2 DESCRIPTION OF THE PERMANENT DEVELOPMENT AND CONSTRUCTION ACTIVITIES

2.1 Introduction

2.1.1 This chapter provides a description of the permanent development including the key processes and functions involved in the operation of the power station. It also provides information on temporary construction activities.

2.2 Permanent Site Layout

2.2.1 The permanent built development which incorporates the completed landscape restoration scheme is shown in Figure 2.1.

2.2.2 HPC will comprise a number of buildings, sub-surface structures and associated facilities including:

- two permanent Nuclear Islands housing the UK EPR reactor buildings and other essential buildings;
- associated Conventional Islands incorporating the turbine halls;
- an Operational Service Centre;
- a cooling water pumphouse for each UK EPR reactor unit with associated infrastructure;
- fuel and waste management facilities, transmission infrastructure, staff facilities, administration and storage;
- a Public Information Centre to provide a public interface and education facility;
- a sea wall incorporating a public footpath;
- access and parking facilities for workers, visitors and deliveries for the main nuclear plant and the National Grid 400kV substation; and
- landscaping (including ecological features and public rights of way (PRoW)).

2.2.3 The layout and design of HPC has taken into consideration a number of options and constraints including:

- nuclear and conventional safety and security measures;
- environmental risk and radiological protection;
- adequate spacing between the reactor buildings and turbine halls to facilitate construction and operation;
- provision of an open circuit main cooling system;
- on-site spent fuel storage and intermediate level waste storage for the two UK EPR units with at least a 100 year operational life;
- energy transmission infrastructure from the energy platform to the National Grid 400kV substation; and
- an Operational Service Centre to be located between the two reactors.

2.2.4 Further details on the layout and design of specific components for the development are provided in the sections below and in the Masterplan: Main Site and Buildings document.

2.3 Main Power Station Structures

2.3.1 HPC will comprise two UK EPR reactor units housed within two separate reactor buildings; the approximate dimensions of other essential buildings and infrastructure are described below. Table 2.1 defines the scale and massing of buildings where applicable.

Table 2.1: Indicative building heights and massing

Building	Indicative Dimensions (m)	Indicative Height (m) from the appropriate platform level
Nuclear Island		
Reactor Building	56 x 56	64
Fuel Building	49 x 30	34
Safeguard Buildings	Restricted	29
Nuclear Auxiliary Building	37 x35	27
Diesel Generator Building	40 x 28	27
Radioactive Waste Storage Building	33 x 25	15
Radioactive Waste Process Building	38 x 37	11
Access Tower	28 x 17	25
Hot Laundry	40 x 17	4
Hot Workshop, Hot Warehouse, Facilities for Decontamination	89 x 20	18
Effluent Tanks	44 x 20	15
Conventional Island		
Turbine Hall	117 x 65	46
Non Classified Electrical Building	39 x 25	11
Gas Insulated Switchgear	31 x 14	15

Building	Indicative Dimensions (m)	Indicative Height (m) from the appropriate platform level
Transformer Areas	35 x 8; 13 x6; 13 x6	12, 9, 9
Balance of Plant		
Cooling Water Pumphouse	82 x 55	14
Forebay	82 x 41	1
Outfall Pond (Surge Chamber)	38 x 38	1
Filtering Debris Recovery Pit	37 x 19	2
Fire-Fighting Water Building	30 x 20	6
Attenuation Pond	22 x 18	3
Demineralisation Station	39 x 31	0
Auxiliary Boilers	18 x 15	6
Hydrogen Storage	45 x 12	4
Oxygen Storage	12 x 3	3
Chemical Products Storage	38 x 28	9
Buildings Related to Fuel and Waste Management		
Spent Fuel Interim Storage Facility	150 x 65	18
Intermediate Level Waste Storage Facility	133 x 36	28
Transit area for very low level waste and low level waste	2,520 m^2	0
Ancillary Buildings		
Main Access Building	42 x 37	5
Permanent Control Access Building	Restricted	
Auxiliary Administration Centre	36 x 23	5
Entry Relay Store	37 x 15	5
Medical Centre	40 x 37	5

Building	Indicative Dimensions (m)	Indicative Height (m) from the appropriate platform level
Outage Restaurant	53 x 37	5
Simulator Building/Training Centre	52 x 41	9
Public Information Centre	31 x 30	18
Office Buildings		
Operational Service Centre	91 x 62	36
EDF Site Offices	64 x 64	9
Storage Buildings / Garage		
Radioactive Source Storage	10 x 10	4
Contaminated Tools Storage	45 x 38	0
Conventional Waste Storage	1,240 m^2	0
Garage for Handling Facilities	40 x 24	5
Oil and Grease Storage and Oil Ancillary Building	42 x 24	9
AREVA Warehouse	105 x 38	11
Raw Water Supply and Storage	NA	Underground
Other Buildings		
Sewage Treatment Plant	38 x 16	4
Helipad	46 x 26	0
Meteorological Station	10 x 10	4
Nuclear Island Water Storage Tank	12 x 12	13
Conventional Island Water Storage Tank	30 x 30	13
Temporary Buildings		
Temporary Access Building	37 x 15	4

Building	Indicative Dimensions (m)	Indicative Height (m) from the appropriate platform level
National Grid Substation		
Main Gas Insulated Switchgear (GIS) Hall	90 x 19	15
Portable Relay Rooms (PRR) (x19)	7 x 4 (x19)	4 (x19)
Amenity Building	12 x 8	4

a) Nuclear Island

2.3.2 The design of the Nuclear Island is fixed via the Generic Design Assessment (GDA) process currently being undertaken by the Health and Safety Executive (HSE) and the Environment Agency (EA) which is assessing new nuclear power station designs to ensure they meet the highest standards of safety, security and environmental protection. Detailed information about the nuclear buildings is restricted due to security considerations.

2.3.3 Each of the two Nuclear Islands, will comprise a reactor building and associated safeguard and fuel buildings which share the same foundation raft, comprising an area approximately 7,000m^2. The foundation raft associated for each of the two Nuclear Islands will be shaped like a cross, with the reactor building at its centre and the fuel building and electrical and safeguard buildings at its edges.

2.3.4 Other structures within the Nuclear Island associated with each reactor include:

- the nuclear auxiliary building;
- the diesel generator buildings;
- the waste buildings; and
- an access tower.

2.3.5 The following sub-sections describe these structures in more detail.

i) The Reactor Building

2.3.6 There will be two reactor buildings, each housing a UK EPR reactor, in the centre of each nuclear island, which will also contain the main components of the Nuclear Steam Supply System (NSSS). The reactor building is cylindrical with an ellipsoidal dome approximately 64m in height. The reactor buildings are “double enclosure” structures and consist of a pre-stressed concrete inner containment with a metallic liner, surrounded by an outer reinforced concrete shell. The primary system components are arranged within shielded areas within the reactor building.

2.3.7 The reactor is a pressurised water reactor. It comprises a steel pressure vessel containing the nuclear fuel (reactor core) and four cooling loops, each consisting of a reactor coolant pump and a steam generator. One loop has a pressuriser vessel. **Figure 2.2** provides a schematic illustration of the electricity generation process.

2.3.8 The reactor buildings are described in detail within the Pre-Construction Safety Report submitted to the HSE and Environment Agency in support of the GDA. Other components of the reactor buildings include:

- safety systems and equipment;
- a refuelling water storage reservoir;
- an area for the chemical and volume control system;
- a steam-generator blowdown system;
- main steam lines and main feedwater lines;
- access to the reactor building; and
- access to the containment inter-space.

ii) Fuel Building

2.3.9 Each unit will have a fuel building. The fuel buildings will be located on the same foundation rafts as the reactor buildings and the safeguard buildings. The fuel building houses a fuel storage pool for fresh and spent fuel and associated fuel handling equipment. A vent stack for discharge of gaseous effluent from the nuclear auxiliary building is situated adjacent to the fuel building.

iii) Safeguard Buildings

2.3.10 The major safety system consists of four sub-systems or "trains". Each train is capable of performing all of the necessary safety functions independently. There will be four safeguard buildings per UK EPR reactor unit, each with one train. The safeguard buildings are located on the same foundation raft as the reactor building and fuel building; the four safeguard buildings will be physically separated to prevent simultaneous common-mode failure of the trains. Access to these buildings will be strictly controlled.

iv) Nuclear Auxiliary Building

2.3.11 The nuclear auxiliary building will be built on an independent foundation raft next to the fuel building for each UK EPR reactor unit. This will house the nuclear operation support systems and the maintenance areas. The main systems installed in the nuclear auxiliary building are the following:

- the treatment system for primary effluents;
- the pool-water treatment system;
- the gaseous effluent treatment system;
- part of the steam generator blow-down treatment and cooling system; and
- the operational ventilation and chilled water systems of the nuclear auxiliary building.

2.3.12 All air exhausts from the radiological controlled areas are routed, collected, controlled and monitored within the Nuclear Auxiliary Building prior to release through the stack.

v) Diesel Generator Buildings

2.3.13 There will be two diesel generator buildings associated with each reactor. Each diesel building houses two main diesel generators and station black out diesel generator each dedicated to one of the safeguard trains in the event of a loss of off-site electrical power. The locations of these diesel generator buildings are guided by construction needs, the requirement to meet safety-related geographical separation criteria, including maintenance imperatives and to enable the easy movement of spare diesel engines and other large components in and out of the buildings.

vi) Waste Building

2.3.14 The shared waste building is used for the collection, storage, treatment and disposal of liquid and solid radioactive waste. It is adjacent to the nuclear auxiliary building on the first unit and is designed to serve both units. A waste transfer facility is provided for Unit 2.

2.3.15 The waste building, which is also made of reinforced concrete, will be divided into two sections; one for the storage of solid waste and the other for liquid effluent treatment. The area for storage of solid wastes is made up of a section acting as a reception room for mobile equipment for resin treatment, and a section consisting of a room for storing drums and containers with vehicle access, rooms for controlling drums before export and rooms for the storage of resins.

2.3.16 The resin treatment section also houses a plant for concrete encapsulation and storing aggregates; the rooms containing the waste treatment cooling system; electrical rooms and the effluent treatment building control room.

vii) The Access Tower

2.3.17 The main function of the access tower on each unit is to control and enable access to the Nuclear Island, specifically access to the controlled area via an underground gallery and a higher level access bridge. The building will contain a room for maintaining and decontaminating minor equipment, together with a number of operational and technical rooms.

b) Conventional Island

2.3.18 The Conventional Island comprises the turbine halls and electrical buildings as described below:

i) Turbine Halls

2.3.19 The turbine halls contain the components of the steam-condensate-feedwater cycle, including the turbine and generator set and the main condensers.

2.3.20 The turbine halls are located adjacent to the reactor buildings. The location of each turbine hall in relation to the Nuclear Island is set by requirements to provide protection from turbine missile impact; for routing pipework and inter-unit tunnels; and the need to leave sufficient space for the air intakes of the Nuclear Island.

ii) Safety Unclassified Electrical Building

2.3.21 The Conventional Island's electrical building houses electrical distribution panels, which supply the permanent 10kV to each of the Nuclear Island's four electrical buildings, and the Conventional Island systems, together with the instrumentation and control system which manages and monitors these systems.

iii) Transformers

2.3.22 The power-transmission platform is located adjacent to the turbine hall and houses the following plant items:

- a main transformer;
- step-down transformers;
- a switchroom; and
- an auxiliary transformer platform.

2.3.23 Electricity generated from the turbo-generator is stepped up to 400kV via the main generator transformer and then this power is exported to the National Grid 400kV substation via overhead lines and towers.

2.3.24 Auxiliary transformers are utilised to provide lower voltages within HPC for powering equipment.

2.4 Balance of Plant

a) Cooling Water Infrastructure

2.4.1 The key components of the open circuit cooling water infrastructure are illustrated in **Figure 2.3** and described in more detail below.

i) Forebay

2.4.2 There is one forebay located to the north of each cooling water pumping station. Each is an open 'semi-circular basin' with a diameter of approximately 80m and depth of 31m. The front of the forebay is formed by a reinforced concrete wall. Each intake tunnel feeds directly into the open forebay. Two underground tunnels of 2.5m diameter run parallel with the shoreline and link the forebays of the two units; these are referred to as 'forebay link tunnels'. The link tunnels allow each forebay to be fed with water to satisfy safety system needs when its own intake tunnel is unavailable. In normal operation, one link tunnel is kept open and the other is kept closed. The link tunnels will be at a depth of approximately 14m below Ordnance Datum (OD) to ensure that they remain available at extreme low water level.

ii) Cooling Water Pumphouse

2.4.3 The proposed nuclear power station will be directly cooled using seawater abstracted from Bridgwater Bay. There will be two cooling water pumphouses, one associated with each reactor. The cooling water pumphouse contains equipment supplying cooling water for:

- the Nuclear and Conventional Islands' auxiliary cooling water systems; and
- the condenser cooling system that cools the turbine exhaust steam.

2.4.4 Each cooling water pumphouse is divided into four distinct sectors fed from a common forebay: two central channels which will accommodate the bulk of the flow abstracted and two lateral channels. Each pumphouse will be served by a separate sub-seabed cooling water intake tunnel linking it to off-shore seabed intake structures.

iii) Supply Channels

2.4.5 Each pumphouse has four separate channels:

- two central channels each separated into four waterways (narrow passages), which then recombine before feeding to the two main drum screens, which primarily supply the essential service-water systems and the condenser cooling water; and
- two lateral channels each including a single waterway, fitted with a chain filter (or 'band screen'), supplying the essential service-water systems and the conventional auxiliary cooling water systems.

2.4.6 Each waterway has a fixed grid with a timer/pressure differential-driven trash rake which performs a preliminary coarse screening function, removing larger elements of flotsam and jetsam. Sluice gates may be closed within these waterways in order to isolate elements of the cooling water system for maintenance purposes.

2.4.7 Each drum screen is made up of a horizontal axis drum whose outer circumference contains a fine mesh. Each drum is continuously rotated around its axis with unscreened seawater being introduced within the drum from each flank, and screened water being withdrawn from behind its outer surface. Elevator ledges, aligned on the inner circumference of each drum, lift debris clear of the seawater surface and wash-water sprays then flush that debris to a series of collection gullies. In normal operation the drum screens will rotate at a slow speed but any indication of blockage will increase both the rate of rotation and the flow rate of wash-water.

2.4.8 Each lateral channel incorporates a chain filter, otherwise known as a 'band screen'. Such a screen is made up of a continuous belt of linked mesh plates which are rotated around two horizontal rollers, one positioned at the foot of the waterway and one above, again associated with a wash water and debris collection system. In normal operation these chain filters are rotated periodically but any indication of blockage will result in more continuous use.

2.4.9 The rotational drive system of the drum and chain ('band') screens thus enable marine debris and organisms trapped on their panels to be separated and removed from the cooling water flow.

2.4.10 The supply of seawater to the essential service-water system pumps and the ultimate cooling water system is designed so that if a drum or chain filter stops working, the pumps continue to be supplied.

iv) Filtering Debris Recovery Pit

2.4.11 The plant for managing screen debris is positioned next to the cooling water pumphouse. It consists of a pre-discharge section and a debris recovery pit. The pre-discharge section involves a series of culverts running from the drum screen and chain ('band') screen area to that pit. A skip with a perforated base resting within the recovery pit is used to collect the marine debris, which is then removed off-site for disposal. The washwater minus the debris is then returned to the outgoing cooling water flow via the outfall pond using an Archimedean screw.

v) Outfall System

2.4.12 The outfall system for each unit will have an outfall surge chamber, open to atmosphere, connected to the outlet culvert. Both unit outlet culverts then connect together to an outfall tunnel to a seabed mounted outfall structure.

vi) Cooling Water Intakes and Associated Tunnels

2.4.13 Each of the two reactor units and its pumphouses is served by an intake tunnel, bored deep underground below the intertidal shore and seabed, each having seabed mounted cooling water intake structures.

2.4.14 The current intent is that two seabed mounted intakes will be associated with each of the two cooling water intake tunnels. Although a number of designs are being considered one requirement of the design is that it reduces the likelihood of fish ingress. These intakes will thus utilise a number of measures, including the maintenance of a low flow condition (~ 0.3 m/sec) at the point of intake, despite the high intake volume involved (in total across the two reactor units, 116 to 134 m^3/sec, depending upon tidal condition) and the high tidal velocities normal to this area (~ 1.5 m/sec).

2.4.15 The currently favoured intake design involves a series of rectangular structures, each approximately 10m wide and 30m long, with the longer side aligned to tidal currents and with the intake ports themselves forming a slit along the length of the longer sides.

2.4.16 The intake ports would abstract water laterally, at mid depth, across all states of the tide and, apart from navigational markers, would not protrude above the sea surface.

2.4.17 The current proposal is that this intake design will incorporate long lived copper-rich alloys within the limited areas of low flow in order to combat potential biological fouling risks in that immediate locality, thus negating the need to employ more active control measures such as chemicals at this remote offshore location.

2.4.18 As shown in **Figure 2.4** these structures will be located approximately 3.3km off-shore at a depth of approximately 12 m below Ordnance Datum (OD).

vii) Cooling Water Outfalls and Associated Tunnels

2.4.19 As noted above, both outfall surge chambers are connected by an underground culvert to a single outfall tunnel, bored at depth under the shore and seabed before which then rises to a pair of seabed mounted outfall structures. These structures, which will be aligned in series offshore, will each discharge a proportion of the outgoing cooling water at approximately mid depth in the water column with a horizontal vector directed offshore. The top of this structure may become visible at the lowest astronomical tides but, otherwise, apart from navigational markers, would not protrude above the sea surface.

2.4.20 As shown in **Figure 2.4** these outfall structures will be located approximately 1.8 km off-shore at a depth of approximately 10m below OD.

b) Attenuation Pond

2.4.21 An attenuation pond will be provided to the north of the HPC Development Site; the volume is of the attenuation pond has been determined by the requirement to accommodate infrequent flood events.

c) Demineralisation Station

2.4.22 A demineralisation station will be provided on site to process raw water delivered via the local water authority mains; this demineralised water will be used in the UK EPR reactor.

d) Auxiliary Boilers

2.4.23 The auxiliary boilers for both UK EPR reactor units are located in a single building adjacent to Unit 1 and remote from the Operational Service Centre.

e) Hydrogen, Oxygen and Chemical Products Storage

2.4.24 There will be two gas storage buildings for hydrogen, nitrogen, oxygen and other process gases, and a chemical products storage building on site. These are all remote from the Nuclear and Conventional Islands.

f) Waste Water Treatment Building

2.4.25 The waste water treatment building includes a containment tank, a settler and oil separator. This building ensures polluted effluent, including effluents following fires or accidental spillage to roads, is not discharged in the environment. The containment tank allows time for analysis and treatment of effluent before discharge. The function of the settler/oil separator is to isolate and separate oil-contaminated water following any incidents or spillages, before discharging only treated water in the effluent water discharge system.

2.5 Buildings related to Management of Spent Fuel, Radioactive Waste and Conventional Waste

a) Spent Fuel Interim Storage Facility

2.5.1 The Spent Fuel Interim Storage Facility provides safe and secure underwater storage of spent fuel until it is transferred from site. The Spent Fuel Interim Storage Facility consists of a pool, or pools, housed in a seismically qualified building. Spent fuel assemblies are placed in storage racks, located at the bottom of the pool(s), which are designed to be resistant to movement. Whilst in storage, water cooling and clean-up systems remove the heat generated by the spent fuel assemblies and maintain water quality. Throughout the operational life of these facilities an inspection and monitoring regime will be implemented to ensure that fuel is safely stored. The pools are lined with welded stainless steel plates and have leak detection and collection systems to ensure that there is no unplanned release of radioactivity to the environment.

2.5.2 The location of the Spent Fuel Interim Storage Facility is adjacent to the Intermediate Level Waste (ILW) building in order to facilitate security zoning during operation and decommissioning.

b) Intermediate Level Waste Storage Facility

2.5.3 ILW generated during the operational phase will be placed in an Interim Storage Facility (ISF) which will be designed to be in operation for at least 100 years. ILW generated during the 60 years of UK EPR operation will be conditioned and packaged in the waste building before transfer to the ISF. The Interim Storage Facility will provide interim storage for all ILW pending removal to a final disposal facility.

c) Low Level Waste Storage Facility

2.5.4 Low Level Waste (LLW) generated during the operational period from both the reactors and the associated auxiliary plant will be transferred to the waste building for segregation, treatment and preparation for disposal. It is intended that all LLW will be transferred off-site to the most appropriate facility for its treatment or disposal. Waste containers awaiting transfer off-site will be placed in buffer stores comprising of a sorting area and interim storage before collection and off-site disposal.

2.5.5 Further details on the management of spent fuel and radioactive waste are provided in Chapter 6 of this volume.

d) Conventional Waste Storage

2.5.6 A conventional waste storage building, which will be used to sort and store waste prior to being transported off-site will be located to the west of the site.

2.6 Ancillary Buildings

2.6.1 There are a number of ancillary buildings located across HPC including security buildings, training centres, offices and storage facilities. These are summarised in Table 2.2 below.

Table 2.2: Summary of Ancillary Buildings and their Function

Building Type	Building(s)	Description
Entrance Buildings	Access Buildings	Main and Permanent Control Access Buildings
	Auxiliary Administration Centre	Multifunctional building that includes ancillary facilities for operational staff and administration.
	Entry Relay Store	Facility for receiving small packages or deliveries. The building is positioned near the site entrance and straddles the double fence so as to enable deliveries to be made without entering the secure area.
	Medical Centre	Building to be used to monitor the health and well-being of the workforce during construction and the operational lifespan of the nuclear power station. This building will include decontamination facilities.
	Outage Restaurant	Facility for the preparation, serving and consumption of meals for personnel during the operational lifespan of the power station.
	Simulator Building/Training Centre	A combined facility for the training of nuclear plant operatives. The building houses a replica of the control room to stimulate normal and abnormal conditions within a controlled environment.
	Public Information Centre (PIC)	Facility to help inform the general public and other interested parties about the nuclear process of producing electricity and its infrastructure. The PIC is located outside the site security fencing scheme, but inside the site boundary.
Office Buildings	Operational Service Centre	Multi-purpose building that is the operational service centre for the power station. It accommodates access areas to the Nuclear Island, storage areas, workshops and storerooms, laboratories, offices, the plant documentation centre, and associated support and welfare facilities, including the staff restaurant.
	EDF Site Offices	Office facilities for site personnel during the construction period and continued usuage during periods of outage when the station is operational. The EDF Site Offices are located to allow easy access to and from the site.
Storage Buildings	Radioactive Source Storage	Facility to store low activity sealed radioactive sources used for the calibration of metering equipment and non destructive testing of equipment for metallic elements.

Building Type	Building(s)	Description
	Garage for Handling Facilities	Building used for the garaging of special handling equipmment and vehicles throughout the operational period.
	Oil Ancillary Building, and Oil and Grease Storage	Building for the storage of oil and grease during operations. The building will also accommodate the vehicles for the transfer of the oil to the required locations.
	AREVA Warehouse	Warehouse to be used by Areva during the construction phase. After the construction phase, it is proposed to be retained as a heavy load storage facility throughout the lifespan of the nuclear power station.
	Contaminated Tool Storage	Store for contaminated tools
	Conventional Waste Storage	Store for conventional waste
	Raw Water Supply and Storage	Facility to be used both during the construction phase and once the power station is operational. During the operational phase it will provide a balancing (buffer) tank for the raw water supply from the local water authority and will also supply raw water to downstream users.
Other Buildings and Facilities	Permanent Sewage Treatment Plant	Facility to process domestic effluents. The permanent sewage treatment is located near to the service water pump of Unit 1.
	Helipad	Helipad to allow authorised overflying for operational safety or security reasons.
	Meteorological station	Facility for housing environmental monitoring and recording equipment.
	National Grid 400kV substation and Connection to the National Grid transmission system	Facility to connect the nuclear power station to the National Grid. Further details provided in **Section 2.8** below.
	Car parking	Facilities for site personnel and visitors. Further details provided in **Section 2.10** below.

2.7 Fencing, Lighting and Other Security Features

2.7.1 The site layout and security features have been guided by the Nuclear Industries Security Regulations (NISR) 2003 (as amended), Guidance to NISR 2003 and the Technical Requirements for NISR 2003.

2.7.2 Under NISR 2003, operators of licensed nuclear sites must have site security plans approved by the Office of Civil Nuclear Security (OCNS). These plans detail the security arrangements for the protection of nuclear sites, nuclear and other radioactive material and sensitive nuclear information on such sites. These arrangements cover for example, physical security protection features such as fencing, CCTV, access controls, intruder alarms and the roles of security guards and of the Civil Nuclear Constabulary.

2.7.3 Security fencing and associated lighting will be provided around and within the site as required by the site security plan.

2.8 Transmission Infrastructure

a) National Grid 400kV Substation

2.8.1 A new substation will be installed to the south-east of the permanent development. This will comprise an 18-Bay 400kV Gas Insulated Switchgear (GIS) double busbar substation, consisting of:

- Six feeder bays with air/gas bushings;
- Two series inductor bays with air/gas bushings;
- Two bus coupler bays;
- Three main bus section bays;
- One reserve bus section bay;
- Two skeletal generator bays and two skeletal station auxiliary transformer bays; and
- Gas Inusulated Busbars (GIB) to connect the switchgear to the overhead line and cable circuits.

2.8.2 The substation compound is contained within 3.5m high electrified pulse palisade security fencing and will occupy an area of 182m x 143m (2.6ha) with an east-west orientation. The substation will be accessed by a single access point at the north east corner of the compound via two padlocked steel gates. An internal tarmac roadway extends around the periphery of the compound along the eastern, northern and western sides to facilitate vehicular access for delivery, removal and maintenance of plant and equipment. Car parking within the compound is provided in designated spaces for six vehicles. Areas not tarmaced will be dressed with stone chippings.

2.8.3 There are two main buildings within the substation compound, the largest 90m long, 19m wide and 15m high accommodating the GIS (main hall). This building is a steel frame structure clad with aluminium, the roof being a flat profile made of aluminium cladding. Immediately abutting the main substation building are 19 portable relay rooms (PRR). The PRR's will be approximately 7m long, 4m wide and 4m high. These are distributed in three blocks over an area approximately 121m long.

2.8.4 A separate single story administrative building at the east end of the substation compound is provided for office, messing and toilet facilities. This building will be 12m long, 8m wide and 4m high, is steel framed and clad in aluminium with a flat profile roof made of aluminium cladding. The substation is normally unmanned, being controlled and monitored remotely by National Grid from their Electricity National Control Centre, apart from when plant maintenance is undertaken.

b) Permanent Development Overhead Lines and Connection to the National Grid

2.8.5 Four overhead line gantries will be sited along the southern side of the substation compound to facilitate the transition from overhead line to gas insulated busbar and subsequent through wall entry into the switchgear building. These four line entries form connections to the main interconnected transmission system at Taunton and Bridgwater-Melksham. Two further overhead line gantries will be sited along the eastern boundary of the substation compound and will form the overhead line interconnection with the existing Hinkley Point B 400kV Air Insulated Switchgear (AIS) substation.

2.8.6 At the centre of the northern end of the compound there are three single phase oil cooled windings or inductors and associated radiators/cooler banks. These inter-bus inductors act to limit possible fault currents within switchgear ratings for specific busbar configurations. Each inductor is connected through sections of GIB into the main GIS building. Also on the northern side of the compound are two overhead line landing gantries to transfer connections between the generator transformers and the substation and two underground cable circuits to connect the auxiliary transformers to the substation..

2.8.7 To facilitate connections between the proposed substation and the national grid high voltage transmission system the overhead line landing gantries along the southern and eastern boundaries of the substation site will connect via overhead line to three overhead line terminal towers (pylons) approximately 48m high.

2.8.8 Modifications to the existing overhead line network beyond the terminal towers to the south east of the substation will also be required and will form part of a separate Development Consent Order application by National Grid.

c) Access to the Substation

2.8.9 Access into the substation site will be via a new access spur constructed from the existing power station access road.

2.9 Coastal Protection

2.9.1 An existing sea wall fronts the eastern part of the HPC Development Site, including the existing Hinkley Point A and B power stations. A new sea wall is required along the shoreline fronting the proposed Hinkley Point C site to prevent cliff erosion and reduce the degree of wave overtopping on the operational site itself. This will form a continuation of the existing sea wall.

2.9.2 The levels involved in both setting the height of this sea wall and the (higher) platform levels to landward have taken into account both anticipated nuclear safety case needs and current UK and site specific understandings of climate change.

2.9.3 The new sea wall will be approximately 760m in length and as illustrated in **Figure 2.5** will comprise:

- a gravity, mass concrete, vertical wall in place of the existing cliff line in order to protect the proposed new nuclear development from cliff erosion;

- rock protection at the foot of the sea wall in order to protect the foundation of that structure from scour and beach lowering;
- a parapet located at the crest of the sea wall to provide a further increment of protection to the coastal footpath lying immediately behind this from wave overtopping; this will include a handrail or other similar safety-related feature; and
- ramped and stepped beach access/egress points.

a) Integration with Existing Seawall and Topography

2.9.4 The sea wall will have a crest height of 13.5m AOD. At its western end, the sea wall will turn through 90° inland and run for approximately 50m at the design crest level of 13.5m AOD. The length of return was calculated using an assumed rate of erosion of 0.1m to 0.5m per annum. This part of the sea wall will also retain the land (to be levelled at approximately 14m AOD), with the ground further inland varying between this level and the existing topography.

2.9.5 At its western end the sea wall will turn through approximately 20° inland to form one side of the access ramp. The topography change at this location will also be blended into the sea wall. For a further 50m beyond the western end of the sea wall, rock would be positioned along the foot of the existing cliff to provide extra scour protection.

b) Toe Scour Protection

2.9.6 Scour protection is needed at the sea wall's toe. The design in **Figure 2.5** indicates a typical rock toe cross-section situated in the foreshore in front of the vertical sea wall. The design is based on the assumption that the rocks must be freestanding and provide a standard of protection allowing for 100 years of sea level rise. Scour protection would comprise a geotextile layer overlain by crushed rock.

c) Structural Design

2.9.7 The sea wall has been appropriately designed to form a continuation of the existing Hinkley Point A and B stations sea defence and to be aligned to the current cliff alignment. The smoothly curved sea wall will not present an obstruction to existing mechanisms of substrate transport along and across the foreshore areas.

2.9.8 The design would meet the 100 years design life requirement whilst minimising encroachment onto the foreshore and the need for long term maintenance. It would, however, require excavation for the removal of approximately a 5m depth of the existing upper shore.

d) Access Ramp

2.9.9 At the western end of the sea wall, a new 5m wide ramp will be provided for maintenance access to the foreshore. It would have a half-way hair-pin bend. The public footpath would pass behind the ramp.

e) Drainage

2.9.10 Positive drainage behind the sea wall would be necessary to reduce sliding and overturning forces from the groundwater and potential wave overtopping, and reduce the scale of the sea wall. The current drainage concept would include perforated upper and lower collector pipes behind the sea wall, with connections between them approximately every 10m.

2.9.11 It is intended that the drains would feed, under gravity, into the main outfalls for discharge to the front of the sea wall.

2.10 Access and Parking

a) Access Arrangements

i) Site access

2.10.1 The existing access road into the Hinkley Point Power Station Complex will also be the main access for the proposed development. Two roundabouts are proposed along this route. The first to the east of HPC will provide access to site personnel and deliveries. The second, to the south-east of the Southern Construction Phase Area will provide access to the southern part of the HPC Development Site during the construction phase, and during the operational phase will provide an alternative means of access to HPC, including public access to the PIC.

ii) Emergency Access Road

2.10.2 In addition, it is proposed to construct an emergency access road from the south of the HPC Development Site as an alternative means of accessing HPC and is only required for use in exceptional circumstances such as for the emergency services to respond to an incident at the power station. It is not intended to be used during the construction period and the requirement to use the road during the operational period is expected to be infrequent. The public highway route for this emergency access is proposed to be from Shurton to the A39 via Stogursey Lane.

2.10.3 The design of the road shall have a load capacity sufficient for the largest/heaviest emergency vehicles and shall have sufficient passing places to allow incoming and outgoing emergency vehicles to pass. The roadway shall be of low-maintenance design, suitable for occasional use and compatible with the proposed landscaping of the surrounding area. There is no requirement for kerbs, footpaths or lighting along the road, but the design shall provide adequate indication of the edges of the road and the location of passing places. The elevation of the road shall be no less than 10m AOD and sufficient land drainage shall be provided to preclude the possibility of flooding making the road impassable.

2.10.4 There shall be locked gates at the ends of the access road where it joins roads open to general use. The gates shall be sufficient to prevent unauthorised access of motor vehicles. Separate provision may be made for pedestrian access, where required.

2.10.5 Where the emergency access road crosses Bum Brook, a bridge shall be provided sufficient to allow the largest/heaviest emergency vehicle to cross. The design of the bridge, as illustrated in **Figure 2.6**, shall present minimal resistance to floodwater flow in order to avoid exacerbating the flooding potential of Bum Brook.

iii) Internal road layout

2.10.6 A ring road around the major buildings provides the main road access within the HPC site and is supplemented by additional roads as necessary.

iv) Car Parking

2.10.7 A car park for operational staff will be located to the south-east of the HPC site, adjacent to the substation. This will comprise 500 car park spaces for operational staff.

2.10.8 In addition, a second permanent car park comprising 500 parking spaces will be provided for planned ‘outage’ (i.e. maintenance) purposes.

2.10.9 A further smaller car park will be provided to the east of the site to replace the existing Hinkley Point Power Station Complex overflow car park. Disabled parking will be included within the car parking provision.

2.11 Public Rights of Way and Bridleways

2.11.1 The landscape strategy detailed in **Section 2.12** provides access to the restored landscape by local residents and walkers. The proposed landscape strategy has been designed to accommodate a network of public rights of way (PRoW) and link with Somerset County Council's Public Rights of Way Plan. Green Lane will be stopped up during construction and will be upgraded to a bridleway following the construction period.

2.11.2 The existing footpath will be maintained along Bum Brook. This will provide access for streamside walks. The coastal footpath will be integrated into the proposed sea wall. All footpaths will be well managed, kept clear of vegetation and clearly signposted. The proposals for the PRoW consider the needs of less able people. Self-closing bridle gates are proposed rather than stiles, to avoid creating barriers.

2.12 Landscape Proposals

a) Landform

2.12.1 Landscape proposals provide for the retention of all suitable excavated material to be retained on-site for use as backfill and incorporation into the landscape strategy. This reduces the need to dispose of the material off-site and minimises the potential impacts on the road network. As illustrated in **Figure 2.1** the landscape strategy aims to recreate the existing landform through the following principles:

- maintain the relative height and prominence of the Green Lane ridge through landscape design which ensures the southern landform will be no higher than 35m AOD;
- use landform for visual mitigation, including coastal screening with landforms to the west at a height of no more than 35m AOD;
- create a culvert for Holford Stream with a wide, gently sloping shallow valley above;
- support required land uses e.g. gentle slopes for arable agricultural land; and
- create a smooth transition between the HPC Development Site and adjacent land e.g. the Eastern Lowlands and Wick.

b) Land Use

2.12.2 The land use proposals, outside the built development, have been guided by the aspiration to link to the existing landscape character of the Quantock Vale landscape sub-characteristics, which include:

- the Eastern Lowlands field patterns, deciduous woodlands, hedgerows and hedgerow trees;
- Wick Moor grazing marsh;
- the cliffs, wave cut platforms and coastal flora;
- linking of woodlands across Quantock Vale; and
- an increased amount of woodland in the area, thus contributing to the Woodland Strategy for Somerset.

2.12.3 As discussed in **Chapter 21** of this volume, the landscape character restoration for the HPC Development Site will comprise:

- a coastal slope field pattern character, recreated with hedgerows and hedgerow trees, a mix of grazing and arable land and neutral grassland, and a scrub edge to the cliffs and hedgerows;

- Retention and enhancement of the Green Lane hedgerow through additional planting;
- Holford Valley field pattern character recreated with hedgerows and hedgerow trees, and species rich grassland; and
- land to the north-west of the HPC Development Site is proposed to be returned to Fairfield Estates following the construction period.

2.12.4 Further details on the provision of different land uses and habitat types to be created following construction of HPC, but excluding the built development areas, are provided in Table 2.3 below.

Table 2.3: Summary of proposed land uses and habitat types within the landscape strategy

Land Use/ Habitat Type	Existing Area (ha)	Proposed Area (ha)
Areas		
Arable	97.0	8.8
Broad-leaved scattered trees	0.4	1.8
Broad-leaved woodland	7.0	27.8
Dense Scrub	1.0	5.5
Improved Grassland	30.0	0.0
Poor Semi-improved Grassland	17.0	0.0
Semi-improved neutral grassland/ Neutral hay meadow	0.0	45.0
Calcareous Grassland	4.6	12.3
Standing Water	0.02	0.08
Swamp	0.0	0.3
Linear Features		
Native Species-rich Hedgerow	2.4	2.5
Species-poor Hedgerow	1.0	0.0
Watercourses	0.7	0.6
Dry ditch	0.1	0.0
Arable Conservation Headland	0.0	1.3

c) Ecological Mitigation and Habitat Creation

2.12.5 The proposed landscape strategy for the land to the south and west of the built development area will be managed for biodiversity, landscape and amenity.

2.12.6 The landscape restoration strategy has been designed to provide habitat suitable for the protected species currently found on the Development Site including badgers, a range of bat species, and slow-worms. This includes a mosaic of semi-natural habitats to accommodate a wide range of native species, including increased areas of wetland habitats and calcareous grassland.

2.12.7 In addition, enhancements are proposed to benefit farmland birds and include the sowing of a field of annual bird cover crop, providing winter feed. Bird boxes will be installed across the site including boxes specifically for barn owls. Planting will include plants which provide seeds and berries suitable for foraging birds. Scrub planting will provide nesting habitat for birds.

2.12.8 Further details of proposed ecological mitigation and enhancements are provided in **Chapter 17** of **Volume 2**.

2.12.9 It is proposed that the Holford Stream culvert is maintained after the construction phase to allow for excess material from the ground terracing and construction phase to be retained on-site and used within the landscaping of the Southern Construction Phase Area, and the area to the west of the built development area.

d) Southern Landscape Bund

2.12.10 A landscape bund will be established in the south east of the site as part of the construction of the accommodation campus, which is expected to commence around mid 2012. The main purpose of the bund is to provide an environmental buffer between the campus and the nearest property at Doggets Farm. This will give some noise attenuation and reduce the visual impact of the campus from Doggets and Shurton to the south. The bund will be in the region of 5m high and will be planted with trees and vegetation as appropriate. The design of the bund will be assimilated with the existing landform. It is the intention to incorporate the landscape bund into the final restoration scheme following construction of the power station and removal of the campus. The south face of the bund will be maintained and vegetation growth with the north side being incorporated into the final restoration levels of the restored site. The location of bund is illustrated in **Volume 2 Figure 3.4.**

2.13 Construction Activities

2.13.1 This section describes some of the key construction activities and uses necessary to build the plant including:

- Earthworks and Ground Terracing
- Surface Water Drainage
- Construction of the Temporary Jetty
- Sea Wall Construction
- Workers accommodation campus

a) Earthworks and Ground Terracing

2.13.2 In order to accommodate the built elements of the development, a number of level platforms will need to be created. These platform levels have been determined by engineering requirements and in part, on the basis of the need to minimise the potential risk of flooding. The proposed platform levels for HPC are as follows:

- the main platform comprising the Nuclear and Conventional Island to be 14m AOD;
- the National Grid substation platform to be 14m AOD; and
- the ancillary platform including the Public Information Centre, simulator building/training centre, and outage facilities to be around 20m AOD.

2.13.3 The construction method for the earthworks will vary according to whether the materials are soft, hard or rock and suitable or not for backfilling. The different methods are outlined below:

- softer, superficial deposits occurring over the flatter and gently undulating parts of the site, will be excavated, loaded, transported, and tipped using scrapers.
- harder materials will be excavated by ripping, which uses single or multiple digging points fixed to heavy tractors or excavators to loosen rock which is closely jointed or is transitional between soil and rock. It is unlikely that ripping will be required for mudstone or highly weathered rock, but it may be required to deal with areas where limestone bands and less weathered mudstones occur.
- rock mass can be loosened by blasting or the use of rock breaking equipment. Blasting is not suitable for final trimming of excavated areas to formation level, so hydraulic rock breakers will be used. Alternatives to blasting include the use of impact hammers, hydraulic splitters and expansion compounds.

2.13.4 It is anticipated that approximately 4.4 million cubic metres of ground materials generated during the excavation and ground terracing works. All the excavated material will be loaded into articulated trucks for transportation to where it is required as fill material or to be stockpiled in the Southern Construction Phase Area for later use. Excavated material to be used as fill will be graded and compacted. This will be achieved by using bulldozers with attachments placing the transported soil in layers and then used to pull vibratory rollers to achieve the required degree of compaction to the transported soils.

b) Surface Water Drainage

2.13.5 In order to reduce the amount of surface water, the existing surface drainage will be modified through the introduction of a strategic series of attenuation ponds and installation of underground drains and culverts that avoid open water flows within the HPC Development Site.

i) Attenuation Ponds

2.13.6 A series of attenuation ponds will be created across the HPC Development Site; these will not exceed a depth of approximately 3m, and the bottom basin will be fairly flat with a shallow slope (no greater than 1 in 100) towards the outlet to maximise contact of run-off with vegetation and prevent standing water from developing.

ii) Drainage

2.13.7 During the construction period the drainage proposals provide up to three temporary spine drains to serve the built development areas east and west. It is anticipated that these spine drains will be north-south aligned and be located parallel to the proposed internal haul roads; these will collect the surface water run-off from the northern side of the site (i.e. run-off north of the Green Lane) and drainage from buildings (e.g. construction site offices) and routed north before discharge into Bridgwater Bay in a controlled manner. Following consultation with EA and Natural England, further options are being explored which may comprise a single outfall at one of two possible locations. During this period trenches for the new spine drains will be excavated to the correct line and level using mechanical excavators.

2.13.8 The drainage in the Southern Construction Phase Area will be divided into three main areas, ultimately controlled to greenfield run-off rates. The area to the west will be routed to an outfall into a new culvert to be constructed along Holford Stream Valley. The central Southern Construction Phase Area will be drained to a water management area to the immediate north of Bum Brook, comprising a number of attenuation ponds via which flows will be effectively controlled prior to discharge into Bum Brook. Thirdly, run-off from the eastern catchments in the Southern Construction Phase Area will be routed to a water management zone to the east of this area in which flows will be attenuated via a series of attenuation ponds, prior to controlled discharge into Holford Stream.

iii) Holford Stream Culvert

2.13.9 The Southern Construction Phase Area will be required to accommodate stockpiled materials from the ground terracing works, workshop and storage facilities and workers accommodation campus. To facilitate these land requirements the Holford Stream valley area will need to be made available, and land will be subject to extensive re-profiling to maximise the usable area. This requires that the existing ground, through the Holford Stream valley is filled to a higher level; therefore the existing drainage network of Holford Stream valley will need to be culverted to allow the existing catchment on the western side of HPC to continue to flow towards Wick Moor to the east.

2.13.10 It proposed that works to culvert Holford Stream will commence with existing flows being intercepted by a reinforced concrete inlet structure to divert the surface water. Trenches for the culvert will be excavated to the correct line and level using mechanical excavators.

2.13.11 The proposed culvert will then be constructed and will comprise a pre-cast reinforced concrete structure that will be manufactured off-site and laid on a suitable in-situ foundation. The internal dimensions of the culvert are likely to be in the range of 2.0m to 4.0m square. This size will allow man access for maintenance rather than reducing the size and needing to provide access chambers at 90.0m along the length of the culvert. The culvert will be suitably screened to ensure no unauthorised access. A reinforced concrete outfall structure will be constructed at the downstream end of the culvert to facilitate the surface water flow back into Holford Stream.

c) Construction of the Temporary Jetty

2.13.12 Construction of the jetty will be carried out in two stages. The majority of the construction will take place during the first stage and includes construction of the principal access bridge infrastructure, the jetty root and the on-shore facility. The construction of the jetty will mainly use marine based plant, but land based plant may be used for works for the jetty root. It will also include dredging of the berthing pocket. The second stage will mainly comprise the expansion of the jetty head (see **Figure 2.7** and **Figure 2.8**).

i) Approach Bridge

2.13.13 During the early stages of the jetty construction, the approach bridge will be constructed from steel tubular piles driven some 4m to 5m into the bedrock layer of the sea-bed. The installation method is anticipated to be either a drill and drive technique or pre-drill and socket technique. With the drill and drive approach, the pile is seated onto the rock head, a drill is then inserted down the pile shaft and a hole drilled into the rock mass, the pile is then driven into the hole, the hole is then extended and the pile is driven further into the hole until the required penetration is achieved. This technique will generate a degree of piling noise but is not anticipated to create much in the way of bed disturbance. With the pre-drill and socket approach, the rock is pre-drilled over size and the pile is concerted or grouted into the pre-drilled socket.

2.13.14 The piles located on the foreshore will be installed using land-based plant gaining access via a temporary ramp cut into the cliff and along a pre-determined and managed route across the beach. The piles beyond the foreshore will be installed from a jack-up barge. Once the piles are driven, concrete cross heads will be placed across the piles. It is anticipated that the bridge deck construction will be placed from cross head to cross head.

2.13.15 The lighting columns for the bridge will be supported on the concrete cross head and installed from the completed bridge deck.

ii) Jetty Head

2.13.16 Steel tubular piles will be used to support the jetty head and dolphins will be driven in a similar manner and extent to those installed for the bridge. Pile installation will be undertaken in the water from a jack-up barge.

iii) Berthing Pocket

2.13.17 A 2m deep berthing pocket will be dredged adjacent to the jetty head to produce a local sea-bed depth of approximately 4.3m below Chart Datum (CD); this will allow berthing and unloading operations to take place over the tidal range without vessels grounding. The berthing pocket will be dredged using conventional dredging plant.

2.13.18 Approximately 20,000m^3 of dredged material would need to be disposed of. The ground information indicates that the dredged material would comprise superficial deposits (i.e. silts). Options for silt removal are currently being explored and include:

- placement of materials on the adjacent sea-bed as part of the construction process; and
- recovery of materials to a waiting barge or other storage facility and transport and deposit at an off-shore disposal ground.

iv) Jetty Root and On-shore Facility

2.13.19 The steel tubular piles to support the jetty root will be driven in a similar manner and extent to those installed for the access bridge using land-based plant. For the on-shore facility, works will be undertaken for the development of the formation level and drainage. The cement storage silos/buildings will be appropriately designed and constructed and the surrounding area will be completed with concrete paving to allow vehicular access to the storage areas.

2.13.20 Minor piping and conveying foundations will also be installed to link with the jetty root to allow the off-loading of aggregates and cements into the correct storage area.

v) Material Handling Equipment

2.13.21 It is anticipated that the cement pipeline and aggregate conveyor will be fixed on to the pre-fabricated steel truss structure units prior to installation onto the piled cross heads using marine plant. Service supply to the jetty will also be alongside the conveyor. It is intended to install a full length walkway along the route of the conveyor and pipeline in order to provide access for maintenance and repairs, and to provide a general walkway route from the jetty head to root.

vi) Construction Site Compound

2.13.22 Since the works will commence off-shore, it is possible that the compound will be based on a jack-up platform off-shore. Once the works commence on-shore, it is likely that another compound will be established within the HPC Development Site.

d) Operation of the Jetty

2.13.23 It will be used principally during the main construction works phase associated with the Hinkley Point C development. Its usage will reduce as Unit 1 becomes operational and will essentially cease in advance Unit 2 becoming operational.

2.13.24 The peak concrete production for the Hinkley Point C development is anticipated to be in the region of 30,000m^3 per month, which will occur during placing of the concrete for the reactor buildings together with other site works. On this basis, it is estimated that the following peak monthly volumes of materials need to be accommodated by the jetty:

- cement – approximately 10,500 tonnes;
- sand – approximately 21,000 tonnes; and
- stone – approximately 36,000 tonnes.

i) Vessel Types and Numbers

2.13.25 It is anticipated that vessels will include self discharging dredgers and cement carriers. Whilst the selection of operational vessels will be made by the works contractor, it is estimated that the following vessel parameters need to be accommodated by the jetty:

- 5,000 dead weight tonnes (dwt); and
- cement carriers: 2,500 – 5000dwt.

ii) Vessel Berthing and Departure

2.13.26 It is proposed that vessels will berth on a rising tide and approach the berth as soon as there is sufficient depth of water for the required under keel clearance. Vessels will always try to approach the berth with the head facing into the wind and / or current (whichever is the stronger) as this enables greater vessel control and manoeuvrability.

2.13.27 The vessel will depart the berth during an ebb tide with the current in an east to west direction. There will be some water disturbance due to propeller and thruster wash during these manoeuvres.

iii) Vessel Movements

2.13.28 The full assessment of vessel capacities, duration alongside and volumes required is yet to be completed; however, monthly delivery figures suggest a total of approximately 16 vessels or 32 vessel movements will be required per month (i.e. arrival and departure) for aggregates and cement. Additional movements will take place for other bulk deliveries.

iv) Timing of Operations

2.13.29 At present, it is assumed that vessels will be able to berth 24 hours a day subject to the tide and weather limits.

2.13.30 It is estimated that a minimum of four shore linesmen will be required for berthing the vessels and two to three people will be required for the unloading operation (depending on the type of shore discharging arrangement).

v) Material Handling Operations

2.13.31 Self-discharging sand dredgers will be utilised to supply the aggregate and cement for concreting. The aggregate will be discharged via the hopper onto the jetty conveyor and hence to the on-shore stockpiles.

2.13.32 On-shore, the conveyor continues to the distribution conveyor which feeds the stockpiles. It is anticipated that the stockpiles will contain about one month's supply of aggregate to help mitigate against berth downtime due to adverse weather and sea conditions. Surface water run-off due to rainfall will be managed as part of the on-shore facility's drainage network system including, as necessary, sand / silt separation using catch pits or separators.

2.13.33 The cement will be off-loaded from the vessel using the on-board discharge pump and hose and fed to a receiver / booster on the jetty deck. The cement pipeline on the access bridge will deliver the cement on-shore to the cement silos.

vi) Maintenance

2.13.34 During the service life of the jetty and associated equipment, a degree of maintenance will be required. It is considered that the main area of maintenance will be mechanical and electrical associated with the conveyor and cement pumps/pipeline. Such maintenance will be undertaken locally to the facility unless significant replacement of equipment is required.

2.13.35 Should it be necessary to replace significant pieces of equipment during the first stage, access will be gained from marine plant. At the second stage the adjacent bridge will be utilised with equipment being off-loaded and craned into position.

e) Sea wall Construction

2.13.36 The construction of the sea wall will take place on two fronts commencing with excavation works starting from the cliff top, and also excavation works from the foreshore. Following excavation, concrete pouring in-situ will take place from the foreshore and cliff top to create the sea wall's lower and upper mass concrete walls. In addition, rock backfilling works will take place from the cliff top to backfill behind the sea wall and rock placement will take place from the foreshore to form scour protection for the sea wall's toe.

i) Excavation of the Cliff

2.13.37 Cliff excavation will be carried out by excavators from the foreshore. Hydraulic cutting and/or hammer equipment will be used for rock excavation. Excavated material will be placed and stored at dedicated locations on the fields behind the cliff. Where suitable, this material will be re-used for grading and as backfill material behind the sea wall and, possibly, ground terracing.

2.13.38 The next step will be to construct the sea wall's footing and base. Depending on the option taken forward through detailed design and into construction, construction could include the use of shuttering and in-situ concrete pouring from the haul road and/or the use of pre-cast concrete units.

2.13.39 Following this, material will be excavated from the ground in front of the line of the sea wall to create the space for the toe and scour protection. Excavation will require the use of excavators. All excavated material will be placed and stored at dedicated locations behind the cliff. Assuming it is suitable, this material will be re-used for grading and as backfill material behind the sea wall.

2.13.40 In order to protect the sea wall from scour effects a geotextile layer will be placed at the sea wall's toe, crushed rock and rock armour. Construction plant will include the use of hydraulic lifting plant positioned on the foreshore and the haul road.

ii) Construction of the Sea wall

2.13.41 Construction will take place from the cliff top and foreshore. Rock will be required to construct the sea wall. This will be imported from a suitable source by sea. It is anticipated that three barge loads of rock will be delivered at high tide and stockpiled on site. Approximately 50,000 tonnes of rock will be required, assuming six tonnes per rock and approximately ten rocks per metre along the length of the sea wall.

2.13.42 Under the current design, concrete will be poured in-situ from the adjacent haul road initially (i.e. for the foundation and base) and then from the cliff top or foreshore as the sea wall becomes higher. Concrete will be poured into steel or wooden shutters to create the sea wall's shape. It is anticipated that concreting works will take 150 days on the basis that they will be constructed in 5m long sections and that it will take about one day to construct one section.

2.13.43 Following the concrete pour, backfill material will be placed behind the new concrete sea wall using excavators positioned on the cliff top. Backfill material will comprise the material excavated from the foreshore and cliff, which may have to be broken down to suitable size prior to placement. Permanent access steps and a ramp will be also constructed.

2.13.44 Once the construction of the sea wall has been completed, the coastal footpath and boundary fence will be reinstated.

f) Accommodation Campus

2.13.45 EDF Energy is also proposing to erect a temporary accommodation campus on land in the south east of the HPC Development Site. This will comprise the following:

- accommodation for 700 construction workers and facilities for a mix of other uses including catering facilities, a medical facility, indoor sports and gym facilities, a retail shop, laundrette and other uses;
- a new access route to the north-east of the accommodation campus;
- recreation and sports facilities; and
- landscaping.

2.13.46 The accommodation buildings will be designed to provide accommodation rooms to include a bed and a small private lounge. The standard room size will be around $14m^2$, with provision for a larger room space at each of the ground floor levels to accommodate residents with disability requirements.

2.13.47 The other campus buildings are proposed to accommodate ancillary facilities to support the workers whilst they are living at the site. These will be provided as flexible spaces to include a range of facilities such as a café, small shop and medical facility. A full description of the on-site accommodation campus is given in the Masterplan: Accommodation Campuses document.

2.14 Lighting Strategy

2.14.1 The primary objectives of the lighting strategy shall be to achieve the following:

- provide a safe working environment;
- target lighting at where it is required;
- avoid over illumination;
- minimise upwards lighting;
- minimise light spill to neighbouring areas; and
- minimise energy consumption.