



Wylfa Newydd Project

6.7.1 ES Volume G - A5025 Off-line Highway Improvements G1 - Proposed Development

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1. Proposed development

1.1 Introduction

- 1.1.1 Construction of the Power Station would require very substantial transport needs for materials, large components and staff. The main route to the Wylfa Newydd Development Area from the mainland and the Port of Holyhead is along the A55, the A5 and the A5025.
- 1.1.2 Studies undertaken by Horizon in 2010–2011, summarised in chapter G2 (alternatives and design evolution) (Application Reference Number: 6.7.2) identified that the stretch of the A5025 between the community of Valley and the Existing Power Station Access Road has physical and operational constraints in relation to its width, alignment, overtaking opportunities and surfacing condition.
- 1.1.3 As a result of these studies, Horizon has committed to improve this section of the A5025 in order to mitigate the predicted impacts of increased traffic associated with construction activities that would be undertaken at the Wylfa Newydd Development Area, and from operational Power Station traffic that would travel along this part of the highway network.
- 1.1.4 Horizon therefore intends to deliver the following on-line and off-line improvements between Valley and the proposed Power Station Access Road Junction, as part of its Integrated Traffic and Transport Strategy (appendix F of appendix C2-4, Integrated Traffic and Transport Strategy, Application Reference Number: 6.3.20).
- A5025 Off-line Highway Improvements – involving the construction of new junctions, new sections of road to bypass local communities, and localised bend improvements generally beyond the existing highway boundary.
 - A5025 On-line Highway Improvements – involving the reconstruction and localised widening of the existing pavement and the application of a surface dressing, largely within the existing highway boundary.
- 1.1.5 The objectives of these improvements are to:
- upgrade the route, both in terms of standard of construction and road geometry, such that it can support increased levels of traffic, and improve safety and accessibility;
 - ensure that all relevant abnormal loads can pass along the full length of the road;
 - reduce the risk of road accidents;
 - reduce any adverse impacts on local communities;
 - reduce any adverse impacts on the environment; and
 - seek opportunities, where possible, to achieve improvements for local communities and the environment through road design measures.

- 1.1.6 Both types of improvement form an important component of the Wylfa Newydd Project, and are required as part of Horizon's Integrated Traffic and Transport Strategy (appendix F of appendix C2-4, Application Reference Number: 6.3.20).
- 1.1.7 The A5025 Off-line Highway Improvements have been subject to a formal process of Environmental Impact Assessment to identify any potentially significant environmental effects that could arise from their construction and operation. The outcomes of this process are presented within volume G of this Environmental Statement (A5025 Off-line Highway Improvements; Application Reference Number 6.7).
- 1.1.8 The A5025 On-line Highway Improvements are the subject of a separate planning application made to the Isle of Anglesey County Council (IACC) (as the determining authority) in November 2017, under the provisions of the Town and Country Planning Act 1990 (as amended). These improvements are accordingly not considered further in this volume.
- 1.1.9 The 16.5km stretch of the A5025 identified for improvement has been divided into eight distinct sections, with a further section associated with the proposed Power Station Access Road Junction. Of these, sections 1, 3, 5 and 7 and the Power Station Access Road Junction relate to the A5025 Off-line Highway Improvements, as summarised below.
- Section 1 (Valley) (work package 8 – see table G1-1 in section 1.4) – A5 east of Valley Junction to north of Valley Junction – comprising a proposed four arm roundabout and a bypass connecting the A5 with the A5025 to the east of the existing A5/A5025 signalised junction in Valley. This is 1.06km in length.
 - Section 3 (Llanfachraeth) (work package 9 – see table G1-1 in section 1.4) – north of Llanynghenedl to north of Llanfachraeth – comprising a proposed bypass east of Llanfachraeth. This is 2.28km in length.
 - Section 5 (Llanfaethlu) (work package 10 – see table G1-1 in section 1.4) – south of Llanfaethlu to north of Llanfaethlu – comprising proposed improvements to two existing substandard bends on the A5025 in Llanfaethlu. This is 1.43km in length.
 - Section 7 (Cefn Coch) (work package 11 – see table G1-1 in section 1.4) – north of Llanrhuddlad to north of Cefn Coch – comprising a proposed bypass to provide a straighter section of road and bypass two existing substandard bends in Llanrhwydrus. This is 1.3km in length.
 - Power Station Access Road Junction (work package 1J – see table G1-1 in section 1.4) – north of Cefn Coch – comprising a proposed three-arm roundabout junction linking the existing A5025 to the proposed Power Station Access Road.
- 1.1.10 The A5025 Off-line Highway Improvements are proposed to be completed in time for the start of major construction activities at the Wylfa Newydd Development Area. It is anticipated that construction of the A5025 Off-line

Highway Improvements would commence in the first year following award of development consent and last for approximately 18 months.

- 1.1.11 For the remainder of this chapter G, the above locations are referred to as 'section 1', 'section 3', 'section 5', 'section 7' and the 'Power Station Access Road Junction'.

1.2 Site location and environmental context

Road network

- 1.2.1 The A5025 is a principal transportation route on the Isle of Anglesey, distributing traffic around the western, northern and eastern parts of the island. It is a rural 'A road' (defined as a major road intended to provide large-scale transport links within or between areas) with variable speed limits, and is predominantly derestricted except where it passes through communities and settlements, where the speed limit reduces to between 30 miles per hour (mph) and 50mph.
- 1.2.2 The A5025 varies significantly in width and elevation. It follows a winding course with a number of sharp bends and, in some places, passes through rural communities, where it is closely flanked by residential properties and other structures. Footways are provided adjacent to either one or both sides of the road throughout these rural community areas; however, the more rural sections of the road do not have any facilities for pedestrians. The road does not have any cycle paths or provision for cyclists. The route connects with the A5 in the centre of the village of Valley.
- 1.2.3 The A5 is a single carriageway road, which connects Holyhead with the Menai Bridge, before continuing into mainland Wales. The A5 connects with junction 3 of the A55, approximately 600m south-east of Valley, and was formerly the principal route crossing the island until the A55 opened.
- 1.2.4 The A55 is the strategic route onto the island and is a high quality dual carriageway, with grade-separated junctions. The route bisects Anglesey on an east-west alignment between the Britannia Bridge over the Menai Strait to the east and the port of Holyhead to the west. The Britannia Bridge is the only section of single carriageway on the entire length of the route across north Wales.
- 1.2.5 Traffic volumes vary along different sections of the A5025. Surveys undertaken by Horizon in 2014 recorded the following Annual Average Daily Traffic (AADT) flows:
- A5025 (Valley) – 5,400 vehicles;
 - A5025 (Llanfachraeth) – 4,700 vehicles;
 - A5025 (Llanfaethlu) – 3,800 vehicles; and
 - A5025 (Cefn Coch) – 2,800 vehicles.
- 1.2.6 Road traffic accidents recorded between 1 January 2009 and 31 December 2014 include some that involved pedestrians and cyclists. Road traffic

accident data are presented in chapter C2 traffic and transport (Application Reference Number: 6.3.2).

- 1.2.7 There are no records of significant carriageway flooding along the A5025. The current drainage system relies on runoff from the road discharging into adjoining land, ditches or watercourses. In several locations, runoff is discharged into gullies installed at low points, which are connected to ditches and watercourses.

Settlement, land use and culture

- 1.2.8 The majority of the land surrounding the A5025 has remained relatively unchanged from the earliest available historical mapping to the present day, with agricultural land dominating the area and some settlements associated with historical, industrial or more recent commercial activities.
- 1.2.9 The main communities situated along the route include the villages of Llanrhuddlad, Llanfaethlu, Llanfachraeth, Llanynghenedl and Valley. Facilities within these villages include shops, places of worship, hotels and other accommodation, recreational areas and places of education. A small number of facilities are located along the A5025 outside these communities.
- 1.2.10 The Welsh language has a strong presence on Anglesey and forms an integral part of community life and local education.

Access

- 1.2.11 The A5025 is the main route to the Existing Power Station and provides access to a number of small villages and scattered rural properties dispersed across an area traditionally dominated by agriculture and the tourism industry.
- 1.2.12 Isolated agricultural holdings, residential properties, businesses and small settlements are connected to the A5025 by way of 'B-classification roads', unclassified side roads, rural lanes and Private Means of Access (PMAs).
- 1.2.13 Local residents have a strong reliance on the A5025 as a means of accessing wider services and facilities by car. Pedestrians, cyclists and, to a lesser extent, horse riders use the A5025 as a recreational route and for journeys between residential properties and community facilities.
- 1.2.14 Public Rights of Way (PRoWs) join and cross the A5025 between the Existing Power Station and Valley, and many of them form a wider network of routes that connect local communities and settlements. The only formal cycle provision is the National Cycle Network (NCN) Route 566 (the Copper Trail) and NCN Route 5, which cross the A5025 at Tregel and Llanynghenedl respectively.

Environmental features and interests

- 1.2.15 The whole of the Anglesey coastline and hinterland, extending inland for several kilometres in parts, is designated as an Area of Outstanding Natural Beauty (AONB). In places, such as Llanfachraeth and Llanfaethlu, the boundary of the AONB extends as far as the A5025.

- 1.2.16 The local landscape surrounding the A5025 is of high quality and differing character, mainly comprising rolling pastoral agricultural land. Much of the road is lined by grass verges bordered by a mixture of hedgerows and trees, fences, stone walls and cloddiau (stone-faced earth banks). Ancient woodland is located in close proximity to the road corridor, near the small settlement of Cefn Coch.
- 1.2.17 A range of archaeological and cultural heritage assets of varying historic significance have been recorded in the area surrounding the A5025, the most important of which are Scheduled Monuments, Listed Buildings, and Registered Historic Parks and Gardens. The landscapes surrounding the A5025 predominantly date to the post-medieval period.
- 1.2.18 Three European Designated Sites are located within 2km of the A5025, comprising Anglesey terns/Morwenoliaid Ynys Môn Special Protection Area; Cemlyn Bay Special Area of Conservation, and; Llyn Dinam Special Area of Conservation. There are also five designated ecological sites of national importance within 500m of the A5025, comprising Beddmanarch-Cymyran Site of Special Scientific Interest (SSSI); Llyn Llygeirian SSSI; Cae Gwyn SSSI; Llyn Garreg-Lwyd SSSI; and Tre'r Gof SSSI.
- 1.2.19 The main surface water bodies crossed by, or located in proximity to, the A5025 comprise the Afon Cleifiog, Afon Alaw, Tan R'Allt, Afon Cafnan and several small watercourses and ditches. A number of these waterbodies have been identified as supporting great crested newts.
- 1.2.20 Soils of varying agricultural quality and type have been recorded along and surrounding the A5025, some of which have been classified as Agricultural Land Classification grades 2 and 3a, considered to be best and most versatile soils.
- 1.2.21 Monitoring undertaken by Horizon in June 2015, at locations along and surrounding the A5025, indicates that background noise is dominated by traffic on the A5025, with additional contributions from traffic on local roads and agricultural and environmental noise sources.
- 1.2.22 Air quality in the area surrounding the A5025 is generally good, with low levels of pollution and dust recorded.

Environmental constraints

- 1.2.23 The design of the A5025 Off-line Highway Improvements has taken account of a number of environmental constraints along and immediately adjacent to the A5025 as part of the design-development process (see chapter G2, Application Reference Number: 6.7.2), the objective being avoid or to minimise the effect on a particular feature during their construction and/or operation.
- 1.2.24 Accordingly, a number of environmental and design-based mitigation measures have been incorporated (embedded) into the design of A5025 Off-line Highway Improvements; these are described in section 1.3 of this chapter.

1.3 Proposals for the A5025 Off-line Highway Improvements

Mitigation measures

- 1.3.1 Mitigation is the term used to describe measures used to prevent or reduce adverse environmental effects.
- 1.3.2 The design of the A5025 Off-line Highway Improvements has responded to the following environmental constraints and opportunities:
- Anglesey AONB – the design has sought to avoid encroachment into this designated landscape by retaining the majority of the works within the existing highway boundary wherever possible.
 - Ancient woodland – the design avoids encroachment into the stand of ancient woodland near to the northern tie-in point of section 7 (Cefn Coch).
 - Water bodies – the design includes an 8m buffer zone around an existing watercourse (Afon Alaw) and the construction working area associated with the proposed viaduct within section 3, in order to protect this environmentally sensitive feature from construction-related activities.
 - PRoWs and PMAs – the design has sought to avoid physical changes to PRoWs and private accesses by retaining existing access arrangements wherever possible and, where effects are unavoidable, by providing new or modified accesses such as diversions.
 - Boundary features – the design has sought to retain existing boundary vegetation and features wherever possible, but where effects are unavoidable, measures have been included in the design to reinstate highway and field boundaries. There are some sections of field boundary walls which would be relocated.
 - Ecology – the design has sought to avoid sensitive ecological features where possible, with ‘no go’ areas and 10m exclusion zones included in the designs of sections 3 and 7 to reduce construction effects on these receptors. This is in addition to the 8m buffer for Afon Alaw, noted above.
- 1.3.3 The details of the mitigation measures for the A5025 Off-line Highway Improvements are summarised further in chapter J1 (environmental commitments) (Application Reference Number: 6.10.1) and appendix J1-1 (schedule of environmental commitments) (Application Reference Number: 6.10.3). This also details the mechanisms for securing the measures.

Section 1: Valley

Introduction

- 1.3.4 Section 1 is illustrated on the general arrangement plans (A5025 Off-line Highway Improvements - Section 1 - Valley Plans) (Application Reference Number: 2.7).

- 1.3.5 The proposed improvements would comprise a four-arm 50m diameter roundabout and bypass connecting the A5 with the A5025 to the east of the existing A5/A5025 signalised junction.
- 1.3.6 The purpose of the bypass is to avoid the increased traffic using the existing signalised junction, which is geometrically constrained and would not be suitable to accommodate the predicted numbers of large HGVs due to space restrictions and the proximity of existing buildings.
- 1.3.7 The roundabout would be located away from the village of Valley in order to reduce the effects of noise, vibration, air quality and street lighting.
- 1.3.8 The speed limit would be 30mph through the roundabout section of section 1. The speed limit for the remainder of section 1 would be the national speed limit (60mph).
- 1.3.9 The proposed roundabout junction would be located on-line (to be constructed as part of the existing A5 highway). The roundabout junction would be located within the 1 in 100 year flood zone plus a 30% allowance for the effects of climate change, whereas the bypass would be positioned outside of the 1 in 100 year flood zone. At three locations, where watercourses or drainage ditches are severed by the new PMAs, culverts would be provided.
- 1.3.10 A shared use footway and cycleway has been incorporated into the design to the south of the roundabout, providing connectivity between the new junction and junction 3 of the A55.

Land acquisition

- 1.3.11 The highway alignment and junction within section 1 has been designed in a manner that minimises land acquisition required to construct and operate the improvements.
- 1.3.12 Approximately 7.9ha of land would be taken temporarily to facilitate construction, and approximately 3.0ha of land would be permanently taken to accommodate the bypass and roundabout junction.

Structures

- 1.3.13 Headwalls are proposed as part of section 1.

Drainage

- 1.3.14 The outline drainage design for section 1, which follows a Sustainable Drainage Systems (SuDS) strategy, is shown on figures within A5025 Off-line Highway Improvements – Section 1 Valley Plans (Application Reference Number: 2.7).
- 1.3.15 Flood modelling has identified the extents of existing tidal and fluvial flooding issues in the area. In response, the alignment would be a minimum of 2.1m Above Ordnance Datum (AOD), with an allowance for 600mm of freeboard (a safety factor used in the design of drainage works).
- 1.3.16 Runoff from the surface of the highway would be collected in two separate systems. The section of road north of the proposed roundabout would be drained by filter drains situated in the verge of the carriageway.

- 1.3.17 The rest of the road (to the east and west of the proposed roundabout) would be served by kerb drains connected to the existing drainage network. The drains would be designed with capacity to carry flows associated with a 1 in 1 year rainfall event and cause no flooding in a 1 in 5 year event in accordance with the relevant highway design standards presented in the *Design Manual for Roads and Bridges* (DMRB) guidance [RD1].
- 1.3.18 The filter drains would discharge to the network of land drains.
- 1.3.19 Due to the topography of the surrounding area, it is not possible to provide an attenuation pond outside of the floodplain for this section of the highway. The drainage system on the northern side of the roundabout junction and off-line section of road would drain into storage swales, with a weir, which would attenuate drainage flows. The drainage on the southern and eastern sides of the junction and road would drain into an oversized drainage trench, which would also provide attenuation. The attenuation systems would provide greenfield runoff rates.
- 1.3.20 The proposed roundabout and approaches would drain to a network of combined kerb drainage units. These would mainly discharge to the existing adjacent highway drainage network. A short section of kerb units near the roundabout would be connected to the roadside open channel (west of the northern approach), which drains north from the roundabout to the existing network of drains in the floodplain.
- 1.3.21 On the section of carriageway to the north of the roundabout, one side of the road would be higher than the other, and therefore filter drains would be located in the verge on the lower edge of the highway. The filter drain serving the southernmost section of the highway (chainage 60m to chainage 230m, north of the roundabout) would drain into the swales before discharging into the existing land drain to the west of the highway. This section of the land drain would be cleaned and reprofiled. The southern side of the road would discharge into an oversized drainage ditch, before draining into the land drain.
- 1.3.22 Runoff from the section of highway between chainage 230m and chainage 380m would discharge into an oversized drainage ditch on the southern side of the road.
- 1.3.23 The northern most section of the highway (chainage 380m to chainage 448m) would be drained by filter drains, which would discharge to the watercourse.
- 1.3.24 Silt traps would also be provided as part of the drainage system.
- 1.3.25 As part of the roundabout junction would be constructed within the floodplain, compensation flood storage would be provided to the west of the new section of road. At this location, the ground level would be reduced by a maximum of 1.2m.

Junctions and accessibility

- 1.3.26 The only junction on the proposed bypass is the roundabout linking the A5, A5025 and freight yard terminal. The eastern and western arms of the roundabout tie into the existing A5 close to the cemetery and the signalised

junction in Valley respectively. The northern arm ties in to the A5025 near two existing agricultural accesses.

- 1.3.27 A PMA in the form of a southern arm off the roundabout would provide direct access to the existing freight yard railway spur from the junction. An existing gated PMA on the southern side of the A5 would be retained as part of the design to provide continued access to land adjacent to the freight yard. A new PMA would be created on the northern side of A5, to the west of the new roundabout junction, to replace an existing field access. A PMA would be created on the eastern side of the new section of road, to provide a private field access to a severed field.
- 1.3.28 A turning head would be provided at the end of the stopped up section of the A5025.

Non-motorised user provisions

- 1.3.29 An existing footway along the southern side of the A5 would be retained in its current position, providing a link for pedestrians between Valley and Caergeiliog. Maintaining this footway in its current position ensures that non-motorised users are separated from the roundabout for safety.
- 1.3.30 The roundabout has been designed to ensure cyclists can access the bypass safely. Cyclists travelling eastbound or westbound along the A5 between Valley and Caergeiliog can use the existing 2.0m wide footway, which would be re-designated as a footway and cycleway to the south of the proposed roundabout.
- 1.3.31 Northbound cyclists from Valley would be able to use the bypassed section of the A5025 to travel to the point where the bypass ties back in to the existing road. A short section of shared footway and cycleway from the new turning head would be provided at the northern end of the bypassed road to connect the A5025 with the bypass.
- 1.3.32 Southbound cyclists would be able to travel on the bypass to access both Valley and Caergeiliog. From the roundabout, two sections of off-carriageway cycleway have been provided to allow cyclists heading to Valley to gain access to the cycleway to the south of the roundabout, via two splitter island crossings, to avoid cyclists having to turn right on the roundabout.

Boundary treatments

- 1.3.33 Existing vegetation and boundary features would be retained where possible. These are depicted on general arrangement plans (A5025 Off-line Highway Improvements - Section 1 - Valley Plans) (Application Reference Number: 2.7).
- 1.3.34 Where the bypass conflicts with existing walls, hedgerows, earth banks, gates and fencing, these features would be replaced on a like-for-like basis. In several locations these would comprise a combination of features, including timber-post and wire fencing, stone walls and hedgerows, providing secure new boundaries for adjacent landholdings.

- 1.3.35 New boundary features would tie into existing features. For section (A5025 Off-line Highway Improvements - Section 1 - Valley Plans) (Application Reference Number: 2.7) the majority of the boundary features consist of hedgerows comprising native species along both sides of the carriageway. A combination of fencing and walls would be provided at the roundabout.

Earthworks

- 1.3.36 Earthworks would be required to construct the bypass, as shown on detail general arrangement plans (A5025 Off-line Highway Improvements - Section 1 - Valley Plans) (Application Reference Number: 2.7).
- 1.3.37 There are two cross-sections of section 1, as shown on detail general arrangement plans (A5025 Off-line Highway Improvements - Section 1 - Valley Plans) (Application Reference Number: 2.7), that demonstrate the earthworks.
- 1.3.38 The cross sections show the 7.3m wide carriageway, with the 1m hard strip and 2.5m verge and drainage ditch on either side of the road, with boundary features such as the stockproof fencing, hedgerows or stone walls beyond.
- 1.3.39 The roundabout junction would be constructed on an embankment up to 1400mm high. There would be a small section of cutting (reduction of ground level), up to 400mm deep, between chainages 80m and 200m. The final section of the road would be on embankment (built up ground level) up to 1300mm high between chainages 200m and 630m. Both of the cross-sections show the road on this embankment. On cross-section 1B-B, the stopped up section of the road is shown, with a 2m wide cycleway.

Landscaping

- 1.3.40 Local landscape character has been a key consideration in the design of the Off-line Highway Improvements within section 1.
- 1.3.41 The design aims to integrate the A5025 Off-line Highway Improvements within section 1 into the receiving landscape and to mitigate effects on views and visually sensitive locations. Illustrative landscaping measures developed to achieve this are depicted on the Landscape Scheme included in Appendix D10-9, (Application Reference Number: 6.7.41) and are also described within chapter J1 (Application Reference Number: 6.10.1).
- 1.3.42 Where possible, existing hedgerows identified for removal would be translocated to a new position during the initial clearance of working areas. Where this would not be achievable, replacement vegetation would be provided as close as possible to its original location.
- 1.3.43 Replacement stone walls and earth banks would be constructed to match existing boundary features, using original materials where possible.
- 1.3.44 The objective of planting would be to integrate the bypass features into the local landscape and to filter views towards it. Planting would be in keeping with local landscape character, and grass verges would be seeded with a typical highway-verge seed mix. Hedgerows are likely to take five to 10 years to fully establish, whereas tree and shrub blocks would up take 15 years to establish and fully achieve their intended function.

1.3.45 The illustrative landscaping and habitat provisions within section 1 include the following measures and are described within chapter J1 (Application Reference Number: 6.10.1):

- retention of existing walls along the A5, existing A5025 and Valley cemetery;
- retention of existing hedgerows where possible;
- replacement of stone walls lost during construction;
- planting of linear belts of trees and shrubs at the new roundabout to filter views of 'stop-start' traffic from Valley and Valley cemetery, which would also provide connectivity for bat flight lines;
- intermittent planting of shrubs with occasional trees for screening (limited to reflect the character of the landscape);
- planting of hedgerow boundaries to reflect hedgerow types in the area;
- planting of both native and ornamental shrubs;
- planting of occasional extra heavy standard trees to encourage bats to fly at height over the carriageway;
- improvements to culverts to maintain connectivity for fauna; and
- ecological enhancement around the ditches to include marginal planting, shrubs, ditch-deepening and the provision of hibernacula for reptiles and amphibians.

Lighting

1.3.46 Lighting would only be provided in the vicinity of the proposed new roundabout at Valley and for a minimum of 105m (i.e., 1.5 x minimum stopping sight distance) on each of the approaches to the roundabout; see figures within A5025 Off-line Highway Improvements – Section 1 Valley Plans (Application Reference Number: 2.7). Lighting would consist of 10m high galvanised steel columns, brackets and lanterns at 30m centres and directional full cut-off lanterns.

Section 3: Llanfachraeth

Introduction

1.3.47 Section 3 is illustrated on the general arrangement plans (A5025 Off-line Highway Improvements - Section 3 - Llanfachraeth Plans) (Application Reference Number: 2.8).

1.3.48 It is proposed to provide a new section of highway to bypass Llanfachraeth village to the east. The purpose of the bypass is to avoid an increase in vehicles passing through the village, and to provide safe overtaking opportunities by improving visibility along the A5025, in order to reduce driver frustration.

- 1.3.49 The horizontal alignment has been designed to provide an additional 1.1km of overtaking in both directions along a straight central section of the bypass that runs parallel to the village.
- 1.3.50 The national speed limit (60mph) would apply along section 3.
- 1.3.51 The bypass is to be located away from the village to reduce the impact of noise and vibration post-construction. The northern section of the bypass would be constructed in a cutting to reduce noise pollution and vibration levels for Llanfachraeth village.
- 1.3.52 The design includes an overbridge to accommodate the side road that would be crossed by the bypass. Providing an overbridge instead of an at-grade junction means that vehicles using the side road avoid a potential conflict with bypass traffic, while maintaining the overtaking opportunities for those using the bypass. The overbridge would be constructed off-line of the side road to avoid disruption to the local highway network during the construction period.
- 1.3.53 The design includes an elevated viaduct structure allowing traffic to cross the Afon Alaw.

Land acquisition

- 1.3.54 The highway alignment of section 3 has been designed in a manner that minimises land acquisition required to construct and operate the bypass.
- 1.3.55 Approximately 5.4ha of land would be taken temporarily to facilitate construction of the A5025 Off-line Highway Improvements within section 3. Approximately 13.9ha of land would be taken permanently to accommodate the bypass. Although part of the Order Limits associated with section 3 fall within the designated Anglesey AONB, this land would only be used temporarily as a construction working area.

Structures

- 1.3.56 There are a total of three structures proposed for the bypass, comprising a viaduct, an overbridge and an underpass.
- 1.3.57 An elevated viaduct has been proposed to cross the Afon Alaw. The design allows cattle to cross underneath the structure adjacent to the Afon Alaw, as well as allowing space for a footpath.
- 1.3.58 The viaduct would comprise precast pre-stressed beams, a concrete deck and three piers. The maximum height of the viaduct, as shown on the long section on (A5025 Off-line Highway Improvements - Section 3 - Llanfachraeth Plans) (Application Reference Number: 2.8), has been assumed to be between 6m and 7m above existing ground level.
- 1.3.59 A proposed overbridge is required to maintain vehicular access from Llanfachraeth village to Llanfigael and Stryd y Facsen. The inclusion of a bridge crossing at the mainline bypass at chainage 1,080m would avoid the need for a junction for vehicles to access the highway at this point, which would be located within the overtaking section.

- 1.3.60 The bridge structure would require a 22m clear span across the bypass and a minimum 5.3m headroom. The maximum height of the soffit of the overbridge, as shown on general arrangement plans (A5025 Off-line Highway Improvements - Section 3 - Llanfachraeth Plans) (Application Reference Number: 2.8), has been assumed to be 5.3m above the proposed ground level. It is proposed to use precast, prestressed concrete beams to span between abutments. The abutments are proposed to be *in situ* reinforced concrete bank seat abutments with inclined wing walls.
- 1.3.61 A proposed underpass is located at chainage 1,850m and would offer access for agricultural vehicles and herding cattle. The underpass would be constructed from precast concrete box sections. The maximum height of the soffit of the underpass, as shown (A5025 Off-line Highway Improvements - Section 3 - Llanfachraeth Plans) (Application Reference Number: 2.8), has been assumed to be 1m below the proposed road level.
- 1.3.62 There would also be six culverts; three for the bypass and three for access tracks which cross land drains. These would comprise concrete pipes with precast concrete headwalls.

Drainage

- 1.3.63 Drainage plans for section 3, which follow a SuDS strategy, are shown on figures within A5025 Off-line Highway Improvements – Section 3 Llanfachraeth Plans (Application Reference Number: 2.8).
- 1.3.64 Runoff from the surface of the highway would drain to filter drains in the verge on either side of the carriageway. The filter drains would be installed with a typical minimum cover of 1.2m and would fall with the gradient of the highway. The filter drains have been designed to have the capacity to carry flows for a 1 in 1 year rainfall event and cause no flooding in a 1 in 5 year event in accordance with the relevant standards presented in the DMRB guidance [RD1].
- 1.3.65 The filter drains would discharge to three attenuation ponds (ponds A, B and C), at approximate chainages 200m, 1,200m and 1,700m, which would be positioned near to existing watercourses and provide storage and water quality treatment (through settlement).
- 1.3.66 The flow from ponds A, B, and C would discharge to the existing watercourses at restricted greenfield runoff rates of 3.5 litres per second per hectare (l/s/ha), 13l/s/ha and 3.4l/s/ha, respectively. Ponds A, B and C have been assumed to have storage capacities of 400m³, 980m³ and 400m³ respectively, and would be sized to attenuate a 1 in 100 year flood event plus a 30% allowance for the effects of climate change.
- 1.3.67 Runoff from land adjacent to the highway would be intercepted and conveyed in open channels, which would follow the general topography of the existing ground and discharge to nearby watercourses. The drainage channels would be kept separate from the highway drainage network.
- 1.3.68 The southernmost part of this section of the highway falls in a southerly direction. The filter drains serving this section (chainage 0m to 182m) would discharge to an oversized channel to the east, which flows south to north and

would be used to provide attenuation of the highway runoff to greenfield levels and treatment. A channel is proposed in this instance as the section of road discharging to the channel is relatively short and the existing ground is relatively flat. Attenuated flows from the oversized channel would eventually discharge into a watercourse to the east of the highway, approximately at chainage 130m.

- 1.3.69 Flows from the section of highway chainage (182m to 730m), where the road rises to cross the Afon Alaw, would drain to an attenuation pond to the west of the highway. This is near to the point where the highway crosses an existing small watercourse, into which attenuated flows from the pond would discharge.
- 1.3.70 As the highway passes over the Afon Alaw and its tributary, it falls in a northerly direction to a low point just to the north of the proposed overbridge on the existing road network. Additional gullies would be located at the low point to reduce the risk of water ponding on the highway. The filter drains adjacent to the carriageway from both the north and south would collect runoff flowing towards this low point, as well as any seepage flows from the cut, and would discharge to a pipe situated in the highway verge. The pipe would fall in a southerly direction back towards the Afon Alaw and discharge to an attenuation pond situated to the east of the highway (at chainage 1,150m). The pond would attenuate flows from chainage 730m to 1,730m. Kerb drains connected to the filter drains are proposed for the bridge sections of the highway.
- 1.3.71 The filter drains serving the most northerly section of highway (chainage 1,730m to 2,150m) would drain to a third attenuation pond situated to the west of the highway and to the north of a smaller watercourse, before discharging into the watercourse.
- 1.3.72 On the eastern side of the viaduct, in between Afon Alaw and its tributary, a flood compensation would be constructed. The required depth of this compensation area will be determined through further consultation with Natural Resources Wales.

Junctions and accessibility

- 1.3.73 There are two junctions with the A5025 at either end of the bypass that would provide access to Llanfachraeth village, at chainages 170m and 2,030m. Both junctions have been designed to provide adequate visibility for vehicles joining and leaving the bypass.
- 1.3.74 On the western side of the overbridge, two replacement PMAs would be provided, one to the north and one to the south of the re-aligned section of road.
- 1.3.75 An existing T-junction at chainage 2,115m would need to be slightly realigned to tie into the bypass.
- 1.3.76 The bypass would sever several land parcels under varied landownership. Through discussions with these landowners, it has been determined that access to both sides of the highway would be required, to allow for operation

of their agricultural businesses. To facilitate this, it is proposed to provide a vehicle underpass at chainage 1,850m, along the southern end of the bypass.

Non-motorised user provisions

- 1.3.77 There are currently four PRowS affected by the bypass, namely 27/012/1, 27/020/1, 27/018/1 and 49/014/2. The northernmost footpath, 27/012/1, would be permanently stopped up and diverted along a route further to the north. The southernmost footpath, 49/014/2, would be permanently diverted to tie back into the existing A5025 at the current position. A wide verge adjacent to the highway would provide pedestrians with a suitable waiting area to cross the highway, and signage would be provided to warn motorists that pedestrians may be crossing the highway at this location.
- 1.3.78 Footpath 27/018/1 would be permanently diverted 30m to the south towards Afon Alaw. A new section of footpath would be provided adjacent to the northern abutment of the viaduct over the river to enable the safe diversion of the footpath. This would avoid pedestrians having to cross the highway along the section of the bypass where overtaking in both directions would be permitted. The new footpath runs along the bottom of the embankment and connects into the existing footpath on the opposite side of the highway.
- 1.3.79 The final footpath is 27/020/1, which provides a direct link to Llanfachraeth village. As the road is close to existing ground level at this location, it is not feasible to provide a footbridge crossing at this location. Instead, an at-grade crossing is proposed to provide access across the highway, with signage to warn motorists that pedestrians may be crossing. The straighter road alignment at this location would provide pedestrians with good visibility in both directions to ensure that they can cross safely.

Boundary treatments

- 1.3.80 Existing vegetation and boundary features would be retained where possible. These are depicted on general arrangement plans (A5025 Off-line Highway Improvements - Section 3 - Llanfachraeth Plans) (Application Reference Number: 2.8).
- 1.3.81 Where the bypass conflicts with existing walls, hedgerows, earth banks, gates and fencing, these features would be replaced on a like-for-like basis. In several locations, these would comprise a combination of timber post and wire fencing, stone walls and hedgerows, to provide a secure new boundary for adjacent landholdings.
- 1.3.82 New boundary features would tie into existing features, the majority of which would comprise fencing and native species hedgerows along both sides of the carriageway.
- 1.3.83 Noise barriers would be constructed along the eastern and western side of section 3. The heights, positions, orientations and acoustic properties (e.g. reflective or absorptive) of the noise barriers will be subject to review and finalisation during the detailed design stages of the A5025 Off-line Highway Improvements. For the purposes of the environmental assessment, the noise barriers have assumed to be up to 2 m high along both sides of the road, apart

from the section on the viaduct, where the barriers have assumed to be 1 m high.

Earthworks

- 1.3.84 Earthworks would be required to construct the bypass, as shown on general arrangement plans (A5025 Off-line Highway Improvements - Section 3 - Llanfachraeth Plans) (Application Reference Number: 2.8).
- 1.3.85 There are nine cross-sections of section 3, as shown on detail general arrangement plans (A5025 Off-line Highway Improvements - Section 3 - Llanfachraeth Plans) (Application Reference Number: 2.8), that demonstrate the earthworks.
- 1.3.86 The cross sections show the 7.3m wide carriageway, with the 1m hard strip and 2.5m verge and drainage ditch on either side of the road, with boundary features such as the stockproof fencing, hedgerows or stone walls beyond. They also show two of the proposed attenuation ponds and farm tracks.
- 1.3.87 From the tie-in with the existing A5025 to section 2, the proposed vertical alignment is close to the existing ground level. The gradient rises at 2% from chainage 350m to where the road crosses a culverted watercourse. The road alignment continues to rise on an embankment approximately 7m high remaining around this elevation to allow for the proposed viaduct to cross the two watercourses. Cross-sections 3A-A to 3D-D show the road on this embankment, with the increasing depths. The embankments for the viaduct have slackened slopes with drainage ditches at the toe.
- 1.3.88 Once the road has crossed the watercourses at this height, it descends at a gradient of 2% to existing ground level at chainage 950m. The road enters a cutting, up to 4m deep, to reduce the visual impact on properties which back on to the road within Llanfachraeth. The road being in cutting along this section facilitates the inclusion of a vehicle overbridge to maintain access from Llanfachraeth to Llanfigael and Stryd y Facsen. The road is shown in this deep cutting in cross-section 3E-E. The road remains in cutting up to chainage 1,370m as the bypass runs parallel to the village. This is shown in cross-section 3F-F. It then enters another small section of cutting, up to 6m deep, between chainage 1,380m and 1,640m, as a result of the road passing through a localised 'high spot' (see cross section 3G-G). The alignment then rises on an embankment up to 2m high until chainage 2,060m, from where it remains close to the existing ground level as it ties back into the existing A5025.

Landscaping

- 1.3.89 Local landscape character has been a key consideration in the design of section 3.
- 1.3.90 A key aim of the design has been to integrate the A5025 Off-line Highway Improvements into the receiving landscape and to mitigate effects on views and visually sensitive locations. Illustrative landscaping measures developed to achieve this are depicted on the illustrative Landscape Scheme (see

Appendix G10-9, Application Reference Number: 6.7.41) and are described within chapter J1 (Application Reference Number: 6.10.1).

- 1.3.91 Where possible, existing hedgerows would be translocated to a new position during the initial clearance of working areas. Where this would not be achievable, replacement vegetation would be provided as close as possible to its original location.
- 1.3.92 Replacement stone walls and earth banks would be constructed to match existing boundary features using original materials.
- 1.3.93 Planting would be provided, the objective being to integrate the bypass features into the local landscape and to filter views towards it. Planting would be in keeping with local landscape character, and grass verges would be seeded with a typical highway-verge seed mix.
- 1.3.94 Landscaping and habitat provision in section 3 include the following measures:
- retention of existing walls and hedgerows along the existing A5025 and minor roads at junctions;
 - re-use of stone for new boundaries;
 - intermittent planting of shrubs with occasional trees for screening (limited to reflect the character of the landscape);
 - planting of shrubs at the top of cuttings to soften the appearance of the road and filter views of traffic;
 - planting of linear tree and shrub belts on embankments to screen views;
 - One in four (1:4) embankment slopes to tie in to the flat surroundings;
 - planting of hedgerow boundaries in keeping with others in the area;
 - limited tree-felling at the viaduct;
 - planting at the overbridge to encourage bats to fly at height over the carriageway;
 - inclusion of four mammal underpasses to maintain connectivity for fauna;
 - ecological enhancement around the three attenuation ponds to include marginal planting and the provision of hibernacula for reptiles and amphibians;
 - provision of an ecological mitigation area by the Afon Alaw for water voles, amphibians and reptiles, including opening up and diversification of habitat, shrub and wet woodland planting, provision of more drainage channels for burrowing opportunities and refugia/hibernacula; and
 - provision of approximately 3.5ha of replacement great crested newt habitat to the north-west of the carriageway, including marginal planting, log piles as refugia and fish management around both an existing pond and a proposed attenuation pond.

Lighting

- 1.3.95 No lighting is required for this section of the scheme, for road safety purposes.

Section 5: Llanfaethlu

Introduction

- 1.3.96 Section 5 is illustrated on the general arrangement plans (A5025 Off-line Highway Improvements - Section 5 - Llanfaethlu Plans) (Application Reference Number: 2.9).
- 1.3.97 At Llanfaethlu, a bypass is proposed to provide a straighter section of road, where there are two existing substandard bends near the Black Lion public house and through Llanfaethlu village. The proposed improvements would also reduce through traffic from passing the new school at Llanfaethlu, scheduled to open in 2017.
- 1.3.98 The speed limit for section 5 would be 40mph from immediately south of the Llanfaethlu junction northwards. The speed limit for the remainder of section 5 would be the national speed limit (60mph).
- 1.3.99 A new footpath would be provided to the west of the highway to allow pedestrians to access Llanfaethlu village from the properties to the north of the bypass. A safe crossing point would be provided across the A5025, as an improvement on the existing conditions, which currently provide no provisions for pedestrians.

Land acquisition

- 1.3.100 The highway alignment of section 5 has been designed in a manner that minimises land acquisition required to construct and operate the bypass.
- 1.3.101 Approximately 3.1ha of land would be taken temporarily to facilitate construction of the Off-line Highway Improvements. Approximately 7.2ha of land would be taken permanently to accommodate the bypass.

Structures

- 1.3.102 A cattle underpass would be provided at chainage 390m. It would be constructed from precast concrete box sections. The maximum height of the soffit of the underpass, as shown (A5025 Off-line Highway Improvements - Section 5 - Llanfaethlu Plans) (Application Reference Number: 2.9), has been assumed to be 1m below the proposed road level.

Drainage

- 1.3.103 Drainage plans for section 5, which follow a SuDS strategy, are shown on figures within in A5025 Off-line Highway Improvements – Section 5 Llanfaethlu Plans (Application Reference Number: 2.9).
- 1.3.104 Runoff from the surface of the highway would drain to filter drains in the verge either side of the carriageway. These would typically be installed with a minimum cover of 1.2m and would fall with the gradient of the highway. The filter drains would be designed to have the capacity to carry flows for a 1 in 1 year rainfall event and cause no flooding up to a 1 in 5 year event in accordance with relevant standards in the DMRB guidance [RD1].

- 1.3.105 The filter drains would discharge to three new attenuation ponds (ponds A, B and C), positioned near to existing watercourses and providing storage and water quality treatment (through settlement).
- 1.3.106 Ponds A, B and C would discharge to the existing watercourses at restricted greenfield runoff rates of 1.7l/s/ha, 4.8l/s/ha and 5.6l/s/ha, respectively. Ponds A, B and C have been assumed to have storage capacities of 175m³, 400m³ and 390m³ respectively, and would be sized to attenuate for a 1 in 100 year flood event plus a 30% allowance for the effects of climate change.
- 1.3.107 Runoff from land adjacent to the highway would be intercepted and conveyed in open channels, which would follow the general topography of the existing ground and discharge to nearby watercourses. The drainage channels would be kept separate from the highway drainage network.
- 1.3.108 The southernmost section of the highway falls in a northerly direction. The filter drains serving this section are situated in the verge up to the point where the proposed cattle underpass crosses the road (chainage 390m). At this point the drainage passes to a carrier drain (buried pipe) situated to the east of the carriageway, which discharges directly to attenuation pond A in the area bounded by the new and existing road and the Black Lion public house access road. The attenuation pond discharges to a carrier drain, which ultimately discharges into an existing drainage channel further east. The existing drainage channel may need to be upgraded to accommodate the additional flows from the highway. This would be confirmed at detailed design stage.
- 1.3.109 To the north of the underpass, the highway continues to fall to a low point at chainage 520m. At this point, the filter drains discharge to a carrier drain, which then discharges to attenuation pond B situated further to the west of the highway, adjacent to the watercourse in which it discharges.
- 1.3.110 The filter drains serving the northernmost section of the highway (chainage 910m to 1,080m) flow to the north. At the northern end of the highway, a carrier drain conveys the road runoff across the highway and into attenuation pond C to the east of the highway. Attenuated flows from pond C discharge to the same watercourse, to which pond A discharges.

Junctions and accessibility

- 1.3.111 There are two junctions proposed as part of the Llanfaethlu bypass, to maintain access to the properties near the Black Lion public house and the village itself. The junction providing access to the Black Lion public house is located at chainage 265m and would be a simple major/minor priority junction. For the second junction, a ghost island has been included to prevent queuing traffic on the southbound carriageway of the bypass.
- 1.3.112 Several PMAs are to be provided to maintain access to private land on either side of the bypass. Access to the residential property at the southern end of the bypass would be maintained in its current position, with measures to improve visibility due to the change in road alignment.
- 1.3.113 Access to the Soar Addoldy y Bedyddwyr Church would be from the southern side road; vehicles from the church would be able to re-join the A5025 via the improved highway junction. The Black Lion public house and neighbouring

residential properties would also be accessed from the side road, which would utilise the existing carriageway in this area where possible.

- 1.3.114 At the point where the proposed bypass ties back into the existing A5025, approximately at chainage 470m, there is an existing farm access that would be maintained in its current position. There is also a field access gate opposite this track that would be affected by the works. It is therefore proposed to provide a cattle underpass beneath the proposed road at chainage 390m to maintain access to the landowner's fields on either side of the highway. The inclusion of this underpass allows for safer cattle movements, as access to the highway would not be required. A series of farm access tracks would be provided on either side of the underpass to maintain access to all fields under the ownership of the landowner.
- 1.3.115 An existing farm access at chainage 580m would be retained in its current position. Access to Tyn-y-bryn farm would be provided from the side road to Llanfaethlu village and would re-use a section of the carriageway from the existing A5025.
- 1.3.116 Following discussions with the landowner, a new agricultural access directly to the A5025 would be provided at chainage 840m to allow for vehicular transportation of cattle along the bypass. Due to the alignment being in cutting at this location, this access track is required to ramp down to the proposed road level. Verges are required to be widened in this area to accommodate a 2.4m by 160m visibility splay for vehicles emerging from this new access.
- 1.3.117 All accesses to the residential properties at the northern end of the bypass would be retained in their current positions directly from the realigned A5025.

Non-motorised user provisions

- 1.3.118 Two PRowS, namely 29/013/1 and 29/009/1, terminate at the side of the existing A5025 along the section of the bypass at chainages 480m and 580m. As the proposed alignment follows the existing A5025 alignment in this area, the PRow would be maintained in their current positions and signage would be provided to warn vehicles of pedestrians crossing the highway in these areas. The wide verge to the west of the highway can provide a suitable link between these public footpaths.
- 1.3.119 A new footpath would be provided to the west of the highway to allow pedestrians to access Llanfaethlu village from the properties to the north of the bypass. A safe crossing point would be provided across the A5025; this would represent an improvement on the existing situation, as there are currently no pedestrian provisions.
- 1.3.120 Cyclists would be able to gain access to the bypass safely via the new junctions to the Black Lion public house and Llanfaethlu village.

Boundary treatments

- 1.3.121 Existing vegetation and boundary features would be retained where possible. These are depicted on general arrangement plans (A5025 Off-line Highway Improvements - Section 5 - Llanfaethlu Plans) (Application Reference Number: 2.9).

- 1.3.122 Where the bypass conflicts with existing walls, hedgerows, earth banks, gates and fencing, these features would be replaced on a like-for-like basis. In several locations, this would comprise a combination of features, including timber post and wire fencing, stone walls and hedgerows, to provide secure new boundaries for adjacent landholdings.
- 1.3.123 New boundary features would tie into existing features, the majority of which would comprise fencing, walls and retention of existing features.

Earthworks

- 1.3.124 Earthworks would be required to construct the bypass, as shown on general arrangement plans (A5025 Off-line Highway Improvements - Section 5 - Llanfaethlu Plans) (Application Reference Number: 2.9).
- 1.3.125 There are four cross-sections of section 5, as shown on detail general arrangement plans (A5025 Off-line Highway Improvements - Section 5 - Llanfaethlu Plans) (Application Reference Number: 2.9), that demonstrate the earthworks.
- 1.3.126 The cross sections show the 7.3m wide carriageway, with the 1m hard strip and 2.5m verge and drainage ditch on either side of the road, with boundary features such as the stockproof fencing, hedgerows or stone walls beyond. They also show one of the proposed attenuation ponds and farm tracks.
- 1.3.127 To provide a better cut and fill material balance, and taking account of the topography, it is proposed to align the road on embankment around the Black Lion bend (up to 3m high). The road is shown on embankments ranging between 2m and 3m in height on cross-sections 5 A-A to 5C-C. The alignment would then go into a cutting, (up to 3m deep), as it passes Llanfaethlu village, which would reduce noise and visual impacts in this area. The road in the deep cutting is shown on cross-section 5 D-D.
- 1.3.128 The road would also be on an embankment on the approach to the side road junction to access Llanfaethlu village (up to 3m high). Beyond this point, it goes into a 500m length of cutting, up to approximately 3.5m deep.

Landscaping

- 1.3.129 A key consideration in the design of section 5 has been its integration into the receiving landscape, to mitigate effects on views and visually sensitive locations. Landscaping measures developed to achieve this are depicted on the illustrative Landscape Scheme (see appendix G10-9, Application Reference Number: 6.7.41) and are described within chapter J1 (Application Reference Number: 6.10.1).
- 1.3.130 Where possible, hedgerows identified for removal would be translocated to a new position during the initial clearance of working areas. Where this would not be achievable, replacement vegetation would be provided as close as possible to its original location.
- 1.3.131 Replacement stone walls and earth banks would be constructed to match existing boundary features using original materials.

1.3.132 Planting would be provided, the objective of which would be to integrate the bypass features into the local landscape and to filter views towards it. Planting would be in keeping with local landscape character, with grass verges seeded with a typical highway-verge seed mix.

1.3.133 Landscaping and habitat provision in section 5 include the following measures:

- re-use of stone;
- intermittent planting of shrubs for screening (limited to reflect the character of the Anglesey landscape);
- slackening of embankment slopes to better integrate earthworks into the surrounding agricultural land profiles;
- planting of hedgerow boundaries in keeping with others in the area;
- limited tree-felling at the northern end;
- inclusion of mammal underpasses to maintain connectivity for fauna;
- rebuilding of a collapsed limekiln to benefit bats, birds, reptiles and amphibia;
- provision of attenuation ponds with marginal planting and refugia/hibernacula for reptiles and amphibia; and
- provision of approximately 1.8ha of replacement great crested newt habitat including grassland seeding, shrub planting, log piles for refugia and new ponds.

Lighting

1.3.134 No lighting is proposed within section 5.

Section 7: Cefn Coch

Introduction

1.3.135 Section 7 is illustrated on the general arrangement plans (A5025 Off-line Highway Improvements - Section 7 - Cefn Coch Plans) (Application Reference Number: 2.10).

1.3.136 The Cefn Coch bypass is proposed to provide a straighter section of road, replacing two existing substandard bends in Llanrhwydrus.

1.3.137 Constructing a bypass at Cefn Coch would involve stopping up the road leading to Llanfechell to the east of the proposed bypass and removing the existing staggered cross-roads along the A5025 between Llanrhwydrus and Llanfechell. This would reduce the risk of collision associated with slow-moving vehicles manoeuvring between the two junctions.

1.3.138 The design includes an accommodation overbridge approximately halfway along the bypass to facilitate the safe movement of cattle.

1.3.139 The proposed bypass is a very straight horizontal alignment that bypasses the existing A5025 to the west. From the southern end tie-in with the existing A5025, the route follows a relatively straight alignment, bending slightly toward

the existing A5025 for approximately 530m to approximately 20m north of the proposed junction to the existing highway to the west. It follows a straight alignment for a short stretch and then bends away from the existing road. The alignment then ties back in to the existing A5025 on a curve approximately 20m north of the private access at the northern end of the bypass.

1.3.140 The speed limit would be the national speed limit (60mph).

Land acquisition

1.3.141 The highway alignment has been designed in a manner that minimises land acquisition required to construct and operate the bypass.

1.3.142 Approximately 2.7ha of land would be taken temporarily to facilitate construction, and approximately 6.6ha of land would be taken permanently to accommodate the bypass.

Structures

1.3.143 Access is to be maintained to private land on both sides of the highway and, in order to allow the existing agricultural land to function as at present, an underpass and accommodation vehicle overbridge are required to cross the bypass.

1.3.144 An underpass is proposed to be constructed from precast concrete box sections. Wing walls would be used to provide a clear opening in the embankment. A longitudinal gradient would be applied across the underpass to facilitate two perforated pipe carrier drains. The maximum height of the soffit of the underpass, as shown (A5025 Off-line Highway Improvements - Section 7 - Cefn Coch Plans) (Application Reference Number: 2.10), has been assumed to be 1m below the proposed road level.

1.3.145 The accommodation bridge would maintain agricultural vehicular access across the proposed bypass in a location where the alignment is approximately 3m below existing ground level. The bridge is only to be used by the land owner to maintain current access rights and would not be accessible to the public. The approach to the bridge from the east would be close to existing ground levels and, on the western approach, an embankment would be required to ramp up. As the bridge is for private use, the ramped gradients can be steeper than would be permitted for a public highway.

1.3.146 The bridge structure would require a minimum 21m clear span across the bypass. It is proposed that precast, prestressed concrete beams would be used to span between abutments. The abutments would comprise *in situ* reinforced concrete bank seats with inclined wing walls. A minimum headroom of 5.3m would be required above the mainline bypass, and bridge parapets would be designed to accommodate the vehicles using the bridge. The maximum height of the soffit of the overbridge, as shown on general arrangement plans (A5025 Off-line Highway Improvements - Section 7 - Cefn Coch Plans) (Application Reference Number: 2.10), has been assumed to be 5.3m above the proposed ground level.

1.3.147 Two culverts would be required where the road and an access track would cross a watercourse.

Drainage

- 1.3.148 Drainage plans for section 7, which follows a SuDS strategy, are shown on figures within A5025 Off-line Highway Improvements – Section 7 Cefn Coch Plans (Application Reference Number: 2.10).
- 1.3.149 Runoff from the surface of the highway would be captured by filter drains situated in the verge either side of the carriageway. These would typically be installed with a minimum cover of 1.2m and would fall with the gradient of the highway. The filter drains would be designed with a capacity to carry flows for a 1 in 1 year rainfall event and cause no flooding up to a 1 in 5 year event in accordance with the relevant designs standards within the DMRB guidance [RD1].
- 1.3.150 The filter drains would discharge to three attenuation ponds, (ponds A, B and C) positioned near to existing watercourses and providing storage and water quality treatment (through settlement).
- 1.3.151 Flows from ponds A, B and C would discharge to the existing watercourses at restricted greenfield runoff rates of 2.7l/s/ha, 7.6l/s/ha and 2.1l/s/ha, respectively. Ponds A, B and C have assumed to have storage capacities of 451m³, 1123m³ and 373m³ respectively, and would be sized to accommodate a 1 in 100 year flood event plus a 30% allowance for the effects of climate change.
- 1.3.152 Runoff from land adjacent to the highway would be intercepted and conveyed in open channels, which would follow the existing topography and discharge to nearby watercourses. The drainage channels would be kept separate from the highway drainage network.
- 1.3.153 The southernmost section of the highway falls steeply in a northerly direction to a crossing of a tributary of the Afon Rhiw (chainage 400m). The filter drains serving this section of highway are situated in the verge up to the point where a proposed underpass crosses the road at chainage 120m. At this point, the drainage passes to a carrier drain situated to the west of the carriageway. The carrier drain and filter drains to the north of the underpass discharge to attenuation pond A, situated to the west of carriageway, just south of the tributary crossing.
- 1.3.154 Immediately to the north of the tributary crossing, land drainage from the embankment would be collected by oversized open channels on the western side of the highway (chainage 400m to 540m). The channels would provide attenuation and treatment of runoff before discharging directly to the tributary at chainage 400m.
- 1.3.155 Runoff from the section of highway between chainage (400m and 1080m) would drain towards a low point on the highway at chainage 900m. A carrier drain across the highway at this point would collect the runoff from the filter drains and discharge to attenuation Pond B to the west of the highway. Attenuated flows from the pond would discharge to the Afon Rhiw to the west.
- 1.3.156 The filter drains serving the most northerly section of highway (chainage 1080m to 1,310m) fall to the north. At the northern end of the highway, the filter drains would discharge to an open channel to the west, which flows in a

southerly direction and discharges to attenuation Pond C. This pond also discharges to the Afon Rhiw.

Junctions and accessibility

- 1.3.157 There are three new highway junctions proposed as part of the bypass to connect in to the existing highway network. One existing junction would be stopped up. As traffic flows using these junctions are anticipated to be low, simple T-junctions are proposed.
- 1.3.158 The southernmost junction is to be located at chainage 160m, close to existing ground level. The central junction, located at chainage 600m, connects to the mainline carriageway on embankment. The northernmost junction is to be located at chainage 1,100m on embankment, with an approach gradient of 6.0% due to the deep cutting at this point.
- 1.3.159 The highway junction at the crossroads along the existing A5025 is to be stopped up to facilitate the deep cutting of the proposed alignment through this section.
- 1.3.160 A number of PMAs would be affected by the proposed bypass and these would be replaced or improved as part of the works. The existing farm access at the southern end of the bypass would be widened to facilitate the turning movements of large HGVs and provide an improved visibility splay for vehicles emerging from the farm. In addition, it has been agreed with the landowner that an additional ramped field access would be provided opposite the improved farm access to provide a direct entrance to this area.
- 1.3.161 A cattle underpass would be provided at chainage 110m to enable the landowner at the southern end of the bypass to access his agricultural land, which would be bisected by the new section of highway, without having to enter it.
- 1.3.162 Access to the parcel of land that would accommodate attenuation pond A would be provided from a small ramp to the highway junction at chainage 600m. Access to the mainline bypass is from the side road junction would reduce the numbers of locations that vehicles would need to slow down to exit the bypass. Access to the land accommodating the other two attenuation ponds is to be provided by an overbridge from the existing A5025 at chainage 1,000m. This is required due to the deep cutting that the alignment follows in this area and would facilitate the vehicle turning movements of a tractor and trailer. Direct access from the highway would be provided to allow the IACC to maintain all attenuation ponds.
- 1.3.163 The existing farm access at the northern end of the bypass would be retained in its current position and would be widened as necessary to allow easier access for large agricultural vehicles.

Non-motorised user provisions

- 1.3.164 Only one PRoW, namely 18/018/1, which crosses the alignment at chainage 540m, would be affected by the proposed works. Discussions with the IACC have indicated that this is a historical footpath which is rarely used and,

therefore, it is proposed to permanently stop it up and divert it along a new route to the north, along the existing A5025 and across the new bypass.

- 1.3.165 The proposed highway junctions can be used by cyclists to safely access the bypass if required, however, the reduced traffic on the existing A5025 should make this road a more attractive route to cyclists.

Boundary treatments

- 1.3.166 Existing vegetation and boundary features would be retained where possible. These are depicted on (A5025 Off-line Highway Improvements - Section 7 - Cefn Coch Plans) (Application Reference Number: 2.10).
- 1.3.167 Where the bypass conflicts with existing walls, hedgerows, earth banks, gates and fencing, these features would be replaced on a like-for-like basis. In several locations, this would comprise a combination of features, including timber post and wire fencing, stone walls and hedgerows to provide secure new boundaries for adjacent landholdings.
- 1.3.168 New boundary features would tie into existing features, and would comprise a combination of fences, walls and hedgerows.

Earthworks

- 1.3.169 Earthworks would be required to construct the bypass, as shown on (A5025 Off-line Highway Improvements - Section 7 - Cefn Coch Plans) (Application Reference Number: 2.10).
- 1.3.170 There are three cross-sections of section 7, as shown on detail general arrangement plans (A5025 Off-line Highway Improvements - Section 7 - Cefn Coch Plans) (Application Reference Number: 2.10), that demonstrate the earthworks.
- 1.3.171 The cross sections show the 7.3m wide carriageway, with the 1m hard strip and 2.5m verge and drainage ditch on either side of the road, with boundary features such as the stockproof fencing, hedgerows or stone walls beyond. They also show two of the proposed attenuation ponds and farm tracks.
- 1.3.172 The vertical alignment has been designed to allow a cut-fill balance along the bypass and provide safer junctions to access the highway, in accordance with current design standards.
- 1.3.173 The vertical alignment would be similar to the existing road at the southern tie-in with the existing A5025. The road ascends on embankment, up to 3m high, to allow for the underpass and watercourse culvert, to chainage 550m. The road is shown on this embankment on cross-section 7A-A. The bypass then descends to a deep cutting, up to about 3.5m below existing ground level, (see cross-section 7B-B), before gradually rising again, with the depth of cutting reducing to a point where the alignment transfers back on to embankment about 40m south of the proposed northern junction with the existing A5025, (see cross-section 7C-C). At this point, only the west side of the highway is on embankment, with the east side in cutting due to the existing topography. North of the junction, the alignment descends to the tie-in with the existing alignment.

Landscaping

- 1.3.174 A key consideration in the design of section 7 has been its integration into the receiving landscape, to mitigate effects on views and visually sensitive locations. Landscaping measures developed to achieve this are depicted on the illustrative Landscape Scheme drawings for section 7 (see appendix G10-9, Application Reference Number: 6.7.41) and are described within chapter J1 (Application Reference Number: 6.10.1).
- 1.3.175 Where possible, hedgerows identified for removal would be translocated to a new position during the initial clearance of working areas. Where this would not be achievable, replacement vegetation would be provided as close as possible to its original location.
- 1.3.176 Replacement stone walls and earth banks would be constructed to match existing boundary features, using original materials where possible.
- 1.3.177 Planting would be provided, the objective of which would be to integrate the bypass features into the local landscape and to filter views towards it. Planting would be in keeping with local landscape character, with grass verges seeded with a typical highway-verge seed mix.
- 1.3.178 Landscaping and habitat provision in section 7 include the following measures:
- retention of existing walls along the A5025;
 - retention of existing hedgerows where possible;
 - replacement of stone walls lost during construction;
 - intermittent planting of shrubs with occasional trees for screening (limited to reflect the character of the landscape);
 - shrub planting on embankments to soften the appearance of the road;
 - limited tree clearance at the northern end;
 - planting of hedgerow boundaries in keeping with others in the area;
 - provision of underpasses to maintain connectivity for fauna; and
 - ecological enhancement around the ditches to include marginal planting, shrubs, ditch-deepening and the provision of hibernacula for reptiles and amphibians.

Lighting

- 1.3.179 No lighting is proposed within this section.

Power Station Access Road Junction

Introduction

- 1.3.180 The proposed new junction would link the Power Station Access Road to the A5025 north of Cefn Coch at the tie-in of On-line section 8. The existing A5025 would require a slight realignment in order to accommodate the new roundabout junction.

1.3.181 The proposed three-arm roundabout would be constructed off-line from the A5025 to link the A5025 with the Power Station Access Road. The proposed general arrangement plan of the Power Station Access Road Junction is shown within the Power Station Site Plans (Application Reference Number: 2.6.1).

Land acquisition

1.3.182 The Power Station Access Road Junction has been designed in a manner that minimises land acquisition required to construct and operate the junction.

1.3.183 Approximately 2.7ha of land would be taken temporarily to facilitate construction of the Power Station Access Road Junction, and approximately 0.9ha of land would be taken permanently.

Structures

1.3.184 No structures are required for the Power Station Access Road Junction.

Drainage

1.3.185 The outline drainage design for the Power Station Access Road Junction, which follows a SuDS strategy, is shown in the Power Station Site Plans (Application Reference Number: 2.6.1).

Junctions and accessibility

1.3.186 The improvements comprise a junction at this location. Two field accesses to the west of the junction would be retained.

Non-motorised user provisions

1.3.187 The Wales Coast Path would require a permanent diversion in order to construct the Power Station. This diversion route would require a section of the Wales Coast Path to navigate across the Power Station Access Road Junction roundabout as part of the route. The roundabout design includes shared use footway/cycleway provision to enable safe crossing for walkers.

Boundary treatments

1.3.188 Existing vegetation and boundary features would be retained where possible. These are depicted in the Power Station Site Plans (Application Reference Number: 2.6.1).

1.3.189 New boundary features would tie into existing features. At the junction, boundary features are to be retained and walls constructed.

Earthworks

1.3.190 Earthworks would be required to construct the junction, as shown on the Power Station Site Plans (Application Reference Number: 2.6.1).

1.3.191 There are three cross-sections of Power Station Access Road Junction, as shown on general arrangement plans within the Power Station Site Plans (Application Reference Number: 2.6.1), that illustrate the earthworks.

1.3.192 The cross sections show the 7.3m wide carriageway, with the verge on either side of the road, with boundary features such as the stockproof fencing, hedgerows or stone walls beyond. They also show the proposed cycleway, the proposed farm access track and the section of the existing A5025 to be broken out.

1.3.193 The 45m diameter roundabout is to be constructed on a slight embankment approximately 0.5m high, as shown on cross-sections 9B-B and 9C-C, for the western and northern arms. In cross-section 9A-A, the southern arm and tie-in to the existing A5025 would be in slight cutting (up to 0.4m deep).

Landscaping

1.3.194 A key consideration in the design of the junction has been its integration into the receiving landscape, to mitigate effects on views and visually sensitive locations. Landscaping measures developed to achieve this are depicted on the illustrative Landscape Scheme drawing (see Appendix G10-9, Application Reference Number: 6.7.41) and are described within chapter J1 (Application Reference Number: 6.10.1).

1.3.195 Planting would be provided, the objective of which would be to integrate the bypass features into the local landscape and to filter views towards it. Planting would be in keeping with local landscape character, with grass verges seeded with a typical highway-verge seed mix.

1.3.196 Landscaping and habitat provision at the Power Station Access Road Junction include the following measures:

- retention of existing boundary features;
- provision of walls; and
- intermittent planting of shrubs with occasional trees for screening (limited to reflect the character of the landscape).

Lighting

1.3.197 Lighting would be provided in the vicinity of the proposed new roundabout for a minimum of 105m (i.e. 1.5 x minimum stopping sight distance) on each of the approaches to the roundabout and on the roundabout itself. Lighting would consist of 10m high galvanised steel columns, brackets and lanterns at 30m centres.

1.4 Rochdale Envelope and parameters

- 1.4.1 A description of the Rochdale Envelope and parameter approach is provided in chapter B1 (introduction to the assessment process) (Application Reference Number: 6.2.1).
- 1.4.2 In order to cope with inevitable change through the design development processes, Horizon has proposed a parameter approach for the application for development consent of the A5025 Off-line Highway Improvements, rather than a defined design. These parameters or limits of deviation provide flexibility to accommodate a reasonable level of change, and would be set by the development consent requirements, in order to keep the development within the defined envelope.
- 1.4.3 The parameters are contained within the following:
- **Order Limits** – these define the areas within which the authorised development may be constructed, operated and maintained under article 3 of the draft Development Consent Order. The Order Limits are illustrated on the drawings listed below.
 - **Works Plans** (Application Reference Number: 2.3) – these identify the limits of deviation for, and location of, each work package (or ‘work area’) under Schedule 1 (authorised development) (also referred to as ‘schedule of works’), as referred to in article 4 of the draft Development Consent Order (limits of deviation). The four individual sections of the A5025 Off-line Highway Improvements each comprise one work area (Work No. 8, 9, 10, 11) as shown in drawings (Work Plans) (Application Reference Number: 2.3).
 - **Schedule of works** – this outlines what works could theoretically take place within each works area, as identified on the Works Plans. The schedule of works for the A5025 Off-line Highway Improvements are presented in table G1-1. The Power Station Access Road Junction is included in the work package 1J, which forms part of the works for the Power Station development (Application Reference Number: 2.6.1). This junction has been assessed as part of the A5025 Off-line Highway Improvements.

Table G1-1 Schedule of works for the A5025 Off-line Highway Improvements

Section	Work Package (work area)	Description of works
Section 1 – Valley	8	New four-arm roundabout and 1.06km bypass connecting the A5 with the A5025 to the east of the existing A5/A5025 signalised junction.
Section 3 – Llanfachraeth	9A	A new 2.28km highway to provide a bypass to the east of Llanfachraeth village and an elevated viaduct.

Section	Work Package (work area)	Description of works
	9B	An over-bridge to accommodate an existing side road.
Section 5 – Llanfaethlu	10	A new 1.43km bypass.
Section 7 – Cefn Coch	11	A new 1.3km bypass.
Power Station Access Road Junction	1J	A new access road and roundabout connecting to the A5025.

- 1.4.4 Horizon has proposed a limits of deviation approach for the construction of the A5025 Off-line Highway Improvements. These limits comprise a 3m lateral deviation either side of the centre line of the road alignment as shown on the Works Plans, and a maximum vertical deviation of 0.5m from the levels shown on the work package plans (Work Plans) (Application Reference Number: 2.3). These limits of deviation fall within the Works Plan areas and have therefore been taken into account in identifying a worst case assessment.

1.5 Development phases and activities

- 1.5.1 The assumed construction activities and associated plant, and the durations and timescales for these activities for each section, have been considered under the separate headings below. The overall assumed construction programme for the four sections and the Power Station Access Road Junction is eighteen months, although some sections have been assumed to have a shorter duration. The predicted volumes of materials associated with construction of the A5025 Off-line Highway Improvements have also been identified.

Section 1: Valley

Construction methodology and timeline

Summary of key activities

- 1.5.2 Construction would involve the following activities in section 1:
- site mobilisation and formation of a temporary Construction Compound;
 - setting out of the rolling traffic management;
 - temporary diversion or closure of existing PRoWs;
 - site clearance of vegetation, topsoil and field boundaries;
 - reinstatement and/or replacement of boundary features;
 - installation of highway drainage infrastructure and formation of swales;
 - works to create or improve kerbs, footways and cycleways, parking arrangements and PMAs;

- earthworks;
 - carriageway construction;
 - landscaping and seeding;
 - installation of signage and road markings; and
 - inspection operations and handover to the highway authority (the IACC) for operation and maintenance.
- 1.5.3 A number of existing utilities, such as buried telecommunications infrastructure, would need to be diverted and/or protected prior to the commencement of the above activities, at the point where the new section of off-line highway would tie into the existing A5025. Such works would be undertaken by contractors appointed by the relevant statutory undertaker(s).

Programme

- 1.5.4 The full construction programme for the A5025 Off-line Highway Improvements would be approximately 18 months. Sections 1, 3, 5 and 7 and the Power Station Access Road Junction would be constructed in parallel.
- 1.5.5 Section 1 at Valley would take approximately 12 months to construct. The core construction activities and their proposed durations are summarised in table G1-2.

Table G1-2 Construction activities and approximate durations for section 1

Construction Activity	Duration
Enabling works, temporary site compound set up (topsoil strip) and erection of boundary fence	One month
Earthworks (cut and fill)	Four months
Earthworks (formation works)	Three months
Road surfacing	Four months
Break up and remove existing road surface at tie-ins	One month

- 1.5.6 It is assumed that construction work would be undertaken between the hours of 07:00 and 18:00 Monday to Friday, and between 07:00 and 13:00 on Saturday. There would be some occasions when activities would run on later into the evening, for example to complete a concrete pour. Permission would be sought from the IACC for such activities, especially noisy activities such as use of a pecker to break up the road surface, where that would require later working hours. There would be noise management as part of the construction works, as outlined in the Wylfa Newydd CoCP (Application Reference Number: 8.6) and A5025 Off-line Highway Improvements sub-CoCP (Application Reference Number: 8.12).

Works phasing and traffic management

- 1.5.7 Construction works within section 1 would be undertaken in progressive segments along the route, i.e. activities would be undertaken in defined working areas, progressing along the carriageway as the works are implemented.
- 1.5.8 Working areas adjacent to existing roads would be controlled using temporary traffic management measures, using a combination of signal-controlled traffic lights, stop-go boards, single-lane running, cones and fencing.
- 1.5.9 Temporary traffic signals for one-way operation would be required during the tie-in works at the interfaces between the off-line sections and the existing A5025. Each tie-in would take approximately one month.
- 1.5.10 The Wylfa Newydd CoCP (Application Reference Number: 8.6) and A5025 Off-line Highway Improvements sub-CoCP (Application Reference Number: 8.12) include a delivery window for construction materials on the A5025. This delivery window would run from 07:00 to 19:00, Monday to Friday, with restrictions during school start times (between 08:00 and 09:00) and end times (between 15:00 and 16:00). It is anticipated that deliveries may occasionally be undertaken outside of these times, but they would be limited whenever practicable.

Workforce

- 1.5.11 The construction workforce for the A5025 Off-line Highway Improvements would consist of a maximum of 211 workers at any one time. See chapter C1 (socio-economics) (Application Reference Number: 6.3.1) for further information.

Working areas, materials storage and parking

- 1.5.12 Areas of temporary land acquisition have been allowed for within the Order Limits to provide space to undertake initial site clearance activities; provide safe working areas for construction; provide temporary parking areas; and to temporarily store materials prior to disposal or reuse.
- 1.5.13 A 3m wide strip of land would be provided within section 1 beyond the areas where permanent land acquisition is required. This area would be used to provide access to construct and establish boundary treatments such as fencing and stone walls. No heavy plant or machinery would be used within this strip, in order to avoid unnecessary compaction of unstripped soils. Soil protection measures would be implemented as required in these locations, as outlined in the Wylfa Newydd CoCP (Application Reference Number: 8.6).
- 1.5.14 Waste materials generated through general site clearance activities, such as vegetation and spoil, would be transported to temporary storage areas, prior to removal off-site by road wagon for disposal or for re-use in the landscape area and as back fill material.
- 1.5.15 A total of 60 parking bays have been included in the design of the compound. These would be used by the contractor's office-based staff and the site team. Construction workers would be encouraged to car-share and, where

practicable, minibuses would be made available to those travelling from their residential accommodation and the compound.

- 1.5.16 The compound would be accessed from the existing A5025 and no access roads would be required. Working areas would be accessed from the compound a via haul road running parallel to the full length of the new sections of road. Surfacing of the compound would be made up of crushed stone (type 1). It is assumed that 50% of the haul routes would consist of existing ground and 50% would be made up of crushed stone (type 1). The haul routes are expected to be 4m wide.
- 1.5.17 The compound, see figure G1-1 (Application Reference Number: 6.7.48) would be located at the northern end of section 1, adjacent to the eastern boundary of the bypass. It would be approximately 250m long and up to 25m wide and would comprise site welfare facilities, a plant store and a materials store. In the plant store area, a re-fuelling point consisting of a diesel fuel tank within appropriate bunding would be provided. In the material storage area, in addition to the materials imported to construct the road, there would also be waste skips for segregated waste and a lockable container for chemical containers.
- 1.5.18 Temporary lighting would be required within the compound, assumed to be on columns <5.0m high or fixed to the mobile office walls. Lighting would be used for construction activities where late working is occasionally unavoidable, for example during a long concrete pour. However, the vast majority of the works would be carried out in daylight for health and safety and environmental reasons (to avoid disturbance).
- 1.5.19 The compound would have wire mesh boundary fencing, approximately 2m high. Hoarding or close boarded fencing would only be considered for mitigation of construction noise, dust and visual effects identified by the assessment.
- 1.5.20 Potable water would be supplied from the Dŵr Cymru Welsh Water main along the existing A5025. Foul sewage is to be captured in a buried cesspit and periodically removed from site in a tanker. Electricity for heating and lighting would be supplied from a silenced 40kVA diesel generator.
- 1.5.21 The compound would comprise porous hardstanding (using type 1) which would drain directly to ground. The compound would not be constructed within 15m of a watercourse.
- 1.5.22 The volume of fuel stored at the compound would be between 10,000 litres and 20,000 litres, within a double bunded tank on concrete hardstanding, with vehicle damage protection and integrated drainage. Drainage would pass through an oil and water interceptor prior to discharge to either a soakaway or watercourse (if present). There would not be any refuelling outside of this area.
- 1.5.23 The main waste produced at the compound would be domestic waste. Office waste would be recycled in the same manner as household waste. Accordingly, paper, cardboard, plastics, metal and glass would be separated and collected by the IACC waste collection service.

1.5.24 Once construction of section 1 is complete, the compound area would be reinstated and handed back to the landowner for its former agricultural use.

Diversions and closures

1.5.25 One PRow, 49/016/2, would be directly affected by the works in section 1. This PRow would either be temporarily closed or diverted during construction for short periods of time.

1.5.26 The footway along the southern side of A5 would be kept open during the construction works. NCN Route 5 and NCN Route 566 would also be kept open during construction works.

1.5.27 Where existing walls and fences are intersected by the proposed new road, these would be reinstated and tied into the new road boundary fence. Stone walls would be finished by hand using existing materials selected from the surplus stockpiles. New highway fences would be securely connected to existing fences and, where pedestrian, cattle or vehicular access is required, suitable timber or metal gates would be installed. These details are shown on figures within A5025 Off-line Highway Improvements - Section 1 - Valley Plans (Application Reference Number: 2.7).

Plant, equipment and machinery

1.5.28 Construction within section 1 is likely to involve the use of the plant, equipment and machinery listed in table G1-3; information regarding power and weight is taken from BS5228 part 1 [RD2].

Table G1-3 Likely plant, equipment and machinery required for each phase of work in section 1

Activity	Plant
Bulk earthworks topsoil strip	Tracked excavator; 170kW, 30T
	Articulated dumptruck; 187kW, 23T
	Dozer; 142kW, 20T
	Road lorry; 260kW, 39T
Bulk earthworks cut and fill	Tracked excavator; 170kW, 30T
	Articulated dumptruck; 187kW, 23T
	Motor grader
	Roller; 145kW, 18T
	Dozer; 142kW, 20T
	Road lorry; 260kW, 39T
	Tipper lorry
Road sweeper; 70kW	
Bulk earthworks formation works	Tracked excavator; 170kW, 30T

Activity	Plant
	Articulated dumptruck; 187kW, 23T
	Motor grader
	Roller; 145kW, 18T
	Dozer; 142kW, 20T
	Road lorry; 270kW, 39T
Road surfacing	Asphalt paver (+ tipper lorry); 112kW, 12T hopper
	Vibratory roller; 95kW, 12T
	Vibratory roller; 20kW, 12T
	Compressor for hand-held pneumatic breaker; 1T
	Tipper lorry
	Road planer; 185kW; 17T
	Road lorry (empty); 260kW, 39T
Break up and remove existing surface	Backhoe mounted hydraulic breaker; 67kW
	Tracked excavator; 170kW, 30T
	Road lorry (empty); 260kW, 39T

Construction works

- 1.5.29 Advanced site clearance would be undertaken in accordance with the breeding bird procedures presented in the Wylfa Newydd CoCP (Application Reference Number: 8.6). Site clearance activities would be in accordance with the site clearance drawings, see figures within A5025 Off-line Highway Improvements - Section 1 - Valley Plans (Application Reference Number: 2.7).
- 1.5.30 There would be no demolition of above-ground structures apart from removal of sections of boundary stone walls and the removal of redundant sections of the existing A5025. The only service diversions would be at the tie-ins with the existing A5025. The volumes of material predicted to be from demolition in section 1 are listed in table G1-4.

Table G1-4 Estimated volumes of material produced from demolition activities for section 1

Materials from demolition	Amount
Areas for road pavement to be excavated and removed	3,792m ²
Volume of excavated road pavement material, based on an assumed	1,100m ³

Materials from demolition	Amount
average depth of 0.29m pavement thickness	
Lengths of stone wall to be removed	317m
Volume of demolished stone wall, assumed to be an average height of 1m and width 0.25m	79m ³
Total of demolition material	1,179m ³

- 1.5.31 Temporary fencing would be installed at the start of construction to demarcate the site boundaries. Following the completion of construction, permanent boundary fencing would be installed at reduced ground levels (in cuttings) or higher ground levels (on embankments).
- 1.5.32 Construction plant would be used to excavate the ground (glacial materials or rock). The excavated material from cuttings would be loaded onto large dumper trucks (see table G1-3), to be deposited and compacted into areas where the existing ground levels need to be increased. Finished excavation and embankment slopes would have gradients no greater than one in two-point-five (1:2.5).
- 1.5.33 Granular material to form a capping layer would be placed and compacted as required, generally <500mm thick. Type 1 road subbase material would be compacted on top of this as the next layer, 150mm thick, followed by three layers of bituminous material with an overall thickness <300mm. Surfacing would comprise hot rolled asphalt.
- 1.5.34 Drainage would be provided to the carriageway, comprising a combination of gulleys and kerb drainage and pipes (assumed to be medium density polyethylene). Cuttings and embankments would be provided with linear drainage, generally at the top and bottom of the slopes.
- 1.5.35 Road markings and signage would be installed. Landscaping would be provided in accordance with the scheme design. Street lighting would only be provided at the roundabout, as shown on figures within A5025 Off-line Highway Improvements - Section 1 - Valley Plans (Application Reference Number: 2.7).
- 1.5.36 On completion, the compound areas would be reinstated and handed back to the relevant landowners for agricultural use. Sections of redundant carriageway that would no longer be required would be broken up and covered with topsoil and grass seeded for landscaping purposes.
- 1.5.37 The new bypass and junction would be handed over to the IACC as the highway authority, post construction.

Materials, waste and transportation

- 1.5.38 The following imported backfill material requirements have been estimated as required for the construction of section 1 (based on the cut and fill balance in table G1-5):

- 3280m³ of imported backfill material (approximately 7,970 tonnes) = 398 lorry loads.
- 1.5.39 Imported materials estimates for construction works within section 1 are as follows, assuming the use of a 20-tonne lorry for transportation:
- 2158m³ of subbase foundation (granular material) = approximately 262 lorry loads; and
 - 3404m³ of pavement bituminous materials = approximately 414 lorry loads.
- 1.5.40 Additionally, 1875m³ (for 300mm thick layer) of crushed material would be imported to the temporary Construction Compound, to provide the porous hardstanding across the site. This equates to approximately 227 lorry loads.
- 1.5.41 Materials required as part of the installation of the highway drainage, the carriageway foundation and surface dressing would be sourced from quarries and macadam batching plants across north Wales.
- 1.5.42 Recyclable materials such as metals and plastics would be managed through the measures contained in the appointed contractor's Site Waste Management Plan, and would be stored in skips prior to disposal through a licenced local company.
- 1.5.43 The quantity of material generated through the excavation of areas of cut and for drainage installation is estimated to be 3,800m³ (approximately 9,234 tonnes), equating to approximately 462 lorry loads. Separated topsoil and subsoil would be stored temporarily across different locations within the Order Limits for reuse elsewhere within the Wylfa Newydd Project or at a suitable third-party site. Other excavated arisings from these areas would be disposed of at a suitable landfill site; however, some of this material may be reused to form the embankment slopes along the corridor (should material for this be required).
- 1.5.44 The topsoil and subsoil stripped from the road footprint and compound would be stored in heaps (no higher than 2m), immediately adjacent to the road footprint within the Order Limits. This material would then be re-used in landscape areas and batter slopes.
- 1.5.45 Site waste management and materials management strategies are outlined in the Wylfa Newydd CoCP (Application Reference Number: 8.6) and the A5025 Off-line Highway Improvements sub-CoCP (Application Reference Number: 8.12). The purpose of these documents is to describe Horizon's expectations for materials and waste minimisation and management during construction, including the relevant legislative context and requirements for permitting.
- 1.5.46 Construction materials would be sourced off-site and stored at the compound, in the material storage areas. Cut and fill material (including crushed rock and clay) would be re-used and transported between the various sections of the A5025 Off-line Highway Improvements, from those with surplus materials to those with a deficit, in road legal (up to 20T net weight) wagons along the existing A5025. Up to 90% of the material from the cut and fill would be re-used. The 10% of material assumed to be unsuitable for re-use for structural reasons would be taken off site and treated and disposed of at a landfill site.

The volumes of materials that would be required to construct section 1 are shown in table G1-5 below.

Table G1-5 Cut and fill balance for Valley - section 1

Cut	Assume 90% acceptable for reuse	Unacceptable (to be disposed of off-site)	Fill	Surplus	Import	Total material moved (m ³)	Total material moved (T)
3,800	3,420	380	6,700	0	3,280	10,500	25,515

1.5.47 The main waste arisings would be domestic (from the site offices/welfare buildings) and office waste. Paper, cardboard, plastics, metal, glass would be separated and collected by IACC waste collection services. Where the new section of the road ties into the existing A5025, road planing wastes would arise. This would be small in quantity and, where possible, this material would be used as subbase for footways and cycleways.

Section 3: Llanfachraeth

Construction methodology and timeline

Summary of key activities

1.5.48 Similar activities would be carried out for the construction of the bypass in section 3 as section 1, apart from the following assumed activities associated with construction of the proposed viaduct and overbridge:

- excavation of foundations;
- installation of bored piles; and
- construction of viaduct using reinforced concrete piers and abutments, precast pre-stressed concrete beams and an *in situ* concrete deck.

1.5.49 These activities would necessitate the use of rotary bored piling machines and cranes of sufficient capacity to lift beams across the two watercourses. It is assumed that two cranes would be required to construct the viaduct; one on the side of each watercourse.

Programme

1.5.50 Construction of section 3 at Llanfachraeth would last for approximately 18 months.

1.5.51 The core construction activities and their proposed durations are summarised in table G1-6.

Table G1-6 Construction activities and approximate durations for section 3

Construction activity	Duration
Enabling works, temporary site compound set up (topsoil strip) and erection of boundary fence	Two months
Earthworks (cut and fill)	Six months

Construction activity	Duration
Earthworks (formation works)	Six months, commencing during final month of cut and fill earthworks
Bored piling	One month, during third month of formation works
Break up and remove existing road surface at tie-ins	Two months, during second and third month of formation works
Erect bridge beams	One month, immediately following removal of existing road surface
Road surfacing	Six months, commencing during final month of formation works

Works phasing and traffic management

1.5.52 As described for section 1 above.

Workforce

1.5.53 As described for section 1 above.

Working areas, materials storage and parking

1.5.54 As described for section 1 above. The compound would be located between the A5025 and the proposed bypass at the southern end of the section and would be 1.4ha in size, as shown on figure G1-2 (Application Reference Number: 6.7.48).

1.5.55 Once construction of section 3 is complete, the compound would be reinstated and handed back to the landowner for agricultural use.

Diversions and closures

1.5.56 Where the new bypass meets the existing A5025, this section of the road would be stopped up and a new junction provided to maintain access to Llanfachraeth village.

1.5.57 The road from Llanfachraeth village to Llanfigael and Stryd y Facsen crosses the alignment of section 3. This section of road would therefore require stopping up and a new bridge over section 3 would be constructed in order to maintain access.

1.5.58 There are four PRowS, namely 49/014/2, 27/018/1, 27/020/1 and 27/012/1, that are crossed by section 3. All of these PRowS would require temporary closures during the construction works. Where each PRow crosses section 3, this section of PRow would be permanently stopped up and each PRow would be diverted along new routes to cross the road safely.

1.5.59 PRow temporary and permanent closures and diversions would be implemented prior to the commencement of construction operations.

1.5.60 Where existing walls and fences are intersected by the proposed new road construction, these would be reinstated and tied into the new road boundary fence. Stone walls would be finished by hand using existing materials selected from the surplus stockpile. New highway fences would be securely connected to existing fences and, where pedestrian, cattle or vehicular access is required, suitable timber or metal gates would be installed. These details are shown on drawings (A5025 Off-line Highway Improvements - Section 3 - Llanfachraeth Plans) (Application Reference Number: 2.8).

Plant, equipment and machinery

1.5.61 Construction within section 3 is likely to involve the use of the same plant as described for section 1 with the likely addition of the equipment and machinery for piling and bridge construction works listed in table G1-7.

Table G1-7 Likely additional activities and plant required in section 3

Activity	Plant
Bored piling	Crawler mounted rig; 126kW; 33T
	Tracked mobile crane; 184kW; 110T
	Tracked excavator; 170kW, 30T
	Concrete pump + cement mixer truck (discharging); 223kW; 8T / 350 bar
	Diesel generator
	Road lorry (260kW, 39T)
Erecting bridge beams	Tracked mobile crane; 184kW; 110T
	Tracked mobile crane; 50T
	Road lorry (empty); 260kW, 39T

Construction works

1.5.62 As described for section 1 above. The estimated volumes of demolition for section 3 are listed in table G1-8.

Table G1-8 Estimated volumes of material produced from demolition activities for section 3

Materials from demolition	Amount
Areas for road pavement to be excavated and removed	4,587m ²
Volume of excavated road pavement material, based on an assumed average depth of 0.29m pavement thickness	1,330m ³
Lengths of stone wall to be removed	1,152m

Materials from demolition	Amount
Volume of demolished stone wall, assumed to be an average height of 1m and width 0.25m	288m ³
Total of demolition material	1,618m ³

1.5.63 Due to the proximity of receptors at Llanfachraeth, low noise road surfacing is to be used for the whole of section 3.

Materials, waste and transportation

1.5.64 Based on the cut and fill volumes indicated in table G1-9, no fill material would need to be imported. There would be a surplus of cut material, which would be imported to the other off-line sections.

1.5.65 Imported materials estimates for construction works within section 3 are as follows, assuming the use of a 20-tonne lorry for transportation:

- 5,745m³ of subbase foundation (granular material) = approximately 698 lorry loads; and
- 6,339m³ of pavement bituminous materials = approximately 770 lorry loads.

1.5.66 Additionally, 4,200m³ (approximately 10,206 tonnes) of crushed material would be imported to the temporary Construction Compound, to provide the porous hardstanding across the site. This equates to approximately 510 lorry loads.

1.5.67 The quantity of material generated through the excavation of areas of cut and for drainage installation is estimated to be 54,450m³ (approximately 132,314 tonnes). This equates to approximately 6,616 lorry loads.

1.5.68 The volumes of materials that would be required to construct section 3 are shown in table G1-9.

Table G1-9 Cut and fill balance for Llanfachraeth - section 3

Cut	Assume 90% acceptable for reuse	Unacceptable (to be disposed of off-site)	Fill	Surplus	Import	Total material moved (m ³)	Total material moved (T)
54,450	49,005	5,445	45,000	4,005	0	99,450	241,664

Section 5: Llanfaethlu

Construction methodology and timeline

Summary of key activities

1.5.69 As described for section 1 above.

Programme

- 1.5.70 As described for section 1 above, except that the construction period for Section 5 would be approximately 18 months.
- 1.5.71 The core construction activities and their proposed durations are summarised in table G1-10.

Table G1-10 Construction activities and approximate durations for section 5

Construction activity	Duration
Enabling works, site compound set up (topsoil strip) and erection of boundary fence	One month
Earthworks (cut and fill)	Four months
Earthworks (formation works)	Three months
Road surfacing	Four months
Break up and remove existing road surface at tie-ins	One month, during month 3 of road surfacing

Works phasing and traffic management

- 1.5.72 As described for section 1 above.

Workforce

- 1.5.73 As described for section 1 above.

Working areas, materials storage and parking

- 1.5.74 As described for section 1 above. The compound would be approximately 1.1ha in size, as shown on figure G1-3 (Application Reference Number: 6.7.48).
- 1.5.75 Once construction of section 5 is complete, the compound would be reinstated and handed back to the landowner for agricultural use.

Diversions and closures

- 1.5.76 At the location where the new bypass meets the existing A5025, at the southern end of section 5, this section of the existing A5025 would be stopped up and a new junction provided to maintain access to the properties near the Black Lion public house.
- 1.5.77 At the northern end of section 5, where the new bypass meets the existing A5025, the existing road would be stopped up, and a new junction would be constructed further to the south, to provide access to Llanfaethlu. This section of the existing A5025 would be used as a footway access to the village.
- 1.5.78 Two PRowS, namely 29/013/1 and 29/009/1, would terminate at the location of the new bypass. Although these would not need to be permanently stopped up and diverted along new routes, they would be subject to temporary closure during construction.

1.5.79 PRow temporary closures and diversions would be implemented prior to the commencement of construction operations.

1.5.80 Where existing walls and fences are intersected by the proposed new road construction, these would be reinstated and tied into the new road boundary fence. Stone walls would be finished by hand using existing materials selected from the surplus stockpile. New highway fences would be securely connected to existing fences and, where pedestrian, cattle or vehicular access is required, suitable timber or metal gates would be installed. These details are shown on drawings (A5025 Off-line Highway Improvements - Section 5 - Llanfaethlu Plans) (Application Reference Number: 2.9).

Plant, equipment and machinery

1.5.81 As described for section 1 above.

Construction works

1.5.82 As described for section 1 above, except in relation to the estimated demolition materials in table G1-11.

Table G1-11 Estimated volumes of material produced from demolition activities for section 5

Materials from demolition	Amount
Areas for road pavement to be excavated and removed	7,306m ²
Volume of excavated road pavement material, based on an assumed average depth of 0.29m pavement thickness	2,119m ³
Lengths of stone wall to be removed	1,549m
Volume of demolished stone wall, assumed to be an average height of 1m and width 0.25m	387m ³
Total of demolition material	2,506m ³

1.5.83 Due to the proximity of receptors at Llanfaethlu, low noise road surfacing is to be used for the whole of section 5.

Materials, waste and transportation

1.5.84 As described for section 1 above, except in relation to material volumes.

1.5.85 The following imported backfill materials requirements have been estimated as required for the construction of section 5 (based on the cut and fill volumes indicated in table G1-12):

- 1,300m³ of imported backfill material (approximately 3,159 tonnes) = approximately 158 lorry loads.

1.5.86 Imported materials estimates for construction works within section 5 are as follows, assuming the use of a 20-tonne lorry for transportation:

- 3,439m³ of subbase foundation (granular material) = approximately 418 lorry loads; and
- 3,794m³ of pavement bituminous materials = approximately 461 lorry loads.

1.5.87 Additionally, 3,300m³ (approximately 8,019 tonnes) of crushed material would be imported to the temporary Construction Compound, to provide the porous hardstanding across the site. This equates to approximately 401 lorry loads.

1.5.88 The quantity of material generated through the excavation of earthworks areas and for drainage installation is estimated to be 23,000m³ (approximately 55,890 tonnes). This equates to approximately 2,794 lorry loads.

The volumes of materials required to construct section 5 are shown in table G1-12.

Table G1-12 Cut and fill balance for Llanfaethlu - section 5

Cut	Assume 90% acceptable for reuse	Unacceptable (to be disposed of off-site)	Fill	Surplus	Import	Total material moved (m ³)	Total material moved (T)
23,000	20,700	2,300	22,000	0	1,300	45,000	109,350

Section 7: Cefn Coch

Construction methodology and timeline

Summary of key activities

1.5.89 As described for section 1 above.

Programme

1.5.90 As described for section 1 above, except construction of section 7 would last for approximately 18 months.

1.5.91 The core construction activities and their proposed durations are summarised in table G1-13.

Table G1-13 Construction activities and approximate durations for section 7

Construction activity	Duration
Enabling works, site compound set up (topsoil strip) and erection of boundary fence	One month
Earthworks (cut and fill)	Six months
Earthworks (formation works)	Six months

Construction activity	Duration
Bored piling	One month, during the third month of formation works
Break up and remove existing road surface at tie-ins	Two months, during the second and third month of formation works
Erecting bridge beams	One month, immediately after removal of existing road surface
Road surfacing	Five months

Works phasing and traffic management

1.5.92 As described for section 1 above.

Workforce

1.5.93 As described for section 1 above.

Working areas, materials storage and parking

1.5.94 As described for section 1 above. The compound would be approximately 0.93ha in size, as shown on figure G1-4 (Application Reference Number: 6.7.48).

Diversions and closures

1.5.95 At the location where the new bypass meets the existing A5025, at the northern end of section 7, a small section of the existing road would be stopped up and a new junction would be provided to maintain access to the existing A5025, and Llanfechell to the east.

1.5.96 In the centre of section 7, the existing staggered cross-roads along the A5025 between Llanrhwydrus and Llanfechell, would be stopped up and replaced by a new junction on the bypass.

1.5.97 One PRoW, namely 18/018/1, would be crossed by the bypass. The section of the PRoW that crosses the bypass would be stopped up and the PRoW would be diverted along a new route to the north in order to cross the bypass safely. This PRoW would also need to be temporarily closed during the construction works.

1.5.98 An additional PRoW, namely 18/067/1 would require temporary closure or diversion during construction as it would be directly affected by the proposed site Construction Compound.

1.5.99 PRoW permanent and temporary closures and diversions would be implemented prior to the commencement of construction operations.

1.5.100 Where existing walls and fences are intersected by the proposed new road construction, these would be reinstated and tied into the new road boundary fence. Stone walls would be finished by hand using existing materials selected from the surplus stockpile. New highway fences would be securely connected to existing fences and, where pedestrian, cattle or vehicular access

is required, suitable timber or metal gates would be installed. These details are shown on drawings (A5025 Off-line Highway Improvements - Section 7 - Cefn Coch Plans) (Application Reference Number: 2.10).

Plant, equipment and machinery

1.5.101 Construction within section 7 would involve the use of the same plant, equipment and machinery as described in section 3 above, including that required for piling and bridge works.

Construction works

1.5.102 As for section 1 above except in relation to estimated demolition materials listed in table G1-14.

Table G1-14 Estimated volumes of material produced from demolition activities for section 7

Materials from demolition	Amount
Areas for road pavement to be excavated and removed	2,502m ²
Volume of excavated road pavement material, based on an assumed average depth of 0.29m pavement thickness	725m ³
Lengths of stone wall to be removed	763m
Volume of demolished stone wall, assumed to be an average height of 1m and width 0.25m	191m ³
Total of demolition material	916m ³

1.5.103 Due to the proximity of receptors at Cefn Coch, low noise road surfacing is to be used for the whole of section 7.

Materials, waste and transportation

1.5.104 As for section 1 above except that the following imported backfill material requirements have been estimated as required for the construction of section 7 (based on the cut and fill volumes indicated in table G1-15):

- 4,320m³ of imported backfill material (approximately 10,497 tonnes) = 525 lorry loads.

1.5.105 Imported materials estimates for construction works within section 7 are as follows, assuming the use of a 20-tonne lorry for transportation:

- 3,317m³ of subbase foundation (granular material) = approximately 403 lorry loads; and
- 3,660m³ of pavement bituminous materials = approximately 445 lorry loads.

1.5.106 Additionally, 2,795m³ (approximately 6,791 tonnes) of crushed material would be imported to the temporary Construction Compound, to provide the porous hardstanding across the site. This equates to approximately 340 lorry loads.

1.5.107 The quantity of material generated through the excavation of earthworks areas and drainage installation is estimated to be 29,200m³ (approximately 70,956 tonnes). This equates to 3,548 lorry loads.

Table G1-15 Cut and fill balance for Cefn Coch - section 7

Cut	Assume 90% acceptable for reuse	Unacceptable (to be disposed of off-site)	Fill	Surplus	Import	Total material moved (m ³)	Total material moved (T)
29,200	26,280	2,920	30,600	0	4,320	59,800	145,314

Power Station Access Road Junction

Construction methodology and timeline

Summary of key activities

1.5.108 As described for section 1 above.

Programme

1.5.109 As described for section 1 above, although construction of the Power Station Access Road Junction would take approximately 12 months.

1.5.110 The following core construction activities and their proposed durations for the Power Station Access Road Junction are summarised in table G1-16.

Table G1-16 Construction activities and approximate durations for the Power Station Access Road Junction

Construction activity	Duration
Enabling works, site compound set up (topsoil strip) and erection of boundary fence	One month
Earthworks (cut and fill)	Four months
Earthworks (formation works)	Three months
Road surfacing	Four months
Break up and remove existing road surface at tie-ins	One month, during the third month of road surfacing

Works phasing and traffic management

1.5.111 As described for section 1 above.

Workforce

1.5.112 As described for section 1 above.

Working areas, materials storage and parking

1.5.113 As described for section 1 above except that it has been assumed that the Construction Compound for section 7 would be used.

1.5.114 The haul route for this section would follow the haul route of section 7, on to the existing A5025 to the Power Station Access Road Junction site.

Diversions and closures

1.5.115 At the location where the northern and southern arms of the roundabout junction meet the existing A5025, a small section of the existing A5025 would be stopped up and landscaped.

1.5.116 During construction of the Power Station Access Road Junction, users of the Wales Coast Path diversion (as diverted during the construction of the Power Station) would be temporarily diverted to avoid the construction working area.

Plant, equipment and machinery

1.5.117 As described for section 1 above.

Construction works

1.5.118 As for section 1 above except in relation to estimated demolition materials as shown in table G1-17.

Table G1-17 Estimated volumes of material produced from demolition activities for Power Station Access Road Junction

Materials from demolition	Amount
Areas for road pavement to be excavated and removed	2,914m ²
Volume of excavated road pavement material, based on an assumed average depth of 0.29m pavement thickness	845m ³
Lengths of stone wall to be removed	171m
Volume of demolished stone wall, assumed to be an average height of 1m and width 0.25m	43m ³
Total of demolition material	888m³

1.5.119 Due to the proximity of receptors to the new junction, low noise road surfacing is to be used for the whole of Power Station Access Road Junction.

Materials, waste and transportation

1.5.120 As described for section 1 above. However, the following imported backfill materials requirements have been estimated as required for the construction of the junction (based on the cut and fill volumes indicated in table G1-18).

- 8,480m³ of imported backfill material (approximately 20,606 tonnes) =1,030 lorry loads.

1.5.121 Imported materials estimates for construction works within section 7 are as follows, assuming the use of a 20-tonne lorry for transportation:

- 1,388m³ of subbase foundation (granular material) = approximately 169 lorry loads; and
- 1,532m³ of pavement bituminous materials = approximately 186 lorry loads.

1.5.122 The quantity of material generated through the excavation of earthworks areas and for drainage installation is estimated to be 800m³ (approximately 1,944 tonnes). This equates to approximately 97 lorry loads.

Table G1-18 Cut and fill balance for Power Station Access Road Junction

Cut	Assume 90% acceptable for reuse	Unacceptable (to be disposed of off-site)	Fill	Surplus	Import	Total material moved (m ³)	Total material moved (T)
800	720	80	9,200	0	8,480	10,000	24,300

Operation and maintenance

1.5.123 Operational speed limits would be at the 60mph national speed limit for the Cefn Coch and Llanfachraeth sections. For Valley, the speed limit would be 30mph through the roundabout. For Llanfaethlu, a 40mph speed limit would be in place from just south of the Llanfaethlu junction northwards.

1.5.124 Maintenance of major elements of the highway, and responsibilities, for all five sections would include:

Drainage

- inspection and maintenance of attenuation ponds (as required, minimum annually) – IACC; and
- inspection and maintenance of control chambers (as required, minimum annually) – IACC; and
- inspections following storm events to check for blockages – IACC.

Highway structures

- Llanfachraeth viaduct (annual inspection) – IACC;
- bridges crossing the A5025 (general and principal inspections 1 year and 5 years) – IACC;
- retaining structures (annual inspection) – IACC
- headwalls (annual inspection) – IACC;
- hedgerows overgrowing obscuring sightlines – landowner (but IACC to enforce if necessary); and

- mowing of grass on verges and embankments (as required) – IACC.

Landscape planting, including ecological habitat areas

- landscape planting maintenance, including weed control, mowing and plant replacement – Contractor for first 3 years; and
- long-term landscape planting maintenance including the monitoring of how well the planting has established (especially for new ecology habitat areas), spot treatment with herbicide, litter collection, hedgerow trimming, pruning and hand weeding of marginal aquatic planting – IACC.

1.6 References

Table G1-19 Schedule of references

ID	Reference
RD1	Highways England, 1993. <i>Design Manual for Roads and Bridges</i> . Volume 4. [Online] [Accessed August 2017] Available from: http://www.standardsforhighways.co.uk/ha/standards/dmr/vol4/section2.htm
RD2	British Standards Institution. 2014. <i>BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise</i> . London: British Standards Institution.