HORIZON NUCLEAR POWER

WYLFA NEWYDD

ENERGY WORKING FOR BRITAIN

Wylfa Newydd Project

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7 Soils and geology

7.1 Introduction

7.1.1 This chapter describes the assessment of potential soils and geology effects resulting from the construction, operation and decommissioning of the Off-Site Power Station Facilities.

7.1.2 Please refer to chapter B7 (soils and geology, Application Reference Number: 6.2.7) for the technical basis for the assessment including a summary of legislation, policy and guidance; key points arising in consultation that have guided the soils and geology assessment; and assessment methodologies and criteria.

7.2 Study area

7.2.1 This section describes the study area relevant to the soils and geology assessment for the Off-Site Power Station Facilities.

7.2.2 The potential effects on soils and geology receptors from the construction, operation and decommissioning of the Off-Site Power Station Facilities are likely to be associated with direct disturbance of ground conditions on site or the migration of contaminants to/from areas immediately adjacent to the site. As a result, the study area has been limited to a 250m buffer around the Off-Site Power Station Facilities; this is shown on figure E7-1 (Application Reference Number: 6.5.27).

7.3 Baseline environment

7.3.1 This section provides a summary of the baseline conditions for soils and geology within the study area described in section 7.2.

7.3.2 Further details on the baseline conditions for soils and geology are provided in appendix E7-1 (Solis and Geology Baseline Condition Report, Application Reference Number: 6.5.15).

Soil quality

Soil type

7.3.3 The northern half of the site is developed land covered by a layer of hardstanding; artificial geology (made ground) is therefore anticipated beneath this area. The southern half of the site is undeveloped grassland, for which soils of the Brickfield 2 association have been mapped [RD1]. This indicates slowly permeable, seasonally waterlogged soils with low natural fertility.

7.3.4 Brickfield 2 soils are also mapped for the wider study area, although East Keswick 1 soils are mapped to the southwest; these are similar but with better natural drainage.

Agricultural Land Classification

7.3.5 The Agricultural Land Classification (ALC) system set out within Agricultural *Land Classification of England and Wales: Revised Guidelines and Criteria for Grading the Quality of Agricultural Land* [RD2] defines six grades of soils: Grade 1 (excellent quality), Grade 2 (very good quality), Subgrade 3a (good quality), Subgrade 3b (moderate quality), Grade 4 (poor quality) and Grade 5 (very poor quality). Grades 1 and 2 and Subgrade 3a are determined as Best and Most Versatile (BMV) land. BMV agricultural land is the most flexible in terms of the range of crops that can be grown, the level and consistency of yield and the cost of obtaining it, and offers the best prospect for both food and non-food crop production.

7.3.6 Due to the developed nature of the site, the Off-Site Power Station Facilities were not subject to a full ALC survey. However; during the ALC survey for the A5025 Off-line Highway Improvements [RD3], one auger point was located in the southwest of the site, and the area around this was classified as Subgrade 3b. It is anticipated that the remainder of the undeveloped parts of the site would also be classified as Subgrade 3b, based on the land use and ALC limitations posed (refer to appendix E7-1, Application Reference Number: 6.5.15) for ALC limitations).

7.3.7 Four additional auger points were located within the wider study area, with an area of Grade 5 mapped to the west and Subgrades 3a and 3b to the southwest. Provisional ALC data for the remainder of the study area suggest that Grade 3[1] (good to moderate quality) soils are mainly present, with Grade 4 land approximately 60m to the northeast [RD4]. For the purposes of the assessment of effects, Grade 3 soils are conservatively assumed to be Subgrade 3a.

Artificial geology

7.3.8 Made ground is not indicated on published geological mapping [RD5, RD6] but during site reconnaissance it was observed in the northern half of the site in the garage/depot area, and is likely to be present beneath the A5025 which is partly located on site. No ground investigation information is available to confirm the nature and extent of this material.

7.3.9 Artificial/made ground is not anticipated within the south of the site or across the majority of the wider study area, which is mostly agricultural land with the exception of a landfill, a sewage works, old quarries, an old lime kiln and the A5025 road (refer to the land contamination subsection for further details on these land uses).

[1] Provisional ALC data provide no differentiation between Subgrade 3a and Subgrade 3b.

Superficial geology

7.3.10 Geological mapping suggests that superficial deposits are absent for the majority of the site, although glacial till[2] is shown to be present in the eastern extent of the site and within the study area to the north and east. Figure E7-2 (Application Reference Number: 6.5.27) illustrates the superficial geology for the study area.

Bedrock geology

7.3.11 The study area is underlain primarily by metamorphic[3] rocks of the Gwna Group, comprising schist and four lenticular bodies of quartzite. The quartzite trends from northeast to southwest. Schist and glaucophane of the Central Anglesey Shear Zone and Berw Shear Zone are also mapped approximately 50m to the west of the site. The bedrock geology is presented on figure E7-3 (Application Reference Number: 6.5.27).

Seismicity

7.3.12 The UK is considered to be an area of low seismicity. The largest known earthquake within the UK had a magnitude of 5.9MW (moment magnitude) and occurred near the Dogger Bank, in the North Sea about 100km off the east coast of England on 7 June 1931. The 1984 Lleyn Peninsula, north Wales event, at 5.4ML (local magnitude), is the largest onshore UK earthquake for which a magnitude can be reasonably determined from measured data. This is considered extremely low in comparison to highly seismically active areas such as California and Japan.

7.3.13 An assessment of the potential risks posed by seismic activity has been undertaken to characterise the seismic hazards at the Wylfa Newydd Development Area; however, a seismic hazard assessment has not yet been completed for the Off-Site Power Station Facilities. The seismic hazard assessment will be extended to cover the Off-Site Power Station Facilities prior to construction. The detailed design of the Off-Site Power Station Facilities will be undertaken using data from the seismic hazard assessment such that the design takes into account any necessary seismic resistance of the proposed facilities.

7.3.14 Therefore, seismicity will not be considered further within this assessment.

Land contamination

Historical and current land use – potential sources of contamination

7.3.15 The former uses of the site have been identified using historical maps provided within the Groundsure report [RD7]. These show that during the 19th century

[2] Unsorted glacial material typically comprising clay with bands of sand and gravel and larger rock fragments up to boulder size (formerly referred to in the UK as 'boulder clay').

[3] Rock that has been subjected to varying degrees of heat and/or pressure, which have led to physical and chemical changes.

the site comprised agricultural fields, with a small watercourse running from west to east through the northern half of the site and a small section of road in the west. By 1949, a small building had been constructed in the northwest; this building had been extended by 1974, at which point it was identified as a garage. The road within the west of the site was also upgraded by 1974 when it was identified as the A5025. By 1995, the garage had been extended again and a large building constructed in the centre of the northern part of the site. The southern part of the site has remained agricultural land since the earliest available historical mapping, with a spring then well and pump noted in the central part of the southern half of the site to the present day.

7.3.16 Within the wider study area, the land is shown to have been largely agricultural, with clusters of residential properties to the north and southwest and a smithy annotated to the northeast between 1900 and 1924. Old quarries (80m and 200m west and northwest) and an old lime kiln (180m west) were identified on historical mapping from 1886. A sewage works has been indicated adjacent to the southeast since 1974.

7.3.17 The Enviroinsight report [RD7] also reported an historical inert landfill (Bryn Maethlu) approximately 150m northwest of the site. The landfill operated from 1995, with the licence surrendered in 2010. Given the age of the site, it is considered unlikely to pose a risk of contamination to the site, however it has been included within the conceptual site model as a potential source as a conservative measure.

7.3.18 Additional potential sources of contamination were identified within the Groundsure report and by the Isle of Anglesey County Council in response to a written enquiry. These are discussed in appendix E7-1 (Application Reference Number: 6.5.15) but not within this chapter since they are considered of limited relevance to the assessment due to the nature of the activity and/or their distance from the site.

7.3.19 The key sources of contamination and potential contaminants associated with them are summarised below and shown on figure E7-4 (Application Reference Number: 6.5.27).

- On-site:
  - garage/repair depot (including on-site observations such as a diesel fuel pump, leaks/spills and waste materials) pre-1974 to present – hydrocarbons, solvents, heavy metals, acids, methyl *tert*-butyl ether[4] and asbestos; and
  - made ground (associated with construction and use of garage/depot, A5025 and earth mounds) – heavy metals, hydrocarbons, ground gases and asbestos.

[4] Methyl *tert*-butyl ether is a volatile organic compound that is used as a petrol additive.

- Off-site:
  - sewage works 1974 to present (including known pollution incidents) – heavy metals, inorganics, hydrocarbons, pathogens, treatment chemicals, ground gases and asbestos; and
  - historical inert landfill (Bryn Maethlu) – heavy metals, hydrocarbons, asbestos and ground gases.

Potential receptors of contamination

7.3.20 Relevant receptors of contamination for the purposes of this assessment include humans, controlled waters (surface water and groundwater) and property (which includes buildings and infrastructure). These receptors are aligned with the key receptor groups set out within *Contaminated Land Statutory Guidance* [RD8].

7.3.21 Human health receptors (high-value) have been subdivided into key groups, with different characteristics. These groups are set out below.

- Construction workers: during earthworks, there is a high likelihood of contact with site soils and contact with groundwater is likely.
- Maintenance workers: for routine maintenance work, contact with site soils is likely whilst there is a low likelihood of contact with groundwater.
- Future site users: contact with site soils and groundwater would be unlikely (due to abundance of hardstanding cover).
- Adjacent land users: mainly residential and agricultural land use, the new primary school is located approximately 120m to the southwest of the site. Due to the abundance of hardstanding, there is a low likelihood of inhalation of wind-blown dusts and contaminants migrating from site.

7.3.22 The assessment of surface water and groundwater receptors in this section relates to the potential for contaminants within the soil (above groundwater) to become mobile and migrate into the water. Assessment of contamination once it has entered surface water and groundwater is included within chapter E8 (surface water and groundwater) (Application Reference Number: 6.5.8) for further details. The controlled water receptors are set out below (refer to chapter E8, Application Reference Number: 6.5.8 for further details):

- surface water: small watercourse flowing from boundary of site to Afon Llanrhuddlad in the east (low value receptor); and
- groundwater: secondary aquifer in bedrock (low value receptor).

7.3.23 Property receptors comprise the following medium-value receptors:

- buildings and infrastructure: neighbouring residential buildings/services and buildings/services associated with the Off-Site Power Station Facilities; and
- domesticated animals (grazing livestock in study area): low likelihood of inhalation of wind-blown dusts and contaminants from site.

7.3.24 Although not a receptor of contamination as such, potential effects on the soil quality receptors (medium-value) identified earlier in this section are considered under the 'land contamination receptors' headings within section 7.5, since land contamination could act to reduce soil quality.

Conceptual site model

7.3.25 Potential sources, receptors and pathways of contamination have been identified and developed into a conceptual site model. The conceptual site model outlines the potential pollutant linkages, for which a qualitative risk assessment has been undertaken in accordance with guidance outlined in *Contaminated Land Report 11: Model Procedures for the Management of Land Contamination* [RD9] and *Contaminated land risk assessment: A guide to good practice* (C552) [RD10].

7.3.26 The conceptual site model indicated that moderate and moderate/low risks may be posed to human, property and controlled water receptors by land contamination associated with the garage/repair depot and associated made ground, as well as the off-site sewage works. A moderate/low risk was also identified for human and property receptors from ground gases associated with the adjacent sewage works, although this is the lowest possible risk outcome for ground gases based on the severity of the risks.

7.3.27 The full conceptual site model is presented within appendix E7-1 (Application Reference Number: 6.5.15).

Sites of geological importance

7.3.28 The Isle of Anglesey was designated as a European Geopark (the GeoMôn Geopark) in 2009 as a result of its outstanding geodiversity and geological heritage. Furthermore, in November 2015, the GeoMôn Geopark was designated as a UNESCO Global Geopark [RD11]. The new designation is intended to raise awareness and promote respect for the environment and integrity of the landscape. The status also expresses governmental recognition of the importance of holistic management of the Geoparks. The designation is not legislative but the key heritage sites within the Geoparks should be protected under local, regional or national legislation as appropriate.

7.3.29 As noted in chapter B7 (Application Reference Number: 6.2.7) sites of geological importance within the Geopark have been identified as the receptors for soils and geology across the Environmental Statement. No sites of geological importance are present within the study area and thus they are not considered further in this chapter.

Geological resources

7.3.30 Geological resources are defined as geological deposits that have a potentially viable economic value by virtue of the resource type or the amount of a specific deposit present.

7.3.31 A Category 2 Aggregates Safeguarding Area for quartzitic sandstone has been identified across the site and much of the wider study area [RD12]; it is considered that this relates to the quartzite lenses shown in figure E7-3

(Application Reference Number: 6.5.27). Category 2 Aggregate Safeguarding Areas are defined as areas that contain resources considered to be of local or regional importance. Another Category 2 Aggregates Safeguarding Area is present approximately 120m to the southwest but this is thought to relate to igneous resources which lie outside of the study area (refer to appendix E7-1, Application Reference Number: 6.5.15 for further details).

7.3.32 None of the mineral resources identified within the study area were recommended for safeguarding within *Hard Rock and Sand & Gravel Safeguarding Areas in Ynys Môn* [RD13].

Evolution of the baseline

7.3.33 Soil quality is the only aspect of the baseline environment likely to naturally and significantly evolve in the foreseeable future.

7.3.34 The UK Climate Projections published in 2009 indicate that increases in annual, summer and winter temperatures are likely for Wales through to at least 2100 [RD14], whilst mean precipitation levels would likely decrease for summers and increase for winters, according to most modelling scenarios.

7.3.35 Taken in isolation, climate is not currently a limiting factor to ALC within the study area and is unlikely to become one in the future based on projections [RD14]; RD15].

7.3.36 The limiting factor for ALC at the Off-Site Power Station Facilities is currently wetness, and hence workability. A general subtle trend towards drier soils across England and Wales is predicted [RD14]; [RD15], which could result in soil wetness becoming less of a limitation for the site.

7.3.37 Where site-specific ALC data are available across the wider study area, the main limiting factor is also wetness, although one field is limited by microrelief, which would not be influenced by climate change. Where only provisional ALC data are available, the limiting factors are not known but would likely be similar. Therefore, the potential effects of climate change are anticipated to be similar.

7.3.38 Potential changes in ALC grade may be localised and variable, but where wetness is the limiting factor, there could be improvements.

7.3.39 For further discussion of the effects of climate change on the Wylfa Newydd Project, refer to chapter B1 (introduction to the assessment process), (Application Reference Number: 6.2.1).

7.4 Design basis and activities

7.4.1 This section sets out the design basis for the assessment of effects. It sets out where any assumptions have been made to enable the assessment to be carried out at this stage in the evolution of the design. This section also identifies the embedded and good practice mitigation that will be adopted to reduce adverse effects as inherent design features or by implementation of standard industry good working practice.

7.4.2 As described in chapter E1 (proposed development) (Application Reference Number: 6.5.1), the application for development consent is based on a

parameter approach. The assessment described within this chapter has taken into consideration the flexibility afforded by the parameters. A worst case scenario has therefore been assessed from a soils and geology perspective within the parameters described in chapter E1 (Application Reference Number: 6.5.1).

Construction

7.4.3 The design and construction of the Off-Site Power Station Facilities would be in accordance with the description provided in chapter E1 (Application Reference Number: 6.5.1). The main activities that could affect soils and geology receptors are:

- stripping of topsoil and subsoil (as required);
- pile and form foundations for the Mobile Emergency Equipment Garage/Alternative Emergency Control Centre building and the Environmental Survey Laboratory building;
- undertake drainage and utility works;
- form the new road surface moving east to west including installation of the surface water storage tank and drainage; and
- undertake soft landscaping.

7.4.4 In addition, all of the activities described in chapter E1 (Application Reference Number: 6.5.1) have the potential to cause pollution incidents and thus are considered within the assessment.

Basis of assessment and assumptions

7.4.5 For the purposes of this assessment, the assumptions listed below have been made.

- Topsoil would be stripped from the car park access track, overspill car park and the area designated for the swale. Topsoil would remain *in situ* elsewhere.
- The majority of subsoil would remain *in situ* wherever it is present across the site, with 'Grasscrete' paving placed above the subsoil for the overspill car park. However, limited volumes of subsoil would be stripped in certain areas, for instance from the area designated for the swale and from the car park access track.
- Temporary soil storage is anticipated to be limited in terms of both volume and length of time, although a worst-case scenario of soil storage through the duration of the construction phase is assumed for the purposes of the assessment.

Embedded mitigation

7.4.6 No embedded mitigation measures have been identified for construction.

Good practice mitigation

7.4.7 The good practice mitigation measures identified for construction are set out below.

Land contamination

7.4.8 Section 9 of the Wylfa Newydd Code of Construction Practice (CoCP) (Application Reference Number: 8.6) and the Off-Site Power Station Facilities sub-CoCP (Application Reference Number: 8.9) set out the management strategies for dealing with land contamination.

7.4.9 Good practice mitigation during construction would include measures to reduce risks to human health and the environment. These measures are set out below.

7.4.10 A ground investigation with appropriate sampling for chemical analysis will be undertaken prior to construction, followed by a risk assessment. If the risk assessment identifies the need for remediation, a remediation strategy would be prepared in accordance with the requirements of *Contaminated Land Report 11: Model Procedures for the Management of Land Contamination* [RD9]. Any remediation would be designed to mitigate risks from contamination and reduce effects to receptors during construction and operation.

7.4.11 A contamination watching brief would be maintained by suitably qualified and experienced personnel during excavation works so that any areas of unexpected contamination would be identified as soon as practicable.

7.4.12 In order to address any areas of unexpected contamination encountered, an unexpected contamination scheme of measures would be prepared prior to the commencement of any activities that involve ground disturbance. Processes and procedures would be established that clearly set out the method for dealing with any material affected by contamination encountered during construction works.

Pollution prevention

7.4.13 The water management strategies in section 10 of the Wylfa Newydd CoCP (Application Reference Number: 8.6) and Off-Site Power Station Facilities sub-CoCP (Application Reference Number: 8.9) set out the pollution management principles and pollution prevention techniques to be applied throughout the construction period. Good practice mitigation during construction would include measures such as good equipment maintenance and repair, and containment systems for all fuel storage areas to reduce leaks and spills.

Materials management

7.4.14 Good practice mitigation would include the implementation of materials management measures in accordance with the materials management

strategy set out in section 9 of the Wylfa Newydd CoCP (Application Reference Number: 8.6).

7.4.15 The reuse of materials would be managed in accordance with the *Definition of Waste: Development Industry Code of Practice* [RD16]. This would allow the reuse of excavated materials as far as practicable without them being defined as waste. Refer to section 9 of the Wylfa Newydd CoCP (Application Reference Number: 8.6) for details.

Waste management

7.4.16 Section 9 of the Wylfa Newydd CoCP (Application Reference Number: 8.6) includes a site waste management strategy which sets out a framework for the management of wastes to reduce the amount of waste disposed to landfill. Further details on waste management are also provided in chapter C6 (waste and materials management) (Application Reference Number: 6.3.6).

Soil management

7.4.17 Topsoil and subsoil (where necessary) would be stripped from where construction activities would otherwise affect (e.g. compact or seal) it, as identified above. This would be undertaken towards the start of the construction works. The topsoil (and subsoil) would then be reused sustainably within the Wylfa Newydd Project or at a suitable third-party receptor site (e.g. via the CL:AIRE Register of Materials).

7.4.18 Good practice mitigation during construction would follow guidance on soil management such as the *Construction Code of Practice for the Sustainable Use of Soils on Construction Sites* [RD17]. The measures would include:

- appropriate procedures for soil handling, such as stopping works when soil moisture exceeds certain limits;
- appropriate segregation of soils, including the segregation of topsoils and subsoils, as well as soils of distinctly different qualities, types or composition;
- soils would be stockpiled using methods appropriate to the soil moisture conditions and stored in secure designated areas;
- soil storage mounds would have slopes of 1 in 2 (approximately 25˚) or less wherever practicable; and
- where soils would be stored for longer than 60 days, stockpiles would be seeded with an appropriate low-maintenance seed mix.

7.4.19 Implementation of the soil management measures set out within section 9 of the Wylfa Newydd CoCP (Application Reference Number: 8.6) would reduce effects on soil resulting from the stripping, handling and reuse of soil during construction works.

Operation

7.4.20 The operation of the Off-Site Power Station Facilities has the potential to cause effects on soils and geology receptors which are discussed in section 7.5; no activities in particular are considered to need highlighting.

Basis of assessment and assumptions

7.4.21 No assumptions have been identified for operation beyond the information set out in chapter E1 (Application Reference Number: 6.5.1).

Embedded mitigation

7.4.22 No embedded mitigation measures have been identified for operation.

Good practice mitigation

7.4.23 Pollution prevention strategies would be implemented in accordance with section 10 of the Wylfa Newydd Code of Operational Practice (CoOP) (Application Reference Number: 8.13). These aim to reduce the risk of accidental leaks and spills occurring, and any effects on receptors should they occur.

Decommissioning

7.4.24 The decommissioning phase would entail the removal of the Off-Site Power Station Facilities buildings from the northern portion of the site, with the southern portion of the site largely restored to its present condition. Activities associated with this have the potential to cause effects on soils and geology receptors, which are discussed in section 7.5.

Basis of assessment and assumptions

7.4.25 For the purposes of this assessment, it has been assumed that upon decommissioning, the southern portion of the site would be restored to its present condition as far as practicable, although the planted woodland would be retained. Suitable topsoil, and subsoil as required, would be imported to restore certain areas, including the swale, overspill car park and access track.

Embedded mitigation

7.4.26 No embedded mitigation measures have been identified for decommissioning.

Good practice mitigation

7.4.27 No good practice mitigation measures have been identified for decommissioning.

7.5 Assessment of effects

7.5.1 This section presents the findings of the assessment of effects associated with the construction, operation and decommissioning of the Off-Site Power Station Facilities.

Construction

Soil quality

Stripping of topsoil and subsoil

7.5.2 Topsoil and subsoil would be stripped from certain areas and temporarily stored during construction, as identified in section 7.4, during which the effects set out below may occur.

- Soil deformation could occur through compaction and smearing, as a result of trafficking and handling of the soil.
- Stripping topsoil too deeply, thereby incorporating subsoil, or stripping to too shallow a depth could respectively lead to a degradation of soil quality or result in the loss of valuable topsoil.
- Although only one ALC grade of soil (Subgrade 3b (medium value)) has been identified on site, if soils of different types or quality are found to be present and are mixed during soil stripping and storage, higher quality soils may be degraded.
- During storage, a number of biological, chemical and physical changes may occur as a result of natural compaction and anaerobic conditions in the core of the stockpile, although these would be largely reversible upon reinstatement.

7.5.3 The implementation of good practice soil management measures, as identified in section 7.4, would reduce the potential for these effects to occur. For instance, stopping works when soil moisture exceeds specific limits would reduce the potential for compaction and smearing, and the appropriate segregation of soils would reduce the potential for mixing. As such, only a small magnitude of change would occur on the medium value (Subgrade 3b) soils identified on site. Accordingly, a minor adverse effect would result.

7.5.4 It should be noted that the effects should be largely reversible at the receptor site to which the soils are reinstated, or within landscaping on-site, provided appropriate handling and aftercare measures are implemented.

Remaining construction activities

7.5.5 The remaining construction activities, such as drainage and utility works and soft landscaping, are considered unlikely to create any additional effects upon soils, beyond those identified above.

Land contamination

Exposure of areas of unexpected contamination

7.5.6 As identified in section 7.4, a ground investigation and risk assessment would be completed, followed by a remediation strategy and the remediation of contamination (if required) prior to construction commencing. This would reduce the likelihood of contaminated soils (if present) posing risks to receptors during construction.

7.5.7 Nevertheless, there remains the potential for the exposure or mobilisation of unexpected contamination during construction which could affect construction workers (high value), Subgrade 3b soils (medium value) and controlled waters (low value). Following the implementation of the good practice mitigation measures set out within section 9 of the Wylfa Newydd CoCP (Application Reference Number: 8.6), it is considered unlikely that a pollutant linkage would occur. For soils and controlled waters, the magnitude of change would be negligible based on the low risks posed, and the effects would be negligible. While the risks to construction workers would be higher than for soils and controlled waters in the unlikely event that unexpected contamination were encountered, they would still remain low. Therefore, a small magnitude of change and minor adverse effect has been identified for construction workers.

7.5.8 No effects have been identified for adjacent land users (high value) from unexpected contamination, as it is very unlikely that pollutant linkages would occur.

Pollution incidents causing soil contamination

7.5.9 During construction there is the potential for activities and pollution incidents to cause new contamination on-site. This could be as a result of leaks or spills from construction plant, or fuel and chemical storage facility leaks. Any contamination resulting from such events has the potential to pose risks to construction workers (high value) or Subgrade 3b soils (medium value).

7.5.10 However, the implementation of pollution prevention strategies e.g. bunding of any fuel tanks and good maintenance of equipment, by way of the Wylfa Newydd CoCP (Application Reference Number: 8.6) would reduce this risk. As such, the magnitude of change would be negligible for both receptors and the resulting effects would be negligible.

7.5.11 For the assessment of effects that could occur to surface water and groundwater, including leaks and spills, reference should be made to chapter E8 (Application Reference Number: 6.5.8).

Geological resources

7.5.12 Whilst shallow bedrock may be encountered during earthworks, it is not considered likely that the construction of the Off-Site Power Station Facilities would require substantial excavation of the bedrock. Therefore, no significant loss of the identified Category 2 Aggregates Safeguarding Area as a result of the construction works is predicted. There would be a loss of access to the resources within the southern portion of the site, but the proportion affected would be minor (<50%) and the length of time that access would be restricted during construction would be relatively short.

7.5.13 Accordingly, the magnitude of change for the medium value geological resources resulting from construction would be negligible and the degree of effect would also be negligible.

Operation

Soil quality

7.5.14 Topsoil and subsoil would have been removed during construction from the majority of areas in which they may have been affected during operation. The only soils likely to be affected would be subsoil remaining *in situ* beneath the overspill car park. It is considered that given the limited area of subsoil affected and the protection offered by the 'Grasscrete' paving, only a negligible magnitude of change would occur due to compaction of the subsoil. Therefore, the effect upon the medium-value Subgrade 3b subsoils would be negligible.

Land contamination

Unexpected contamination

7.5.15 The remediation strategy (if required) would be designed to break all pollutant linkages present, both current and future, and as such would consider the remediation required to protect receptors during operation. Although there remains the potential for unexpected contamination to be present which may affect receptors during operation (e.g. as a result of mobilisation during in-ground maintenance works), the likelihood of this occurring is very low. It is therefore considered that any magnitude of change would be negligible for the receptors: maintenance workers (high value), buildings and infrastructure (medium value) and controlled waters (low value). The degree of effect from this change would be negligible.

Pollution incidents causing soil contamination

7.5.16 During the operation of the Off-Site Power Station Facilities, the only receptors that might be affected by pollution incidents would be maintenance workers and future site users (high value), and Subgrade 3b (medium value) soils. However, the implementation of pollution prevention strategies as set out in section 10 of the Wylfa Newydd CoOP (Application Reference Number: 8.13) would reduce the risk of potential leaks and spills, such that soils are unlikely to be affected by pollution incidents, whilst the likelihood of contaminants posing risks to human health is very low. As such, the magnitude of change across the receptors would be negligible and any potential effects would be negligible.

Geological resources

7.5.17 The presence of the Off-Site Power Station Facilities would limit access to the identified mineral resources whilst the site is operational. However, given that the current use of the site prevents access to much of the identified Aggregates Safeguarding Area, the magnitude of change is considered negligible on the medium value mineral resources, such that a negligible effect is predicted.

Decommissioning

Soil quality

7.5.18 It is considered that the only areas containing natural soils that would be affected during decommissioning would be the swale, overspill car park and access track, to which topsoil (and some subsoil) would need to be imported to restore the areas to approximately their original condition. Soils of a similar quality (or better) would be imported to restore the ALC grade to at least Subgrade 3b, such that the receptor is assumed to be medium value Subgrade 3b soils.

7.5.19 Imported soils could be adversely affected during handling and reinstatement, primarily through compaction and smearing. However, it is anticipated that the quantity of soil and the degree of the effect would be limited. Effects upon soils remaining *in situ* would involve relatively minor compaction and would only occur over limited areas.

7.5.20 Therefore, a negligible magnitude of change and negligible effect is predicted on imported soils and soils remaining *in situ* during decommissioning.

Land contamination

Unexpected contamination

7.5.21 Construction workers (high value) involved with the decommissioning of the Off-Site Power Station Facilities may be exposed to residual contamination on site. However, given the likelihood that any contamination (if present) would have been addressed during construction, the change would be of negligible magnitude and the degree of effect would be negligible.

Pollution incidents

7.5.22 There is the potential for accidental pollution incidents during the decommissioning works. However, it is expected that appropriate procedures would be implemented to reduce the potential for, and the scale of, any pollution incidents. As such, the magnitude of change for construction workers (high value) and Subgrade 3b soils (medium value) would be negligible and the effect would be negligible.

7.5.23 For effects that occur to surface and groundwater, including leaks and spills, reference should be made to chapter E8 (Application Reference Number: 6.5.8).

Geological resources

7.5.24 Decommissioning would reinstate access to the identified geological resources within the southern portion of the site, which would be beneficial. However, no effect is predicted, as the site would simply be returned to approximately its current condition.

7.6 Additional mitigation

7.6.1 In accordance with chapter B1 (Application Reference Number: 6.2.1), embedded and good practice mitigation measures relevant to soils and geology were taken into account when determining the 'pre-mitigation' significance of effects. These are detailed in the design basis and activities section of this chapter.

7.6.2 No potential significant effects have been identified in the assessment of effects section and therefore no additional mitigation is required.

7.7 Residual effects

7.7.1 No significant adverse effects were identified for soils and geology.

7.7.2 Minor adverse effects identified in the assessment of effects section are summarised in appendix I3-1 (master residual effects table, Application Reference Number: 6.9.8) and include:

- degradation of Subgrade 3b soil during construction (minor adverse); and
- potential exposure of construction workers to unexpected contamination (minor adverse).

7.8 References

Table E7-1 Schedule of references

ID	Reference
RD1	National Soil Resources Institute. 2015. *Soils Site Report: Full Soil Report. SH3267088793, 5km x 5km*.
RD2	Ministry of Agriculture, Fisheries and Food. 1988. *Agricultural Land Classification of England and Wales: Revised Guidelines and Criteria for Grading the Quality of Agricultural Land*. [Online]. [Accessed: October 2016]. Available from: http://webarchive.nationalarchives.gov.uk/20130402151656/http:/archive.defra.gov.uk/foodfarm/landmanage/land-use/documents/alc-guidelines-1988.pdf.
RD3	Reading Agricultural Consultants Ltd. 2017. *Off-line Improvements to the A5025, Anglesey: Agricultural Land Classification and Soil Resources*.
RD4	Ministry of Agriculture, Fisheries and Food. 1977. *1:250,000 Series Agricultural Land Classification: Wales*.
RD5	British Geological Survey. 1974. *1:50,000 Scale 'Solid and Drift Geology' Geological Map of Anglesey (Special Sheet 092)*.
RD6	British Geological Survey. 2017. *Geology of Britain Viewer*. [Online]. [Accessed: April 2017]. Available from: http://mapapps.bgs.ac.uk/geologyofbritain/home.html
RD7	Groundsure. 2015. *Enviroinsight, Geoinsight and Mapinsight (GS-2735145, 2735146 & 2735147)*.
RD8	Welsh Assembly Government. 2012. *Contaminated Land Statutory Guidance for Wales.* [Online]. [Accessed: April 2017]. Available from: http://gov.wales/docs/desh/publications/130712contaminated-land-statutory-guidance-2012-en.pdf?
RD9	Department for Environment, Food and Rural Affairs and Environment Agency. 2004. *Contaminated Land Report 11: Model Procedures for the Management of Land Contamination*. Bristol: Environment Agency.
RD10	Rudland, D.J, Lancefield, R.M. and Mayell, P.N. 2001. *Contaminated land risk assessment: A guide to good practice* (C552). London: CIRIA.
RD11	The United Nations Educational, Scientific and Cultural Organization (UNESCO). 2016. *New UNESCO programme recognises the UK's seven 'Global Geoparks'*. [Online]. [Accessed: January 2016]. Available from: http://www.unesco.org.uk/news/new-unesco-programme-recognises-the-uks-seven-global-geoparks/

ID	Reference
RD12	British Geological Survey and Welsh Assembly Government. 2012. *North West Wales Aggregates Safeguarding Map*. [Online]. [Accessed: April 2017]. Available from: http://nora.nerc.ac.uk/20133/1/NW_Wales_FINAL.pdf
RD13	Capita Symonds. 2010. *Hard Rock and Sand & Gravel Safeguarding Areas in Ynys Môn*. Unpublished report prepared on behalf of the Isle of Anglesey County Council.
RD14	HR Wallingford. 2012. *A Climate Change Risk Assessment for Wales (Defra Project Code GA0204)*. [Online]. [Accessed: 18 May 2017]. Available from: http://gov.wales/docs/desh/publications/120126climateriskassessen.pdf
RD15	Keay, C.A., Jones, R.J.A., Procter, C., Chapman, V., Barrie, I., Nias, I., Smith, S. and Astbury, S. 2014. *SP1104 The Impact of Climate Change on the Capability of Land for Agriculture as Defined by the Agricultural Land Classification*. Defra. [Online]. [Accessed: 18 May 2017]. Available from: http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=16929.
RD16	Contaminated Land: Applications in Real Environments (CL:AIRE). 2011. *The Definition of Waste: Development Industry Code of Practice*. Version 2. London: CL:AIRE.
RD17	Department for Environment, Food and Rural Affairs. 2009. *Construction Code of Practice for the Sustainable Use of Soils on Construction Sites*. London: Defra.