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Low Level Waste Repository (LLWR), Drigg

**ES Annex H14: Habitats
Regulations Assessment (HRA)
Signposting**

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1 Background

1.1 Introduction

The proposed development lies adjacent to the Drigg Coast Special Area of Conservation (SAC) and, therefore, the provisions of the Conservation of Habitats and Species Regulations 2010 (commonly referred to as the 'Habitats Regulations') apply. The Regulations set out a stepwise process, including an 'Appropriate Assessment' to consider the impacts and effects of the proposed development on the Natura 2000 site. Although the necessity for an Appropriate Assessment has not been established, this document has been prepared on the assumption that the competent authority will find one is required.

This appendix represents a 'Habitats Regulations Assessment Signposting Document' prepared on behalf of LLW Repository Ltd. to assist the competent authority (Cumbria County Council) in discharging their obligations under the Habitats Regulations 2010 when considering the planning application for the site optimisation and closure works (the 'proposed development'). It includes references, under relevant subject headings, to those chapters, technical appendices and/ or paragraphs within Volumes I and II of the Environmental Statement (ES) that contain the information required by the competent authority to undertake an appropriate assessment under the terms of Regulation 61 of the Habitats Regulations. It is designed to serve two key functions:

- to assist the competent authority by making it easier to undertake and consult on an Appropriate Assessment; and
- to act as a confirmatory checklist that can be used to ensure that the relevant information needed for an Appropriate Assessment is adequately presented within this ES.

The content of the document mirrors that submitted with the Environmental Permit application to the Environment Agency as part of the Environmental Safety Case (ESC) for the operation of the site. The permit has been granted by the Environment Agency, and the Agency has agreed with the outcome of the assessment that has not identified any likely significant effects on the Drigg Coast SAC. Following a request from CCC during length consultation on the revised planning application, further information on the potential for construction phase impacts on the SAC arising from potential radiological pathways (air, surface water and groundwater) has been incorporated into the document to assist the competent authority with the undertaking of their Habitats Regulations Assessment, as well as the impact receptor pathways considered as part of the ESC assessment and within the ES for the planning application.

1.2 Overview of Procedure and Context

Office of Deputy Prime Minister (ODPM) Circular 06/2005 (Biodiversity and Geological Conservation - Statutory Obligations and Their Impact Within the Planning System) provides guidance on how the Regulations should be implemented. This is interpreted and summarised as follows:

- determination of whether the proposal is likely to have a significant effect, either alone or cumulatively (referred to as 'in-combination' in Habitat Regulations Assessment terms) with other plans or projects, on a European site;
- if a significant effect is likely, the competent authority must conduct an Appropriate Assessment of the implications for the site in view of the site's conservation objectives (Natural England, 2008);
- in considering the project's effects on the site's conservation objectives, the competent authority must determine whether it can ascertain that the proposal will not adversely affect the integrity of the site;
- taking account of the way in which works are proposed to be carried-out, and the site conditions or other restrictions;
- being satisfied that there are no alternative solutions which would have a lesser effect on site integrity.

- considering whether there are Imperative Reasons of Overriding Public Interest (IROPI) to justify granting of permission for the development despite a potentially negative effect on site integrity.
- in the absence of alternatives, and where the importance of the development outweighs the harm to a European site, consideration of proposed compensatory measures (to ensure that the overall coherence of the network of Natura 2000 sites is protected).

A flow chart of the Habitat Regulations Assessment (HRA) process (showing the decisions that are required at each stage) is provided as Figure 1.1. A four-stage methodology for HRA would therefore include:

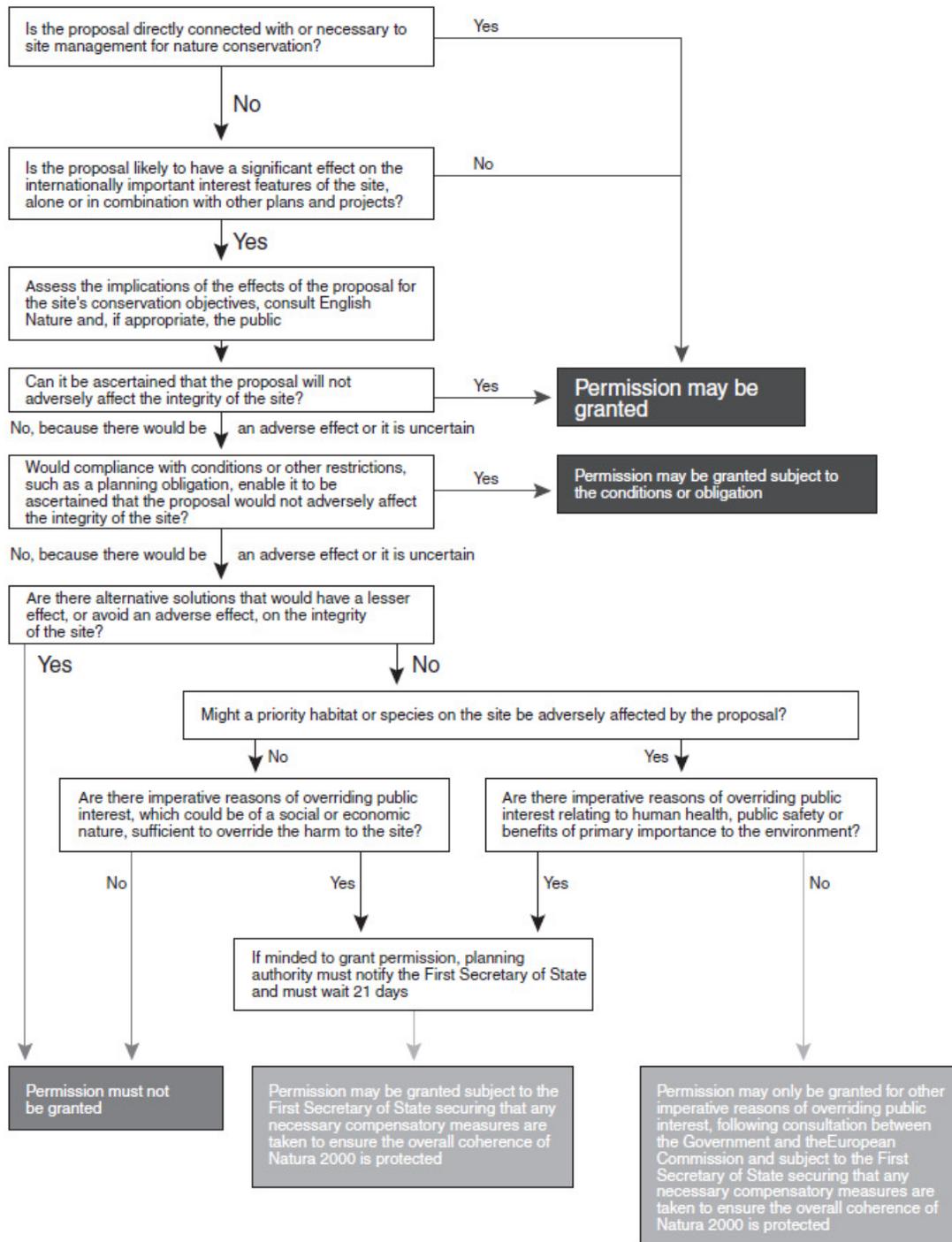
- HRA Stage 1: Screening (including a 'likely significant effect' judgement);
- HRA Stage 2: Appropriate Assessment;
- HRA Stage 3: Assessment of Alternative Solutions; and
- HRA Stage 4: Assessment where no alternative solutions exist and where adverse effects remain.

Whilst the Appropriate Assessment and any subsequent assessments are undertaken by a competent authority, the information needed to undertake the assessments is generally provided by the applicant. For the Scheme the necessary information is presented within Volumes I and II of the ES.

The ES concludes that the Scheme will not result in any significant adverse effects on the Drigg Coast SAC. It should be appreciated that the mechanism for EIA (including how terminology is used, and how the importance of receptors is evaluated) differs from that adopted for HRA. Consequently, whilst it is considered that all the information necessary to undertake HRA is contained within the ES and supplementary post-submission documents, a separate process is still required to address the specific obligations of the Habitats Regulations. This is the role that this document seeks to bridge by assisting the competent authority in directing them to the necessary topics within the submitted reports.

One primary difference between EIA and HRA relates to the context of the assessments. HRA is specifically designed to consider the effects of a scheme on the integrity of a Natura 2000 site, including its designated features (regardless of whether or not they are geographically located within the site at the time). It considers the whole of the Natura 2000 site in some detail, and by definition focuses on a site acknowledged to be of international importance. EIA, on the other hand, adopts a different perspective. It considers the impacts resulting from a development, and whether they have the potential to affect different receptors. The significance of the effect on any receptor is measured by combining the magnitude of the impact, and the importance and sensitivity of the receptor itself. EIA therefore seeks to establish the level at which significant effects occur, which may include Natura 2000 receptors at less than an international (possibly just at a local) level. All readers should be aware of this distinction when applying the signposting document.

Figure 1.1: Consideration of development proposals affecting Internationally Designated Nature Conservation Sites (ODPM, 2005)



2 Designated Sites Directly or Indirectly Affected

The proposed development lies adjacent to the Drigg Coast SAC, which abuts part the western boundary of the LLWR site. The international nature conservation importance of this stretch of Cumbrian coastline has been recognised through its statutory protection. Specifically, the Drigg Coast SAC was designated under the EC Habitats Directive (92/43/EEC) for its Annex I habitats estuaries, sand dunes and dune slacks.

2.1 The Need for the Proposed Development

A comprehensive description of the project's rationale is presented in Chapter 2 (Background to the Proposals) in the Planning Statement which accompanied the Planning Application.

2.2 Scheme Description and Alternatives

A detailed description of the proposed development is provided in Chapter 3 of the Environmental Statement (ES) which accompanied the Planning Application.

Consideration of the different alternatives to the proposed development is provided in Chapter 4 of the ES.

2.3 Consultation with Natural England and/ or General Public

Regulation 61(3) & (4) of the Habitats Regulations refer to the need and option of consultation with Natural England and the public respectively. Consultations have been carried out at intervals as the proposals have developed. These have involved meetings, discussions and written correspondence with Cumbria County Council, Natural England and the Environment Agency to determine the scope of the EIA prior to the formal submission of the ES to Cumbria County Council. In addition, public exhibitions on the revised application have been undertaken within the local community.

A summary of the consultation meeting and events undertaken to date on the proposed development is provided in Chapter XX of the ES.

2.4 The Site's Designated Features and Conservation Objectives

A summary of the designated features of the Drigg Coast SAC is presented in Table 3.1 in Appendix H (Ecology & Nature Conservation) of the ES.

The conservation objectives and definitions of favourable condition for the designated features of interest of the Drigg Coast SAC have been produced by Natural England and state the following:

"With regard to the natural habitats and/ or species for which the site has been designated ('the Qualifying Features' listed below);

"Avoid the deterioration of the qualifying natural habitats and the habitats of qualifying species, and the significant disturbance of those qualifying species, ensuring the integrity of the site is maintained and the site makes a full contribution to achieving Favourable Conservation Status of each of the qualifying features.

"Subject to natural change, to maintain or restore:

- *The extent and distribution of qualifying natural habitats and habitats of qualifying species;*
- *The structure and function (including typical species) of qualifying natural habitats and habitats of qualifying species;*

- *The supporting processes on which qualifying natural habitats and habitats of qualifying species rely;*
- *The populations of qualifying species;*
- *The distribution of qualifying species within the site.”*

Favourable condition is defined in terms of site-specific standards as published in the conservation objectives document (Natural England, 2008).

2.5 Baseline Description of Relevant Interest Features

Annex I habitats that are a primary reason for selection of this site:

- Estuaries
- Atlantic decalcified fixed dunes (*Calluno – Ulicetea*)
- Dunes with *Salix repens ssp. argentea* (*Salicon arenariae*)

Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site:

- Mudflats and sandflats not covered by seawater at low tide
- Salicornia and other annuals colonising mud and sand
- Atlantic salt meadows (*Glauco – Puccinellietalia maritimae*)
- Shifting dunes along the shoreline with *Ammophila arenaria* ('white dunes')
- Fixed dunes with herbaceous vegetation ('grey dunes')
- Humid dune slacks

In addition to the above designated habitats, the Annex II species great crested newt (*Triturus cristatus*) is also present but is not a qualifying feature. This species has been scoped out of the assessment because surveys of all waterbodies within 500 m of the Scheme boundary within the SAC did not record the species, and therefore there is no pathway by which the proposed development could result in any direct or indirect effects on the SAC great crested newt population.

The dune system associated with the SAC is also known to support a widespread population of natterjack toad (*Bufo calamita*), and surveys for this species in 2015 recorded it breeding in several pools in the dunes within 500 m of the site. Although this species is not a qualifying feature and is not listed as an interest feature of the SAC, it has been included within this signposting document because the species is dependent on the humid dune slacks for breeding. Direct or indirect impacts on the dune slacks and associated dune habitats, or other habitats within the terrestrial range of the species from its breeding ponds have the potential to adversely affect this species, which is present throughout the SAC.

Habitat information on the Drigg Coast SAC is provided in the citation for the site included as Annex H3 to Appendix H (Ecology & Nature Conservation) of the ES. In addition, a survey of habitats within the Drigg Coast SAC within approximately 100 m of the LLW Repository Ltd. boundary was undertaken in January 2012, and was updated through a walkover survey in 2015, and was supplemented with information on habitat types and distributions in the wider SAC/ SSSI was obtained from Natural England following their 2013 LIDAR survey of the site. The primary objective of the 2015 survey within the SAC/ SSSI was to identify humid dune slacks and pools within 500 of the LLWR site that could support breeding natterjack toad (*Bufo calamita*) and great crested newt (*Triturus cristatus*). The surveys also aimed to identify whether any groundwater dependent ecosystems were present within the potential zone of influence of hydrological effects resulting from the Drigg Stream diversion (approximately 50 m from the Scheme boundary), that could be adversely affected by the stream diversion. Habitats are mapped on Figure 10.2 (Phase 1 Habitat Surveys) in Volume I of the ES. The location of pools and dune slacks that were

surveyed for natterjack toad and great crested newt are provided in the figures included with Annexes H5 (Natterjack Toad Survey Report) and H6 (Great Crested Newt Survey Report) respectively.

One Annex I priority feature is present in the SAC immediately adjacent to the site; this is the Annex I habitat 'Atlantic decalcified fixed dunes (*Calluno -Ulicetea*)', which is listed as a primary reason for selection of the site as an SAC. In addition the habitat type 'Estuaries', which is also listed as a primary reason for site selection, is present approximately 1 km west of the LLWR site, and is directly linked to the site by the Drigg Stream, which flows into the River Irt estuary approximately 0.3 km downstream of the LLWR site. Other habitats potentially relevant to the HRA are 'fixed dunes with herbaceous vegetation ('grey dunes')', and 'humid dune slacks', the nearest of which are within approximately 50 m of the Scheme boundary.

Potential impacts on all other Annex I qualifying habitats have been scoped into the assessment, on the basis that the proposed development has the potential to result in indirect effects on SAC features that are not directly connected to the site. Potential pathways by which the proposed development could give rise to likely significant effects on the SAC qualifying habitats have been identified and assessed, or scoped out with an appropriate rationale as necessary (see Section 3.1).

A summary of the information collated in the ES on the baseline habitat features of the SAC is provided in Table 2.1 below, along with the relevant signposting.

Table 2.1: Summary of Baseline Information on SAC

SAC Feature	Information Provided	Document	Reference
SAC citation	Information on Annex I habitats that are a primary reason for selection of the site, and Annex I habitats that are a qualifying feature but not a primary reason for site selection.	ES Appendix H	Annex H3
Terrestrial habitats	Survey of SAC habitats within approximately 50 – 100 m from the Scheme boundary to broadly map habitats present, as agreed with Environment Agency in 2011, to identify groundwater dependent terrestrial ecosystems within zone of influence of potential hydrological impacts resulting from the Scheme. Walkover survey in 2015 to update habitat information, supplemented with examination of 2013 LIDAR survey of SAC completed by Natural England.	ES Appendix H	
Waterbodies	Walkover survey in 2015 to update habitat information and map waterbodies within 500 m of Scheme to be surveyed for great crested newts and natterjack toads.	ES Appendix H	Annex H5
		ES Appendix H	Annex H6
Drainage system	Plan showing drainage arrangement within LLWR site and adjacent SAC.	ES Figures	Figure 14.1

3 Potential Impacts on Designated Features of Drigg SAC

3.1 Identification of Potential Impact Receptor Pathways

The potential impacts of the Scheme on the qualifying features of the Drigg SAC have been summarised in Tables 3.1 to 3.9 below, with consideration to each of the ten qualifying features of the SAC.

The potential impacts on the relevant SAC qualifying features are identified and assessed in the ES in Appendix H (Ecology & Nature Conservation). The following topics were scoped into the assessment, as they were identified as being potential pathways by which the proposed development could result in significant effects on the SAC:

- Groundwater regime change – the diversion of Drigg Stream and Vault excavation and construction will result in small changes in groundwater head within a zone of influence of approximately 50m, which extends into the adjacent SAC. Consequently, there is the potential for groundwater dependent terrestrial ecosystems to be affected e.g. humid dune slacks.
- Radiological impacts (air) - radiological effects on non-human biota were assessed for the Environmental Safety Case (ESC), and this included assessment of the following direct-to-air pathways on the SAC; release of radioactive gas (tritium and Carbon 14 from the waste containers in the vaults and small amounts from the trenches) and its uptake into vegetation via photo-synthesis, and direct shine from uncapped waste containers.
- Radiological impacts (groundwater) – as discussed above, radiological effects on non-human biota were assessed for the ESC, and this included assessment of radioactive leachate from the vaults and trenches via the marine outfall pipe.
- Radiological impacts (surface water) – as discussed above, radiological effects on non-human biota were assessed for the ESC and this included assessment of the potential for the mobilisation of contaminated sediment from downstream sections of the Drigg Stream. No potentially contaminated sediment is present in the section of the Drigg Stream to be diverted.
- Non-radiological impacts (groundwater) – potential pathways for the uptake of contaminants into groundwater and subsequent impacts on adjacent groundwater dependent terrestrial ecosystems in the SAC.
- Non-radiological impacts (surface water) – potential pathways identified through the mobilisation of contaminated sediment into the Drigg Stream during the construction phase.
- Air quality - potential pathways identified through NO₂ emissions from mobile plant and nutrient enrichment via aerial deposition of nitrogen, and subsequent changes in vegetation.
- Smothering/ dust – release of fugitive dust during construction phase (including clearance of vegetation and movement of spoil from storage areas onto the capped area).

The following topics were considered but were scoped out of the ecological impact assessment on the basis that there was no pathway by which the proposed development could impact the SAC features (although they are included in the impact assessment tables for completeness):

- Habitat loss – the proposed development will have no direct impacts on the habitats within the Drigg Coast SAC, and therefore there is no potential for the scheme to result in habitat loss. At the consultation stage, concerns regarding potential works to monitoring boreholes in the SAC, and the marine outfall pipe (which is buried beneath the SAC) as part of the Scheme, which could result in direct impacts, were raised. However, it was clarified that any works to the

monitoring boreholes, or the marine outfall pipe (including as a result of damage during a seismic event), would be subject to a separate planning application and would therefore require their own ecological impact assessment and Habitats Regulations Assessment screening for likely significant effects (and Appropriate Assessment, if necessary).

- Physical damage – no pathways by which the proposed development could result in physical damage to the SAC habitats was identified. As discussed above, any works to the monitoring boreholes or marine outfall pipe do not form part of this application, and would be subject to their own ecological impact assessments and Habitats Regulations Assessment screening for likely significant effects (and Appropriate Assessment, if necessary).
- Hydrological regime change – the drainage system for the LLWR site is entirely separate from that of the SAC, and there is no drainage of the SAC into the LLWR that could be affected. Similarly there is no drainage of surface water into the SAC from the LLWR (a previous outfall into Carl Cragg Gulley from the LLWR site into the SAC was closed following the construction of vault 8). This drainage arrangement will not change as a result of the construction of the proposed development; surface water draining from the re-capped trenches and newly capped vaults will be captured in a new perimeter drain (a diversion of the upper reaches of Drigg Stream) and will therefore drain surface water into the Drigg Stream channel, as is the case with the current perimeter drainage of the trench cap.
- Noise/ vibration – no qualifying features of the SAC are susceptible to the effects of noise and vibration during the construction phase. Potential noise and vibration impacts on protected species that are present within the dune habitats (natterjack toads, reptiles and invertebrates) have been considered in the ES, but have not been scoped into the HRA screening as these receptors are not qualifying features of the SAC.

3.2 Summary of HRA Screening

The ecological impact assessment has concluded that the proposed development will not result in any significant effects on the Drigg Coast SAC qualifying features. To assist the competent authority in the completion of their Habitats Regulations Assessment for the Scheme, the table below summarises the screening exercise undertaken for impact receptor pathways on the Drigg Coast SAC, and provides signposting to the relevant sections in the ES Volumes that provide further detail to assist with the screening of likely significant effects. A summary of the topics screened for each of the SAC habitat features is provided in Tables 3.1 to 3.9.

Table 3.1: Summary of Screening for ‘Atlantic Decalcified Fixed Dunes (*Calluno – Uliceta*)’

Potential Impact	Potential Pathway for Effects	Summary of Evidence Presented	Document	Reference
Habitat loss	No pathway	The Scheme requires no work within the boundary of the Drigg Coast SAC and therefore there is no pathway by which the proposed development could result in loss of any of the ‘Atlantic decalcified fixed dunes (<i>Calluno – Ulicetea</i>)’ habitat feature.	ES Appendix H	4.7.1
Physical damage	No pathway	The scheme requires no work within the boundary of the SAC. Requirements for additional monitoring boreholes or replacement of existing monitoring infrastructure will require a new planning permission and associated Habitats Regulations Assessment.	ES Appendix H	4.7.1
Groundwater regime change	Changes in groundwater head due to construction of vaults and diversion of Drigg Stream	The hydrogeological assessment in the Environmental Statement identified potential changes in the elevation of the Upper Groundwater up to 10 cm within 50 m of the boundary of the LLWR in response to vault construction. Monitoring has also shown that shallow groundwater within the SAC is not linked to the Upper Groundwater; rather, surface water levels are dependant primarily on the balance between rainfall onto and drainage from the SSSI. Shallow groundwater levels are not therefore likely to be affected by the development - even within the zone of influence (i.e. 50 m from the LLWR boundary).	ES Appendix J2	N/A
Hydrological regime change	No pathway	The hydrological regime within the SAC is separate from the drainage of the LLWR site. There is no drainage of surface water into the SAC habitats. Drainage from the newly constructed vaults will be tied into the existing leachate management system, and surface water drainage will be via the internal surface water drainage network that outfalls into the Drigg Stream, as it does at present during operation of the current site. There will be no changes in the hydrology of the adjacent SAC, notwithstanding the minor impacts on groundwater (see above). There is therefore no potential for the drainage regime within the LLWR to result in any effect on the ‘Atlantic decalcified fixed dunes (<i>Calluno – Ulicetea</i>)’ habitat feature.	ES Appendix H	4.7.2
Radiological impacts (air)	Release of radioactive material into the air and uptake by non-human biota	Radiological effects on non-human biota were assessed for the Environmental Safety Case (ESC), and this included assessment of the following direct-to-air pathways; release of radioactive gas (tritium and Carbon 14 from the waste containers in the vaults and small amounts from the trenches) and direct shine from uncapped waste containers. Potential aerial impacts on the SAC via release of radioactive C-14 and its uptake in vegetation via photo-synthesis were assessed and found to be below the generic screening threshold dose rate of 10 $\mu\text{Gy h}^{-1}$. No potential for adverse effects on the SAC habitats were therefore identified.	ES Appendix D2	7.1

Potential Impact	Potential Pathway for Effects	Summary of Evidence Presented	Document	Reference
Radiological impacts (groundwater)	Migration of radioactive material into upper groundwater and discharge onto foreshore	Radiological effects on non-human biota as a result of leachate from the marine outfall pipe resulting in adverse effects on groundwater were assessed for the ESC. Potential radiological dose rates via the groundwater discharge pathway have been assessed and found to be more than three orders of magnitude below the generic screening threshold dose rate of $10 \mu\text{Gy h}^{-1}$. No potential for adverse effects on the SAC habitats were therefore identified.	ES Appendix D2	7.1
Radiological impacts (surface water)	Release of radioactive contaminated sediment into the Drigg Stream and downstream pollution of Estuary	No radioactive contaminated sediment is present in the section of Drigg Stream to be diverted, and therefore the stream diversion will not result in any mobilisation of contaminated sediment downstream and potentially into the Estuary. Radiological effects on non-human biota as a result of the potential mobilisation of contaminated sediment (due to increased flow resulting from the increase in surface-water catchment area and subsequent scouring of the channel) from downstream sections of Drigg Stream into the Estuary have been assessed. The scheme includes embedded mitigation for changes in flow through the construction of an attenuation lagoon in the first phase of the scheme. This will attenuate run-off flow rates such that no scouring of the channel downstream of the scheme would occur.	ES Appendix H	4.7.4
		Surface water run-off from the vaults and trenches is treated in a separate system and outfalls into the sea via the existing discharge pipeline under a discharge consent administered by the Environment Agency. Furthermore, the Environmental Permit for the site provides the regulatory framework by which potential radiological effects through surface water contamination are carefully controlled and monitored. Potential radiological dose rates via groundwater discharge have been assessed for the ESC and found to be more than three orders of magnitude below the generic screening threshold dose rate of $10 \mu\text{Gy h}^{-1}$	ES Appendix D2	2.3.2
Non-radiological impacts (groundwater)	Migration of non-radioactive contamination into upper groundwater and discharge onto foreshore	Modelled concentrations of non-radiological contaminants in groundwater between the LLWR and the coast are negligible. No potential for adverse effects on the SAC habitat were therefore identified.	ES Appendix D3	6.3.3
Non-radiological impacts (surface water)	Release of non-radioactive contaminated sediment into Drigg Stream and Estuary	Embedded mitigation in the scheme will ensure that there is a negligible risk of contaminated surface water reaching the SAC through the Drigg Stream, through the installation of an attenuation lagoon in the first phase of the scheme. This will attenuate surface-water run-off containing suspended sediment. In addition strict measures will be enforced through the construction phase via best practice measures and a Construction Environmental Management Plan (CEMP) to minimise the risk of a pollution event occurring during construction. Legislative measures currently in place provide a framework for compliance by LLW Repository Ltd. to ensure that no pollution occurs during the operational phase. This is regulated by the Environment Agency under the Environmental	ES Appendix H	4.7.4
	Pollution of Drigg Stream e.g. fuel spillage and subsequent		ES Appendix L3	2.3.2

Potential Impact	Potential Pathway for Effects	Summary of Evidence Presented	Document	Reference
	pollution of Estuary	<p>Permit for the site.</p> <p>Even if a pollution event was to occur, due to the slow flowing nature of the Drigg Stream, the distance downstream to the River Irt and Drigg Coast, and the dilution effect as any contaminant moves downstream, there is no potential for significant effects.</p> <p>Notwithstanding the above, modelled concentrations of non-radiological contaminants in groundwater between the LLWR and the coast are negligible.</p>	ES Appendix D3	6.3.3
Air quality	Emissions of NO ₂ from mobile plant and aerial nitrogen deposition onto adjacent habitats	<p>Potential pathways by which an impact on the SAC could occur have been identified as resulting from NO₂ emissions from mobile plant and nutrient enrichment via aerial deposition of nitrogen.</p> <p>An assessment of NO₂ from mobile site plant has been undertaken. This demonstrates that the total concentration of NO₂ (background plus contribution from the development) is less than 70% of the Air Quality Strategy Objective for the Protection of Vegetation and Ecosystems.</p> <p>The increase in nitrogen deposition (as NO₂) from the Proposed Development is less than the 1% threshold above which significant effects may occur and as such this is considered to be an increase of negligible significance</p>	ES Appendix I	7
			ES Appendix H	4.7.7
Smothering/ dust	Fugitive dust releases during vegetation clearance and spoil movements on site, and subsequent smothering of vegetation	<p>Smothering and toxic contamination of habitats is not considered to be a significant risk to the habitats within the Drigg Coast SAC/SSSI. The Principal Contractor appointed by LLW Repository Ltd will develop and implement a Construction Environmental Management Plan (CEMP), which will present a comprehensive list of mitigation measures to minimise dust generation at the site. Additionally, rainfall will wash away small amounts of deposited materials which may be deposited periodically.</p>	ES Appendix I	7
			ES Appendix H	4.7.6
Noise	No pathway	'Atlantic decalcified fixed dunes (<i>Calluno Ulicetea</i>)' habitat feature not sensitive to this impact	Not applicable	Not applicable

Table 3.2: Summary of Screening for ‘Dunes with *Salix Repens ssp. Argentea (Salicon Arenariae)*’

Potential Impact	Potential Pathway for Effects	Summary of Evidence Presented	Document	Reference
Habitat loss	No pathway	The Scheme requires no work within the boundary of the Drigg Coast SAC and therefore there is no pathway by which the proposed development could result in loss of any of the ‘Dunes with <i>Salix Repens ssp. Argentea (Salicon Arenariae)</i> ’ habitat feature.	ES Appendix H	4.7.1
Physical damage	No pathway	The scheme requires no work within the boundary of the SAC. Requirements for additional monitoring boreholes or replacement of existing monitoring infrastructure will require a new planning permission and associated Habitats Regulations Assessment.	ES Appendix H	4.7.1
Groundwater regime change	Changes in groundwater head due to construction of vaults and diversion of Drigg Stream	The hydrogeological assessment in the Environmental Statement identified potential changes in the elevation of the Upper Groundwater up to 10 cm within 50 m of the boundary of the LLWR in response to vault construction. Monitoring has also shown that shallow groundwater within the SAC is not linked to the Upper Groundwater; rather, surface water levels are dependant primarily on the balance between rainfall onto and drainage from the SSSI. Shallow groundwater levels are not therefore likely to be affected by the development - even within the zone of influence (i.e. 50 m from the LLWR boundary).	ES Appendix J2	N/A
Hydrological regime change	No pathway	The hydrological regime within the SAC is separate from the drainage of the LLWR site. There is no drainage of surface water into the SAC habitats. Drainage from the newly constructed vaults will be tied into the existing leachate management system, and surface water drainage will be via the internal surface water drainage network that outfalls into the Drigg Stream, as it does at present during operation of the current site. There will be no changes in the hydrology of the adjacent SAC, notwithstanding the minor impacts on groundwater (see above). There is therefore no potential for the drainage regime within the LLWR to result in any effect on the ‘Dunes with <i>Salix Repens ssp. Argentea (Salicon Arenariae)</i> ’ habitat feature.	ES Appendix H	4.7.2
Radiological impacts (air)	Release of radioactive material into the air and uptake by non-human biota	Radiological effects on non-human biota were assessed for the Environmental Safety Case (ESC), and this included assessment of the following direct-to-air pathways; release of radioactive gas (tritium and Carbon 14 from the waste containers in the vaults and small amounts from the trenches) and direct shine from uncapped waste containers. Potential aerial impacts on the SAC via release of radioactive C-14 and its uptake in vegetation via photo-synthesis were assessed and found to be below the generic screening threshold dose rate of 10 $\mu\text{Gy h}^{-1}$. No potential for adverse effects on the SAC habitats were therefore identified.	ES Appendix D2	7.1
Radiological impacts (groundwater)	Migration of radioactive material into upper groundwater and	Radiological effects on non-human biota as a result of leachate from the marine outfall pipe resulting in adverse effects on groundwater were assessed for the ESC. Potential radiological dose rates via the groundwater discharge pathway have	ES Appendix D2	7.1

Potential Impact	Potential Pathway for Effects	Summary of Evidence Presented	Document	Reference
	discharge onto foreshore	been assessed and found to be more than three orders of magnitude below the generic screening threshold dose rate of $10 \mu\text{Gy h}^{-1}$. No potential for adverse effects on the SAC habitats were therefore identified.		
Radiological impacts (surface water)	Release of radioactive contaminated sediment into the Drigg Stream and downstream pollution of Estuary	No radioactive contaminated sediment is present in the section of Drigg Stream to be diverted, and therefore the stream diversion will not result in any mobilisation of contaminated sediment downstream and potentially into the Estuary. Radiological effects on non-human biota as a result of the potential mobilisation of contaminated sediment (due to increased flow resulting from the increase in surface-water catchment area and subsequent scouring of the channel) from downstream sections of Drigg Stream into the Estuary have been assessed. The scheme includes embedded mitigation for changes in flow through the construction of an attenuation lagoon in the first phase of the scheme. This will attenuate run-off flow rates such that no scouring of the channel downstream of the scheme would occur.	ES Appendix H	4.7.4
		Surface water run-off from the vaults and trenches is treated in a separate system and outfalls into the sea via the existing discharge pipeline under a discharge consent administered by the Environment Agency. Furthermore, the Environmental Permit for the site provides the regulatory framework by which potential radiological effects through surface water contamination are carefully controlled and monitored. Potential radiological dose rates via groundwater discharge have been assessed for the ESC and found to be more than three orders of magnitude below the generic screening threshold dose rate of $10 \mu\text{Gy h}^{-1}$	ES Appendix D2	2.3.2
Non-radiological impacts (groundwater)	Migration of non-radioactive contamination into upper groundwater and discharge onto foreshore	Modelled concentrations of non-radiological contaminants in groundwater between the LLWR and the coast are negligible. No potential for adverse effects on the SAC habitat were therefore identified.	ES Appendix D3	6.3.3
Non-radiological impacts (surface water)	Release of non-radioactive contaminated sediment into Drigg Stream and Estuary	Embedded mitigation in the scheme will ensure that there is a negligible risk of contaminated surface water reaching the SAC through the Drigg Stream, through the installation of an attenuation lagoon in the first phase of the scheme. This will attenuate surface-water run-off containing suspended sediment. In addition strict measures will be enforced through the construction phase via best practice measures and a Construction Environmental Management Plan (CEMP) to minimise the risk of a pollution event occurring during construction.	ES Appendix H	4.7.4
	Pollution of Drigg Stream e.g. fuel spillage and subsequent pollution of Estuary	Legislative measures currently in place provide a framework for compliance by LLW Repository Ltd. to ensure that no pollution occurs during the operational phase. This is regulated by the Environment Agency under the Environmental Permit for the site. Even if a pollution event was to occur, due to the slow flowing nature of the Drigg Stream, the distance downstream to the River Irt and Drigg Coast, and the dilution	ES Appendix L3	2.3.2
			ES Appendix D3	6.3.3

Potential Impact	Potential Pathway for Effects	Summary of Evidence Presented	Document	Reference
		<p>effect as any contaminant moves downstream, there is no potential for significant effects.</p> <p>Notwithstanding the above, modelled concentrations of non-radiological contaminants in groundwater between the LLWR and the coast are negligible.</p>		
Air quality	Emissions of NO ₂ from mobile plant and aerial nitrogen deposition onto adjacent habitats	<p>Potential pathways by which an impact on the SAC could occur have been identified as resulting from NO₂ emissions from mobile plant and nutrient enrichment via aerial deposition of nitrogen.</p> <p>An assessment of NO₂ from mobile site plant has been undertaken. This demonstrates that the total concentration of NO₂ (background plus contribution from the development) is less than 70% of the Air Quality Strategy Objective for the Protection of Vegetation and Ecosystems.</p> <p>The increase in nitrogen deposition (as NO₂) from the Proposed Development is less than the 1% threshold above which significant effects may occur and as such this is considered to be an increase of negligible significance</p>	ES Appendix I	7
			ES Appendix H	4.7.7
Smothering/ dust	Fugitive dust releases during vegetation clearance and spoil movements on site, and subsequent smothering of vegetation	<p>Smothering and toxic contamination of habitats is not considered to be a significant risk to the habitats within the Drigg Coast SAC/SSSI. The Principal Contractor appointed by LLW Repository Ltd will develop and implement a Construction Environmental Management Plan (CEMP), which will present a comprehensive list of mitigation measures to minimise dust generation at the site. Additionally, rainfall will wash away small amounts of deposited materials which may be deposited periodically.</p>	ES Appendix I	7
			ES Appendix H	4.7.6
Noise	No pathway	'Dunes with <i>Salix Repens ssp. Argentea (Salicon Arenariae)</i> ' habitat feature not sensitive to this impact	Not applicable	Not applicable

Table 3.3: Summary of Screening for ‘Mudflats and Sandflats not Covered by Seawater at Low Tide’

Potential Impact	Potential Pathway for Effects	Summary of Evidence Presented	Document	Reference
Habitat loss	No pathway	The Scheme requires no work within the boundary of the Drigg Coast SAC and therefore there is no pathway by which the proposed development could result in loss of any of the ‘Mudflats and Sandflats not Covered by Seawater at Low Tide’ habitat feature.	ES Appendix H	4.7.1
Physical damage	No pathway	The scheme requires no work within the boundary of the SAC. Requirements for additional monitoring boreholes or replacement of existing monitoring infrastructure will require a new planning permission and associated Habitats Regulations Assessment.	ES Appendix H	4.7.1
Groundwater regime change	No pathway	‘Mudflats and sandflats not covered by the seawater at low tide’ habitat feature not sensitive to this impact.	ES Appendix J2	N/A
Hydrological regime change	No pathway	‘Mudflats and sandflats not covered by the seawater at low tide’ habitat feature not sensitive to this impact.	ES Appendix H	4.7.2
Radiological impacts (air)	No pathway	‘Mudflats and sandflats not covered by the seawater at low tide’ habitat feature not sensitive to this impact.	Not applicable	Not applicable
Radiological impacts (groundwater)	Migration of radioactive material into upper groundwater and discharge onto foreshore	Radiological effects on non-human biota as a result of leachate from the marine outfall pipe resulting in adverse effects on groundwater were assessed for the ESC. Potential radiological dose rates via the groundwater discharge pathway have been assessed and found to be more than three orders of magnitude below the generic screening threshold dose rate of 10 $\mu\text{Gy h}^{-1}$. No potential for adverse effects on the SAC habitats were therefore identified.	ES Appendix D2	7.1
Radiological impacts (surface water)	Release of radioactive contaminated sediment into the Drigg Stream and downstream pollution of Estuary	No radioactive contaminated sediment is present in the section of Drigg Stream to be diverted, and therefore the stream diversion will not result in any mobilisation of contaminated sediment downstream and potentially into the Estuary. Radiological effects on non-human biota as a result of the potential mobilisation of contaminated sediment (due to increased flow resulting from the increase in surface-water catchment area and subsequent scouring of the channel) from downstream sections of Drigg Stream into the Estuary have been assessed. The scheme includes embedded mitigation for changes in flow through the construction of an attenuation lagoon in the first phase of the scheme. This will attenuate run-off flow rates such that no scouring of the channel downstream of the scheme would occur.	ES Appendix H	4.7.4
		Surface water run-off from the vaults and trenches is treated in a separate system and outfalls into the sea via the existing discharge pipeline under a discharge consent administered by the Environment Agency. Furthermore, the Environmental Permit for the site provides the regulatory framework by which potential radiological effects through surface water contamination are carefully controlled and monitored.	ES Appendix D2	2.3.2

Potential Impact	Potential Pathway for Effects	Summary of Evidence Presented	Document	Reference
		Potential radiological dose rates via groundwater discharge have been assessed for the ESC and found to be more than three orders of magnitude below the generic screening threshold dose rate of 10 $\mu\text{Gy h}^{-1}$		
Non-radiological impacts (groundwater)	Migration of non-radioactive contamination into upper groundwater and discharge onto foreshore	Modelled concentrations of non-radiological contaminants in groundwater between the LLWR and the coast are negligible. No potential for adverse effects on the SAC habitat were therefore identified.	ES Appendix D3	6.3.3
Non-radiological impacts (surface water)	Release of non-radioactive contaminated sediment into Drigg Stream and Estuary Pollution of Drigg Stream e.g. fuel spillage and subsequent pollution of Estuary	<p>Embedded mitigation in the scheme will ensure that there is a negligible risk of contaminated surface water reaching the SAC through the Drigg Stream, through the installation of an attenuation lagoon in the first phase of the scheme. This will attenuate surface-water run-off containing suspended sediment. In addition strict measures will be enforced through the construction phase via best practice measures and a Construction Environmental Management Plan (CEMP) to minimise the risk of a pollution event occurring during construction.</p> <p>Legislative measures currently in place provide a framework for compliance by LLW Repository Ltd. to ensure that no pollution occurs during the operational phase. This is regulated by the Environment Agency under the Environmental Permit for the site.</p> <p>Even if a pollution event was to occur, due to the slow flowing nature of the Drigg Stream, the distance downstream to the River Irt and Drigg Coast, and the dilution effect as any contaminant moves downstream, there is no potential for significant effects.</p> <p>Notwithstanding the above, modelled concentrations of non-radiological contaminants in groundwater between the LLWR and the coast are negligible.</p>	ES Appendix H	4.7.4
			ES Appendix L3	2.3.2
			ES Appendix D3	6.3.3
Air quality	No pathway	'Mudflats and sandflats not covered by the seawater at low tide' habitat feature not sensitive to this impact.	Not applicable	Not applicable
Smothering/ dust	No pathway	Mudflats and sandflats not covered by the seawater at low tide' habitat feature not sensitive to this impact as daily tidal movements will wash away any deposited dust.	ES Appendix I	7
			ES Appendix H	4.7.6
Noise	No pathway	'Mudflats and sandflats not covered by the seawater at low tide' habitat feature not sensitive to this impact.	Not applicable	Not applicable

Table 3.4: Summary of Screening for ‘Salicornia and other annuals colonising mud and sand’

Potential Impact	Potential Pathway for Effects	Summary of Evidence Presented	Document	Reference
Habitat loss	No pathway	The Scheme requires no work within the boundary of the Drigg Coast SAC and therefore there is no pathway by which the proposed development could result in loss of any of the ‘Salicornia and other annuals colonising mud and sand’ habitat feature.	ES Appendix H	4.7.1
Physical damage	No pathway	The scheme requires no work within the boundary of the SAC. Requirements for additional monitoring boreholes or replacement of existing monitoring infrastructure will require a new planning permission and associated Habitats Regulations Assessment.	ES Appendix H	4.7.1
Groundwater regime change	No pathway	The hydrogeological assessment in the Environmental Statement identified potential changes in the elevation of the Upper Groundwater up to 10 cm within 50 m of the boundary of the LLWR in response to vault construction. Discharges onto the foreshore from the Upper Groundwater are not likely to be affected by the development, being outside the zone of influence.	ES Appendix J2	N/A
Hydrological regime change	No pathway	The hydrological regime within the SAC is separate from the drainage of the LLWR site. There is no drainage of surface water into the SAC habitats. Drainage from the newly constructed vaults will be tied into the existing leachate management system, and surface water drainage will be via the internal surface water drainage network that outfalls into the Drigg Stream, as it does at present during operation of the current site. There will be no changes in the hydrology of the adjacent SAC, notwithstanding the minor impacts on groundwater (see above). There is therefore no potential for the drainage regime within the LLWR to result in any effect on the ‘Salicornia and other annuals colonising mud and sand’ habitat feature.	ES Appendix H	4.7.2
Radiological impacts (air)	Release of radioactive material into the air and uptake by non-human biota	Radiological effects on non-human biota were assessed for the Environmental Safety Case (ESC), and this included assessment of the following direct-to-air pathways; release of radioactive gas (tritium and Carbon 14 from the waste containers in the vaults and small amounts from the trenches) and direct shine from uncapped waste containers. Potential aerial impacts on the SAC via release of radioactive C-14 and its uptake in vegetation via photo-synthesis were assessed and found to be below the generic screening threshold dose rate of 10 $\mu\text{Gy h}^{-1}$. No potential for adverse effects on the SAC habitats were therefore identified.	ES Appendix D2	7.1
Radiological impacts (groundwater)	Migration of radioactive material into upper groundwater and discharge onto foreshore	Radiological effects on non-human biota as a result of leachate from the marine outfall pipe resulting in adverse effects on groundwater were assessed for the ESC. Potential radiological dose rates via the groundwater discharge pathway have been assessed and found to be more than three orders of magnitude below the generic screening threshold dose rate of 10 $\mu\text{Gy h}^{-1}$. No potential for adverse effects on the SAC habitats were therefore identified.	ES Appendix D2	7.1

Potential Impact	Potential Pathway for Effects	Summary of Evidence Presented	Document	Reference
Radiological impacts (surface water)	Release of radioactive contaminated sediment into the Drigg Stream and downstream pollution of Estuary	No radioactive contaminated sediment is present in the section of Drigg Stream to be diverted, and therefore the stream diversion will not result in any mobilisation of contaminated sediment downstream and potentially into the Estuary.	ES Appendix H	4.7.4
		<p>Radiological effects on non-human biota as a result of the potential mobilisation of contaminated sediment (due to increased flow resulting from the increase in surface-water catchment area and subsequent scouring of the channel) from downstream sections of Drigg Stream into the Estuary have been assessed. The scheme includes embedded mitigation for changes in flow through the construction of an attenuation lagoon in the first phase of the scheme. This will attenuate run-off flow rates such that no scouring of the channel downstream of the scheme would occur.</p> <p>Surface water run-off from the vaults and trenches is treated in a separate system and outfalls into the sea via the existing discharge pipeline under a discharge consent administered by the Environment Agency. Furthermore, the Environmental Permit for the site provides the regulatory framework by which potential radiological effects through surface water contamination are carefully controlled and monitored.</p> <p>Potential radiological dose rates via groundwater discharge have been assessed for the ESC and found to be more than three orders of magnitude below the generic screening threshold dose rate of $10 \mu\text{Gy h}^{-1}$</p>	ES Appendix D2	2.3.2
Non-radiological impacts (groundwater)	Migration of non-radioactive contamination into upper groundwater and discharge onto foreshore	Modelled concentrations of non-radiological contaminants in groundwater between the LLWR and the coast are negligible. No potential for adverse effects on the SAC habitat were therefore identified.	ES Appendix D3	6.3.3
Non-radiological impacts (surface water)	<p>Release of non-radioactive contaminated sediment into Drigg Stream and Estuary</p> <p>Pollution of Drigg Stream e.g. fuel spillage and subsequent pollution of Estuary</p>	<p>Embedded mitigation in the scheme will ensure that there is a negligible risk of contaminated surface water reaching the SAC through the Drigg Stream, through the installation of an attenuation lagoon in the first phase of the scheme. This will attenuate surface-water run-off containing suspended sediment. In addition strict measures will be enforced through the construction phase via best practice measures and a Construction Environmental Management Plan (CEMP) to minimise the risk of a pollution event occurring during construction.</p> <p>Legislative measures currently in place provide a framework for compliance by LLW Repository Ltd. to ensure that no pollution occurs during the operational phase. This is regulated by the Environment Agency under the Environmental Permit for the site.</p> <p>Even if a pollution event was to occur, due to the slow flowing nature of the Drigg Stream, the distance downstream to the River Irt and Drigg Coast, and the dilution effect as any contaminant moves downstream, there is no potential for significant effects.</p> <p>Notwithstanding the above, modelled concentrations of non-radiological contaminants in groundwater between the LLWR and the coast are negligible.</p>	ES Appendix H	4.7.4
			ES Appendix L3	2.3.2
			ES Appendix D3	6.3.3

Potential Impact	Potential Pathway for Effects	Summary of Evidence Presented	Document	Reference
Air quality	Emissions of NO ₂ from mobile plant and aerial nitrogen deposition onto adjacent habitats	Potential pathways by which an impact on the SAC could occur have been identified as resulting from NO ₂ emissions from mobile plant and nutrient enrichment via aerial deposition of nitrogen.	ES Appendix I	7
		An assessment of NO ₂ from mobile site plant has been undertaken. This demonstrates that the total concentration of NO ₂ (background plus contribution from the development) is less than 70% of the Air Quality Strategy Objective for the Protection of Vegetation and Ecosystems. The increase in nitrogen deposition (as NO ₂) from the Proposed Development is less than the 1% threshold above which significant effects may occur and as such this is considered to be an increase of negligible significance	ES Appendix H	4.7.7
Smothering/ dust	Fugitive dust releases during vegetation clearance and spoil movements on site, and subsequent smothering of vegetation	Smothering and toxic contamination of habitats is not considered to be a significant risk to the habitats within the Drigg Coast SAC/SSSI. The Principal Contractor appointed by LLW Repository Ltd will develop and implement a Construction Environmental Management Plan (CEMP), which will present a comprehensive list of mitigation measures to minimise dust generation at the site. Additionally, rainfall will wash away small amounts of deposited materials which may be deposited periodically.	ES Appendix I	7
			ES Appendix H	4.7.6
Noise	No pathway	' <i>Salicornia</i> and other annuals colonising mud and sand' habitat feature not sensitive to this impact	Not applicable	Not applicable

Table 3.5: Summary of Screening for ‘Atlantic Salt Meadows (*Glauco-Puccinellietalia Maritimae*)’

Potential Impact	Potential Pathway for Effects	Summary of Evidence Presented	Document	Reference
Habitat loss	No pathway	The Scheme requires no work within the boundary of the Drigg Coast SAC and therefore there is no pathway by which the proposed development could result in loss of any of the ‘Atlantic Salt Meadows (<i>Glauco-Puccinellietalia Maritimae</i>)’ habitat feature.	ES Appendix H	4.7.1
Physical damage	No pathway	The scheme requires no work within the boundary of the SAC. Requirements for additional monitoring boreholes or replacement of existing monitoring infrastructure will require a new planning permission and associated Habitats Regulations Assessment.	ES Appendix H	4.7.1
Groundwater regime change	Changes in groundwater head due to construction of vaults and diversion of Drigg Stream	The hydrogeological assessment in the Environmental Statement identified potential changes in the elevation of the Upper Groundwater up to 10 cm within 50 m of the boundary of the LLWR in response to vault construction. Monitoring has also shown that shallow groundwater within the SAC is not linked to the Upper Groundwater; rather, surface water levels are dependant primarily on the balance between rainfall onto and drainage from the SSSI. Shallow groundwater levels are not therefore likely to be affected by the development - even within the zone of influence (i.e. 50 m from the LLWR boundary).	ES Appendix J2	N/A
Hydrological regime change	No pathway	The hydrological regime within the SAC is separate from the drainage of the LLWR site. There is no drainage of surface water into the SAC habitats. Drainage from the newly constructed vaults will be tied into the existing leachate management system, and surface water drainage will be via the internal surface water drainage network that outfalls into the Drigg Stream, as it does at present during operation of the current site. There will be no changes in the hydrology of the adjacent SAC, notwithstanding the minor impacts on groundwater (see above). There is therefore no potential for the drainage regime within the LLWR to result in any effect on the ‘Atlantic Salt Meadows (<i>Glauco-Puccinellietalia Maritimae</i>)’ habitat feature.	ES Appendix H	4.7.2
Radiological impacts (air)	Release of radioactive material into the air and uptake by non-human biota	Radiological effects on non-human biota were assessed for the Environmental Safety Case (ESC), and this included assessment of the following direct-to-air pathways; release of radioactive gas (tritium and Carbon 14 from the waste containers in the vaults and small amounts from the trenches) and direct shine from uncapped waste containers. Potential aerial impacts on the SAC via release of radioactive C-14 and its uptake in vegetation via photo-synthesis were assessed and found to be below the generic screening threshold dose rate of 10 $\mu\text{Gy h}^{-1}$. No potential for adverse effects on the SAC habitats were therefore identified.	ES Appendix D2	7.1
Radiological impacts (groundwater)	Migration of radioactive material into upper groundwater and	Radiological effects on non-human biota as a result of leachate from the marine outfall pipe resulting in adverse effects on groundwater were assessed for the ESC. Potential radiological dose rates via the groundwater discharge pathway have	ES Appendix D2	7.1

Potential Impact	Potential Pathway for Effects	Summary of Evidence Presented	Document	Reference
	discharge onto foreshore	been assessed and found to be more than three orders of magnitude below the generic screening threshold dose rate of $10 \mu\text{Gy h}^{-1}$. No potential for adverse effects on the SAC habitats were therefore identified.		
Radiological impacts (surface water)	Release of radioactive contaminated sediment into the Drigg Stream and downstream pollution of Estuary	<p>No radioactive contaminated sediment is present in the section of Drigg Stream to be diverted, and therefore the stream diversion will not result in any mobilisation of contaminated sediment downstream and potentially into the Estuary.</p> <p>Radiological effects on non-human biota as a result of the potential mobilisation of contaminated sediment (due to increased flow resulting from the increase in surface-water catchment area and subsequent scouring of the channel) from downstream sections of Drigg Stream into the Estuary have been assessed. The scheme includes embedded mitigation for changes in flow through the construction of an attenuation lagoon in the first phase of the scheme. This will attenuate run-off flow rates such that no scouring of the channel downstream of the scheme would occur.</p> <p>Surface water run-off from the vaults and trenches is treated in a separate system and outfalls into the sea via the existing discharge pipeline under a discharge consent administered by the Environment Agency. Furthermore, the Environmental Permit for the site provides the regulatory framework by which potential radiological effects through surface water contamination are carefully controlled and monitored.</p> <p>Potential radiological dose rates via groundwater discharge have been assessed for the ESC and found to be more than three orders of magnitude below the generic screening threshold dose rate of $10 \mu\text{Gy h}^{-1}$</p>	ES Appendix H	4.7.4
			ES Appendix D2	2.3.2
Non-radiological impacts (groundwater)	Migration of non-radioactive contamination into upper groundwater and discharge onto foreshore	Modelled concentrations of non-radiological contaminants in groundwater between the LLWR and the coast are negligible. No potential for adverse effects on the SAC habitat were therefore identified.	ES Appendix D3	6.3.3
Non-radiological impacts (surface water)	Release of non-radioactive contaminated sediment into Drigg Stream and Estuary	<p>Embedded mitigation in the scheme will ensure that there is a negligible risk of contaminated surface water reaching the SAC through the Drigg Stream, through the installation of an attenuation lagoon in the first phase of the scheme. This will attenuate surface-water run-off containing suspended sediment. In addition strict measures will be enforced through the construction phase via best practice measures and a Construction Environmental Management Plan (CEMP) to minimise the risk of a pollution event occurring during construction.</p> <p>Legislative measures currently in place provide a framework for compliance by LLW Repository Ltd. to ensure that no pollution occurs during the operational phase. This is regulated by the Environment Agency under the Environmental Permit for the site.</p> <p>Even if a pollution event was to occur, due to the slow flowing nature of the Drigg Stream, the distance downstream to the River Irt and Drigg Coast, and the dilution effect as any contaminant moves downstream, there is no potential for significant</p>	ES Appendix H	4.7.4
			ES Appendix L3	2.3.2
	Pollution of Drigg Stream e.g. fuel spillage and subsequent pollution of Estuary	ES Appendix D3	6.3.3	

Potential Impact	Potential Pathway for Effects	Summary of Evidence Presented	Document	Reference
		effects. Notwithstanding the above, modelled concentrations of non-radiological contaminants in groundwater between the LLWR and the coast are negligible.		
Air quality	Emissions of NO ₂ from mobile plant and aerial nitrogen deposition onto adjacent habitats	Potential pathways by which an impact on the SAC could occur have been identified as resulting from NO ₂ emissions from mobile plant and nutrient enrichment via aerial deposition of nitrogen. An assessment of NO ₂ from mobile site plant has been undertaken. This demonstrates that the total concentration of NO ₂ (background plus contribution from the development) is less than 70% of the Air Quality Strategy Objective for the Protection of Vegetation and Ecosystems. The increase in nitrogen deposition (as NO ₂) from the Proposed Development is less than the 1% threshold above which significant effects may occur and as such this is considered to be an increase of negligible significance	ES Appendix I	7
			ES Appendix H	4.7.7
Smothering/ dust	Fugitive dust releases during vegetation clearance and spoil movements on site, and subsequent smothering of vegetation	Smothering and toxic contamination of habitats is not considered to be a significant risk to the habitats within the Drigg Coast SAC/SSSI. The Principal Contractor appointed by LLW Repository Ltd will develop and implement a Construction Environmental Management Plan (CEMP), which will present a comprehensive list of mitigation measures to minimise dust generation at the site. Additionally, rainfall will wash away small amounts of deposited materials which may be deposited periodically.	ES Appendix I	7
			ES Appendix H	4.7.6
Noise	No pathway	'Atlantic Salt Meadows (<i>Glauco-Puccinellietalia Maritimae</i>)' habitat feature not sensitive to this impact	Not applicable	Not applicable

Table 3.6: Summary of Screening for ‘Embryonic Shifting Dunes’

Potential Impact	Potential Pathway for Effects	Summary of Evidence Presented	Document	Reference
Habitat loss	No pathway	The Scheme requires no work within the boundary of the Drigg Coast SAC and therefore there is no pathway by which the proposed development could result in loss of any of the ‘Embryonic Shifting Dunes’ habitat feature.	ES Appendix H	4.7.1
Physical damage	No pathway	The scheme requires no work within the boundary of the SAC. Requirements for additional monitoring boreholes or replacement of existing monitoring infrastructure will require a new planning permission and associated Habitats Regulations Assessment.	ES Appendix H	4.7.1
Groundwater regime change	Changes in groundwater head due to construction of vaults and diversion of Drigg Stream	The hydrogeological assessment in the Environmental Statement identified potential changes in the elevation of the Upper Groundwater up to 10 cm within 50 m of the boundary of the LLWR in response to vault construction. Monitoring has also shown that shallow groundwater within the SAC is not linked to the Upper Groundwater; rather, surface water levels are dependant primarily on the balance between rainfall onto and drainage from the SSSI. Shallow groundwater levels are not therefore likely to be affected by the development - even within the zone of influence (i.e. 50 m from the LLWR boundary).	ES Appendix J2	N/A
Hydrological regime change	No pathway	The hydrological regime within the SAC is separate from the drainage of the LLWR site. There is no drainage of surface water into the SAC habitats. Drainage from the newly constructed vaults will be tied into the existing leachate management system, and surface water drainage will be via the internal surface water drainage network that outfalls into the Drigg Stream, as it does at present during operation of the current site. There will be no changes in the hydrology of the adjacent SAC, notwithstanding the minor impacts on groundwater (see above). There is therefore no potential for the drainage regime within the LLWR to result in any effect on the ‘Embryonic Shifting Dunes’ habitat feature.	ES Appendix H	4.7.2
Radiological impacts (air)	Release of radioactive material into the air and uptake by non-human biota	Radiological effects on non-human biota were assessed for the Environmental Safety Case (ESC), and this included assessment of the following direct-to-air pathways; release of radioactive gas (tritium and Carbon 14 from the waste containers in the vaults and small amounts from the trenches) and direct shine from uncapped waste containers. Potential aerial impacts on the SAC via release of radioactive C-14 and its uptake in vegetation via photo-synthesis were assessed and found to be below the generic screening threshold dose rate of $10 \mu\text{Gy h}^{-1}$. No potential for adverse effects on the SAC habitats were therefore identified.	ES Appendix D2	7.1
Radiological impacts (groundwater)	Migration of radioactive material into upper groundwater and discharge onto foreshore	Radiological effects on non-human biota as a result of leachate from the marine outfall pipe resulting in adverse effects on groundwater were assessed for the ESC. Potential radiological dose rates via the groundwater discharge pathway have been assessed and found to be more than three orders of magnitude below the generic screening threshold dose rate of $10 \mu\text{Gy h}^{-1}$. No potential for adverse	ES Appendix D2	7.1

Potential Impact	Potential Pathway for Effects	Summary of Evidence Presented	Document	Reference
		effects on the SAC habitats were therefore identified.		
Radiological impacts (surface water)	Release of radioactive contaminated sediment into the Drigg Stream and downstream pollution of Estuary	No radioactive contaminated sediment is present in the section of Drigg Stream to be diverted, and therefore the stream diversion will not result in any mobilisation of contaminated sediment downstream and potentially into the Estuary.	ES Appendix H	4.7.4
		<p>Radiological effects on non-human biota as a result of the potential mobilisation of contaminated sediment (due to increased flow resulting from the increase in surface-water catchment area and subsequent scouring of the channel) from downstream sections of Drigg Stream into the Estuary have been assessed. The scheme includes embedded mitigation for changes in flow through the construction of an attenuation lagoon in the first phase of the scheme. This will attenuate run-off flow rates such that no scouring of the channel downstream of the scheme would occur.</p> <p>Surface water run-off from the vaults and trenches is treated in a separate system and outfalls into the sea via the existing discharge pipeline under a discharge consent administered by the Environment Agency. Furthermore, the Environmental Permit for the site provides the regulatory framework by which potential radiological effects through surface water contamination are carefully controlled and monitored.</p> <p>Potential radiological dose rates via groundwater discharge have been assessed for the ESC and found to be more than three orders of magnitude below the generic screening threshold dose rate of $10 \mu\text{Gy h}^{-1}$</p>	ES Appendix D2	2.3.2
Non-radiological impacts (groundwater)	Migration of non-radioactive contamination into upper groundwater and discharge onto foreshore	Modelled concentrations of non-radiological contaminants in groundwater between the LLWR and the coast are negligible. No potential for adverse effects on the SAC habitat were therefore identified.	ES Appendix D3	6.3.3
Non-radiological impacts (surface water)	Release of non-radioactive contaminated sediment into Drigg Stream and Estuary Pollution of Drigg Stream e.g. fuel spillage and subsequent pollution of Estuary	<p>Embedded mitigation in the scheme will ensure that there is a negligible risk of contaminated surface water reaching the SAC through the Drigg Stream, through the installation of an attenuation lagoon in the first phase of the scheme. This will attenuate surface-water run-off containing suspended sediment. In addition strict measures will be enforced through the construction phase via best practice measures and a Construction Environmental Management Plan (CEMP) to minimise the risk of a pollution event occurring during construction. Legislative measures currently in place provide a framework for compliance by LLW Repository Ltd. to ensure that no pollution occurs during the operational phase. This is regulated by the Environment Agency under the Environmental Permit for the site.</p> <p>Even if a pollution event was to occur, due to the slow flowing nature of the Drigg Stream, the distance downstream to the River Irt and Drigg Coast, and the dilution effect as any contaminant moves downstream, there is no potential for significant effects.</p> <p>Notwithstanding the above, modelled concentrations of non-radiological</p>	ES Appendix H	4.7.4
			ES Appendix L3	2.3.2
			ES Appendix D3	6.3.3

Potential Impact	Potential Pathway for Effects	Summary of Evidence Presented	Document	Reference
		contaminants in groundwater between the LLWR and the coast are negligible.		
Air quality	Emissions of NO ₂ from mobile plant and aerial nitrogen deposition onto adjacent habitats	Potential pathways by which an impact on the SAC could occur have been identified as resulting from NO ₂ emissions from mobile plant and nutrient enrichment via aerial deposition of nitrogen.	ES Appendix I	7
		An assessment of NO ₂ from mobile site plant has been undertaken. This demonstrates that the total concentration of NO ₂ (background plus contribution from the development) is less than 70% of the Air Quality Strategy Objective for the Protection of Vegetation and Ecosystems. The increase in nitrogen deposition (as NO ₂) from the Proposed Development is less than the 1% threshold above which significant effects may occur and as such this is considered to be an increase of negligible significance	ES Appendix H	4.7.7
Smothering/ dust	Fugitive dust releases during vegetation clearance and spoil movements on site, and subsequent smothering of vegetation	Smothering and toxic contamination of habitats is not considered to be a significant risk to the habitats within the Drigg Coast SAC/SSSI. The Principal Contractor appointed by LLW Repository Ltd will develop and implement a Construction Environmental Management Plan (CEMP), which will present a comprehensive list of mitigation measures to minimise dust generation at the site. Additionally, rainfall will wash away small amounts of deposited materials which may be deposited periodically.	ES Appendix I	7
			ES Appendix H	4.7.6
Noise	No pathway	'Embryonic Shifting Dunes' habitat feature not sensitive to this impact	Not applicable	Not applicable

Table 3.7: Summary of Screening for ‘Shifting dunes along the shoreline with *Ammophila Arenaria* (‘white dunes’)’

Potential Impact	Potential Pathway for Effects	Summary of Evidence Presented	Document	Reference
Habitat loss	No pathway	The Scheme requires no work within the boundary of the Drigg Coast SAC and therefore there is no pathway by which the proposed development could result in loss of any of the ‘Shifting dunes along the shoreline with <i>Ammophila Arenaria</i> (‘white dunes’)’ habitat feature.	ES Appendix H	4.7.1
Physical damage	No pathway	The scheme requires no work within the boundary of the SAC. Requirements for additional monitoring boreholes or replacement of existing monitoring infrastructure will require a new planning permission and associated Habitats Regulations Assessment.	ES Appendix H	4.7.1
Groundwater regime change	Changes in groundwater head due to construction of vaults and diversion of Drigg Stream	The hydrogeological assessment in the Environmental Statement identified potential changes in the elevation of the Upper Groundwater up to 10 cm within 50 m of the boundary of the LLWR in response to vault construction. Monitoring has also shown that shallow groundwater within the SAC is not linked to the Upper Groundwater; rather, surface water levels are dependant primarily on the balance between rainfall onto and drainage from the SSSI. Shallow groundwater levels are not therefore likely to be affected by the development - even within the zone of influence (i.e. 50 m from the LLWR boundary).	ES Appendix J2	N/A
Hydrological regime change	No pathway	The hydrological regime within the SAC is separate from the drainage of the LLWR site. There is no drainage of surface water into the SAC habitats. Drainage from the newly constructed vaults will be tied into the existing leachate management system, and surface water drainage will be via the internal surface water drainage network that outfalls into the Drigg Stream, as it does at present during operation of the current site. There will be no changes in the hydrology of the adjacent SAC, notwithstanding the minor impacts on groundwater (see above). There is therefore no potential for the drainage regime within the LLWR to result in any effect on the ‘Shifting dunes along the shoreline with <i>Ammophila Arenaria</i> (‘white dunes’)’ habitat feature.	ES Appendix H	4.7.2
Radiological impacts (air)	Release of radioactive material into the air and uptake by non-human biota	Radiological effects on non-human biota were assessed for the Environmental Safety Case (ESC), and this included assessment of the following direct-to-air pathways; release of radioactive gas (tritium and Carbon 14 from the waste containers in the vaults and small amounts from the trenches) and direct shine from uncapped waste containers. Potential aerial impacts on the SAC via release of radioactive C-14 and its uptake in vegetation via photo-synthesis were assessed and found to be below the generic screening threshold dose rate of 10 $\mu\text{Gy h}^{-1}$. No potential for adverse effects on the SAC habitats were therefore identified.	ES Appendix D2	7.1
Radiological impacts (groundwater)	Migration of radioactive material into upper groundwater and	Radiological effects on non-human biota as a result of leachate from the marine outfall pipe resulting in adverse effects on groundwater were assessed for the ESC. Potential radiological dose rates via the groundwater discharge pathway have	ES Appendix D2	7.1

Potential Impact	Potential Pathway for Effects	Summary of Evidence Presented	Document	Reference
	discharge onto foreshore	been assessed and found to be more than three orders of magnitude below the generic screening threshold dose rate of $10 \mu\text{Gy h}^{-1}$. No potential for adverse effects on the SAC habitats were therefore identified.		
Radiological impacts (surface water)	Release of radioactive contaminated sediment into the Drigg Stream and downstream pollution of Estuary	<p>No radioactive contaminated sediment is present in the section of Drigg Stream to be diverted, and therefore the stream diversion will not result in any mobilisation of contaminated sediment downstream and potentially into the Estuary.</p> <p>Radiological effects on non-human biota as a result of the potential mobilisation of contaminated sediment (due to increased flow resulting from the increase in surface-water catchment area and subsequent scouring of the channel) from downstream sections of Drigg Stream into the Estuary have been assessed. The scheme includes embedded mitigation for changes in flow through the construction of an attenuation lagoon in the first phase of the scheme. This will attenuate run-off flow rates such that no scouring of the channel downstream of the scheme would occur.</p> <p>Surface water run-off from the vaults and trenches is treated in a separate system and outfalls into the sea via the existing discharge pipeline under a discharge consent administered by the Environment Agency. Furthermore, the Environmental Permit for the site provides the regulatory framework by which potential radiological effects through surface water contamination are carefully controlled and monitored.</p> <p>Potential radiological dose rates via groundwater discharge have been assessed for the ESC and found to be more than three orders of magnitude below the generic screening threshold dose rate of $10 \mu\text{Gy h}^{-1}$</p>	ES Appendix H	4.7.4
			ES Appendix D2	2.3.2
Non-radiological impacts (groundwater)	Migration of non-radioactive contamination into upper groundwater and discharge onto foreshore	Modelled concentrations of non-radiological contaminants in groundwater between the LLWR and the coast are negligible. No potential for adverse effects on the SAC habitat were therefore identified.	ES Appendix D3	6.3.3
Non-radiological impacts (surface water)	Release of non-radioactive contaminated sediment into Drigg Stream and Estuary	<p>Embedded mitigation in the scheme will ensure that there is a negligible risk of contaminated surface water reaching the SAC through the Drigg Stream, through the installation of an attenuation lagoon in the first phase of the scheme. This will attenuate surface-water run-off containing suspended sediment. In addition strict measures will be enforced through the construction phase via best practice measures and a Construction Environmental Management Plan (CEMP) to minimise the risk of a pollution event occurring during construction.</p> <p>Legislative measures currently in place provide a framework for compliance by LLW Repository Ltd. to ensure that no pollution occurs during the operational phase. This is regulated by the Environment Agency under the Environmental Permit for the site.</p> <p>Even if a pollution event was to occur, due to the slow flowing nature of the Drigg Stream, the distance downstream to the River Irt and Drigg Coast, and the dilution effect as any contaminant moves downstream, there is no potential for significant</p>	ES Appendix H	4.7.4
			ES Appendix L3	2.3.2
	Pollution of Drigg Stream e.g. fuel spillage and subsequent pollution of Estuary	ES Appendix D3	6.3.3	

Potential Impact	Potential Pathway for Effects	Summary of Evidence Presented	Document	Reference
		effects. Notwithstanding the above, modelled concentrations of non-radiological contaminants in groundwater between the LLWR and the coast are negligible.		
Air quality	Emissions of NO ₂ from mobile plant and aerial nitrogen deposition onto adjacent habitats	Potential pathways by which an impact on the SAC could occur have been identified as resulting from NO ₂ emissions from mobile plant and nutrient enrichment via aerial deposition of nitrogen. An assessment of NO ₂ from mobile site plant has been undertaken. This demonstrates that the total concentration of NO ₂ (background plus contribution from the development) is less than 70% of the Air Quality Strategy Objective for the Protection of Vegetation and Ecosystems. The increase in nitrogen deposition (as NO ₂) from the Proposed Development is less than the 1% threshold above which significant effects may occur and as such this is considered to be an increase of negligible significance	ES Appendix I	7
			ES Appendix H	4.7.7
Smothering/ dust	Fugitive dust releases during vegetation clearance and spoil movements on site, and subsequent smothering of vegetation	Smothering and toxic contamination of habitats is not considered to be a significant risk to the habitats within the Drigg Coast SAC/SSSI. The Principal Contractor appointed by LLW Repository Ltd will develop and implement a Construction Environmental Management Plan (CEMP), which will present a comprehensive list of mitigation measures to minimise dust generation at the site. Additionally, rainfall will wash away small amounts of deposited materials which may be deposited periodically.	ES Appendix I	7
			ES Appendix H	4.7.6
Noise	No pathway	'Shifting dunes along the shoreline with <i>Ammophila Arenaria</i> ('white dunes') habitat feature not sensitive to this impact	Not applicable	Not applicable

Table 3.8: Summary of Screening for ‘Fixed dunes with herbaceous vegetation (‘grey dunes’)’

Potential Impact	Potential Pathway for Effects	Summary of Evidence Presented	Document	Reference
Habitat loss	No pathway	The Scheme requires no work within the boundary of the Drigg Coast SAC and therefore there is no pathway by which the proposed development could result in loss of any of the ‘Fixed dunes with herbaceous vegetation (‘grey dunes’)’ habitat feature.	ES Appendix H	4.7.1
Physical damage	No pathway	The scheme requires no work within the boundary of the SAC. Requirements for additional monitoring boreholes or replacement of existing monitoring infrastructure will require a new planning permission and associated Habitats Regulations Assessment.	ES Appendix H	4.7.1
Groundwater regime change	Changes in groundwater head due to construction of vaults and diversion of Drigg Stream	The hydrogeological assessment in the Environmental Statement identified potential changes in the elevation of the Upper Groundwater up to 10 cm within 50 m of the boundary of the LLWR in response to vault construction. Monitoring has also shown that shallow groundwater within the SAC is not linked to the Upper Groundwater; rather, surface water levels are dependant primarily on the balance between rainfall onto and drainage from the SSSI. Shallow groundwater levels are not therefore likely to be affected by the development - even within the zone of influence (i.e. 50 m from the LLWR boundary).	ES Appendix J2	N/A
Hydrological regime change	No pathway	The hydrological regime within the SAC is separate from the drainage of the LLWR site. There is no drainage of surface water into the SAC habitats. Drainage from the newly constructed vaults will be tied into the existing leachate management system, and surface water drainage will be via the internal surface water drainage network that outfalls into the Drigg Stream, as it does at present during operation of the current site. There will be no changes in the hydrology of the adjacent SAC, notwithstanding the minor impacts on groundwater (see above). There is therefore no potential for the drainage regime within the LLWR to result in any effect on the ‘Fixed dunes with herbaceous vegetation (‘grey dunes’)’ habitat feature.	ES Appendix H	4.7.2
Radiological impacts (air)	Release of radioactive material into the air and uptake by non-human biota	Radiological effects on non-human biota were assessed for the Environmental Safety Case (ESC), and this included assessment of the following direct-to-air pathways; release of radioactive gas (tritium and Carbon 14 from the waste containers in the vaults and small amounts from the trenches) and direct shine from uncapped waste containers. Potential aerial impacts on the SAC via release of radioactive C-14 and its uptake in vegetation via photo-synthesis were assessed and found to be below the generic screening threshold dose rate of 10 $\mu\text{Gy h}^{-1}$. No potential for adverse effects on the SAC habitats were therefore identified.	ES Appendix D2	7.1
Radiological impacts (groundwater)	Migration of radioactive material into upper groundwater and	Radiological effects on non-human biota as a result of leachate from the marine outfall pipe resulting in adverse effects on groundwater were assessed for the ESC. Potential radiological dose rates via the groundwater discharge pathway have	ES Appendix D2	7.1

Potential Impact	Potential Pathway for Effects	Summary of Evidence Presented	Document	Reference
	discharge onto foreshore	been assessed and found to be more than three orders of magnitude below the generic screening threshold dose rate of $10 \mu\text{Gy h}^{-1}$. No potential for adverse effects on the SAC habitats were therefore identified.		
Radiological impacts (surface water)	Release of radioactive contaminated sediment into the Drigg Stream and downstream pollution of Estuary	<p>No radioactive contaminated sediment is present in the section of Drigg Stream to be diverted, and therefore the stream diversion will not result in any mobilisation of contaminated sediment downstream and potentially into the Estuary.</p> <p>Radiological effects on non-human biota as a result of the potential mobilisation of contaminated sediment (due to increased flow resulting from the increase in surface-water catchment area and subsequent scouring of the channel) from downstream sections of Drigg Stream into the Estuary have been assessed. The scheme includes embedded mitigation for changes in flow through the construction of an attenuation lagoon in the first phase of the scheme. This will attenuate run-off flow rates such that no scouring of the channel downstream of the scheme would occur.</p> <p>Surface water run-off from the vaults and trenches is treated in a separate system and outfalls into the sea via the existing discharge pipeline under a discharge consent administered by the Environment Agency. Furthermore, the Environmental Permit for the site provides the regulatory framework by which potential radiological effects through surface water contamination are carefully controlled and monitored.</p> <p>Potential radiological dose rates via groundwater discharge have been assessed for the ESC and found to be more than three orders of magnitude below the generic screening threshold dose rate of $10 \mu\text{Gy h}^{-1}$</p>	ES Appendix H	4.7.4
			ES Appendix D2	2.3.2
Non-radiological impacts (groundwater)	Migration of non-radioactive contamination into upper groundwater and discharge onto foreshore	Modelled concentrations of non-radiological contaminants in groundwater between the LLWR and the coast are negligible. No potential for adverse effects on the SAC habitat were therefore identified.	ES Appendix D3	6.3.3
Non-radiological impacts (surface water)	Release of non-radioactive contaminated sediment into Drigg Stream and Estuary	<p>Embedded mitigation in the scheme will ensure that there is a negligible risk of contaminated surface water reaching the SAC through the Drigg Stream, through the installation of an attenuation lagoon in the first phase of the scheme. This will attenuate surface-water run-off containing suspended sediment. In addition strict measures will be enforced through the construction phase via best practice measures and a Construction Environmental Management Plan (CEMP) to minimise the risk of a pollution event occurring during construction.</p> <p>Legislative measures currently in place provide a framework for compliance by LLW Repository Ltd. to ensure that no pollution occurs during the operational phase. This is regulated by the Environment Agency under the Environmental Permit for the site.</p> <p>Even if a pollution event was to occur, due to the slow flowing nature of the Drigg Stream, the distance downstream to the River Irt and Drigg Coast, and the dilution effect as any contaminant moves downstream, there is no potential for significant</p>	ES Appendix H	4.7.4
			ES Appendix L3	2.3.2
	Pollution of Drigg Stream e.g. fuel spillage and subsequent pollution of Estuary	ES Appendix D3	6.3.3	

Potential Impact	Potential Pathway for Effects	Summary of Evidence Presented	Document	Reference
		effects. Notwithstanding the above, modelled concentrations of non-radiological contaminants in groundwater between the LLWR and the coast are negligible.		
Air quality	Emissions of NO ₂ from mobile plant and aerial nitrogen deposition onto adjacent habitats	Potential pathways by which an impact on the SAC could occur have been identified as resulting from NO ₂ emissions from mobile plant and nutrient enrichment via aerial deposition of nitrogen.	ES Appendix I	7
		An assessment of NO ₂ from mobile site plant has been undertaken. This demonstrates that the total concentration of NO ₂ (background plus contribution from the development) is less than 70% of the Air Quality Strategy Objective for the Protection of Vegetation and Ecosystems. The increase in nitrogen deposition (as NO ₂) from the Proposed Development is less than the 1% threshold above which significant effects may occur and as such this is considered to be an increase of negligible significance	ES Appendix H	4.7.7
Smothering/ dust	Fugitive dust releases during vegetation clearance and spoil movements on site, and subsequent smothering of vegetation	Smothering and toxic contamination of habitats is not considered to be a significant risk to the habitats within the Drigg Coast SAC/SSSI. The Principal Contractor appointed by LLW Repository Ltd will develop and implement a Construction Environmental Management Plan (CEMP), which will present a comprehensive list of mitigation measures to minimise dust generation at the site. Additionally, rainfall will wash away small amounts of deposited materials which may be deposited periodically.	ES Appendix I	7
			ES Appendix H	4.7.6
Noise	No pathway	'Fixed dunes with herbaceous vegetation ('grey dunes')' habitat feature not sensitive to this impact	Not applicable	Not applicable

Table 3.9: Summary of Screening for ‘Humid Dune Slacks’

Potential Impact	Potential Pathway for Effects	Summary of Evidence Presented	Document	Reference
Habitat loss	No pathway	The Scheme requires no work within the boundary of the Drigg Coast SAC and therefore there is no pathway by which the proposed development could result in loss of any of the ‘Humid Dune Slacks’ habitat feature.	ES Appendix H	4.7.1
Physical damage	No pathway	The scheme requires no work within the boundary of the SAC. Requirements for additional monitoring boreholes or replacement of existing monitoring infrastructure will require a new planning permission and associated Habitats Regulations Assessment.	ES Appendix H	4.7.1
Groundwater regime change	Changes in groundwater head due to construction of vaults and diversion of Drigg Stream	The hydrogeological assessment in the Environmental Statement identified potential changes in the elevation of the Upper Groundwater up to 10 cm within 50 m of the boundary of the LLWR in response to vault construction and the diversion of the Drigg Stream.	ES Appendix J2	N/A
		Monitoring has also shown that shallow groundwater within the SAC is not linked to the Upper Groundwater; rather, surface water levels are dependant primarily on the balance between rainfall onto and drainage from the SSSI. Shallow groundwater levels are not therefore likely to be affected by the development - even within the zone of influence (i.e. 50 m from the LLWR boundary). The assessment has concluded that changes in Upper Groundwater are not significant, and are well within the seasonal fluctuations recorded in the monitoring boreholes. The changes will therefore not significantly adversely affect the surface water features of the SAC that are within the zone of influence, including the natural humid dune slacks and scrapes that have been artificially created/ extended for natterjack toad in recent years.	ES Appendix H	4.7.2
Hydrological regime change	No pathway	The hydrological regime within the SAC is separate from the drainage of the LLWR site. There is no drainage of surface water into the SAC habitats. Drainage from the newly constructed vaults will be tied into the existing leachate management system, and surface water drainage will be via the internal surface water drainage network that outfalls into the Drigg Stream, as it does at present during operation of the current site. There will be no changes in the hydrology of the adjacent SAC, notwithstanding the minor impacts on groundwater (see above). There is therefore no potential for the drainage regime within the LLWR to result in any effect on the ‘Humid Dune Slacks’ habitat feature.	ES Appendix H	4.7.2
Radiological impacts (air)	Release of radioactive material into the air and uptake by non-human biota	Radiological effects on non-human biota were assessed for the Environmental Safety Case (ESC), and this included assessment of the following direct-to-air pathways; release of radioactive gas (tritium and Carbon 14 from the waste containers in the vaults and small amounts from the trenches) and direct shine from uncapped waste containers. Potential aerial impacts on the SAC via release of radioactive C-14 and its uptake in vegetation via photo-synthesis were assessed and found to be below the generic screening threshold dose rate of 10 $\mu\text{Gy h}^{-1}$. No potential for adverse	ES Appendix D2	7.1

Potential Impact	Potential Pathway for Effects	Summary of Evidence Presented	Document	Reference
		effects on the SAC habitats were therefore identified.		
Radiological impacts (groundwater)	Migration of radioactive material into upper groundwater and discharge onto foreshore	<p>Radiological effects on non-human biota as a result of leachate from the marine outfall pipe resulting in adverse effects on groundwater were assessed for the ESC.</p> <p>Potential radiological dose rates via the groundwater discharge pathway have been assessed and found to be more than three orders of magnitude below the generic screening threshold dose rate of $10 \mu\text{Gy h}^{-1}$. No potential for adverse effects on the SAC habitats were therefore identified.</p>	ES Appendix D2	7.1
Radiological impacts (surface water)	Release of radioactive contaminated sediment into the Drigg Stream and downstream pollution of Estuary	<p>No radioactive contaminated sediment is present in the section of Drigg Stream to be diverted, and therefore the stream diversion will not result in any mobilisation of contaminated sediment downstream and potentially into the Estuary.</p> <p>Radiological effects on non-human biota as a result of the potential mobilisation of contaminated sediment (due to increased flow resulting from the increase in surface-water catchment area and subsequent scouring of the channel) from downstream sections of Drigg Stream into the Estuary have been assessed. The scheme includes embedded mitigation for changes in flow through the construction of an attenuation lagoon in the first phase of the scheme. This will attenuate run-off flow rates such that no scouring of the channel downstream of the scheme would occur.</p> <p>Surface water run-off from the vaults and trenches is treated in a separate system and outfalls into the sea via the existing discharge pipeline under a discharge consent administered by the Environment Agency. Furthermore, the Environmental Permit for the site provides the regulatory framework by which potential radiological effects through surface water contamination are carefully controlled and monitored.</p> <p>Potential radiological dose rates via groundwater discharge have been assessed for the ESC and found to be more than three orders of magnitude below the generic screening threshold dose rate of $10 \mu\text{Gy h}^{-1}$</p>	ES Appendix H	4.7.4
			ES Appendix D2	2.3.2
Non-radiological impacts (groundwater)	Migration of non-radioactive contamination into upper groundwater and discharge onto foreshore	Modelled concentrations of non-radiological contaminants in groundwater between the LLWR and the coast are negligible. No potential for adverse effects on the SAC habitat were therefore identified.	ES Appendix D3	6.3.3
Non-radiological impacts (surface water)	Release of non-radioactive contaminated sediment into Drigg Stream and Estuary Pollution of Drigg	<p>Embedded mitigation in the scheme will ensure that there is a negligible risk of contaminated surface water reaching the SAC through the Drigg Stream, through the installation of an attenuation lagoon in the first phase of the scheme. This will attenuate surface-water run-off containing suspended sediment. In addition strict measures will be enforced through the construction phase via best practice measures and a Construction Environmental Management Plan (CEMP) to minimise the risk of a pollution event occurring during construction.</p> <p>Legislative measures currently in place provide a framework for compliance by</p>	ES Appendix H	4.7.4
			ES Appendix L3	2.3.2
			ES Appendix D3	6.3.3

Potential Impact	Potential Pathway for Effects	Summary of Evidence Presented	Document	Reference
	Stream e.g. fuel spillage and subsequent pollution of Estuary	<p>LLW Repository Ltd. to ensure that no pollution occurs during the operational phase. This is regulated by the Environment Agency under the Environmental Permit for the site.</p> <p>Even if a pollution event was to occur, due to the slow flowing nature of the Drigg Stream, the distance downstream to the River Irt and Drigg Coast, and the dilution effect as any contaminant moves downstream, there is no potential for significant effects.</p> <p>Notwithstanding the above, modelled concentrations of non-radiological contaminants in groundwater between the LLWR and the coast are negligible.</p>		
Air quality	No pathway	'Humid Dune Slacks' habitat feature not sensitive to this impact	Not applicable	Not applicable
Smothering/ dust	No pathway	'Humid Dune Slacks' habitat feature not sensitive to this impact	Not applicable	Not applicable
Noise	No pathway	'Humid Dune Slacks' habitat feature not sensitive to this impact	Not applicable	Not applicable

3.3 Mitigation Measures

Measures will be implemented throughout the construction phase to ensure legislative compliance with regards to environmental impacts such as surface water run-off, dust emissions and noise and these measures will be detailed in the Construction Environmental Management Plan (CEMP). However, such measures are not considered to represent mitigation, as they are provided as a matter of course as 'best practice' for construction regardless of potential effects. In addition, there are already monitoring protocols in place to address the risk of operational contamination of the Drigg Stream (and potentially the estuary feature of the Drigg Coast SAC), through regular monitoring and reporting to the Environment Agency.

The ES does not identify any potential significant adverse effects on the qualifying features of the Drigg SAC and therefore no other mitigation is provided.

3.3.1 In-Combination Effects with Other Plans or Projects

Projects considered as part of the cumulative effects assessment undertaken for the ecological impact assessment, along with potential cumulative effect topics of relevance to the HRA in-combination assessment are summarised in Table 3.10 below, along with the relevant signposting to Appendix H of the ES.

Where cumulative effects have been scoped out, this is highlighted and signposted to the relevant discussion paragraph in Annex H of the ES.

Table 3.10: Summary of Projects Considered in Cumulative Effects ES Assessment

Project or Plan	Potential Cumulative Effects on SAC	Likely Significant Effects In-combination with Scheme?	Document	Reference
Within LLWR Site Boundary				
PCM Magazines Decommissioning and Demolition	Impacts on reptiles and natterjack toads within adjacent SAC due to habitat losses	No	ES Appendix H	6.2.1
	Noise and vibration during overlapping construction/ demolition phases	No pathway	ES Appendix H	6.2.3
	Air quality impacts on reptiles and natterjack toads in SAC due to fugitive dust emissions during demolition.	No	ES Appendix H	6.2.4
	Pollution of Drigg Stream by release of contaminated sediment or suspended sediment in surface water run-off.	No	ES Appendix H	6.2.5
Security Fence Replacement	Direct impacts on SAC habitats during construction of new fence.	No pathway	ES Appendix H	6.3.1
	Impacts on natterjack toads due to habitat fragmentation/ severance.	No	ES Appendix H	6.3.2
	Impacts on reptiles due to habitat fragmentation/ severance	No	ES Appendix H	6.3.3
	Pollution of Drigg Stream by release of contaminated sediment or suspended sediment in surface water run-off.	No	ES Appendix H	6.3.8

Project or Plan	Potential Cumulative Effects on SAC	Likely Significant Effects In-combination with Scheme?	Document	Reference
Outside LLWR Site Boundary				
Drigg Moorside Nuclear Power Station	Scoped out. No planning application submitted to date, insufficient information to inform cumulative assessment. Scoped out	Not applicable	ES Appendix H	6.4
National Grid North West Coast Connection	Scoped out. No planning application submitted to date, insufficient information to inform cumulative assessment.	Not applicable	ES Appendix H	6.5
Drigg Moorside Wind Turbine	None identified	No	ES Appendix H	6.6
West Cumbria Mining Offshore Mine, Whitehaven	Scoped out. No planning application submitted to date, insufficient information to inform cumulative assessment.	Not applicable	ES Appendix H	6.7
Other Plans				
North West England and North Wales Shoreline Management Plan 2	Scoped out. The presence of the LLWR site in its current location forms part of the baseline against which the effects of the Scheme have been assessed, and the implications of the adoption of the SMP2 policy have therefore already been considered within the future baseline assessment	Not applicable	ES Appendix H	6.8.1
Copeland Local Plan 2013 – 2028	Scoped out. Allocation for site of new nuclear power station at Drigg Moorside is considered above and has been scoped out.	Not applicable	ES Appendix H	6.8.2
Cumbria County Minerals and Waste Local Plan	Scoped out. The MWLP policy for the continued use of LLWR for the management of radioactive waste underpins the planning application for the Scheme.	Not applicable	ES Appendix H	6.8.3

3.4 Integrity of the European Marine Site

In undertaking an Appropriate Assessment it will be necessary to determine whether the project or plan would, or is likely to, adversely affect the integrity of the Natura 2000 site in the light of the site's conservation objectives, either alone or 'in combination' with other projects or plans. The Office of the Deputy Prime Minister's (ODPM) Circular 06/2005: DEFRA Circular 01/2005 published to accompany Planning Policy Statement 9 states at paragraph 20 that:

"the integrity of the site is the coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the levels of populations of species for which it was classified".

The ES assesses the impacts and the significance of effects on all identified ecology and nature conservation receptors, including the Drigg Coast SAC. Effects have been assigned a significance and confidence level in line with standard EIA guidelines. It is acknowledged that this does not directly translate into those criteria used to determine whether the plan or project has a 'likely significant effect' and then an 'adverse effect' on the integrity of the Natura 2000. For example, the ES might predict an effect of minor adverse significance at a local level on a qualifying feature, but this does not infer that the integrity of the European site is affected. However, the ES concludes that the proposed development will not result in any adverse effects on the Drigg Coast SAC.

4 References

European Commission (2007) *Guidance Document on Article 6(4) of the 'Habitats Directive' 92/43/EEC*.
Published on the internet at:

http://ec.europa.eu/environment/nature/natura2000/management/docs/art6/guidance_art6_4_en.pdf

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