA and cohesivity assessments are required from the site investigations.</p> <p>The method of dredging is also important, as this will determine the mobility of the material at the site, i.e. whether it will disperse, stay at the deposit location or breakdown and disperse over time. The Cardiff Grounds as stated above is predominantly considered a dispersive site. If the material deposited is therefore in lump form this will be a different characteristic to the current functioning of the site.</p> <p>The material to be dredged is not building material waste as it is either of geological origin or has naturally accumulated over time. Under the London and OSPAR Conventions dredged material if deemed safe will not be classified as a waste and therefore is able to be deposited in the sea. However, should the assessment of the indicate the material, for whatever reason, is not suitable for sea disposal, then the material must either be contained either in the sea or on land. Should the material go to land it would then need to be assessed under the Waste Regulations.</p> <p>Similarly, the disposal site's capacity is linked to the alternative use point. At present, it is premature to make assumptions on the disposal site capacity. The applicant will have to consider the results of the sample analysis regime alongside the known characteristics of the disposal site (history of use, hydrodynamics etc.) to determine what proportion (and therefore quantity) of the dredged material is suitable for disposal at the intended disposal site. Only at this stage, can an assessment on the capacity be undertaken.</p>
<p>The IMO 2014 guidelines have not been complied with relation to criteria (3.2) human health risks (e.g. resulting from consumption of contaminated fish) and sediment toxicity affecting benthic production</p>	<p>The point raised is out of scope of this consultation.</p> <p>It is not clear whether the representation refers to IMO 2014 or 2015. However, assessments are based on international agreed IAEA guidelines as explained above</p>

<p>and biodiversity and toxicity assessment and levels in fish</p>	
<p>There is the need to analyse other radionuclides like 106Ru and 237Np</p>	<p>The level of characterisation should be proportionate to the level of risk from the radionuclides present. The nature of the discharges from the nuclear sites discharging into the Bristol Channel is understood and the characterisation programme should be proportionate to the level and risks. The representation makes the assertion that Np-237 was difficult to detect (i.e. the levels were small) in the environment near Sellafield. Given that the discharges of actinides from Sellafield are 3 or more orders of magnitude greater than they historically have been from the Hinkley Point sites it would suggest that Np-237 will be 3 or more orders of magnitude more difficult to detect in the Severn Estuary.</p>
<p>The representation doubts on the level/impartiality of advice. The representation objects to the use of Cefas due to conflict of interests.</p> <p>The representation questions NRW advisor's competence and indicates no trust on EA's competence.</p>	<p>The point raised is out of scope of the consultation.</p> <p>However, NRW has received advice from its internal technical experts (the Radioactivity and Industry Policy (R&IP) and All Wales Marine Advice Teams) and external technical consultees (the Environment Agency, ABPmer, and the advisory branch of Cefas) all of which are highly regarded in their field.</p> <p>The Environment Agency regulates the disposal of radioactive wastes in England and is a highly credible technical consultee.</p> <p>NRW's marine advisory fulfils the role of WG's Statutory Nature Conservation Body and provides support and expert advice to the NRW's Regulatory function to ensure the quality and resilience of our ecosystems. R&IP Team leads evidence-based policy and strategy for radioactivity and industry regulation.</p> <p>ABPmer is a leading UK marine consultancy with a 70-year track record of assessing port development and capital / maintenance dredging. ABPmer employs experts with decades of experience across a wide range of marine specialities including dredging/disposal assessments, numerical modelling and survey interpretation together with extensive experience in environmental assessments (including EIA, WFD assessments and HRA) and marine licensing.</p> <p>Cefas has sent the statement below:</p>

	<p>“Cefas, is an executive agency of Defra (Department for Environment, Food and Rural Affairs) and as such, we have a mandate from Defra and UK Government that any spare capacity should be made available to others such as Government departments and industry.</p> <p>We acknowledge that there could be a perceived conflict of interest in relation to our advice on dredge material assessment emanating from the new Hinkley Nuclear New Build project as members of Cefas staff are involved in the authorship of the Hinkley nuclear build application documents, working for EDF ENERGY. However, to mitigate the potential for a perceived impact, the lead for providing advice to NRW PS and Welsh Government on large infrastructure projects in Wales and the deputies do not engage in any delivery for EDF ENERGY projects.</p> <p>Cefas also adhere to strict procedures which limits contact between colleagues working on such projects. Therefore, it is our view that these mitigations are satisfactory in addressing any perceived conflict and as such these advisors can continue to provide impartial advice on this matter to NRW PS.”</p>
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b) Representations from Individual Members of the Public

Of the total of 151 responses received, 122 of were identical and have been responded together. Of the responses received from individual members of the public two had complex attachments and are responded to separately. The issues raised by the members of the public have been collated and summarised, some of which were the same as those addressed above.

i. Collated public representations

Response Received from members of the public	
Summary of issues raised:	Summary of consideration / how this has been covered
Request reassurance that the sediment deposited in LU110 will not be reaching Welsh coastline in particular Penarth/Barry beaches	Understanding the fate and behaviour of the dumped sediment is out of scope of this consultation and relates to any subsequent disposal licence application.

	<p>The sediment disposed to Cardiff Grounds will enter the Severn Estuary sedimentary regime. Whilst it is impossible to guarantee no single particle from LU110 will ever reach the Penarth/Barry coastline, material disposed will join the naturally highly dynamic region off Cardiff and move in a general North East direction towards the long-term sinks of the Newport Deeps and River Usk marshes (Figure 3 for sands and Figure 4 for muds from Cannard, 2016¹⁷)</p>
<p>Country issues are highlighted: the origin of the sediment is in English waters and should be dealt and disposed of in England</p>	<p>This aspect is out of scope of the consultation.</p> <p>A designated disposal site can be used to dispose of appropriate dredged material from anywhere within UK waters.</p> <p>However, the MACAA imposes a legal obligation on NRW to comply with international law when exercising its licensing functions. Accordingly, when NRW determines a marine licence application, regard must always be had to:</p> <ul style="list-style-type: none"> • the need to protect the environment • the need to protect human health • the need to prevent interference with legitimate uses of the sea
<p>Independent assessment and expert advice to ensure total freedom of opinion</p>	<p>The point raised is out of scope of the consultation.</p> <p>However, NRW has received advice from its internal technical experts (the Radioactivity and Industry Policy (R&IP) and All Wales Marine Advice Teams) and external technical consultees (the Environment Agency, ABPmer, and the advisory branch of Cefas) all of which are highly regarded in their field.</p> <p>The Environment Agency regulates the disposal of radioactive wastes in England and is a highly credible technical consultee.</p> <p>NRW's marine advisory fulfils the role of WG's Statutory Nature Conservation Body and provides support and expert advice to the NRW's Regulatory function to ensure the quality and resilience of our ecosystems. R&IP Team leads evidence-based policy and strategy for radioactivity and industry regulation.</p>

¹⁷ Cannard, Phil 2016. The Sediment Regime of the Severn Estuary. Literature Review. Bristol City Council. Available at: <http://sites.cardiff.ac.uk/secg/files/2016/02/The-Sediment-Regime-of-the-Severn-Estuary-Literature-Review.pdf>

	<p>ABPmer is a leading UK marine consultancy with a 70-year track record of assessing port development and capital / maintenance dredging. ABPmer employs experts with decades of experience across a wide range of marine specialities including dredging/disposal assessments, numerical modelling and survey interpretation together with extensive experience in environmental assessments (including EIA, WFD assessments and HRA) and marine licensing.</p> <p>Cefas has sent the statement below:</p> <p>“Cefas, is an executive agency of Defra (Department for Environment, Food and Rural Affairs) and as such, we have a mandate from Defra and UK Government that any spare capacity should be made available to others such as Government departments and industry.</p> <p>We acknowledge that there could be a perceived conflict of interest in relation to our advice on dredge material assessment emanating from the new Hinkley Nuclear New Build project as members of Cefas staff are involved in the authorship of the Hinkley nuclear build application documents, working for EDF ENERGY. However, to mitigate the potential for a perceived impact, the lead for providing advice to NRW PS and Welsh Government on large infrastructure projects in Wales and the deputies do not engage in any delivery for EDF ENERGY projects.</p> <p>Cefas also adhere to strict procedures which limits contact between colleagues working on such projects. Therefore, it is our view that these mitigations are satisfactory in addressing any perceived conflict and as such these advisors can continue to provide impartial advice on this matter to NRW PS.”</p>
<p>To consider the increased exposure to radiation by disturbing and transporting possibly contaminated sediments</p>	<p>The point raised is out of scope of this consultation.</p> <p>The assessment of potential radiation exposures can only be made once samples have been analysed for radioactivity. The sampling and assessment will clarify if the material can be deemed safe for disposal at sea.</p>
<p>Request that decisions are based in solid science</p>	<p>Evidence-based decisions are embedded in NRW ways of working. It is stated in our Corporate Plan¹⁸ that “we are and will be an</p>

¹⁸ <https://naturalresources.wales/about-us/strategies-and-plans/wellbeing-objectives/?lang=en>

	evidence-based organisation, undertaking operations, giving advice and making decisions based on best available evidence”
Disposal site alternatives	This is out of scope of this consultation. The understanding of alternative disposal sites is a matter that relates to the potential subsequent disposal licence application if needed.
Consider there will be an environmental impact even if the sediment is proved to be not contaminated	<p>The point raised is out of scope of this consultation and relates to any subsequent disposal licence application.</p> <p>However, the MACAA imposes a legal obligation on NRW to comply with international law when exercising its licensing functions. Accordingly, when NRW PS determines a marine licence application, regard must always be had to:</p> <ul style="list-style-type: none"> • the need to protect the environment • the need to protect human health • the need to prevent interference with legitimate uses of the sea <p>Cardiff Grounds (LU110) has been an active disposal site for several decades designated in the 1980’s. The site has received on average 650,000 tonnes per annum in the last 10 years mainly from maintenance dredging, with the highest recorded disposal of 1,022,874 tonnes in 2011. Most of these cargoes have been fine grained silt material of low density predominantly deposited from bottom opening doors from Dredgers.</p>
Request thorough assessment and transparency.	<p>Transparency is embedded in NRW ways of working. It is stated in our Corporate Plan¹⁹ as part of our wellbeing objective (number 7) that customers should be at the heart of the ways we work. “We make clear, evidence-based decisions, and we are open and transparent in our work, communicating this effectively.”</p> <p>The sample plan will be subject to a thorough assessment by NRW Regulatory and Advisory functions. We will also take advice from external technical experts.</p> <p>A position statement is published on our web-site and documents are available from our on-line public register.</p>

¹⁹ <https://naturalresources.wales/about-us/strategies-and-plans/wellbeing-objectives/?lang=en>

<p>Reassurance that EDF ENERGY is not avoiding landfill to hide radioactive nature of sediment</p> <p>○</p>	<p>The point raised is out of scope of this consultation. We need first to obtain the results from the sampling to assert the levels of radioactivity in the sediment before taking any decision as to the suitability of the material for disposal at a marine designated disposal site.</p>
<p>Radioactive particles could become airborne – consideration of inhalation risk</p>	<p>The point raised is out of scope of this consultation.</p> <p>We need first to obtain the results from the sampling to assert the levels of radioactivity in the sediment before taking any decision. Assessment of potential radiation exposures can only be made once samples have been analysed for radioactivity.</p> <p>The following exposure pathways are considered in the IAEA guidelines for members of the public without regards to the likelihood of these pathways resulting in actual exposures for a particular candidate material:</p> <ul style="list-style-type: none"> • External exposure to radionuclides deposited on the shore; • Ingestion of seafood caught in the area around the dumping site; • Inadvertent ingestion of beach sediments; • Inhalation of particles resuspended from beach sediments; • Inhalation of sea spray.
<p>Sediment sampling along the Severn Estuary coast</p>	<p>This is out of scope of this consultation and is not a requirement that can imposed by the marine licensing process. Any future marine disposal licence application will need to ensure the material is safe for disposal.</p> <p>The Environment Agency requires nuclear operators to conduct environmental sampling and monitoring in the vicinity of nuclear sites. Additionally, robust independent monitoring (sampling and analysis programme) is conducted in the area and the results are published annually in the RIFE reports.</p> <p>EDF ENERGY will need to report all PSA data collected in the dredged area to assess the depositional environment in the dredge area. Different sediment types have different settling velocities, which will affect the extent of transport and deposition. EDF ENERGY will need to demonstrate the nature of the material to inform an assessment (and decision) on the potential</p>

	dispersal of sediment during dredging and disposal operations.
Material is not suitable for disposal on site due to its heavy clay nature	<p>The point raised is out of scope of this consultation. Any future marine disposal licence application will need to ensure the suitability of the material for disposal.</p> <p>A pre-requisite, to answer whether the material dredged is suitable for disposal at any site is the need to establish the exact character of the material. Detailed PSA and cohesivity assessments are required from the site investigations.</p> <p>The method of dredging is also important, as this will determine the mobility of the material at the site, i.e. whether it will disperse, stay at the deposit location or breakdown and disperse over time. The Cardiff Grounds as stated above is predominantly considered a dispersive site. If the material deposited is therefore in lump form this will be a different characteristic to the current functioning of the site.</p> <p>Under the London and OSPAR Conventions dredged material if deemed safe will be allowed to be deposited in the sea. However, should the assessment of the indicate the material, for whatever reason, is not suitable for sea disposal, then the material must either be contained either in the sea or on land.</p>
Americium found in Teifi estuary sediment highlighting the risk of nuclear plant discharges	<p>The point raised is out of scope of this consultation. The reference is unclear. There are no nuclear sites in the vicinity of the Teifi estuary. The only nuclear sites (now de-fuelled) are at Trawsfynydd and Wylfa, which are not in the Teifi area. Even in worst case locations such as Sellafield, particle reactive actinides have been shown to migrate less than 30 km over decades.</p>
Not 'at sea' disposal: the Severn is an estuary and as such cannot be assessed as disposal at sea. For it to be 'at sea' disposal should be done past the line connecting Barry Pier, Steep Holme, and Breen Down, in the Bristol Channel	<p>OSPAR commission defines the North East Atlantic region as formed by 5 sub-regional areas. The Severn Estuary forms part of the OSPAR convention's Region III: Celtic Seas. The sea is defined in Article 1 of the convention and includes estuary areas. Moreover, the Severn Estuary is one of the Marine Protected Areas identified under OSPAR in 2011.</p> <p>The term 'disposal at sea' is a common term to describe disposal of material within the marine environment, i.e. below mean high water springs. As such, the term is used to describe material being disposed of in the open ocean, estuaries,</p>

	and riverine systems and regardless of the specific environment, the same standards and guidance (those provided by OSPAR, International Maritime Organisation, IAEA) are applied.
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ii. Public representation 147

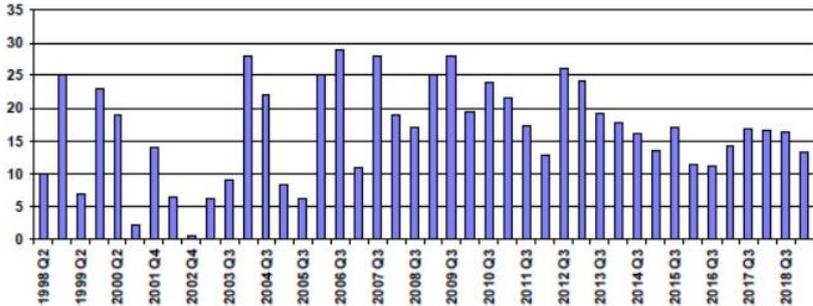
Summary of issues raised:	Summary of consideration / how this has been covered
The hazard of an isotope is not a function of its origin. Radiological protection standards are set to each radio-isotope (natural or man-made origin)	Noted.
Risks of disposing of such substances in an estuary rather than an open coast as estuaries are enclosed bodies of water	<p>Understanding the fate and behaviour of the disposed sediment is out of scope of this consultation and relates to the any subsequent disposal licence application.</p> <p>Cardiff Grounds (LU110) has been an active disposal site for several decades designated in the 1980's. The site has received on average 650,000 tonnes per annum in the last 10 years mainly from maintenance dredging, with the highest recorded disposal of 1,022,874 tonnes in 2011. Most of these cargoes have been fine grained silt material of low density predominantly deposited from bottom opening doors from Dredgers.</p> <p>The sediment disposed to Cardiff Grounds will enter the Severn Estuary sedimentary regime. Whilst it is impossible to guarantee no single particle from LU110 will ever reach the Penarth/Barry coastline, material disposed will join the naturally highly dynamic region off Cardiff and move in a general North East direction towards the long-term sinks of the Newport Deeps and River Usk marshes (Figure 3 for sands and Figure 4 for muds from Cannard, 2016²⁰)</p>
Need to consider historic inputs, a baseline and along the shores of the estuary including sediments between the Berkeley and several miles above Oldbury site on both sides of the river) is needed to	<p>The requirement of a baseline is out of scope of this consultation and not a requirement that can be imposed through the marine licensing process.</p>

²⁰ Cannard, Phil 2016. The Sediment Regime of the Severn Estuary. Literature Review. Bristol City Council. Available at: <http://sites.cardiff.ac.uk/secg/files/2016/02/The-Sediment-Regime-of-the-Severn-Estuary-Literature-Review.pdf>

ascertain the contribution of any new licence	<p>The Environment Agency requires nuclear operators to conduct environmental sampling and monitoring in the vicinity of nuclear sites. Additionally, robust independent monitoring (sampling and analysis programme) is conducted in the area and the results are published annually in the RIFE reports.</p> <p>EDF ENERGY will need to report all PSA data collected in the dredged area to assess the depositional environment in the dredge area. Different sediment types have different settling velocities, which will affect the extent of transport and deposition. EDF ENERGY will need to demonstrate the nature of the material to inform an assessment (and decision) on the potential dispersal of sediment during dredging and disposal operations.</p>
The representation suggests extra radionuclides (106Ru, 140Ba) but no reasoning is given	Noted. However, there is no evidence to suggest the need to sample for such radionuclides

iii. Public representation 150

Summary of issues raised:	Summary of consideration / how this has been covered
Two core samples for testing for alpha-emitters is not enough.	<p>Noted. This has been already considered in our position.</p> <p>Our pre-application advice has sought an explanation from EDF ENERGY regarding the chosen sample location for plutonium and alpha emitting particles and the decision to take only one measurement for alpha emitters at each location. We support further analysis for plutonium isotopes and alpha emitting particles in a focused manner proportionate to the risk. The chosen sample location for plutonium should be explained. Clear justification on the number of stations in relation to risk will need to be provided. In addition, each core chosen for such analysis will require subsamples to be taken from all depths.</p>
Sediment sampling along coast needed	<p>The requirement of a baseline is out of scope of this consultation and not a requirement that can be imposed through the marine licensing process.</p> <p>The Environment Agency requires nuclear operators to conduct environmental sampling and monitoring in the vicinity of nuclear sites. Additionally, robust independent monitoring (sampling and analysis programme) is conducted in the area and the results are published annually in the RIFE reports.</p> <p>EDF ENERGY will need to report all PSA data collected in the dredged area to assess the depositional environment in the dredge area. Different sediment types have different settling velocities, which will affect the extent of transport and</p>

	<p>deposition. EDF ENERGY will need to demonstrate the nature of the material to inform an assessment (and decision) on the potential dispersal of sediment during dredging and disposal operations.</p>																
<p>The representation indicates that there is evidence of increase of 241Am since last dredging in RIFE</p>	<p>There is no evidence of levels of radionuclides increasing in the areas around HP since the last dredging campaign. There has been an increase in the limit of detection and not in the presence of Am-241 in the environment.</p> <p>Results of analyses are currently reported for those radionuclides that are either positively detected or are below the level of detection (but likely to result in a dose which is significant for the purposes of a <i>de minimis</i> assessment). Where 'less than' is quoted it means that a statistically positive detection of the radionuclide cannot be made and the results are quoted as 'less than', providing greater transparency than 'not detected'.</p> <p>For those radionuclides that can be detected above a given limit of detection, there is no evidence of an increase but there is evidence of fluctuation. As an example, in the case of Cs-137 at the same location the EA monitoring data is below:</p>  <table border="1" data-bbox="612 1335 1262 1507"> <tr> <td>Site</td> <td>Hinkley Point</td> <td>Location Ref</td> <td>275</td> </tr> <tr> <td>Location</td> <td>Stofford</td> <td></td> <td></td> </tr> <tr> <td>Nuclide</td> <td>Caesium-137</td> <td>Sample type</td> <td>Sediment</td> </tr> <tr> <td>Units</td> <td>Bq/kg dry</td> <td></td> <td></td> </tr> </table>	Site	Hinkley Point	Location Ref	275	Location	Stofford			Nuclide	Caesium-137	Sample type	Sediment	Units	Bq/kg dry		
Site	Hinkley Point	Location Ref	275														
Location	Stofford																
Nuclide	Caesium-137	Sample type	Sediment														
Units	Bq/kg dry																
<p>Incidents in Magnox in the 60's released alpha particles</p>	<p>The Environment Agency is aware of an incident in the R1 fuel pond in the late 1960s which led to a release of fission products into the pond. The pond has now been treated and emptied of effluent and sludge. This has been discussed openly at Site Stakeholder Group meetings. Discharges are matter for Magnox Ltd, but the Environment Agency is aware of these historic events that may have led to higher levels the Hinkley Point A pond excursion in the late 1960s. The EA also prosecuted Magnox for poor maintenance of effluent filters at Hinkley Point A (and Bradwell) in June 2001. They (Magnox Electric) were fined £100,000 plus £28,000 costs. No abnormal</p>																

	levels of radioactivity were detected and no environmental detriment or harm to the public could be demonstrated.
Evidence of Pu particles of 1-2u being blown back on land through sea spray.	This is out of scope of this consultation. The risk posed by such particles should be raised to the appropriate authority (Public Health England/Wales Centre for Radiation, Chemical and Environmental Hazards).
FoI data show evidence of release of 239Pu and relates with the highest cluster of leukaemia in the region. Data provided show that no remedial action was taken (continuous small 239Pu release) and by the time the ponds were drained in 2015 and estimated release of x4 the NRPB evacuation level.	This is out of scope of this consultation. The risk posed by such particles should be raised to the appropriate authority (Public Health England/Wales Centre for Radiation, Chemical and Environmental Hazards).
Gamma levels in the environment have gone down but Alpha has not, indicating that the use of Gamma for estimating alpha is not accurate as the ratio does not stand	<p>Americium-241 is a radioactive daughter of Plutonium-241 and as such gamma spectrometry used to measure Am-241 will indicate the historic presence of Pu isotopes. However, as no radioactive equilibrium exists, Gamma spectrometry cannot measure Pu isotopes with confidence but will suggest the historic presence of Pu in the sample. We understand that Pu isotopes can only be reliably measured by radiochemical separation and alpha spectrometry. We have requested further detail from EDF ENERGY on the locations and needs for further Pu analysis</p> <p>Our pre-application advice has sought an explanation from EDF ENERGY regarding the chosen sample location for plutonium and alpha emitting particles and the decision to take only one measurement for alpha emitters at each location. We support further analysis for plutonium isotopes and alpha emitting particles in a focused manner proportionate to the risk. The chosen sample location for plutonium should be explained. Clear justification on the number of stations in relation to risk will need to be provided. In addition, each core chosen for such analysis will require subsamples to be taken from all depths.</p>
Random HP site samples of soil provide evidence of contamination of nuclides of Mg and Be at high levels (higher than if released from fuel cladding) indicating possible accidental releases	This is out of scope of this consultation. We are unaware of the study or references supporting this claim.
The representation requests testing for alpha emissions in many cores at all depths on site and in the estuaries.	Further details on the testing of alpha emitters is given above.

If alpha emitters are found, then alpha lung tests to workers should be done

The requirement for lung tests of workers is out of scope of this consultation. The risk posed by such particles should be raised to the appropriate authority.