The Sizewell C Project

9.29 Comments on Councils' Local Impact Report Appendices

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APPENDIX 15A HPC FREIGHT MANAGEMENT STRATEGY

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1. INTRODUCTION

1.1.1 NNB Generation Company Limited (Company Number 06937084), part of EDF Energy, is the Company that will lead the nuclear programme in the United Kingdom. For the purpose of this application for Development Consent, NNB Generation Company Limited is referred to as EDF Energy.

1.1.2 EDF Energy is planning to build a new nuclear power station at Hinkley Point near Bridgwater, Somerset, comprising two UK EPR reactor units with an expected output of approximately 1,630MW per unit.

1.1.3 The new site, Hinkley Point C (HPC), is to the west of the existing Hinkley Point Power Station Complex. The new power station is based on replicating as much as possible the design for the Flamanville 3 unit in Normandy, France, currently under construction.

1.1.4 The Freight Management Strategy (FMS) accompanies EDF Energy's Development Consent Order (DCO) application to the Infrastructure Planning Commission (IPC) and is therefore focused on the movement of materials post DCO consent. It does not include the site preparation works freight plans, as these works were subject to a separate planning application to West Somerset Council and are accompanied by their own plans. It does include the total quantity of materials required to construct the HPC Project, including materials for site preparation works and construction of the jetty.

1.1.5 The FMS sets out the measures required for delivery from key freight management facilities in the local area to the point of use having regard to the objectives of the FMS (see 2.1.1).

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2. OBJECTIVES

2.1.1 The objectives of the FMS are to:

- minimise the volume of freight traffic associated with the development of the new power station so far as reasonably practicable, at all times but especially during peak hours;
- maximise the safe, efficient and sustainable movement of materials required for the HPC Project so far as reasonably practicable;
- minimise the impacts both for the local community and visitors to the area using the road network so far as reasonably practicable;
- provide long-term, sustainable legacy benefits for the local community from new infrastructure, where appropriate;
- take all reasonable steps to ensure the resilience of the transport network in the event of an incident; and
- take all reasonable steps to protect the natural and built environment.

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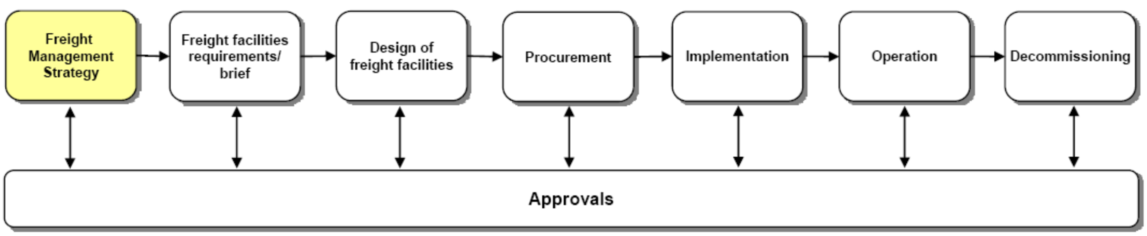
3. METHODOLOGY

3.1.1 The methodology adopted for the FMS is as follows:

- understand the scope, type and schedule of construction activities;
- assess existing infrastructure;
- propose measures to meet objectives;
- assess material requirements throughout the lifetime of the HPC Project; and
- assess the resultant road freight traffic.

3.1.2 The principles included in the FMS have been and will continue to be used to develop the design, procurement, delivery, operational and post-operational phase of the required freight management facilities and associated infrastructure, as illustrated in **Figure 3.1**.

Figure 3.1: Material Freight Implementation Process



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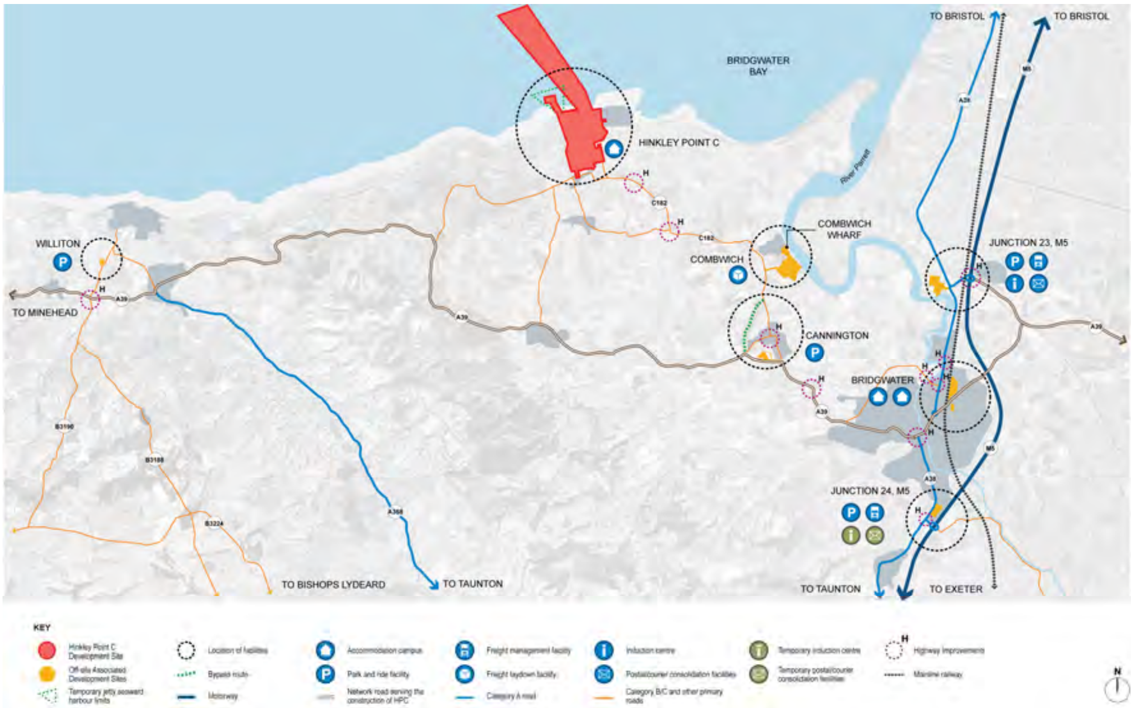
4. CONSTRUCTION SCOPE AND STRATEGIC PROGRAMME

4.1.1 For the purpose of this FMS, two main construction areas are considered:

- HPC related development**.** This includes:
  - Preliminary works (including temporary jetty).
  - Construction of two UK EPR reactor units, related infrastructure, temporary construction facilities and an accommodation campus for 510 workers proposed within the HPC construction site.
  - National Grid 400kV substation and overhead line modifications.
- Off-site associated developments. These include:
  - Accommodation campuses for up to 1,000 construction workers, with ancillary facilities, across two sites.
  - Park and ride facilities for up to 2,361 car parking spaces, 49 mini-bus/van parking spaces, 125 motorcycle spaces, 125 bicycle spaces and 51 bus parking spaces, with ancillary facilities, across four sites.
  - Freight management facilities for up to 140 heavy goods vehicles (HGV) parking spaces, with ancillary facilities, across two sites.
  - An induction centre for the induction of staff in connection with the HPC construction phase.
  - A consolidation facility for postal/courier deliveries.
  - A bypass to the west of Cannington.
  - Refurbishment and extension of the existing Combwich Wharf and provision of an associated temporary freight laydown facility for the storage of abnormal indivisible loads (AILs) and other construction goods being delivered via Combwich Wharf before they are transported to the HPC development site.

4.1.2 As the road freight traffic, which will be transported using the C182, is a measure of the impact on the key routes to HPC through Bridgwater and Cannington, the material quantities required for the refurbishment and extension of Combwich Wharf and construction of the new freight laydown facility have been included as part of the HPC related development (refer to Section 7).

Figure 4.1: Construction Sites Associated with the HPC Project



4.1.3 The overall programme for the construction at HPC, including the preliminary works, is anticipated to take approximately nine years to complete the main construction works for HPC when both units will be operational and includes:

- the site preparation works;
- construction and subsequent operation of the temporary jetty;
- construction of HPC, including the nuclear island, the conventional island, the balance of plant, ancillary buildings and structures, the National Grid 400kV substation and overhead line transmission infrastructure;
- construction of the cooling water infrastructure;
- construction of the HPC accommodation campus;
- dismantling and removal of the temporary jetty;
- removal of the HPC accommodation campus; and
- landscape restoration.

4.1.4 The first phase of works, involving preliminary works, includes site clearance, construction of access roads and roundabouts and main excavation. This phase includes the construction of the temporary jetty, completion of which is expected in mid 2013, to allow materials for on-site concrete production to be transported by water.

4.1.5 **Figure 4.2** and **Figure 4.3** show ongoing works at the Flamanville 3 site in Normandy, France. Illustrations from this site have been used to help visualise the likely construction activities at HPC.

Figure 4.2: Site Preparation Works (Flamanville 3 - France)

4.1.6 The civil works will follow the site preparation works, completing the deep excavations and ensuring the site is ready for the start of building construction, which includes the foundations, structural concrete, backfilling, galleries, construction of the reactor buildings, auxiliary buildings, control buildings, turbine halls, cooling water tunnels, ancillary buildings and associated infrastructure. Material requirements for these elements will be mainly sand, aggregate and cement, reinforced steel, pipework, structural steelwork and formwork.

Figure 4.3: Construction of Buildings (Flamanville 3 – France)

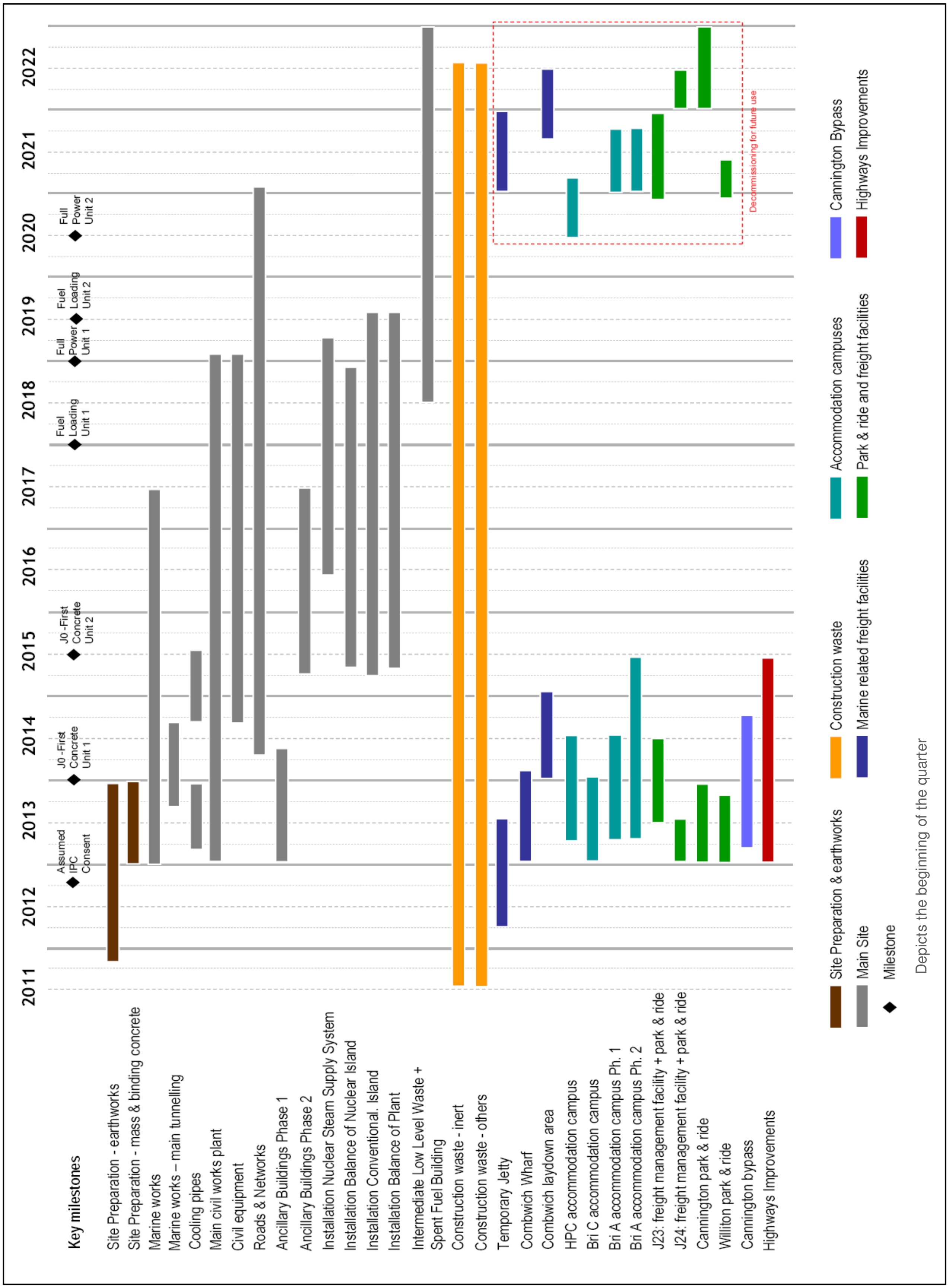
4.1.7 The mechanical and electrical plant installation phase will commence when the civil structures are sufficiently advanced to enable access, which will be in approximately 2015.

4.1.8 Approximately 180 mechanical and electrical plant items, e.g. the reactor pressure vessels, will be very large and/or heavy and will require special transport to site. These items are all classified as AILs and will be shipped to Combwich Wharf by sea and then taken to the HPC development site by road using special trailers.

4.1.9 Temporary components will be required throughout the construction period and will include construction plant, concrete batching plant, access and maintenance equipment (e.g. earthwork machinery, cranes, hoists, cherry pickers, man riders etc) as well as temporary site facilities (e.g. temporary offices, canteen, toilets etc).

4.1.10 **Figure 4.4** illustrates the HPC Project strategic programme, as described above. The first UK EPR reactor unit is planned to be operational in Quarter 1 2019 while the second in mid 2020.

Figure 4.4: HPC Project Strategic Programme



5. EXISTING TRANSPORT INFRASTRUCTURE

5.1 Road

5.1.1 **M5**: the M5 motorway bypasses Bridgwater to the east of the town with two interchanges at Junction 23 and Junction 24.

5.1.2 **A38**: the A38 runs from Wellington to Burnham-on-Sea via Taunton and Bridgwater.

5.1.3 **A39**: the A39 from Cannington runs westwards towards Williton and Minehead, southwards through Bridgwater and then eastwards to Glastonbury.

5.1.4 **NDR**: (now classified as A39): the Northern Distributor Road (NDR) was built to access and distribute traffic around new residential areas as well as routing some through traffic movements away from the town centre. It links the A38 with the A39 to the west of Bridgwater.

5.1.5 **C182**: the main access road serving Hinkley Point is the C182, which runs from Hinkley Point to the village of Cannington. The C182 routes through the centre of Cannington and then joins the A39.

Figure 5.1: Existing Transport/Freight Infrastructure in the Vicinity of HPC

5.2 Water

5.2.1 **Combwich Wharf**: the facility is located approximately 4km south-east of Hinkley Point. It was built to support the construction of the Hinkley Point A development and subsequently modified for Hinkley Point B.

5.2.2 The facility is currently used by EDF Energy for deliveries to Hinkley Point B, as well as National Grid, for the delivery of AILs.

5.2.3 **Dunball Wharf**: located on the A38, adjacent to Junction 23 of the M5 motorway, it hosts a wharf on the River Parrett. The key materials handled at Dunball include sand, aggregates and agricultural goods.

5.2.4 **Bristol Port**: comprises of two elements; Avonmouth and Royal Portbury Dock (RPD).

5.2.5 RPD can handle up to 130,000 dead weight tonne (dwt) vessels and deals primarily with dry bulk goods, oil, forest products and motor vehicles.

5.2.6 Avonmouth is smaller and can handle up to 35-39,000dwt vessels. Cargo handled at Avonmouth includes petroleum, fresh produce, gas, cement, scrap metals, containers, sand, gravel, grain, steel products and forest products.

5.2.7 The Avonmouth Container Terminal serves short sea container markets. The terminal has a large stockyard for coal storage and a railhead to the Portbury line and a totally enclosed conveyor link connecting the stockyard to another railhead in Avonmouth.

5.2.8 Other key ports in the Bristol Channel include Newport, Cardiff, Barry, Port Talbot and Swansea in South Wales.

5.3 Rail

5.3.1 The nearest railhead to the site is at Bridgwater, 10 miles from the HPC development site, on the route between Bristol and Penzance. This is a relatively small facility with limited scope for expansion and has road access via a residential area.

5.3.2 There is also an operational railhead at Taunton, 20 miles from the HPC development site, however it is currently a stabling area so no freight handling facilities exist.

5.3.3 A railway line, privately operated by West Somerset Railway, passes approximately 20 miles to the west of the HPC development site with an existing station at Williton. There are no existing handling facilities or railhead to cater for rail freight and possible line upgrades would be required if rail freight was considered. Also, third party ownership currently imposes operational and access constraints to the railway.

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6. PROPOSED FREIGHT MEASURES

6.1 Overview

6.1.1 The constrained nature and relatively remote geographical location of the proposed HPC development site presents a number of challenges to the transportation of materials for the HPC Project.

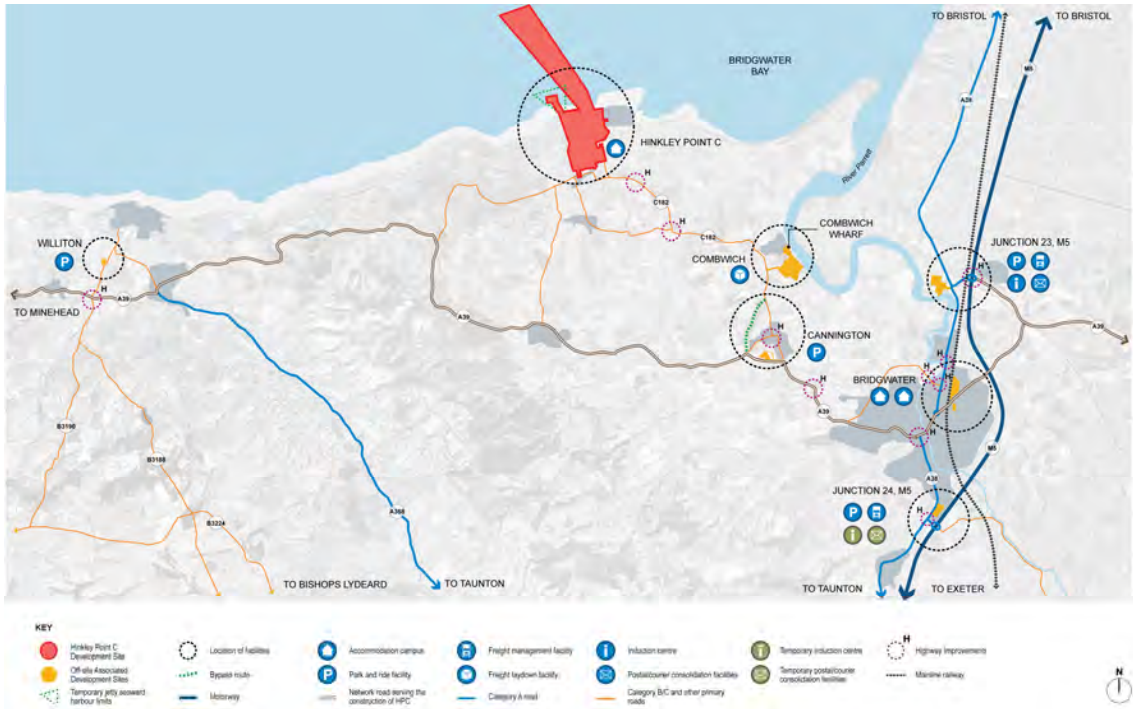
6.1.2 The local road infrastructure, for example, has a rural character and requires access through settlements such as Bridgwater and Cannington for traffic travelling between the M5 and Hinkley Point.

6.1.3 These characteristics require the development of a bespoke FMS if the HPC Project objectives are to be achieved in a sustainable and environmentally responsible manner.

6.1.4 The proposed freight measures aim to reduce and control the use of road freight traffic during the construction phase, especially in the peak hours. A number of measures are proposed, including (see **Figure 6.1**).

- the re-use and storage of excavated materials on-site to avoid exporting off-site;
- the use of water for delivery of materials and the largest AILs through the construction of a temporary jetty at the HPC site, the refurbishment and extension of Combwich Wharf and the construction of a new, temporary freight laydown facility at Combwich;
- reducing the impact of construction traffic in Cannington by constructing a bypass around the western side of the village, linking the A39 directly to the C182;
- reducing the impact of construction traffic by providing a package of highway improvements;
- introducing off-site freight management facilities close to Junction 23 and Junction 24 of the M5, to control incoming Heavy Goods Vehicles (HGVs) and holding them in case of an incident on the local network or at the HPC development site;
- regulating HGVs by using a project-wide delivery management system (DMS) to regulate and track flows and move away from network peak time congestion; and
- reducing Light Goods Vehicles (LGVs) movement.

Figure 6.1: HPC Development Site and Associated Developments



6.2 Re-use and Storage of Excavated Materials On-site

6.2.1 The site terracing, excavation and tunnelling works will involve the excavation of over 4 million cubic metres of soil and rock.

6.2.2 Apart from a small amount of waste that will be exported off-site to minimise construction traffic on the road, the remaining excavated materials will be kept on-site and re-used as follows:

- about 2 million cubic metres of the excavated material will be fresh rock, suitable for re-use as engineered fill material for the terracing of the main site and as backfill around the main buildings (so avoiding the import of an equivalent quantity of material from quarries;
- a large amount of the excavated soil will be used to re-profile the site topography whilst topsoil, overburden and weathered rock will also be used for the final landscaping; and
- a proportion of the fill material required to construct the main platform would be imported (the top layer in particular).

6.3 Delivery by Water

6.3.1 The purpose of providing the temporary jetty and refurbishing and extending Combwich Wharf is to maximise the use of water as a method for the delivery of materials to the HPC development site.

6.3.2 The temporary jetty has been designed with a conveyor bridge which is able to accommodate 100% (by weight) of aggregates, sand and cement for on-site concrete production and also includes a road bridge for the delivery of other construction materials.

6.3.3 The Combwich Wharf refurbishment and extension has been designed to accommodate up to 90x30m barges for the delivery of AILs and other construction materials, equipment and plant. This is by providing Roll-on/Roll-off and Lift-on/Lift-off facilities.

6.3.4 EDF Energy has committed to deliver a minimum of 80% (by weight) of materials for on-site concrete production via the temporary jetty (once available) and 100% of the largest AILs to Combwich Wharf (currently approximately 180 have been identified). These targets will be achieved by imposing them as constraints on contractors. This commitment to use the temporary jetty will avoid a very substantial volume of HGV movements on the local road network – estimated at around 125,000 HGVs (250,000 movements) over the length of the construction programme.

6.3.5 The assumed use of the temporary jetty and Combwich Wharf is conservative. It therefore allows for a conservative approach to the road freight movements generated during the construction period and ensures that the potential impact of the HPC Project on the local road network is not underestimated within the **Transport Assessment**.

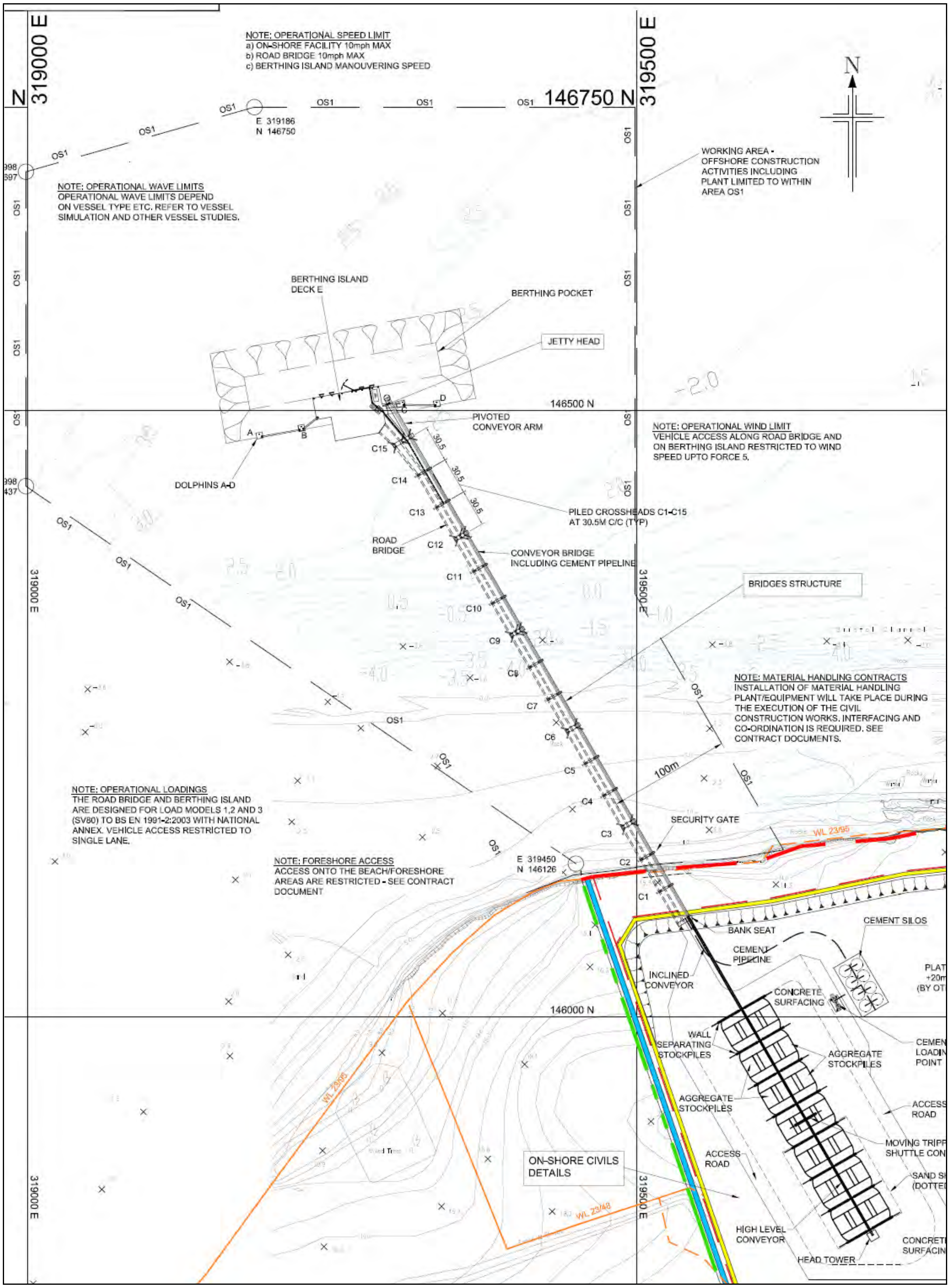
6.3.6 In practice there is potential scope for EDF Energy to bring additional construction materials to the HPC development site by sea. This includes the potential for both a higher proportion of bulk materials for concrete and other construction materials which could include structural steelwork, reinforcement bars, pipework, cabling, ducting, formwork and scaffolding. At the same time there is a range of weather, tidal and operational constraints which may act to limit the scope to achieve greater levels of sea deliveries.

a) Temporary Jetty at Hinkley Point C

6.3.7 The temporary jetty includes the following elements (see **Figure 6.2**):

- the jetty head to accommodate berthing of self-discharging vessels and cement carriers for offloading of sand/gravels, cement and pulverised fuel ash respectively;
- a conveyor bridge from the jetty head to shore, which will include a covered aggregate conveyor and a cement pipeline;
- a road bridge to accommodate vehicles. The jetty head can accommodate a mobile crane, one truck unloading and one truck on standby; and
- onshore facilities including conveyors and stockpiles/storage facilities.

Figure 6.2: Plans of the Temporary Jetty at HPC



6.3.8 The jetty head has been designed to accommodate two types of vessel for cement and aggregates. Cement carriers in the range of 2,500 to 4,500 dead weight tonne (dwt) and self-discharging dredgers up to a nominal 5,000 dead weight tonne may be used. The jetty will also be able to accommodate other cargo vessels provided that they fall within these parameters.

6.3.9 The aggregate vessels will be self-discharge type, e.g., self-discharge dredger. The vessel will approach the jetty at mid-water on a rising tide, berth and remain at the jetty until the tide falls to mid-water when it will depart. During this tidal window of approximately five to six hours, the vessel will discharge using its onboard conveyor. The aggregate conveyors on the jetty will transport the aggregates along the conveyor bridge to the onshore stock pile area.

6.3.10 The cement vessels will approach the jetty at or above mid-water on specific neap tides and berth. The jetty design would allow the cement vessel to remain afloat over a group of suitable neap tides, which is necessary as the offloading process for the cement vessel could take approximately 20 hours. The onboard pumps would blow cement to the jetty receiver, which would then pump the cement along the pipeline to site.

6.3.11 The jetty is designed to accommodate only one vessel at a time. At times of peak demand for aggregates and cement (and in combination with any extended bad weather) it is likely that the jetty berth would be almost fully occupied by these deliveries.

6.3.12 However, analysis indicates that during normal demand periods there will be opportunities for other bulk cargos to be imported via the jetty. Such cargos would require craneage for offloading and vehicles to transport the cargo to shore, which are proposed as part of the jetty design. Materials include unitised and pre-fabricated construction materials, such as concrete pipe units, steel reinforcing bars, cabling, ducting etc.

6.3.13 The jetty occupies a sensitive location within the European Designated SPA, SAC and SSSI. It also occupies a more exposed location than Combwich Wharf, which falls outside those designated areas. It is therefore not a suitable location to construct a more substantial facility capable of handling AILs.

6.3.14 The jetty has therefore been designed to be a lightweight structure in order to minimise any impact on these areas. It is considered that it would be more appropriate to refurbish and use the existing facilities at Combwich Wharf to import AILs.

6.3.15 The jetty, at this location, is relatively exposed with regard to wind and wave and there is expected to be a degree of downtime associated with periods when the aggregate and cement vessels cannot use the berth due to weather conditions. In addition, there may be other events such as disruption of supply, mechanical breakdown (vessels or conveyors/pipelines), service disruptions, etc, which may prevent the operational use of the jetty from time to time.

6.3.16 In order to mitigate such events as far as practical, it has been decided to provide onshore stock pile areas for aggregates and cement in order to store materials and thus provide a degree of contingency against supply disruption.

6.3.17 The jetty and associated facilities are anticipated to be operational from Quarter 3 2013, subject to receiving the appropriate permissions. An application for the jetty was submitted to the Marine Management Organisation (MMO) in December 2010.

b) Combwich Wharf Refurbishment and Extension

6.3.18 The proposed works at Combwich Wharf will require the partial demolition and removal of redundant features, such as the finger jetty and some berthing dolphins (independent structures for mooring boats). The existing wharf structure will remain behind a new sheet pile wall but will be partially broken down to allow installation of the new anchorage system. Its height will also be reduced and its western edge extended to allow for the increased turning circle of the trailers carrying the forecast AILs (see **Figure 6.3**).

Figure 6.3: Schematic of Upgraded Combwich Wharf

6.3.19 A new goods handling platform (Goods Wharf) will be built over the existing embankment to the east of the quay and will require the removal of the two inner berthing dolphins (the outer two dolphins shall remain as they do not affect the proposed works).

6.3.20 The existing berthing bed will be built up to a higher level and extended to the south – some bulk excavation and removal of soil/silt will be required in this area.

6.3.21 Finally, the wharf area and approach roads will be laid with a heavy duty industrial surface.

6.3.22 The primary function of Combwich Wharf is to serve the delivery of the largest AILs. These comprise a range of bespoke plant items manufactured off-site and delivered as complete packages for installation. As such, they are not geometrically suitable for long distance transport by road, being too large or heavy.

6.3.23 The type and number of AILs relating to the Nuclear Steam Supply System contract is certain as the information was derived from Flamanville and these items are replicated for the HPC Project. There are components associated with the main turbine generators, and other contracts, where the loads may differ from Flamanville; and detailed information on these will be collected as the design and procurement process progresses.

6.3.24 The facility would also be used for the import of other construction-related goods (in bulk or containers).

6.3.25 Delivery of AILs and other goods will originate from neighbouring commercial ports, most likely from Bristol or the south coast of Wales. These will serve as feeder ports to the receiving facilities at Combwich Wharf.

6.3.26 The facility provides a single-occupancy berth with two offloading options - Roll-on-Roll-off (RoRo) and Lift-on-Lift-off (LoLo). Due to the single-occupancy berth, it will only be possible to deliver either AILs or other goods at any one time (deliveries are mutually exclusive). The berth will operate on a NAABSA principle (not always afloat but safely aground). This allows the vessels to arrive and depart on suitable high-water. Unloading will generally be at low tide where operating hours permit. Where high tides occur during the day the vessels will take on negative ballast (water) so they ground and unloading can take place. The new base of the berth will be formed of concrete to provide support to the laden vessels.

6.3.27 The delivery schedule will be governed both by the weather and arrival/departure manoeuvres, which will be tidally restricted.

6.3.28 The capacity at the Wharf has been assessed on the basis of a worst case of 3 tides for each AIL delivery and is adequate to cater for unloading all of the largest AILs leaving capacity for unloading of other goods.

6.3.29 AILs are to be delivered by barge on a trailer system so that they can be driven off the barge onto the wharf. The design of the wharf recognises that the delivery barges are fitted with all necessary ramps for offloading.

6.3.30 The design ship for delivery of AILs has been proposed as a standard 90m x 30m flat-bottomed barge, as this is most compatible with the facilities at Combwich Wharf.

6.3.31 Deliveries to the Goods Wharf may make use of either a 90m x 30m or 60m x 30m flat-bottomed barge. General construction goods are to be unloaded using a mobile harbour crane that will either deposit directly onto a waiting vehicle or temporarily onto the quay for later handling.

6.3.32 The existing users of Combwich Wharf are EDF Energy and National Grid. However, EDF Energy recognises that there are many users of the adjacent Combwich Pill and adjoining land, and the proposals have been drawn up in the light of input from such users.

6.3.33 Recreational boats usually depart from Combwich Wharf on a rising tide, and return just after high tide, which would not conflict with an EDF Energy scheduled arrival or departure manoeuvre that requires exclusive use of the wharf area for the ~20min slack water period at high tide only (construction deliveries would be dependent upon a minimum tide level of 4.5m). Therefore it is feasible that a scheduled EDF Energy delivery would not preclude from using the same high tide for recreational purposes. In a “peak” month it has been estimated that the maximum number of possible deliveries to the wharf would be 15-16 therefore there will be days with no EDF Energy scheduled deliveries.

6.3.34 The majority of the wharf works will not affect the boats moored in the Combwich Pill. For health and safety purposes boat owners could be requested to move their boats for short periods and in this instance they will be provided with alternative secure boat storage.

c) Combwich Freight Laydown Facility

6.3.35 A new temporary freight laydown facility will be constructed in the vicinity of Combwich Wharf and will include the following functions/facilities:

i. Stand-by Area for AILs

6.3.36 The origin for many of the AILs means that they need to be transported long distances by sea, with sailings booked many months in advance and subject to fluctuation due to adverse weather conditions.

6.3.37 In recognition of these characteristics, and due to the constraints of the HPC development site, it is proposed to provide a temporary holding/storage area for AILs at Combwich. As there is no alternative to using Combwich Wharf for the largest AILs the stand by area would provide a degree of contingency against supply disruption before AILs are transported to the HPC development site.

6.3.38 At times when the stand-by area will not be used for AILs i.e. limited or no AILs delivered to Combwich in the short term, the available area will be used for storing other construction items.

ii. Laydown Area for Other Goods

6.3.39 Due to tide constraints and restricted unloading hours, the barges arriving at Combwich Wharf will be unloaded as quickly as possible, thus a laydown area close to the wharf is proposed to temporarily store goods (containers or bulk) before they are moved to the HPC development site.

6.3.40 The use of this area will be limited to weatherproof items (either containers or in bulk) that will not require covered facilities. The stacking of containers will be limited to two in height to limit the visual impact. Maximum container height would be approximately 2.6-2.8 metres each. Contractors' offices (if needed) will be limited to two-storey (maximum height of 4.5m).

6.3.41 Priority for the use of the freight laydown facility will be given to water borne deliveries. However, EDF Energy needs to preserve a degree of logistics flexibility and the freight laydown facility will also be used as a temporary store for road borne deliveries when there is a shortage of space at the HPC development site.

6.3.42 Parcel(s) of the freight laydown facility will be allocated to one or more contractors for a prescribed period of time to suit construction operations.

iii. Parking Facilities

6.3.43 A limited number of site vehicles (e.g. pickups, 4x4s) will be permitted for each contractor to allow for movement on the freight laydown facility or between Combwich and the HPC development site. Fifty parking spaces will be provided at the Combwich freight laydown facility to cater for these site vehicles and those associated with managing the delivery of the AILs and unloading of other goods at the wharf.

6.3.44 Workers at Combwich will be subject to the same park and ride/bussing regime as the other HPC workers, with the exception of those having special working hours not compatible with the normal bus services.

iv. Administration, Welfare and Security Facilities

6.3.45 Two buildings are proposed at the freight laydown facility; a security building and a welfare/amenity/administration building. They will both be single storey.

v. Operational Considerations

6.3.46 There will be the potential for boats to arrive at Combwich Wharf at night to suit the tidal nature of the River Parrett, however, unloading at the Wharf would be restricted to the operational hours of 07:30 to 18:30, seven days a week.

6.3.47 Activities in the freight laydown facility would be permitted between 07:00 and 20:00 Monday to Friday, and between 08:00 and 18:00 on Saturday, Sunday, Bank and Public Holidays.

6.3.48 Due to the over-sized nature of the AILs the timing of their transportation from Combwich to the HPC development site will be chosen to minimise impact (on residents along the route and other road users including HPA and HPB). For this reason, associated facilities may be open beyond normal hours to cater for this if necessary as agreed with the relevant Authorities. Local residents would be given prior notice to any such activity.

6.4 Use of Rail for Movement of Freight

6.4.1 Rail transport generally provides opportunities to transport bulk quantities of materials, thereby reducing road movements. However, local rail facilities currently present a limited opportunity for rail-borne freight to the HPC Project due to lack of capacity, limited access, limited possibility for expansion and other operational constraints. In addition, the use of local facilities would require an additional road trip to complete the journey from the railhead to the HPC development site and therefore would not reduce construction traffic on the local network.

6.4.2 In addition to these constraints, further investment would be necessary to secure rail freight capacity to support the construction works. This requirement to provide/upgrade rail facilities has been weighed against the likely usage and operational duration, and was not considered a viable option. The emphasis for materials delivery has, instead, been directed towards water-borne freight via the temporary jetty and Combwich Wharf.

6.4.3 The Port of Bristol, however, benefits from rail freight access and its use, coupled with the shipment of materials by water, will also be encouraged. Bulk materials/containers could be transferred to a coastal barge and delivered to the temporary jetty or Combwich Wharf.

6.4.4 Dunball Wharf has been discounted as a primary option as its location would not provide relief to road transport through Bridgwater. It could, however, be used as a short-term back-up for bulk materials in the event that either the jetty or Combwich Wharf becomes unavailable for any reason.

6.5 Cannington Bypass and Highway Improvements

a) HGV Routes

6.5.1 The HGV routes (see **Figure 6.4**) to the HPC development site have been selected based on the following:

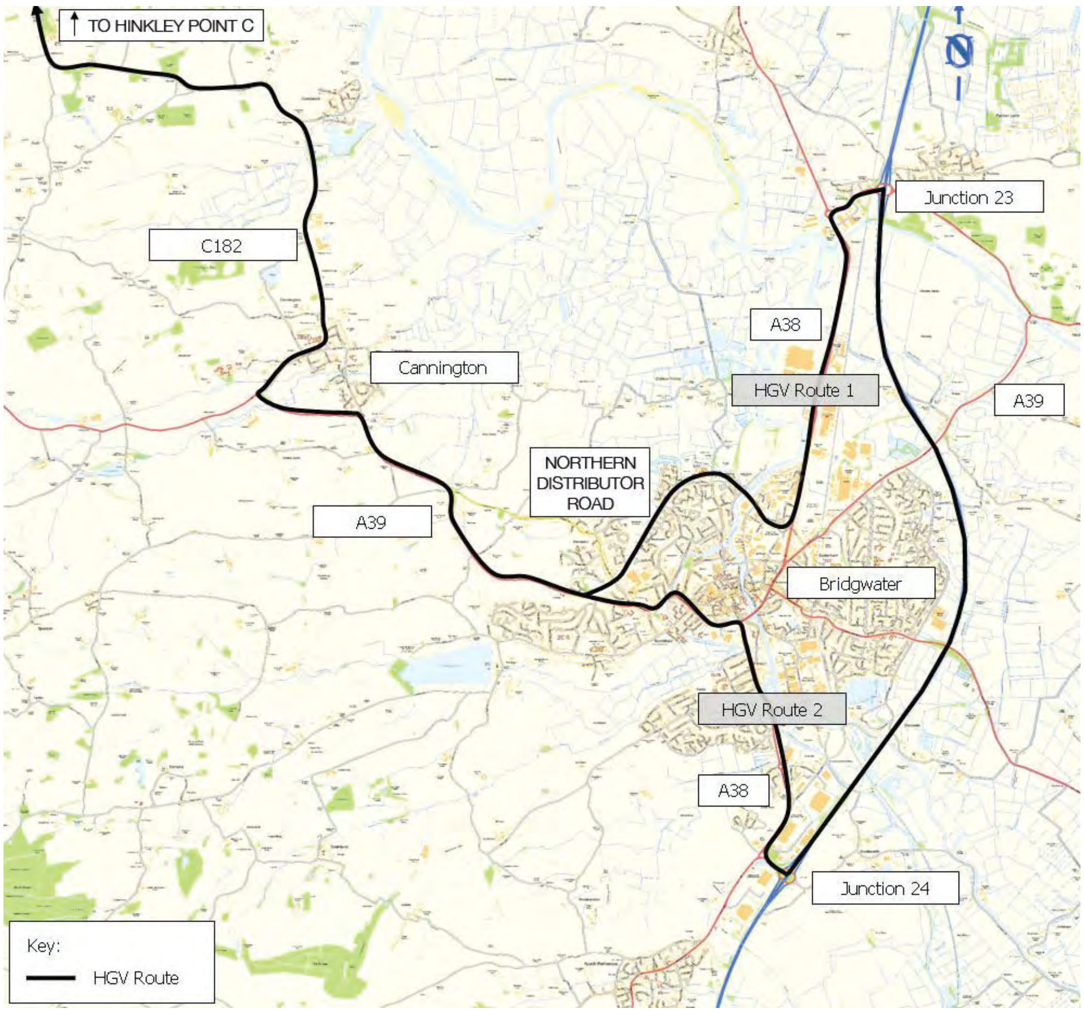
- the appropriateness of the roads to accommodate HGVs; and
- avoidance of congested areas of Bridgwater.

6.5.2 It is proposed to route HGVs from Junction 23 along the A38 Bristol Road, Northern Distributor Road (NDR – now re-classified as A39), the A39 west of Quantock roundabout, Cannington High Street (prior to any new bypass becoming operational) and Cannington bypass, once it is operational, and then along the C182.

6.5.3 It is proposed to route HGVs from Junction 24 along the A38 Taunton Road, the A39 west of the Taunton Road/Broadway junction, Cannington High Street (prior to any new bypass) and Cannington bypass, once it is operational, and then along the C182.

6.5.4 For transport modelling purposes it has been assumed that 75% of the HGVs will be coming from the north towards Junction 23 and 25% from the south towards Junction 24. In order to spread the traffic in Bridgwater between the selected HGV routes, of the 75% heading towards Junction 23 from the north, 15% will be diverted to the Junction 24 via the M5. The total proportion of HGVs at each Junction will therefore be 60% at Junction 23 and 40% at Junction 24.

Figure 6.4: Designated HGV Routes to the HPC Development Site



6.5.5 The NDR was built during 2001/02 to route traffic around and away from central Bridgwater to reduce congestion and freight flows, as well as acting as a distributor road for new housing.

6.5.6 HGVs will route along High Street, Cannington, rather than Main Road in order to avoid some of the main residential areas in Cannington. Once the Cannington bypass is operational, HGVs would route along the bypass.

6.5.7 The HGV routes have also been designed to avoid the most congested areas of Bridgwater as much as possible. No HGVs would route on the A39 stretch between Cross Rifles and the junction with the A38 Taunton Road.

6.5.8 The HGV routes have specifically been chosen because appropriate alternative routes are available nearby over most of their lengths in the event of a temporary closure on the network. Diversion routes will be set out in a Traffic Incident Management Plan.

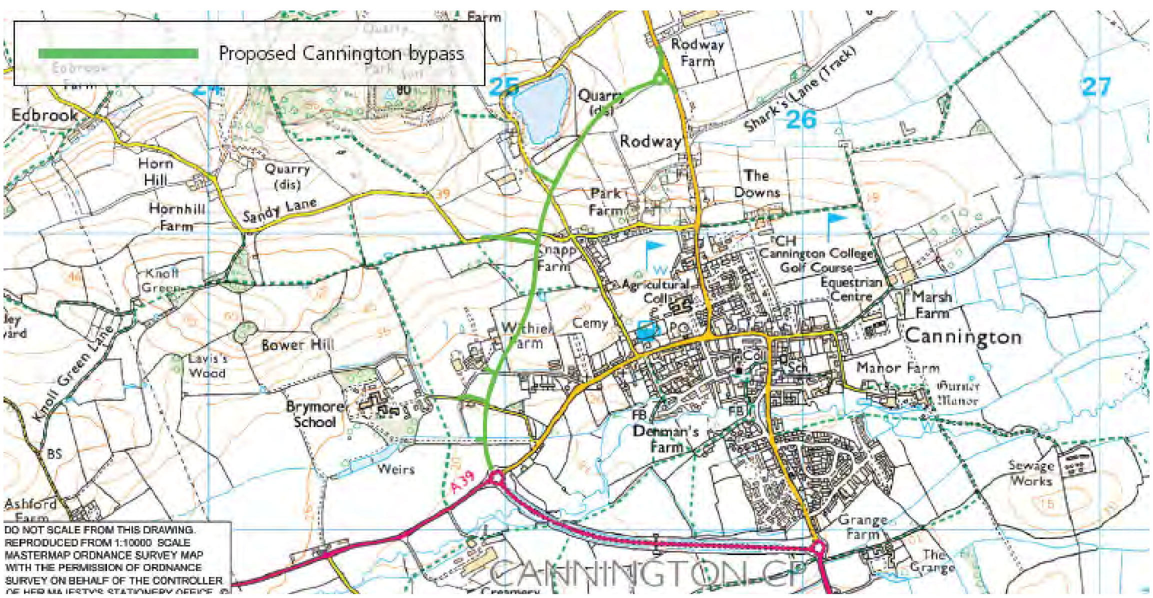
b) Cannington Bypass

6.5.9 Whilst the level of traffic anticipated through Cannington could be accommodated within the capacity of the existing road network, the increase in traffic levels above the current flows and the construction-related nature of that traffic would be more pronounced in Cannington than elsewhere. On this basis, a new bypass around the western side of Cannington is proposed, linking the A39 directly to the C182 Rodway, and is estimated to be operational in Quarter 4 2014 (see **Figure 6.5**).

6.5.10 Construction traffic would be diverted from the centre of Cannington to the new bypass for the remainder of the construction phase.

6.5.11 The bypass would be a permanent development available for use by the general public and would also absorb operational traffic to and from HPC during the operation of the power station.

Figure 6.5: Proposed Cannington Bypass



c) Highway Improvements

6.5.12 The following improvements to the road network have been identified:

- M5 Junction 23 - improvements including signals at the motorway roundabout along with some improvements to the southbound off-slip road (i.e. from the Bristol direction). In addition, minor improvements to the lane markings at Dunball roundabout will enhance the link to Junction 23.
- A39 New Road/B3339 Sandford Hill – constructing a roundabout that will improve safety and reduce vehicle speeds.
- Cannington Traffic Calming – introduction of traffic management features which will likely take the form of road markings and finishes; additional pedestrian crossing and planning restrictions.
- C182 Farringdon Hill Lane horse crossing – introduction of a formal horse crossing with associated warning signals and signage.
- Claylands Corner – introducing improvements which increase visibility for those using Adam's Lane and reduces vehicle speeds.
- A39 Broadway/A38 Taunton Road – widening of the highway and better signal arrangements to improve the operation of this junction, reduce queuing and improve pedestrian and cycle crossing facilities.
- A38 Bristol Road/Wylds Road – introduction of measures to discourage HGVs turning from Bristol Road into Wylds Road and to encourage through traffic.
- Wylds Road/The Drove – improvements to the operation of the signals and widening of the highway which will lead to more efficient operation and reduced queuing.
- A38 Bristol Road/The Drove – widening of the highway to improve the operation of this junction and reduce queuing.
- Huntworth roundabout – increase in width of eastern arm of roundabout to reduce queuing, provision of new pedestrian facilities and revision of white lining.
- Washford Cross – new roundabout to increase safety of junction.

6.5.13 The timing of the highway improvements will be coordinated with other highway works and HPC construction activities in order to minimise disruptions on the road network. Further information on the proposed highway improvements is included in the **Transport Assessment**.

6.6 Off-site Freight Management Facilities at Junction 23 and Junction 24

6.6.1 It is proposed to provide two freight management facilities close to Junction 23 (see **Figure 6.7** and **Figure 6.8**) and Junction 24 (see **Figure 6.9, Figure 6.10** and **Figure 6.11**) of the M5 motorway in order to manage HGV movements on the HGV routes. The purpose of the freight management facilities is twofold:

1. To control the flow of HGVs dispatched to HPC by holding them at the freight management facility in dedicated parking spaces until the appropriate delivery time.
2. To hold HGVs in the event of an incident requiring site deliveries to be temporarily suspended (e.g. an incident on the road network between the M5 and site, or a disruption on-site).

6.6.2 In addition to parking spaces for HGVs the freight management facilities will also include a building with administration areas and welfare facilities for drivers. Entrance/egress will be via a multi-entrance lane and booths for vehicle/paperwork checking (see **Figure 6.6**).

Figure 6.6: Examples of Holding Area

6.6.3 The freight management facilities would have security personnel present 24 hours seven days a week. The freight management facilities would be operational from Monday to Saturday and on each of these days from 05:30 to 21:30 to support the delivery window to HPC. During the construction of the freight management facilities HGVs will go directly to the HPC development site via the established HGV routes.

6.6.4 Until the Junction 23 development becomes fully operational, HGVs using the Somerfield (Junction 24) development would use two routes to travel to the HPC site. One route would be via the M5 motorway from Junction 24 to Junction 23 and then along HGV Route 1. The second route would be HGV Route 2.

6.6.5 In addition to HGVs travelling to the HPC development site, there will also be HGVs to the associated development sites mainly during the construction of these facilities. These would not be required to stop at the freight management facilities. They will therefore travel directly to the associated development sites.

Figure 6.7: Layout of Facilities at Junction 23

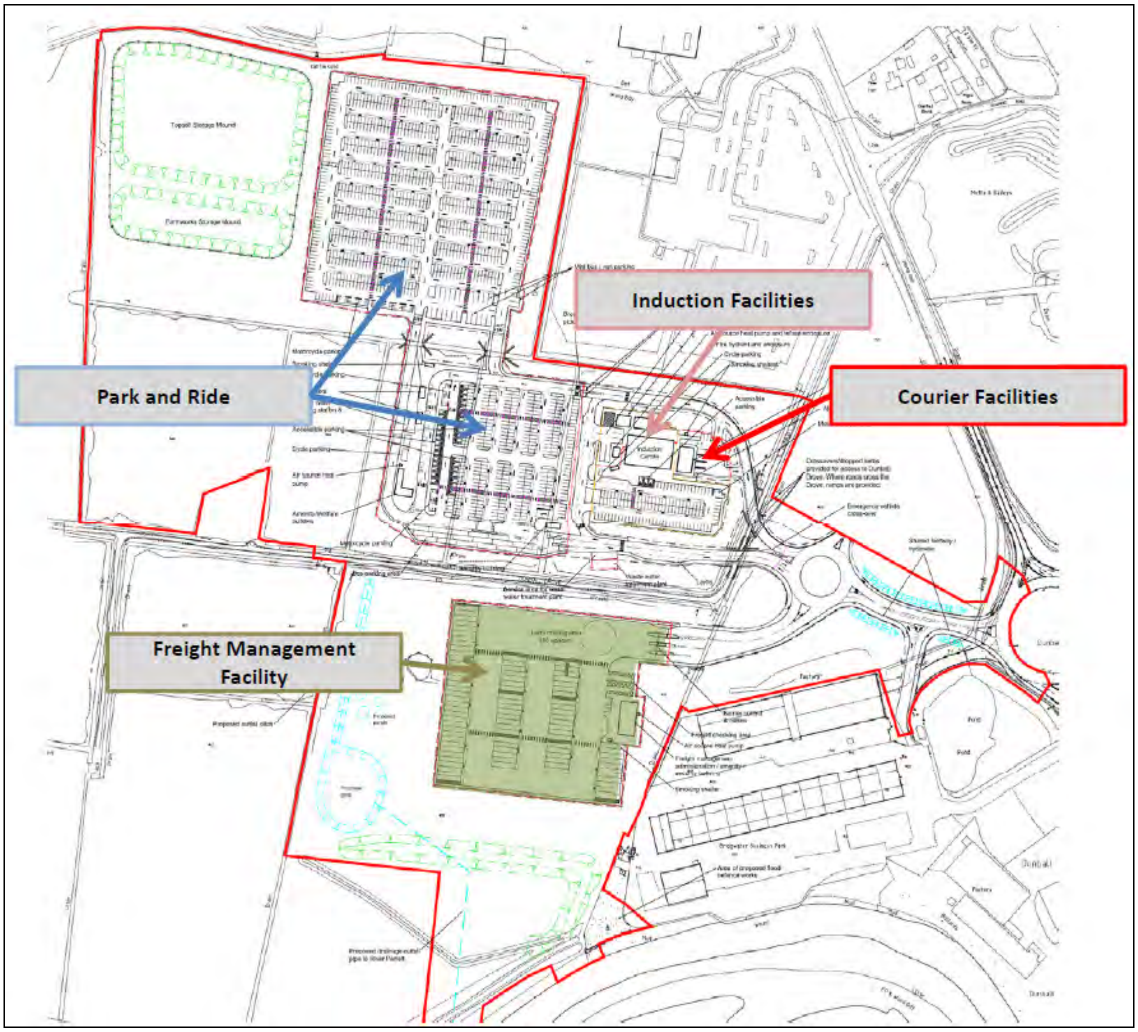


Figure 6.8: Layout of Freight Management Facility at Junction 23

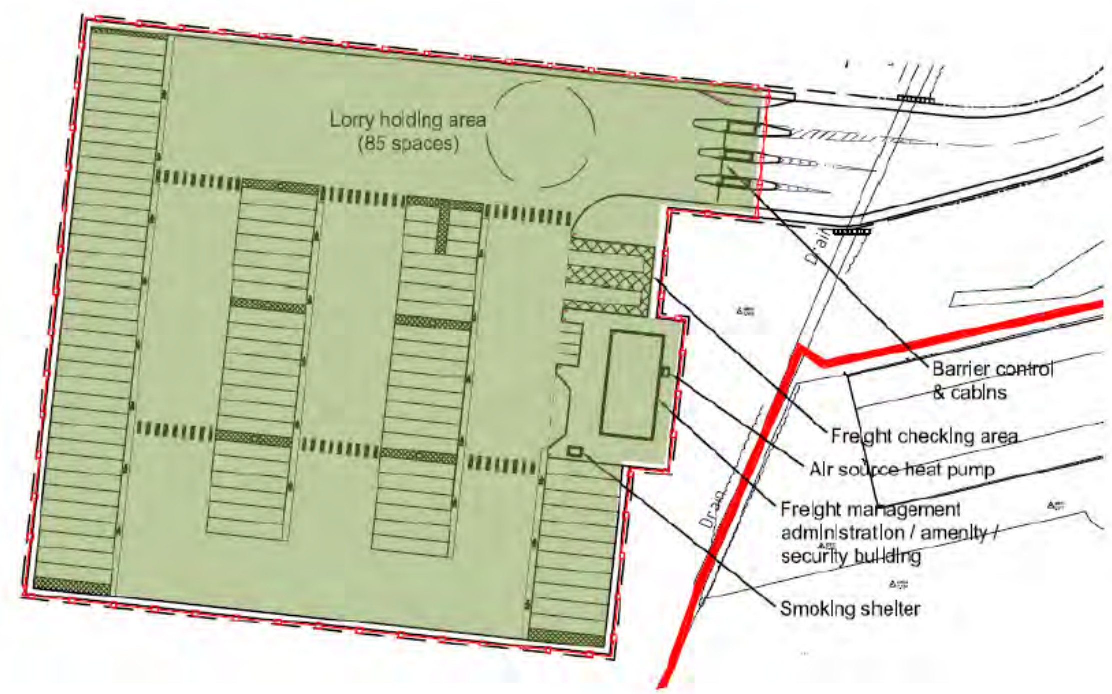


Figure 6.9: Layout of Facilities at Junction 24 (Phase 1 - prior to J23 being operational)

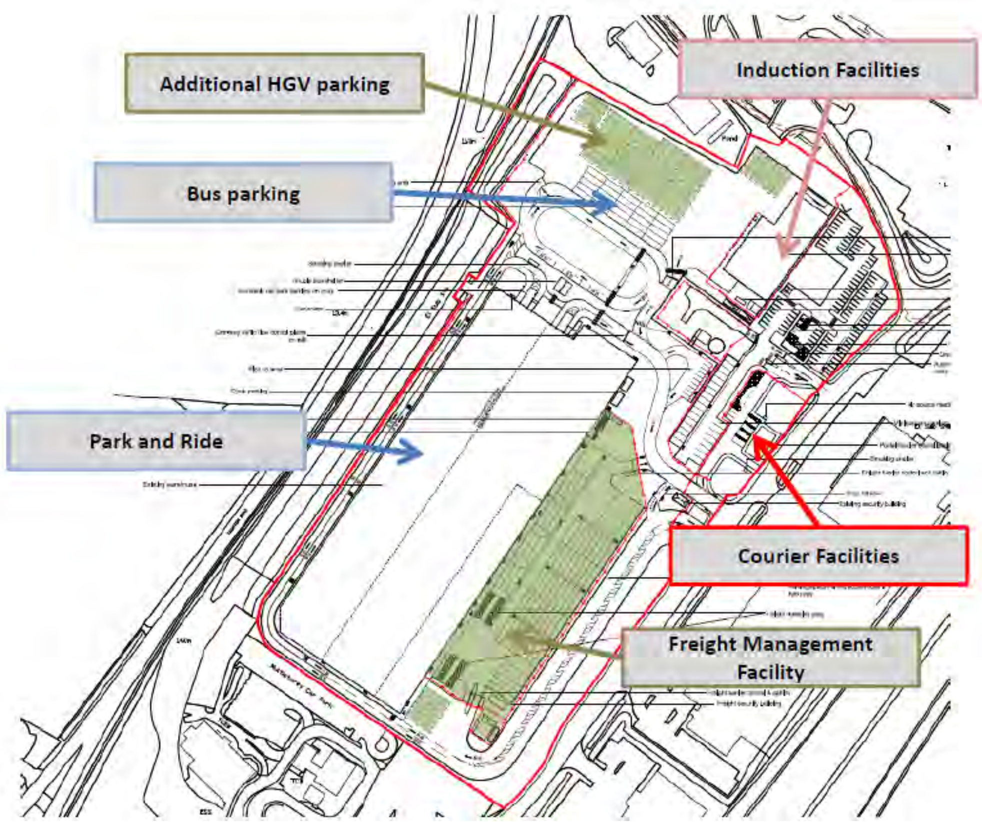
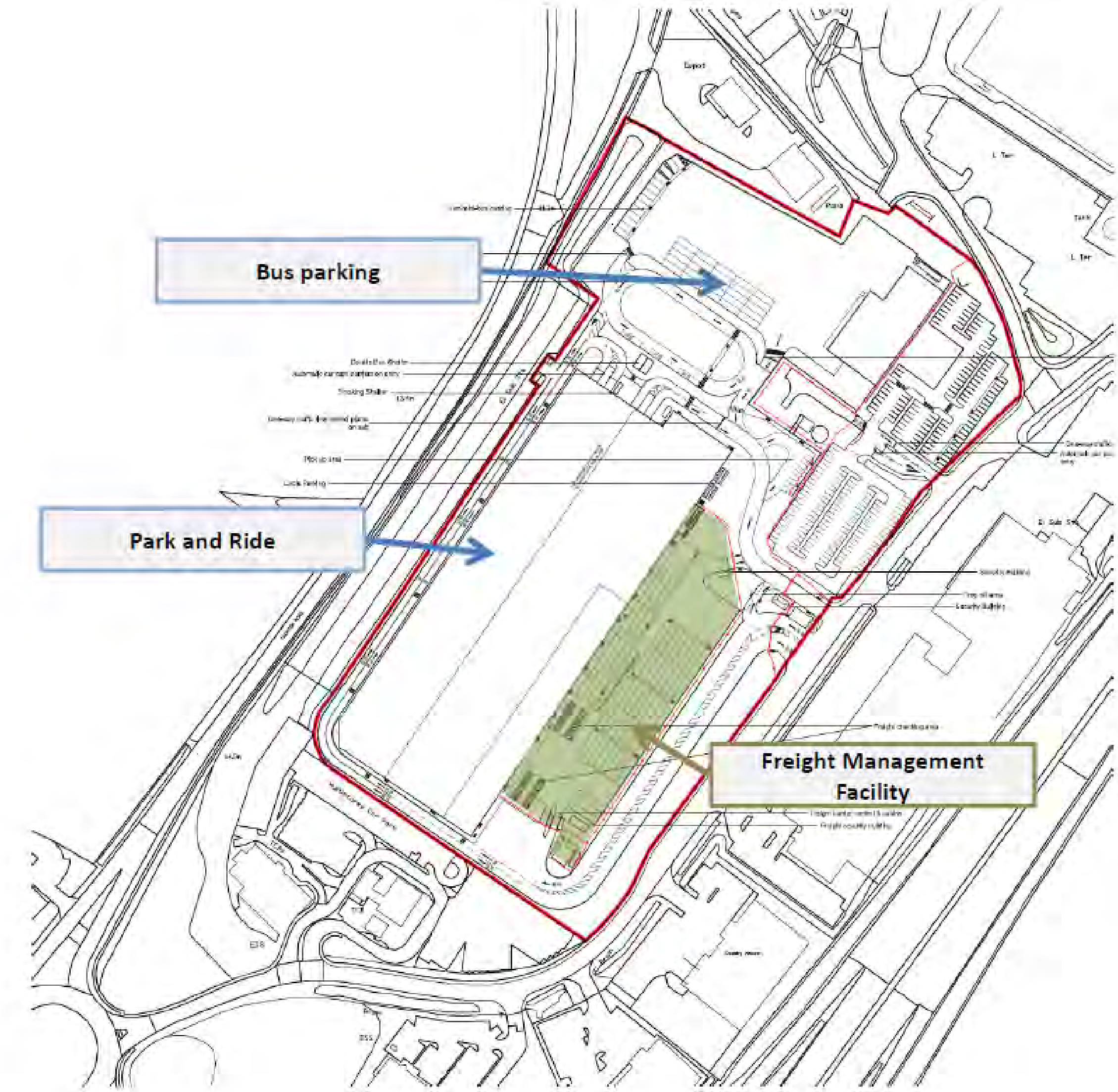


Figure 6.10: Layout of Facilities at Junction 24 (Phase 2 - after J23 operational)



NOT PROTECTIVELY MARKED

Figure 6.11: Layout of Freight Management Facility at Junction 24

6.6.6 In a typical day scenario (no incidents) the parking spaces within each freight management facility will not be fully utilised as the number of HGVs arriving and processed per hour will be lower than the number of parking spaces available.

6.6.7 The number of parking spaces is instead driven by the holding capacity of the freight management facility at the time of an incident. This will depend on:

- the rate at which vehicles are arriving; and
- the number of vehicles already within the facility at the time of the incident. This, in turn, will be a function of how early a vehicle will be allowed to arrive at the facility before its scheduled departure to site.

6.6.8 From experience on other projects it would be reasonable to expect that the holding capacity of the freight management facilities at Junctions 23 and 24, in the event of an incident, is sufficient to absorb approximately three hours of the peak daily traffic on an average day during the peak quarter. It is anticipated that this capacity will deal with most incidents and disruptions. It will allow sufficient time to communicate to upstream vehicles the requirement to hold at their origin or, if already en route, at existing truck stops until further notice.

6.6.9 The tolerance has been set so that, on average, vehicles will arrive up to 60 minutes before the allocated time slot for departure to the HPC development site. There will be a cluster of vehicles arriving near the scheduled departure time to site which will allow for a number of vehicles to be earlier than 60 minutes without impacting on the centre capacity. The tolerance to achieve this will vary with the demands of the HPC Project and can be set and adjusted to suit. It is likely that vehicles coming from abroad will be given a wider tolerance.

6.6.10 The flow of vehicles leaving the relevant freight management facility will be naturally regulated by having to pass through the security checkpoints at the site gates. It is envisaged that under normal circumstances no further control will be required. In the event of an incident, vehicles will be held on-site in accordance with the site procedures.

6.6.11 Taking all these factors into account, a total holding capacity of approximately 140 HGVs (with 85 at Junction 23 and 55 at Junction 24) would allow three hours of traffic to be accommodated.

6.6.12 In advance of the freight management facility becoming available at Junction 23, the Junction 24 development would provide 140 HGV holding spaces. Once Junction 23 becomes operational, the HGV holding spaces at Junction 24 would reduce to 55 (refer to Section 8 for HGV numbers).

6.7 Delivery Management System

6.7.1 A delivery management system (DMS) will be implemented on the project to allow for an effective and efficient planning, control and monitoring of road freight deliveries to the HPC development site and Combwich. The DMS will also allow the collection of data which can be used for monitoring compliance with the planning constraints and trend analysis.

6.7.2 The DMS will consist of 3 components:

- Booking.
- Control and Monitoring.
- Passes (for regular/frequent deliveries).

a) Booking

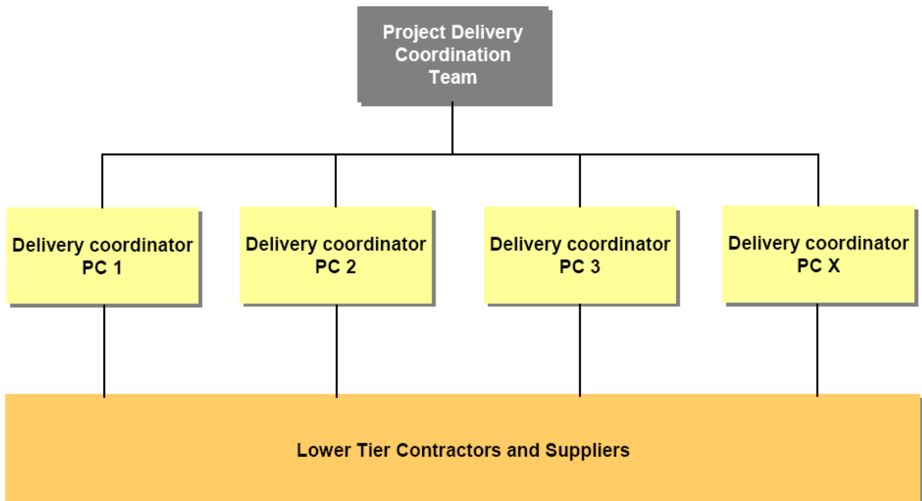
6.7.3 The booking component is web-based and allows Main Contractors (MC), sub-contractors, suppliers and other users to pre-book road freight deliveries to the project.

6.7.4 To obtain authorisation to make a delivery authorised users will request a delivery slot via the web. Aside from strategic exceptions bookings will generally be on a “first come first served” basis to encourage delivery requests to be made as far in advance as possible. The system will be interactive showing the delivery slots currently effectively available to book. The booking request will include the details of the load, the destination, the vehicle and the driver.

6.7.5 EDF Energy will establish a Project Delivery Coordination Team responsible for the overall management of the project site deliveries. Each MC will appoint a member of their staff to act as the delivery coordinator responsible for the coordination of their deliveries.

6.7.6 The MC's delivery coordinator will approve or reject the delivery request received from their sub-contractors by the authorisation cut off time. The approval will include confirmation of which freight management facility the HGV is required to pass through or note the exemption from this requirement as appropriate. Lower Tier Contractors and suppliers will be required to check the status of their delivery request in the system for any discrepancy. All bookings will be approved or rejected by the Project Delivery Coordination Team. This will carry out their final review and issue the collated "next day delivery schedule" for the entire HPC site and Combwich on a daily basis (see **Figure 6.12**).

Figure 6.12: Outline Project Delivery Coordination Structure



b) Control and Monitoring

6.7.7 The number of HGVs to/from HPC and Combwich will be controlled and monitored to ensure compliance with the booking schedule, agreed capping limits and permitted routes. Key control and monitoring points include:

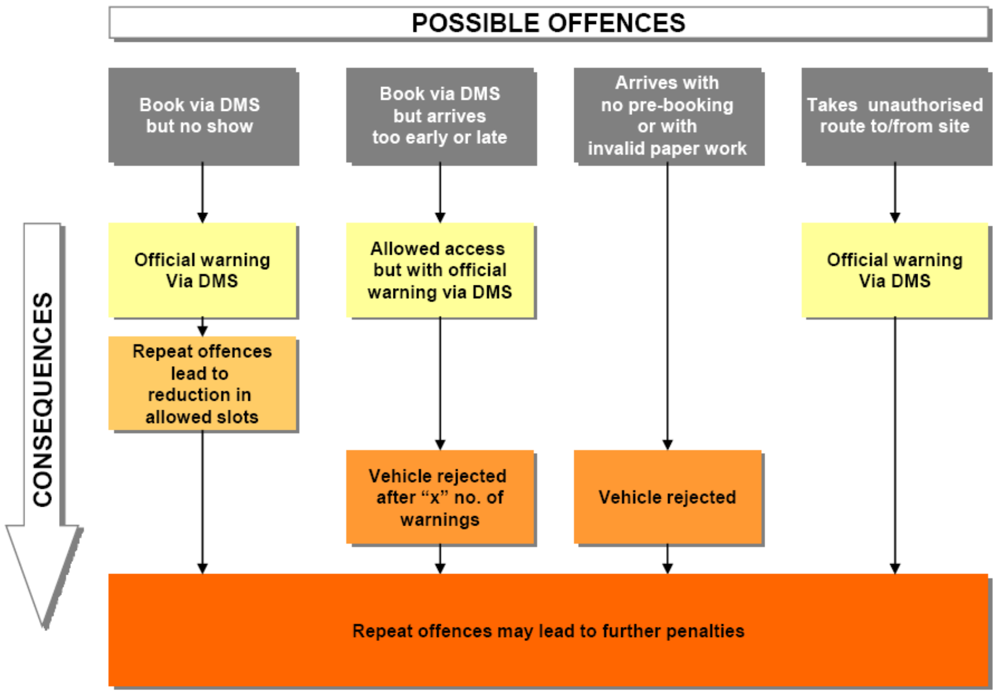
- Freight management facility (entrance and exit).
- Permitted HGV routes (for both HGVs arriving and leaving HPC).
- HPC development site and Combwich laydown (entrance and exit).

6.7.8 Upon arrival at the relevant freight management facility (earliest guaranteed control point) the delivery papers will be verified. Once identification has been confirmed, the freight vehicle will be allowed to enter the freight management facility and wait there until the established departure time to HPC or Combwich.

6.7.9 HGVs will be required to arrive at the freight management facility within a set time period prior to the agreed slot time for the relevant HGV. This is to ensure that the freight management facilities holding capacity is not eroded by vehicles arriving too early. The exact window of acceptable arrival time may vary and will be subject to review dependent on the phase of the HPC Project.

6.7.10 Vehicles arriving too early or too late will be penalised and may be rejected if necessary. Penalties will be designed to instil discipline and compliance with the system whilst at the same time minimising any consequential effect on the road network. An example of how this might work is given in **Figure 6.13**.

Figure 6.13: Indicative Penalties Approach



6.7.11 The consequences would escalate once the number of offences reaches a pre-set trigger level. There would be exceptions for the rejection of deliveries where practical reasons dictate e.g. ready -mix deliveries or where a driver's tachograph doesn't allow for an immediate turn around. Vehicles which are delayed owing to an incident which triggers (or would trigger) vehicles being held at the freight management facility will not be penalised and will be rescheduled as soon as practicable.

6.7.12 HGVs leaving the freight management facility (inbound traffic) and HPC (outbound traffic) will be monitored to ensure compliance with the mandatory HGV routes and capping limits. EDF Energy anticipates using an Automated Number Plate Recognition (ANPR) solution to monitor compliance with the HGV routes and this will include the installation of ANPR cameras at HPC, at the freight management facilities at Junction 23 and Junction 24, at Combwich and along the permitted HGV routes.

c) Passes

6.7.13 For suppliers making regular or frequent deliveries, applications will be allowed for a permanent or temporary pass.

6.7.14 An example of where a permanent pass may be issued is regular food deliveries from one supplier. In this case approval of the application would include agreeing the allocation of a regular slot with the supplier for the deliveries.

6.7.15 An example of a temporary pass may be for HGVs delivering aggregate several times a day for a period of time. In this case the supplier would agree a band of slots for each day the deliveries are required. In order to control the daily flow and monitor the actual number of journeys to/from the HPC development site at least the first delivery of the day will have to go to site via a freight management facility with subsequent trips being naturally controlled by the time between successive deliveries.

6.7.16 In all cases where passes are issued an analysis will be undertaken and appropriate slots will be blocked out on the booking systems to control the number of bookable slots remaining available.

6.8 Reducing Light Goods Vehicle Movements

6.8.1 Whilst the number of HGV movements generated by the tonnes/volume of materials delivered to the HPC development site is quantifiable, the number of movements generated by LGVs associated with the HPC Project (e.g. vans, 4x4s, pickups) is difficult to estimate as it is not directly dependent on the tonnage/volume of material usage for the HPC Project. The table below illustrates likely uses of LGVs and the measures proposed to reduce their numbers/movements.

Table 6.1: Summary of Measures to Reduce LGVs

Typical LGVs use on Construction Projects	Mitigation Measure
Irregular postal/courier deliveries to site	Use of a postal/courier consolidation facility - no post deliveries/couriers will be able to go directly to the HPC development site. Instead they will dispatch at an off-site facility at Junction 23 (temporarily at Junction 24 before Junction 23 is operational) where parcels will be scanned and consolidated into dedicated vans for delivery to HPC.
Workers carrying tools/equipment to site	Introducing an area for on-site storage of workers' tools*/equipment - workers will be required to dispatch/collect their tools at the start/end of their involvement on the HPC Project. **specialist tools where this is not practical may be exempted*
Multiple low volume deliveries (on part loads/small vehicles) e.g. items such as food, consumables, light fittings, ironmongery, fixings, concrete void formers, etc.	Upstream consolidation by the supplier to secure full load efficiencies. This will be achieved by: Providing storage space on site so that materials can be delivered in bulk and then split down as and when required.
Contractors' fleet vehicles (these vehicles will be largely used to support construction operations on site and between the HPC development site and Combwich)	Cap the number of contractors' vehicles on the HPC Project i.e. cars, 4x4, small vans. Staff will generally not be allowed to commute to/from work with these vehicles except for staff covering special operations (e.g. on-call site supervisors).

6.9 Construction Pre-fabrication

6.9.1 Pre-fabrication can be undertaken off-site, on-site or both. Off-site pre-fabrication may include structural steelwork, cladding and roofing panels, mechanical and electrical plant pre-assembly and tunnel lining segments. In addition there are a limited number of major components/assemblies which have been specifically considered and result in scheduled Abnormal Indivisible Loads (AILs). On-site pre-fabrication may include elements that cannot be transported over the road network or where the transport infrastructure would restrict the size of such prefabrications including steel liners and sections of the dome for the reactor building, reinforcement bar assemblies for piling, cut off walls, concrete walls and pre-cast elements such as piping and galleries.

6.9.2 Pre-fabrication has the advantage of improving quality, providing faster site installation with potentially less on-site labour required. However, it increases the physical volume of the material to be transported, resulting in an increase in the number of vehicles required, with further implications on larger craneage requirements because of higher unit weights and additional costs such as enhanced protection during transport.

6.9.3 EDF Energy will provide space and facilities which would allow at least the level of pre-fabrication adopted for Flamanville 3. Given the transport restrictions, it is envisaged that most pre-fabrication would take place at the HPC development site where transport to the final position would be most easily accomplished.

6.10 Freight Consolidation

6.10.1 EDF Energy has considered the possibility of consolidation of the construction materials in a dedicated off-site consolidation centre. This solution has not been adopted for the HPC Project for the following reasons:

- One of the key principles of consolidation is to significantly reduce the number of multiple part loads by combining them into complete load shipments in order to decrease the number of freight vehicles directed to and from a construction site. Due to the large quantities required for the majority of the material groups to construct the HPC Project it is anticipated that deliveries will be predominantly on a complete load basis hence limiting the need for further consolidation.
- Consolidation at dedicated off-site consolidation centres also promotes the efficient flow of construction goods from supply chains to actual points of use by allowing materials to be “called off” when needed. This is particularly efficient when storage space on site is limited (e.g. city centre sites). On the HPC Project contractors will be able to store materials at the HPC development site and Combwich and call it off when needed.
- Consolidation also requires the freight operator responsible for managing the consolidation centre to take ownership of the load from the supplier until this is collected/dispatched to the contractor. This is inconsistent with the general contracting approach for the HPC Project which is to order final structures, equipment or systems and to allow the contractor to manage its supply chain in

order to deliver the required quality and schedule at minimum cost with limited involvement from EDF Energy.

6.10.2 In addition it should be noted that the proposed limits on HGV movements set out in Section 8 will encourage the supply chain to deliver materials efficiently hence maximising full load deliveries.

6.10.3 EDF Energy will also provide postal/courier consolidation at Junction 23 (and temporarily at Junction 24 until Junction 23 is operational) as described in **Table 6.1**.

6.11 Modes of Transport Summary

6.11.1 **Table 6.2** provides a qualitative assessment of the transport capabilities for main material groups required for the HPC Project.

Table 6.2: Summary of Transport Capabilities for Main Material Groups

	Road via J23 and J24	Temporary Jetty	Combwich Wharf
Largest AILs			On RoRo trailers
Smaller AILs	Low loader via M5 or other main roads.		
Fill material	Via M5 or other main roads.	Conveyor for aggregate of a suitable size once the jetty is operational. This is only when slots are available after priority has been given to concrete materials.	
Bulk aggregates **Sand and cement used for concrete production**	By road before the jetty is operational. Possible limited amount (up to 20%) from local quarries delivered by road once the jetty is operational.	Once it is operational, at least 80% will be delivered via the jetty and then by conveyor, or pumped pneumatically, to site (with up to one month of stockpile being made available on-site in case the jetty is unavailable due to weather conditions, maintenance, etc.)	
Ready mixed concrete	A proportion of the concrete required before the jetty is operational may be from ready mixed plants in the local area.		
Reinforcement	Via M5 or other main roads.	Unload by crane into trailers	On LoLo trailers or unloaded by crane onto trailer.
Steelwork	Via M5 or other main roads.	Unload by crane into trailers	On LoLo trailers
Other materials (bulk)	Via M5 or other main roads.	Unload by crane into trailers	On LoLo trailers or unloaded by crane onto trailer.
Other materials (containers)	Via M5 or other main roads.	Unload by crane into trailers	On LoLo trailers or unloaded by crane onto trailer.

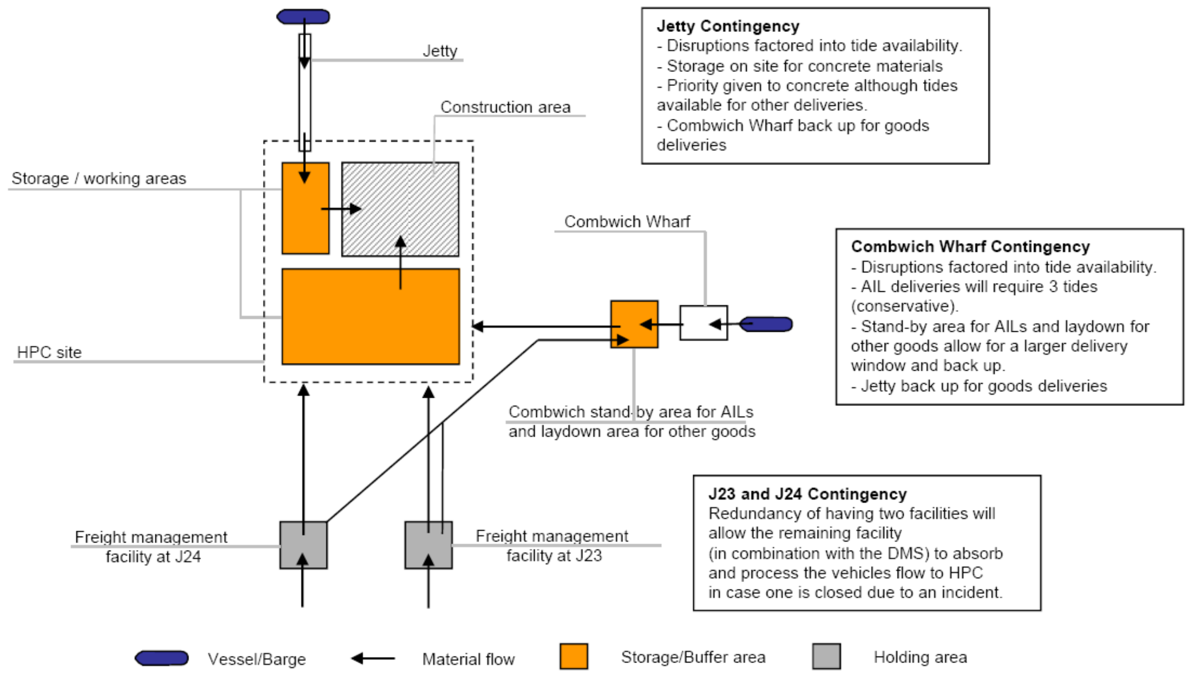
6.12 Contingency Plan

6.12.1 The FMS has been drafted with a number of contingency measures in place to allow for the possibility of delivery disruptions to HPC. **Table 6.3** illustrates key potential disruptions identified and the resulting mitigation measures incorporated in the strategy.

Table 6.3: Summary of Main Mitigation Measures

Potential disruption	Mitigation measures
Jetty: no deliveries of aggregate, sand and cement for concrete production due to bad weather, maintenance, repairs, etc.	Jetty downtime considered as follows: • Winter months = 12 tides unavailable/60 tides available per month. • Summer months = 6 tides unavailable/60 tides available per month. Provision of storage on-site for concrete materials to ensure in excess of one month's supply at peak concrete production is available as a contingency. Priority shall be given to the delivery of cement, aggregate and sand although a number of tides will be potentially available for other deliveries. Deliveries by road within the authorised 20% of total quantities for concrete materials (included in figures in Section 7).
Jetty: no deliveries of goods due to bad weather, maintenance, repairs, etc.	Provision of storage areas on-site to secure back up of supplies. Goods could be delivered to Combwich Wharf instead (depending on weather/tidal conditions and usage). Deliveries by road (included in figures in Section 7)
Combwich Wharf: no deliveries of AILs due to bad weather, maintenance, repairs, etc.	Wharf downtime considered in the calculation of the available tides to allow for disruption due to wind/weather. Conservatively assumed that all AIL deliveries will require a max of 3 tides. Provision of a stand-by area for AILs at Combwich to allow for a larger delivery window.
Combwich Wharf: no deliveries of goods due to bad weather, maintenance, repairs, etc.	Wharf downtime considered in the calculation of the available tides to allow for disruption due to wind/weather. Provision of a freight laydown facility for goods at Combwich to allow for a larger delivery window and secure back-up of supplies. Goods could be delivered to the jetty instead (depending on weather conditions and jetty usage). Deliveries by road (included in figures in Section 7).
Freight Management Facilities: Traffic incidents preventing smooth access of deliveries to the HPC development site or Combwich	Freight management facilities (in combination with the DMS) will provide control on HGV movements and the ability to hold HGVs prior to resolution of the incident.

Figure 6.14: Schematic Showing Contingency Plan



7. MATERIAL USAGE

7.1.1 EDF Energy estimates that **7.1 million** tonnes of materials will be transported to/from the HPC Project sites (HPC development site plus off-site associated development sites) during the construction phase.

7.1.2 This figure includes construction materials, waste and materials generated by the removal of some of the associated development facilities at the end of the HPC construction phase.

7.1.3 As the road freight traffic, which will be transported using the C182, is a measure of the impact on the key HGV routes to HPC through Bridgwater and Cannington, the total tonnes of materials have been split as follows:

- **6.4 million** tonnes for developments which affect traffic on the C182 - these include:
  - HPC development site.
  - On-site accommodation campus.
  - Combwich Wharf and freight laydown facility.
- **0.7 million** tonnes for developments which do not affect traffic on the C182 - these include:
  - Park and ride facilities at Junction 23, Junction 24, Cannington and Williton.
  - Freight management facilities, induction centres and postal/courier consolidation facilities at Junction 23 and Junction 24.
  - Accommodation campuses in Bridgwater.
  - Cannington bypass.
  - Highway improvements.

7.1.4 **Table 7.1** illustrates the breakdown of the above tonnages for key elements, together with the transport mode and assumed payload for each type of materials.

Table 7.1: Materials Quantities for the HPC Project

UNITS 1 and 2					
Site	**Weight (t)**	**Transport Mode**	**% by Road**	**Payload (t)**	**N. of veh**
Site Preparation – Earthworks (note 1)					
Bitumen	50,000	road	100	15	3,333
Imported fill material	450,000	road	100	18	25,000
Mass and blinding concrete	93,249	80% jetty/20% road once jetty available	20	18	3,108
Precast concrete (Sea wall block, pipes)	150,000	road	100	12	12,500
Miscellaneous	10,000	road	100	5	2,000
Total Site Preparation	**753,249**				**45,942**
Cooling Pipes					
Prefabricated elements	18,000	road	100	8	2,250
Miscellaneous	2,000	road	100	5	400
Total Cooling Pipes	**20,000**				**2,650**
Roads and Networks					
Drainage	40,000	road	100	5	8,000
Road and networks – plant area	100,000	road	100	15	6,667
Miscellaneous	10,000	road	100	5	2,000
Total Road and Networks	**150,000**				**16,667**
Marine Works (note 2)					
Tunnelling works	163,049	road	100	5 PC units/HGV	8,198
Ancillary works	32,000	80% jetty/20% road Once jetty available	100	18	559
Total Marine Works	**195,049**				**8,757**
Temporary Jetty					
Concrete on shore	28,349	road	100	18	1,576
Concrete precast on shore	1,155	road	100	10	116
Steelwork on shore	400	road	100	15	27
Piles on shore	1,508	road	100	5	302
Concrete off shore	10,500	6% road - 94% sea	6	18	35
Concrete precast off shore	2,363	road	100	10	236
Steelwork off shore	865	50% road - 50% sea	50	15	29
Piles off shore	2,577	5% road - 95% sea	5	5	26
Jetty Decommissioning					
Inert	37,707	road	100	15	2,514
Non hazardous	9,546	road	100	8	1,193
Hazardous	477	road	100	3	159
Total Jetty	**95,462**				**6,212**
Sub Total Site	**1,213,760**				**80,227**
Contingency (10%)	**121,376**	**road/sea**	**Varies**	**Varies**	**8,023**
Total Site	**1,335,136**				**88,250**

CIVIL CONSTRUCTION	Weight (t)	Transport Mode	% by Road	Payload (t)	N. of veh
Main Civil Works					
Concrete	2,331,224	80% jetty/20% road Once jetty available	20	18	27,528
Reinforcing bars	230,000	road	100	18	12,778
Formwork and scaffolding	20,000	road	100	5	4,000
Plates and insert	10,000	road	100	5	2,000
Structural steelwork	30,000	road	100	15	2,000
Civil equipment – doors	10,000	road	100	3	3,333
Miscellaneous	300,000	road	100	5	60,000
Total Main Civil Works	**2,931,224**				**111,642**
Civil Equipment					
Civil works built-in mechanical equipment	2,000	road	100	10	200
Total Main Civil Works plant	**2,000**				**200**
Ancillary Buildings Phase 1					
Concrete	14,430	80% jetty/20% road Once jetty available	20	18	339
Precast concrete	100	road	100	10	10
Steelworks & reinforcement	1,620	road	100	15	108
Total Civil Ancillary Buildings Phase 1	**16,150**				**457**
Ancillary Buildings Phase 2					
Concrete - reinforcing bars - formwork and scaffolding	31,600	80% jetty/20% road	20	18	351
Miscellaneous	10,000	road	100	5	2,000
Total Civil Ancillary Buildings Phase 2	**41,600**				**2,351**
Sub Total Civil Construction	**2,990,974**				**114,650**
Contingency (5%)	**149,549**	**road/sea**	**Varies**	**Varies**	**5,733**
Total Civil Construction	**3,157,080**				**120,383**

INSTALLATION					
Nuclear Steam Supply System (NSSS)					
Heavy components	15,000	Sea to Combwich then by road to HPC	100	AILs	150
Equipment	2,000	road	100	10	200
Mechanical (Piping/Support/Valves/Insulation)	20,000	road	100	5	4,000
Electrical (I&C cabinets)	1,000	road	100	5	200
Miscellaneous	2,000	road	100	5	400
Total NSSS	**40,000**				**4,950**
Balance of Nuclear Island (BNI)					
Handling	2,000	road	100	10	200
Wastes process	10,000	road	100	10	1,000
Mechanical	40,000	road	100	5	8,000

INSTALLATION					
Nuclear Steam Supply System (NSSS)					
(Piping/Support/Valves/ Insulation)					
Diesels generators	10,000	road	100	10	1,000
Ventilation (HVAC for class. buildings)	20,000	road	100	3	6,667
Electrical (cables, switchyard)	10,000	road	100	5	2,000
Miscellaneous	10,000	road	100	5	2,000
Total BNI	**102,000**				**20,867**
Conventional Island (CI)					
Turbine – generator (Heavy components)	10,000	Sea to Combwich then road to HPC	100	AILs	100
Condenser – feed water plant (Heavy components)	8,000	Sea to Combwich then road to HPC	100	AILs	80
Equipment	4,000	road	100	10	400
Mechanical (Piping/Support/Valves/ Insulation)	10,000	road	100	5	2,000
Electrical erection - I&C	2,000	road	100	5	400
Steelwork - anchorages	5,000	road	100	15	333
Miscellaneous	4,000	road	100	5	800
Total CI	**43,000**				**4,113**
Balance of Plant (BOP)					
Pumphouse	10,000	road	100	10	1,000
Transformers platform	2,000	road	100	10	200
Miscellaneous	3,000	road	100	5	600
Total BOP	**15,000**				**1,800**
Sub Total Installation	**200,000**				**31,730**
Contingency (50%)	**100,000**	**road**	**100**	**Varies**	**15,865**
Total Installation	**300,000**				**47,595**

BUILDINGS "BASIC DESIGN STAGE"					
	Weight (t)	**Transport Mode**	**% by Road**	**Payload (t)**	**N. of veh**
(Spent Fuel Store & Intermediate Level Waste Store)					
Intermediate level waste store	31,391	60% jetty/ 40% road	40	18	698
Spent fuel store	255,559	60% jetty/ 40% road	40	18	5,679
Sub-total Buildings "basic design stage"	**286,951**				**6,377**
Contingency (30%)	**86,085**	**60% sea/ 40%road**	**40**	**18**	**1,913**
Total Buildings "basic design stage"	**373,036**				**8,290**

HPC SITE WASTES					
	Weight (t)	Transport Mode	% by Road	Payload (t)	N. of veh
Inert	150,000	road	100	12	10,000
Non hazardous	68,000	road	100	4	8,500
Hazardous	2,000	road	100	3	667
Sub total Wastes	**220,000**				**19,167**
Contingency (10%)	**22,000**	**road**	**100**	**Varies**	**1,917**
Total Waste	**242,000**				**21,084**

Sub–Total Quantities Units 1 & 2	**5,390,694**	**road/jetty/wharf**	**varies**	**varies**	**285,600**
Construction Plant Equipment (5% allowance)					**14,280**
Total Quantities Units 1 & 2	**5,390,694**				**299,880**

OTHER OFF-SITE ASSOCIATED DEVELOPMENTS WHICH AFFECT TRAFFIC ON C182					
Combwich Wharf	**Weight (t)**	**Transport Mode**	**% by Road**	**Payload (t)**	**N. of veh**
Construction material generally	71,238	road	100	Varies	4,749
Inert waste	23,972	road	100	Varies	1,598
Non hazardous waste	6,392	road	100	Varies	426
Hazardous waste	1,589	road	100	Varies	107
Subtotal Combwich Wharf	**103,200**				**6,880**
Contingency (20%)	**20,640**	**road**	**100**	**Varies**	**1,376**
Total Combwich Wharf	**123,840**				**8,256**

Combwich Freight Laydown Facility	Weight (t)	Transport Mode	% by Road	Payload (t)	N. of veh
Construction material generally	336,400	road	100	Varies	18,689
Inert waste	2,103	road	100	Varies	140
Non Hazardous waste	561	road	100	Varies	37
Hazardous waste	140	road	100	Varies	9
Decommissioning					
Inert waste	265,756	road	100	Varies	14,764
Non hazardous waste	67,280	road	100	Varies	3,738
Hazardous waste	3,364	road	100	Varies	187
Subtotal Combwich Freight Laydown Facility	**675,603**				**37,565**
Contingency (20%)	**135,121**	**road**	**100**	**Varies**	**7,513**
Total Combwich Freight Laydown Facility	**810,724**				**45,078**

HPC Accommodation Campus	Weight (t)	Transport Mode	% by Road	Payload (t)	N. of veh
Construction material generally	37,653	road	100	Varies	3,170
Inert waste	1,767	road	100	Varies	118
Non hazardous waste	471	road	100	Varies	31
Hazardous waste	118	road	100	Varies	8
Decommissioning					
Inert waste	29,709	road	100	Varies	2,103
Non hazardous waste	7,521	road	100	Varies	532
Hazardous waste	376	road	100	Varies	27
Sub-total HPC Campus	**77,617**				**5,989**
Contingency (20%)	**15,523**	**road**	**100**	**Varies**	**1,198**
Total HPC Campus	**93,140**				**7,187**

National Grid	Weight (t)	Transport Mode	% by Road	Payload (t)	N. of veh
Construction	13,760	road	100	10	1,376
Subtotal National Grid	**13,760**				**1,376**
Contingency (10%)	**1,376**	**road**	**100**	**10**	**138**
Total National Grid	**15,136**				**1,514**

Sub-Total Other Developments Which Affect C182	**1,042,840**	**road/jetty**	**varies**	**varies**	**62,034**
Construction Plant Equipment (5% allowance)					3,101
Total Other Developments Which Affect C182	**1,042,840**				**65,135**

OTHER OFF-SITE ASSOCIATED DEVELOPMENT SWHICH DO NOT AFFECT TRAFFIC ON THE C182					
Bridgwater A Accommodation Campus	**Weight (t)**	**Transport Mode**	**% by Road**	**Payload (t)**	**N. of veh**
Construction	95,015	road	100	Varies	7,131
Remediation Materials	11,272	road	100	Varies	751
Inert waste	28,775	road	100	Varies	1,822
Non hazardous waste	7,673	road	100	Varies	486
Hazardous waste	1,918	road	100	Varies	80
Decommissioning					
Inert waste	61,523	road	100	Varies	4,409
Non Hazardous waste	15,576	road	100	Varies	1,116
Hazardous waste	778	road	100	Varies	56
Subtotal BRI A campus	**222,532**				**15,893**
Contingency (20%)	**44,506**	**road**	**100**	**Varies**	**3,179**
Total BRI A campus	**267,038**				**19,072**

Bridgwater C Accommodation Campus	Weight (t)	Transport Mode	% by Road	Payload (t)	N. of veh
Construction	14,251	road	100	Varies	1,694
Remediation Materials	1,845	road	100	Varies	123
Inert waste	1,591	road	100	Varies	106
Non hazardous waste	424	road	100	Varies	28
Hazardous waste	106	road	100	Varies	7
Subtotal BRI C Campus	**18,217**				**1,959**
Contingency (20%)	**3,643**	**road**	**100**	**Varies**	**392**
TOTAL BRI C Campus	**21,860**				**2,351**

Junction 23 Park and Ride/Freight Management Facility	Weight (t)	Transport Mode	% by Road	Payload (t)	N. of veh
Construction	103,478	road	100	Varies	5,936
Inert waste	4,295	road	100	Varies	286
Non hazardous waste	1,145	road	100	Varies	76
Hazardous waste	286	road	100	Varies	19
Decommissioning					
Inert waste	76,343	road	100	Varies	5,057
Non hazardous waste	19,327	road	100	Varies	1,280
Hazardous waste	966	road	100	Varies	64
Subtotal J23	**205,842**				**12,718**
Contingency (20%)	**41,168**	**road**	**100**	**Varies**	**2,544**
Total J23	**247,010**				**15,262**

Junction 24 Park and Ride/Freight Management Facility	Weight (t)	Transport Mode	% by Road	Payload (t)	N. of veh
Construction	6,020	road	100	Varies	685
Inert waste	2,577	road	100	Varies	283
Non hazardous waste	687	road	100	Varies	76
Hazardous waste	172	road	100	Varies	19
Decommissioning					
Inert waste	2,462	road	100	Varies	269
Non Hazardous waste	623	road	100	Varies	68
Hazardous waste	31	road	100	Varies	3
Subtotal J24	**12,572**				**1,403**
Contingency (20%)	**2,514**	**road**	**100**	**Varies**	**281**
Total J24	**15,086**				**1,684**

Cannington Park and Ride	Weight (t)	Transport Mode	% by Road	Payload (t)	N. of veh
Construction	19,139	road	100	Varies	1,124
Inert waste	2,099	road	100	Varies	140
Non hazardous waste	560	road	100	Varies	37
Hazardous waste	140	road	100	Varies	9
Decommissioning					
Inert waste	14,096	road	100	Varies	944
Non Hazardous waste	3,569	road	100	Varies	239
Hazardous waste	178	road	100	Varies	12
Subtotal Cannington	**39,781**				**2,505**
Contingency (20%)	**7,956**	**road**	**100**	**Varies**	**501**
Total Cannington	**47,738**				**3,006**

Williton Park and Ride	Weight (t)	Transport Mode	% by Road	Payload (t)	N. of veh
Construction	11,702	road	100	Varies	673
Inert waste	2,273	road	100	Varies	152
Non hazardous waste	606	road	100	Varies	40
Hazardous waste	152	road	100	Varies	10
Decommissioning					
Inert waste	815	road	100	Varies	57
Non Hazardous waste	206	road	100	Varies	15
Hazardous waste	10	road	100	Varies	1
Subtotal Williton	**15,764**				**948**
Contingency (20%)	**3,153**	**road**	**100**	**Varies**	**190**
Total Williton	**18,916**				**1,137**

Cannington Bypass	Weight (t)	Transport Mode	% by Road	Payload (t)	N. of veh
Construction	32,188	road	100	Varies	2,070
Inert waste	40,364	road	100	Varies	2,691
Non hazardous waste	10,764	road	100	Varies	718
Hazardous waste	2,691	road	100	Varies	179
Subtotal Bypass	**86,006**				**5,658**
Contingency (20%)	**17,201**	**road**	**100**	**Varies**	**1,132**
TOTAL Bypass	**103,208**				**6,790**

Road Improvements	Weight (t)	Transport Mode	% by Road	Payload (t)	N. of veh
Construction	5,000	road	100	12	416
Subtotal Road Improvements	**5,000**				**416**
Contingency (20%)	**1,000**	**road**	**100**	**12**	**84**
Total Road Improvements	**6,000**				**500**

Sub- Total Other Off Site Developments Which Do Not Affect Traffic On C182	726,855	road	100	Varies	49,801
Construction Plant Equipment (5% Allowance)					2,490
Total Other Off Site Developments Which Do Not Affect Traffic On C182	726,855				52,291

Summary					
	Weight (t)	Transport Mode	% by Road	Payload (t)	N. of veh
Total Quantities Units 1 & 2	5,390,694	road/jetty/wharf	varies	varies	299,880
Total Other Developments Which Affect C182	1,042,840	road/jetty	varies	varies	65,135
Total Other Off Site Developments Which Do Not Affect Traffic On C182	726,855	road	100%	varies	52,291
Total	7,160,389				417,306

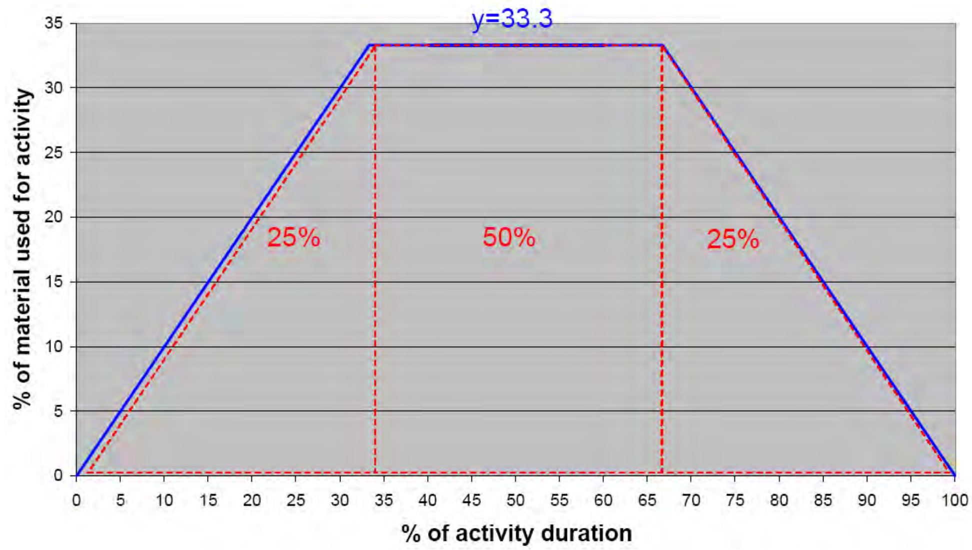
Note 1: All excavation materials being re-used on site either for backfilling around buildings, for preparing the platform or for landscaping are not included in this table

Note 2: All spoil materials of tunnels from tunnel excavation being stored on site are not included in this table.

7.1.5 An analysis of the material percentage usage for each of the key construction activities has been undertaken. The profiles used for the distribution of materials across the programme reflect the typical ramp up and down at the start and end of an activity while the output remains constant through the core period. A flat profile (constant output throughout the activity period) has been adopted for steady activities spanning for long periods (e.g. on-site road construction) or for shorter activities such as the construction of some of the off-site associated developments. The types of profile used for the distribution of materials across the programme activities are as follows:

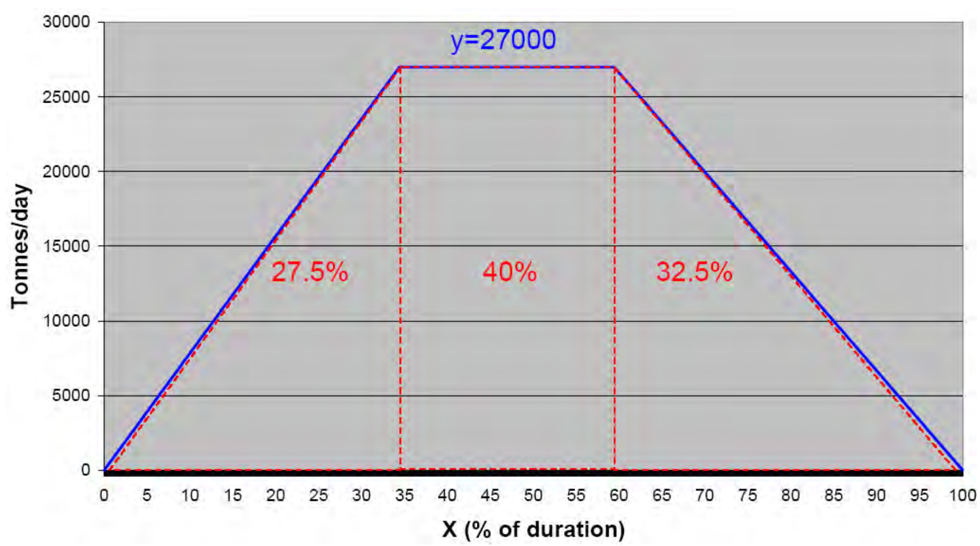
- **Figure 7.1** shows a general profile for material use that is used for a number of activities, such as cooling pipes and plant installation. The profile increases linearly for the initial third, remains constant through the middle third, and reduces linearly over the final third of the activity.

Figure 7.1: General Profile



- **Figure 7.2** is a similar profile based on information provided from bidders for the civil engineering works in relation to civil works activities.

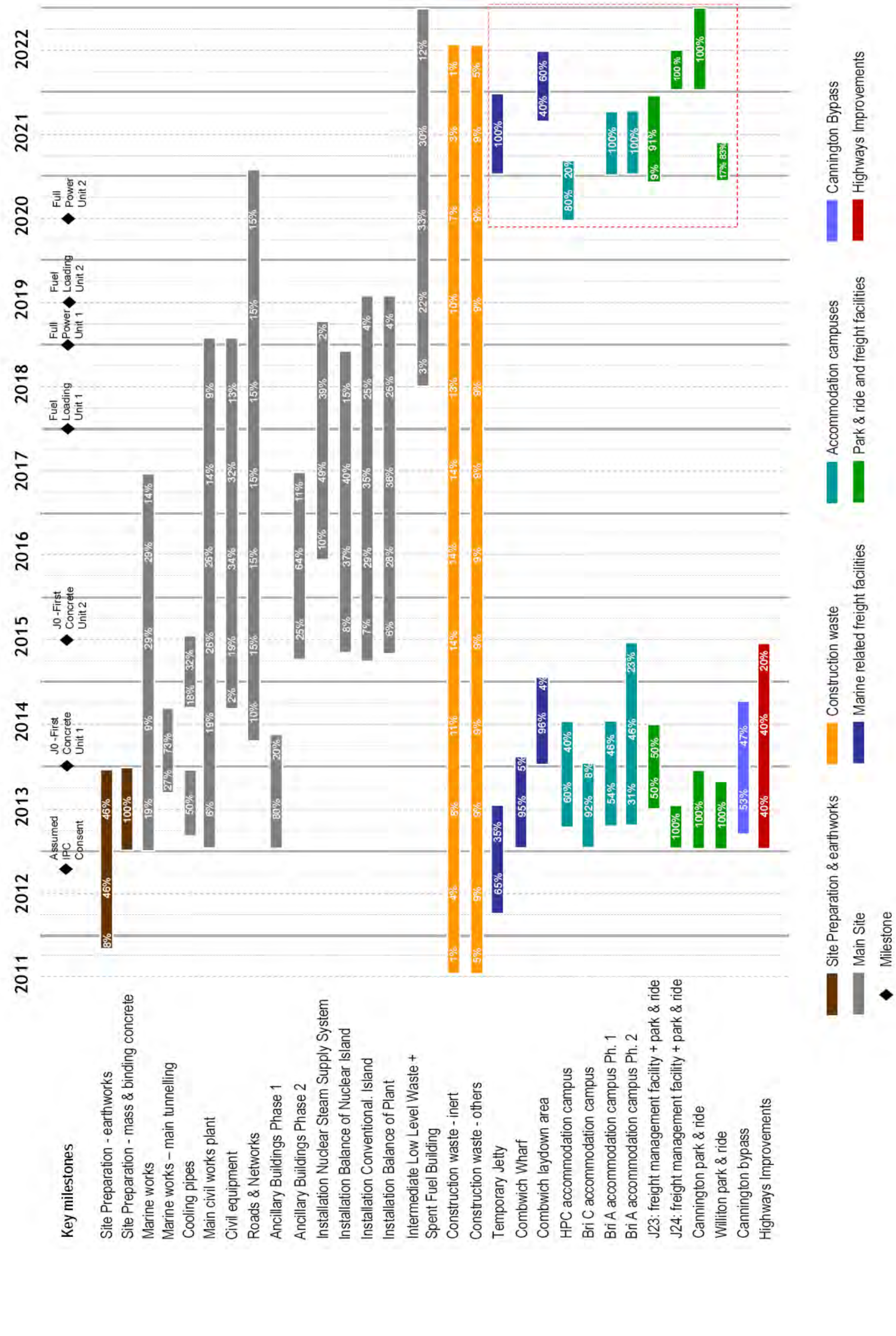
Figure 7.2: Civil Works Profile



- Flat profile for activities such as the Combwich laydown area and on-site road construction.

7.1.6 The strategic programme in **Figure 7.3** shows the results of an analysis of the material percentage usage for each of the key construction activities.

Figure 7.3: Strategic Programme Showing the Outline Material Percentage Use by Year for Key Activities



7.1.7 The materials usage profiles for the HPC development site and other off-site associated developments are shown in **Figure 7.4** and **Figure 7.5** (these include materials arising during the removal of the temporary associated developments).

Figure 7.4: Material Usage Profile (for developments which affect traffic on the C182)

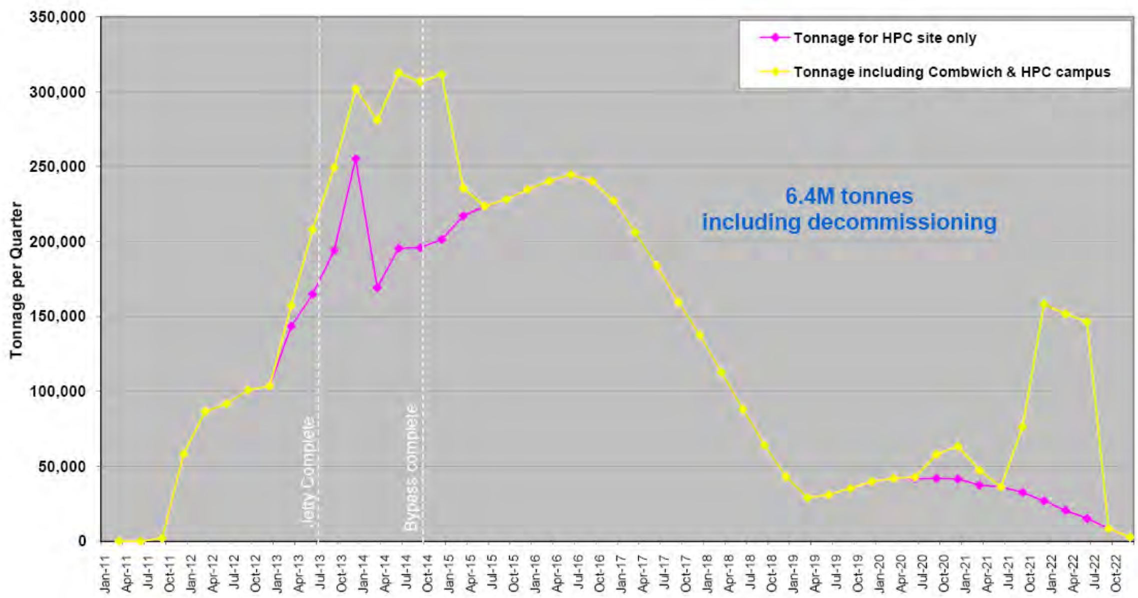
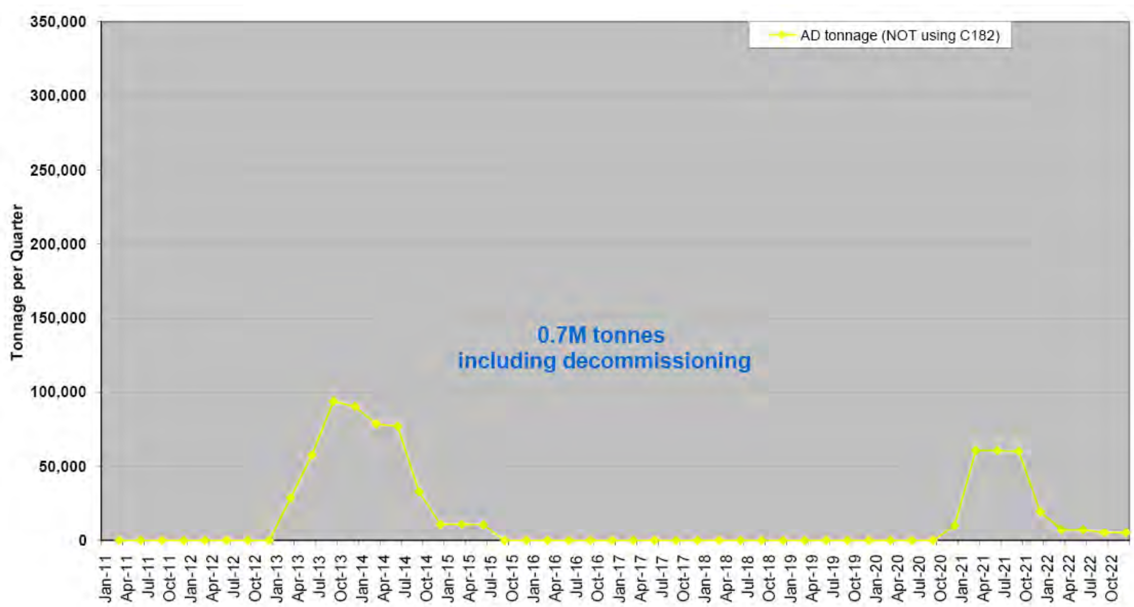


Figure 7.5: Material Usage Profile (for developments which do not affect traffic on the C182)



7.1.8 The road/water split for the **6.4 million** tonnes of materials required for the developments which affect traffic on the C182 is as follows (see **Figure 7.6** and **Figure 7.7**):

- **4.1 million** tonnes by road. For the reasons set out earlier, these are conservative assumptions for the purpose of transport modelling.
- **2.3 million** tonnes by water (deliveries by water would commence once the temporary jetty becomes operational in Quarter 3 2013).

7.1.9 The **0.7 million** tonnes for other developments which do not affect traffic on the C182 will be transported by road.

Figure 7.6: HPC Material Usage Profile (by road freight)

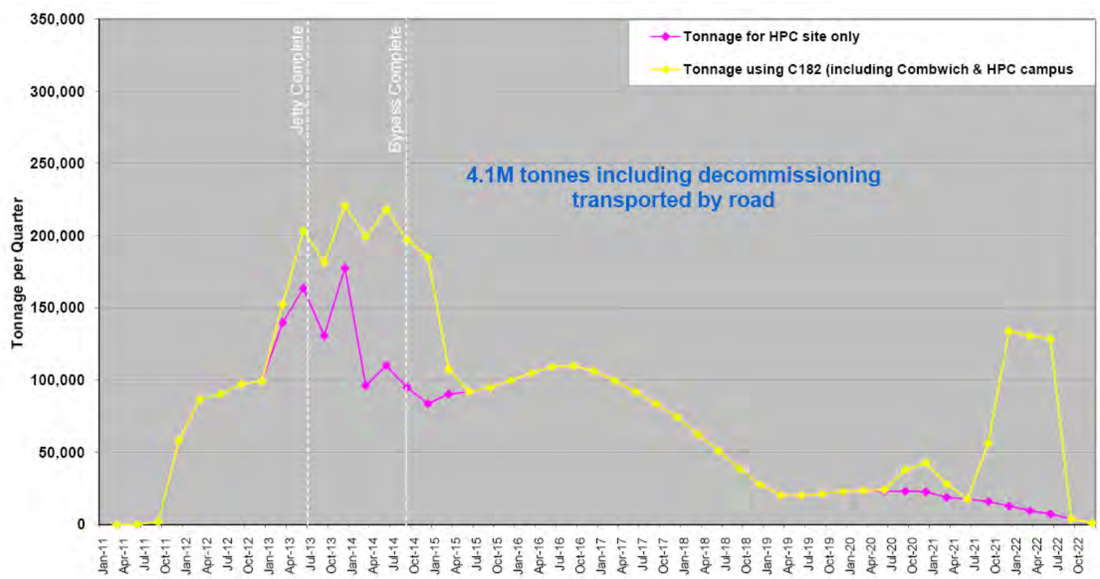
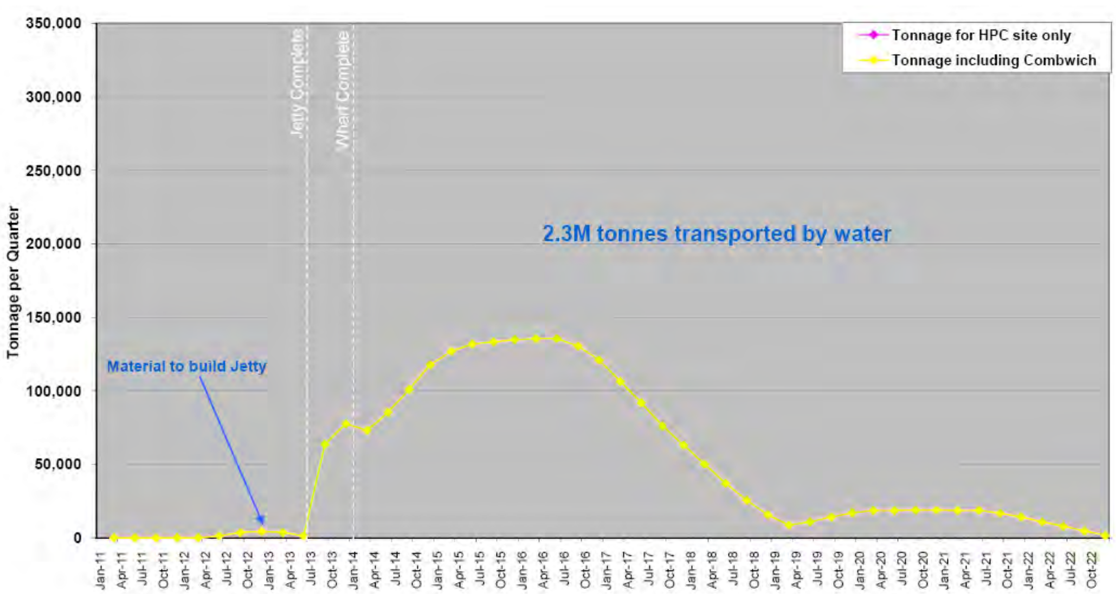


Figure 7.7: HPC Material Usage Profile (by water freight)



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8. FREIGHT TRAFFIC

8.1 Overview

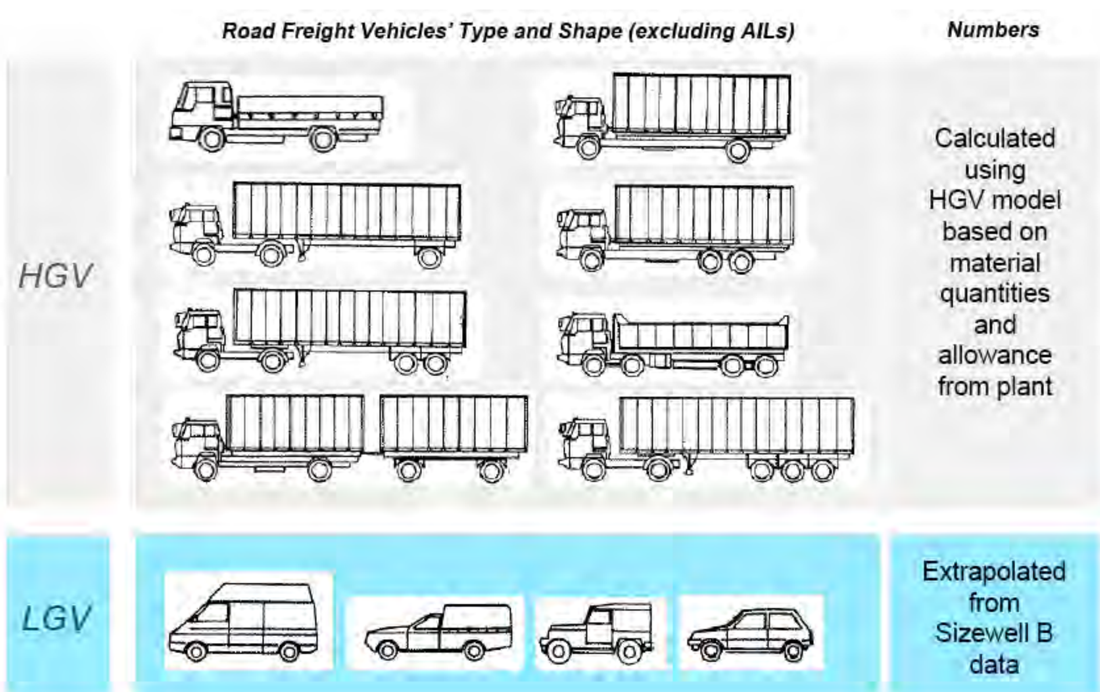
8.1.1 For the purpose of quantifying freight traffic for the HPC Project the freight vehicles associated with the construction of the HPC Project have been categorised as follows:

- HGVs: all vehicles exceeding a maximum gross weight of 3.5 tonnes (maximum allowable total weight when loaded). These include medium goods vehicles (maximum gross weight between 3.5 and 7.5 tonnes) and heavier with 2 or more axles.
- LGVs: vans, pickups, 4x4s and cars with a maximum gross weight of 3.5 tonnes.

8.1.2 It has been assumed that the construction materials, plant and equipment for the HPC Project will be transported by HGVs whilst LGVs will be used for transporting food and consumables, small items and specialist tools/equipment. LGVs will also include contractors' fleet vehicles.

8.1.3 The number of HGVs has been calculated using a bespoke model based on the estimated construction material and plant usage for the HPC Project. As the number of LGVs is not directly dependent on the tonnage/volume of material usage for the project, an assumption has been made by extrapolating the number of LGVs required to construct the Sizewell B project.

Figure 8.1: Road Freight Vehicles summary table (*)



(*) type of vehicles is illustrative only and do not include all type of freight vehicles available in market

8.2 Heavy Goods Vehicles (HGVs)

8.2.1 The model for assessing the number of HGVs to and from the HPC development site during the construction period is based on the material tonnage and distribution as shown in **Figure 7.6** (material usage profile by road freight), together with the average payload of each vehicle used to transport the material.

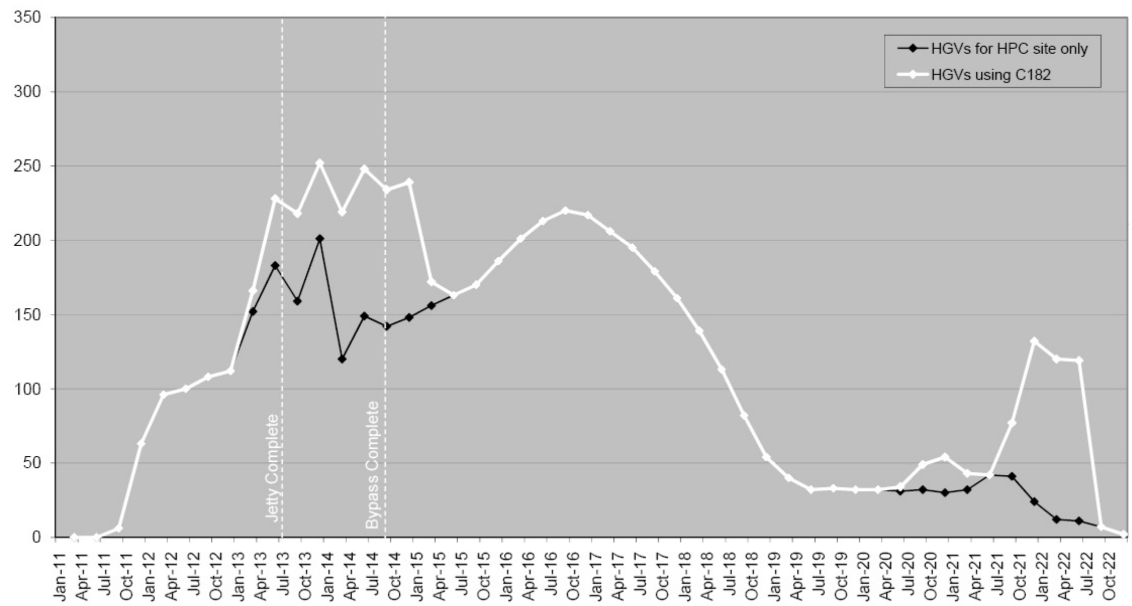
8.2.2 Most multi-axle HGVs have payloads ranging between 20-25 tonnes with some vehicles able to transport up to 30 tonnes or more. The average payloads considered in the model **(Table 8.1)** are based on experience on other projects and take into account of the possibility of "less than full" loads and low weight-high volume items therefore providing a conservative estimate of the road freight traffic (AILs generally require special vehicles with higher carrying capacity therefore are not included in the table).

Table 8.1: Average Payloads

Bitumen, road & networks	**15t**
Cement, aggregate, sand, PFA	**18t**
Precast concrete for sea wall	**12t**
Reinforcement	**18t**
Temporary jetty precast	**10t**
Prefabricated cooling pipe elements	**8t**
Scaffolding and formwork	**5t**
Civil equipment	**10t**
Ancillary building precast	**10t**
Plates & inserts	**5t**
Structural steelwork	**15t**
Steel piling	**8t**
Doors	**3t**
Drainage	**5t**
Water mains	**3t**
Pipework and support	**5t**
Ducting	**3t**
Cables	**5t**
Plant	**10t**
Civil waste	**12t**
Other waste	**4t**
Polluted waste	**3t**
Miscellaneous	**5t**

8.2.3 The number of HGVs increases at the start of the main civil works at the beginning of 2013 to reach approximately an average of 250 vehicles per day (500 movements) in Quarter 4 2013. The number of HGVs drops in 2015 then rises again in 2016/17 to an average of 220 vehicles per day (440 movements) as shown in **Figure 8.2**. This figure includes the AILs travelling from Combwich, together with an allowance for construction equipment and temporary facilities, assumed to be 5% of the total vehicle movements for construction plant.

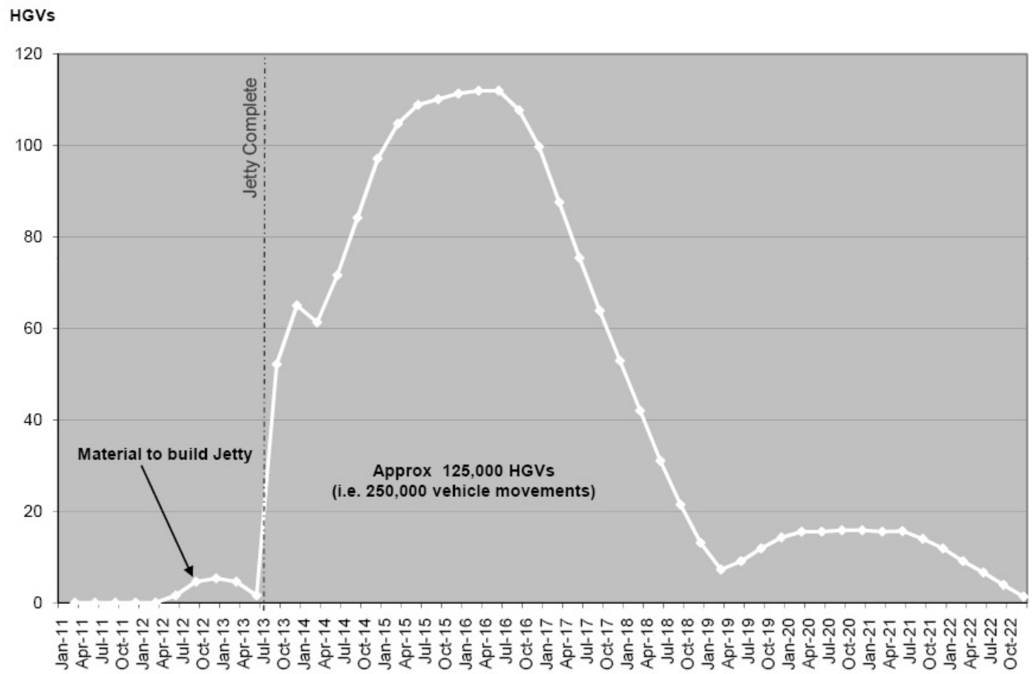
Figure 8.2: Delivery Forecast Summary (average HGVs per day – one way)



8.2.4 The numbers of HGVs shown in **Figure 8.2** represents the average number of HGVs per day over each period of three months. In reality the number of HGVs per day will fluctuate around the average figure depending on the type of on-site activities and delivery requirements. It is considered that a factor of ±50% applied to the average will provide an adequate range to cater for these variations e.g. an average of 250 HGVs per day(500 movements) over a quarter may result in a number of HGVs per day varying between 125 (250 movements) and 375 (750 movements).

8.2.5 **Figure 8.3** shows the number of HGVs taken off the road by using the temporary jetty. This equals a total of 125,000 HGVs throughout the entire construction phase (250,000 movements) and a potential "saving" of up to 110 HGVs per day (220 movements). The profile prior to July 2013 reflects the proportion of materials for construction of the jetty which are delivered by sea.

Figure 8.3: HGVs Taken Off the Road using the Temporary Jetty (one way)



8.2.6 The traffic flow of HGVs will vary throughout the day and the anticipated profile shown in **Table 8.2** and **Figure 8.4** below is based on:

- minimising the volume of construction traffic between 08:00 and 09:00 and 17:00 and 18:00 (network peak hours);
- no freight traffic on the local road network after 22:00 or before 07:00;
- arrival profile based on experience from other projects where the majority of goods is delivered in the morning and early afternoon with limited numbers after 15:00/16:00; and
- departure profile based on: 25% of HGVs leaving the HPC development site within an hour of arrival, 25% within two hours, 25% within three hours and 25% within four hours.

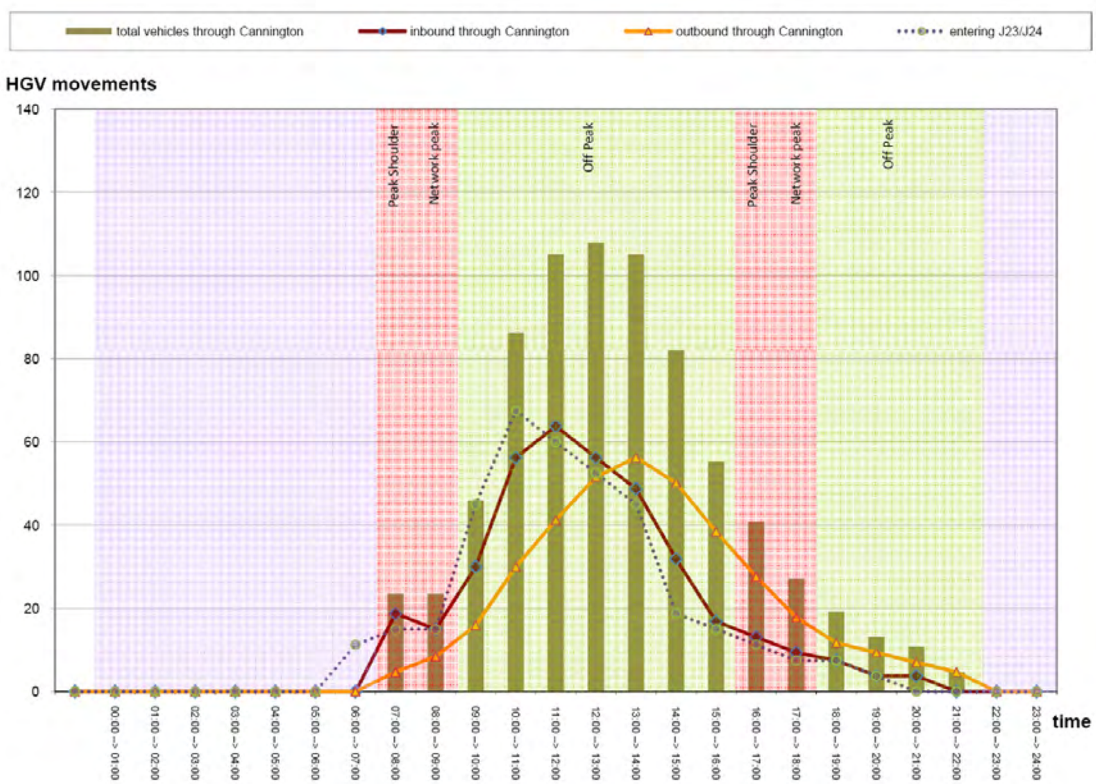
8.2.7 **Table 8.2** and **Figure 8.4** are based on 375 HGVs/day (750 movements) which represent the highest number of HGV movements anticipated during the busiest day of the peak quarter period (based on an average of 250 HGVs/day during the quarter). As noted earlier these HGV movements are also derived from conservative assumptions on the use of sea deliveries for construction materials and on payloads per HGV. As such the figures in these tables represent very much a worst case assessment and on the large majority of weekdays during the construction programme HGV flows will be lower. **Table 8.3** and **Figure 8.5** illustrate the assumed daily profile on a typical Saturday.

Table 8.2: Number of HGVs through Cannington/via the Bypass throughout the Day (peak day in the peak quarter)

Time	% of HGVs entering J23 or J24 per hour	cumulative	Number of HGVs entering J23 or J24 per hour	% of inbound HGVs through Cannington per hour	cumulative	Number of inbound HGVs through Cannington per hour	% of outbound HGVs through Cannington per hour	cumulative	Number of outbound HGVs through Cannington per hour	total number of inbound+outbound HGVs through Cannington per hour
00:00 --> 01:00	0%		0	0%		0	0%		0	0
01:00 --> 02:00	0%		0	0%		0	0%		0	0
02:00 --> 03:00	0%		0	0%		0	0%		0	0
03:00 --> 04:00	0%		0	0%		0	0%		0	0
04:00 --> 05:00	0%		0	0%		0	0%		0	0
05:00 --> 06:00	0%		0	0%		0	0%		0	0
06:00 --> 07:00	3%	3%	11	0%	0%	0	0%	0%	0	0
07:00 --> 08:00	4%	7%	15	5%	5%	19	1%	1%	5	23
08:00 --> 09:00	4%	11%	15	4%	9%	15	2%	4%	8	23
09:00 --> 10:00	12%	23%	45	8%	17%	30	4%	8%	16	46
10:00 --> 11:00	18%	41%	68	15%	32%	56	8%	16%	30	86
11:00 --> 12:00	16%	57%	60	17%	49%	64	11%	27%	41	105
12:00 --> 13:00	14%	71%	53	15%	64%	56	14%	41%	52	108
13:00 --> 14:00	12%	83%	45	13%	77%	49	15%	56%	56	105
14:00 --> 15:00	5%	88%	19	9%	86%	32	13%	69%	50	82
15:00 --> 16:00	4%	92%	15	5%	90%	17	10%	79%	38	55
16:00 --> 17:00	3%	95%	11	4%	94%	13	7%	87%	28	41
17:00 --> 18:00	2%	97%	8	3%	96%	9	5%	91%	18	27
18:00 --> 19:00	2%	99%	8	2%	98%	8	3%	94%	12	19
19:00 --> 20:00	1%	100%	4	1%	99%	4	3%	97%	9	13
20:00 --> 21:00	0%		0	1%	100%	4	2%	99%	7	11
21:00 --> 22:00	0%		0	0%		0	1%	100%	5	5
22:00 --> 23:00	0%		0	0%		0	0%		0	0
23:00 --> 24:00	0%		0	0%		0	0%		0	0
Totals	100%		375	100%		375	100%		375	750

Off Peak
Network Peak
No traffic through Cannington

Figure 8.4: HGV Daily Profile (based on HGVs on the C182)



8.2.8 The number of HGVs per hour to/from HPC varies depending on whether they are counted at Junction 23/Junction 24, Cannington or at the HPC development site. HGVs will be allowed to arrive at the freight management facilities at Junction 23 and Junction 24 from 05:30 but they will not leave the facilities before 07:00. Between 07:00 and 09:00 the number of vehicles leaving the freight management facilities will be limited to minimise the impact on the road network. The large proportion of HGVs will be dispatched from the freight management facilities between 09:00 and 16:00 with the peak expected between 10:00 and 14:00. After 16:00 it is envisaged that the number of deliveries to HPC will be nominal.

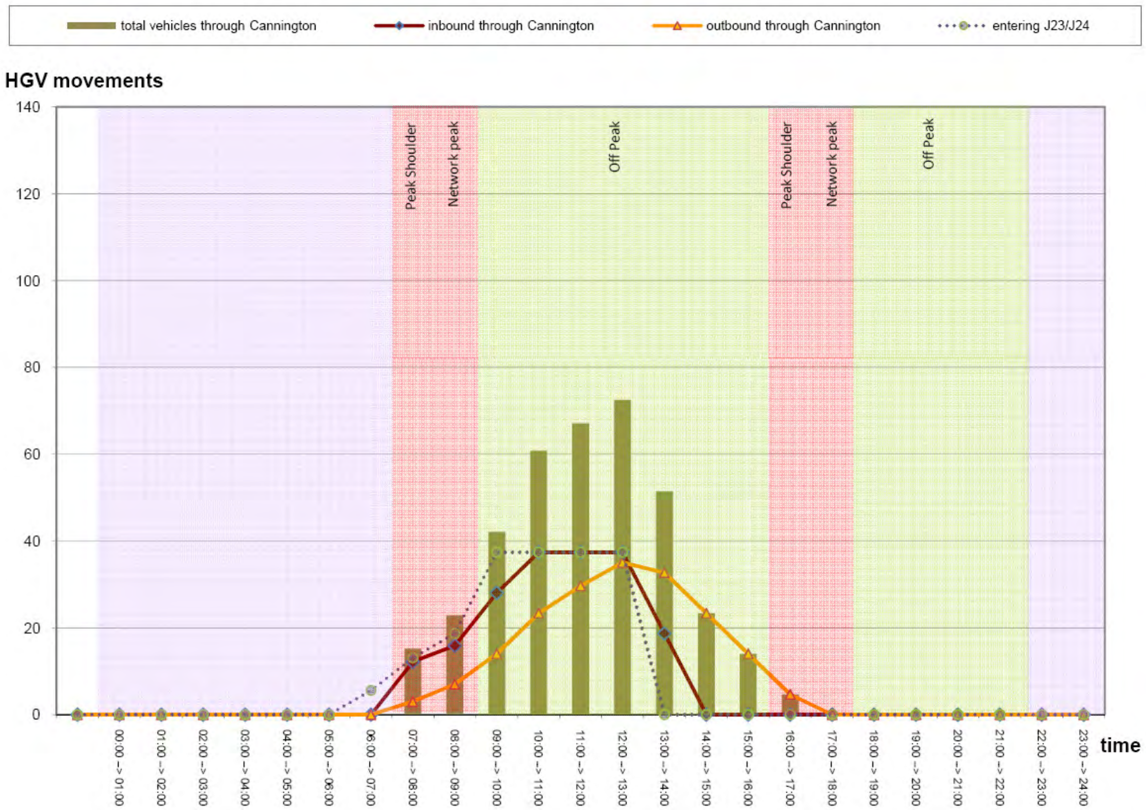
8.2.9 The number of HGVs leaving HPC is a function of the arrival profile and of the length of time that each HGV will be on site. HGVs arriving at HPC will exceed the HGVs leaving site up until 12:00-13:00 when the trend will reverse and the number of HGVs leaving will be higher than the ones arriving to site. The HGVs departure flow between 07:00 and 09:00 will be nominal as the number of HGVs arriving and leaving early is low. The number will increase between 09:00 and 12:00 peaking between 12:00 and 15:00. Between 16:00 and 18:00 the cumulative number of HGVs arriving/leaving site will be higher than the cumulative number of vehicles arriving/leaving between 07:00 and 09:00 making the afternoon flow more onerous on the network than the morning peak.

Table 8.3: Number of HGVs through Cannington via the C182/Bypass on Saturday

Time	% of HGVs entering J23 or J24 per hour	cumulative	Number of HGVs entering J23 or J24 per hour	% of inbound HGVs through Cannington per hour	cumulative	Number of inbound HGVs through Cannington per hour	% of outbound HGVs through Cannington per hour	cumulative	Number of outbound HGVs through Cannington per hour	total number of inbound+outbound HGVs through Cannington per hour
00:00 --> 01:00	0%		0	0%		0	0%		0	0
01:00 --> 02:00	0%		0	0%		0	0%		0	0
02:00 --> 03:00	0%		0	0%		0	0%		0	0
03:00 --> 04:00	0%		0	0%		0	0%		0	0
04:00 --> 05:00	0%		0	0%		0	0%		0	0
05:00 --> 06:00	0%		0	0%		0	0%		0	0
06:00 --> 07:00	3%	3%	6	0%	0%	0	0%	0%	0	0
07:00 --> 08:00	7%	10%	13	7%	7%	12	2%	2%	3	15
08:00 --> 09:00	10%	20%	19	9%	15%	16	4%	5%	7	23
09:00 --> 10:00	20%	40%	37	15%	30%	28	8%	13%	14	42
10:00 --> 11:00	20%	60%	37	20%	50%	37	13%	25%	23	61
11:00 --> 12:00	20%	80%	37	20%	70%	37	16%	41%	30	67
12:00 --> 13:00	20%	100%	37	20%	90%	37	19%	60%	35	72
13:00 --> 14:00	0%	100%	0	10%	100%	19	18%	78%	33	51
14:00 --> 15:00	0%	100%	0	0%	100%	0	13%	90%	23	23
15:00 --> 16:00	0%	100%	0	0%	100%	0	8%	98%	14	14
16:00 --> 17:00	0%	100%	0	0%	100%	0	3%	100%	5	5
17:00 --> 18:00	0%	100%	0	0%	100%	0	0%	100%	0	0
18:00 --> 19:00	0%	100%	0	0%	100%	0	0%	100%	0	0
19:00 --> 20:00	0%	100%	0	0%	100%	0	0%	100%	0	0
20:00 --> 21:00	0%		0	0%	100%	0	0%	100%	0	0
21:00 --> 22:00	0%		0	0%		0	0%	100%	0	0
22:00 --> 23:00	0%		0	0%		0	0%		0	0
23:00 --> 24:00	0%		0	0%		0	0%		0	0
Totals	100%		187	100%		187	100%		187	374

Green	Off Peak
Orange	Network Peak
Purple	No traffic through Cannington

Figure 8.5: HGV Daily Profile on Saturday (based on HGVs on the C182)



8.2.10 In order to limit and control the number of HGVs relating to deliveries to the HPC development site and Combwich, EDF Energy proposes to cap the number of these movements as follows:

- a maximum limit of 750 HGV movements (Monday to Friday); and
- a maximum limit of 375 HGV movements (Saturdays).

8.2.11 These limits will be applied to HGV movements on the C182 Rodway north of Cannington and at the location of the junction of the C182 with the new Cannington bypass.

8.2.12 In addition it is proposed that the HGV movements on the HGV routes through Bridgwater will be subject to the following limits:

- a one day maximum limit of 450 movements on HGV Route 1 (Monday - Friday); and
- a one day maximum limit of 300 movements on HGV Route 2 (Monday – Friday).

The effect of these proposed limits is to enforce a balanced use of the two HGV routes through Bridgwater. The limit for HGV Route 1 will be applied to movements on the Northern Distributor Road and the limit for HGV Route 2 will be applied on the A39, west of the Taunton Road/Broadway Junction.

8.2.13 HGV movements will be subject to an additional limit that the number of HGV movements will not exceed an average of 500 movements per day in any given quarter. The HGVs calculation is based on 265 working days per year (66.25 working days per quarter). This includes weekdays plus Saturday (counted as half day in terms of productivity for the delivery of materials and goods) less industry Christmas and Easter breaks and other bank holidays. An average of 250 HGVs per day would therefore equal to a maximum of 16,562 HGVs per quarter (33,124 movements).

8.2.14 In addition to the limits on the number of HGV movements set out above, it is proposed that the movement of HGVs will be subject to the following timing constraints:

- There will be no HGV movements on the local highway network between the hours of 22:00 and 07:00.
- Morning peak hour HGV movements (08:00 – 09:00) on the local highway network to the HPC development site and Combwich will be limited to 30 movements and evening peak hour (17:00 - 18:00) movements will be limited to 45 movements. These limits will apply Monday to Friday and at the locations defined in paragraph 8.2.11 above.
- There will be no HPC construction-related HGV movements on the local highway network on Sundays or on Bank Holidays.

8.2.15 As noted in Section 6.6 it is proposed to monitor and report on the flow of HGVs: as they leave the freight management facilities at Junction 23 and Junction 24 for inbound traffic, at HPC for outbound traffic and along the permitted HGV routes to ensure compliance with these caps (See Section 6.7 on the DMS).

8.2.16 There are a range of exceptional circumstances in which it may be necessary to disapply some of the limits proposed above. Such circumstances could include an emergency response requiring an HGV movement after 22:00 or before 07:00 or a major traffic incident preventing use of the proposed HGV routes to the HPC development site.

8.2.17 It is proposed to address these exceptional circumstances through a Traffic Incident Management Plan. This will set out in more detail the kinds of circumstances in which it may be necessary to disapply any of the limits and the mechanisms which may need to be in place to agree these with the relevant authority.

8.3 Light Goods Vehicles (LGVs)

8.3.1 The potential number of LGV deliveries to the HPC development site throughout the construction period has been estimated at approximately 220,000 (440,000 movements).

8.3.2 This is based on data from the construction of the power station at Sizewell B (single unit), which has been adjusted to take into account the additional unit at HPC and different construction characteristics between the projects.

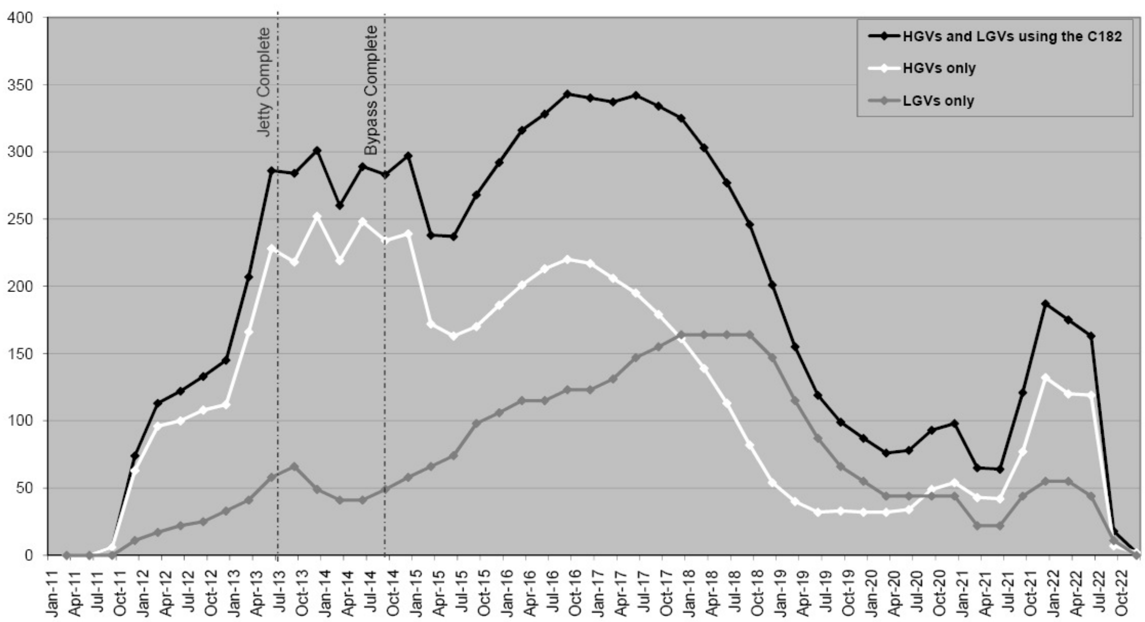
8.3.3 As it is understood that no specific measures were introduced at Sizewell B to reduce and control the number of LGVs to and from site, it is reasonable to assume that 220,000 is a conservative figure for the purpose of transport modelling.

8.3.4 The volume of LGV traffic will be minimised and monitored as noted in Section 6 although LGVs will not be required to: book deliveries via the DMS, transit at the freight management facilities or comply with HGV routes. The introduction of postal/courier consolidation at Junction 23 (temporarily at Junction 24 before Junction 23 becomes operational), which has been proven effective on other projects, is likely to considerably reduce the number of LGV journeys to the HPC development site.

8.3.5 The profile for LGVs shown in **Figure 8.5** is based on the activities included in the strategic programme (see **Figure 7.1**) together with experience of the associated LGV distribution on other large projects. The average LGVs per day over a quarter is estimated to reach approximately 170 (340) movements during the period 2018/19. The daily profile will generally follow the HGV profile shown in **Figure 8.4**.

8.3.6 The average number of HGVs plus LGVs deliveries per day to the HPC development site reaches approximately 350 (700 movements) in 2016/17.

Figure 8.6: Delivery Forecast Summary (average HGVs + LGVs per day – one way)



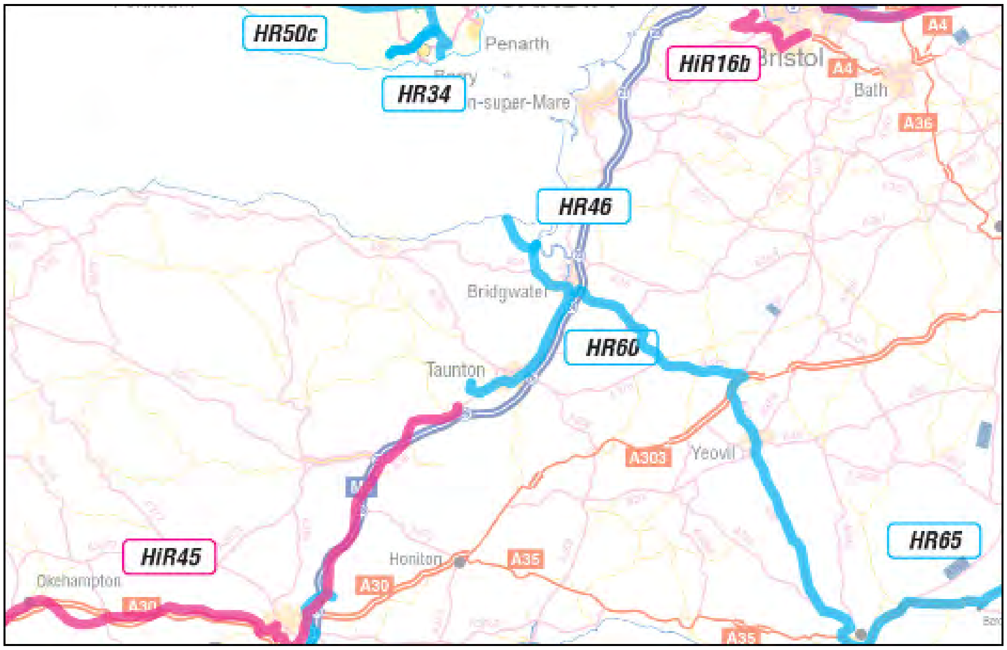
8.4 Abnormal Indivisible Loads (AILs)

8.4.1 As noted in Section 6.3, the largest AILs would be transported by water to Combwich Wharf. Freight traffic would also include a number of smaller AILs that will not be transported via Combwich Wharf but will be dispatched by road instead.

8.4.2 It is anticipated that these smaller AILs will be delivered to the HPC development site on low loader combinations, unescorted (as the maximum width, length and weight fall within limits prescribed by The Road Vehicles (Authorisation of Special Types) Order 2003 as requiring a police escort).

8.4.3 The Highways Agency, in partnership with local highway authorities and the police, has identified national routes that are suitable for heavy loads and classified them by weight capacity. **Figure 8.7** details the two routes that make up the passage from the HPC development site to the M5 motorway namely; Heavy Route 46 (HR46) from Combwich to the HPC development site and Heavy Route 60 (HR60) from Combwich to Taunton. Both routes were approved for AIL transport in 2006.

Figure 8.7: AILs Routes to HPC



8.4.4 HR46 from Combwich Wharf to the site has a weight group of B, which equates to a maximum 280T over 12 axles or 315T over 14 axles. HR60 from Combwich to Taunton has a weight group of E, which equates to a maximum 259T over 12 axles or 294T over 14 axles.

8.4.5 Hauliers are legally required to give a minimum of 2 full days notice to the police, highway authorities and Road and Bridge authorities before moving the load. It is proposed to use the HA's 'Electronic Service Delivery for Abnormal Loads' (ESDAL) system, an electronic service that simplifies the process of notifying abnormal load movements. ESDAL will be used by EDF Energy and its suppliers to deliver fully compliant notifications to the relevant organisations (i.e. HA, SCC and police) of the details of the AIL deliveries before the movements are made.

8.4.6 Currently a full listing for the smaller AILs is not available as the number and nature will depend on future choices of contractor. However, EDF Energy expects the road-borne AILs to be suitable for transport on the strategic road network, using ESDAL.

8.5 HGVs via Combwich Wharf and Freight Laydown Facility

a) HGVs Generated by Water Deliveries at Combwich Wharf

8.5.1 The vehicle movements generated by water deliveries at Combwich Wharf would depend on the type of materials and mode of transport. Three main scenarios have been identified:

1. Day with no deliveries to the Wharf therefore nil or very limited vehicle movements (e.g. only vehicles for maintenance, operatives, security, etc.).

2. Day with delivery of AIL – likely to be single movement per day of large component with special trailers plus limited vehicle movement for operatives. This includes temporarily stored at the freight laydown facility.

3. Day with delivery of other construction goods – the number of vehicle movements will vary depending on the vessel capacity and transport mode (RoRo or LoLo). For RoRo the determining factor will be the number of HGVs and construction plant that can be accommodated on each barge (e.g. 15 HGVs on a flat top 60x30 barge = 30 HGV movements - assuming that the HGVs will leave by barge). For LoLo the number of vehicles will depend on the tonnage and volume of materials transported (e.g. 500t of reinforcement bars would require 25 HGVs = 50 HGV movements in a day – assuming that HGVs return to the wharf after unloading at the freight laydown facility).

8.5.2 Depending on construction and space requirements, loaded vehicles leaving Combwich Wharf may dispatch either to the freight laydown facility or go directly to the HPC development site.

8.5.3 The HGV profile in **Figure 8.2** already includes the number of vehicle movements generated by water deliveries at Combwich Wharf as it is based on the conservative assumption that only the largest AILs will be delivered at the Wharf.

b) HGVs Generated by the Use of the Freight Laydown Facility

8.5.4 Materials stored at the freight laydown facility include water borne deliveries and potentially road deliveries via Junction 23 and Junction 24. Road deliveries will normally be dispatched directly to the HPC development site although the freight laydown facility may be used in cases of space shortage on site.

8.5.5 There is the possibility that some materials would be broken down into smaller deliveries at the freight laydown facility for contractor's collection as and when required. As a consequence one such HGV delivery to Combwich freight laydown facility would require multiple smaller vehicles to HPC. It has been estimated that an average of 150 vehicles per day will be required to dispatch materials from the freight laydown facility to HPC (with a daily peak of 200 vehicles). This is considered to be a conservative assumption as it would be more efficient for contractors to break down deliveries at HPC whilst only temporarily dispatching full loads at Combwich.

8.5.6 It should be noted that the HGV profile in **Figure 8.2** already includes all materials delivered via the C182. As a consequence only a proportion of the 150 vehicles per day are not accounted for in the HGV profile. This is due to the possibility to break down materials at the freight laydown facility into smaller deliveries as described above.

8.6 HGVs Generated by the Associated Developments.

8.6.1 The total number of HGVs generated by the construction and post-operation of the associated developments are shown in **Table 7.1**.

8.6.2 **Table 8.3** illustrates the average and peak number of HGVs per day required for each facility during the peak quarter. These are calculated by applying the general distribution illustrated in **Figure 7.1** and considering a ±50% factor for fluctuations around average values.

Table 8.3: HGV movements required for the construction of the associated developments (not affecting the C182)

SITE	Total HGVs From Table 7.1	20% Contingency From Table 7.1	Total HGVs Including Contingency	Timing in Quarters	Worst Quarters	Average HGV/ Day Worst Quarters	Average Mov./ Day Worst Quarters	Peak Mov./ Day Worst Quarters
Bridgwater A – Phase 1	4,302	860	5,162	5	Q3/Q4 2013	23	47	70
Bridgwater A – Phase 2	5,258	1,052	6,310	9	Q1/Q2 2014	16	32	48
Bridgwater C	1,836	367	2,203	4	Q2/Q3 2013	12	25	37
Junction 23 P&R and Freight	6,317	1,263	7,580	4	Q4 2013 Q1 2014	43	86	129
Junction 24 P&R and Freight	1,602	212	1,274	2	Q1/Q2 2013	14	29	43
Cannington P&R	1,310	262	1572	3.5	Q2/Q3 2013	10	20	31
Williton P&R	875	175	1,050	3	Q2/Q3 2013	8	16	24
Cannington Bypass	5,658	1,132	6,790	6	Q3/Q4 2013 Q1 2014	26	51	77

8.6.3 In addition it has been assumed that during the construction of the associated development sites, the number of LGVs will be the same as the number of HGVs each day.

9. CONCLUSIONS

9.1.1 The FMS provides an overview of the proposed freight management measures and assesses material quantities, modes of transport and determines the resulting freight traffic.

9.1.2 The strategy shows that the use of water deliveries via the jetty and Combwich Wharf avoid a substantial volume of road freight traffic via Bridgwater and Cannington and that road freight deliveries will be efficiently managed via dedicated freight management facilities and a web-based delivery management system.

9.1.3 Road freight traffic is calculated on the basis of a conservative estimate of construction materials and payloads and on a “less than full” utilisation of the jetty and wharf. This approach offers robust HGV results and provides satisfactory margins to cope with the uncertainties typical of a project of this scale and duration.

9.1.4 This FMS is the result of a number of consultations and discussions with the relevant authorities and the public and the holistic effort between a number of stakeholders and disciplines. It proposes freight management measures that meet or exceed best practice solutions adopted on other large construction projects.

APPENDIX 15B CALCULATION OF ROAD – JETTY SPLIT FOR HINKLEY POINT C

Hinkley Materials (DCO Transport Assessment, Annex 3.7)

80% of aggregate, sand and cement by jetty (once jetty operational)
7.1 million tonnes of material - HPC main site, AD sites using C182 and other AD sites
6.4 million tonnes for HPC site + AD sites using C182

** in the table below denotes that the mode by jetty is only once jetty available so allowance made pre-jetty for 100% by road*

Activity	tonnes	% jetty	% road	Road tonnage	Road Tonnage taking account of jetty phasing	Payload (t)	No. veh
Site Prep - Earthworks							
Bitumen	50,000	0%	100%	50,000	50,000	15	3,333
Fill material	450,000	0%	100%	450,000	450,000	18	25,000
Concrete	93,249	80%	20%	18,650	55,944	18	3,108
precast concrete	150,000	0%	100%	150,000	150,000	12	12,500
Misc	10,000	0%	100%	10,000	10,000	5	2,000
Total	**753,249**						**45,941**
Cooling Pipes							
Prefab elements	18,000	0%	100%	18,000	18,000	8	2,250
Misc	2,000	0%	100%	2,000	2,000	5	400
Total Cooling Pipes	**20,000**						**2,650**
Roads and Networks							
Drainage	40,000	0%	100%	40,000	40,000	5	8,000
Roads and networks	100,000	0%	100%	100,000	100,000	15	6,667
Misc	10,000	0%	100%	10,000	10,000	5	2,000
Total Roads and Networks	**150,000**						**16,667**
Marine works							
Tunnelling works	163,049	0%	100%	163,049	163,049	5 PC units /	8,198
Ancillary works	32,000	80%	20%	6,400	10,062	18	559
Total Marine	**195,049**						**8,757**
Jetty							
Concrete on shore	28,349	0%	100%	28,349	28,349	18	1,575
Concrete pre-cast on shore	1,155	0%	100%	1,155	1,155	10	116
Steelwork on shore	400	0%	100%	400	400	15	27
Piles	1,508	0%	100%	1,508	1,508	5	302
Concrete off shore	10,500	94%	6%	630	630	18	35
Concrete precast off shore	2,363	0%	100%	2,363	2,363	10	236
Steelwork off shore	865	50%	50%	433	433	15	29
Piles off shore	2,577	95%	5%	129	129	5	26
Inert	37,707	0%	100%	37,707	37,707	15	2,514
Non hazardous	9,546	0%	100%	9,546	9,546	8	1,193
Hazardous	477	0%	100%	477	477	3	159
Total Jetty	**95,447**						**6,211**
Subtotal	1,213,745			82,696			80,226
Contingency (10%)	121,375						8,023
Total Site	**1,335,120**						**88,248**
Civils							
Main Civil Works							
Concrete	2,331,224	80%	20%	466,245	495,504	18	27,528
Reinforcing bars	230,000	0%	100%	230,000	230,000	18	12,778
Formwork	20,000	0%	100%	20,000	20,000	5	4,000
Plates	10,000	0%	100%	10,000	10,000	5	2,000
Steelwork	30,000	0%	100%	30,000	30,000	15	2,000
Equipment	10,000	0%	100%	10,000	10,000	3	3,333
Misc	300,000	0%	100%	300,000	300,000	5	60,000
Total	**2,931,224**						**111,639**
Civil Equipment							
Civils plant	2,000	0%	100%	2,000	2,000	10	200
Total Plant	**2,000**						**200**
Ancillary Buildings Phase 1							
Concrete	14,430	80%	20%	2,886	6,102	18	339
Precast concrete	100	0%	100%	100	100	10	10
Steelwork	1,620	0%	100%	1,620	1,620	15	108
Total	**16,150**						**457**
Ancillary Buildings Phase 2							
Concrete	31,600	80%	20%	6,320	6,318	18	351
Misc	10,000	0%	100%	10,000	10,000	5	2,000
Total	**41,600**						**2,351**

Sub Total Civil Construction	2,990,974						114,647
Contingency (5%)	149,549						5,732
Total Civil Construction	**3,140,523**						**120,379**
Installation							
Nuclear Steam Supply System							
Heavy components	15,000	Sea to Combwich + road		100		AILs	150
Equipment	2,000	0%	100%	2,000	2,000	10	200
Mechanical (piping/support/valves/insulation	20,000	0%	100%	20,000	20,000	5	4,000
Electrical	1,000	0%	100%	1,000	1,000	5	200
Misc	2,000	0%	100%	2,000	2,000	5	400
							4,950
Balance of Nuclear Island							
Handling	2,000	0%	100%	2,000	2,000	10	200
Wastes process	10,000	0%	100%	10,000	10,000	10	1,000
Mechanical	40,000	0%	100%	40,000	40,000	5	8,000
Nuclear Steam Supply System							
Diesels generators	10,000	0%	100%	10,000	10,000	10	1,000
Ventilation	20,000	0%	100%	20,000	20,000	3	6,667
Electrial	10,000	0%	100%	10,000	10,000	5	2,000
Misc	10,000	0%	100%	10,000	10,000	5	2,000
Total BNI	**142,000**						30,767
Convential Island							
Turbine - generator	10,000	Sea to Combwich + road		100		AILs	100
Condensor - feed water plant	8,000	Sea to Combwich + road		100		AILs	80
Equipment	4,000	0%	100%	4,000	4,000	10	400
Mechanical	10,000	0%	100%	10,000	10,000	5	2,000
Electrial erection	2,000	0%	100%	2,000	2,000	5	400
Steelwork	5,000	0%	100%	5,000	5,000	15	333
Misc	4,000	0%	100%	4,000	4,000	5	800
Total CI	**43,000**						**4,113**
Balance of Plant							
Pumphouse	10,000	0%	100%	10,000	10,000	10	1,000
Transformers platform	2,000	0%	100%	2,000	2,000	10	200
Misc	3,000	0%	100%	3,000	3,000	5	600
Total BOP	**15,000**						**1,800**
Sub Total Installation	200,000						36,680
Contingency (50%)	100,000						18,340
Total Installation	**300,000**						**55,020**
Buildings - Basic Design Stage							
Spent Fuel Store							
Intermediate level waste store	31,391	60%	40%	12,556	12,556	18	698
Spent Fuel Store	255,559	60%	40%	102,224	102,224	18	5,679
Sub-total Buildings	286,950						6,377
Contingency (30%)	86,085						1,913
Total Buildings	**373,035**						**8,290**
HPC Site Wastes							
Inert	150,000	0%	100%	150,000	150,000	12	12,500
Non-hazardous	68,000	0%	100%	68,000	68,000	4	17,000
Hazardous	2,000	0%	100%	2,000	2,000	3	667
Sub-total Wastes	220,000						30,167
Contingency (10%)	22,000						3,017
Total Waste	**242,000**						**33,183**
Sub-total Quantities Units 1 + 2	5,390,677						305,121
Construction Plant (5%)							15,256
Total Quantities Units 1 + 2							**320,377**
Other Off-site AD Works which affect traffic on the C182							
Combwich Wharf							
Construction material	71,238	0%	100%	71,238	71,238	Varies	4,749
Inert waste	23,972	0%	100%	23,972	23,972	Varies	1,598
Non-hazardous waste	6,392	0%	100%	6,392	6,392	Varies	425
Hazardous waste	1,589	0%	100%	1,589	1,589	Varies	107
Sub-total Combwich Wharf	103,191						6,879
Contingency (20%)	20,638						1,376

Total Combwich Wharf	**123,829**						**8,255**
Combwich Wharf Freight Laydown Facility							
Construction material	336,400	0%	100%	336,400	336,400	Varies	18,689
Inert waste	2,103	0%	100%	2,103	2,103	Varies	140
Non-harzardous waste	561	0%	100%	561	561	Varies	37
Hazardous waste	140	0%	100%	140	140	Varies	9
Decommissioning							
Inert waste	265,756	0%	100%	265,756	265,756	Varies	14,764
Non-hazardous waste	67,280	0%	100%	67,280	67,280	Varies	3,738
Hazardous waste	3,364	0%	100%	3,364	3,364	Varies	187
Sub-total Laydown Area	675,604						37,564
Contingency (20%)	135,121						7,513
Total Laydown Area	**810,725**						**45,077**
HPC Campus							
Construction material	37,653	0%	100%	37,653	37,653	Varies	3,170
Inert waste	1,767	0%	100%	1,767	1,767	Varies	118
Non-hazardous waste	471	0%	100%	471	471	Varies	31
Hazardous waste	118	0%	100%	118	118	Varies	8
Decommissioning							
Inert waste	29,709	0%	100%	29,709	29,709	Varies	2,103
Non-hazardous waste	7,521	0%	100%	7,521	7,521	Varies	532
Hazardous waste	376	0%	100%	376	376	Varies	27
Sub-total Campus	77,615						5,989
Contingency (20%)	15,523						1,198
Total Campus	**93,138**						**7,187**
National Grid							
Construction	13,760	0%	100%	13,760	13,760	10	1,376
Sub-total National Grid	13,760						1,376
Contingency (10%)	1,376						138
Total National Grid	**15,136**						**1,514**
Sub-total AD affect C182	**1,042,828**						**62,032**
Construction Plant (5%)							**3,102**
							65,134
Total HPC Material to or near site	6,433,505						
Material by road	**3,635,345**						
Total Materials to HPC by road/jetty	**6,433,505**						
Total material by road	**57%**						
Total material by jetty	**43%**						