HORIZON NUCLEAR POWER

WYLFA NEWYDD

ENERGY WORKING FOR BRITAIN

Wylfa Newydd Project

6.4.1 ES Volume D - WNDA Development D1 - Proposed development

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1 Proposed development

1.1 Introduction

1.1.1 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 requires that an Environmental Statement must provide a description of the development, in particular:

- “a description of the physical characteristics of the whole development and the land-use requirements during the construction and operational phases”;
- “a description of the main characteristics of the production processes, for instance, nature and quantity of the materials used;
- “an estimate, by type and quantity, of expected residues and emissions (water, air and soil pollution, noise, vibration, light, heat, radiation, etc.) resulting from the operation of the proposed development”.

1.1.2 In accordance with this legislation, this chapter describes the physical characteristics and functions of the WNDA Development during the construction, operation and decommissioning. The general details of residues and emissions are included, but more specific details, particularly in respect of quantities, are set out in the volume C and D assessment chapters (Application Reference Numbers: 6.3.1 to 6.4.16).

Structure of the chapter

1.1.3 This chapter comprises the following:

- **Section 1.2: Embedded mitigation** – describes how embedded mitigation is incorporated into the descriptive text.
- **Section 1.3: Rochdale envelope and parameters** – details the parameter approach and parameters used in the assessment.
- **Section 1.4: Site location and environmental context** – describes the key environmental features of the Wylfa Newydd Development Area and surrounding area.
- **Section 1.5: Construction schedule** – details the construction timeline for the works.
- **Section 1.6: Power Station** – provides a description of the operational layout, an outline of construction activities and operational processes.
- **Section 1.7: Marine Works** – provides a description of the operational layout, an outline of construction activities and operational functions.
- **Section 1.8: Site Campus** – provides a description of the operational layout, an outline of construction activities and operational functions.
- **Section 1.9: Other on-site development** – provides a description of the other development required to support the construction and operation of the WNDA Development.

- **Section 1.10: Ecological Compensation Sites** – provides information on compensatory habitat to offset potential adverse ecological effects on the Tre'r Gof Site of Special Scientific Interest (SSSI) which is located within the Wylfa Newydd Development Area.

Geographical areas

1.1.4 The following geographical areas are referred to as shown in figure A2-1 (Application Reference Number: 6.1.10, reproduced in the volume D Figure Booklet, Application Reference Number: 6.4.101).

- **Power Station Site:** the indicative areas of land and sea (145 hectares) within which the majority of the permanent Power Station, Marine Works and Other on-site development would be situated.
- **Wylfa Newydd Development Area:** the indicative areas of land and sea (approximately 409 hectares) including the areas surrounding the Power Station Site that would be used for the construction and operation of the Power Station, the Marine Works, the Site Campus and other on-site development.
- **WNDA Development:** the term used to describe the elements of the Wylfa Newydd Project that are located within the Wylfa Newydd Development Area, namely the Power Station, Other on-site development, the Marine Works and the Site Campus.
- **Ecology mitigation areas**: comprising a Notable Wildlife Enhancement Site and a Reptile Receptor Site (approximately 24 hectares) - see chapter D9 (terrestrial and freshwater ecology) (Application Reference Number: 6.4.9) for further details.

1.1.5 Reference is also made in this chapter (see section 1.10) to the creation of compensatory habitat and or enhancement at three sites on Anglesey to offset potential adverse ecological effects on the Tre'r Gof SSSI which is located within the Wylfa Newydd Development Area. Appendix D1-2 (Ecological Compensation Sites: Assessment of Environmental Effects) (Application Reference Number: 6.4.18) describes these three sites and provides an environmental assessment of the habitat creation proposals.

1.1.6 The WNDA Development comprises the following buildings and structures. This project description describes each of these under sections 1.6 to 1.9.

- **Power Station:** the proposed new nuclear power station at Wylfa, including two UK Advanced Boiling Water Reactors (ABWR), the Cooling Water System, supporting facilities, buildings, plant and structures, radioactive waste and spent fuel storage buildings and the Grid Connection (apparatus to transfer electrical energy to the National Grid high voltage electricity transmission network).
- **Marine Works:**
  - Permanent Marine Works: the Cooling Water System, the Marine Off-Loading Facility (MOLF), breakwater structures, shore

protection works, surface water drainage outfalls, waste water effluent outfall (and associated drainage of surface water and waste water effluent to the sea), fish recovery and return system, fish deterrent system, navigation aids and Dredging; and

- Temporary Marine Works: temporary cofferdams, a temporary access ramp, temporary navigation aids, temporary outfalls and a temporary barge berth.

- **Site Campus:** a temporary facility that would house up to 4,000 construction workers in modular type accommodation blocks, providing an independent living space for each worker, with shared campus-style amenities.
- **Other on-site development** including:
  - landscape works and planting;
  - drainage/surface water management systems;
  - public access works including temporary and permanent closures and diversions of Public Rights of Way (PRoWs);
  - new Power Station Access Road and internal site roads;
  - car parking;
  - construction compounds and temporary parking areas;
  - laydown areas;
  - working areas and temporary works and structures;
  - temporary construction viewing area;
  - diversion of utilities, electricity connections; and
  - perimeter and construction fencing.

Construction phasing

1.1.7 The construction of the WNDA Development would be carried out firstly through Site Preparation and Clearance (SPC) Works, which would prepare the Wylfa Newydd Development Area for Main Construction, including site establishment, soil remediation, erection of fencing, habitat clearance, demolition and diversion of a watercourse. Main Construction activities would follow, which would result in the completion of the Power Station, including final levelling and deep excavations for the Power Station foundations, civil construction activities, commissioning of both Units and site finishing.

Limitations

1.1.8 This chapter provides a description of all elements of the WNDA Development, but focuses on those elements of the project that are most relevant to the Environmental Impact Assessment (EIA). Those aspects which have no significant implications in relation to the EIA, for example detailed technical aspects of the operation of the UK ABWRs and detailed security arrangements, are presented but not described in as much detail.

1.2 Embedded mitigation

1.2.1 Where potentially adverse environmental effects have been anticipated during the iterative design and EIA process, measures have been 'embedded' in the design in order to avoid or reduce the risk of adverse effects occurring. These embedded mitigation measures are included within the descriptive text in this chapter and form the basis on which the EIA was undertaken. Embedded mitigation, specific to each topic is listed within the topic chapters within volume D (Application Reference Numbers: 6.4.1 to 6.4.16). Chapter J1 (environmental commitments) (Application Reference Number: 6.10.1) and appendix J1-1 (schedule of environmental commitments) (Application Reference Number: 6.10.3) provide further details of how mitigation would be secured.

1.3 Rochdale Envelope and parameters

1.3.1 A description of the Rochdale Envelope and parameter approach is provided in chapter B1 (introduction to the assessment process) (Application Reference Number: 6.2.1).

1.3.2 In order to cope with inevitable change through the Generic Design Assessment, the Nuclear Site Licence and design development processes, Horizon has proposed a parameter based approach for the construction and operation of the Power Station. As such, the application for an order granting development consent will be based on bounded parameters rather than a defined design. These parameters are sufficiently flexible to accommodate a reasonable level of change. Maximum and minimum parameters (such as limits on height and location of buildings) would be set by the development consent requirements, in order to keep the development within the defined envelope. Therefore, the final design will be within parameters set in the Development Consent Order (DCO) and upon which the EIA (as reported in this Environmental Statement) is based.

1.3.3 The parameters are contained within the following:

- **Order Limit Plans** – identify the Order Limits for the development to be authorised. The Order Limits for the Wylfa Newydd Development Area define the area within which the authorised development may be constructed, operated and maintained under article 3 of the draft DCO (Application Reference Number: 3.1). Order Limits are illustrated on the Parameter Plans (figures D1-1 to D1-6; Application Reference Number: 6.4.101). The Order Limits are encompassed within the Wylfa Newydd Development Area and the contiguous areas set aside for ecological mitigation as illustrated on figure A2-1 (Application Reference Number: 6.4.101).
- **Schedule of works** – outlines what works could theoretically take place within each works area, as identified on the Works Plans (Application Reference Number: 2.3). The schedule of works for the WNDA Development is outlined in table D1-1.

- **Works Plans (Application Reference Number: 2.3)** – Identify the limits of deviation for, and location of, each work package (or 'work area' or 'zone') under Schedule 1 (authorised development) (also referred to as 'schedule of works' (see above)), as referred to in article 4 of the draft DCO (limits of deviation). The WNDA Development comprises five main work areas (Work No. 1 to 4 and 12), which are subdivided further as shown on Works Plan Drawings (Application Reference Number: 2.3) submitted as part of the application for development consent.
- **Parameter Plans** – Identify the 'zones' within which buildings, structures and works identified in the parameter tables (see below) must be located. They provide an additional layer of restriction by further controlling where Horizon can construct certain elements within the limits of deviation in the Works Plans (Application Reference Number: 2.3). Parameter Plans are included as figures D1-1 to D1-6 (Application Reference Number: 6.4.101).
- **Construction parameter zones** – the Wylfa Newydd Development Area is divided into 11 construction zones (see figure D1-1, Application Reference Number: 6.4.101) with maximum parameters applied to each zone in relation to construction landform height and gradient, and maximum heights of temporary construction buildings and cranes. These construction phase parameters are included as table D1-4.
- **Parameter tables** – Identify maximum and minimum building dimensions (e.g. heights) and zones within which specific buildings, structures and works must be located (as shown on the Parameter Plans). They also identify final construction platform levels for each building (table D1-4), for each work area (table D1-1), dredging depths and volumes (table D1-10). The parameter tables for the Power Station, Marine Works and Site Campus are included as tables D1-2, D1-9 and D1-11. Only certain buildings and structures have minimum parameters stated, as these were required for modelling purposes.

1.3.4 In essence, the Order Limits define the whole area which is the subject of the draft DCO (Application Reference Number: 3.1). That area is then sub-divided into a number of work areas within which certain works could take place. The actual work that takes place in those areas is then further constrained by the Parameter Plans and the information contained in the parameter tables.

1.3.5 Some elements of the WNDA Development are largely fixed (e.g. the location of the nuclear reactors) for EIA and consenting purposes. The flexibility associated with other buildings, structures, works and construction methodology are restricted through the application of the parameters. These parameters have been informed by the potential to create adverse environmental effects. Likewise, for those buildings where the location is sensitive in terms of EIA, e.g. because there is a stack on the building, the location has been limited to relatively modest limits of deviation.

1.3.6 This chapter describes the parameters that are being sought under the DCO together with an indicative Power Station layout presented as figure A2-1 (Application Reference Number: 6.4.101).

Table D1-1 Description of works and platform parameters for the WNDA Development

Work package (work area)	Platform parameters (mAOD)		Description of works
	Min	Max	
1			Power Station Site
1A*	6	22	A twin unit nuclear reactor (Units 1 and 2), associated balance of plant, below-ground services and ancillary buildings.
1B*	6	22	Common Power Station (facilities to support Unit 1 and 2) buildings, associated balance of plant and ancillary buildings.
1C	19	22	Support facilities, associated balance of plant, below-ground services and ancillary buildings.
1D	19	22	Spent fuel and radioactive waste storage facilities, associated plant, below-ground services and ancillary buildings.
1E	-	-	Marine preparatory works (temporary access ramp, dredging of superficial material and weathered rock).
1F	-	-	Two breakwaters in Porth-y-pistyll, temporary causeway and cofferdam, bulk MOLF, Roll-on Roll-off MOLF, associated maritime navigation lights and markers, dredging, land reclamation, shore protection, temporary barge berth, lay-by berth, temporary pontoon, associated below-ground services.
1G*	6	20	Cooling Water intake structure, intake tunnels, biocide plant, intake skimmer wall.
1H	-	-	Cooling Water outfall, discharge tunnels, temporary cofferdams.
1I	30	34	Simulator and training building, car parking, associated balance of plant and below-ground services.
1J	-	-	New access road and roundabout connecting to the A5025, associated laying, replacement and diversions of apparatus and associated works.
1K	26	30	Vehicle inspection bay, plant logistics warehouse, associated balance of plant and below-ground services.
1L	19	22	Other required buildings – search building main entrance, main car park, connection to new site access roads, associated balance of plant and below-ground services.

Work package (work area)	Platform parameters (mAOD)		Description of works
	Min	Max	
1M	14	20	Other required buildings, outage building, gas storage houses, secondary gatehouse for outer fence, search building secondary entrance, secondary outer gate, foul water pumping station, associated balance of plant and below-ground services.
1N	14	22	Other required buildings – outage car park, connection to new site access roads, associated balance of plant and below-ground services.
2			Landscaping
2A			Mound A
2B			Mounds B and C
2C			Mound D
2D			Mound E
3			Site Campus
3A			Accommodation and amenity buildings, ancillary structures and plant, below-ground services, temporary internal access road, hardstanding and parking areas, surface water and foul drainage systems, utilities, fencing, landscaping including open space, multi-use games areas, lighting and security works, reinstatement of access to Fisherman's car park.
3B			Site Campus access road.
4			Grid Connection to the existing 400kV National Grid substation and associated buildings, structures, plant and apparatus.
12			SPC Works – site clearance works (vegetation, above-ground features), site establishment works (new crossing of the Existing Power Station access road, vehicle crossing points and routing, temporary footpath links, fuel and material storage compounds), ground improvement works (Remediation Processing Compound, fencing, access tracks, drainage, treatment of contaminated materials and invasive species), re-alignment of a tributary to the Afon Cafnan with associated landscaping works, temporary diversion/closure of Cemlyn Road with controlled access to Fisherman's car park.

*Note: the large range in parameter platform levels within each work area is due to the flexibility of parameter zones to move across each other, so for example, in parts of 1A and 1G, some levels are 6, 12, 18 and 22 metres Above Ordnance Datum (mAOD).

1.4 Site location and environmental context

1.4.1 The Wylfa Newydd Development Area is bounded to the north by the Existing Power Station and a stretch of coastline including Wylfa Head. It extends into the marine environment at Porth-y-pistyll. To the east, it is separated from the town of Cemaes by agricultural land. The A5025 road defines part of the south-east boundary. To the south and west, the site abuts agricultural land with a small number of residential dwellings and farmsteads. To the west, the site is bounded by the coastal hinterland and Cestyll Valley Garden, beyond which lies Cemlyn Bay.

1.4.2 The landscape in this area is characterised by small rounded hills (known as drumlins). Land within and surrounding the Wylfa Newydd Development Area is predominantly in agricultural use, for grazing by sheep or cattle. Land is contained by hedgerows and dry stone walls ('cloddiau'), and crossed by a network of roads, rural lanes, watercourses and overhead electricity infrastructure.

1.4.3 Settlement patterns around the Wylfa Newydd Development Area are characterised by small clusters of residential dwellings and more isolated farmsteads. Larger settlements in the immediate vicinity of the Wylfa Newydd Development Area include the villages of Cemaes, 2km to the east, and Tregele, 1km to the south-east.

1.4.4 A number of PRoWs, including the Wales Coast Path and the Copper Trail, cross the Wylfa Newydd Development Area. The Wales Coast Path is a long-distance trail that follows the entire coastline of Wales. Some sections of the route divert inland where access is restricted, as is the case where the path runs inland of the Existing Power Station.

1.4.5 Land to the north and west of the Wylfa Newydd Development Area is within the Anglesey Area of Outstanding Natural Beauty and the North Anglesey Heritage Coast.

1.4.6 There are a number of sites subject to ecological conservation designations (both statutory and non-statutory) of international, national and local importance within and in the vicinity of the Wylfa Newydd Development Area. Notable sites are:

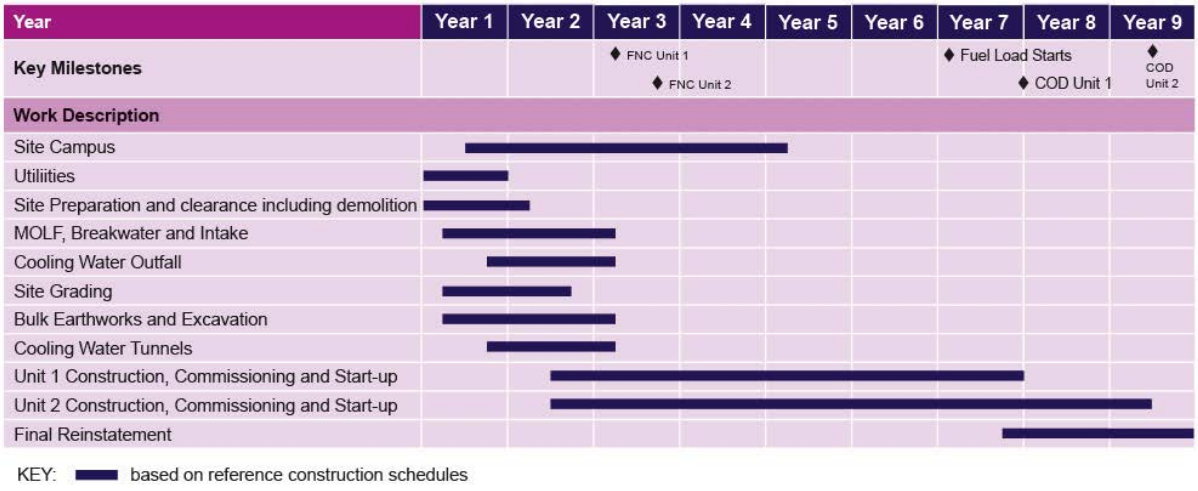
- Tre'r Gof and Cae Gwyn SSSIs;
- Cemlyn Bay SSSI which forms part of the Anglesey Terns Special Protection Area;
- Cemlyn Bay Special Area of Conservation;
- North Anglesey Marine Special Area of Conservation; and
- Anglesey Terns Special Protection Area.

1.4.7 Further information on the environmental context of the Wylfa Newydd Development Area and the surrounding area are contained within chapter A3 (environmental context) (Application Reference Number: 6.1.3).

1.5 Construction schedule

1.5.1 The indicative construction timeline for the works in the Wylfa Newydd Development Area is provided in figure D1-7.

Figure D1-7 Indicative construction timeline for the Wylfa Newydd Development Area



1.5.2 The Power Station construction programme is anticipated to commence following grant of development consent. The Main Construction stage is anticipated to take approximately seven years, with the first Unit operational seven years after grant of development consent, and the second Unit operational approximately two years later.

1.5.3 Construction of the spent fuel storage facility would commence following Main Construction, to be available for use approximately 10 years into the operation phase. The solid Intermediate Level Waste (ILW) storage facility would be built at the same time.

1.5.4 Activities such as SPC, followed by bulk earthworks, deep excavations, rock excavation and MOLF construction would commence in the first year following grant of development consent. Construction activities, concrete production, distribution and placing, steel reinforcing works, cranage, access to structures and related site logistics would likely peak during year 4 following grant of development consent.

1.6 Power Station

Operational site layout

1.6.2 A description of the main buildings and structures is provided in this section. The Power Station would comprise a range of buildings, structures, facilities and features.

- **Main plant** – buildings that are located in and around the single power island and contain the plant that is particularly important for safe generation of electricity.

- **Common plant** – comprising those parts of the Power Station that support the process of generation of power and are shared between the two UK ABWRs (hereby referred to as the two "Units").
- **Supporting facilities, buildings, structures and features** – including those parts of the Power Station necessary to support the operation and maintenance of the Power Station, including offices and security facilities.
- **Grid Connection** – apparatus to transfer electrical energy to the National Grid high voltage electricity transmission network.

1.6.3 The illustrative locations of these components of the Power Station are shown in figure A2-1 (Application Reference Number: 6.4.101).

1.6.4 Table D1-2 and table D1-3 provides the parameters (dimensions and heights) of buildings and structures used for assessment purposes in the EIA. For further information on the application of envelopes and parameters to building dimensions, see section 1.3 above.

1.6.5 Volume 2 of the Design and Access Statement (Power Station Site) (Application Reference Number: 8.2.2), provides further information on the approach to masterplanning, and the opportunities and constraints that have influenced the development of the design proposals.

1.6.6 The key buildings and structures are described below.

Main plant

Reactor buildings (building no. 101, zone 1A-1) and main stacks (S5, S6, zone 1A-1)

1.6.7 The reactor buildings are a critical part of the Power Station and would be the tallest buildings on the Power Station Site at up to 49m in height (67mAOD). Each reactor building would have an emissions stack (main stack) with a maximum height of 98mAOD (Unit 1) and 95mAOD (Unit 2). The main stacks would provide the discharge point for the off-gas system (see turbine building description) and for the main ventilation system that would service the main buildings (reactor building, turbine building and radioactive waste building).

1.6.8 Each reactor building would house:

- a nuclear reactor;
- main steam supply and part of the steam supply tunnel;
- various safety systems;
- fuel handling equipment;
- suppression pool; and
- spent fuel pool.

1.6.9 The spent fuel pool would be used for the storage of new nuclear fuel and the storage of spent fuel immediately after it has been removed from the reactor, prior to transfer to the spent fuel storage facility after a period of cooling.

1.6.10 The plant in the reactor buildings would be supported by safety and auxiliary systems. Each Unit would be served by a number of auxiliary systems, notably water cooling systems, which remove heat from the plant auxiliaries in order to preserve the required functions during all modes of operation.

Turbine buildings (building no. 108, zone 1A-1)

1.6.11 The two turbine buildings would house all equipment associated with the main steam turbine generators. This includes part of the steam supply system that feeds into the steam turbines, as well as the turbine power generators, the main steam condensers and the off-gas system. The off-gas system processes gases from the steam that do not condense in the condenser. The system includes processes to reduce radioactivity in the gaseous phase prior to discharge via the main stack.

Control buildings (building no. 102, zone 1A-1)

1.6.12 The control buildings would contain the main control room for the Units, as well as some of the electrical switchgear and support systems needed to supply electrical power to the Power Station's auxiliary systems. The main steam tunnels from the reactor buildings to the turbine buildings would be located on the ground floor of the control buildings.

Heat exchanger buildings (building no. 103, zone 1A-1)

1.6.13 The heat exchanger buildings would be located close to the turbine and reactor buildings in order to reduce pipe runs and response time between them. The heat exchanger buildings would contain the Cooling Water System for the reactor building and the turbine building. The systems would use seawater to cool essential plant and equipment, including the turbines and generators. They would also provide reactor cooling during certain emergency scenarios.

Filter vent buildings (building no. 105, zone 1A-1)

1.6.14 The filter vent buildings would contain the filtration and monitoring equipment necessary to ensure that gases arising within the reactor buildings in emergency situations would be vented from these areas and released into the environment in a safe manner. In particular, in the extremely unlikely event of abnormally high pressure within the reactor primary containment vessels, safety systems would automatically relieve the pressure by venting gases and steam to the atmosphere via the filtered vent system, which would protect against harmful releases to the atmosphere.

Back-up building (building no. 107, zone 1A-2)

1.6.15 The back-up building would provide alternative safety management capacity during an emergency if the control buildings and associated safety systems were not operational. This would include a diverse means of cooling the reactor cores and spent fuel pools. The back-up building would be located to provide adequate separation from the reactor buildings and would include separate power and water supplies.

Emergency Diesel Generator buildings (building no. 110, zone 1A-1)

1.6.16 Emergency alternating current power generation would be required to provide power to the Power Station safety systems that would support shut down and cooling the reactor in the event of loss of power. Three Emergency Diesel Generators (EDGs) per Unit would be required in addition to the back-up building to perform this function. One EDG would be located in each of the six EDG Buildings. Each EDG would be powered by a diesel-fuelled compression ignition engine and rated at 10.4MW (megawatts electrical output).

Service building (building no. 109, zone 1A-1)

1.6.17 The service building would contain functions essential to the operation of the Units, for example the personnel monitoring and welfare facilities. It would also contain other support functions for operation of the Power Station that must be located close to the Unit, such as chemistry and environmental laboratories.

Radioactive waste building (building no. 104, zone 1A-1)

1.6.18 The radioactive waste building is part of the main power block, and serves both Units. The building would provide the following functions:

- Location for radioactive liquid effluent management systems. Operation and maintenance of the Units and associated systems would generate quantities of radioactive liquid effluent. The effluent management systems would clean the effluent to restore it to the Units' water quality specification and the effluent would be sent to storage tanks for re-use. The systems would comprise collection tanks, treatment systems, sample tanks and storage tanks.
- Location for wet solid ILW and Low Level Waste (LLW) storage and processing systems. Operation and maintenance of the reactors and associated systems would generate quantities of radioactive wet solid wastes in the form of spent resins and filter sludges (comprising particulate removed from the reactor coolant and condensate systems). Dependent on their source and the amount of radioactivity contained the wastes would be either ILW or LLW. The building would contain separate storage tanks for each category of waste to enable their efficient management. The building would also house processing capabilities for both ILW and LLW that would solidify the wastes in cement in approved containers that were compatible with their respective disposal requirements. For wet solid ILW, the waste packages would then be stored on-site until a national disposal facility (termed the Geological Disposal Facility (GDF)) became available. For wet solid LLW, the waste packages would be transported off-site to the Low Level Waste Repository (LLWR) in West Cumbria.

1.6.19 The radioactive waste building would be constructed during the Main Construction stage and would be available for use during commissioning, operation and decommissioning.

The facility would vent any radioactive gaseous discharges via the main stack of Unit 1, in accordance with the limits established through the Environmental Permit that Horizon would need to hold. In general, processed effluent would be returned to storage tanks for re-use, but on occasion, it would be necessary to discharge small quantities of excess water. This would be discharged to sea via the Cooling Water System outfall after sampling and monitoring to demonstrate that it was within discharge limits specified in the Environmental Permit that Horizon would need to hold. The locations of the radioactive facilities are presented in figure D1-8 (Application Reference Number: 6.4.101).

Main plant generator and auxiliary transformers (building no. 506, zone 1A)

1.6.20 The electricity produced by each Unit would be transferred to the National Grid extra high voltage transmission network via the exisiting 400kV substation adjacent to the Existing Power Station. The electrical power generated by the new Power Station would be transferred through either Gas Insulated Lines or cross-linked polyethylene (XLPE) cables. The connection equipment may be installed above ground, buried below ground or would be a combination of above and below ground. The connection would run from the Power Station's generator step up transformers to the existing National Grid 400kV substation approximately 100m north of the Power Station.

Common plant and supporting facilities

Make-up water treatment building (building no. 219, zone 1B)

1.6.21 The make-up water treatment building would comprise the water treatment systems used to make the demineralised water required for various plant systems including the house load (auxiliary) steam boilers. The building would be designed to accommodate the pumps, tanks, vessels and secondary equipment required to process mains water into demineralised water in a covered, controlled, internal environment. Mains water sourced from an upgraded local mains water supply would be processed into demineralised water. The demineralised water from this plant would be stored in purpose built tanks for use within the Power Station process.

1.6.22 The treatment process and its equipment would be based on the quality of the input and output water and the volume of throughput to the process system.

Fire water pump houses (building no. 207, zone 1B-2)

1.6.23 The two fire water pump houses would accommodate four fire water pumps and electrical equipment required to supply pressurised water to the fire water main for the Power Station Site. Bulk water storage tanks would be located adjacent to the buildings and would be fed from the local mains water supply

system, with at least two independent supply routes to give flexibility and redundancy, should one source of water fail.

Emergency response centre (building no. 242, zone 1C)

1.6.24 Personnel, equipment and vehicles intended to respond to an incident within the Power Station Site and Site Campus, including fire response, would be housed within the emergency response centre.

Garage for mobile emergency vehicles (building no. 204, zone 1C)

1.6.25 This would house mobile vehicles and equipment that would provide emergency cooling, fire control and emergency power supply (in case the back-up building or EDGs are unavailable).

Auxiliary boiler building (building no. 218, zone 1B-1)

1.6.26 The auxiliary boiler building is a facility to house the auxiliary steam supply boilers and associated equipment that would be used for plant start-up and operation of various loads requiring conventional steam supply. There would be six fuel oil fired boilers in the combustion installation, located in the auxiliary boiler building. Four boilers would discharge emissions through a shared stack containing four flues (north stack), and two boilers would discharge through a shared stack containing two flues (south stack). The auxiliary boiler building serves both Units.

1.6.27 The building would be designed to accommodate the boilers, secondary equipment and drain treatment process equipment required and would provide a covered controlled internal environment to house the equipment.

1.6.28 The building would have a number of associated support facilities located in the vicinity of the boiler house including:

- fuel oil storage tanks;
- purified water storage tanks; and
- ancillary equipment inside the building.

Cooling towers (building no. 519, zone 1A)

1.6.29 The cooling towers comprise wet cell cooling towers, arranged in two sets (one for each Unit). These cooling towers would be used during certain emergency events and support routine operational testing. They would remove decay heat from the core and all other auxiliary systems in the event of an impairment of auxiliary service water flow.

1.6.30 The cooling towers would be connected directly to the reactor building Cooling Water System in the heat exchanger building. The heat exchangers and condensers are also important parts of the cooling cycle as it means that the seawater being discharged back into the Irish Sea does not come into direct contact with any nuclear material.

1.6.31 The cooling towers would automatically be deployed to effect the safe shutdown of the reactor.

Other generators

1.6.32 There would be four Back-up Building Generators (BBGs), located in the back-up building (building no.107, zone 1A-2). Each BBG would be powered by a diesel-fuelled compression ignition engine rated at 4.8 Megawatt electric (MWe).

1.6.33 There would be two Auxiliary Standby Generators (ASGs), which would be housed in the auxiliary standby generator building (building no. 518, zone 1A), located in the south of the installation. Emissions from both ASGs would be via a twin-flue stack in a common windshield. The stack would be at a maximum height of 51mAOD and a minimum height of 42mAOD; this would typically result in a minimum stack height of 3m above building height. Both ASGs would be powered by a diesel-fuelled compression ignition engine rated at 3.6MWe, situated within acoustic enclosures.

Conventional waste storage

1.6.34 The waste and recycling facility (conventional and hazardous waste building and conventional waste storage compound) within the outer perimeter of the Power Station Site (building no. 222, zone 1B), would be for conventional waste and hazardous waste streams (such as fluorescent tubes, batteries, flammable liquids, paints, or aerosols), including a specific area for the storage of hazardous waste. It would provide facilities for the collection, sorting and temporary holding of waste and recyclable materials generated within the Power Station Site. Collection and removal of sorted waste would occur on a regular basis. Waste would be stored in ways that would maximise collection efficiency, so the facility is likely to comprise a combination of containers such as wheelie bins and skips of varying sizes.

Administration building (building no. 220, zone 1C)

1.6.35 The administration building would provide office accommodation for up to 300 permanent personnel and up to 50 visitors. The building would form the main reception for invited visitors to the Power Station, as well as including restaurant facilities, a dosimetry office and the primary document control centre for the Power Station.

Maintenance facility (building no. 226, zone 1A)

1.6.36 The maintenance facility would incorporate workshop spaces for heavy and light mechanical, electrical, control and instrumentation activities, and a laboratory. It would also provide office, welfare and occupational health space for maintenance staff, as well as meeting facilities, a permit office, stores and maintenance planning facilities.

Simulator and training building (building no. 904, zone 1I)

1.6.37 The simulator and training building would house two full scope simulators of the Power Station Units, as the primary tool for training operators. The building would also house classrooms and related training facilities. It would be located outside the outer site security fence. The facility would be used as

soon as it is available during Main Construction for staff training. The facility may be required for use 24 hours a day.

Outage building (building no. 240, zone 1M)

1.6.38 The outage building would provide canteen facilities, changing room facilities and welfare for day- and night-shift personnel. It would also house a control centre, maintenance control centre, permit office, store and management office. It would only be brought into use during periods of outage and planning, implementation and close out; however, the building would be permanently manned, including times between outages.

Cylinder storage house (building no. 208, zone 1M, 1A, 1L, 1K or 1C)

1.6.39 A gas storage house would be located on the Power Station Site in order to store gases that would be used routinely in operational processes. These gases would be stored in suitably sized tanks or cylinders depending on the specific technical requirements.

Switchgear buildings (building no. 253, zone 1A-1)

1.6.40 There would be one switchgear building per Unit that would house the 6.9kV switchgear; and heating, ventilation, and air conditioning (HVAC) plant. Switchgear is the combination of electrical disconnect switches, fuses or circuit breakers used to control, protect and isolate electrical equipment.

Plant logistics warehouse (building no. 254, zone 1K)

1.6.41 A warehouse provided for receiving deliveries.

Fuelling station (building no. 206, zone 1C)

1.6.42 The fuelling station would comprise an area of hardstanding within the southern part of the Power Station, which would contain a fuel pump for refuelling site vehicles.

Foul water pumping station (building no. 724, zone 1M)

1.6.43 The foul water pumping station would comprise a buried chamber with package pumps for the pumping of foul water from the WNDA Development to the existing Dŵr Cymru Welsh Water (DCWW) Cemaes waste water treatment plant.

Intake screen structure for auxiliary service water system (building no. 404, zone 1G-1)

1.6.44 The auxiliary service water system intakes and screening would be located either side of the Cooling Water intake with the pumping installation for these systems located in the heat exchanger building. A skimmer wall would be located up to 50m in front of the intake screens.

1.6.45 The auxiliary service water system provides cooling to auxiliary systems in the Power Station and also removes the heat generated within related equipment

and rooms. The circulating water and auxiliary service water system would draw water directly from the Irish Sea at the Porth-y-pistyll foreshore.

Biocide plant (building no. 237, zone 1G)

1.6.46 Facilities to enable on-site generation and dosing of Cooling Water with biocide or facility to store biocide delivered in bulk.

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Table D1-2 Parameters for Power Station Site buildings and structures

Building no.	Buildings/structures	Number	Parameter zone	Maximum parameter (L(m) x W(m) x H(m))	Minimum parameter (L(m) x W(m) x H(m))	Maximum height (mAOD)	Maximum platform level (mAOD)
Main Plant							
1-101	Reactor building (except main stack)	One	1A-1	77 x 78 x 49	66 x 67 x 38	67	18
2-101	Reactor building (except main stack)	One	1A-1	76 x 76 x 49	65 x 65 x 38	67	18
108	Turbine building	One per Unit	1A-1	96 x 121 x 49	80 x 109 x 34	67	18
102	Control building	One per Unit	1A-1	76 x 50 x 49	66 x 39 x 19	67	18
103	Heat exchanger building	One per Unit	1A-1	69 x 77 x 49	42 x 66 x 20	67	18
105	Filter vent building	One per Unit	1A-1	23 x 28 x 49	None	67	18
107	Back-up building	Single building with distinct systems for each Unit	1A-2	86 x 67 x 37	None	55	21
1-110 a	EDG building	One	1A-1	26 x 37 x 49	None	67	18
1-110 b	EDG building	One	1A-1	35 x 49 x 49	None	67	18
1-110 c	EDG building	One	1A-1	26 x 36 x 49	None	67	18
2-110 a	EDG building	One	1A-1	35 x 55 x 49	None	67	18
2-110 b	EDG building	One	1A-1	26 x 36 x 49	None	67	18
2-110 c	EDG building	One	1A-1	26 x 36 x 49	None	67	18

Building no.	Buildings/structures	Number	Parameter zone	Maximum parameter (L(m) x W(m) x H(m))	Minimum parameter (L(m) x W(m) x H(m))	Maximum height (mAOD)	Maximum platform level (mAOD)
109	Service building	Shared facility	1A-1	88 x 41 x 49	79 x 40 x 28	67	18
104	Radioactive waste building	Shared facility	1A-1	82 x 68 x 49	None	67	18
506A	Generator transformer	One per Unit	1A	59 x 24 x 16	None	34	18
506B	Auxiliary normal transformer	One per Unit	1A	22 x 37 x 11	None	29	18
506C	Excitation transformer	One per Unit	1A	11 x 11 x 8	None	26	18
506D	Spare generator transformer	One per Unit	1A	21 x 22 x 12	None	30	18
Common plant and supporting facilities, buildings, structures and features							
413	Seal pit	One per Unit	1A	26 x 27 x 0	None	None	-
419	Ball strainer pit	One per Unit	1A	19 x 29 x 0	None	None	-
204	Garage for mobile emergency vehicles	One per Unit	1C	93 x 22 x 15	None	36	21
210	Discharge water sampling building	One per Unit	1A	15 x 12 x 6	None	24	18
208	Cylinder storage house	One per Unit	1M,1A,1L,1K or 1C	30 x 30 x 7	None	25	18
519	Cooling towers	One per Unit	1A	52 x 132 x 31	None	49	18
201	Spent fuel storage facility	Shared facility	1D	150 x 190 x 27	None	48	21

Building no.	Buildings/structures	Number	Parameter zone	Maximum parameter (L(m) x W(m) x H(m))	Minimum parameter (L(m) x W(m) x H(m))	Maximum height (mAOD)	Maximum platform level (mAOD)
202	ILW storage facility	Shared facility	1D	150 x 49 x 19	None	40	21
207A, B	Fire water pump house	One per Unit	1B-2	10 x 15 x 5	None	23	18
218	Auxiliary boiler building	Shared facility	1B-1	90 x 34 x 17	None	35	18
219	Make-up water treatment building	Shared facility	1B	21 x 37 x 8	None	26	18
246	LAW management facility	Shared facility	1B	151 x 66 x 18	None	39	21
222	Waste and recycling facilities (conventional and hazardous waste building and conventional waste storage compound)	Shared facility	1B	74 x 44 x 14	None	35	21
239	Underground water storage pit	Shared facility	1A	81 x 26 x 0	None	None	-
240	Outage building	Shared facility	1M	140 x 43 x 19	None	37	18
242	Emergency response centre	Shared facility	1C	83 x 38 x 16	None	37	21
248	Cask transporter garage	Shared facility	1C	57 x 36 x 22	None	43	21
308	Vehicle inspection bay	Shared facility	1K or 1L	61 x 51 x 12	None	40	28

Building no.	Buildings/structures	Number	Parameter zone	Maximum parameter (L(m) x W(m) x H(m))	Minimum parameter (L(m) x W(m) x H(m))	Maximum height (mAOD)	Maximum platform level (mAOD)
904	Simulator and training building	Shared facility	1I	145 x 85 x 21	None	52	31
304	Main gatehouse for inner fence	Shared facility	1A	100 x 49 x 22	None	43	21
305	Secondary gatehouse for inner fence	Shared facility	1A	45 x 40 x 16	None	34	18
306	Main gatehouse for outer fence	Shared facility	1C	84 x 48 x 22	None	43	21
307	Secondary gatehouse for outer fence	Shared facility	1M	45 x 45 x 10	None	28	18
226	Maintenance facility	Shared facility	1A	100 x 55 x 20	None	38	18
220	Administration building	Shared facility	1C	158 x 45 x 23	None	44	21
507	Nitrogen gas supply system facility	Shared facility	1A	20 x 26 x 23	None	41	18
510	Purified water storage tank	One per Unit	1B	Dia 19 x [W] x 15	None	33	18
513	Light oil storage tank	One per Unit	1B	Dia 14 x [W] x 10	None	28	18

Building no.	Buildings/structures	Number	Parameter zone	Maximum parameter (L(m) x W(m) x H(m))	Minimum parameter (L(m) x W(m) x H(m))	Maximum height (mAOD)	Maximum platform level (mAOD)
515	Water storage tank (flooding system of specific safety system)	10 tanks per Unit	1A	Dia 17 x [W] x 15	None	36	21
518	Auxiliary standby transformer	One per Unit	1A	17 x 21 x 10	None	28	18
502	BBGs light oil tank	One per Unit	1A	Dia 13 x [W] x 11	None	32	21
504	Domestic water storage tank	One per Unit	1B	Dia 41 x [W] x 10	None	28	18
718	Weigh bridge	Shared facility	1B	20 x 20 x 5	None	26	21
256	Auxiliary standby generator building		1C-1	40 x 30 x 22	None	43	21
310	Search building main entrance	Shared facility	1L	45 x 38 x 10	None	31	21
311	Search building secondary entrance	Shared facility	1M	45 x 38 x 10	None	28	18
253	Switchgear building	One per Unit	1A-1	70 x 32 x 49	None	67	18
411	Intake water structure, includes auxiliary service water structure 404	One per Unit	1G-1	174 x 97 x 25	None	32	7
206	Fuelling station	Shared facility	1C	41 x 38 x 11	None	32	21

Building no.	Buildings/structures	Number	Parameter zone	Maximum parameter (L(m) x W(m) x H(m))	Minimum parameter (L(m) x W(m) x H(m))	Maximum height (mAOD)	Maximum platform level (mAOD)
237	Biocide plant	Shared facility	1G	35 x 24 x 15	None	22	7
254	Plant logistics warehouse	Shared facility	1K	35 x 105 x 13	None	41	28
505	High Pressure Core Flooder (HPCF) water storage tank	One per Unit	1A-1	40 x 40 x 17	None	35	18
520	Variable speed drive transformer	One per Unit	1A	27 x 25 x 10	None	28	18
521	Step-down transformer for Reactor Internal Pump Adjustable Speed Drive (RIP ASD) panel	One per Unit	1A	27 x 25 x 10	None	28	18
522	Step-down transformer for class 1 M/C	One per Unit	1A	35 x 16 x 10	None	28	18
255	Domestic water pump house	Share facility	1B	12 x 12 x 7	None	28	18
416	Outfall facility	Shared facility	1H-1	38 x 25 x 0	None	-	-
724	Foul water pumping station	Shared facility	1M	12 x 12 x 5	None	23	18
428	Intake skimmer wall	Shared facility	1G	210 x 10 x 10	None	10	0
719	Outage accommodation laydown	Shared facility	1M	60 x 15 x 8	None	26	18

Table D1-3 Parameters for Power Station Site stacks

Stack no.	Description	Stack centre NS/EW parameter	Maximum parameter	Minimum parameter
			Height (mAOD)	Height (mAOD)
S1, S2, S3, S4	EDG stack	5m radius	70	55
S5	Main stack	5m radius	98	94
S6	Main stack	5m radius	95	91
S7, S8	EDG stack	5m radius	70	38
S9, S10, S11, S12	BBG stack	5m radius	61	51
S13	Auxiliary standby generator building	5m radius	51	42
S14, S15	Auxiliary boiler building (north and south stack)	5m radius	53	38
S16, S17	Fire water pump house (north and south stack)	5m radius	26	21

Combustion plant exhaust stacks (S1 – S4, S7 – S15) will be a minimum of 3m above the roof height or parapet level of the building they are attached to.

Grid Connection

1.6.47 The Power Station would be connected to the 400kV National Grid system via the existing National Grid 400kV substation at the Existing Power Station. There are two circuits per generating unit, therefore a total of four circuits for the Power Station. Responsibility for the 400kV connection between Power Station and the substation and the termination within the substation, including any associated planning consents, rests with Horizon. Responsibility for the substation, including wider transmission network reinforcements (the North Wales Connection Project), and associated planning consents, rests with National Grid.

1.6.48 The design of the connection between the Power Station and the National Grid substation has not been finalised and options remain that involve the use of Gas Insulated Line and XLPE cable. The installation method options include below ground in tunnels or troughs or installed above-ground on steelwork either at ground level or at height.

1.6.49 For the purposes of the EIA, it has been assumed that all connection circuits would use Gas Insulated Lines and be installed on 15m-high supporting structures for the full length of the connection. By adopting this approach, the EIA is based on a worst case scenario.

Radioactive waste management

1.6.50 Radioactive waste would be generated during the operation of the Power Station, primarily due to nuclear fission of the fuel, activation of impurities in

the reactor water and activation of corrosion products in the reactor circuit. In the UK, radioactive wastes are classified in terms of the nature and quantity of radioactivity they contain and the heat they produce. The categories are broadly divided into Higher Activity Radioactive Waste (HAW) and Lower Activity Radioactive Waste (LAW) as explained below.

Higher Activity Radioactive Waste

1.6.51 HAW is made up of High Level Waste (HLW) and ILW. HLW is waste that is sufficiently radioactive for its decay heat to significantly increase its temperature and the temperature of its surroundings, such that heat generation has to be taken into account in the design of storage and disposal facilities.

1.6.52 ILW is waste exceeding the upper boundaries for LLW but which does not require heat generation to be taken into account in the design of storage or disposal facilities.

1.6.53 The HAW definition also includes for any LAW that does not conform to disposal requirements and therefore has to be managed as HAW (no LAW of this type has currently been identified for the Wylfa Newydd Project).

1.6.54 There is currently no available UK disposal facility for HAW and therefore it is required to be managed on-site in the interim. The Power Station design incorporates facilities and capabilities to manage the production, processing and storage of HAW.

Lower Activity Radioactive Waste

1.6.55 LAW has a radioactive content not exceeding 4GBq (Giga Becquerels) per tonne of alpha activity, or 12GBq per tonne of beta/gamma activity.

1.6.56 Very Low Level Waste is a sub-set of LAW with lower levels of radioactivity which enable its disposal to specific landfill sites that hold appropriate Environmental Permits.

1.6.57 LAW would be transported from site to treatment and/or disposal facilities that hold appropriate Environmental Permits. The waste would generally be removed from site shortly after being produced and therefore on-site storage is limited to the collation of transportable quantities of waste, with some in-built contingency should any off-site route be temporarily unavailable. The design incorporates facilities and capabilities to manage the production, processing and buffer storage of LAW.

Lower Activity Radioactive Waste management facility (building no. 246, zone 1B)

1.6.58 The LAW management facility would provide the capability for management of dry solid LAW.

1.6.59 Dry solid LAW would arise from operational and maintenance activities within the radioactive facilities on the site. The wastes would be sorted, segregated and containerised at source into suitable approved metal containers. These

would then be transferred across site to the LAW management facility. The functions of the facility would be as below.

- Receive packaged dry solid LAW from the site. Loaded waste containers would be moved across site using battery powered tugs and trailers.
- Carry out detailed radiological characterisation of the waste containers. The waste containers would be subjected to non-intrusive measurement using appropriate equipment to determine the most appropriate disposition route.
- Place the characterised containers into buffer storage. Segregated buffer storage would be provided to allow for transportable quantities of waste to be collated.
- Load waste containers into approved transport containers. Once a transportable quantity of waste had been collated, it would be loaded to an approved transport container.
- Load the transport containers to road vehicles for transfer from the site. The transport container would be loaded to a road vehicle for transport off-site.

1.6.60 The facility would also include floor space to enable the construction of modular containment systems to support any ad-hoc small-scale waste processing that may be required during the operational phase of the site.

1.6.61 There would be one shared LAW management facility for the two Units, which would be constructed during the Main Construction phase of the Power Station and be available for use during commissioning, operation and decommissioning.

1.6.62 The facility would vent any radioactive gaseous discharges via a small ventilation stack 3m above the ridgeline of the roof, in accordance with the limits established through the Environmental Permit that Horizon would need to hold.

Intermediate Level Waste storage facility (building no. 202, zone 1D)

1.6.63 The ILW storage facility would provide long-term on-site storage for packages of solidified wet solid ILW produced in the radioactive waste building. The facility would comprise a concrete shielded store in which the packages would be remotely handled using an overhead crane. The design would incorporate a shielded ILW transporter to transfer the packages from the radioactive waste building to the storage facility.

1.6.64 There would be one shared ILW storage facility for the two Units and this would be constructed after the Main Construction phase of the Power Station, to be available for use approximately 10 years into the operation phase. The store would not be required at commencement of operation, as it would take a number of years to accumulate the first quantity of wet solid ILW for processing.

1.6.65 The facility may require a small ventilation stack approximately 3m above the ridgeline of the roof, to support ventilation of the facility to control

environmental conditions. There would be no radiological gaseous discharge from this facility.

1.6.66 The store would remain in operation until the waste packages could be disposed of to the GDF.

Spent fuel storage facility (building no. 201, zone 1D)

1.6.67 The spent fuel storage facility would provide long-term storage for shielded dry storage casks containing spent fuel and HLW. Spent fuel and HLW would be stored in separate purpose designed cask types. The facility would comprise a simple overbuilding to provide environmental and security protection for the casks. Radiological shielding of the spent fuel and the HLW would be provided by the storage casks.

1.6.68 The spent fuel would arise as a result of reactor operation and would be removed from the reactors during outages. The spent fuel would undergo cooling in the spent fuel pools in the reactor buildings for approximately 10 years before being transferred into the dry storage casks.

1.6.69 The HLW would arise in the form of activated reactor components (spent control rods, etc.) and would be removed from the reactors during outages. The HLW would undergo cooling and radiological decay in the spent fuel pools in the reactor buildings for approximately 10 years before being transferred into the dry storage casks.

1.6.70 The loaded casks would be transferred across site to the spent fuel storage facility using a purpose designed cask transporter.

1.6.71 The facility would comprise a simple overbuilding to provide environmental and security protection for the casks. Radiological shielding of the spent fuel and the HLW would be provided by the storage casks.

1.6.72 There would not be any aerial or liquid discharges from this facility.

1.6.73 There would be one shared spent fuel storage facility for the two Units, which would be constructed after the Main Construction phase of the Power Station and be available for use approximately 10 years into the operation phase. The store would not be required at commencement of operation as the spent fuel and HLW would be stored in the spent fuel pool for up to 10 years prior to transferring to dry storage casks.

Construction of the Power Station

1.6.74 This section provides information on the land use and describes the activities to be undertaken during the construction of the Power Station Site. It provides a description of the activities that comprise the SPC and Main Construction works including information on the workforce numbers, shift patterns and vehicle movements.

1.6.75 The details of construction works relating to the various construction stages are described in the Construction Method Statement contained within appendix D1-1 (Application Reference Number: 6.4.17).

Power Station construction land use parameters

1.6.76 Table D1-4 identifies the 11 construction zones and the parameters applied to each zone in relation to construction landform height and gradient, and maximum heights of temporary construction buildings and cranes. The construction zones are presented in figure D1-1 (Application Reference Number: 6.4.101).

1.6.77 To protect the most sensitive receptors, no works would take place within the boundary of either the Tre'r Gof SSSI or the Cae Gwyn SSSI. Furthermore, to protect these features and other sensitive receptors, buffer zones would be established as shown below.

- For the north and west of the Tre'r Gof SSSI adjacent to the Site Campus, the buffer zone would be 20m.
- To the south of the Tre'r Gof SSSI, the buffer zone would be 50m.
- For the more sensitive eastern end of the Tre'r Gof SSSI, the buffer zone would be 100m.
- There would be a 15m buffer zone along all watercourses including the boundary ditch flowing into the Cae Gwyn SSSI, separating construction activities from the designated habitat.
- Buffers around bat barns would be a minimum of 10m. Appropriate planting within this zone is required. This would be a hard buffer, with no works within it. The screening along the buffer zone would be proportionate to the potential noise and disturbance effects anticipated. Construction activities in areas adjacent to the buffer would reduce noise and visual disturbance, as far as practicable, in line with the requirements of the Wylfa Newydd Code of Construction Practice (CoCP) (Application Reference Number: 8.6). These principles apply to the two existing bat barns as well as the two proposed barns.

Table D1-4 Construction parameters

Parameter zone	Description	Construction landform		Temporary construction building and facilities	Cranes
		Max height (mAOD)	Max gradient	Max height (mAOD)	Max height (mAOD)
Zone C1	Mound A	45	1:2	-	-
Zone C2	Laydown area/Mound B	45	No restriction	60	265
Zone C3	Mound B	50	1:1	-	-
Zone C4	Mound C	40	No restriction	-	260

Parameter zone	Description	Construction landform		Temporary construction building and facilities	Cranes
		Max height (mAOD)	Max gradient	Max height (mAOD)	Max height (mAOD)
Zone C5	Laydown area/Mound D	35	No restriction	60	255
Zone C6	Mound E	40	1:3	-	-
Zone C7	Power Station Site	22	No restriction	52	292
Zone C8	Breakwaters	14	No restriction	20	234
Zone C9	MOLF	14	No restriction	48	234
Zone C10	Cooling Water outfall	22	No restriction	37	242
Zone C11	Site Campus	23	No restriction	33	243

Notes:

1 – Mobile construction plant and equipment are not constrained by parameter envelopes (except for mobile cranes).

2 – Minimum landform heights not shown as land would start at existing height and could be excavated below existing levels.

3 – Maximum crane height stated is irrespective of the number of cranes or duration which cranes would be in place. For most locations, the majority of cranes would be significantly less than the maximum height.

4 – All areas that are adjacent to an area which has a maximum crane height stated may experience over swing from the adjacent area.

Site Preparation and Clearance (SPC)

1.6.78 The SPC Works are preparatory activities and works to facilitate the construction of the Power Station, comprising part of the construction phase of the Wylfa Newydd Project. The SPC Works have been designed to enable an efficient construction period following the grant of the DCO, and comprise species translocation and site clearance.

Demolition of existing buildings and walls

1.6.79 It is proposed that 35 buildings and other structures would be demolished during the early SPC Works prior to the commencement of the Main Construction activities, as listed in table D1-5. Where of historic interest, these buildings and structures would be subject to cultural heritage recording prior to demolition (see chapter D11, cultural heritage, Application Reference Number: 6.4.11). These include the Existing Power Station's Alternative Emergency Control Centre and District Survey Laboratory, the former Wylfa Sports and Social Club premises as well as a number of empty dwellings.

1.6.80 Other, more general, site clearance works would include the taking down of walls, gates and field boundaries, using plant and machinery up to 7.5m high (which include the operating booms of the largest excavators).

Table D1-5 Buildings to be demolished

Building name	Building footprint (sqm)
Tre'r Gof Uchaf	159
Tre'r Gof Farm agricultural building	68
Tre'r Gof Farm agricultural building	676
Steel shed outbuilding	40
Nant Orman	125
Building (Torman Cottage outbuilding)	59
Building (Torman Cottage)	120
Nant Orman outbuilding and garage	53
Tyddyn-Goronwy outbuilding	55
Tyddyn-Goronwy house	97
Tyddyn-Goronwy outbuilding	27
Tyddyn-Goronwy outbuilding	12
Tyddyn-Goronwy holiday cottage	57
Former Wylfa Sports and Social Club	729
Outbuilding adjacent to the former Wylfa Sports and Social Club	48
Tennis court	600
Boundary outbuilding	4
Magnox depot garage	426
Magnox Alternative Emergency Control Centre and District Survey Laboratory	95
Tyddyn-Gele	116
Tyddyn-Gele shed and outbuilding	90
Tyddyn Gele garage	20
Wylfa Lodge	80
The Firs outbuilding	46
Penrallt steel shed 1	4
Penrallt steel shed 2	4
Penrallt steel shed 3	4
Rhwng Dau Fynydd stone outbuilding	3
Swn y Mor house	74

Building name	Building footprint (sqm)
Swn y Mor shed	14
Swn y Mor stable	14
Swn y Mor cowshed	84
Swn y Mor stable block	30
Swn y Mor cowshed	61
Swn y Mor container	17

Tree and hedgerow removal

1.6.81 The majority of existing trees, shrubs and hedges, which make up road and field boundaries of the Wylfa Development Area would be removed as part of the clearance works proposed. The trees would be cut to approximately 300mm above ground level. The trees surrounding the proposed Remediation Processing Compound would be felled near the end of the clearance works and before Main Construction, so they could afford screening prior to their removal.

Clearance of other vegetation

1.6.82 Vegetation clearance activities would also include the clearance of other vegetation in addition to trees, shrubs and hedges. This would involve the management of other vegetation to ensure that it is no higher than 200mm above ground level with the exception of Invasive Non-Native Species (INNS), for which vegetation removal could include removal of contaminated soil. These works would incorporate a range of ecological and related measures including taking account of the bird breeding season. In order to minimise effects on species present, it is proposed that field boundary structures in sensitive locations would be dismantled using a combination of hand and machine clearance. In addition, where possible, some trees and shrubs would be retained around the Wylfa Newydd Development Area.

1.6.83 Following the clearance works, cleared land would be actively managed to prevent re-colonisation through methods such as low grass cutting.

Species management

1.6.84 There is a variety of species whose habitats would be lost or affected by the clearance works. In order to mitigate adverse effects, some species would be moved from the Wylfa Newydd Development Area through habitat manipulation, clearing refuge and foraging habitat in a directional manner, towards those areas secured as receptor sites, as well as trapping and translocation. These species include, but are not limited to, the following:

- great crested newt (*Triturus cristatus*);
- common lizard (*Zootoca vivipara*);
- adder (*Vipera berus*);
- common toad (*Bufo bufo*);

- water vole (*Arvicola amphibius*);
- polecat (*Mustela putorius*);
- hedgehog (*Erinaceus europaeus*); and
- brown hare (*Lepus europaeus*).

1.6.85 Two receptor sites have been secured by Horizon to accommodate species translocated or displaced from the Wylfa Newydd Development Area; a reptile receptor site and receptor site for species listed in accordance with Section 7 of the Environment (Wales) Act 2016 (hereafter referred to as 'Section 7 Species'). Locations are illustrated on figure A2-1 (Application Reference Number: 6.4.101).

1.6.86 The Section 7 Species receptor site comprises approximately 15ha of land and is located to the north-west of the Wylfa Newydd Development Area. It is separated into three distinct parcels of land by a public highway and Pencarreg (see figure D9-9, Application Reference Number: 6.4.101).

1.6.87 The reptile receptor site comprises approximately 5ha of land located at Mynydd-Ithel Farm, to the south-west of the Wylfa Newydd Development Area. It is separated into two parcels of land by the track to Mynydd-Ithel which runs east to west, providing vehicular access to the farmhouse (see figure D9-8, Application Reference Number: 6.4.101).

Watercourse realignment

1.6.88 It is proposed that the existing small watercourse of Nant Caerdegog Isaf be realigned. Further details of the methodology and location of the realignment works are included in appendix D1-1 (Application Reference Number: 6.4.17). The design of the proposed realignment has taken account of the presence of water voles and seeks to improve the local habitat by enhancing the opportunities for flora and fauna in the area. A new channel would be created to the south of the existing watercourse. The proposals are designed to enhance the diversion for water voles and would include steep sloping earth sides into which water voles could burrow. It would also contain planting with a range of grass, sedge and rush species to provide a food source for water voles.

1.6.89 Water voles would be trapped and translocated away from the area of the watercourse realignment, prior to water vole fencing being installed along the northern and southern boundaries of the watercourse realignment and landscaping area. This would be to prevent the re-entry of this species to this area during the watercourse realignment works.

1.6.90 The diversion itself would involve the formation of a new channel measuring approximately 360m in length, with an average width and depth of approximately 0.8m and 0.2m respectively. It would incorporate a gravel bed designed to mimic the existing watercourse.

1.6.91 The watercourse has been designed to encourage a range of features to develop along its course (including a wetland area, berms and a natural low flow channel) and provide potential habitat for wildlife (including water vole). It would be formed with an irregular sinuous planform and it is not anticipated

that it would actively erode its banks and therefore move its course, due to the very low river energies anticipated.

Remediation

1.6.92 The Wylfa Newydd Development Area contains three main types of contaminated soils. These are soils contaminated with:

- asbestos fibres;
- trichloroethene and hydrocarbons; and
- INNS, for example Japanese knotweed.

1.6.93 It is proposed to treat the majority of asbestos contaminated soil and INNS on-site and to transport all of the trichloroethene and hydrocarbon contaminated material off-site to a licensed facility. Further details on the contamination identified at the site are contained within chapter D7 (soils and geology) (Application Reference Number: 6.4.7).

Remediation Processing Compound

1.6.94 In order to treat and process the range of contaminated soils and INNS present in various locations across the Wylfa Newydd Development Area, an area has been identified as a dedicated Remediation Processing Compound. This compound would comprise of an asbestos treatment area (approximately 0.6ha), asbestos processes material storage area (approximately 0.2ha), and an INNS treatment and storage area (approximately 0.4ha). All these areas would be surfaced with a geomembrane and 250mm of compacted material.

1.6.95 The Remediation Processing Compound would also be used for the storage of plant (up to 6m in height) and be enclosed by a 3m high Centre for the Protection of National Infrastructure (CPNI) fence to ensure the secure storage of plant overnight with a 2.4m high timber hoarding sited on the outside of the CPNI fence. The Remediation Processing Compound would include a perimeter drain, and surface water would be collected, filtered and subsequently either re-used on the misting/sprinkler systems for dust suppression or tankered off-site for disposal.

Main Construction

1.6.96 Main Construction includes activities within the Wylfa Newydd Development Area that would result in the completion of the Power Station, including final levelling and deep excavations for the Power Station foundations, civil construction activities, commissioning of both Units and site finishing.

Plant and equipment

1.6.97 The plant required to construct the Power Station would include two very heavy lift cranes up to 270m high, one mobile very heavy lift crane up to 220m high, approximately 40 tower cranes up to 192m high and a large number of smaller mobile cranes. Parameters relating to crane heights and their location are presented in table D1-4. The cranes would require aircraft warning lights and lighting levels of 100lux would be applied. Crane operating hours would be 24 hours a day, seven days a week.

1.6.98 Temporary diesel generators may be required during early earthworks phase of the Wylfa Newydd Project as well as to act as standby power for power outages, power cuts, etc. Existing supplies to the present compound would be augmented to provide 37MVA supplies that should meet all of the temporary power supplies to support construction. Site power to support construction would be scheduled to be available nine months after granting of the DCO and is a predecessor for the establishment of Main Construction, site compounds and accommodation. The installation of the site power would avoid the need to use diesel generators to power the site compounds, Site Campus and the main concrete batching plant.

Soil stripping, storage and re-use

1.6.99 Topsoil and subsoil would be stripped, as per good practice construction techniques as presented in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7), from all areas required. This would be undertaken towards the start of the Main Construction works. Topsoil and subsoil would be stripped from the footprints of the following:

- Power Station;
- Site Campus, including the temporary car parking, pedestrian areas, buildings and bus pick-up/drop-off area, as well as from construction-phase haul/access roads around the site;
- haul roads;
- landscaped mounds;
- compounds and material storage areas; and
- proposed new channel of the watercourse realignment.

1.6.100 The majority of temporary topsoil and subsoil storage would be in the location of landscape mounds. Limited volumes of soil stripped from the Site Campus may be stored temporarily at that site during its construction for a short time period. Some soil may be stored outside of the Wylfa Newydd Development Area but within the wider Wylfa Newydd Project. Soil storage mounds would be up to 3m in height.

1.6.101 Where soil is stockpiled for longer than six months, the stockpiles would be seeded to reduce sediment runoff and mitigate the risk of infestation with invasive weeds. The maximum duration of temporary soil storage would be approximately eight years.

1.6.102 Most of the topsoil and subsoil would be re-used sustainably on-site in the landscape mounds. However, topsoil and subsoil stripped from the Site Campus would mainly be re-used outside of the Site Campus, either elsewhere within the Wylfa Newydd Project or at a suitable third-party receptor site. Limited volumes may be re-used in landscaping for the Site Campus.

1.6.103 Topsoil and subsoil would not be stripped from the following areas:

- buffer zones around watercourses (15m either side);
- Wylfa Head; and

- Tre'r Gof plus a 50m buffer around it (unless otherwise stated in paragraph 1.6.77).

Bulk earthworks

1.6.104 Site levelling and grading is required to form building platform levels for Unit 1 and Unit 2, including building platforms and construction and laydown areas. Platform level parameters are included in table D1-1 and presented on figure D1-9 (Application Reference Number: 6.4.101). Excavation materials would be incorporated into site landscaping/mounding to provide screening between plant and local residents during both construction and operation (figure D1-9, Application Reference Number: 6.4.101). All material excavated within the Wylfa Newydd Development Area would be retained on-site within the Wylfa Newydd Development Area.

Deep excavation (of Unit 1 and Unit 2)

1.6.105 Parts of the main plant buildings are designed to be constructed below ground, embedded in the ground and constructed on solid rock. Unit 1 and Unit 2 therefore require deep excavations for the installation of building foundations. Both Units would be constructed within a single excavation to a design depth of -16.9mAOD. However, for assessment purposes, a worst case depth of -18mAOD was modelled to allow for any sumps excavated below the base, so that the excavation is dry to -16.9mAOD. With the platform at between 6mAOD and 22mAOD, this means that the excavations would be around 24m to 40m deep. These deep excavation works would use a range of construction methods including rock blasting and mechanical removal techniques. Such activities would be strictly controlled to meet any vibration limits applicable to the works, and near neighbours would receive appropriate notification of periods of blasting.

1.6.106 Rock processing would be undertaken within areas of the Wylfa Newydd Development Area to suit the sequence of works.

1.6.107 Rock faces would be drilled and blasted to the final depth. This would be to vertically 'pre-split' the rock to further reduce risk of vibration migrating outside the excavation area during deep excavation activities. The material may be removed in 'benches' to support equipment and personnel access for excavation face preparation. Rock face support works using appropriate methods including shotcrete, rock bolting and ground anchoring, would be executed at every temporary bench layer as required.

1.6.108 Much of the deeper excavations would be below the water table. To ensure such excavated areas remain dry, water would need to be pumped out of them – a process called dewatering. Any discharge from the construction site dewatering system would be via appropriate treatment and settlement facilities to ensure compliance with the relevant Environmental Permit.

Excavation of other features such as culverts and building foundations

1.6.109 Shallow trenches for connecting services and pipes, together with other building foundations, would be dug during the Main Construction works. This

would optimise the use of mechanical plant and machinery, in the interests of construction efficiency.

Deep excavation dewatering

1.6.110 The dewatering component of deep excavations would comprise rainfall and groundwater seepage. The proposed method of dewatering would be to manage the inflows by a combination of drains, ditches and surface grading within the excavation to collect the water in the excavations and pump it to sediment settlement ponds located on the working platform.

1.6.111 To minimise groundwater inflow to the excavation, particularly through fractures, the walls of the deep excavations would be sprayed with concrete as the excavation deepens. To minimise surface water inflows running into the excavations, a bund and surface water drains would be installed around the periphery of the excavation.

1.6.112 Groundwater abstracted for dewatering of the basement and other structures during construction would be discharged to the sea at three discharge points (see appendix D8-8, summary of preliminary design for construction surface water drainage, Application Reference Number: 6.4.33) depending on the phase of construction. It would also include land drainage from around the platform area.

1.6.113 Suspended solid concentrations of the groundwater dewatering components would be limited to the concentrations proposed in the construction Environmental Permit (70mg/l during normal rainfall events), with discharges direct to the marine environment.

1.6.114 It is estimated that approximately 130m^3/day of groundwater would be abstracted from the deep inland excavations with typically a further 750m^3/day of rain water of direct rainfall being abstracted. The amount of rainwater removed would vary greatly from day to day, as it is dependent on the rainfall total. A daily maximum rainfall abstraction could be in the order of 7,500m^3/day based on historical rainfall data.

Cooling Water tunnel dewatering

1.6.115 Water arising during tunnel construction would be collected in sumps and pumped to attenuation points located at either tunnel portal where it would be monitored and treated, as required, to ensure compliance with applicable environmental limits before being released into the existing construction drainage system and outfalls. As such, the existing drainage system/outfall outside both portals would be sized to accommodate the maximum water from both tunnels. The maximum inflow rate for dewatering Cooling Water tunnels is 70l/s.

Waste and materials

1.6.116 An initial forecast of waste and materials associated with construction of the Power Station is included in chapter C6 (waste and materials management) (Application Reference Number: 6.3.6). Typical wastes and materials generated through construction could include, but would not be limited to,

topsoil clearance, vegetation removal, bulk earthworks, concrete, aggregates and packaging.

1.6.117 All waste and materials arising from construction works would be managed in a responsible manner in accordance with the principles of the waste hierarchy, and re-used on the Wylfa Newydd Development Area where possible. This would reduce the volume of material required to be removed from the site and increase the reuse, recycling and recovery of waste off-site.

Construction site management

1.6.118 The Wylfa Newydd CoCP (Application Reference Number: 8.6) and the Main Power Station Site sub-CoCP (Application Reference Number: 8.7) set out the general and topic-specific standards and measures to demonstrate the effective planning, management and control of all construction activities. The Wylfa Newydd CoCP (Application Reference Number: 8.6) and Main Power Station Site sub-CoCP (Application Reference Number: 8.7) form part of the application for development consent for the Wylfa Newydd Project.

1.6.119 The Wylfa Newydd CoCP (Application Reference Number: 8.6) and sub-CoCPs (Application Reference Numbers: 8.7 to 8.12) set out the framework of principles by which contractors would produce their Construction Environmental Management Plans. A contractor's Construction Environmental Management Plan would describe how they would plan, manage and control their construction activities to meet with requirements set out in the Wylfa Newydd CoCP (Application Reference Number: 8.6) and relevant sub-CoCPs (Application Reference Numbers: 8.7 to 8.12).

1.6.120 The Wylfa Newydd CoCP (Application Reference Number: 8.6) supports the planning and delivery of the Wylfa Newydd Project in as sustainable, efficient and cost-effective a manner as possible. It also promotes co-operation with other projects in the vicinity, as far as practicable, in order to reduce the potential for combined effects.

1.6.121 Horizon's contractors would be contractually required to deliver the construction works in accordance with the terms of all planning requirements and conditions, including the Wylfa Newydd CoCP (Application Reference Number: 8.6) and the Main Power Station Site sub-CoCP (Application Reference Number: 8.7. The contractor would be responsible for demonstrating compliance through appropriate monitoring and audit controls to meet Horizon's oversight and assurance requirements.

Fuels and oils

1.6.122 In line with good working practice, all fuels and oils (which would be transported to site via road in tankers or in suitable containers) would be stored in appropriately bunded tanks or other storage areas. Fuel tanks would be properly maintained, protected by a suitable anti-collision barrier where appropriate, and inspected on a regular basis (with a record maintained of all inspections). Spill kits would be provided at all chemical dispensing and refuelling locations. The strategy for the management of fuel on-site would be developed by the appointed contractor.

1.6.123 During the Main Construction works, a variety of chemical substances may be used, such as paints, solvents, flocculating agents (for settlement ponds) and explosive pre-mix. Potentially polluting materials used on-site would be suitably stored and pollution prevention measures deployed. Horizon would maintain a chemical register at all times. Horizon would monitor and audit contractor activities.

Construction workforce and shift working

1.6.124 Figure D1-10 below shows the projection of the size of the workforce that is anticipated to be required during the construction phase, on the basis that there would be approximately seven years between the start of construction and the Commercial Operation Date for Unit 1, with the Commercial Operation Date for Unit 2 following within two years. The construction timeline illustrates that a portion of the operation workers would join the wider construction workforce during the construction phase. Workers required for the construction of the WNDA Development overlap the construction period for some of the other Associated Development considered part of the Wylfa Newydd Project, including the Off-Site Power Station Facilities.

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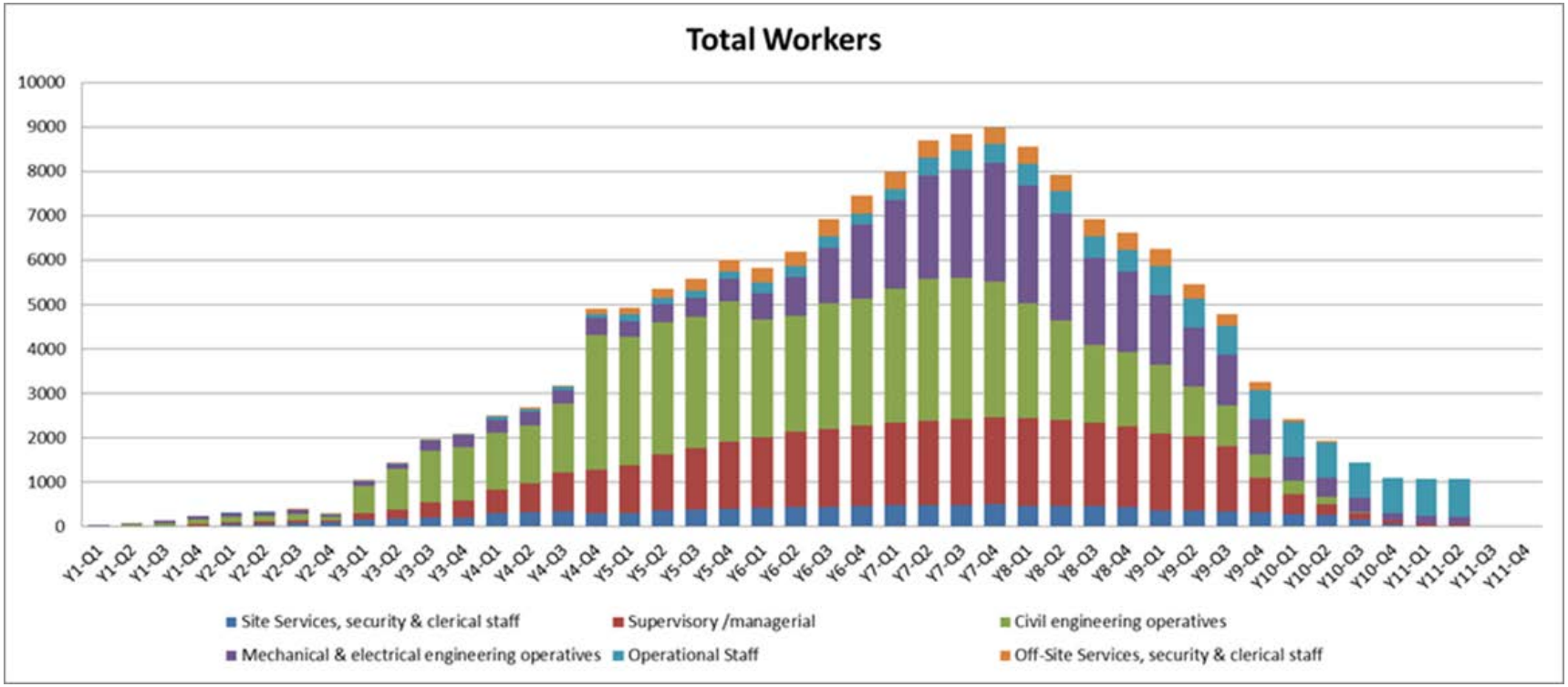
Figure D1-10 Indicative construction workforce profile



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1.6.125 The peak worker number breakdown is provided in table D1-6.

Table D1-6 Breakdown of workers by category

Worker category	Approximate worker numbers at peak
Civil engineering operatives	3,070
Mechanical and electrical engineering operatives	2,580
Off-site services, security and clerical staff	390
Operational staff	450
Site services, security and clerical staff	510
Supervisory/managerial	2,000
TOTAL	9,000

1.6.126 Approximately 9,000 workers would be required, and for assessment purposes, a figure of 9,000 has been used. Of these, it is estimated that approximately 2,000 would be home based; approximately 3,000 would be from outside the area, living in existing accommodation; and up to 4,000 would live in the Site Campus.

1.6.127 For the Main Construction works, multiple-shift working would be required with the ability to implement 24-hours-a-day, seven-days-per-week working for certain specified actions in order to deliver a viable construction schedule.

1.6.128 Table D1-7 provides site operation hours and shift patterns that are expected for activities during Main Construction.

Table D1-7 Site operation hours

Site operation	Working hours
Earthworks (digging, hauling, dumping, back-filling, stockpiling)	07:00–19:00 hours
Temporary/permanent road construction	07:00–19:00 hours
Blasting	Monday–Friday between 10:00 hours and 16:00 hours, and Saturday between 10:00 and 13:00 hours
Marine piling	07:00–18:00 hours
Drilling and packing for blasting	07:00–19:00 hours
Drilling/stuffing/grouting rock/soil nails	07:00–19:00 hours
Moving/re-positioning rock in the excavations	07:00–19:00 hours
Tunnelling	24 hours, seven days per week

Site operation	Working hours
Shotcreting	24 hours, seven days per week
Support operations (e.g. equipment/road maintenance, fuelling, dewatering, etc.)	07:00–19:00 hours apart from dewatering (24 hours, seven days per week)
Marine Dredging	24 hours, seven days per week
MOLF construction	07:00–18:00 except crane, barges, tugs which are 24 hours, seven days per week
Site establishment (facilities/utilities set-up)	07:00–19:00 hours
Batch plant set-up	24 hours, seven days per week
Miscellaneous construction operations (training, canteens, facilities management, etc.)	Generally, 24 hours, seven days per week

1.6.129 During Main Construction, there would be a fortnightly shift pattern of 11 days on, three days off. The three days off would be at the weekend, with 50% of workers taking their leave each week.

1.6.130 Day-shift start times would be phased in order to reduce traffic numbers and would typically be 07:00, 07:30 and 08:00 hours. Night-shift start times would typically be 16:30, 17:00 and 17:30 hours.

1.6.131 The day/night shift pattern during peak construction would likely be a split of 70% day and 30% night, which would be representative of normal working practice and broadly reflects the night-shift workers equating to 50% of day-shift workers.

Emergency services arrangements

1.6.132 The Power Station Site would contain a facility within the security fence to treat minor injuries. This facility would also support first response to incidents and be a staging point for more serious incidents. Serious injuries would receive initial triage and trauma care through on-site paramedics/first responders prior to transfer by NHS ambulance (or their supporting air ambulance) service to hospital.

Construction vehicles

Construction worker vehicles

1.6.133 During the SPC Works, the Main Site Compound would have parking for approximately 20 cars plus two disabled parking bays, with an overflow facility for a further 25 cars.

1.6.134 The current Main Site Compound, used to control and manage contractors onto the Wylfa Newydd Development Area, would only remain in place during the early phases of the Wylfa Newydd Project and would be lost during the early earthworks activities. The northern and southern worker and vehicular security access points would become operational and remain in place for the duration of the construction phase.

1.6.135 The southern security plaza would be the primary site entrance facility and used by all those commuting to the Wylfa Newydd Development Area via bus, either from off-site accommodation or from the Park and Ride. In addition, heavy goods vehicles (HGVs) that have first visited the Logistics Centre would access the site via this plaza. In the event it is inaccessible, then the northern plaza would be made available for pedestrians and a limited flow of critical HGV deliveries that otherwise could not be held at the off-site Logistics Centre.

1.6.136 The northern security plaza would principally be used by those living in the Site Campus and as a standby arrangement.

1.6.137 The southern security plaza would be at least 2ha in size and would include numerous security gates (pedestrian and vehicular), a bus drop-off/pick-up facility, an area for searching of goods vehicles entering the site, buildings (e.g. gatehouses), visitor car parking and lay-by areas. The northern security plaza would be similar in nature, but would be significantly smaller.

1.6.138 A total of approximately 1,900 car parking spaces would be provided in the Wylfa Newydd Development Area to accommodate peak parking demand throughout construction of the Power Station. The remaining workers would make use of the Park and Ride and shuttle buses. Car sharing would be strongly promoted to the workforce to minimise single-occupancy vehicles on the road network.

Road freight

1.6.139 No permanent plant component and Abnormal Indivisible Load (AIL) deliveries would be scheduled during SPC Works, though some earth moving equipment would be delivered in this time. The most significant deliveries would be fence items, and these are forecast to be as regular as two to three deliveries per day for the first six months. Deliveries would be via road and are most likely to be on flat bed wagons. Estimated daily (07:00 to 19:00 hours, Monday to Friday) traffic movements at peak periods would be 32 HGVs.

1.6.140 For the Main Construction works, it is intended that most bulk materials, as well as most AIL components, would be delivered through the MOLF. The intent is to maximise the number of deliveries by sea during construction towards a figure of around 80%. However, to allow for periods when conditions may prevent sea-based transport, a lower figure of 60% by sea and 40% by road has been adopted when assessing the effect on the road network.

1.6.141 The peak numbers of HGV deliveries to the Wylfa Newydd Development Area during the Main Construction phase have been estimated as follows:

- 3,500 per month;

- 160 per day; and
- 40 per hour.

1.6.142 HGVs would travel along the A5025 between the hours of 07:00 and 19:00, Monday to Friday.

Operation of the Power Station

1.6.143 This section provides a description of the operation of the Power Station, which would have a design life of approximately 60 years. Unit 1 is scheduled to commence operation seven years after grant of development consent and Unit 2, approximately two years later.

Power Station commissioning

1.6.144 There are four commissioning activities:

- construction testing;
- pre-operational testing;
- start-up testing; and
- commissioning testing of standby diesel generators.

Construction testing

1.6.145 Construction testing is the first commissioning activity carried out during the construction phase. This activity would involve a series of tests conducted on components of the Power Station. These are typically conducted using temporary power supplies and therefore do not rely on the performance of other plant systems.

1.6.146 During hydrostatic pressure test activities, small amounts of non-radioactive liquid wastes would be generated. Arrangements would be in place to minimise the amount of waste generation, to accord with the relevant Environmental Permit. Small amounts of non-radioactive gaseous waste may be generated from temporary diesel-driven electric generators, hydrostatic pressure test pumps or air compressors, but this would be minimised by use of temporary electrical power supplied to the Power Station Site from the National Grid. No gaseous, liquid or solid radioactive waste would be generated during this phase of commissioning.

Pre-operational testing

1.6.147 Pre-operational testing (also known as cold commissioning) is the second commissioning activity performed during the construction phase. Small amounts of non-radioactive gaseous, liquid and solid waste would be generated during the pre-operational testing phase, which would be subject to emission and discharge controls under an Environmental Permit. As the main station systems would be available, demineralised water would be processed and recycled by these systems as in normal operation. In the unlikely event of some equipment failure related to the condensate storage tank, suppression pool or condenser hotwell, it may be necessary to discharge

some water to support required plant testing. No gaseous, liquid or solid radioactive waste is expected to be generated during pre-operational testing.

1.6.148 The amount of water abstracted would be increased in stages, but would not exceed the maximum volumes for the Cooling Water and service water intakes. During this period, the discharge water would be approximately the same temperature as the abstracted water, i.e. ambient temperature.

Start-up testing

1.6.149 Start-up testing (also known as hot commissioning) is the final commissioning activity conducted during the commissioning phase of the Wylfa Newydd Project. Start-up testing involves testing of all the Power Station systems together (called integrated system operation).

1.6.150 The testing in this phase is conducted in a prescribed sequence to ensure that there is no reliance on system configurations which have not been previously tested and ensured functional. In this phase, the plant is operated by appropriately qualified Horizon personnel using normal station operating procedures and processes.

1.6.151 The start-up testing verifies that all safety functions, of both passive and active systems, work as designed and demonstrate that high power operation can be safely achieved. During this period, electricity is generated and exported to the National Grid and small amounts of radioactive and non-radioactive gaseous, liquid and solid wastes would be generated, all within acceptable limits. During this phase, the Cooling Water System would be in operation as heat is generated. Water would be abstracted up to the maximum permitted volumes for the Cooling Water and service water systems. During this period, warm water would be discharged from the outfall at temperatures up to 12°C above ambient.

1.6.152 The chemicals discharged during start-up testing would be similar or less than those used during the operational phase.

Commissioning testing of diesel generators

1.6.153 The commissioning (known as ‘Site Acceptance Testing’) would be undertaken to confirm that the generators have not been damaged during transit or during installation and the system operates as per the design specification.

1.6.154 The EDG and BBG Site Acceptance Testing would be carried out for up to 72 hours during the pre-operation commissioning period and would consist of individual testing of each standby generator. Each of the EDGs would be required to undergo a 24-hour test. As a worst case, this could require two of the EDGs to be operated simultaneously for a period of 24 hours with the remaining EDG undergoing a 24-hour run separately within the 72 hours. There would also be some limited in-combination testing of the EDGs and BBGs which could occur, in the worst case combination, for up to four hours.

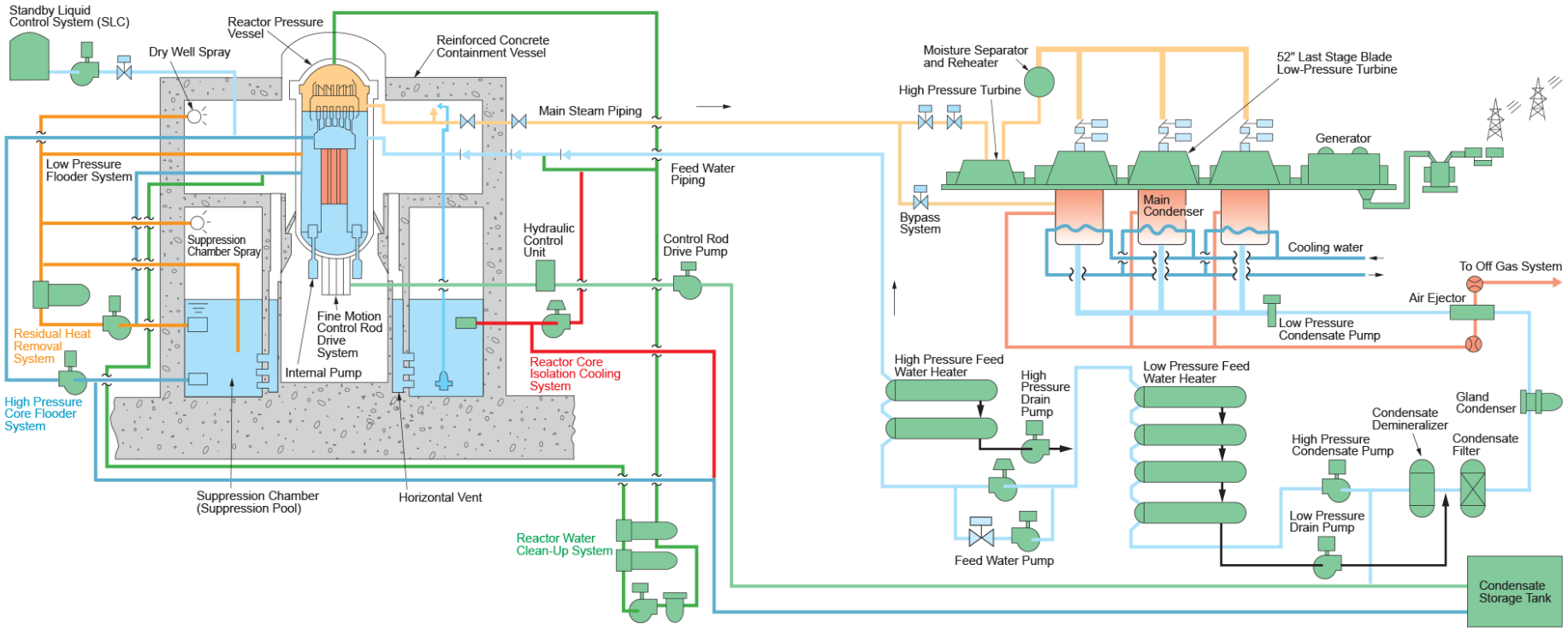
1.6.155 The ASGs would be commissioned at a different time from the EDGs and BBGs, as they would not be required for the combined commissioning run. ASG commissioning would involve each ASG being run separately for 24

hours followed by both ASGs running together for 24 hours each at 100% load (i.e. 72 hours in total).

Full operation of the Power Station

1.6.156 Horizon Nuclear Power Wylfa Limited is planning to construct and operate the Power Station on the island of Anglesey. Initially it was envisaged that the Power Station would have an installed capacity of 2.7GWe (2,700MWe), however, following an exercise to optimise design and efficiency aspects of design development of the Power Station, the output of the generating units has been improved. The increase in generating capacity has been achieved within the constraints of the assessment work undertaken within the ES. The Power Station will have two UK Advanced Boiling Water Reactors (ABWRs) with a nominal total gross generating capacity each of around 1550MWe. Electricity would be generated at the Power Station from heat energy produced by the two Units. Fission reactions within the reactor core generate heat boiling water to raise steam, which would then be utilised by power turbines to generate electricity. The expected nominal gross electrical generation capacity of the Power Station would be approximately 3,100 MWe, enough to power 5.5 million homes. Figure D1-11 shows a schematic of a typical ABWR.

Figure D1-11 Schematic of a typical ABWR



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1.6.157 Reactor power output can be controlled via two methods:

- controlling the flow of water through the reactor: water flow through the reactor core can be increased or decreased to control neutron moderation; or
- using neutron absorbing rods: these 'control rods' can be inserted into or withdrawn from the reactor core if more or less neutron absorption is needed to control reactor heat output.

1.6.158 The reactor pressure vessel is a very strong, high-integrity steel vessel that contains the reactor core, fuel, control rods, reactor internal pumps and other equipment. The reactor pressure vessel is housed in the reactor building.

1.6.159 The thermal energy of the steam generated within the nuclear reactor is then passed through the turbine where the energy is converted to rotational energy. The steam exhausts to a condenser, which is a vessel that sits beneath the steam turbine. To extract as much energy from the steam as possible for the electrical generation process, the steam pressure is reduced to below atmospheric pressure in the condenser. Thousands of tubes run through the condenser, through which cold seawater is pumped. As the steam touches the tubes, it condenses back to water, which is then pumped back to the reactor to again raise steam.

1.6.160 The Power Station would utilise once-through water cooling to cool the condenser, using seawater abstracted from the Irish Sea through the Cooling Water intake and pump house structures.

1.6.161 The turbine is connected to the rotor of the electrical generator so the rotational energy from the steam turbine is directly transferred to the generator rotor. The rotor is an electromagnet that is rotated inside copper coils. This in turn induces a voltage, resulting in an electric current that is exported to the National Grid. The Power Station would have one steam turbine and electrical generator per Unit.

1.6.162 A number of the main buildings (reactor building (building no. 101, zone 1A-1), control building (building no. 102, zone 1A-1), filter vent building (building no. 105, zone 1A-1), EDG buildings (building no. 110, zone 1A-1), back-up building (building no. 107, zone 1A-2), heat exchanger buildings (building no. 103, zone 1A-1)) would be constructed from a significant thickness of reinforced concrete. The reactor buildings would be built to withstand impact from aircraft. The control building would be built to indirectly withstand impact from aircraft.

1.6.163 The turbine building would be reinforced concrete below ground and steel frame above ground with radiation shielding local to the turbine. The radioactive waste building would also be steel frame above ground and reinforced concrete below ground. In addition, there would be thick, heavy doorsets to all entranceways that would not open during normal operation. These factors mean that any noise from equipment within these buildings would be inaudible at local receptors.

1.6.164 Other buildings to be constructed of steel frame or composite steel frame and concrete are:

- auxiliary standby generator building (building no. 256, zone 1C-1);
- auxiliary boiler building (building no. 218, zone 1B-1);
- makeup water treatment building (building no. 219, zone 1B); and
- Lower Activity Waste management facility (building no. 246, zone 1B).

1.6.165 The operation of the Power Station would involve various types of balanced rotating equipment such as Cooling Water pumps, steam turbines and diesel generators, which have the potential to be vibration sources. However, the majority of such equipment would be located within large concrete structures. Cooling Water pumps would be located underground within an open topped concrete structure, with the Cooling Water pump motor located above ground and not within an enclosure.

Fuel delivery

1.6.166 The largest shipment of new nuclear fuel would occur prior to first start-up of the reactors. Each Unit would have a maximum fuel capacity of 872 fuel assemblies. This translates to approximately 73 HGVs delivering new fuel to the Power Station Site over the initial fuelling period.

1.6.167 Fuel is transported in packages, containing two assemblies per package.

Refuelling and maintenance outages

1.6.168 The Power Station is planned to operate on an 18-month fuel cycle: 17 months at high power operation and one-month shutdown. Scheduled outages would be for approximately 30 days, during which some of the fuel assemblies would be replaced (approximately 224 assemblies per outage). The fuel cycles for the two Units planned at the Power Station would not run concurrently, meaning that planned outages would not be undertaken on both reactors at the same time. This means that one reactor would always be operational under normal operating conditions.

1.6.169 During these outages, maintenance on plant and equipment that cannot be maintained or tested while power is being generated (for example due to high radiation doses) would be undertaken.

1.6.170 Refuelling outages would typically last around one month with 24-hour working. Every 10 years, a longer outage would be performed to accommodate in-service inspection. This would involve a detailed inspection of plant components and equipment.

1.6.171 Fuel assemblies would be transported to the Power Station Site by road from whichever UK port of entry was deemed most appropriate. They would be transported to the Power Station Site, over a short period of time yet to be determined, in readiness for each refuelling outage. Therefore, it is not expected that fuel assemblies would be stored on the Power Station Site for a significant period before being installed. However, for initial fuel loading, fuel may arrive at site earlier than routine deliveries to support inspection of a full core of 872 assemblies. For routine deliveries, the fuel assemblies would be transported directly to the reactor building, inspected and loaded straight into

the fuel pool prior to loading into the core. Approximately 12 HGVs per Unit would be required over each outage.

1.6.172 On removal from the reactor, spent fuel would be stored in the spent fuel pool for around 10 years.

1.6.173 Neutron sources would be transported to the Power Station for initial reactor start-up only. Other sources would be used for the calibration and monitoring of various fuel route systems and processes. The strategy for the purchase and management of these items is currently under development, so the bounding assumption is one delivery per outage (every 18 months) per Unit for transporting these sources onto site.

Management of radioactive waste and spent fuel

1.6.174 Operation of the Power Station would result in the unavoidable generation of quantities of spent fuel and radioactive waste. This is a known and justifiable consequence of nuclear power generation. The UK regulatory permitting regime for nuclear power stations defines precise regulatory requirements and expectations for the management of this waste in a manner that:

- conforms to international, national and regional strategy, policy and guidance;
- complies with relevant UK legislative requirements;
- demonstrates that volumes and activity levels of the wastes produced have been minimised as far as reasonably practicable;
- demonstrates the application of relevant good practice;
- demonstrates the application of Best Available Techniques (BAT) to the generation, management and disposal of radioactive waste; and
- demonstrates that risks are reduced to As Low As Reasonably Practicable.

1.6.175 Horizon is developing strategies for management of the spent fuel and radioactive wastes that fully conform to UK legislation and to published policies, strategies and guidance. In general, the published material aligns to the UK categories of radioactive waste since they are classified in terms of the nature and quantity of radioactivity they contain and the heat they produce. Broadly, the waste is divided into HAW and LAW.

1.6.176 At present, there is no national disposal facility for HAW. A GDF is planned for the disposal of spent fuel and HAW, but this would not be available until 2040 at the earliest. Once available, there would be a phased transfer of packaged waste from existing sites before Horizon would be able to access this facility for disposal of HAW and spent fuel. There is therefore a requirement to manage HAW and spent fuel on-site in the interim.

1.6.177 Horizon strategy is to process radioactive wastes on an operational basis (as opposed to storing them until completion of operation, which has been the historic basis for UK nuclear power stations) and to convert them into a passively safe disposable form as early as is reasonably practicable. Where

appropriate, the strategy includes for periods of decay storage prior to processing where this is shown to be beneficial.

1.6.178 Horizon's would not classify spent fuel as radioactive waste at the point of its generation, but it is included in this consideration since there is currently no UK strategy to provide reprocessing capability. Horizon's strategy would be to classify spent fuel as radioactive waste only once a firm decision is made to dispose of it to the GDF.

1.6.179 Extensive facilities for the treatment and disposal of LAW currently exist in the UK and overseas, and there is a robust and mature National Waste Programme that oversees the provision of the required capabilities. The services for treatment and disposal are provided through a waste services contract administered by the LLWR operator, LLWR Ltd.

1.6.180 Horizon's strategy for the management of LAW is predicated on the national arrangement described above. LAW from the Power Station would be despatched off-site for treatment and disposal as soon as reasonably practicable after it was generated.

1.6.181 A key thread of national strategy is to ensure that LAW is suitably segregated at source to maximise the application of the waste hierarchy and thereby minimise the amounts of wastes that are sent for disposal. In this way, Horizon would contribute towards one of the key objectives of the National Waste Programme, which is to make the best use of existing national waste management assets, namely LLWR waste disposal capacity.

1.6.182 It is recognised that, in the planned timescales for construction, commissioning and operation of the Power Station, there may be technological developments in the field of radioactive waste processing and disposal that could improve on the current strategies. Horizon is therefore maintaining ongoing dialogue with the relevant stakeholders to ensure that proposed approaches remain demonstrably the BAT or could be adjusted to reflect the state of the art.

Control of radioactive discharges

Gaseous

1.6.183 Under normal operating conditions, and expected abnormal situations, there would be two systems for control, treatment and monitoring of aerial discharges: the off-gas system and the HVAC system.

1.6.184 Radioactive gas in the reactor steam circuit that is non-condensable would be vented via the off-gas system. The off-gas system minimises and controls the release of the entrained gaseous radioactive wastes to the atmosphere by providing for hold-up, and consequential decay of, radioactive gases, and monitoring of the residual discharges. This system would discharge via the main reactor stack (stack no. S5 and S6, zone 1A-1).

1.6.185 The key environmental function of the HVAC system is to limit the spread of radioactive materials from contaminated plant and equipment and to filter contaminated air prior to its discharge to atmosphere using high efficiency particulate air filters. The HVAC system would comprise a number of

independent sub-systems serving separate areas of the nuclear power plant, the majority of which would ultimately discharge via the main stack.

Liquids

1.6.186 The liquid effluent waste management system consists of the following three subsystems:

- Low Chemical Impurity Waste (LCW) treatment system;
- High Chemical Impurity Waste (HCW) treatment system; and
- Controlled Area Drain (CAD) system.

1.6.187 The LCW system is designed to allow the efficient treatment of relatively large volumes of waste water containing low levels of both insoluble and soluble impurities. Cartridge filters are used to remove the insoluble impurities (with back pulse cleaning of the filter membrane upon detection of a raised differential pressure). The filtered water is then passed through a mixed bed demineraliser packed with bead ion exchange resins to remove soluble impurities. Treated water is collected in a sample tank, where a representative sample of the water is analysed to confirm it meets the criteria for re-use in the reactor. If the treated water does not meet the appropriate criteria, it can be routed back to the LCW collection tank and the treatment process repeated (potentially multiple times) until the criteria are met. Once the treated water has been confirmed to meet the appropriate criteria it is sent to the condensate storage tank for re-use. If the liquid effluent cannot be cleaned by the LCW system, the waste could be transferred to the HCW collection tanks.

1.6.188 The HCW treatment system is designed to allow the efficient treatment of waste water containing high levels of both insoluble and soluble impurities. The waste water is first subjected to distillation. The distillate is collected in the HCW distilled water tank and then passes through a demineraliser (mixed bed demineraliser packed with a bead ion exchange resin) to remove any soluble contaminants that could potentially be carried over from the evaporator. Treated water is collected in a sample tank, where a representative sample of the water is analysed to confirm it meets the criteria for re-use in the reactor or fuel pool make-up water (or for discharge to the environment via the Cooling Water outfall). If the treated water does not meet the appropriate criteria, it could be routed back to the HCW collection tank and the treatment process repeated (potentially multiple times) until the criteria are met.

1.6.189 The CAD system collects the drains of the local air-conditioning systems, potentially contaminated drains from various equipment systems and waste water originating from the personnel showers and hand-washing facilities. The system is comprised of liquid waste collection tanks, collection pumps, piping, valves and measuring and control equipment. Liquid waste in the CAD system is not expected to be radioactive but could become contaminated. Effluents are collected in the CAD collection tanks and sampled. If the effluents meet the discharge criteria, they are discharged via the Cooling Water outfall. If effluents require further treatment prior to discharge to the environment, they are routed to the HCW treatment system.

Combustion plant and stacks

1.6.190 There would be five types of combustion plant at the Power Station Site, all of which would be diesel powered with their own stack. These are:

- six EDGs (stack no. S1, S2, S3, S4, S7, S8, zone 1A-1);
- four BBGs (stack no. S9, S10, S11, S12, zone 1A-2);
- two ASGs (shared stack, stack no. 13, zone 1C-1);
- six auxiliary boilers (two stacks, stack no. S14, S15, zone 1B-1); and
- a number of emergency mobile generators and smaller combustion plant on-site.

1.6.191 EDGs would be contained within concrete structures, and acoustic attenuation would be included in all air intake and exhaust systems. Cooling fans would be specified to ensure potential noise effects would be minimised. Wherever appropriate and practicable, air handling systems would be designed to reduce noise emissions (e.g. fitting with acoustic attenuators).

1.6.192 It is likely that the auxiliary boilers within the Power Station Site would generate a visible plume. Detailed plume dimensions are not known, but for assessment purposes, release height would be at 17m above ground level (3m above building ridge height). It is assumed that the width and height of the plume would be in the order of 5m to 10m with a length not exceeding 100m as a worst case. The plumes would not be permanent and would only occur on certain days or weather conditions.

Transformers

1.6.193 One of the key operational noise issues would be likely to be the operation of the generator transformers and auxiliary transformers. The electrical ratings for the transformers are:

- two generator transformers – each made up of three limbs at 530MVA each;
- four auxiliary normal transformers – each approximately 70MVA; and
- two auxiliary standby transformers – each approximately 110MVA.

1.6.194 Provision would be made in the design for the installation of noise enclosures to reduce the noise should the unenclosed commercially available transformers not meet the noise criteria upon which the assessment has been based. These criteria are detailed in chapter D6 (noise and vibration) (Application Reference Number: 6.4.6). These transformers would be provided with bunds, appropriate oil interceptors and leakage detection devices.

1.6.195 In addition, provision would be made for:

- eight (four per Unit) feedwater pumps variable speed drive transformers (each approximately 10MVA);
- six (three per Unit) class 1 feeder transformers (each approximately 9MVA); and

- eight (four per Unit) Reactor Internal Pump Motor Generator (RIP MG) set feeder transformers (each approximately 4MVA)

Fuels, oils and chemicals

1.6.196 As the design is developing, Horizon is developing an inventory of fuels, oils and chemicals which would be used during all stages of the plant lifecycle. At the current stage, the focus is on bulk chemicals which are defined as chemicals which are used in quantities greater than 200 litres per year, or where there is storage of greater than 200 litres. 'Chemical' refers to all oils, fuels, greases, paints, solvents, aerosols and gases.

1.6.197 An amount of up to 600m^3 of sodium hypochlorite, used for biocide dosing, could be stored on-site, delivered by tanker. However, current design development would allow for the on-site generation which would limit the amount stored on-site to less than 600m^3.

1.6.198 The closed-loop cooling systems would be dosed with a corrosion inhibitor, with the current assumption being that sodium nitrite azole would be used. The systems are designed with integral chemical addition tanks and the intention is to use commercially available products.

1.6.199 Ethylene glycol would be used as anti-freeze in various components. Packaged ethylene glycol would be held within stores, and then added to the equipment internal glycol tanks.

1.6.200 The cylinder storage house (building no. 208, zone 1M, 1A, 1L, 1K or 1C) would be located on the Power Station Site in order to store gases that would be used routinely in operational processes. These gases would be stored in suitably sized tanks or cylinders depending on the specific technical requirements and include the following:

- oxygen, which would be injected into the reactor feed water to prevent corrosion of the reactor components, as well as off-gas injection;
- hydrogen, which would be used as a fill gas for the main generator and would also be used for feed water injection;
- carbon dioxide, which would be used for purging pipework containing hydrogen prior to maintenance; and
- nitrogen, which would be used to provide an inert atmosphere inside the reactor secondary containment.

1.6.201 A large number of emergency vehicles and equipment would be required on-site and off-site to support emergency response and emergency reactor cooling capability.

Emergency Diesel Generators

1.6.202 The EDG buildings (building no. 110, zone 1A-1) contain two light oil storage tanks in the basement and the fuel day tank on the first floor. The day tank has capacity for eight hours' operation at rated power and the light oil tanks have capacity for eight days' operation at rated power (seven days to meet safety case requirements and an extra day of fuel to give sufficient headroom

to undertake 24-hour testing without comprising the minimum seven-day requirement).

1.6.203 The light oil tanks would contain approximately 225,000 litres of fuel each (a total of 450,000 litres). The fuel day tank would contain approximately 20,000 litres of fuel.

1.6.204 A lubricant oil system provides lubrication and cooling for the EDGs and also pre-lubricates and pre-warms the system to reduce starting time. The system consists of an engine-driven pump, cooler, oil supply tank, pre-heater, pre-heating pump and associated pipework, filters and valves.

1.6.205 The EDG lubricant oil supply tanks (one per EDG) would each contain 7,100 litres of oil. Each EDG would have its own dedicated supply tank.

Back-up Building Generators

1.6.206 The fuel oil system design consists of one fuel oil day tank for each BBG, both of which would be fed from a single common light oil tank, and all associated pipework, valves, filters and pumps.

1.6.207 The day tanks have capacity for eight hours' operation at rated power and the light oil tank has capacity for eight days' operation of one BBG at rated power (seven days to meet safety case requirements and an extra day of fuel to give sufficient headroom to undertake four-hour testing without comprising the minimum seven-day requirement). The fuel oil day tanks would be located in separate rooms on the first floor of the back-up building. The light oil tanks would be situated externally to the east of the back-up building.

1.6.208 Based on a fuel consumption of 1,000 litres/hour, each day tank would hold approximately 8,000 litres of fuel, and the common light oil tank would contain approximately 170,000 litres.

1.6.209 The lubricant oil system consists of an engine-driven pump, cooler, oil supply tank, pre-heater, pre-heating pump and associated pipework, filters and valves. The lubricant oil supply tanks (one for each BBG) would each contain 7,100 litres of oil.

Auxiliary Standby Generators

1.6.210 Each generator would have dedicated bulk fuel storage and delivery system. This would consist of a bulk fuel storage tank located within the auxiliary standby generator building to provide fuel for up to eight days if necessary. This would be supplemented by a day tank at the engine location with eight hours' storage. The bulk fuel storage would be 240,000 litre capacity.

Containment

1.6.211 To minimise the risk of spills and leaks from fuels, oils and chemicals stored and used at the Power Station Site, good practice measures would be incorporated. These are detailed in the Wylfa Newydd Code of Operational Practice (Application Reference Number: 8.13).

Management of conventional wastes

1.6.212 All waste generated during the operation of the Power Station would be managed in accordance with the implementation of waste and materials management arrangements set out in the Wylfa Newydd CoCP (Application Reference Number: 8.6) and the Wylfa Newydd Code of Operational Practice (Application Reference Number: 8.13), which provide the approach to waste and materials management across the lifetime of the Wylfa Newydd Project.

1.6.213 All conventional wastes generated at the Power Station Site would be handled at the waste and recycling facilities (conventional and hazardous waste building and conventional waste storage compound) (building no. 222, zone 1B), which is designed solely for the storage, treatment and collection of wastes.

1.6.214 The waste and recycling facilities would be secure and consist of areas for dealing with different types of waste. They would include facilities for breaking down wastes into separate parts so that they could be segregated prior to disposal.

1.6.215 The waste and recycling facilities have been designed to be compliant with Natural Resources Wales' Environmental Permits and waste exemptions. The facilities would have sealed drainage, and hazardous waste would be suitably contained to prevent any spillages entering the drainage system. The design of the facility has been future-proofed to accommodate increasing levels of segregation, re-use and recycling.

Routine testing of generators

1.6.216 Routine maintenance and testing of each ASG and BBG would be conducted at set intervals in accordance with a defined maintenance and testing programme. Test runs would be conducted routinely to prove operation and also following the completion of routine maintenance to confirm there are no defects. It is anticipated that this would consist of:

- a four-hour test run per month; and
- a six-hour test after preventative maintenance, immediately followed by four hours of short-duration (consecutive) maintenance, undertaken during each planned reactor refuelling outage (i.e., once every 18 months).

1.6.217 The generators would be tested individually and no two Units would be tested within the same day.

1.6.218 It is proposed to undertake the routine testing described above during daylight hours. However, there is the possibility that, in exceptional circumstances, testing could be required at night.

Routine testing of cooling towers

1.6.219 Routine maintenance and testing of each of the banks of cooling towers would be conducted at set intervals in accordance with a defined maintenance and testing programme. Test runs would be conducted routinely to prove

operation and also following the completion of routine maintenance to confirm there are no defects.

1.6.220 It is expected that each bank of cooling towers would be tested once per month, and this testing would occur during the daytime.

Non-radioactive emissions

Gaseous

1.6.221 A set of proposed emissions limits (mg/Nm^3), are presented in table D1-8 below.

Table D1-8 Standby AC generation plant emissions

Stacks	NOx (as NO_2)	SO_2	Particulates	CO
EDG	1,900	0.5	65	150
BBG	1,900	0.5	65	150
ASG	1,600	0.5	55	150
House boilers (25 tonnes per hour (tph))	200	1.6	10	30
House boilers (3 tph)	200	1.6	15	150

1.6.222 The arrangements for monitoring emissions to air from the combustion plant is being developed by Horizon. It is currently proposed that each Unit's standby generation plant is monitored during the 10-hour runs due to be carried out at 18-month intervals.

1.6.223 Emissions from the four 25tph boilers would be monitored for NOx, particulates and CO every six months. SO_2 would be calculated based on hours of operation, the fuel supply rate and sulphur content of the fuel.

1.6.224 Emissions from the two 3tph boilers would be monitored once every three yearly for NOx and CO.

Liquid

1.6.225 There would be a variety of conventional (non-radioactive) liquid discharges, predominantly related to water use on, and drainage from, the Power Station.

1.6.226 Table D1-9 identifies the discharge location(s), sources and emissions that are within the proposed boundary for the Water Discharge Activity Environmental Permit. With the exception of the effluent from human welfare activities (foul drainage), the uncontaminated surface water runoff (arising from outside the inner security fence) and the discharge from the fish recovery and return system, all discharges of liquid effluent to the environment from the Power Station would occur via the seal pit in each Unit.

Table D1-9 Summary of the discharge location(s), sources and emissions of liquid effluents for the Power Station

System from which the discharge arises	Source	Discharged to	Location
Circulating Water System	Sea water	Sea	Cooling Water outfall
Auxiliary Service Water System	Sea water	Sea	Cooling Water outfall
Fish recovery and return system	Sea water	Sea	Open sea, north of eastern breakwater
Cooling towers	Potable water	Sea	Cooling Water outfall
Process effluents except Make-Up Water Treatment Plant	Demineralised water	Sea	Cooling Water outfall
Control Area Drain	Demineralised water	Sea	Cooling Water outfall
Service water storm drain	Sea water	Sea	Cooling Water outfall
Non-radioactive storm drain	Demineralised water	Sea	Cooling Water outfall
Surface water	Rainwater	Sea	Cooling Water outfall and surface watercourse outfall(s)
Foul drainage	Potable water	DCWW water treatment works	Existing DCWW wastewater treatment works at Wylfa Head.

1.6.227 As a general strategy, discharge monitoring for all conventional liquid effluents would be undertaken upstream of the point at which each effluent discharges into the seal pit (either within the building in which the effluent to be discharged arises, or between that building and the seal pit).

1.6.228 Details of the discharge monitoring to be undertaken (including the specific monitoring location(s)) is to be confirmed. The operator would use best available measures to avoid the presence of visible hydrocarbons in the non-radioactive storm drain and service water storm drain systems. Hydrocarbons are not expected to be present in effluents entering the non-radioactive storm drain and service water storm drain systems, and therefore the measures implemented are precautionary measures.

Operational workforce

1.6.229 It is anticipated that the operational workforce would comprise approximately 850 permanent staff on-site during normal operation, comprising approximately:

- 210 x operations staff;
- 210 x engineering staff;
- 210 x maintenance staff;
- 70 x business support staff;
- 90 x technical support staff; and
- 60 x training staff.

1.6.230 During planned outage periods, up to an additional 1,000 temporary workers would be required to carry out routine maintenance.

Decommissioning of the Power Station

1.6.231 At the end of the 60-year operating stage, the Wylfa Newydd Power Station would be decommissioned. The decommissioning of a nuclear power station is subject to international and national guidance and regulation. No single guidance document prescribes a set process. However, there is a consensus that decommissioning should be undertaken as early as possible, supported by a requirement for planned delays or deferral periods to be robustly justified.

1.6.232 Before decommissioning starts, Horizon would need to obtain consent from the Office for Nuclear Regulation and undertake a separate EIA under the Nuclear Reactors (Environmental Impact Assessment for Decommissioning) Regulations 1999. This would require a period of consultation relating to the submission of a decommissioning proposal and supporting Environmental Statement. Horizon expects that this process would begin in the final few years prior to generation ceasing, so that the specific environmental characteristics of the environmental baseline could be fully evaluated and understood.

1.6.233 Horizon is taking the following criteria into account during the design refinement for the Power Station as a means of facilitating the future decommissioning stage.

- Careful selection of materials to minimise the potential of them becoming radioactive through activation. The measures adopted at the design phase concerning the choice of materials principally include elimination of cobalt wherever possible and by replacing materials with a high cobalt content with alloys with a low content of cobalt. Cobalt is significant as it is activated during operation and then undergoes radioactive decay.
- The use of containment structures (barriers and filters) that minimise contamination of equipment.
- Tank and pipework design that minimise transport and deposition of contamination.

- Using surface materials that are easy to clean.
- Using modular plant components that are easy to disassemble and allowing sufficient handling or lifting equipment and access routes to reduce decommissioning time and dose to workers.

1.6.234 Horizon has developed a strategy for the decommissioning of the Power Station. This proposes prompt starting of decommissioning with a target timeframe for completion of main decommissioning activities of 20 years following the end of power generation, which would be consistent with traditional de-construction/demolition works.

1.6.235 The decommissioning strategy assumes that spent fuel and ILW would be transferred to the UK Government's planned GDF to accord with relevant current government guidance. Consequently, these storage facilities would remain *in situ* and independently operational beyond the completion of the main decommissioning activities, until such time as the waste streams could be safely packaged and transferred to the GDF. The overall timeframe for spent fuel to remain in the storage facilities would depend on the availability of the GDF and the amount of time needed to allow the spent fuel to have cooled sufficiently to allow disposal. At present, this is conservatively estimated at 140 years after the end of power generation, but may in reality prove to be considerably shorter than this.

1.6.236 Decommissioning activities would include the following.

- The shutdown of reactors and the reduction and eventual cessation of abstraction and discharge of Cooling Water.
- The removal of structures including the intake, outfall and MOLF, but not the breakwaters. The landscaped mounds, including pasture and planting, would remain *in situ* and the landscape drainage system would remain in place.

1.6.237 The details of decommissioning are not known at this time. To facilitate the assessment, a number of assumptions have been made, as described below.

- Both reactors would be decommissioned simultaneously.
- The pumps required to abstract Cooling Water would continue for a period of 100 days after cessation of generation.
- There would be some residue abstraction and discharges during the decommissioning period.
- All plant and equipment would be removed prior to demolition, and all structures down to 1m below ground level would be removed.
- Hardstanding areas would be removed (except those associated with the ILW and spent fuels store, which would remain until those facilities were removed).
- All drainage systems, pipes and ducting located less than 1m below finished ground level would be removed and disposed of via a licenced process. Any uncontaminated drainage, pipework or ducting located

greater than 1m below finished ground level would be flushed out and then grouted up.

- Civil structures greater than 1m depth would be left *in situ* and punctured to allow drainage; all voids below 1m would be backfilled or grout filled, including the discharge water channel and the discharge water tunnels.
- The Power Station Site would be landscaped and restored to an 'equivalent' land use and ecological condition to that prior to construction as far as possible.
- Landscaped areas outside of the Power Station Site, including landscaped mounding and associated pasture and planting, would be retained, with no removal of topsoil, or major earthworks.
- The removal of structures would be carried out using similar equipment as for construction.

1.6.238 During decommissioning, it has been assumed that lighting would be provided in conjunction with the following:

- perimeter security fence;
- dismantling of Power Station buildings and ancillary infrastructure; and
- lighting of tower cranes.

1.6.239 The number of staff employed at the Power Station Site during decommissioning is currently unknown; however, it is expected to be lower than the operation workforce of 850. For assessment purposes, it is assumed that at the start of decommissioning up to 850 staff are employed on-site. Horizon currently estimates that there would be a range of conventional wastes and materials generated through the decommissioning process. These would be segregated and stored ready for final treatment and/or disposal at the dedicated handling facilities. All wastes would be sent off-site for recycling or disposal as appropriate. It is anticipated that concrete type material would remain on-site and would be re-used for backfill during the decommissioning phase.

1.7 Marine Works

1.7.1 This section provides a description of the Marine Works and its construction and operation.

1.7.2 The Marine Works consist of temporary structures required for the construction of the marine facilities and the permanent structures required for the construction and operation of the Power Station. The Temporary and Permanent Marine Works are illustrated in figure D1-12 (Application Reference Number: 6.4.101). Table D1-10 provides the parameters (dimensions and heights) of structures, dredge depths and volumes, used for assessment purposes in the EIA. For further information on the application of these parameters, see section 1.3. Information on the construction methods are presented in appendix D1-1 (Application Reference Number: 6.4.17).

Permanent Marine Works Cooling Water System

1.7.3 The Cooling Water System is comprised of three individual components, all of which share a common intake structure:

- circulating water system;
- reactor building service water system; and
- turbine building service water system.

1.7.4 The circulating water would be used primarily to condense the steam leaving the steam turbine as well as the reactor. The Cooling Water System incorporates the following.

- Cooling water intake structure and pump house (to draw Cooling Water in from the sea), including screening and fish recovery and return systems.
- Circulating water system pipes from the intake structure and pump house to the turbine buildings, which would be routed underground – there would be a set of these for each Unit.
- Reactor building service water system/turbine building service water system pipes from the intake structure to the heat exchanger building where both the pumps and heat exchangers are located.
- Seal pits (required for the hydraulic system design and mixing), one for each Unit where the Cooling Water would be returned after cooling prior to discharge back to the sea.
- Outfall tunnels, to transfer Cooling Water from the seal pits to the outfall structure. These structures would be buried – there would be a set of these for each Unit.
- Cooling Water outfall (to return Cooling Water to the Irish Sea).

1.7.5 Horizon has elected for a once-through circulating water system, using seawater abstracted from the Irish Sea.

1.7.6 The closed-loop reactor building service water system and the turbine building service water system would use heat exchangers to remove heat from a number of plant operational and safety critical systems.

Cooling Water intake

1.7.7 The Cooling Water System requires the construction of an intake channel (zone 1F-1) and forebay structure with screening, acoustic fish deterrents and a skimmer wall. The Cooling Water intake would be located in the south-east corner of Porth-y-pistyll.

1.7.8 The Cooling Water intake forebay would be situated within the Cooling Water intake channel. It would comprise coarse raked bar screens and a concrete lined water pit. The raked bar screens would collect organic debris (e.g. seaweed) and other floating debris. The water pit would collect deposited sediment and other sunken debris. The coarse raked bars are located in front of fine mesh drum screens (for the main Cooling Water intake) and band

screens (for the service water intake). The proposed fine mesh screen size is 5mm.

Cooling Water System outfall

1.7.9 A Cooling Water outfall facility (building no. 416, zone 1H-1) would be constructed in Porth Wnal adjacent to the Existing Power Station outfall within the boundary of the Porth Wnal Dolerite Regionally Important Geological/Geodiversity Site (see chapter D7, Application Reference Number: 6.4.7, for details of this site). The Cooling Water outfall would take the form of a reinforced concrete open spillway channel sloping down from two tunnel outlets.

1.7.10 The cofferdam (zone 1H) required for the construction of the Cooling Water outfall would, avoid as far as practicable, the key features of the Porth Wnal Dolerite Regionally Important Geological/Geodiversity Sites. In particular, impacts on the exposed dolerite dyke located to the north of the Existing Power Station's cooling water outfall would be reduced as far as practicable.

1.7.11 The Cooling Water outfall would be fed by two discharge tunnels (one tunnel per Unit) which would be approximately 1.1km in length from their respective seal pits (building no. 413, zone 1A) to their outlets into the Irish Sea. Seal pits are required for the hydraulic system design and mixing within the Cooling Water System prior to pumping to sea.

1.7.12 The Cooling Water outfall has been designed to maximise the momentum of the discharge, to help propel the thermal plume, promote mixing and dispersal of associated biocide products to the north of Wylfa Head where the offshore currents would aid decay and dispersion, and reduce the risk of recirculation.

Marine Off-Loading Facility (MOLF) (zone 1F-7)

1.7.13 The MOLF would provide two purpose-built quays (see figure D1-12; Application Reference Number: 6.4.101):

- a bulk quay (with two berths); and
- a Roll-on Roll-off (Ro-Ro) quay.

1.7.14 The MOLFs use would offset the need for the delivery of a considerable quantity of construction materials by road and, therefore, would reduce the volume of road traffic.

1.7.15 The bulk quay would extend between the eastern breakwater and the Ro-Ro quay and comprise two berthing platforms, each with four mooring dolphins (i.e., eight in total). The area between the two platforms would be either a revetment or a continuous quay wall, and for the purposes of modelling and assessment, a revetment has been assumed. The bulk quay would provide berthing facilities for bulk vessels and unloading facilities for bulk materials. The area behind the platforms and dolphins would be filled to a platform level of between +5mAOD or +6mAOD, and would be protected by a rock armour revetment.

1.7.16 The Ro-Ro quay would extend eastwards from the southern end of the bulk quay (i.e., towards the shoreline) and comprise a quayside used primarily for

Ro-Ro vessels and Lift-on Lift-off (Lo-Lo) vessels, incorporating a ramp for ship-to-shore transfer of AILs and Lo-Lo of equipment and materials by cranes. Its quay wall would be approximately 100m in length and its quay surface would be set at a platform level of between +5mAOD or +6mAOD. The quay wall for the Ro-Ro ramp would be set at the same level as the bulk berth quay surface level, with the toe of the sloping ramp used to receive AILs being at approximately +3.5mAOD, thereby providing a shallow gradient up to the general quay level. The quay wall would continue towards the Cooling Water intake, and the base of the wall would match the level required for the Cooling Water intake.

Layby berth (zone 1F-9)

1.7.17 In addition to the bulk and Ro-Ro quays, the marine facilities would also include a temporary layby berth that vessels could be moored against for short-term waiting until the destination bulk or Ro-Ro berth is available. The berth would be located at the southern end of the western breakwater and consist of a series of berthing and mooring dolphin structures. The berth is remote from the land and would be accessed by small boats.

Pontoon (zone 1F-8)

1.7.18 A pontoon would also be required for mooring tugboats, pilot vessels, safety boats and other small workboats during the construction of the Power Station. It would be a floating structure located between the Ro-Ro berth and the Cooling Water intake structure.

Breakwaters

1.7.19 There would be two breakwaters extending out into Porth-y-pistyll that would provide protection and create acceptable wave conditions for operation of the Cooling Water intake equipment, hereafter referred to as the western breakwater (zone 1F-4) and the eastern breakwater (zone 1F-5). The breakwaters would also provide sheltered conditions for vessels accessing and berthing at the MOLF.

1.7.20 Construction of the breakwater structures, in principle, introduces permanent new hard surfaces, which could potentially have the capacity to function as an artificial rocky reef, providing a new colonisation surface for species dependent on hard substrate. The development of habitats and species on the breakwater structures could also potentially provide habitat, food and refuge resources for seabirds. They also provide intertidal areas for grey seals to haul out.

1.7.21 The western breakwater would not be connected to the shore. From its landward end, it would be aligned approximately south-west to north-east and then kinked approximately south to north. The eastern breakwater would be connected to the shore. From its landward end, it would be aligned approximately south-east to north-west.

1.7.22 The breakwaters' dimensions are identified in table D1-10.

Shore protection (zone 1F-5)

1.7.23 Adequate shore protection would be provided where dredging or excavation could lead to shore erosion and/or unacceptable wave overtopping discharges. Locations for shore protection would include:

- between the eastern breakwater and the shoreline (approximately 80m in length); and
- between the two bulk quay platforms and between the southern platform (berth two) and the Ro-Ro quay (approximately 150m in total).

1.7.24 Shore protection would take the form of rock revetments or seawalls and would be tied in with the adjacent structures (e.g. breakwaters and quay walls). The toe of the shore protection would be below Mean Low Water Springs at the dredged seabed depth, which would be approximately -10mAOD. Where there is no requirement to dredge in front of the area of shore protection, the revetment/sea wall would tie in with the existing seabed level.

Drainage outfalls

1.7.25 There would be a number of surface water discharges direct to the marine environment during construction and during operation of the Power Station. Construction surface water drainage would discharge, following treatment, at two locations into Porth-y-Pistyll. In addition, the cofferdam structures would be drained of both surface water and ingress via a pumped discharge, following treatment, at the centre of the cofferdam. The cofferdam drainage would operate during the period required for construction.

1.7.26 The construction surface water would discharge through a headwall structure with an appropriate valve or gate to minimise seawater intrusion when the outfall is submerged

Fish recovery and return system and fish deterrent

1.7.27 The proposed measures to reduce the entrapment of marine organisms into the Cooling Water System are described below.

- The Cooling Water intake velocity would be designed to not exceed 0.3m/s in front of the intake opening at lowest astronomical tide, which is 3.6m below Ordnance Datum. This has been designed so as to minimise localised erosion and scour as far as practicable inside the inner harbour area.
- Screening in the form of coarse raked bars located in front of fine mesh drum screens (for the main Cooling Water intake) and band screens (for the service water intake). The proposed fine mesh screen size is 5mm. It is likely there would be a minimum of four main screens at the Cooling Water intake and two service water screens per Unit; this would incorporate redundancy to allow maintenance and biocide treatment of screens and adequate and effective fish handling capacity.

- Provision of an acoustic fish deterrent in front of the Cooling Water intake, which would be designed in line with the BAT. The sound field would be located in the most appropriate location within the intake entrance; it would be specified to allow redundancy in the system and would be supported by modelling to demonstrate a uniform sound field. It would also be designed to avoid effects on marine mammals.
- Provision of an effective fish recovery and return system designed in line with the BAT that would remove fish impinged on all screens and return them to sea. The preferred option is for a tunnel discharging into Porth-y-pistyll, and the preferred position for the discharge point is below lowest astronomical tide at the north-eastern end of the eastern breakwater.
- To control biofouling, treatment of the Cooling Water System would be required. Sodium hypochlorite would be used for this purpose. The biocide dosing regime would be designed to reduce biofouling risk. For assessment purposes, it is assumed that the water source for any on-site generation of hypochlorite is sea water, that water balance is not affected and the abstraction point is downstream of the fine mesh screens.

1.7.28 The temperature of the Cooling Water discharge water would vary with the tide. The larger the volume of abstracted water, the lower the temperature would be at the point of discharge.

1.7.29 The Cooling Water outfall has been designed to maximise the momentum of the discharge, to help propel the thermal plume, promote mixing and dispersal of associated biocide products to the north of Wylfa Head where the offshore currents would aid decay and dispersion, and reduce the risk of recirculation.

1.7.30 The management of the intake and outfall flows includes a number of features consistent with reducing erosion and deposition and effects on coastal geomorphology.

1.7.31 The Cooling Water abstraction and associated discharge could vary during the lifetime of the Power Station, as a result of different operational modes, resulting in variation of the discharge flow and temperature. During routine operation, the Power Station would be in one of two modes: limit frequency sensitive mode (which is the default operating mode) and frequency sensitive mode (which is only activated once instructed by National Grid). In the event of a Grid system frequency excursion, the turbine steam bypass system may be opened which may lead to variation of the discharge flow and temperature.

1.7.32 The ultimate heat sink is the Irish Sea using this once-through cooling system. Should this system become impaired, a cooling tower facility, based on forced draft wet cell cooling towers, would be called into service. There would be no additional discharge from this facility into the marine environment.

1.7.33 The service water intakes would be independent from the main Cooling Water intake, but they have a common discharge.

Aids to navigation

1.7.34 Aids to navigation would be installed to provide safe navigation for vessels during both construction and operation. During the MOLF construction phase, up to three special marks with yellow lights would be placed at intervals along the north-west of the bay such that they create a safety zone but do not present a navigational hazard for approaching construction vessels. Subject to agreement with the Maritime and Coastguard Agency and Trinity House Lighthouse Service, the aids to navigation for the operational phase would include a set of leading marks with lights to guide vessels between the breakwaters, and marks and lights for breakwaters, the bulk and Ro-Ro berths and the Cooling Water System intake. The aids to navigation would be in accordance with the International Association of Lighthouse Authorities' buoyage system.

Table D1-10 Parameters for Marine Works

Breakwater	Parameter zone	Maximum parameter			Minimum parameter		
		Crest length (m)	Width (m)	Crest height at roundhead (mAOD)	Crest length (m)	Width (m)	Crest height at roundhead (mAOD)
Western	1F-4	402	130	14	398	-	10
Eastern and shore protection	1F-5	240	100	13	150	-	9

Dredging	Parameter zone	Maximum parameter	Maximum parameter
		Dredge depth (mAOD)	Dredged volume (m^3)
Intake channel	1F-1	-11	-
Berthing pockets	1F-6	-13	-
Superficial deposits	1E-1, 1E-2, 1E-3	-	220,000[1]

Marine Off-Loading Facilities and associated structures	Parameter zone	Maximum parameter			Minimum parameter		
		Length (m)	Width (m)	Height (m)	Length (m)	Width (m)	Height (m)
Bulk MOLF	1F-7	To extents of zone 1F-7		6	-	-	5
Land reclamation	1F-7	To extents of zone 1F-7		6	-	-	5
Mooring dolphins	1F-7	6	6	6	2	2	5

[1] The dredged volume represents an in-situ value.

Marine Off-Loading Facilities and associated structures	Parameter zone	Maximum parameter			Minimum parameter		
		Length (m)	Width (m)	Height (m)	Length (m)	Width (m)	Height (m)
Ro-Ro MOLF quay	1F-7	To extents of zone 1F-7		6	-	-	5
Lay-by berth	1F-9	To extents of zone 1F-9		6	-	-	5
Temporary pontoon	1F-8	To extents of zone 1F-8			-	-	

Temporary structures	Parameter zone	Maximum parameter			Minimum parameter		
		Length (m)	Width (m)	Height (mAOD)	Length (m)	Width (m)	Height (mAOD)
Bund cofferdam	1F-2	To extents of zone 1F-2		10	-	-	-
Temporary barge berth	1F-3	To extents of zone 1F-3		6	-	-	3
Intake cofferdam	1G	260	30	10	-	-	-
Outfall cofferdam	1H	240	85	10	-	-	-
Temporary access ramp	1E-4	200	20	-	-	-	-

Construction of the marine facilities

Plant and equipment

1.7.35 To excavate and construct the marine facilities the following plant are required in addition to conventional site plant:

- jack up platforms;
- a variety of cranes;
- barges for the transportation of material;
- drilling rigs;
- dredgers;
- rock breaker;
- rock cutter; and
- work boats and safety boats.

1.7.36 There would be a number of small vessels required to transfer workers from land onto marine plant during the construction and operation of the MOLF. These vessels would primarily operate within Porth-y-pistyll and would be subject to strict controls including appropriate speed restrictions.

1.7.37 It is expected that the MOLF would operate on a 24-hour basis, 365 days of the year, used by bulk Lo-Lo and Ro-Ro vessels. Typically, the bulk vessels would take the form of approximately 8,000 deadweight tonnage aggregate bulk carriers, plus up to approximately 5,000 deadweight tonnage cement bulk carriers and approximately 1,500 deadweight tonnage general cargo/Lo-Lo ships (for plant, equipment, rebar, AILs and cement in tanktainers). Typically, the Ro-Ro vessels would take the form of barges, sized to suit the dimensions of the individual AILs.

1.7.38 The peak number of vessels is still to be determined but would be likely to be between 103 and 122 over a three-month period, which equates to approximately 1.3 vessels per day.

1.7.39 At the bulk quay, a range of bulk materials handling and conveyance equipment would be installed, including a mobile harbour crane on each berth, height adjustable receiving hoppers, mechanical conveyors for aggregate transport, and pneumatic pumps and pipelines for cement transport.

1.7.40 Lighting levels would be required to be as uniform as possible, thereby offering an even field of view and the elimination of unnecessary bright spots. The effect of glare is of particular importance for the moving of vehicular and trailer-mounted cargo within the area together with the effect on the approach to the MOLF from the Power Station Site. Lighting levels would vary based on the construction activity with maximum levels of 200lux associated with dredging operations. Land-based operations would have light levels between 2lux and 120lux.

1.7.41 Dolphin walkway lighting would typically consist of low-level luminaires mounted in walkway hand-railing. The mobile harbour cranes located on each platform would feature on-board lighting for the purpose of providing specific

supplementary lighting, task lighting and, for operational purposes, to supplement the berth platform vulnerable areas (i.e. remove shadows created when the crane moves on the platform).

Temporary access ramp construction (zone 1E-4)

1.7.42 As one of the initial marine construction activities, a temporary access ramp would be constructed at the southern end of Porth-y-pistyll. The ramp would take the form of a slipway and would be used to import the large-scale construction plant, using specialist landing craft or shallow draft barges, required for the site establishment and levelling and deep excavations (e.g. 100 tonne dump trucks).

1.7.43 Once built, it is anticipated that the ramp would remain in place for a limited period of time (up to one year). It would then be dismantled and removed having served its purpose. The resulting materials would be re-used on-site or off-site (e.g. as aggregate) in accordance with the Contaminated Land: Applications in Real Environments (CL:AIRE) *The Definition of Waste: Development Industry Code of Practice* [RD1].

Temporary barge berth (zone 1F-3)

1.7.44 A temporary berthing and unloading facility would be required to accommodate barges importing construction materials for subsequent Marine Works (e.g., quay wall materials for the MOLF).

1.7.45 The berth would be located to the south of (and adjacent to) the planned site of the eastern breakwater within the area of reclaimed land. Its structure would comprise a modular retaining wall constructed using either steel shipping containers filled with crushed rock or other suitable fill, or another suitable modular type retaining wall structure. An area behind the retaining wall would be backfilled to create a working platform for a mobile tracked/crawler crane behind the retaining wall. An area in front of the retaining wall would be filled and levelled with rock to create a platform onto which barges could be grounded as the tidal level falls. An access ramp would be provided from the quay level down to the beach in front of the quay to facilitate plant access for maintenance of the platform.

1.7.46 Once the MOLF is part-constructed, the temporary barge berth would no longer be required, and it would be left *in situ* and built over.

Construction of the temporary cofferdam and causeway (zone 1F-2)

1.7.47 The temporary cofferdam, approximately 350m long, and a causeway, approximately 400m long, would be required to create a watertight seal, inside which the inner harbour would be dewatered and excavated in the dry. The temporary causeway would also be used to create a haul road between the land and the southern end of the western breakwater to facilitate construction.

1.7.48 Construction of the temporary cofferdam and causeway (including sheet piling) is expected to take approximately eight months. Once fully dewatered, the cofferdam should be sufficient to maintain dry conditions within the basin

with continuous use of dewatering pumps to compensate for water inflow into the basin, for example, through or under the cofferdams, through the ground or by precipitation.

Cofferdam dewatering

1.7.49 Dewatering comprises seawater (from the temporary cofferdams in Porth-y-pistyll (temporary inner harbour cofferdam and temporary intake cofferdam) and Porth Wnal (temporary outfall cofferdam)). The locations of these cofferdams are presented on figure D1-12 (Application Reference Number: 6.4.101).

1.7.50 Dewatering in the marine environment would be required at the outfall and intake cofferdams and for the inner harbour cofferdam in Porth-y-pistyll. Water would be pumped over the side of the cofferdams into the sea.

1.7.51 The dewatering component of the inner harbour cofferdam would comprise rainfall, groundwater seepage and marine water seepage.

1.7.52 Suspended solid concentrations of the marine dewatering components (with the exception of the initial dewatering of the inner harbour) would be limited to the concentrations proposed in the construction Environmental Permit (70mg/l during normal rainfall events), with discharges direct to the marine environment.

Removal of the temporary works (temporary cofferdam and causeway) (zone 1F-2)

1.7.53 On completion of the works in the inner harbour, the temporary cofferdam and the southern causeway would need to be removed. This is expected to extend over a period of 12 months. The temporary structures would be removed in reverse of the installation method. All materials would be re-used or disposed of on land in accordance with the Contaminated Land: Applications in Real Environments (CL:AIRE) *The Definition of Waste: Development Industry Code of Practice* [RD1].

Dredging and excavation

1.7.54 Superficial soft sediments would be dredged from the outer harbour to provide a solid foundation for the breakwaters and MOLF, and to ready the area for dredging of rock which is also required to create sufficient depth for the intake channel and inner harbour.

1.7.55 The target dredge depth is -10mAOD with a maximum parameter of -11mAOD at the intake channel and -13mAOD at the berthing pockets.

Re-use and disposal of dredged material

1.7.56 Dredged superficial soft sediment (mainly sands and gravels) would be disposed of to the licenced disposal site at Holyhead North (referred to as the ‘Disposal Site’), which is located approximately 18km west of the Wylfa Newydd Development Area.

1.7.57 Dredged rock arising from the works would be re-used to construct the marine facilities (e.g. for core material in the breakwaters), where practicable, and any excess rock would be disposed of to the Disposal Site.

1.7.58 The volume for material that could require Deep Disposal at sea is approximately 610,000m^3. This would comprise approximately 368,000m^3 of bulked rock material and 242,000m^3 of bulked soft sediment.

1.7.59 Any rock material would be deposited within a micro-sited area of the Disposal Site representing approximately 0.4km^2. This would restrict the footprint of rock disposal on the seabed.

1.7.60 Where possible, capital dredged sedimentary material would be deposited within the middle of the Disposal Site, thus constraining the effects of sediment dispersion, as much as possible, to within the Disposal Site boundary. Further information on the physical characteristics of the Disposal Site are contained in chapter D12 (coastal processes and coastal geomorphology) (Application Reference Number: 6.4.12).

1.7.61 For assessment purposes, it is assumed that a barge with approximate capacity of 3,500m^3 would undertake two daily disposals for 35 days, up to a total volume of 242,000m^3 of bulked soft sediment.

1.7.62 Rock would be disposed of over the duration of the wet excavation works, taking approximately 16 months.

Construction of the breakwaters

1.7.63 Both the eastern (zone 1F-5) and western (zone 1F-4) breakwaters would have rock-filled cores covered with pre-cast concrete armour units and, where practical, rock armour. The largest concrete armour units to be used on the ends of the breakwaters would be expected to be approximately 38 tonnes in weight, with smaller units being used in less exposed areas. A change to natural rock armour would occur once the block weights were sufficiently reduced to allow economical use of natural rock and where there was sufficient space to accommodate the gentler gradient when using rock armour.

1.7.64 Particular consideration would be given to the position of the western breakwater, ensuring a sufficient gap exists at the landward end, post construction of the Marine Works. This would be designed to maintain appropriate hydrodynamic flows and allow mixing within Porth-y-pistyll and prevent long-term physical disturbance to habitats located to the west of the breakwater structures around Cerrig Brith during the remainder of the construction phase of the Wylfa Newydd Project. The design would also consider wave refraction to reduce changes to hydrodynamics (bed shear stress and scour) and wave climate from the presence of the breakwaters and MOLF.

1.7.65 Permanent structures would be designed to reduce the extent of the construction footprint. The design has also taken into account the position of the western breakwater, to ensure migratory fish species such as European eel (*Anguilla anguilla*) and sea trout (*Salmo trutta*) would not be prevented from entering and leaving freshwater habitat in the Afon Cafnan during the construction phase.

1.7.66 Access for the construction of both breakwaters would be facilitated by the construction of haul roads. A temporary causeway would be constructed to create a haul road (wide enough for two vehicles to pass) between the land and the southern end of the western breakwater.

Operation of the marine facilities

MOLF and breakwater during operation

1.7.67 All or part of the MOLF (zone 1F-7) may be retained for use during Power Station operation. Whilst is it not expected that the bulk quay would be required, the Ro-Ro quay may be used for delivery of replacement parts, which are AIL (to avoid road transport). It is currently assumed that only one vessel per year would use the MOLF during operation.

1.7.68 During operation, there would be periodic vessel movements relating to maintenance dredging to ensure sufficient depth would be maintained in front of the Cooling Water intake and for access to the MOLF. The volume of the material required to be removed would be considerably lower than that for the capital Dredging work undertaken during construction, possibly representing less than 10 percent. There may also be very infrequent movements (less than one per year) linked to the delivery of AILs during operation.

1.7.69 It is likely dredging would be required to maintain sufficient depth in front of the intake and to allow continued access to the MOLF. The dredged material is likely to be deposited at the Disposal Site. The volume of dredged material (sediment) would be significantly smaller than that for the capital dredging programme and would largely consist of dispersive material.

1.7.70 During operation, the western breakwater (zone 1F-4) would be a standalone structure with no connection between the breakwater and the land to allow throughflow of water.

1.7.71 During Power Station operation, the breakwaters would be subject to routine visual inspection to check that they were structurally intact, particularly after major storm events. No routine maintenance of breakwaters should be required, but it is possible that the breakwaters could require some occasional maintenance, which is most likely to take the form of the re-positioning and/or replacement of dislodged and/or damaged armour units. In the case of the western breakwater, this would require the use of floating plant; there would be no access to the breakwater from the land.

1.8 Site Campus

1.8.1 This section provides a description of the Site Campus (work area 3A) and its construction and operation.

1.8.2 Volume 3 of the Design and Access Statement (Associated Developments and Off-Site Power Station Facilities) (Application Reference Number: 8.2.3) provides information on the approach to masterplanning, and the opportunities and constraints that have influenced the development of the design proposals, including landscaping.

1.8.3 The temporary accommodation for construction workers would comprise a campus-style development (see figure D1-13 for an illustrative layout) to accommodate up to 4,000 construction workers. The Site Campus would occupy approximately 15ha of land, located to the north-east of the Power Station Site, east of the Existing Power Station. It is essential that such workers could reach the construction areas for work and without the possible delays associated with travelling from off-site locations along public highways. The provision of the Site Campus for a proportion of the construction workforce would also reduce the off-site vehicle movements at shift-changes that would otherwise occur.

1.8.4 The Site Campus would consist of:

- accommodation for up to 4,000 workers in campus-style modular form (providing an independent living space for each worker);
- amenity building (zone 3A-19) including cafeteria, café, reception area, gym, bar, shop, Medical Centre and other social space;
- outdoor recreation, including two multi-use games areas (zone 3A-29), outdoor seating and informal public spaces;
- Site Campus access road (from the Existing Power Station access road);
- bus set-down and parking area;
- disabled parking spaces and parking for light vans/minibuses;
- temporary parking for workers during the initial phases of construction, consisting of 400 spaces;
- internal access ways for pedestrians, service vehicles and emergency vehicles;
- 2.4m high Paladin-type fence around the perimeter;
- soft landscaping works; and
- secondary substation, compactor and bin stores and cycle stores.

1.8.5 The total 4,000 bed spaces would be provided over 25 buildings, the majority of which would be four storeys (18m high), with others at five storeys (23m high), six storeys (27m high) and seven storeys (32m high). Each building would provide between 128 and 224 bed spaces.

1.8.6 The parameters (dimensions and heights) of buildings are shown in table D1-11. These parameters have been used for assessment purposes in the EIA.

For further information on the application of envelopes and parameters to building dimensions, see section 1.3.

Table D1-11 Parameters for Site Campus

Building/structure	Parameter zone	Maximum parameter		
		Length (m)	Width (m)	Height (m)
Accommodation block	3A-1, 2, 3, 7, 8, 16, 17, 23, 24, 25, 33, 43, 53	75	13	18
Substation and bin enclosure	3A-4, 5, 9, 10, 11, 13, 15, 18, 22, 26, 27, 28, 37, 38, 39, 40, 42, 48, 49, 50, 51, 52	10	5	5
Accommodation block	3A-6, 12, 14, 21	75	13	32
Substation	3A-19	10	6	5
Amenity building	3A-19	95	63	14
Sprinkler pump house, compactor and external bin store for amenity building	3A-19	12	6	5
Cycle store	3A-20	8	5	4
Multi-use games area	3A-29	Extent of zone 3A-29		
Multi-use games area equipment store	3A-30	7	4	3
High voltage switchroom	3A-31	11	4	5
Security building	3A-32	7	5	4
Accommodation block	3A-34, 41, 46	75	13	23
Accommodation block	3A-35, 36, 44, 45, 47	75	13	27

1.8.7 The Site Campus would be used during the construction phase of the Power Station to accommodate workers on a temporary basis. It is expected that the Site Campus would likely be operational some two years following grant of development consent, and be operational for five years, with peak occupation

levels occurring across the last two years of operation. However, the Site Campus would be designed to have a service life of a minimum of 10 years.

Site Campus Medical Centre

1.8.8 A medical centre would be located on the Site Campus (the Site Campus Medical Centre) which would be similar in concept to a GP surgery. This would be accessible to all construction workers (including sub-contractors), whether they live in the Site Campus, reside locally or travel to the Wylfa Newydd Development Area from the wider area.

1.8.9 The Site Campus Medical Centre would include appropriately equipped space and facilities for:

- primary care services, including GP services, specialised clinics, out-of-hours care and pharmaceutical services;
- occupational health services, including medicals and screening of workers where required;
- administrative functions, including medical records and health surveillance systems; and
- occupational hygiene facilities and resources, which would then be deployed across the Wylfa Newydd Development Area.

1.8.10 The Site Campus Medical Centre would be located in close proximity to the amenity block within the ground floor of the first accommodation block to be constructed at the Site Campus (ensuring services are in place before the non-home-based workforce arrives). At the peak of construction, the Site Campus Medical Centre could, if required, encompass the entire ground floor of the accommodation block (approximately 700m^2). The size of the Site Campus Medical Centre, and the services provided therein, would be commensurate with the size and medical needs of the construction workforce.

1.8.11 The final design of the Site Campus Medical Centre will be prepared in consultation with the local healthcare authorities/representatives and would be operated by a suitable healthcare service provider. Further information is provided in the Health Impact Assessment Report (Application Reference Number: 8.19).

Figure D1-13 Site Campus general arrangement plan

Legend

- WNDA Boundary
- Road surface
- Footway / pedestrian route surface
- Soft landscaping
- Existing vegetation retained
- Existing rock outcrop retained
- Proposed building footprint
- Building access point / entrance
- Proposed drainage
- Fenceline (2.4m paladin type)
- Fenceline (1.8m timber close board type)
- Fenceline (3m MUGA sports type)
- Existing stone walling retained
- Vehicle access barrier
- Pedestrian access barrier
- Pedestrian crossing - white line markings
- Area required for sustainable drainage

Buildings - Maximum storeys

TYPE A	4 Storeys + Rooftop Plantroom
TYPE B	5 Storeys + Rooftop Plantroom
TYPE C	6 Storeys + Rooftop Plantroom
TYPE D	7 Storeys + Rooftop Plantroom
TYPE E	Substation and bin enclosure
TYPE F	Amenity building
TYPE G	Existing bat barn
TYPE H	Security building
TYPE I	Sprinkler pumphouse, compactor and external bin store for amenity building
TYPE J	HV Switchroom
TYPE K	Cycle store
TYPE L	Equipment compound for MUGAs

Car parking legend

P1 Parking (16No. accessible spaces and 16No. delivery vehicles / minibuses or 1 HGV)

Amenity legend

S1 Multi use games area suitable for five-a-side football

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Construction of the Site Campus

1.8.12 Construction would be in a phased manner with three key phases. The first phase would provide accommodation for up to 1,000 workers (phase one), then increase incrementally to provide accommodation for up to 2,500 workers (phase two) and 4,000 workers (phase three).

1.8.13 Prior to the Site Campus being operational, construction workers who are not home based would be housed in private rental and tourist accommodation. This would be managed by Horizon's Worker Accommodation Management Service, who would work with accommodation providers to ensure there is a sufficient supply of appropriate accommodation that workers can use that is affordable, of a high enough standard and in the right locations.

1.8.14 Connections would be provided from the Power Station's main services, including:

- communication lines, telephones and IT networks;
- electricity supply; and
- potable water supply.

1.8.15 All surface water during construction of the Site Campus would run into drainage channels, which would discharge into a sedimentation pond east of the Site Campus. Discharge would then be into the sea at Porth Wylfa within Cemaes Bay.

Operation of the Site Campus

1.8.16 Up to 400 members of staff would be required for the on-site management, welfare and security of the full 4,000 beds. Around 100 would be required for stage one and 250 for stage two. These staff members would work in shifts, with peak shift numbers being around 200 people.

1.8.17 The drainage design for operation of the Site Campus would include attenuation of discharge to surface water, and recharge of storm water runoff via infiltration trenches, in order to reduce potential hydrological effects on the SSSI arising from surface water flows.

1.8.18 An extension to the existing Cemaes Welsh Water Treatment Plant, operated by DCWW, and located to the west of the Site Campus, would treat sewage derived from the Site Campus. This would discharge through the current DCWW outfall or, otherwise, through the new Cooling Water outfall constructed for the Wylfa Newydd Project.

1.8.19 External lighting would be a combination of pole and building wall-mounted. A central management system would be utilised, which would be remotely accessible. Light-emitting diode (LED) lighting would be used, with a detection system to provide lighting only when required for access.

Decommissioning of the Site Campus

1.8.20 Following completion of the construction of the Power Station, some nine years following grant of development consent, the Site Campus would be decommissioned and returned to its pre-developed condition. Public footpaths and access to Fisherman's car park would be reinstated after decommissioning. Further details on decommissioning can be found within the Construction Method Statement contained within appendix D1-1 (Application Reference Number: 6.4.17).

1.8.21 The assessment of effects for the Site Campus decommissioning is included within the wider assessment of the Main Construction of the Power Station. Construction plant and activities would not result in effects which would increase the significance of effects reported for Main Construction.

1.9 Other on-site development

Construction phase

1.9.1 During the construction phase for the WNDA Development, a number of buildings, structures and supporting infrastructure are required to support the construction works, namely:

- site compounds (SPC site compound, material and satellite compounds and main contractor compound);
- concrete batching plant;
- other temporary buildings;
- fencing;
- haul roads and crossings;
- public access diversions;
- landscaping;
- land drainage;
- sewage discharge; and
- water supply.

1.9.2 A description of these structures is provided below, with details of their construction provided in the Construction Method Statement contained within appendix D1-1 (Application Reference Number: 6.4.17).

Site compounds

Site Preparation and Clearance site compound

1.9.3 The existing contractor's compound that is currently being used for supervision of minor works, intrusive investigations and survey works would be utilised during SPC. The compound would include:

- modular buildings (up to two storeys in height);

- parking for 20 cars plus two disabled bays, with overflow for a further 25 cars;
- a secure compound with 3m high fencing for plant storage;
- gatehouse, control room and holding area for searching vehicles; and
- a 2m high perimeter fence.

1.9.4 In choosing the location of the compound, the distance to noise sensitive receptors (e.g. bat barns, chough nesting sites) has been taken into account. By maximising stand-off distances between noise sources and receptors as far as reasonably practicable, noise levels at experienced by receptors from activities within the compound would be reduced.

1.9.5 A diesel fuel store would be provided within the compound and would enable the concentration of fuel handling at a single location within the Power Station Site, as opposed to at multiple locations. Fuel would be delivered to the compound for storage within a single 15,000 litre fuel container located within a 110% capacity bunded area. This would be the main fuel store for the SPC Works and the main source of fuel supply for the double-skinned mobile fuel bowser. This mobile fuel bowser would be transported around the Wylfa Newydd Development Area to refuel plant and machinery. Spill kits would always be present during refuelling to mitigate against the risk of spillage. The fuel store refuelling area would have a concrete apron laid to fall to a gully connected to an oil separator from which clean water would then be discharged to a drainage swale.

1.9.6 The SPC site compound and associated construction establishment facilities would be surfaced with different surface materials depending on operational, safety and security requirements. Hardstanding with falls to drainage trenches would be used where required. Graded and compacted stone would be used in other areas and would enable surface water runoff to percolate into the ground. Drainage (comprising stone-filled trenches or perforated pipes) would be installed beneath the surfacing to prevent runoff onto the Existing Power Station access road. This would be channelled and discharged to swales located adjacent to all areas of the site establishment facilities.

1.9.7 Existing potable water and power connections available at the perimeter of the compound would be utilised for the offices and welfare facilities. Temporary diesel generators may be required during early earthworks phase of the project as well as to act as standby power for power outages, etc. Existing supplies to the present compound would be augmented to provide 25MVA 37MVA supplies that should meet all of the temporary power supplies to support construction.

1.9.8 The SPC site compound would be illuminated as required during the hours of operation. Suitable lighting equipment and arrangements would be implemented to control light spill from site into the surrounding areas. This would be achieved using directional, passive infrared, LED security lighting.

1.9.9 Dedicated segregated skips would be provided within the compound to cater for different waste types so that waste can be separated and managed accordingly.

1.9.10 Bulk or palleted materials (such as fencing materials) suitable for external storage would be stored in a laydown area within the compound.

Satellite and material compounds

1.9.11 The creation of compounds as part of the temporary site construction establishment allows the safe storage of equipment and material close to where it is required, reducing the distance vehicles need to travel across the Wylfa Newydd Development Area. In addition to the SPC site compound, there is a requirement for three satellite compounds and seven material compounds, each of which would be constructed early in the programme and retained throughout the duration of the SPC works (with the exception of compound eight, which would be utilised as a long-term materials storage compound).

1.9.12 In total, 10 compounds would be established. The compounds proposed are provided in table D1-12 below.

Table D1-12 Proposed satellite and material compounds

Compound	Area (ha)	Surfacing
Compound 1 (Satellite)	0.26	Entirely surfaced with crushed stone.
Compound 2 (Material)	0.22	Partially located on hardstanding with remainder surfaced with crushed stone.
Compound 3 (Material)	0.18	Partially located on existing hardstanding with remainder surfaced with crushed stone.
Compound 4 (Material)	0.20	Partially located on existing hardstanding with remainder surfaced with crushed stone.
Compound 5 (Material)	0.15	Partially located on existing hardstanding with remainder surfaced with crushed stone.
Compound 6 (Material)	0.19	Partially located on existing hardstanding with remainder surfaced with crushed stone.
Compound 7 (Satellite)	0.36	Partially located on existing hardstanding with remainder surfaced with crushed stone.
Compound 8 (Material)	0.24	Entirely surfaced with crushed stone.
Compound 9 (Material)	0.17	Partially located on existing hardstanding with remainder surfaced with crushed stone.
Compound 10 (Satellite)	0.21	Partially located on existing hardstanding with remainder surfaced with crushed stone.

Satellite compounds

1.9.13 Three remote satellite compounds would be established around the Wylfa Newydd Development Area. The satellite compounds would be located on existing areas of hardstanding and utilised for the secure storage of plant and materials, rather than have all vehicles return to the SPC site compound at the end of each working day. Each compound would incorporate appropriate

surface treatment and security fencing measuring 3m in height meeting CPNI standards. Ecology fencing and/or stock-proof fencing would also be incorporated for some of the compounds, as required.

1.9.14 The compounds would only be lit during the hours of work and for security reasons. This would be achieved using directional, passive infrared, LED security lighting. Surface water would be allowed to percolate and/or runoff to ground. For compounds that house heavy equipment or fuel storage, interceptors would be provided to areas of hardstanding, as appropriate, in line with the standards and requirements contained in the Wylfa Newydd CoCP (Application Reference Number: 8.6).

Material compounds

1.9.15 Seven material compounds would be established. These material compounds would be located around the Wylfa Newydd Development Area and would be used for the temporary storage of materials from building and other demolitions. The majority of the material compounds would also be utilised for the crushing of recovered material such as concrete and cement-bound walls, using specialist equipment. The stored materials would include stone from walls and other demolitions, gateposts and pillars together with materials associated with clearance works themselves. The materials would be stored in mounds that would measure no more than 3m in height. Some of the material compounds would also include rock crushing facilities.

1.9.16 Each compound would be enclosed by security fencing which measures 3m in height and meets CPNI standards. Ecology fencing would also be incorporated for some of the compounds, as required. The material compounds would be lit using passive infrared, LED security lighting.

1.9.17 All the satellite and material compounds would be sited partially on existing areas of hardstanding with the remaining areas surfaced with crushed stone. The only exceptions would be compounds one and eight, which would both be surfaced with crushed stone. The material to be stored at compound eight would remain following the completion of the clearance works for use during the landscaping phase of the Wylfa Newydd Project.

Contractors compounds, laydown areas and prefabrication areas

1.9.18 During the Main Construction, compounds would be located in close proximity to construction work areas. They would consist of demarcated areas, as required, where temporary office facilities can be erected as well as to provide storage of materials within temporary warehousing facilities or buildings.

1.9.19 Laydown areas would consist of demarcated space where materials can be stored in the open. Prefabrication areas would consist of demarcated areas where prefabrication and assembly of components could take place. Prefabrication areas could include temporary buildings to provide protection from weather.

1.9.20 Illustrative construction phasing plans or ‘time slices’ contained within appendix D1-1 (Application Reference Number: 6.4.17) provide indicative locations of construction compounds and laydown areas.

1.9.21 The number, sizing and location of temporary facilities/buildings would be distributed over the entire site. However, the two principal areas for warehousing and fabrication would be the western and eastern laydown areas.

Concrete batching plant

1.9.22 The construction of the concrete batching plant and associated infrastructure (e.g. hardstanding, haul roads, conveyor system) would be integrated with the construction of the MOLF. The concrete batching plant would have a total footprint of up to 3.6ha and an assumed height of up to 26mAOD for the main plant and up to 11mAOD for the bulk conveyor system.

1.9.23 Peak concrete production is expected to be around 35,000m^3 per month, which would require four or five batching plants with the largest being capable of producing 200m^3 per hour down to the smallest unit producing 60m^3 per hour.

1.9.24 The concrete batching plant would include embedded mitigation to prevent or reduce emissions of dust as part of the design. These include enclosing the various parts of the plant, silos, material storage areas and cement powder delivery systems fitted with suitable dust mitigation systems.

Other temporary buildings

1.9.25 There would be a requirement for a number of temporary buildings to be erected during the early earthworks phase of construction to provide office, welfare, warehouse, tool shops and canteen facilities. These temporary buildings would be made up of portable modular units in varying sizes and up to 5m tall. Other features within the Main Site Compound would include a fuel store and parking for office-based staff and some of the site workforce.

1.9.26 During the Main Construction phase, the number of buildings would be increased to suit the workforce profile, with up to approximately 20 different buildings located around site. The temporary buildings would include:

- office;
- welfare;
- warehouse;
- tool shops;
- canteen facilities; and
- related buildings.

1.9.27 These buildings would mainly be made up of portable modular units, up to four storeys (approximately 12m in height), but there would also be large robust frame built tents up to 10m in height and climate-controlled warehouse buildings up to 30m in height, providing they remain within construction parameters for the particular construction zone (table D1-4).

Perimeter fence

1.9.28 Prior to the granting of development consent, PRoWs within the Wylfa Newydd Development Area would be maintained, managed and controlled in a safe and proper manner. Plans and preparation would be put in place for future diversion of PRoWs, where required, around the Wylfa Newydd Development Area.

1.9.29 During early works, temporary internal boundary fencing would be required in a number of locations:

- either side of Cemlyn Road;
- where vehicle access routes interface with PRoWs;
- along the Existing Power Station access road;
- the road to Fisherman's car park; and
- to the northernmost extent of the Wylfa Newydd Development Area to demarcate the extent of the site and to deter accidental trespassing.

1.9.30 Temporary fencing would also be installed to protect surface waters where required.

1.9.31 Perimeter fencing would not cross the Afon Cafnan, Nant Caerdegog Isaf, Nant Cemlyn, Nant Cemaes and the Tre'r Gof SSSI drains, and would be sited 15m from the edge of these watercourses.

1.9.32 Minor watercourses and ditches may be crossed by the perimeter fence.

1.9.33 Following grant of development consent, the Wylfa Newydd Development Area would be installed with perimeter fencing and PRoW diverted around it. The primary purpose of the perimeter fencing during the construction phase is to demarcate defined areas or boundaries and constitute a barrier to deter crossing of the boundary for safety and security purposes.

1.9.34 This fencing would comprise both temporary construction fencing measuring 2m in height and temporary internal boundary fencing measuring 0.9m in height. The key construction areas would be enclosed by the temporary construction fencing, with the temporary internal boundary fencing used to demarcate the extent of the area within which work would be undertaken and to mark the extent of buffer zones. Perimeter fencing during vegetation clearance and topsoil strip would be permeable to small mammals.

Road crossings and haul roads

1.9.35 In order to enable vehicular access to those parcels of land either side of the access road to the Existing Power Station, it would be necessary to construct a new road crossing. This would permit safe access for plant and other vehicles from the Main Site Compound to the northern section of the Wylfa Newydd Development Area. The sections of tracks leading to the road crossing on either side may be formed of crushed stone or other hard surfacing, level with the Existing Power Station access road.

1.9.36 The permanent diversion of the Existing Power Station access road may include a temporary bridge over the access road to the Existing Power Station.

1.9.37 It would also be necessary to formalise two existing accesses across Cemlyn Road. Since these are existing agricultural accesses, the formalisation of these accesses would comprise the installation of new gates and affixing these into the proposed fencing. The formalised crossings at Cemlyn Road would only be used for vehicles crossing from the north to the south of the Wylfa Newydd Development Area across Cemlyn Road. There would be no access to the Wylfa Newydd Development Area from Cemlyn Road.

1.9.38 Haul roads would be constructed of crushed stone and would be capped as soon as reasonably practicable with suitable materials and techniques, which would have a lower potential for emitting dust, noise and vibration than unsurfaced haul roads.

1.9.39 Construction works would create various construction routes and temporary bridges and culverts, including the Afon Cafnan crossing. The haul road bridge over the Afon Cafnan would be of an appropriate construction and design (to be agreed with the regulators), to reduce flooding as far as practicable.

Public access diversions

1.9.40 A number of PRoWs, including the Wales Coast Path, would be affected by construction activities, necessitating the creation of diversions and some closures. A diversion of the Wales Coast Path would be provided around the construction fence between Cemlyn Bay and Cemaes throughout construction. This route would be unsurfaced, and wooden bridges suitable for use by walkers would be provided where the diverted route crosses a watercourse.

1.9.41 The existing Cemlyn Road, which is also part of the Copper Trail cycle route, would need to be closed through the Power Station Site. Nanner Road provides an alternative access to Cemlyn Bay from the A5025. Horizon has completed improvements to Nanner Road as part of the A5025 On-line Highway Improvements, which forms part of the Wylfa Newydd Project.

1.9.42 Access to Wylfa Head would be retained throughout construction by retaining a number of PRoWs along the north coast between Cemaes and Wylfa Head as a linear route. Access to Porth Wylfa and Porth yr Ogof from the Wales Coast Path would be retained throughout construction.

1.9.43 Chapter D4 (public access and recreation) (Application Reference Number: 6.4.4) of this Environmental Statement provides further details and figures of the proposed PRoW diversions and closures.

Landscaping

1.9.44 The Power Station would be subject to a landscaping scheme, secured through the Landscape and Habitat Management Strategy (Application Reference Number: 8.16), which would be an important element of setting the building and structures into their context. The proposals seek to:

- visually integrate the Power Station into the existing landscape context;
- reduce the impact of light pollution, noise and vibration from the WNDA Development;

- deliver coordinated and multi-purpose environmental enhancements; and
- provide a high quality green infrastructure setting for the operation of the Power Station.

1.9.45 The proposals seek to achieve the above by the following.

- Creating a new landscape setting that reflects the existing open, rolling, drumlin landscape character, in conjunction with an appropriate architectural design.
- Using natural resources efficiently, for example by retaining excavated material on-site to create building platforms and landscape mounding.
- Retaining and enhancing existing woodland, scrub, hedgerows and grassland habitats where possible.
- Retaining the wooded mounds forming part of the landscape design for the Existing Power Station by Dame Sylvia Crowe.
- Providing a range of wildlife habitats for biodiversity improvements.
- Planting for new woodland to supplement visual screening provided by landscape mounding and to provide locally distinctive features, whilst respecting the relatively open nature of the existing landscape character.
- Providing a network of new footpaths to replace routes closed due to construction and to serve the local communities and other footpath users.
- Providing a safe temporary viewing area for visitors to view construction activities.
- Providing buffer zones where necessary, for example, between the proposed landscape mounds and Tre'r Gof SSSI and other sensitive receptors, to help safeguard them from the effect of construction works.
- Developing a phased construction sequence to provide early landscape mitigation on the outer parts of the Wylfa Newydd Development Area, which would help to screen or soften views and provide noise attenuation to the communities of Tregele and Cemaes from construction activities.
- Considering opportunities for the sensitive return of land to agricultural use, in conjunction with biodiversity improvements, with new field boundaries reflecting the surrounding landscape pattern. The most likely agricultural use is grazing by sheep or cattle.

1.9.46 Design of the earthworks is optimised in relation to cut and fill, to balance material available for screen mounds, to reduce the volume of excavated material and achieve a natural appearance to outward slope profiles.

Progressive mound creation

1.9.47 A significant proportion of the excavated material would be used to form the level areas needed for the Power Station building platforms (see table D1-1) and to level the construction compounds. The remaining excavated materials would be used to create an appropriate landscape setting for the Power

Station and help to mitigate potential noise and visual effects. The construction landform parameters are included in table D1-4.

1.9.48 Landscaping would comprise progressive landscaping, including planting of hedgerows, scrub and trees on completed areas of landscape mounding, as early as practicable throughout Main Construction, in accordance with the illustrative reference point drawings 3 and 4 in the Landscape and Habitat Management Strategy (Application Reference Number: 8.16).

1.9.49 The formation of the landscaped mounds seeks to minimise double handling of materials and deliver earth mound landforms to provide visual screening and noise mitigation to nearby properties, to be implemented as soon as practicable in the construction programme, with the focus particularly on mitigating potential effects of the Power Station on the residents of Tregele and Cemaes.

1.9.50 The mound creation relies on the sequential use of materials that would be excavated during construction activities, and as such, the appearance of the land within the Wylfa Newydd Development Area would change as construction progresses, leading to the completion of the final landscape.

1.9.51 As the construction of Unit 1 would be completed approximately two years in advance of Unit 2, some areas of the construction site could be demobilised, and cranes and compounds removed prior to commissioning of Unit 1. However, completion of the final landform in the areas surrounding the Power Station Site, as well as completion of planting/soft landscaping, would be completed after all Main Construction works have been completed, site compounds demobilised, and any remaining construction or laydown areas removed.

1.9.52 The development of landscape design has been influenced by the landscaping principles set out in volume 2 of the Design and Access Statement (Application Reference Number: 8.2.2) and the Landscape and Habitat Management Strategy (Application Reference Number: 8.16).

Construction land drainage

1.9.53 The surface water drainage within the Wylfa Newydd Development Area would be modified during construction to manage the change in runoff from land drainage. The preliminary design for construction of surface water drainage is contained in appendix D8-8 (Application Reference Number: 6.4.33). A multi-stage treatment solution has been designed for each outfall, including the use of good practice soil management, a sustainable drainage system (to include silt fences, silt traps, swales and sedimentation ponds) and polyelectrolyte coagulant dosing system. Each dosing system would comprise a power source (which could be a generator) and treatment tanks. For assessment purposes, six treatment tanks have been assumed to be present for each dosing system. The discharge of suspended solids from the discharge points would be limited to the concentrations proposed in the construction Environmental Permit (i.e. 40mg/l to 70mg/l during normal rainfall events). Worst case assessments to the marine environment have been based on suspended solid concentrations predicted during a spring–neap tidal cycle for a 1 in 2 year average with a 1 in 30 year storm event, as presented

in appendix D13-8 (Marine Hydrodynamic Modelling Report – Wylfa Newydd Development Area) (Application Reference Number: 6.4.90).

1.9.54 There would be nine discharge points for land drainage, for mounds A to E, eight of these to existing terrestrial watercourses and one effectively directly to the sea. Eight of the nine discharge points would operate during construction, whilst the ninth (the discharge from Mound E to the Nant Cemlyn) would only operate once all construction works on the western side of Mound E are complete, the surface revegetated and the risk of suspended solids discharge to the Nant Cemlyn is low. Prior to a revegetation of the western side of Mound E, the discharge would be routed to the Afon Cafnan, either via discharge point E2 or an alternate point downstream. A further three discharge points to the sea would be used for land drainage around the platform area and dewatering of the deep excavations (see appendix D8-8, Application Reference Number: 6.4.33).

1.9.55 No process water from the concrete batching plant would enter the marine environment. Clean surface water runoff from the concrete batching plant would drain into the Power Station Site surface water drainage. It would be intercepted within the batching plant site and monitored for pH levels prior to discharge.

1.9.56 Drainage of the MOLF quay would occur via longitudinal slot drains which would run along the back of the paved areas to collect surface water via an oil separator (to remove oily contaminants) and sediment catch-pit (to remove settled solid materials) before discharge to the sea via the Power Station Site drainage outfall. It is anticipated that this outfall would comprise a pipe outlet concrete headwall with a flap valve. The Power Station Site drainage outfall would be located within the MOLF's footprint, for example in the revetment between the two bulk berths.

Sewage discharge

1.9.57 Construction-derived sewage would be treated in a dedicated construction sewage package plant. Sewage would be discharged following treatment, in the north of Porth-y-pistyll, in a location that during construction becomes the northern end of the western breakwater. The maximum rate of discharge would be approximately 1,598m^3 per day. The suspended sediment concentration would be limited to 30mg/l. The sewage package plant is likely to be operational for the duration of the construction phase, until DCWW connect the foul sewerage system to their waste water treatment plant.

1.9.58 The package sewage treatment plant would be a modularised system that would be predominately enclosed. This would prevent the emissions of odours from the main process vessels which have the potential to generate odours. Under normal circumstances, the inlet works and settlement tanks would not generate high levels of odour that could lead to annoyance at sensitive off-site locations. Appropriate operational management arrangements would be adequate to reduce the risk of odour becoming a nuisance.

Water supply

1.9.59 All water supplies for construction activities and for potable supply in the Site Campus and elsewhere around the construction site would be provided from the water main by DCWW. This supply would be provided from within DCWW's existing licenced abstractions with no requirement for new abstractions or increase in licenced quantities for existing abstractions.

Operational phase

1.9.60 During the operational phase of the Power Station Site, the following infrastructure is required to support the site operation, namely:

- access and parking;
- security and fencing;
- lighting;
- public access;
- landscaping;
- drainage;
- waste water disposal; and
- water supply.

1.9.61 A description of these structures is provided below.

Access and parking

Power Station Access Road

1.9.62 Access for the Site Campus, MOLF and outage carpark would be via the Existing Power Station access road. All other access would be via the new access junction. Minor localised diversions would be required to facilitate these modifications.

1.9.63 Horizon intends to create a new Power Station Access Road, which would connect to the existing A5025 highway via a proposed off-line roundabout. Further details on the Power Station Access Road are contained in chapter G1 (proposed development) (Application Reference Number: 6.7.1).

Car parking

1.9.64 On-site car parking would be available for the Power Station and would comprise a maximum of:

- 200 parking spaces at the simulator and training building;
- 200 permanent parking spaces and a maximum 650 temporary spaces located on grass-crete or similar surfacing, in the northern car park; and
- 700 parking spaces (including 20 disabled parking spaces) in the southern car park.

Internal roads

1.9.65 A network of roads and pedestrian walkways would be provided to facilitate the safe and efficient movement of staff and equipment around the WNDA Development (see figure A2-1, Application Reference Number: 6.4.101). Certain roads would be designed to handle AILs associated with the replacement of large components or the transfer of spent fuel from the spent fuel pools to the spent fuel storage facility.

Security and fencing

1.9.66 There would be an inner security fence and an outer security fence. Both fence arrangements comprise double fences, with maximum heights of 5m. The fence arrangements would comply with the UK Government standards and would require Office for Nuclear Regulation approval.

1.9.67 The fences would be monitored by security systems (e.g. CCTV), and would have permanent perimeter lighting of a minimum of 6–10lux. LED fittings would be modelled centrally in the sterile corridor, mounted on 5m lighting columns. Levels would be higher than the 6–10lux to achieve visibility immediately outside the outer security fence.

1.9.68 Both the inner and outer security fences would have a main gatehouse as well as a secondary gatehouse, forming the entrance buildings to the Power Station Site.

Lighting

1.9.69 External lighting would be provided for the Power Station Site with lighting levels generally at the minimum necessary to enable safe and secure operation. Excessive lighting levels would be avoided and, wherever practical, dimming would be provided. Lamps would be chosen to balance energy efficiency and colour rendering whilst considering the need to avoid or reduce potential adverse effects to local environment and visual impact. LED use would be promoted and colour choice carefully selected to reduce impact. Lamps would also be chosen to prevent light spill and sky glow including high efficiency bulbs and directional lighting, and accessories such as barn door shields. Roadway lamps would be selected with a zero upward light component.

1.9.70 During operation, it is likely that lighting would be required for the main stacks (aviation warning lights), the site access road, permanent site roadways and car parks, office buildings and perimeter lighting of the inner and outer security fences, which is a statutory requirement for nuclear sites. In addition, there would be a low level of pedestrian amenity lighting required across the Power Station Site to aid safe pedestrian movement.

Public access

1.9.71 The following visitor amenities would be provided during operation:

- a car park at the same location as the current Ty-croes (Fisherman's car park);

- creation of new PRoWs on re-profiled land outside of the Power Station Site, linking to the Wales Coast Path, existing PRoW network and Cemaes;
- the diverted Wales Coast Path would include a new nature trail which would include information boards and interest points suitable for all ages, with digital and paper-based maps of the trail made available; and
- a new wildlife watching shelter and information boards would be provided at the location of the former coastguard lookout on Wylfa Head.

Landscaping

1.9.72 The landscape design of Wylfa Newydd Development Area outside the Power Station Site would soften the appearance of the Power Station and reduce visual effects during operation. Landscaping would include new tree and scrub planting to restore characteristic field patterns with traditional boundary types including hedgerows and return of land to pasture for grazing sheep or cattle.

1.9.73 Approximately 5.9km of stone walls and cloddiau would be reconstructed from stone saved from dismantled stone walls and cloddiau during the SPC Works, as part of the landscape restoration scheme. This represents approximately 50% of the existing length.

Drainage

1.9.74 The surface water drainage design for the Power Station Site is based on the collection of storm water from rooftops and impermeable road surfaces and discharge to sea. Between the inner and outer fences, storm water would be drained via interceptors and monitoring to sedimentation ponds prior to discharge to Porth-y-pistyll, at locations north and south of the Cooling Water intake structure.

1.9.75 Appropriate collection systems would be designed which would include drainage pipes, ditches and channels. The ditches/swales would be connected to natural settlement ponds to attenuate and treat surface water. Drainage from areas of the site containing environmental hazards would be designed accordingly and would not connect to the storm water drainage system unless intercepted and suitably treated (e.g. via oil/petrol inceptor) or diverted to a treatment system (if there is a possibility of active contamination).

1.9.76 The drainage system of the landscaped areas post-construction has been designed to ensure that surface water flows from landscaped areas outside of the Power Station platform would not impact on the platform itself. Settlement ponds would be used and maintained appropriately at these areas until natural silt and suspended solids levels were obtained. After this, the drainage system would become passive with no maintenance required. However, this drainage would incorporate appropriate attenuation to prevent any increases to flood risk off-site.

Dewatering

1.9.77 During the operation of the Power Station, no active groundwater dewatering outside of basements would be required. However, a passive (gravity) drainage system at approximately 6mAOD would be installed around the deep basements with this water being directed to the sea.

Waste water disposal

1.9.78 Waste water would result from both conventional uses (for example, sanitary requirements in the administration building) and liquid process effluents.

1.9.79 DCWW would provide additional secondary treatment (screening/settlement and biological treatment) by installing one additional 76m^2 plastic media filter bed at the existing Cemaes Waste Water Treatment Works located at Wylfa Head. DCWW also proposes to relocate the existing pumped sewer between the Cemaes pumping station (at Cemaes) and the Cemaes Waste Water Treatment Works, to a new 160mm diameter main to be located so that it is outside of the area which would be used during the construction of the Power Station (i.e. between the construction site perimeter fence and the coast). There would be a need to construct a new pumping station at the Power Station Site to pump effluent from the Power Station to the enlarged Waste Water Treatment Works via about 1km of small (90mm) diameter plastic pipe, laid in an open cut trench at a depth of 1.2m. The location of the emergency overflow outfall (via about 750m of 150mm internal diameter emergency overflow gravity sewer, laid in an open cut trench) from the pumping station has not yet been decided.

1.9.80 Discharge from the Cemaes Waste Water Treatment Works would be via the existing outfall close to the Cooling Water outfall for the Existing Power Station.

Water supply

1.9.81 The expected operational demand for each Unit during operation would be 830m^3/day; therefore, the total for the Power Station would be 1,660m^3/day. For each Unit, the maximum expected demand during outages is 1,500m^3/day, so the peak operational demand would total 2,330m^3/day (i.e. 1,500m^3/day + 830m^3/day).

1.9.82 DCWW would provide a new supply of 3,000m^3/day (allowing for an additional margin) to the Power Station Site. This would be supplied from the Alaw water treatment works via a twin mains supply comprising a combination of pumped rising main and gravity main.

1.9.83 There is no intention for surface water, groundwater or seawater to be abstracted by Horizon for supply of potable water specifically to meet the Wylfa Newydd Project's demand for potable supply.

1.9.84 Demineralisation to supply process water for operating the Power Station would be achieved by an on-site plant (shared between the two Units) using an ion exchange process. Two domestic water storage tanks (5,000m^3 each) would store potable water from DCWW prior to water being demineralised in the water treatment plant. Demineralised water produced by the water

treatment plant would be stored in two 1,400m^3 tanks (one per Unit) and in the condensate storage tank.

1.10 Ecological Compensation Sites

1.10.1 As noted in paragraph 1.1.5, Horizon has committed to delivering a compensation package which would create new areas of rich-fen habitat and enhance areas of existing rich-fen habitat at three sites within Anglesey.

1.10.2 More details of these works, including plans showing their location, are provided in appendices D9-23 and D9-24 (SSSI Compensation Strategy – Volumes I (Application Reference Number: 6.4.56) and II (Application Reference Number: 6.4.57)). An assessment of the environmental effects of these works is provided in appendix D1-2 (Application Reference Number: 6.4.18). Topic chapters within volume D do not include any discussion on the compensation sites unless a significant effect is identified in appendix D1-2. If a significant effect is identified, then this is acknowledged in the respective volume D topic chapter, along with any required additional mitigation.

Ecological Compensation Site - Cae Canol-dydd

1.10.3 The site includes an area within the Caeau Talwrn SSSI and connects it to another area within the SSSI to the south. The proposed works to create new habitat outside of Caeau Talwrn SSSI would comprise the following:

- creation of access tracks;
- topsoil stripping and re-landscaping in order to lower the land level and expose a nutrient-poor, calcium-rich mineral substrate for vegetation establishment;
- topsoil storage in dedicated locations on site, in mounds two metres high;
- drainage modifications to reverse the artificial drainage of the site;
- fencing to exclude stock from the habitat creation areas; and
- seeding and planting of key species.

1.10.4 The part of the site that is within Caeau Talwrn SSSI would have the following habitat enhancement works:

- cutting of black bog-rush and purple moor-grass tussocks to create a patchwork of short open areas while retaining some tussocks, particularly those supporting calcifugous and other vegetation.

1.10.5 The eventual long-term management of the site would involve low-intensity grazing. The site physically connects existing areas of designated and un-designated rich-fen habitat, and grazing management would therefore seek to manage this entire rich-fen unit as a whole, where possible. This would allow for the better management of existing fen, especially small, fragmented areas, and in the long-term would be conducive to the dispersal of rich-fen plant species from existing habitat.

Ecological Compensation Site - Cors Gwawr

1.10.6 The proposed works to create new habitat would comprise the following:

- creation of access tracks;
- topsoil stripping and re-landscaping in order to lower the land level and expose a nutrient-poor, calcium-rich mineral substrate for vegetation establishment;
- topsoil storage in dedicated locations on site, in mounds two metres high;
- scrub removal;
- drainage modifications to reverse the artificial drainage of the site;
- fencing to exclude stock from the habitat creation areas; and
- seeding and planting of key species.

1.10.7 An area of 1.9ha of poor quality rich-fen habitat in the east of Site 24 would be enhanced as part of the works. The existing species-poor, coarse vegetation would be scraped away, and green hay or other plant propagules would be introduced

1.10.8 The eventual long-term management of the site would involve low-intensity grazing. The site physically connects existing areas of designated and un-designated rich-fen habitat, and grazing management would therefore seek to manage this entire rich-fen unit as a whole, where possible. This would allow for the better management of existing fen, especially small, fragmented areas, and in the long-term would be conducive to the dispersal of rich-fen plant species from existing habitat.

Ecological Compensation Site - Ty Du

1.10.9 The proposals for habitat enhancement for Ty du would aim to facilitate the regeneration and management of mire habitat, and would include the following:

- installation of management infrastructure;
- 2.4ha of mire that would be enhanced directly through appropriate management;
- 3.1ha of scrub-covered mire that would be enhanced through scrub clearance and vegetation regeneration;
- 1.5ha of species-poor purple moor-grass dominated mire that would be enhanced through cutting and vegetation regeneration; and
- removal of the septic tank in the north-east of site.

1.10.10 Public access to Ty du would be improved. Scrub is proposed to be cleared from part of the route and a new bridge would be constructed. Signage and interpretation boards would be installed to enable the public to understand the works being undertaken, and to appreciate the importance of peatlands for nature conservation and ecosystem service provision. These measures are set out in the Landscape and Habitat Management Strategy (Application Reference Number: 8.16).

1.10.11 The long-term management of Ty du would principally be low-intensity grazing by suitable livestock, such as ponies or cattle. Scrub would be managed as

part of routine site management and removed where it encroached on important herbaceous communities.

1.11 References

Table D1-13 Schedule of references

ID	Reference
RD1	Contaminated Land: Applications in Real Environments (CL:AIRE). 2011. *The Definition of Waste: Development Industry Code of Practice*. Version 2. London: CL:AIRE.

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