HORIZON NUCLEAR POWER

WYLFA NEWYDD

ENERGY WORKING FOR BRITAIN

Wylfa Newydd Project

6.4.17 ES Volume D - WNDA Development App D1-1 - Construction Method Statement (Track Change Version - Revision 2.0 against Revision 1.0)

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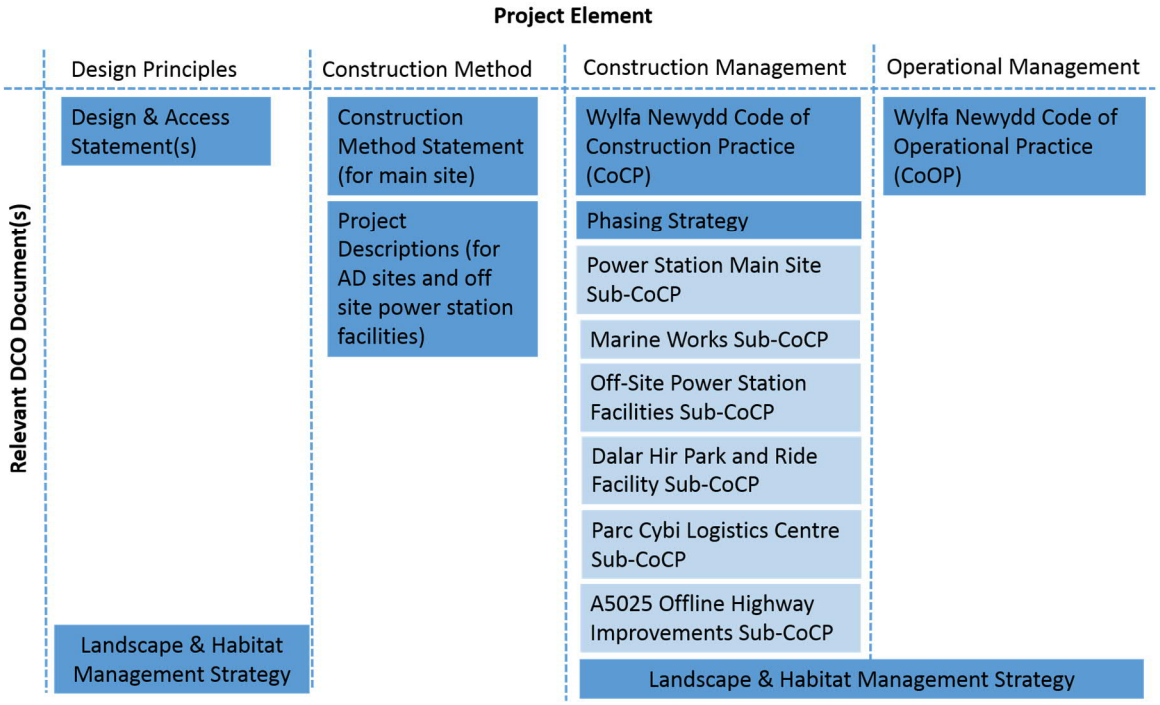
1 Introduction

1.1 Purpose

1.1.1 This Construction Method Statement (CMS) sets out the construction methodologies, works and machinery required for constructing the Power Station. A description of the physical characteristics and functions of the Power Station during the construction is contained within chapter D1 (proposed development) (Application Reference Number: 6.4.1).

1.1.2 The CMS forms part of a suite of documents which support the DCO application for the Wylfa Newydd Project. In addition to the CMS, the control documents listed in Figure 1-1 establish the framework for the construction and operation of the Wylfa Newydd Project.

Figure 1-1 DCO control documents



1.1.3 The following geographical areas are referred to:

- **Power Station Site**: The indicative areas of land and sea (145 hectares) within which the majority of the permanent Power Station buildings, plant and structures would be situated; and
- **Wylfa Newydd Development Area**: The indicative areas of land and sea (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.

- **Wylfa Newydd Development Area 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.

1.1.4 The scope of this document is as follows:

- **Section 2** describes the key phases of the construction of the Power Station Site and an overview of the construction programme.
- **Section 3** describes the construction works that would be undertaken to facilitate the construction of the Power Station.
- **Section 4** describes the methods used to construct the Marine Works.
- **Section 5** describes the construction works that would be undertaken to facilitate the construction of the Site Campus.
- **Section 6** describes the construction works that would be undertaken to facilitate the construction of the other on-site development.
- **Section 7** describes the removal of the temporary structures and infrastructure required during construction.
- **Section 8** presents an overview of the health and safety arrangements.

1.2 Environmental management

1.2.1 The Wylfa Newydd Code of Construction Practice (CoCP) (Application Reference Number: 8.6), together with the associated location-specific Main Power Station Site and Marine Works sub-CoCPs (Application Reference Numbers: 8.7 and 8.8), set out the general and topic-specific requirements for managing the environmental effects of the construction works, which are described in the CMS. As such, those requirements are not repeated in this CMS.

1.3 Limitations

1.3.1 This CMS describes the main construction works to be carried out across the Wylfa Newydd Development Area only. It excludes construction methodology for the Offsite Power Station Facilities (consisting of the Mobile Emergency Equipment Garage, Alternative Emergency Control Centre and the Environmental Survey Laboratory (see volume E1, Application Reference Number: 6.5.1); Park and Ride (see volume F1 proposed development, Application Reference Number: 6.6.1); A5025 Off-line Highway Improvements (see volume G1, Application Reference Number: 6.7.1); and Logistics Centre (see volume H1, Application Reference Number: 6.8.1).

1.3.2 The methodologies identified in the CMS have been used as the basis of the assessment reported in the Environmental Statement. The construction of

the WNDA Development would be undertaken in general accordance with the CMS. Some aspects of the construction methodology may vary slightly as the project develops, but not so much as to give rise to any materially new or materially different environmental effects from those assessed in the Environmental Statement.

1.3.3 This CMS is not intended to describe the construction of all buildings and structures of the WNDA Development. The CMS provides general construction methods that have been used for assessment purposes within the Environmental Statement.

2 Key phases and strategic construction programme

2.1 Introduction

2.1.1 This section identifies the key elements of the construction on the WNDA Development and explains the overall project construction programme. Schedule 3 of the draft Wylfa Newydd (Nuclear Generating Station) Order includes a requirement that construction of the Wylfa Newydd Project must be carried out in general accordance with the phasing and construction methodologies set out in this document. The Phasing Strategy (Application Reference Number: 8.29) outlines when key embedded mitigation (i.e. Park and Ride) across the Project shall be sequenced and operational.

2.1.2 The Power Station Site comprises construction of the following:

- **Power Station:** the proposed new Nuclear Power Station at Wylfa, including two UK Advanced Boiling Water Reactor, 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:** comprising:
  - Permanent Marine Works: the Cooling Water System, the Marine Off-Loading Facility (MOLF), breakwater structures, shore protection works, 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, perimeter and construction fencing.

2.2 Construction phasing

2.2.1 The key construction phases of the project are set out below.

Site Preparation and Clearance (SPC) Works

2.2.2 SPC Works consist of the following.

- Site establishment including:
  - temporary construction site compound and car parking, security buildings, control room, access/egress and gatehouse;
  - material storage areas;
  - temporary construction fencing around the perimeter of the site;
  - security fencing for SPC Works site compound area and satellite compound;
  - ecology fencing; and
  - ~~watercourse realignment of a small stretch of the existing small watercourse (Nant Caerdegog Isaf).~~
- Management of PRoWs, roads and accesses, including: management and guidance for PRoW footpath users, ensuring their safety near site works; temporary closures of Cemlyn Road to enable boundary wall/fence removal; plant and traffic crossing the Existing Power Station Access Road for ingress/egress between north/south land parcels; formalising two existing agricultural accesses across Cemlyn Road.
- Vegetation clearance and excavations including targeted removal of most above ground vegetation to ground level.
- Clearance of other features including targeted removal of above ground features e.g. gates and poles; and demolition of walls and buildings to ground level.
- Remediation and land management including: establishment of Remediation Processing Compound (RPC) for contaminated land remediation; installation of temporary haul route for dedicated access between contaminated site and RPC; remediation of land that is known to be contaminated; waste management and material storage/ management; management of vegetation after grazing ceases; eradication/removal of identified Invasive Non-Native Species (INNS) and INNS impacted soils; ecology translocation of known species from within the perimeter fence to on- and off-site locations.

Main Construction Works

2.2.3 Main Construction includes:

- Contractor mobilisation including:

  - expansion of existing contractor compounds developed during the SPC Works;
  - induction training and security checks for new workers;
  - preparation and approval of construction environmental management plans prepared by the contractor in accordance with Horizon's CoCP and sub-CoCPs;
  - preparation and approval of method statements;
  - temporary buildings providing office space and workforce welfare facilities;
  - watercourse realignment of a small stretch of the existing small watercourse (Nant Caerdegog Isaf).
  - the creation of a site compound near to the MOLF; and
  - satellite temporary construction facilities.

- **Site access and security** including: the establishment of a secure construction site with security controls for people, equipment and materials entering and leaving the site.
- **Earthworks** including topsoil and subsoil stripping and storage, bulk earthworks and deep excavations;
- **Tunnels** comprising two Cooling Water (discharge or outfall) tunnels, each approximately 1.1km in length.
- **Marine Works** comprising the Cooling Water System, Cooling Water System intake, and outfall, MOLF, breakwater structures, shore protection works, drainage outfalls, fish recovery and return system, fish deterrent system, navigation aids, dredging, temporary cofferdams, a temporary access ramp, temporary outfalls and a temporary barge berth.
- **Power block** including reactor building, control building, turbine building, service building, heat exchanger building and radioactive waste building.
- **Site Campus** comprising modular type accommodation blocks and associated buildings and services.
- **Ancillary buildings, structures and features** including office buildings, outage building, and waste and recycling facilities (conventional and hazardous waste building and conventional waste storage compound) site infrastructure (roads, parking, fencing and lighting) and landscaping. Some elements would be permanent, whilst others are only provided during construction and these are captured in section 6.2.
- **Utilities** including temporary and permanent utilities.

Dismantling of temporary structures and landscape restoration works

- **Dismantling of temporary structures** and removal of temporary infrastructure (used for construction purposes).
- **Landscape restoration** following the removal of temporary construction facilities.

2.3 Project Construction Programme

2.3.1 Illustrative construction phasing plans or 'time slices' are included in annex A and represent a high-level view of site activity post DCO consent at key points in the projects construction timeline. The final time slices show the final overview of the Commercial Operation Date (COD) and final landform. Table 2-1 outlines the main works occurring at each time slice and progress on site.

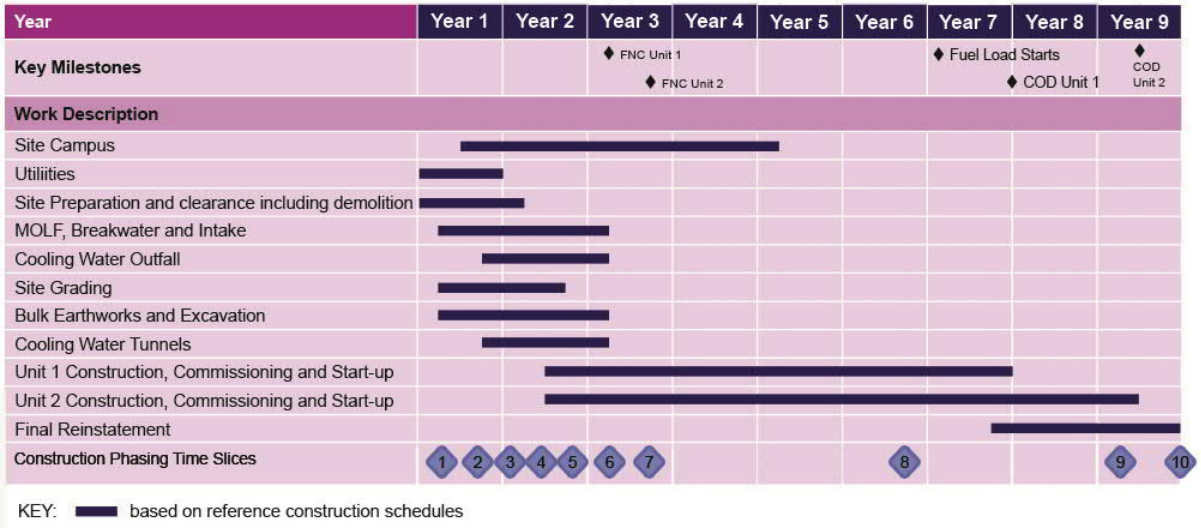
Table 2-1 Phasing plans construction works

Time slice (TS)	Construction stage
TS1	SPC
TS2	Six months following completion of SPC
TS3	Site grading
TS4	Deep excavation and platform creation
TS5	Completion of blasting
TS6	First Nuclear Construction (FNC) Unit 1
TS7	FNC Unit 2
TS8	Power plant construction
TS9	Units 1 and 2 operational
TS10	Commercial operation

2.3.2 The indicative construction timeline for the works in the Wylfa Newydd Development Area is included as Figure 2-1. The construction programme will continue to develop as the scope requirements for both the construction works and commercial operation are developed.

2.3.3 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.

Figure 2-1 Indicative construction timeline for the Wylfa Newydd Development Area



3 Construction Methodology for the Power Station

3.1 SPC Works

3.1.1 SPC Works are intended to facilitate the later construction works. The key tasks associated with the SPC Works are presented in time slice 1 (annex A).

Vegetation clearance

3.1.2 The clearance of vegetation would comprise the following:

- Targeted removal of vegetation, mostly above ground or to ground level.
- Tree felling would be carried out in accordance with good practice, as presented in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7).
- The trees would have the branches removed and chipped. The wood would be cut to manageable sizes, and be removed off-site to a recycling or biomass facility in north Wales.

Clearance of other features

3.1.3 The clearance of other features would comprise the following.

- Targeted removal of above ground features e.g. gates, poles and posts.
- Clearance of walls and buildings to ground level only with any foundations and other subterranean features left for removal during the bulk earthworks.
- A mobile elevated work platform would be used to access the roofing and slating of buildings; roofing felt would be removed to uncover the structure, rendering it uninhabitable for bats, under conditions set by a Bat European Protected Species Licence (EPSL) where required. Once clear of bats, a permit would be signed off to allow the main demolition of the structure.
- The demolition of dry stone walls would take place by hand in conjunction with a loadall telehandler. A team of ground workers would move the stone walling into the front bucket for loading into a dumper for transporting to the material storage compound. The materials resulting from these demolition works would be stored at designated locations for either reuse or subsequent removal to an appropriate facility.
- An Ecologist~~/~~ / Environmental Clerk of Works (ECoW) would review progress on the dry stone wall demolition on a regular basis and

during the works. If it becomes apparent that reptiles are not present, or are only present in hedge banks adjacent to areas of high quality habitat such as semi-improved grassland, scrub and woodlands, then the working method would be changed to reflect this. This method would only target hedge banks with a high likelihood of supporting reptiles. Those adjacent to areas of arable or improved grassland (considered to provide poor habitat for reptiles) would be removed by construction machines without requiring an ECoW to be present.

- Asbestos Containing Materials (ACM) intrusive surveys would be necessary in some buildings when vacated. Horizon's contractor would employ a specialist asbestos removal company to carry out further surveys and for the removal and disposal of ACM. Horizon would arrange all ACM removal activity including the appropriate means of temporary storage, transportation and disposal.
- Materials envisaged to arise from the demolition activities would be listed and quantified in a pre-demolition audit. It is expected over 90% of the buildings would be recycled with the timber, plastics and steel being taken off-site to recycling yards and the brick and stone being recycled on-site and stored in the various material compounds.
- Soft strip activities would generate timber, pipework, plasterboard and wiring, all of which would be placed in separate skips. Mechanical demolition would be carried out by an excavator equipped with a hydraulic grab capable of placing different materials in appropriate skips as work proceeds. Ultimately, there would be only masonry/brick left which would be processed for reuse on-site.

Watercourse realignment

3.1.4 The watercourse realignment would include the following measures:

- Water voles would be trapped and translocated away from the area of the watercourse realignment. Water vole fencing would also be installed along the northern and southern boundaries of the watercourse realignment and landscaping area, preventing the re-entry of this species during the realignment works. The fencing would be removed once the works have been completed, allowing this species to once again access this area.
- Vegetation (including shrubs and trees) identified for retention, to be protected from damage using suitable temporary fencing, and vegetation identified for removal to be removed prior to the start of watercourse realignment works.
- Excavation/stripping of topsoil from the area identified as the proposed channel realignment route.
- The new watercourse alignment would be excavated to form 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, and allowed to establish vegetation cover before flows are diverted.

- Construction of upstream and downstream tie-in sections would use soft bank protection.
- Backfilling of the redundant watercourse with clean uncontaminated material dug from excavation on-site.
- Top dressing of section of backfilled watercourse.
- Connection of the existing pond to watercourse by a shallow scrape.
- Creation of proposed wetland area, including two ponds.

3.1.5 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) Where practicable, the watercourse realignment works would be undertaken when flows are low. Appropriate consents would be obtained, such as European Protected Species Licence for the water vole. All consents and licences being applied for are listed within *Details of Other Consents, Licences and Agreements* (Application Reference Number: 5.4).

3.1.6 It is anticipated that these civil engineering works would take around two to four months to complete with subsequent landscape planting and ecological habitat formation works being undertaken up to 12 months prior to diverting the flow of water from the existing watercourse. The key features of the watercourse realignment are presented in Figure 3-1.

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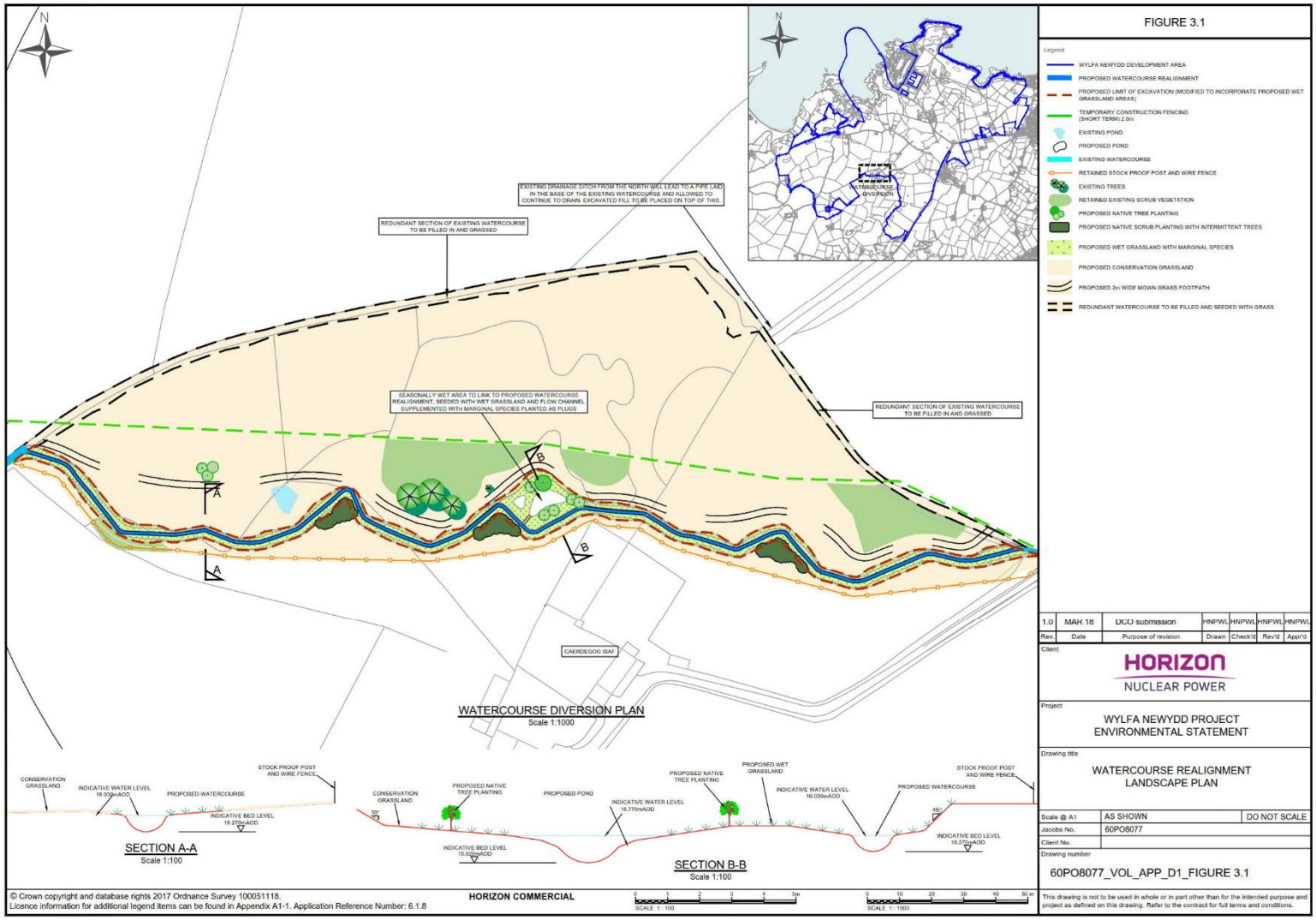
Figure 3-1 Watercourse realignment



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Remediation and management

3.1.7 The remediation of contaminated soils and INNS would be undertaken in accordance with good practice, as outlined in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7). It would comprise the following.

- Establishment of the RPC for contaminated land remediation (time slice 1 in annex A).
- Installation of temporary haul route for dedicated access between contaminated sites and RPC.
- Remediation of the sump area known to be contaminated with Trichloroethylene (TCE):
  - The proposed approach would be to pump the sump dry with the contaminated water passing through clarifiers, oil and water separators and filtered through a granular activated carbon pod.
  - The sump residue would be removed using an excavator and transported to the RPC.
  - Validation sampling would be undertaken on the excavated soils prior to re-use within the landscaped mounds.
- Remediation of land that is known to be contaminated with asbestos:
  - The proposed approach would involve the excavation and treatment of identified soils by a specialist asbestos contractor. The proposed method of works would be to use a tracked hydraulic excavator to excavate/scrape to a depth where the material was identified in the surveys, then continually progress vertically and laterally until visible asbestos is removed. Where any visible ACMs are encountered these would be excavated from the face. Any larger ACMs would be removed and placed in a designated quarantine area for off-site disposal.
  - The excavated material would be transported to the RPC. The material would be loaded into a screen to remove oversize fragments including pieces of cables, lumps of concrete etc. The oversized material would then be checked for fragments of asbestos and if none are present would be put into an area for selective reuse as fill material on-site, subject to testing with the results being below the hazardous waste threshold. The remainder of the screened material would be subject to controlled handpicking of asbestos fragments over a conveyor belt system. All fragments of asbestos from screening and handpicking (to reduce the asbestos in soils to less than 0.1% by wet weight) would be contained and packaged for disposal at an appropriately licensed facility off-site.

- Where processed material is tested and confirmed to contain less than 0.1% asbestos on a wet weight basis, it would be removed to the asbestos processes material storage area where material would be placed on top of a geomembrane and compacted in layers to form remediated soil storage mounds. These mounds would measure up to 3m, with a side gradient of 1:3. A non-woven geotextile used for separating contaminated/uncontaminated soils would be placed over the processed material and covered with an inert capping material up to 600mm thick. This material would remain in a temporary stockpile until the bulk earthworks commences, after which it would be incorporated into the landscaping associated with the Wylfa Newydd Project and capped with a suitable thickness of inert material.
- The remediation works would be subject to continuous air monitoring and testing by a certified P403 (Asbestos Fibre Counting) and P404 (Air Sampling and Clearance Testing for Asbestos) analyst, who would be on-site to carry out fibre monitoring to confirm threshold limits are kept to acceptable levels.
- On completion of validation, the excavation sites would be progressed into bulk earthworks.

- Eradication/removal of identified INNS and INNS impacted soils would be assessed and treated in accordance with the following hierarchy and corresponding method.
  - Herbicide programme *in situ*. This method consists of environmental visits to the site periodically to spray known INNS to ensure they are contained.
  - Removal of affected pond silts to stockpiles and reuse as topsoil (aquatic species). This method consists of excavation of all pond silts showing evidence of INNS presence. The excavated material would be contained and transported to RPC for treatment.
  - Removal of affected soils to stockpiles/permanent locations and reuse with cultural controls (terrestrial species). This method consists of excavation of material *in situ*, contained and transported to RPC where it is treated with chemicals.
  - Removal of affected soils to treatment areas for further herbicide treatment (terrestrial species). This method consists of excavation of material in a controlled zone and transported to the RPC where it would be placed either in a 600mm thick layer on geotextile on the existing ground, or in a 600mm thick layer on top pf the processed asbestos material where it would be used as

cover material. In both situations the contaminated soil would undergo a course of herbicide treatment.

3.1.8 Japanese Knotweed would be managed in general accordance with the Japanese Knotweed Code of Practice [RD1].

3.1.9 Areas where contaminated soils have been excavated, would be backfilled with suitable clean inert materials such as that derived from the demolition of buildings and structures during site clearance.

3.2 Main Construction

Contractor mobilisation

3.2.1 Contractor mobilisation would commence after Development Consent Order is granted. It would involve multiple contractors, under the control of the Engineering, Procurement and Construction (EPC) contractor to meet the demands of the early construction works.

3.2.2 Contractor mobilisation works include the following items.

- Preparation and approval of method statements for the work to be undertaken, to include safety, environmental, quality and regulatory aspects.
- Delivery/installation and testing of key temporary construction plant, such as excavators, marine construction vessels and cranes.
- Expanding and establishing further environmental monitoring as set out in the Wylfa Newydd CoCP (Application Reference Number: 8.6) and Main Power Station Site sub-CoCP (Application Reference Number: 8.7).
- Installation of site offices and welfare facilities and as described in section 6.1.

Earthworks

3.2.3 Earthworks consist of:

- topsoil and subsoil stripping and storage;
- bulk earthworks; and
- deep excavations.

3.2.4 Topsoil and subsoil stripping and storage is required to segregate reusable topsoil and subsoil that would be suitable to provide new final layers for final landscaping when bulk earthworks are complete. Bulk earthworks are required to help achieve new permanent ground levels to suit the design of the permanent nuclear works and ancillary facilities. Deep excavation works are required to achieve a foundation depth for nuclear construction works.

Topsoil and subsoil stripping

3.2.5 Topsoil and subsoil stripping would commence after Development Consent Order is granted, across most of the Wylfa Newydd Development Area, following SPC Works and be undertaken in accordance with good practice as presented in the Main Power Station Site sub-CoCP (Application Reference Number: 8.7).

3.2.6 These works would be undertaken in a phased manner with topsoil and subsoil stripped shortly ahead of bulk earthworks to minimise exposed areas as far as practical.

3.2.7 Topsoil and subsoil stripping would take place using conventional mechanical earthmoving methods, most likely consisting of excavators to remove soil material which would then be transported to local stockpiles using dump trucks.

3.2.8 Once bulk earthworks are complete in areas, soil would be transported from the appropriate stockpiles using dump trucks and placed at its final reuse location within the landscape mounds using low ground pressure bulldozers, excavators and graders. On placement of soils, appropriate methods of de-compaction and preparation before seeding would occur using mechanical plant and agricultural machinery such as towing a till behind a tractor. This would break up the surface of the soil sufficiently to promote water infiltration prior to seeding.

Bulk earthworks

3.2.9 Earthworks would generate in the region of nine million cubic metres of excavated materials. A proportion of this would be used as backfill and to create the construction compounds, haul roads and some would be used when creating the Power Station building platform. The remainder would be used within the Wylfa Newydd Development Area to create an appropriate landscape setting for the Power Station and help to mitigate potential noise and visual effects.

3.2.10 Bulk earthworks would commence after Development Consent Order is granted, within year 1, and would take place across most of the Wylfa Newydd Development Area, following SPC Works (see time slices 2 to 5, annex A).

3.2.11 Temporary construction works would be required to achieve the revised ground levels/mounding. This would include the construction of temporary construction drainage, temporary sediment ponds/pumping systems/ dewatering, haul roads as well as some temporary bridging to create improved access to areas of the site (see section 6).

3.2.12 The excavation approach (site grading) would be mechanical excavation for general soil and weathered rock. For hard rock, this would be achieved through ripping rock fracturing and blasting.

3.2.13 As site grading and excavation is undertaken, a number of mounds would be created at the north-east, east and south-west of the site. These mounds would be used both as temporary storage for future material use across the

site (for example for backfill and filling laydown areas once they are no longer required) and to screen the construction site from local communities (see time slices 3 to 10, annex A).

3.2.14 Initial activities include topsoil and subsoil strip from the footprint of earthworks structures. Construction of the initial screening mounds is a priority, using materials gained from topsoil stripping and initial excavations. The area of mounding adjacent to the local community of Tregele would be constructed first for the purpose of visual and noise screening (acoustic bund). The screen mounding north-east of mound A, east of mound B and the whole of mound E would be constructed in the early phase of each mounding construction (see time slice 3, annex A).

3.2.15 Site grading would occur from north to south. The proposed sequence for site grading begins with the area adjacent to the Marine Works and Units 1 and 2 construction area, and finally the eastern and western laydown areas, future mound B and D footprints respectively.

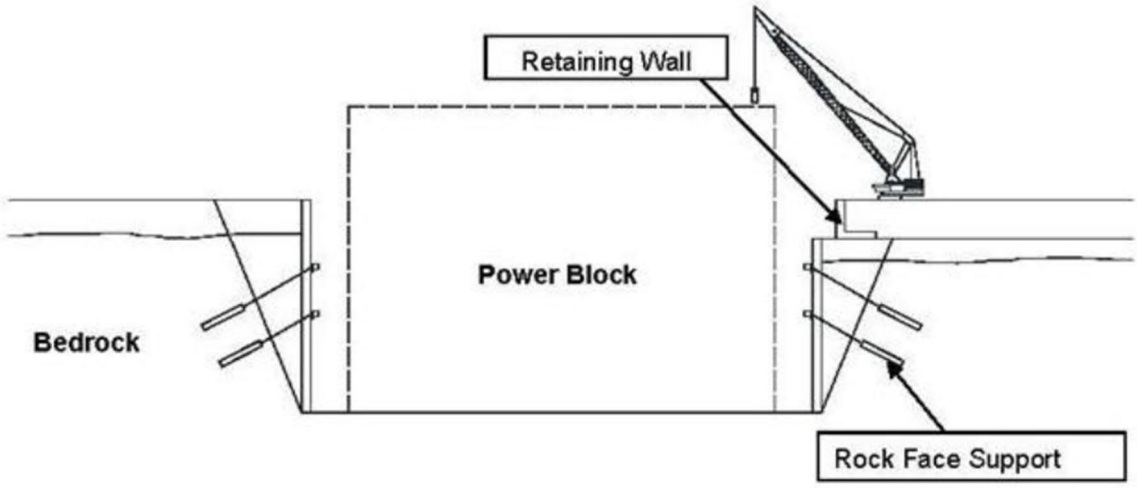
Deep Excavations

3.2.16 Deep excavation would commence after Development Consent Order is granted, within year 1, and would follow bulk excavation works (time slice 2, annex A).

3.2.17 The deep excavation works for the power blocks, i.e. Units 1 and 2, would consist of rock fracturing, rock excavation, and rock face support (using techniques such as shotcrete, rock bolts and ground anchors). In addition, a retaining wall may need to be constructed along part of the perimeter to support the ground at the appropriate platform level for the mobile crane working area. A simplified drawing of the power block excavation is included as Figure 3-2.

3.2.18 The rock faces in the power block area would be drilled and blasted to the final depth. The material may be removed in benches to support equipment and personnel access for excavation face preparation. Rock face support works, shotcrete, rock bolting and ground anchoring, may be executed at every temporary bench layer.

Figure 3-2 Power block excavation



3.2.19 The anticipated rock fracturing/excavation working procedure may be as follows, although this methodology might be refined as the design developed.

- Pre-split blasting would be carried out along the perimeter of the excavation area to full depth of the excavation to reduce damage on the rock surface and reduce vibration outside the excavation area.
- Sink blasting to loosen bedrock and bench blasting proceeding in layers followed by excavation until the appropriate level is achieved.
- Bench blasting would be carried out in layers for each excavation depth and many blocks wide to complete the full building excavation.
- Once side bench excavation is completed, side wall support would be provided by progressively installing shotcrete, rock bolts and ground anchors around the deep excavation areas.
- To finish the excavation at the building foundation, mechanical excavation using a hydraulic breaker mounted on a backhoe excavator, or road planer would be utilised in order minimise disruption to the foundation bedrock. The thickness of finishing excavation is assumed to be 0.5m.

3.2.20 The blasting process would be designed to ensure that relevant vibration thresholds are complied with, as set out in the Wylfa Newydd CoCP (Application Reference Number: 8.6), Marine Works sub-CoCP (Application Reference Number: 8.8) and Main Power Station Site sub-CoCP (Application Reference Number: 8.7).

3.2.21 Rock processing facilities would undertake the processing of all excavated materials during construction to recycle excavated materials into usable engineering materials for use in the works, which might consist of recycling

concrete or haul road materials, or crushing rock for reuse within the works. Rock processing would be undertaken within areas of the Wylfa Newydd Development Area to suit the sequence of works. However, for the purposes of assessment, two rock processing area have been assumed, one located immediately west of the power block area and one immediately east of the power block.

3.2.22 Where practicable, excavated material would be used for backfilling of the excavations as the buildings are constructed, requiring careful quality control in the segregation of materials going to the stockpiles. To achieve the size and performance standards required for backfilling, a material processing facility would be used. Where excavated material proved insufficient or unsuitable for backfill, appropriate granular fill material would be used.

3.2.23 The deep excavations would require dewatering.

3.2.24 Pre-splitting of all deep excavations would commence after site grading of the power block area. First bench blasting would take place to intake channel. Excavation for Unit 1 and Unit 2 would commence simultaneously and progress across multiple faces, followed by second bench blast and pinning.

3.2.25 The majority of rock fill would be used to complete the eastern and western laydown areas (see time slice 3, annex A). Rock material from excavations in the areas of deep excavation would be stored temporarily in mounds.

Dewatering

3.2.26 The water ingress into deep excavations would generally be due to rain, surface water and groundwater. This would be removed by pumping, after initial treatment at source, into a surface water drainage system (temporary or permanent drainage systems), with ultimate discharge to the sea. If more detailed geotechnical information shows that ground water inflow would be significant, a suitable well point dewatering system or other ingress reduction system would be installed as required, discharging into the surface water drainage system. The surface water system would be designed to allow for this additional capacity when further development of the requirements and further design of the deep excavation and dewatering requirements is undertaken.

Excavation of other features such as culverts and building foundations

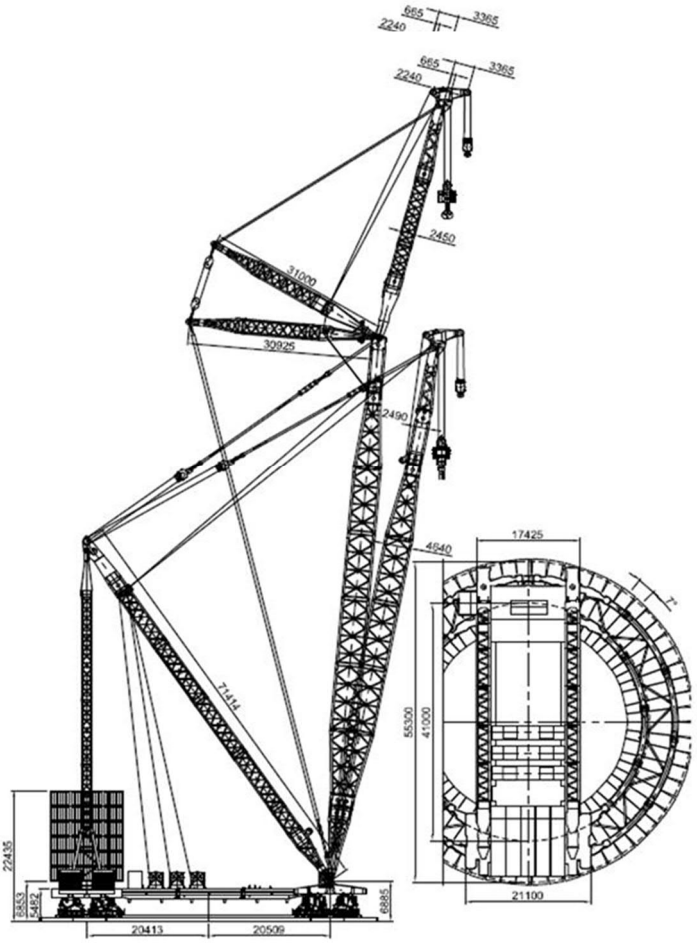
3.2.27 Redundant buried features such as culverts under roads and building foundations which were not removed during the SPC Works, would be removed during bulk earthworks by mechanical excavators and reused where practicable. Excavation of new features such as culverts and building foundations would be carried out in rock were possible as part of the bulk earthworks, in the superficial material areas this would be undertaken as required to suit the programme. These features would be excavated using conventional mechanical earthmoving methods or as part of the blasting works, where appropriate.

Construction of the power block

3.2.28 The power block contains the reactors and power generating plant and equipment and is to be constructed within the deep excavation. Materials would be supplied to the power block workface via a sequence of tower cranes and mobile cranes on the perimeter of the excavation or within the excavation. Cranes would initially arrive to site by road until the construction of the MOLF is complete, it is likely that the remaining cranes would arrive by sea.

3.2.29 The construction of the power block buildings would also rely upon Very Heavy Lift (VHL) crane/s (Figure 3-3) to assist in lifting key prefabricated module components into the deep excavation and then to assist with construction of above ground structures. The VHL crane would have a crane jib lifting to around 270m above ground level.

Figure 3-3 Typical section and plan view of very heavy lift crane



3.2.30 Some of the larger prefabricated modules that would be lifted using the VHL include pre-assembled reinforcing modules and include:

- Reinforced Concrete Containment Vessel (RCCV) lower liner estimated at 330 tonnes;

- RCCV upper liner module estimated at 170 tonnes; and
- RCCV top slab module estimated at 550 tonnes.

3.2.31 The power block building structures are constructed of reinforced concrete. Once the pre-assembled reinforcing modules and other reinforcing is fixed the concrete would be placed/poured. The concrete would be mixed on-site using the site concrete batching plant (see time slice 4, annex A).

3.2.32 The construction method and sequence proposed for the key power block buildings is for the civils contractor and mechanical and electrical contractor work concurrently. The construction method proposed is a combination of conventional and common construction practices used alongside methods developed in previous construction projects. Large modules and combined packages of mechanical and electrical equipment would be loaded into part completed rooms. In this approach the buildings are constructed floor by floor, the walls are erected, the mechanical and electrical plant is lifted into the room in a temporary arrangement, and then the roof floor slab (forming the floor for the next level) is poured. Once the roof floor slab has strengthened, the equipment would be placed, piping and electrical systems would be installed in sequence on each completed floor as the civils works continued above. This process would then be repeated floor by floor, room by room, lift by lift until the final top roof slab is poured. The steel roof structure would then be installed. Not all rooms or all floors would be constructed this way, some floors and rooms would be built in a more conventional manner depending on complexity and ease of installation.

Electrical infrastructure

3.2.33 Electrical infrastructure includes the following works to facilitate the provision of temporary electrical supplies for use during construction:

- National Grid (NGET) 132kV connection, which would be derived from the NGET 132kV substation adjacent to the Power Station.
- Installation of a Construction Electrical Supply (CES) substation, including 132kV to 11kV transformer, switchgear, and associated plant, apparatus, buildings and support structures.
- 11kV ring mains circuits to provide electrical supplies to the temporary construction facilities, including the Workers Accommodation Campus.

Materials

3.2.34 Suppliers and products achieving sustainable sourcing standards would be encouraged for material groups currently covered, including cement and steel, concrete pipes and blocks, windows, flooring, roof tiles, plastics and wood products. Sustainable sourcing standards can be achieved through schemes such as ISO14001 and ECO Reinforcement. Also through compliance to the Navigate system standards platform used by Horizon contractors, and compliance with Sedex ethical Auditing systems.

Bulk fill

3.2.35 Ground condition and contamination surveys, together with detailed design and modelling of the civil and ground works, would inform the cut/fill arrangements and any need for export or import of materials. A strategy to minimise the extent of import/export would be implemented, including on-site stockpiling of material where appropriate. Subject to availability of materials of suitable quality and sufficient quantity, it is anticipated that regional/mainland UK sourcing would be achievable.

Aggregates

3.2.36 It is anticipated that aggregates for the purposes of main building construction would be from a single source so as to maintain quality and consistency. However, the final strategy for aggregates is still to be determined. It is anticipated that these would be sourced from the mainland UK and the majority of this material brought to site by sea through the MOLF as part of the wider bulk materials delivery strategy. After offloading, these would be stored on-site in a buffer area of sufficient size to maintain continuity of production of the concrete batching plant.

Cementitious materials

3.2.37 The majority of this material would brought onto site via the MOLF. It is anticipated that this would be stored in silos, connected to the concrete batching plant, in sufficient quantities to provide continuity of production. Opportunities for recycled aggregates and cement replacement would be considered where possible.

Timber

3.2.38 The use of timber on-site would be closely monitored to optimise reuse where practicable. The responsible sourcing of timber is to be promoted, with a commitment to use only sustainably sourced timber. It is anticipated that sourcing locally within the UK can be prioritised, accepting that some European sourcing may be required.

Nuclear plant and components

3.2.39 The majority of the main reactor and power island plant components and generation plant would be sourced directly from Japan and brought to site via the MOLF. Those components not sourced from Japan could come from any other country both inside and outside of the UK, and brought to site via the MOLF or road, depending on the origin of the components.

3.2.40 The RCCV liners would be brought to site early in the construction programme and is one of the first deliveries to the MOLF. The RCCV liners would be fabricated on-site within temporary buildings to provide protection from weather. The fabrication location would be adjacent to the power block buildings and/or in a construction laydown area.

4 Construction Methodology for the Marine Works

4.1 Marine Works

4.1.1 Marine Works construction would comprise:

- Cooling Water outfall ~~tunnels~~structure;
- Cooling Water intake and outfall;
- temporary access ramp;
- temporary barge berth;
- temporary cofferdam and southern causeway;
- removal of the temporary works (temporary cofferdam and temporary southern causeway);
- dredging and excavation;
- shore protection;
- western and eastern breakwaters;
- MOLF which provides two purpose-built quays:
  - bulk quay; and
  - Ro-Ro quay.
- layby berth; and
- pontoon.

4.1.2 A large number of plant and equipment would be required for the construction of the Marine Works. The primary plant and vessels would include jack up platforms, a variety of cranes, barges for the transportation of material, drilling rigs, dredgers, work boats and safety boats, and land-based equipment such as excavators and cranes. The key features of the marine facilities are presented in Figure 4-1.

Cooling Water outfall tunnels

4.1.3 Two Cooling Water outfall tunnels are required to discharge heated water from each of the two Units. The two tunnels are each approximately 1km in length and approximately 7m in diameter for most of the tunnel length (see time slice 6, annex A). The two tunnels are constructed adjacent to each other and consist of straight and curved sections. The tunnels would incorporate a length of cut-and-cover excavation (discharge channel) and a length of mined tunnel. These lengths would be determined by ground conditions as the design develops.

4.1.4 The Cooling Water outfall facility is required as a discharge point for the cooling water outfall tunnels. The outfall facility would consist of tunnel outlets (one for each Unit) arranged in parallel, and a common concrete

apron. The outfall facility would require a temporary cofferdam in front of it to enable construction in dry conditions.

4.1.5 The Cooling Water outfall tunnels would be constructed using a combination of the following methods (depending upon depth and ground conditions):

- cut and cover;
- road header; and
- drill and blast.

4.1.6 Whilst design development is continuing and final arrangements are yet to be determined, an indicative construction method may assume the following:

- the tunnels would be driven sequentially;
- probe-hole drilling would be undertaken in advance of tunnel excavation to verify rock quality and to assess potential groundwater ingress;
- if required, pre-excavation grouting would be carried out through the probe-holes, to limit flow rates to manageable levels which would not impact construction;
- a heading would be excavated to advance the tunnel, the length of the heading is yet to be developed and would be partially dependent on the rock quality encountered;
- initial tunnel support would be installed in the heading prior to driving the next section;
- the initial tunnel support would incorporate a lining which would be designed to resist hydrostatic pressure;
- on completion of the full tunnel drive a permanent lining would be installed, which shall resist hydrostatic pressure.

4.1.7 Other temporary tunnel support measures could include rock bolts and sprayed concrete, in conjunction with steel arches, to ensure the stability of the excavations, and also provide a stable, clean working environment within which the construction of the permanent linings can take place.

4.1.8 Tunnelling works construction would commence during year 1. Tunnelling works construction at the south end of the tunnels would commence once the excavation and pre-splitting works have progressed to allow access for the tunnelling contractor.

4.1.9 The south end of tunnels interface point with the power island, and all tunnelling blasting activities, would be complete prior to commencement of nuclear construction works. By eliminating the need for blasting, outfall tunnel construction works could continue beyond this date if necessary. The Cooling Water outfall tunnels will be lined post-construction within the Tre'r gof catchment such that there will be no ingress or loss of water from the tunnel.

Cooling Water intake and outfall works

4.1.10 Construction of the intake and outfall would require significant rock excavation which would be completed in the dry behind cofferdams. The Cooling Water intake channel would be excavated to create a formation level of -11 metres Above Ordnance Datum (mAOD), to configure the seabed bathymetry in such a way that it would provide a uniform water input across the Cooling Water intake at all states of the tide.

4.1.11 An additional cofferdam would be required in front of the intake, as the tunnelling works and installation of associated infrastructure would be longer in duration than the marine excavation and construction works.

4.1.12 The cofferdams at both the Cooling Water intake and outfall would be constructed using one of three options:

- twin sheet piled wall gravity structure;
- twin tubular pile wall gravity structure; or
- rock bund type cofferdams similar to the semi-dry cofferdam (not considered for the Cooling Water intake structure).

4.1.13 For the two piled options, trenches on the line of the two tubular pile/sheet pile walls would either be blasted into the rock (intake cofferdam constructed in the dry), or cut into the rock where the work is undertaken underwater. The tubes/sheet piles would be stood up in place and concreted into position. In the case of the Cooling Water intake cofferdam this operation would be undertaken in the dry, behind the semi-dry cofferdam. In the case of the Cooling Water outfall cofferdam, the operation would be carried out underwater. In both cases, tie rods and steel waling beams would be installed between the two parallel walls and fill material placed inside the cofferdam.

4.1.14 The rock bund type cofferdam being considered as an option for the Cooling Water outfall would be a similar form of construction to the semi-dry cofferdam with a steel sheet pile concreted into a trench cut into the rock, supported on both sides by a rock fill bund, protected on the outer face by rock armour.

4.1.15 The cofferdam structures would remain in place until completion of each of the intake and outfall works. The cofferdam removal works would be a reversal of the construction works.

Construction of the temporary access ramp

4.1.16 As one of the initial marine construction activities, a temporary access ramp would be constructed at the southern end of Porth-y-pistyll. Materials would be either site won crushed rock, or where this is not available due to excavations not having commenced across the Wylfa Newydd Development Area, would be imported to site. The ramp would be graded to the required slope by a bulldozer working within the tidal window. The toe of the ramp would be at around low water springs level.

Construction of the temporary barge berth

4.1.17 The temporary barge berth would comprise a modular retaining wall constructed using either steel shipping containers filled with site won crushed rock or other suitable fill, or another suitable modular type retaining wall structure. The fill / rock material would be transported from where it is won on site, to the work area, using dumper trucks.

4.1.18 An area behind the retaining wall would be backfilled using mechanical earthmoving equipment such as bulldozers, excavators and graders to create a working platform for a mobile tracked/crawler crane.

4.1.19 The area in front of the retaining wall would be filled with rock and levelled to create a platform onto which barges could be grounded as the tide level falls. The backfill would consist of site won crushed rock.

Construction of the temporary cofferdam and southern causeway

4.1.20 The temporary cofferdam would be constructed by depositing rubble stone and rock armour either won from the Power Station Site or imported to site, over the foreshore and seabed to form rubble mound structures. The materials would be transported to the cofferdam using dump trucks or by sea in barges, and would be shaped by tracked excavators either working from land or from sea on jack-up platforms or barges.

4.1.21 The rubble mound structures would need to be made watertight by integrating a steel pile wall into the centre of the structure. The wall could be constructed by installing steel sheet piles through the middle of the structures and grouting them into a pre-cut trench in the seabed (i.e. trench cut from the seabed prior to the placement of the rubble mound structure) to create an effective seal. Under this option, the piles would be installed using a vibratory piling hammer and, potentially, a hydraulic drop hammer (e.g. Dawson's hydraulic impact hammer) should the piles not reach the required depth through the use of the vibratory piling hammer alone.

4.1.22 Alternatively, the wall could be constructed by installing interlocking steel tubular piles through the middle of the structures and grouting them into the rock below the rubble mound. Under this option, the piles would be installed into holes pre-drilled through the middle of the rubble mound structures and into the bedrock using a vibratory piling hammer and, potentially, a hydraulic drop hammer should the piles not reach the required depth through the use of the vibratory piling hammer alone. Under both options the piles would be installed by construction plant working from the top of the rubble mound structures.

4.1.23 Construction of the temporary cofferdam and temporary causeway (including sheet piling) is expected to take approximately eight months. Once sealed, the main dewatering of the inner harbour would take approximately ten days.

4.1.24 To maintain dry conditions within the cofferdam there would be 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.

4.1.25 The cofferdam would initially be dewatered using pipes within the cofferdam structure to allow outflow at low water. The remaining seawater would subsequently be pumped from the landward to the seaward side. The suspended solids of the pumped seawater would be monitored to ensure they do not exceed agreed limits and if required, management procedures such as settlement would be provided to meet this limit.

4.1.26 There will also be protection of the existing rocky shoreline beneath the temporary causeway construction. Further technical details regarding the protective layer to be installed beneath the temporary causeway structure are still to be developed. This is classified as a temporary construction requirement and shall be the responsibility of the appointed Contractor to design and install as part of the causeway construction activity. Horizon will require the contractor to provide details of the final design for review prior to commencement of the works.

4.1.27 The protective layer will be designed to facilitate the removal of the temporary section of the causeway construction with minimal resulting damage to the underlying shoreline rock strata. Several construction solutions may be proposed however, the fundamental objective will be to deliver a solution that enables the protective layer of materials placed directly on top of the shoreline to be removed using excavation techniques that will not result in damage to the underlying rock. It is envisaged that this could involve techniques such as vacuum excavation to remove the protective sand/aggregate layer. In this solution it is normal to install a physical barrier such as a geotextile product before placement of the protective materials and subsequent main construction material.

4.1.28 The majority of the temporary causeway cross section, comprised of rock fill, will be removed by a 360-degree mechanical excavator working from the temporary causeway structure. As the removal progresses, and as it gets to a level immediately above the 200-300mm protective layer of geotextile/sand/gravel/type 6F material placed above the shoreline surface, the excavation technique shall change. The depth of the protective layer is yet to be determined and will be incorporated into the contractor's construction design requirements. This will utilise a lorry-mounted suction excavation technique that is capable of removing the material sizes used in the construction of the temporary causeway protective layer. This type of equipment is commonly used in excavations around sensitive services/operational pipework/structures to eliminate any risk of damage caused by mechanical excavation techniques.

4.1.29 Material will be removed to shore and disposed of as waste in line with the Horizon's waste management procedures as secured in Section 9 of the Wylfa Newydd CoCP. All geogrid or terram sheeting will be recovered during excavation and either recycled or disposed of in accordance with Horizon's waste management procedures.

4.1.30 To protect water resources from pollution Horizon will follow the Wylfa Newydd CoCP. Horizon's management of construction activities will be updated by the Environment Agency's Guidance for Pollution Prevention (GPPs), as they are made available.

4.1.31 Marine restoration measures as set out in the Section 11 of the Marine Works sub-CoCP will be applied once the temporary causeway has been completely removed.

Removal of the temporary works (temporary cofferdam and temporary southern causeway)

~~4.1.26~~4.1.32 On completion of the works in the inner harbour, the temporary cofferdam would be removed and the southern causeway would need to be removed following completion of the western breakwater. Each activity would be expected to extend over a period of 12 months.

~~4.1.27~~4.1.33 These temporary structures would be removed generally in reverse of the installation method. Although piles or pile wall would need removed after the rock fill is removed.

~~4.1.28~~4.1.34 Divers using underwater cutting equipment would cut the steel pile wall off at bed level.

~~4.1.29~~4.1.35 Suitable materials from the removal of temporary works would be managed in accordance with the Wylfa Newydd CoCP (Application Reference Number: 8.6).

Dredging and excavation

Dredging soft sediments

~~4.1.30~~4.1.36 The superficial soft sediment (mainly sands and gravels) would be removed by conventional dredging plant such as a backhoe dredger, cutter suction dredger or trailing suction hopper. This activity would run for approximately 10 months. The upper limit of in-situ soft sediment that would be dredged is 220,000m^3 (equating to 242,000m^3 of bulked volume of soft sediment), although the values are likely to be considerably less. Disposal of this material would be by barge to the licenced disposal site at Holyhead North.

Wet excavation of the outer harbour

~~4.1.31~~4.1.37 Outside the temporary cofferdam, the bedrock would be initially fractured by peckering with a breaker and then ripped out and dredged with a barge-mounted excavator and loaded into barges. The duration of this activity would be about 16 months. For the purposes of the assessment the worst case upper limit of rock that would be removed from the outer harbour by wet excavation is a bulked volume of 368,000m^3 (equating to an *in situ* density of approximately 709,714 tonnes, based on a specific gravity of 2.7). Dredged bedrock would be reused for the construction of the marine facilities e.g. cores of the western and eastern breakwaters where appropriate (i.e. geotechnically suitable) and practical (i.e. available when the breakwater

construction requires it), and any excess rock would be disposed of to the licenced disposal site at Holyhead North.

Dry excavation of the inner harbour

4.1.324.1.38 From the existing rock head level, down to around low tide level, and inside the temporary cofferdam, the bedrock would be fractured by blasting (i.e. with explosives in the dry) and then excavated using tracked excavators and dump trucks.

4.1.334.1.39 Dry excavation of the inner harbour is expected to take around 14 months in total. Preliminary excavation would begin onshore up to 0mAOD and would take around six months. Once the cofferdam around the inner harbour is in place, rock fracturing by blasting in the dry behind the cofferdam would be carried out for approximately seven months. Blasting would be in accordance with the Marine Works Sub-CoCP (Application Reference Number: 8.8). The maximum charge weight would be 150kg. Drilling activities prior to blasting may be required to be undertaken at night, subject to S61 applications as described in the Wylfa Newydd CoCP (Application Reference Number: 8.6).

4.1.344.1.40 Approximately 500,000m^3 bedrock would be excavated in the dry, including the excavation directly in front of the Cooling Water intake structure. The excavated material would be reused for breakwater construction or for developments within the Wylfa Newydd Development Area.

Shore protection

4.1.354.1.41 Shore protection would be provided where dredging or excavation could lead to shore erosion and/or unacceptable wave overtopping discharges. Shore protection would take the form of rock revetments or seawalls and be tied-in with the adjacent structures (e.g. breakwaters, quay walls).

4.1.364.1.42 The two types of shore protection (rock revetments or seawalls) would be constructed by different techniques.

4.1.374.1.43 The rock revetment would be constructed by depositing rubble stone (won from the Power Station Site, or imported if suitable rock size cannot be generated on-site) on top of the prepared seabed to form the desired slope.

4.1.384.1.44 The materials would be transported to the shore protection using dump trucks and shaped by tracked excavators.

4.1.394.1.45 Once in place, the sloping surface would be trimmed to the design profile using tracked excavators. Where detailed, a geotextile membrane (inner face) and a rock under layer and rock armour (outer face) would be placed over the sloping surface.

4.1.404.1.46 Seawalls would be constructed in a similar way to the concrete blockwork walls for the MOLF's Ro-Ro quay wall, or by reinforced concrete walls cast against the cut rock face and tied back using ground anchors or similar.

Construction of the breakwaters

4.1.414.1.47 The western breakwater's core would be constructed by depositing dredged material (i.e. fractured bedrock) and rubble stone won from the Power Station Site, with a rock size varying from approximately one kilogramme to one tonne, on top of the prepared seabed to form a mound.

4.1.424.1.48 The core material would be transported to site by road using dump trucks or by sea using split hopper barges and/or side stone dumping vessels as appropriate, and would be trimmed by long-reach tracked excavators working on the breakwaters or from jack-up platforms or barges in the sea.

4.1.434.1.49 A rock under-layer with rock size varying from one tonne to six tonnes, depending upon the location along the breakwater, would be placed on top of the core material. Pre-cast concrete armour units (or rock armour, if used; see below) would be placed over the mound. The armour units could vary in size (e.g. from approximately 12 tonnes to 34 tonnes) depending upon the location along the breakwater. The further to seaward, the larger the armour unit size. The armour units would be placed in a precise grid pattern to ensure they are interlocked. The rock under-layer and armour units would be transported to site by sea using barges and/or via the haul road using dump trucks, and would be unloaded directly onto the breakwaters using cranes working from the breakwaters.

4.1.444.1.50 The eastern breakwater would be constructed from land working seawards using similar methods, materials and plant as described for the western breakwater.

Construction of the MOLF

4.1.454.1.51 The bulk quay and Ro-Ro quay would provide purpose-built berthing platforms to allow delivery by sea of bulk materials such as aggregates, cement and reinforcing steel together with plant and equipment and Abnormal Indivisible Loads required for the construction of the Power Station. Construction of the MOLF would include mooring dolphins with steel bridges to connect to shore to allow safe access for the mooring crews.

4.1.464.1.52 The bulk and Ro-Ro quays would be constructed by the following methods:

- Preparing the seabed to provide a solid and level foundation by dredging or excavating to the required level.
- Following the dredging/excavation, a regulating layer of either gravel or concrete would be placed over the exposed rock formation.
- The berthing platforms and mooring dolphins would be constructed on top of the prepared bed using pre-cast concrete blocks. To facilitate the placing of the blocks, the area immediately behind the quay wall would be partially filled with suitable rock fill material. The pre-cast concrete blocks would be transported to site by barges and would be placed into position by cranes working from the land or from jack-up

platforms or barges in the sea. A concrete capping beam would be cast *in situ* along the top of the blockwork to complete the structures.

- The mooring dolphins would either be similarly constructed in pre-cast mass concrete blocks or using large diameter steel mono-piles socketed onto the seabed or multi-pile dolphins similarly socketed into the seabed.
- The area behind the MOLF would be backfilled with graded material using standard construction plant such as mechanical shovels, bulldozers, rollers, excavators and dumper trucks.
- A concrete apron would be constructed to the quay area immediately behind the berthing platforms and dolphins.
- A utility corridor would be constructed behind the quay surface in the form of a series of trenches to install ducts, cables, pipework and associated drainage, power, fire-fighting water supply and communications infrastructure.
- The area between the two platforms of the Ro-Ro quay would be either a revetment or a continuous quay wall and for the purposes of modelling and assessment, a revetment has been assumed. Rock revetments would be constructed between the berthing platforms using suitably sized rock armour laid on a slope.
- Prefabricated quay infrastructure (e.g. fenders, bollards, ladders), material handling and conveyance equipment (e.g. hoppers, conveyors, pipes), batching plant components (e.g. aggregate storage bins, cement silos, batching hoppers, conveyors, towers, washing plant) would be installed on the berthing platforms and immediately behind the MOLF.

4.1.474.1.53 The area behind the berthing platforms, dolphins and quay would be reclaimed to form a new land area up to the required platform level. This reclaimed area would house the concrete batching plant. The fill material would be rock and granular material sourced from the bulk earthworks taking place within the Power Station site and/or the excavation of the Cooling Water intake channel. It is estimated that up to 260,000m^3 of fill would be required for the land reclamation. The fill material would be transported to and placed at the reclamation area, and would be compacted and levelled. The land reclamation would be undertaken using standard construction plant such as mechanical shovels, bulldozers, rollers, excavators and dumper trucks.

Construction and removal of the layby berth

4.1.484.1.54 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.

4.1.494.1.55 The berth would consist of a series of berthing and mooring dolphin structures and be constructed in the dry behind the temporary cofferdam.

The mooring dolphins would either be constructed using pre-cast concrete blocks, large diameter steel mono-piles or multi-pile dolphins (as considered for the bulk quay dolphins).

~~4.1.50~~4.1.56 Power to the berth for lighting and the mooring crew shelter would be provided by a cable trenched into the harbour bed connected to a feeder pillar on one of the dolphins.

~~4.1.51~~4.1.57 The layby berth would be removed once Power Station construction was complete. Removal would involve the use of a floating crane barge or a jack-up crane barge for lifting off the walkways between the dolphins and demolition of the dolphins. If mass concrete blocks are used for the dolphins, they would be cut into manageable sections using a wire saw or similar and lifted onto a barge for removal and crushing off-site. If steel piles are used to construct the dolphins, these piles would be cut off at seabed level and lifted onto a barge for removal from site then either reuse elsewhere or scrapping. The power cable would be removed from the seabed.

Berthing Pockets

~~4.1.52~~4.1.58 Berthing pockets would be dredged alongside the bulk quay and the layby berth. The proposed depth of the berthing pockets would allow bulk cargo vessels to remain berthed across most states of the tide, but may not be sufficient to allow fully laden vessels to manoeuvre onto the berths across all states of the tide. The berthing pockets would extend approximately 30m from the quay and be dredged to a depth of –13mAOD.

Pontoon

~~4.1.53~~4.1.59 The pontoon would take the form of either a floating pontoon supported by guide piles drilled and grouted into the seabed, or by H piles fixed to the vertical wall behind the pontoon berth. Fenders and bollards would be installed on the pontoon to allow for berthing. The pontoon would be connected to the shore by a suitable access gangway, such as an articulating access bridge on piled supports drilled and grouted into the seabed.

Dismantling and removal of other temporary marine structures

~~4.1.54~~4.1.60 In addition to the removal of the temporary cofferdam and temporary southern causeway, it is expected that the following would be undertaken.

- Once built, it is anticipated that the temporary access 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 material handling and conveyance equipment, including cement pipelines and conveyors at the bulk quay would be dismantled and removed. This would involve the use of earthmoving machinery, demolition equipment to remove structures to ground level and mobile

cranes to dismantle above ground pipelines and conveyors. Where possible, material would be reused on-site and material handling equipment would either be reused on other construction projects or recycled/disposed of at licensed sites.

- The concrete apron behind the bulk quay and the concrete platform adjacent to the Ro-Ro quay would remain in place for potential use during the operational life of the Power Station.
- Some quay infrastructure (bollards, fenders, ladders etc.) would remain in place and to be maintained, or removed as appropriate.

4.1.554.1.61 The MOLF structures and the eastern and western breakwaters would remain in place for the operational life of the Power Station.

4.1.564.1.62 All affected areas where temporary marine structures have been removed and land-based areas affected by the removal of temporary marine structures would, where feasible, be restored to their former condition.

4.1.574.1.63 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. There may be a small number of other temporary marine structures left and abandoned. Should this be the case where it is impractical to remove these, all structures would be made safe and accurate records taken.

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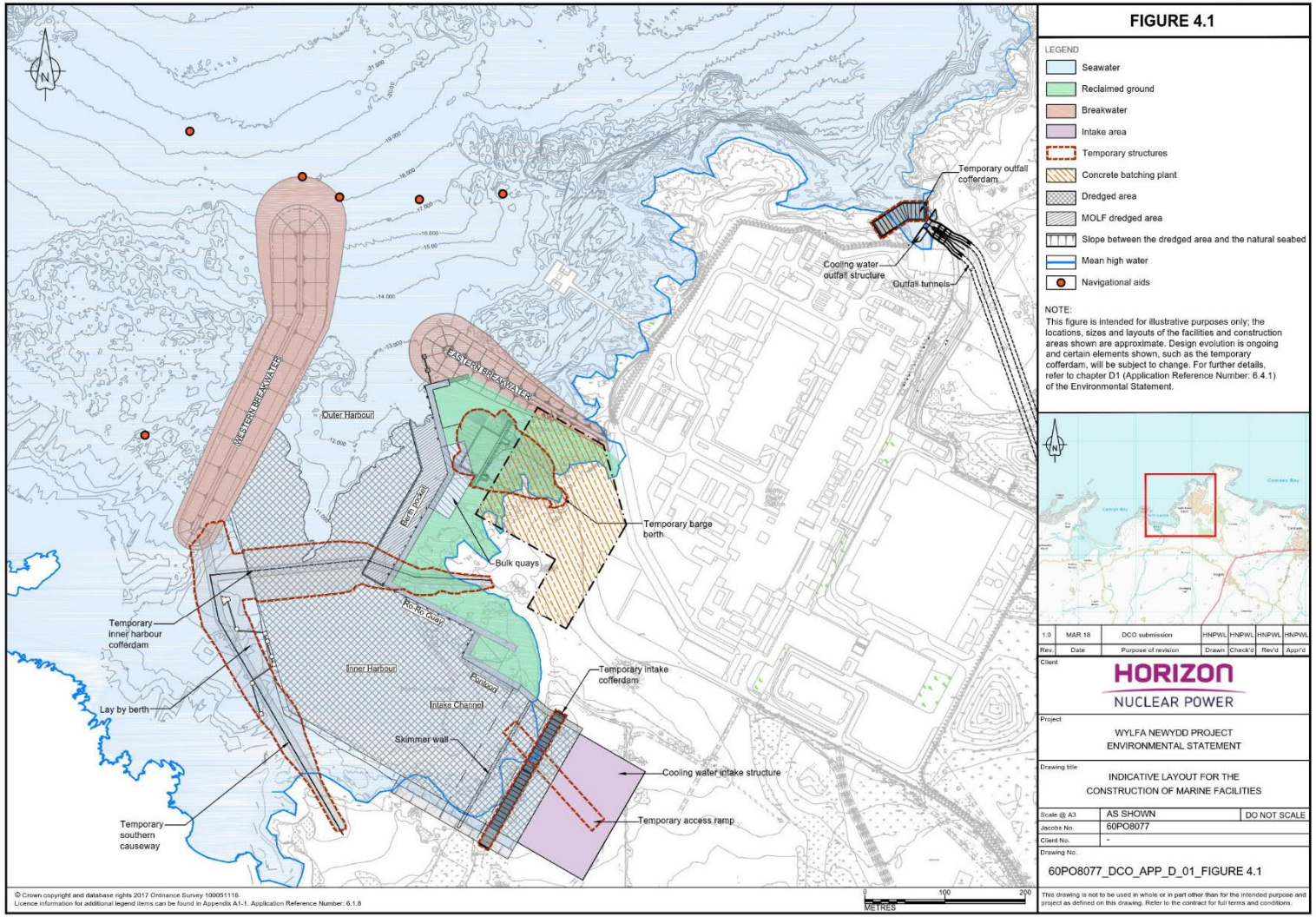
Figure 4-1Marine facilities



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5 Construction Methodology for the Site Campus

5.1 Accommodation blocks

5.1.1 The layout of the Site Campus is included as Figure 5-1.

5.1.2 The on-site worker campus would be constructed using modular buildings which would be prefabricated off-site.

5.1.3 Construction would be in a phased manner with three key phases (see time slices 2, 3, 4 in annex A).

5.1.4 The construction method would be as follows.

- Removal of topsoil and subsoil for subsequent reuse in landscaping, using mechanical earthmoving equipment.
- Excavations for foundations, drainage and utility services using mechanical earthmoving equipment.
- Construction of any concrete foundations could be from the temporary on-site concrete batching plant (see time slice 2 in annex A) or via delivery to site of ready mix concrete.
- Installation of utility services local to the accommodation block using mini excavators.
- Delivery of modular buildings and components could be via the MOLF or via road transport.
- Lifting and assembly of modular buildings using mobile cranes and mobile elevated working platforms.
- Installation of external cladding using cranes and mobile elevated working platforms.
- Installation of plant, equipment and services, such as hot and cold water systems and heating systems. Mobile cranes used as required for location of the plant on the roof.
- Internal finishing works to the assembled modular buildings.
- Connection and making live utility services.
- External landscaping would be undertaken using mechanical earthmoving and landscaping equipment.

5.2 Amenity building

5.2.1 Construction would be modular and aligned with the phasing of the accommodation blocks phases to match the accommodation demand.

5.2.2 The construction method would be as follows.

- Excavations for foundations and utility services using mechanical earthmoving equipment.

- Construction of any concrete foundations could be from the temporary on-site concrete batching plant or via delivery to site of ready mix concrete.
- Installation of utility services local to the accommodation block using mini excavators.
- Delivery of steel work, cladding and internal components could be via the MOLF or via road truck transport.
- Lifting and assembly of steelwork using mobile cranes and mobile elevated working platforms.
- Installation of external cladding using cranes and mobile elevated working platforms.
- Installation of plant, equipment and services, such as hot and cold water systems and heating systems. Mobile cranes used as required for location of the plant on the roof.
- Internal finishing works to the buildings.
- Connection and making live utility services.
- External landscaping would be undertaken using mechanical earthmoving and landscaping equipment.

5.3 Infrastructure

5.3.1 Initially, a main access route would be constructed to provide the primary route for construction plant access. Typical plant would be excavators, earth moving, haulage lorries and asphalt laying machines.

5.3.2 The construction compound for the initial phases would be located to the east of the amenity building location.

5.3.3 General site grading and levelling would be carried out by excavators, earth moving and haulage lorries

5.3.4 The multi-use games areas would both be constructed in the initial phasing. This could comprise a synthetic pitch laid on a prepared area that has been levelled by appropriate plant. The area would be fenced and lighting columns erected.

5.3.5 The infrastructure associated with each accommodation building would be installed with each block.

5.3.6 Core site infrastructure, such as highways and utilities, would be installed to allow the build out of the full development. Typical plant to be used would be excavators and dump trucks, and asphalt plant for highways construction.

5.3.7 Drainage outlets to the west of the site and by Fisherman's car park would be constructed in the initial phase with the outlets for the eastern end completed as the development moves to the east of the amenity building. Typical plant would be excavators.

5.3.8 Parking would be provided to the east of the amenity building for Phase 1. When the area is needed for accommodation blocks for expansion of the site, this parking and additional parking would be provided outside the Site Campus but within the Wylfa Newydd Development Area. Typical plant for the car park construction would be excavators, earth moving, haulage lorries and asphalt laying machines.

5.4 Removal of Site Campus

5.4.1 The dismantling and removal of the Site Campus would also be undertaken in phases to meet the reduction in accommodation demand as the Power Station construction works are completed. The works would broadly follow a reverse order of the construction methods.

Accommodation blocks

5.4.2 The accommodation blocks would be removed in the reverse of the construction sequence. This would broadly follow a reverse order of the construction methods.

- Disconnections of live utility services.
- Removal of some internal finishing to allow removal of plant, equipment and services and to allow disassembly of modules.
- Removal of external cladding using cranes and mobile elevated working platforms.
- Disassembly of modular buildings using mobile cranes and mobile elevated working platforms.
- Transport of modular buildings off-site using road truck transport.
- Removal of utility services.
- Removal of concrete foundations using mechanical earthmoving and demolition equipment.

Amenity building

5.4.3 The amenity building would be removed when accommodation is no longer needed. This would broadly follow a reverse order of the construction method:

- Disconnections of live utility services.
- Removal of some internal finishing to allow removal of plant, equipment and services and to allow disassembly of modules.
- Removal of external cladding using cranes and mobile elevated working platforms.
- Disassembly of buildings frame using mobile cranes and mobile elevated working platforms.
- Transport of components off-site using road truck transport.
- Removal of utility services.

- Removal of concrete foundations using mechanical earthmoving and demolition equipment.

Site infrastructure

5.4.4 The infrastructure associated with each accommodation block would be removed with the associated accommodation block. Typical plant would be excavators, earth moving and haulage lorries.

5.4.5 Core site infrastructure would be removed last with the final removal of the drainage outfalls and the site fence.

Site reinstatement

5.4.6 Reinstatement would commence when an area has been cleared of buildings and the associated infrastructure. Typical plant would be excavators, earth moving and haulage lorries. The majority of material removed (concrete, duct work etc.) would be considered for recycling and it is expected some soil may need to be imported for topsoil reinstatement. The site would be restored with planting and footpaths as illustrated in Figure 5-1 and outlined in Volume 3 of the Design and Access Statement (Associated Developments and Off-Site Power Station Facilities, Application Reference Number: 8.2.3).

Figure 5-1 Site Campus general arrangement plan

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6 Other on-site developments

6.1 Construction phase developments

6.1.1 During the construction phase of the Power Station Site, a number of temporary 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;
- site access, security and fencing;
- haul roads and crossings;
- public access diversions;
- utility removal and diversions;
- landscaping;
- land drainage; and
- sewage treatment and discharge.

6.1.2 The construction of many of these would be undertaken during SPC Works.

Site compounds

6.1.3 Site compounds (SPC site compound, material and satellite compounds and main compound) would provide office space and workforce welfare facilities. Material compounds would be provided for the storage of materials, and satellite compounds for the secure storage of plant and equipment.

6.1.4 Site compound temporary offices and welfare facilities would be constructed using modular buildings transported to site via road trucks and assembled on concrete foundations using mobile cranes and elevated working platforms.

6.1.5 Material and satellite compounds would be constructed using mechanical earthmoving equipment such as excavators, bulldozers and graders to provide a stable trafficable surface for material and vehicles.

6.1.6 The number, sizing and location of temporary facilities/buildings would be developed with the main Horizon contractor. However, the two principal areas are defined as the western and eastern laydown areas, located to the south-west and south-east of the main power block (see time slices 3 to 8 in annex A).

Concrete batching plant

6.1.7 The concrete batching plant would be constructed using prefabricated and manufactured batching plant components such as mixers, conveyors and cement silos, as well as *in situ* reinforced concrete bins for the storage of aggregate.

6.1.8 Reinforced concrete foundations would be constructed initially, followed by the assembly of prefabricated components using mobile cranes and elevated working platforms. Structural steelwork would be erected to form a framework for supporting the batching plant, hoppers and storage bins. The construction of storage bins would be undertaken using formwork, reinforcement fixing and casting of sections of the storage bins in a phased sequence.

Other temporary buildings

6.1.9 Other temporary buildings would be constructed from modular buildings, or steel frame buildings. Modular buildings would use construction methods described in section 5. Steel frame buildings and their cladding and roofing materials would be constructed on concrete foundations using mobile cranes and elevated working platforms.

6.1.10 The Power Station designs would incorporate modern, efficient design solutions. Wherever practicable, temporary buildings would be designed with a modular construction and would be manufactured off-site. Alternatively, other methods may be more efficient and would be considered in the round. If modular construction is appropriate, it would occur in controlled conditions to protect the integrity of the materials from external elements. Construction within controlled conditions ensures greater control of inventory of materials; greater potential reuse of materials on other projects; materials are less likely to be damaged; and improved recycling rates can be more easily achieved resulting in less waste.

6.1.11 The extent of internal fit-out of buildings would vary depending on use and include a combination of mechanical and electrical installation (of process plant and control systems), installation of heating ventilation and air conditioning and conventional fit-out of items such as sanitary and welfare facilities, office facilities, workshop and stores facilities.

6.1.12 The locations of temporary buildings are shown on the time slices in annex A.

Site access, security and fencing

6.1.13 Site access, security facilities and fencing form a key component for the effective operation of the completed facility.

6.1.14 Site access and security facilities would be constructed using either traditional or modular building construction techniques. Modular units are pre-fitted with security features such as turnstiles and would be transported to site for use during SPC Works.

6.1.15 Fences would be constructed using traditional fencing construction techniques. Post stanchions would be concreted into the ground at depths of approximately 750mm at appropriate centres to facilitate installation of meshed anti climb powder coated steel fencing panels.

6.1.16 Site access points and security facilities would be managed by security personnel.

6.1.17 The Wylfa Newydd Development Area would be arranged as a secure construction site with security controls for people, equipment and materials entering and leaving the site. Security staff would be deployed at all entrance points.

6.1.18 PRoWs, roads and footpaths to be closed permanently or diverted would be managed in accordance with the Wylfa Newydd CoCP (Application Reference Number: 8.6)

6.1.19 As Nuclear Site Licence holder, Horizon would ensure the entirety of the site is secure in line with regulatory requirements throughout the duration of the project.

6.1.20 Security and access would require extensive infrastructure, including security buildings, turnstiles, secure access gates and vehicular access points.

6.1.21 Delivery of material and equipment for the early Power Station construction works would be transported to site via road. Most of the delivery of material and equipment for the remainder of the Power Station construction works would be transported by sea and off-loaded at the marine facilities.

6.1.22 Abnormal Indivisible Loads which are subject to road transport restrictions, including major equipment items such as the reactor pressure vessel, would be delivered by sea to the marine facilities where they would be offloaded and undergo security and engineering inspections.

6.1.23 Workers would arrive at the main entry points by bus or passenger vehicle. Those workers living in the Site Campus would walk or be transported by bus to the northern security plaza, while a small number of workers might arrive on foot or by cycle from the immediate surrounding area.

6.1.24 Waste and other materials despatched from site would also be subject to security controls at all entry/exit points.

6.1.25 An existing site compound, previously used to control and manage contractors onto the Wylfa Newydd Development Area would remain in place during the early Power Station construction. Once site demands warrant expansion and relocation of these facilities, the northern and southern security plazas would be established and utilised as the main worker and vehicular security access points (see time slice 4, annex A). These would remain in place for the remainder of the Power Station construction.

6.1.26 There would also be security access facilities at the marine facilities and north-east and south-west crossing points through the construction site boundary fence.

6.1.27 A temporary road network would be developed within the site boundary for the use of buses, construction vehicles and equipment.

6.1.28 The perimeter fence installed during SPC Works may be utilised for the Power Station construction works where appropriate, with an upgraded fence to meet the requirements of increasing security as the project progresses.

Haul roads and crossings

6.1.29 The construction of a site-wide haul road and road networks (where practicable) would make use of existing roads which have been closed off for public use and would also align with planned routes of permanent roads).

6.1.30 Haul roads would be constructed using appropriate material and techniques.

6.1.31 Haul road material would be laid using road construction techniques with mechanical earthmoving equipment such as bulldozers, graders and excavators.

6.1.32 Road crossings would either be provided at grade or where required. Temporary bridge crossings would be constructed using either *in situ* concrete produced on-site at the concrete batching plant, precast concrete, steel or a combination of techniques. Temporary modular bridge crossings would also be considered.

Public access diversions

6.1.33 Where necessary, marshals would manage and guide PRoW footpath users, ensuring their safety near site works until closure or diversion of the PRoWs. Where necessary, marshals would be present to temporarily restrict access to footpath users, separating them from on-site works, thus ensuring their safety. This would be undertaken in a manner designed to control the area and reduce effects for recreational users.

6.1.34 Temporary closures of Cemlyn Road are required to enable boundary wall/fence removal. This would be managed through early communication with the public and by establishing any necessary diversions.

6.1.35 Plant traffic crossing the Existing Power Station Access Road is required for access/egress between north/south land parcels. The crossing design will be developed with the contractors and designers to meet the various functional and safety requirements for the Project. This could be managed by utilising traffic light control, physical barriers that can be opened or closed to suite requirements or by deploying temporary traffic marshals.

Utility removal and diversions

6.1.36 It would be necessary to divert, remove or abandon above and below ground services running across the WNDA Development. This would be undertaken by the relevant statutory undertakers as owner / operator of the infrastructure, and would include:

- 11kV overhead line diversion;
- 132kV below ground cable diversions;
- Cemaes foul water riser main diversion; and
- Diversion of telecom services.

Landscaping

6.1.37 A final landscaping scheme for the Power Station Site would be submitted for approval to the relevant planning authority in accordance with the DCO requirements. The landscaping scheme would be prepared in accordance with the landscape principles set out in Volume 2 of the Design and Access Statement for the Power Station and Off-site Power Station Facilities (Application Reference Number: 8.2.2) and the Landscape and Habitat Management Strategy (Application Reference Number: 8.16). Landscaping would take place in a phased manner across the Wylfa Newydd Development Area and would follow after bulk earthworks or building construction is complete.

6.1.38 Topsoil and subsoil placement and seeding would be undertaken as soon after bulk fill as possible in a manner that reduces suspended solids in water runoff.

6.1.39 Landscaping would take place using conventional/standard landscaping techniques and machinery, to suit planting seasons for each species. Typical machinery could be small light excavators and dump trucks for tree planting, stone walling, fencing and cloddiau construction. In addition, trucks and cranes may be required for planting larger trees. For seeding large areas such as fields, tractors with de-compaction and seeding towed equipment would be used.

6.1.40 A landscape maintenance regime, would be implemented once initial landscaping is undertaken, in accordance with the Landscape and Habitat Management Strategy (Application Reference Number: 8.16), the Wylfa Newydd CoCP (Application Reference Number: 8.6) and the Main Power Station Site sub-CoCP (Application Reference Number: 8.7).

6.1.41 A key aspect of the landscaping is the creation of new landscaped mounds. The mound locations and their development throughout the construction phase are presented on the time slices in annex A.

6.1.42 Initial landscape activities include topsoil and subsoil strip (removal) from the footprints of mound A and mound E to prepare for the formation of the new landscape mounds. Soil materials gained from excavation of the drumlins and soil strip would be used as a priority to construct the screening bund along the eastern boundary of the site to provide a noise and visual screen to the local community in Tregele (acoustic bund, see time slice 3 in annex A). Construction of the northern and eastern section of mound A would also be completed as a priority to mitigate visual effects on the local community in Cemaes. The slopes facing Cemaes would be planted with species that match existing patterns and styles. Construction of the western portion of mound A would be completed temporarily with materials to be used at a later date for backfilling structures once nuclear construction activities commence. The temporary mound solution in the western portion of mound A would last approximately six years.

6.1.43 Mound E construction would be ~~completed including soil reinstatement, while earthworks~~constructed to store material for use in the final landform and ~~the remainder~~as such will be placed, seeded for a period of ~~the~~

construction ~~works are still underway.~~ , and then reworked at the end of construction to finalise the mound. Mound E would contain remediated soils from other parts of the site. Mounds B, C and D provide the laydown area flat platforms during construction hosting site platforms and storage areas during the main construction works. These platform areas would be returned to drumlin landforms to help screen the new development at the end of the construction period. The final landscaping of mounds B, C and D would make use of the stockpiled material in the western part of mound A. Final landscaping and planting of the western part of mound A and mounds B, C ~~and~~, D and E would occur at the end of the construction period after the Power Station becomes operational.

Land drainage

6.1.44 Drainage has been developed taking into account the following considerations:

- the impact of topsoil removal on drainage flows across the site;
- the impact of alterations in water flow on Sites of Special Scientific Interest;
- the impact on drainage and any knock-on effect on flows into culverts, the sea and water systems across the site of the excavations;
- the impact of mounding on drainage, in particular around the Sites of Special Scientific Interest; and
- the mitigation of the impact of drainage affected by construction works and waste.

6.1.45 Drainage methods incorporate a multi-stage treatment approach using the following key principles:

- using surface water runoff as a resource;
- managing rainwater close to where it falls;
- managing runoff on the surface;
- promoting evapotranspiration;
- slowing and storing runoff to mimic natural runoff characteristics;
- reducing contamination of runoff through pollution prevention and controlling runoff at source;
- treating runoff to reduce the risk of construction contaminants causing environmental pollution; and
- providing a flexible and adaptable system capable of replicating, as far as practicable, existing conditions within the existing drainage catchments.

6.1.46 The treatment methods are described below and include:

- soil management;
- silt fences;

- silt traps,
- silt curtains,
- vegetated channels;
- swales;
- sediment ponds; and
- polyelectrolyte coagulant dosing.

Soil management

6.1.47 Erosion and sedimentation loss during and after construction would be managed in accordance with good practice soil management, as per the Wylfa Newydd CoCP (Application Reference Number: 8.6).

Silt fences

6.1.48 Silt fences would be installed at the base of unseeded earthworks mounds and/or erosion control matting on the face of the mounds. Soil management and silt fences would, at source, provide an initial defence against the migration of sediment into the drainage system.

Silt traps, silt curtains and vegetated channels

6.1.49 The installation of silt traps, silt curtains and vegetated channels may be used at intervals along the ditch and support localised silt removal principally by slowing the velocity of flow. The silt traps use fixed wells, below and outlet, which collects rainwater and allows the deposition of silt and sand. Silt curtains provide a flexible impermeable barrier used to trap sediment in water bodies.

Swales

6.1.50 Swale installation would provide a shallow, broad and vegetated channel to store and/or convey runoff and remove potential pollutants.

Sediment ponds

6.1.51 The installation of sediment ponds would incorporate permeable berms and silt forebays sized to attenuate surface water flows and to allow suspended sediment to settle prior to discharge into any receiving watercourse.

Polyelectrolyte coagulant dosing

6.1.52 This method, where required, would treat surface water runoff where particulates are less than 0.002mm.

Drainage from mound areas

6.1.53 Drainage of the mound area during construction would be directed to wide ditches and sedimentation ponds and, after natural sedimentation and if necessary treatment, discharged. Discharged water would be sampled to a schedule, agreed with the regulator, to confirm it does not exceed the

permitted values of the Environmental Permit. In the sedimentation pond, sediments are separated from the water and the water discharged to the existing inflows to the Site of Special Scientific Interest, local watercourse or the sea.

6.1.54 During soil stripping, excavation and mounding works local temporary drainage (including dewatering systems) would be installed where required. Crushed rock derived from excavation works would be used to construct the drainage blanket of mound A. The drainage of mounds, once completed, would mimic as close as possible the existing drainage flows.

Drainage from site grading and excavation

6.1.55 Excavation and fill working areas would be progressed to promote managed runoff to designated ditches and collection ponds, for settlement and/or treatment of sediment prior to discharge. Surface water runoff from hard-surfaced areas which may be subject to hydrocarbon spillage would be collected separately and routed through suitable interceptors before discharge into the site surface water drainage system. This separation of potential hydrocarbon containing flows would occur as the drainage system develops with hard surfaced areas during construction.

6.1.56 The surface water in the sedimentation ponds may include a large amount of soil from runoff; therefore, water quality tests would be performed to confirm the permitted value and provide necessary treatment before discharging the water to a watercourse or the sea.

Drainage from batching plant

6.1.57 Surface water runoff drainage from the batching plant area would require additional treatment before discharge into the surface water system. Runoff would drain into the main site surface water drainage. It would be intercepted within the batching plant site and monitored for pH levels. If the pH is above eight, then it would be treated prior to discharge.

Drainage from buildings

6.1.58 Water from buildings is collected through the temporary drain pipes installed on the lowest floor of buildings, routed to the temporary water collection pit, treated, and discharged by being pumped up to the accepted discharge point. Rainwater going into buildings during the building construction and water used for the building construction is collected in the temporary sump pit installed on the lowest floor of the building through the temporary drain line set in each place, pumped up by the transfer pump, treated, and transferred to ponds through the ditches.

6.1.59 Water from building construction would be treated as necessary at a tank outside the building before connecting to rainwater channels (i.e., if pH or amount of oil exceed the limit).

6.1.60 Drainage water collected in the sedimentation ponds would include runoff, which might include sediment and oil; therefore, water quality testing would

be carried out to check the permitted value, provide necessary treatment before discharge to the sea.

Disposal of drainage silt

6.1.61 It is anticipated that silt generated from the drainage system would be reused on the Wylfa Newydd Project, where it is suitable for use. Where it is not suitable for use on site the silt would be taken off-site to an appropriate licensed facility. Currently the volume of silt to be generated is not known.

Sewage treatment and discharge

6.1.62 Sewage generated during construction, excluding Site Campus, would be treated in a dedicated sewage package plant. The treated effluent would be discharged via a temporary sewage discharge/outfall installation located at the northern end of the western breakwater.

6.1.63 The outfall pipe may be constructed on land and floated out to sea. Once in position the pipe would be progressively flooded to allow its positioning in a controlled sinking operation. Concrete ballast would prevent the pipe from moving once on the seabed.

6.1.64 Should the outfall pipe be constructed at the same time as the breakwater, it could be incorporated within the breakwater structure.

6.1.65 The outfall pipe would be fitted with a diffuser to provide good dilution in the sea and prevent intrusion of sand, mud, debris and salt water into the outfall.

6.2 Ancillary infrastructure

6.2.1 During the operational phase of the Power Station Site, the following infrastructure would be required to support the site operation, namely:

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

Access and parking

6.2.2 Access routes for vehicles, busses, cyclists and pedestrians would be provided for operational staff, constructed of asphalt, concrete or various forms of hard landscaping pavements using standard construction techniques.

Security facilities and fencing

6.2.3 Security facilities and fencing form a key component of the operation of the facility. The security facilities would be constructed using either traditional or modular building construction techniques. Fences would be constructed using traditional fencing construction techniques.

Lighting

6.2.4 The various forms of lighting provided on-site would be constructed using current lighting installation techniques. Depending upon the location, timing and status of activities / construction at site, lighting could be either mobile, semi-permanent or permanent. Current construction techniques vary but include trenching, cable laying and erection of lighting stands (lamp posts) using mobile plant such as excavators.

Landscaping

6.2.5 A final landscaping scheme for the Power Station Site would be submitted for approval to the relevant planning authority in accordance with the DCO requirements. The landscaping scheme would be prepared in accordance with the landscape principles set out in Volume 2 of the Design and Access Statement for the Power Station and Off-site Power Station Facilities (Application Reference Number: 8.2.2) and the Landscape and Habitat Management Strategy (Application Reference Number: 8.16). Landscape restoration works include:

- removal of temporary construction facilities, reinstatement and final reprofiling;
- hard and soft landscaping and planting;
- maintenance of landscaped areas and planting until handover to power station operations after the initial maintenance period after planting; and
- return the land to agricultural use and enhance the biodiversity whenever possible.

6.2.6 Reinstatement following the removal of temporary buildings, would consist of earthworks for the final land profile using the methods described for earthworks. Reprofiling of the land would take place where the final land profile design differs from the original, and would use earthworks methods described earlier. Similarly, hard and soft landscaping and planting would follow techniques already described.

6.2.7 Maintenance of landscaped areas would be undertaken using traditional landscape and farm maintenance techniques. Typical plant may be small light excavators and dump trucks for tree and cloddiau maintenance. In addition, trucks and cranes may be required for maintaining larger trees.

Drainage

6.2.8 Detailed construction methodologies relating to the installation of drainage to the Power Block is still under development. However, the sub-drainage systems for the power block would be installed during construction of the base mat.

Waste water disposal

6.2.9 Waste water for the operation of the power plant would discharge to the existing sewage treatment plant outfall located at the Cemaes Waste Water Treatment Works at Wylfa Head, which is owned and operated by DCWW. This would require the construction of an on-site pumping station by the Horizon contractor, within the Power Station Site.

Water supply

6.2.10 Potable water would be supplied to the WNDA Development from DCWW's Alaw Reservoir. This supply would meet the need of both the construction and operational phases. DCWW would provide this supply utilising their permitted development powers, they would undertake the design taking into account future considerations to address Natural Resources Wales (NRW) concerns about the wider water management impact. The supply would be from the Alaw Reservoir to the site boundary, via the Alaw pumping station. A distance of approximately 9.5km. The supply would be a twin pipework of diameter 200mm and 350mm, the former supplying operational phase needs, the later providing additional for construction activities.

7 Removal of temporary structures and buildings

7.1 Introduction

7.1.1 Following construction, temporary structures would be dismantled and removed. It is anticipated that the dismantling and restoration works would take approximately two years to complete following the commissioning of Unit 1.

7.2 Dismantling and removal of temporary structures and buildings

7.2.1 Dismantling and removal of temporary construction structures and buildings includes the removal of:

- concrete batching plant;
- offices;
- worker welfare facilities;
- workshops;
- security facilities; and
- construction compounds.

7.2.2 The method for dismantling would include the following items.

- Removal of modular buildings including concrete batching plant, offices, worker welfare facilities, workshops and some security facilities using mobile cranes and elevated working platforms.
- Concrete foundations would be removed using mechanical earthmoving and demolition equipment.
- Removal of construction compounds using mechanical earthmoving machinery.

7.2.3 Where temporary buildings can be reused, these would be taken off-site.

7.2.4 It is intended that where possible any structures demolished that contain concrete or brick would be crushed for reuse on-site. Other material that can be recycled would be either reused on-site or removed to be appropriately recycled.

7.2.5 Any areas affected by the removal of temporary construction buildings would, where feasible, be restored to their former condition.

7.3 Removal of temporary infrastructure

7.3.1 Removal of temporary infrastructure as required includes the removal of:

- compounds;
- laydown areas;
- parking;

- temporary construction utilities; and
- haul and access roads.

7.3.2 Removal of temporary infrastructure would involve various techniques, predominantly the use of mechanical earthmoving and demolition equipment.

7.3.3 Where temporary infrastructure elements can be reused, these would be taken off-site.

7.3.4 It is intended that where possible any infrastructure demolished that contains concrete or brick would be crushed for reuse on-site.

7.3.5 Other material that can be recycled would be either reused on-site or removed to be appropriately recycled.

7.3.6 Any areas affected by the removal of temporary infrastructure would, where feasible, be restored to their former condition.

8 Health and Safety

8.1 Construction arrangements

8.1.1 Horizon would provide control and oversight of construction health and safety arrangements for the Wylfa Newydd programme.

8.1.2 Horizon health and safety requirements would be defined and cascaded down to its suppliers within the contractual arrangements, and they would adhere to these throughout the Wylfa Newydd programme.

8.1.3 Horizon would require its supply chain to deliver their works to an exemplary standard for health, safety and welfare performance, with Horizons vision and philosophy that "*everyone working on the project goes home unharmed every day*".

8.1.4 Horizon intend to develop a behavioural safety programme in collaboration with their supply chain. In addition, Horizon would develop a set of health and safety performance indicators to measure and manage health and safety performance on the project.

8.1.5 Horizon intend to establish a Safety Leadership Group consisting of senior executives and health and safety personnel from Horizon and key suppliers, that would meet monthly to set the strategic health and safety direction and review performance.

8.1.6 The Safety Leadership Group would develop a health, safety and welfare strategy to deliver key initiatives, including:

- occupational health programme;
- fair culture model;
- positive reporting;
- frontline leadership programme; and
- setting lead and lag measures and performance metrics.

8.1.7 In addition, Horizon would establish a supply chain forum that would meet quarterly with the involvement of Horizon, and senior supply chain directors in order to apply the appropriate focus to deliver exemplary health, safety and welfare standards and performance.

8.1.8 The Horizon construction board and sub-programme leadership teams would commit to the health, safety and welfare programme. This would include the supply chain senior management involvement, and that of the Safety Leadership Group to deliver the leadership engagement programme. This would be supportive to establishing the safety culture, thereby enabling a positive start to the site health, safety and welfare programme.

8.1.9 Horizon intend to develop and implement a set of 'Golden Rules' for Health, Safety and Welfare. These would be the guiding principles for all personnel involved in delivering the Wylfa Newydd Project, setting the behavioural baseline to develop the right health, safety and welfare culture.

8.1.10 Horizon would empower their personnel, suppliers and contractors with permission and authority to have the courage and bravery to challenge unsafe acts and conditions. This would have the full support from the Chief Executive Officer and the Construction Director in supporting those staff who demonstrate the right behaviours.

8.1.11 Horizon would develop health, safety and welfare assurance arrangements which would test the arrangements in order to ensure they meet their legal obligations and those standards and requirements set through the contract.

Construction (Design & Management) Regulations 2015

8.1.12 Horizon would act as the *Construction (Design & Management) Regulations 2015* (CDM) Client as defined by CDM, and would discharge its duties through its organizational arrangements. The Construction Director would be the named CDM Client representative.

8.1.13 Horizon has developed CDM management arrangements which describe how it would discharge its duties for the Wylfa Newydd Programme.

8.1.14 Horizon would appoint its supply chain to deliver Principal Designer services for the Wylfa Newydd programme.

8.1.15 The Principal Designer would manage and co-ordinate the design activities at the pre-construction phase. They would develop management arrangements which describe how they would deliver this in compliance with CDM.

8.1.16 Horizon would appoint its supply chain to deliver the Principal Contractor role.

8.1.17 Horizon would test these arrangements as part of delivering its CDM client duties.

9 References

Table 9-1 References

Ref. No.	Title
[RD1]	The Knotweed Code of Practice: Managing Japanese Knotweed on development sites Environment Agency. July 2013.

Annex A. Time slice phasing plans

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Description of construction works at each time slice

Time slice (TS)	Construction stage	Construction works
TS1	SPC	• site clearance, including demolition and removal of existing buildings and structures to ground level; • translocation and displacement of any affected species; • vegetation clearance; • ground remediation; • watercourse diversion; • services/ utilities diversions, including 11kV overhead line diversion; and • perimeter fence installation and controlled access points.
TS2	Six months following completion of SPC	• topsoil strip; • area for deep excavation demarked; • setting up of initial site offices; • setting up explosive cabins; • setting up of fuel storage area; • setting up of plant maintenance shop; • establish pre-earthwork drainage; • install temporary batching plant; • establish construction laydown areas; • Magnox Road Crossing; • begin MOLF dredging; • begin off-site fabrication of pre-cast Units for MOLF; and • Phase 1 of Site Campus underway.

Time slice (TS)	Construction stage	Construction works
TS3	Site grading	• site grading; • build acoustic bund near Tregele; • temporary cofferdam and causeway construction on-going at MOLF; • MOLF dredging ongoing; • bulk MOLF construction starts; • eastern breakwater construction commences; • blasting and rock excavation at Cooling Water intake commences; • outfall tunnelling works commence; • blasting and excavation works ongoing to Unit 1 and 2; • intake structure and Cooling Water tunnel route to power block blasting; • haul road routes are changed as the landform changes through earthworks activities; • route temporary utilities to temporary construction facilities; • establish mound E; • Phase 1 of Site Campus complete; and • Construction of Phase 2 of Site Campus on-going.

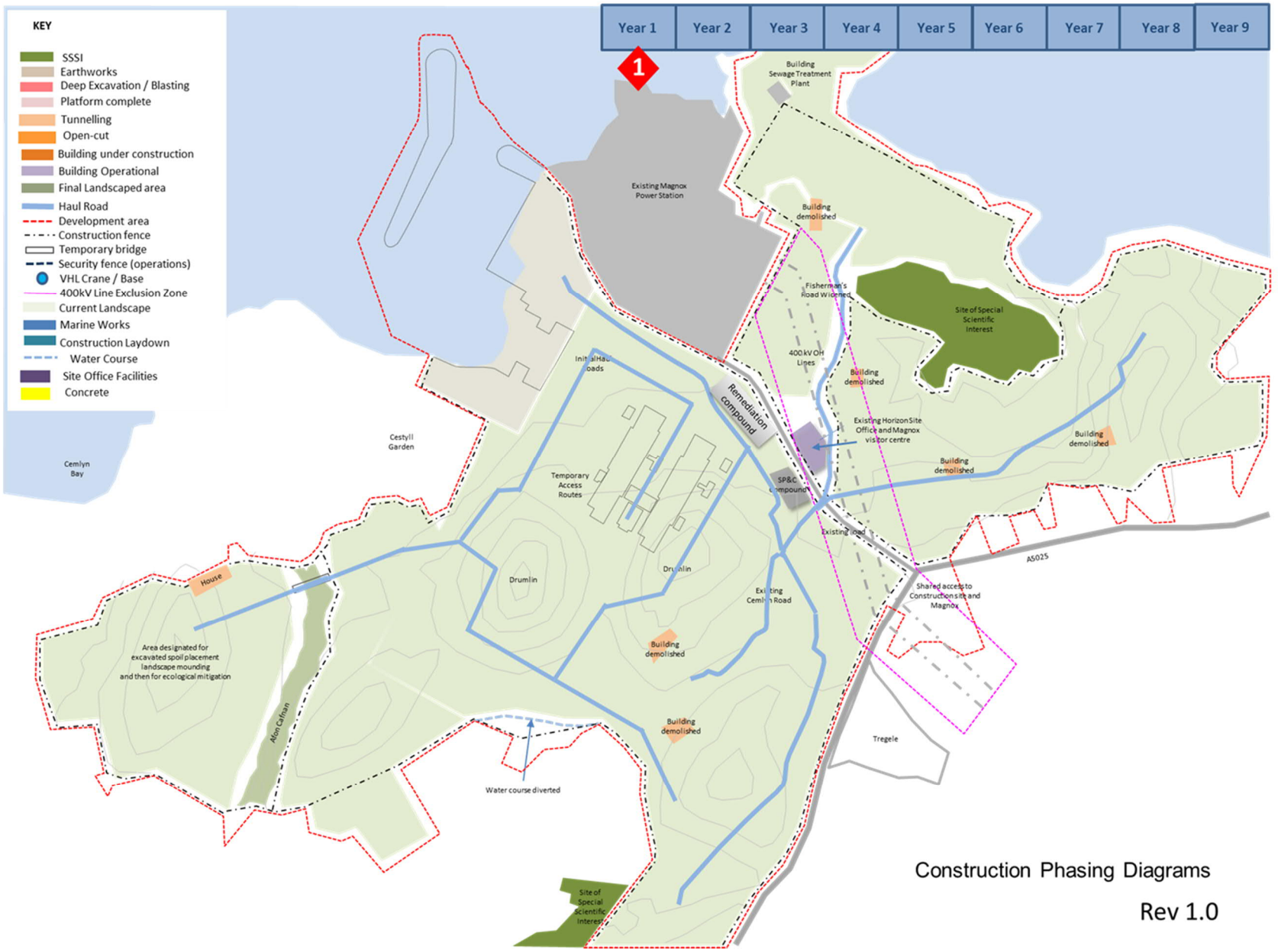
Time slice (TS)	Construction stage	Construction works
TS4	Deep Excavation and Platform Creation	• deep excavation works ongoing to Unit 1 and 2; • mound creation ongoing; • eastern and western laydown under construction and temporary utilities connected; • haul road routes are changed as the landform changes through earthworks activities; • temporary cofferdam in place and dewatering intake channel on-going; • bulk MOLF construction is on-going and RO-RO complete; • intake structure, Cooling Water tunnel route and 2nd stage of bench blasting for Units 1 and 2 on-going; • outfall tunnelling ongoing and Cooling Water outfall open cut commenced; • concrete batching plant under construction; • assemble and test Very Heavy Lift (VHL) Crane – Unit 1; • platform creation ongoing; • southern security plaza under construction; • construction of site offices and welfare facilities; • simulator and training building construction commences; and • construction of Phase 3 of Site Campus on-going.
TS5	Completion of blasting	• installation of sewage treatment facility; • temporary cofferdam being removed; • bulk MOLF completed; • western breakwater armour placing complete; • temporary causeway to western breakwater being removed;

Time slice (TS)	Construction stage	Construction works
		• concrete batching plant testing complete and start of nuclear concrete production; • completion of AIL haul roads; • Unit 1 RCCV pre-fabrication and assembly started; • final excavation works ongoing to Unit 1 and 2; • VHL crane Unit 1 operational; • construction of Cooling Water intake channels; • base mats for Heat Exchanger and Turbine Buildings; • construction of mounds on-going; • Southern security plaza complete; • simulator and training building construction reaching completion; • Cooling Water outfall tunnelling complete and open cut works ongoing; • Site Campus complete.
TS6	First Nuclear Construction on Unit 1	• All platforms and laydown areas complete; • western breakwater armour placing completed; • western breakwater access route (causeway) removed; • MOLF and Ro-Ro operational; • Unit 1 FNC and base mat construction commences; • sub-drainage including cool water piping preparation to all areas of nuclear island; • Unit 1 RCCV assembly ongoing; • VHLs (Very Heavy Lift Cranes) operational; • creation of mounds ongoing;

Time slice (TS)	Construction stage	Construction works
		• Cooling Water outfall tunnels and facilities complete; and • simulator and training building complete.
TS7	First Nuclear Construction on Unit 2	• Unit 1 construction ongoing; • work to Cooling Water intake structures continues throughout period; • security buildings complete and fencing ongoing; • Cooling Water intake cofferdam removed; • construction laydown areas complete; • Cooling Water outfall facilities complete; • Unit 2 FNC and reactor building base mat construction commences; • Unit 2 RCCV pre-fabrication and assembly commenced; and • sub-drainage including cool water piping preparation to all areas of Unit 2 nuclear island ongoing.
TS8	Power Plant Construction	• Unit 1 construction ongoing; • Unit 1 RCCV in-situ assembly ongoing; • Work to Cooling Water intake structures continues throughout period; • Unit 2 FNC and base mat construction complete and upward construction commences; • Unit 2 RCCV lift completed and In-situ assembly ongoing; • sub-drainage including cool water piping preparation to all areas of Unit 2 nuclear island commences; and • construction of other operational permanent buildings continues.
TS9	Units 1 and 2	• Unit 2 fully fuelled and coming out of hot commissioning into operation;

Time slice (TS)	Construction stage	Construction works
	operational	• dedicated access from the north provided to Unit 2 i.e. shared access with Magnox; • Unit 1 fully fuelled and operating and have dedicated access from the south; • disassembly, demolition and removal of construction facilities ongoing; • concrete batching plant area decommissioned and removed from site; • disassembly of VHLs complete and removed from site; and • conversion of laydown areas into landscape mounds ongoing.
TS10	Commercial operation	• Units 1 and 2 are both operational and infrastructure and landscaping works complete.

Time Slice 1 Site Preparation & Clearance



Construction Phasing Diagrams

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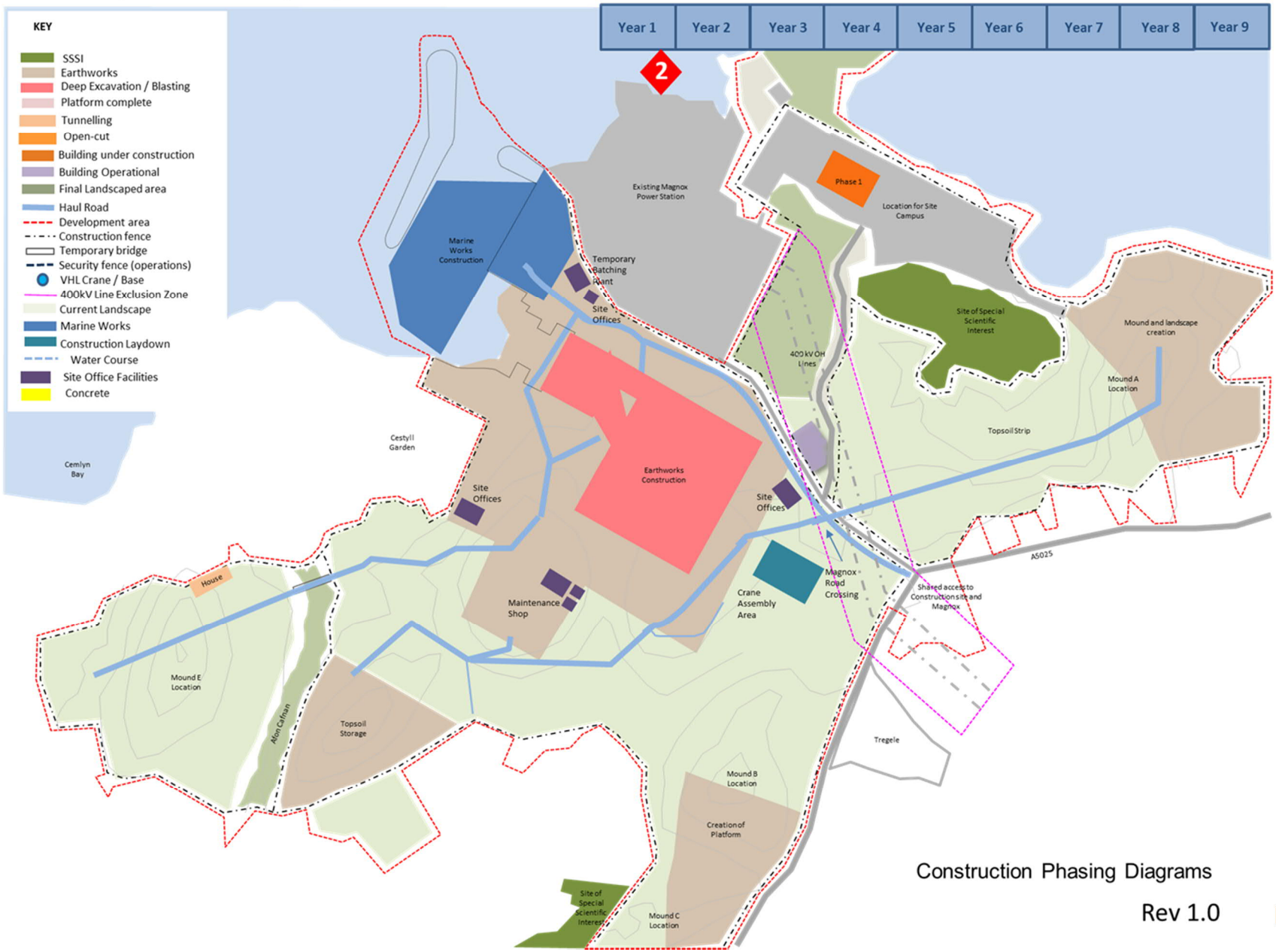
Time Slice 2 (6 Months following SPC)



Construction Phasing Diagrams

Time Slice 3 (Site Grading)

Construction Phasing Diagrams

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Time Slice 4 (Deep Excavation and Platform Creation)

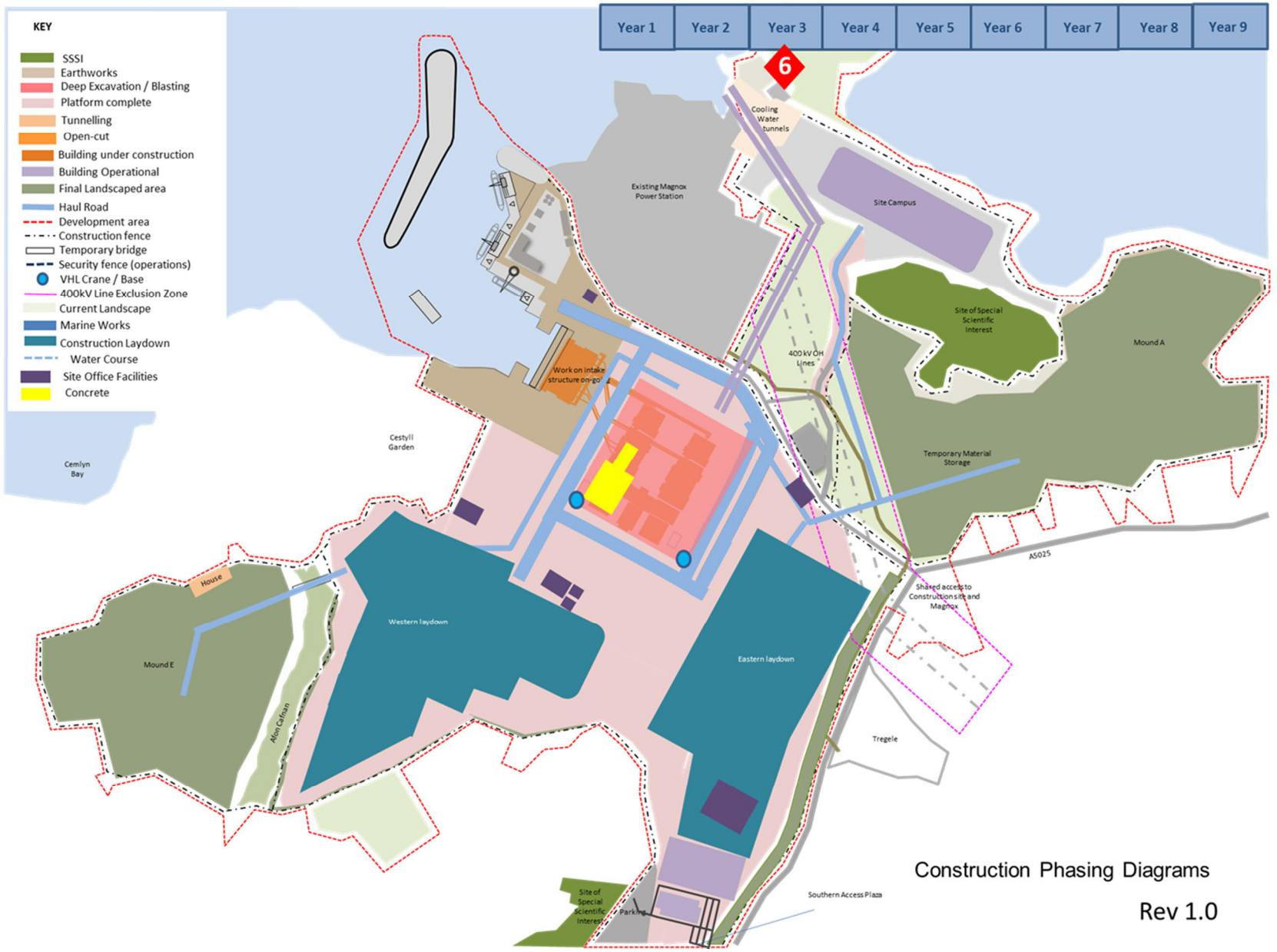
Construction Phasing Diagrams

Rev 1.0

Time Slice 5 (Completion of Blasting)

Construction Phasing Diagrams

Time Slice 6 (FNC Unit 1)



Construction Phasing Diagrams

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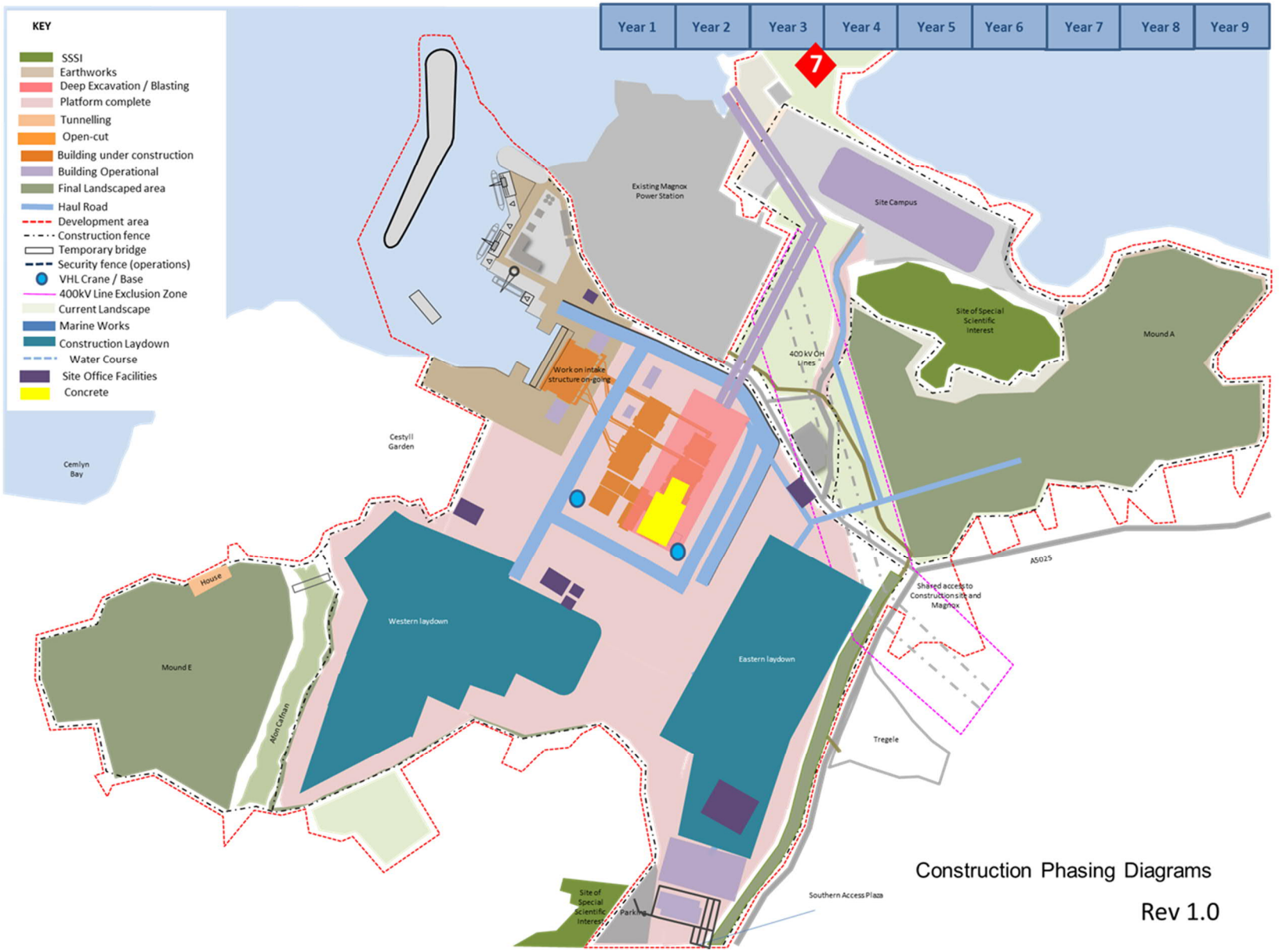
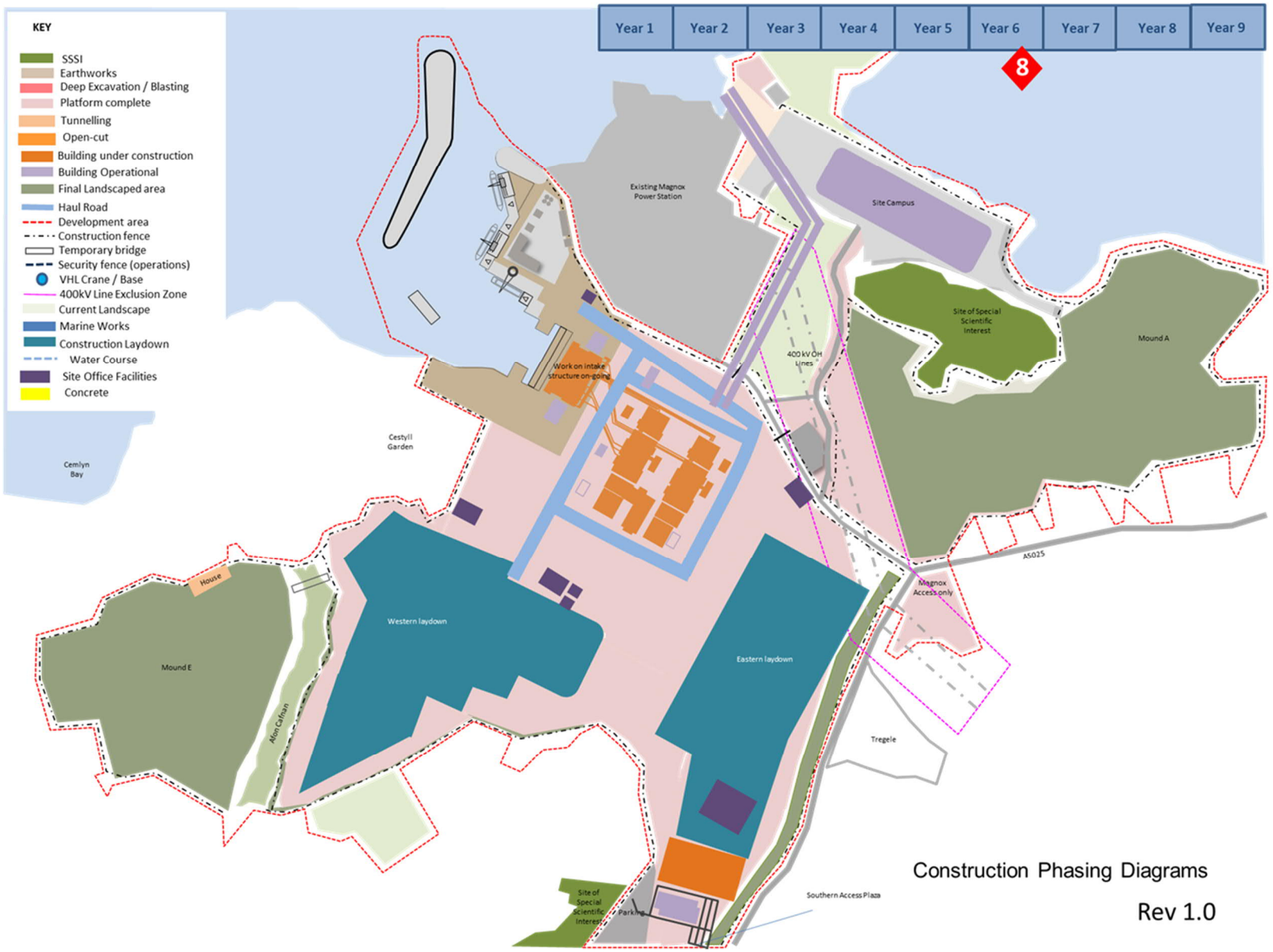
Time Slice 7 (FNC Unit 2)



Time Slice 8 – Power Plant Construction



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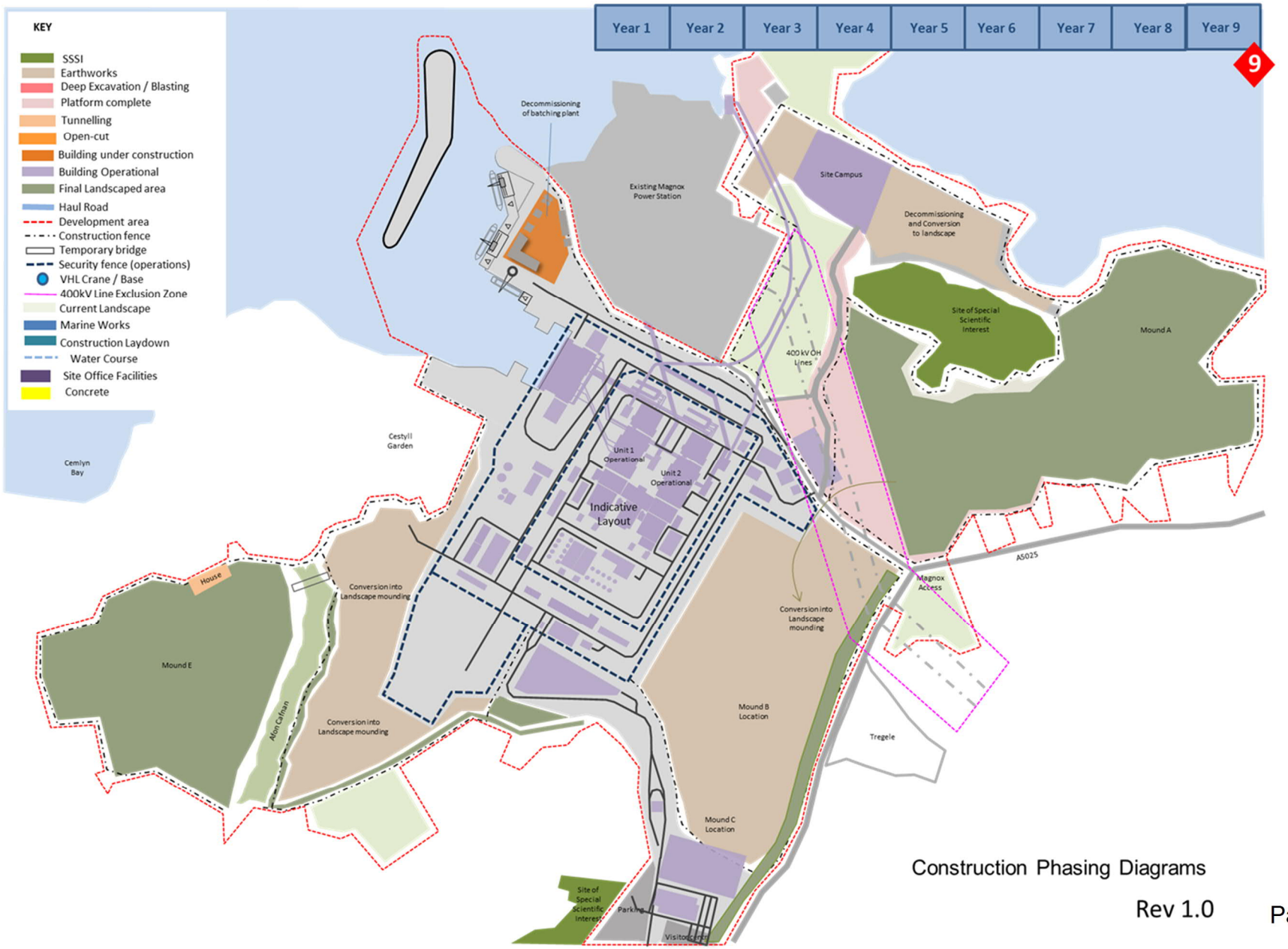
Time Slice 9 – Units 1 and 2 Operational



Construction Phasing Diagrams

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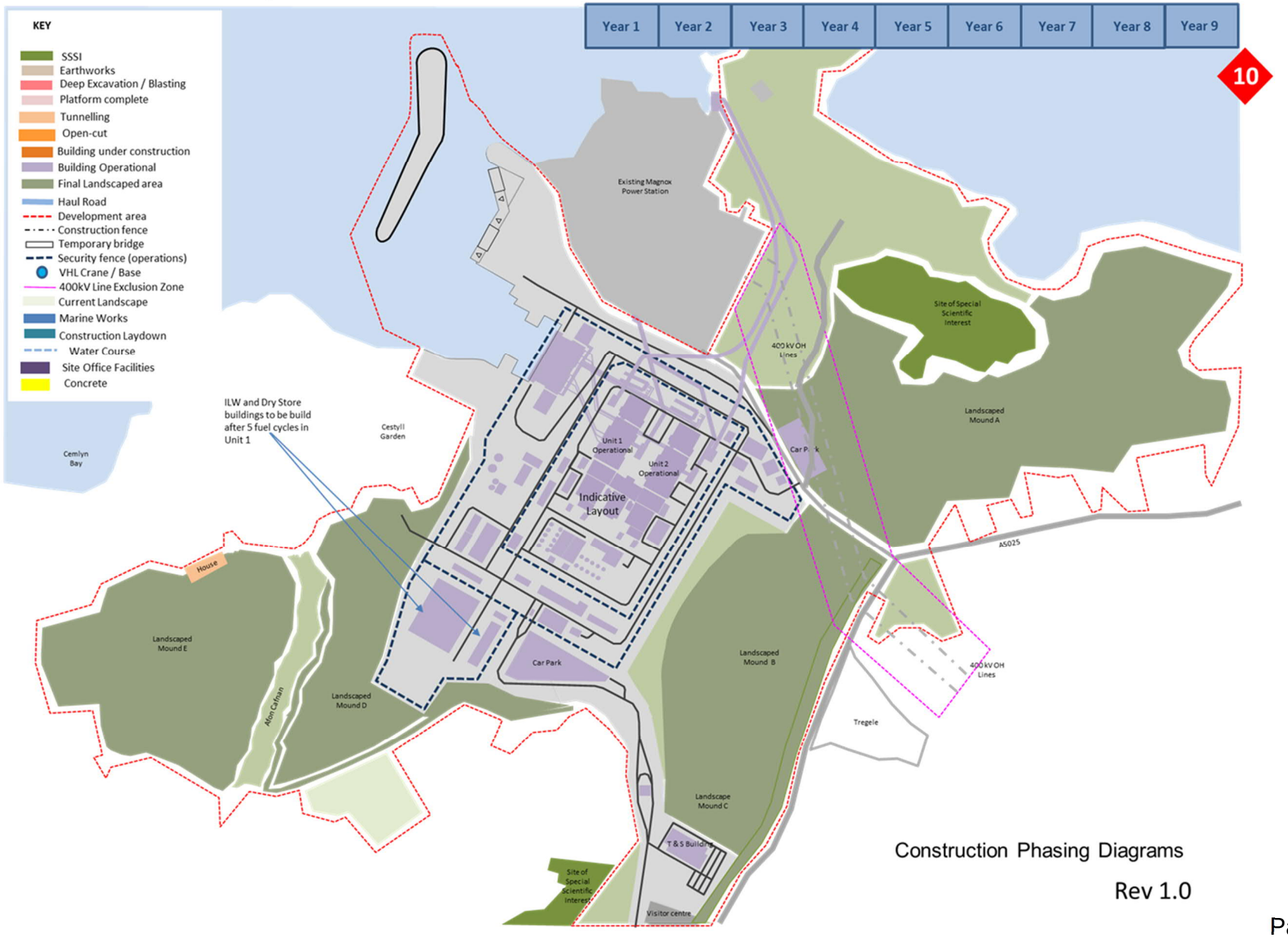
Time Slice 10 – Commercial Operation



Construction Phasing Diagrams

Rev 1.0