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# 11 Environmental impact assessment of the onshore components

## 11.1 Introduction

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The following sections present the environmental impact assessment of the onshore components of the Gwynt y Môr project; that is the construction, operation and decommissioning of the components of the project located onshore, above the mean high water mark and including the following main aspects:

- onshore cabling
- onshore substation and associated development
- development associated with the grid connection works (notably the overhead and underground cabling and the cable end sealing compound).

The assessment of the potential effects of the onshore components is limited spatially to the areas covered by that development plus a relevant buffer area around them, principally the onshore cable route corridor, the onshore substation site, the cable route from the onshore substation to the grid connection and the cable end sealing compound area.

The potential cumulative effects of both the offshore and onshore components of Gwynt y Môr when acting in combination with other projects or activities are assessed in Chapter 12.

The following onshore assessment considers the potential effects of Gwynt y Môr in the following areas:

- terrestrial ecology and ornithology
- onshore archaeology and cultural heritage
- landscape
- noise
- traffic
- amenity use
- utilities, cables and pipelines
- coastal defence and flood risk
- water quality and drainage
- physical effects.

The following sections have been completed with particular regard to the comments received during the scoping process, through subsequent detailed consultations and with reference to the wide range of statutory and non-statutory guidance.

The assessment method used for the identification, description and evaluation of the potential effects of the onshore development follows broadly that described under Section 8.1.

## 11.2 Potential impacts on the physical environment

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### 11.2.1 Potential physical effects

This section presents an assessment of the potential effects of the onshore components on agricultural land quality, natural soil resources and the generation of spoil.

### *Potential effect 11.1: The construction of the onshore components of Gwynt y Môr will lead to permanent or temporary land-take*

The features of the development that will involve permanent land-take are as follows:

- the onshore substation development
- the construction of access roads to the onshore substation
- the cable end sealing compound
- the placement of the two NGT overhead line towers between the substation and the grid connection.

These components of the onshore development will lead to the permanent loss of circa 6.1 ha of agricultural land. This area excludes any additional land required for landscaping or compensatory measures.

In addition, a maximum of approximately 37 ha of agricultural land will be temporarily affected by the onshore cable route corridor (including the haul road) from the beach land fall to the onshore substation, together with approximately 2 ha for the buried cable between the substation and the cable end sealing compound and a further circa 1 ha for the temporary cable construction and substation construction compounds. Temporary effects in these areas will be in the form of trenching, side-casting of spoil and the temporary laying of the cable route haul track. This area assumes that all temporary side-casting or storage of spoil during the construction activities occurs within the footprint of the development. The final permanent and temporary land-take will be determined following the detailed project design. The estimates provided here are therefore based on ‘worst case’ assumptions with regard to substation size.

Permanent land take as required for the onshore substation and associated grid connection works is subject to planning policy guidance as laid out under the Denbighshire County Council UDP in relation to the land quality.

Agricultural land is classified in terms of quality (Ministry of Agriculture, Fisheries and Food (MAFF) Agricultural Land Classification) and Government guidance seeks the retention of the best quality land (grades 1, 2 and 3a).

The UDP notes that Denbighshire has large areas of high grade agricultural land (grades 1, 2 and 3a) mainly located on the coastal plain and in the Vale of Clwyd. The UDP notes that:

*“This rich farmland is recognised as a highly important resource and its loss will only be allowed in exceptional circumstances.”*

The Agricultural Land Classification has been considered in planning the onshore cable route and substation location. A survey of the quality of the land has confirmed that the area to the north of the A55(T), representing the coastal plain is of high quality, equating generally to the ALC grade 2, representing agricultural land of ‘very good’ quality.

By contrast, agricultural land that would be taken by the onshore substation and the associated grid connection works and access road development is classified as Grade 3b or 4, representing agricultural land of ‘moderate to poor’ quality.

Grade 2 agricultural land will be temporarily affected by the cable installation works but will be subject to subsequent remediation such that long term effects would not be anticipated. By contrast the agricultural land proposed for the permanent land take at the substation location is of grade 3b to 4 and would not, therefore, represent a loss of high quality land, in line with the policies set out by the UDP.

The temporary impacts on agricultural land arising from cable installation is considered to be of **Negligible** significance given the temporary nature of the impacts and the restoration and management set out below. The permanent land-take is considered to be of **Low** significance given the relatively low-quality nature of the land occupied.

*Mitigation:* The temporary impacts on soils and land-use will be minimised by adopting best practice for construction activities on agricultural land and ensuring effective remediation of the land affected. In particular, attention will be given to the following principles of management and remediation:

- the separation of topsoil and subsoil
- minimisation of soil storage times and protection of spoil heaps from damage
- the handling of soils under appropriate conditions and use of the most appropriate soil handling methods
- the siting of construction vehicles along the temporary haul roads avoiding damage to surrounding land
- appropriate remediation of the areas affected and subsequent management of the restoration process.

*Monitoring:* the remediation and restoration process will be subject to monitoring in association with the Local Authority

***Potential effect 11.2: The construction of the onshore components of the Gwynt y Môr project could give rise to spoil requiring disposal***

The construction of the onshore components of Gwynt y Môr is expected to give rise to the production of spoil material requiring disposal.

In the case of the onshore substation, it is predicted that circa 7,500 m<sup>3</sup> of spoil could be generated and require disposal. It is predicted that the cable installation from the landfall to the substation could give rise to circa 15,000 m<sup>3</sup> of spoil.

Additional quantities of spoil could also be generated as a result of the access road development, the overhead and buried cabling connecting the substation to the 400kV line and the construction of the cable end sealing compound. Although the design of these components is not yet finalised, it is currently anticipated that these additional works could give rise to circa 10,000 m<sup>3</sup> of spoil.

In total, therefore, it is anticipated that circa 32,500 m<sup>3</sup> of spoil could be generated by the onshore components and require off-site disposal. It should be noted that the predicted volume of spoil is based on the current options for the onshore components and may be amended as a result of the final project design process.

The spoil waste generated during construction would be controlled by Section 34 of the Environmental Protection Act 1990 and would be disposed of accordingly to licensed facilities. As a result, significant impacts arising from the spoil would not be expected to arise, given the currently anticipated nature of the spoil.

Were contaminated material to be uncovered during the construction excavation works, all construction

activities at that site would be stopped immediately and appropriate measures taken to protect surface and groundwater, in association with the Environment Agency.

*Monitoring:* All waste generated by the construction activity will be properly recorded using Waste Transfer Notices. In addition, on-site, temporary storage of spoil will be undertaken according to the relevant guidance and will be subject to management and monitoring as agreed with the Environment Agency and the Local Authority.

**11.2.2 Potential effects on water quality and drainage**

The following section considers the potential effects on drainage and water quality arising from the onshore works. This includes the drainage of water from the onshore substation site and cable end sealing compound, maintenance of drainage in areas affected by the cable installation and possible effects on water quality during construction and operation.

***Potential effect 11.3: The construction, operation or decommissioning of the onshore components could affect water drainage or water quality***

Installation of the onshore cables will cross a number of drainage ditches where the route passes across the coastal plain. In addition, an extensive network of field drainage exists in the area to the north of the A55(T) which will be temporarily disrupted by cable installation. Installation methods will ensure the minimal disruption to these drainage systems and ensure proper re-instatement following the completion of the cable installation works. There would be no net loss in the overall length or area of drainage ditch as a result of the cable installation process.

At the substation and cable end sealing compound, surface water currently drains naturally by infiltration onto the existing agricultural land. Where possible, permeable surfaces would be incorporated within the substation and cable end sealing sites, once constructed, in order to reduce surface water run off. However, on hard surfaces at these sites, surface water would be collected and balanced to ensure an acceptable level of drainage, the details of which will be agreed with the Environment Agency and the Local Authority.

Construction activities also have the potential to affect surface water quality through, for example, the pumping out of cable trenches or the accidental spillage of fuel or oil. An appropriate method will be agreed with the Environment Agency and the Local Authority to ensure that controls are in place to avoid any adverse effects on the water quality of main watercourses such as the River Gele. In addition, pollution control plans will be in place providing details of actions to be taken in the case of accidental spillage or pollution incident.

During operation of the substation and cable end sealing compound, effects on surface water quality will be subject to control in the forms of, for example:

- oil retention bunds around the transformers and other oil-filled equipment on the site
- oil interceptors on the surface water drainage gullies.

The appropriate design and management of the construction and operation of the onshore components means that there will be **No Impact** on drainage or water quality.

*Mitigation:* The final design of the onshore components during the construction and operational phase will

take account of the potential effects on both drainage and surface water quality. The construction process and design of the onshore components will be agreed with the Environment Agency and the Local Authority to ensure that adverse effects are avoided or minimised. Appropriate pollution prevention and control measures will be adopted to ensure that the integrity of the aquatic environment is assured.

*Monitoring:* The proper installation and operation of all drainage and pollution control measures will be subject to monitoring in order to ensure compliance with the standards set out and agreed with the Environment Agency.

### 11.3 Potential impacts on the biological environment

#### 11.3.1 Potential impacts on terrestrial ecology and ornithology

The following sections review the potential impacts of the onshore components of Gwynt y Môr, together with the associated grid connection works, on the onshore ecology of the area surrounding the proposed works, including breeding and wintering birds, based on site specific survey work completed in support of the EIA process.

The assessment is based on widely accepted criteria with regard to the onshore habitats of which the most important are:

- naturalness
- extent
- rarity
- diversity
- status as statutory and non-statutory designated sites.

Any amenity value of the area has also been taken into consideration. In addition it is now generally considered that special importance be attached to ancient semi-natural habitats that depend for their survival upon traditional kinds of land management, for example, ancient coppice woodlands or meadows. These support special plant and animal communities that cannot be recreated quickly (if at all) and have suffered large reductions in the post-war period due to development and agricultural intensification.

Species are similarly assessed according to accepted criteria and the extent to which they are under threat. The importance of species to wider communities is also considered. Protection of species by the relevant legislation including the Wildlife and Countryside Act, 1981 and amendments, the Conservation (Natural Habitats) Regulations, 1994 and non-statutory guidance is taken into account. In the urban context several specific criteria are also relevant. These broadly relate either to the social and amenity value of the sites or to the ecological importance that may accrue to particular sites as a result of the general fragmentation of urban wildlife habitat.

In completing the assessments, reference has also been made to the Draft Guidelines for Ecological Impact Assessment produced by the Institute of Ecology and Environmental Management ([www.ieem.org.uk/ECIA.htm](http://www.ieem.org.uk/ECIA.htm)).

Impacts that could result from the proposals that have been considered within the impact assessment include:

- permanent loss of habitat or species due to permanent or temporary landtake for the proposals

- creation of temporary barriers to the movements of animals, especially mammals, amphibians and invertebrates and plants with limited powers of dispersal
- temporary fragmentation of habitat or severance of wildlife corridors between isolated habitats of ecological importance
- disturbance or damage to adjacent habitat and species (movement of vehicles and personnel, artificial lighting, dust, spillage of fuels and chemicals, and noise)
- impacts on habitats caused by alterations to drainage regimes
- introduction of alien species during the construction works; and
- creation of new habitats and introduction of species as a result of reinstatement works, habitat enhancement and landscaping.

In considering the following impact assessments, reference should be made to the habitat maps covering the onshore development area presented in Figure 11.1 and 11.2.

#### *Potential effect 11.4: The construction of the onshore components will lead to a permanent loss of habitat*

Construction of the onshore components is likely to result in the permanent loss of a maximum of approximately 6.1 ha of habitat as a result of the following:

- access road to the onshore substation (up to area circa 1 ha)
- the onshore substation site (up to circa 4.2 ha)
- the reactive power compensation unit (circa 0.8 ha)
- 2 400kV overhead electricity pylons (circa 0.03 ha)
- the NGT Cable end sealing compound (circa 0.1 ha).

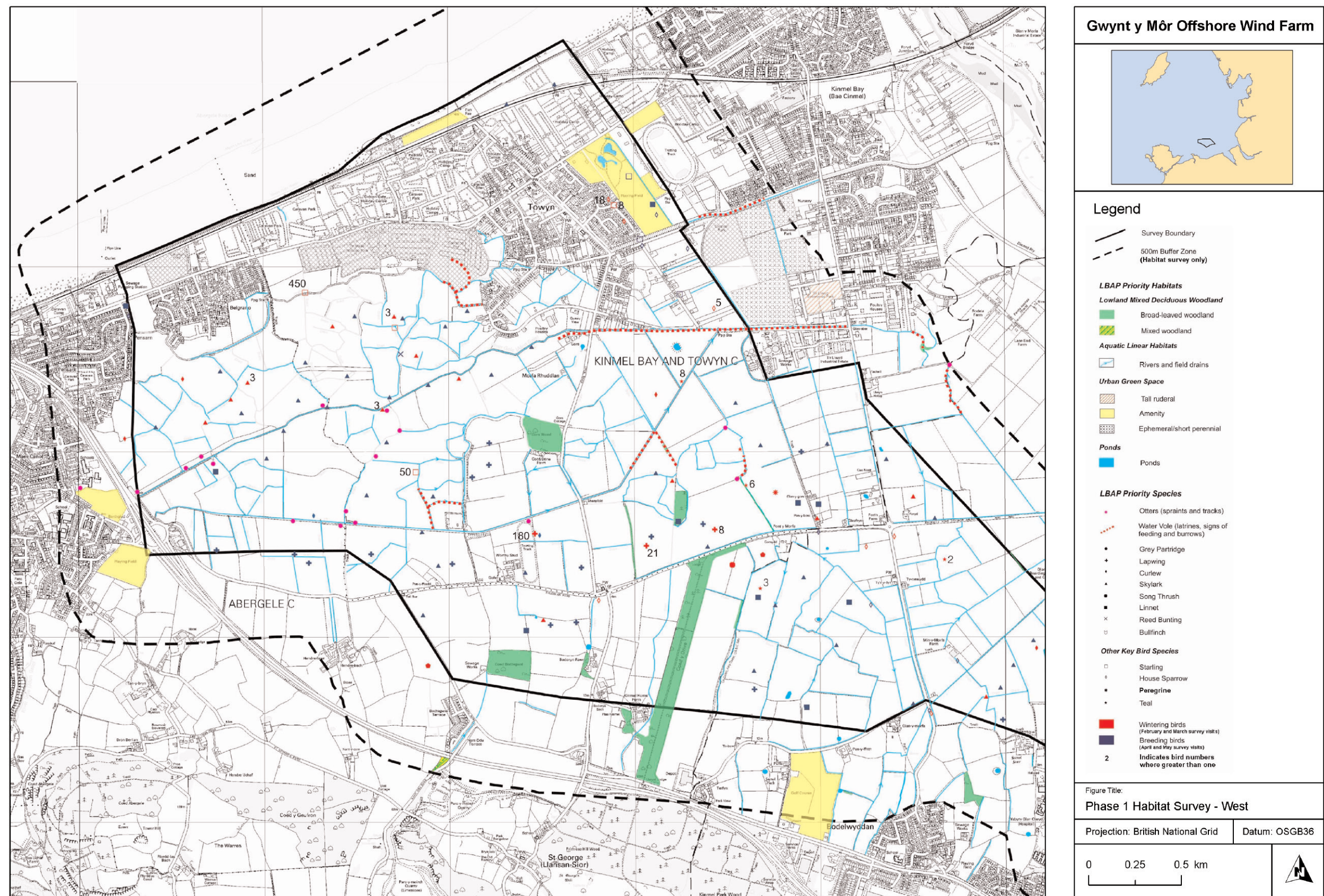
The final location and extent of permanent habitat loss will be determined following the detailed project design, however, the majority of the habitat likely to be affected is agricultural land comprising improved grassland and arable fields. These habitats are of low local nature conservation interest but do provide some foraging habitat for birds and badgers. Given that the permanent habitat loss is predicted to be relatively small and that the land use in the wider area is predominantly agricultural, the permanent impacts to this habitat are of **Low** significance.

The construction of the substation could result in the loss of circa 6.1 ha of agricultural land and one or two ponds and two ditches, depending on the final design and siting of the substation. No site of nature conservation interest as designated under national or local criteria will be affected by the substation development.

All ponds are UK and LBAP priority habitats, the two ponds that could be lost as a result of the substation construction have also been identified as having the potential to support great crested newts, a species of high nature conservation interest. Should these ponds be confirmed as supporting great crested newts, any loss of these pond habitats is predicted to have an impact of **High** significance on the nature conservation interests of the substation site.

Drains and ditches in the area of the survey area affected by the substation are of low local nature conservation interest as no species of note were recorded on either of the ditches during the site specific surveys. LBAP priority species otter and water vole were noted on drains and ditches in the northern section of the survey area but these areas would not be subject to permanent loss. The permanent impacts of this habitat loss are therefore expected to be **Negligible**.

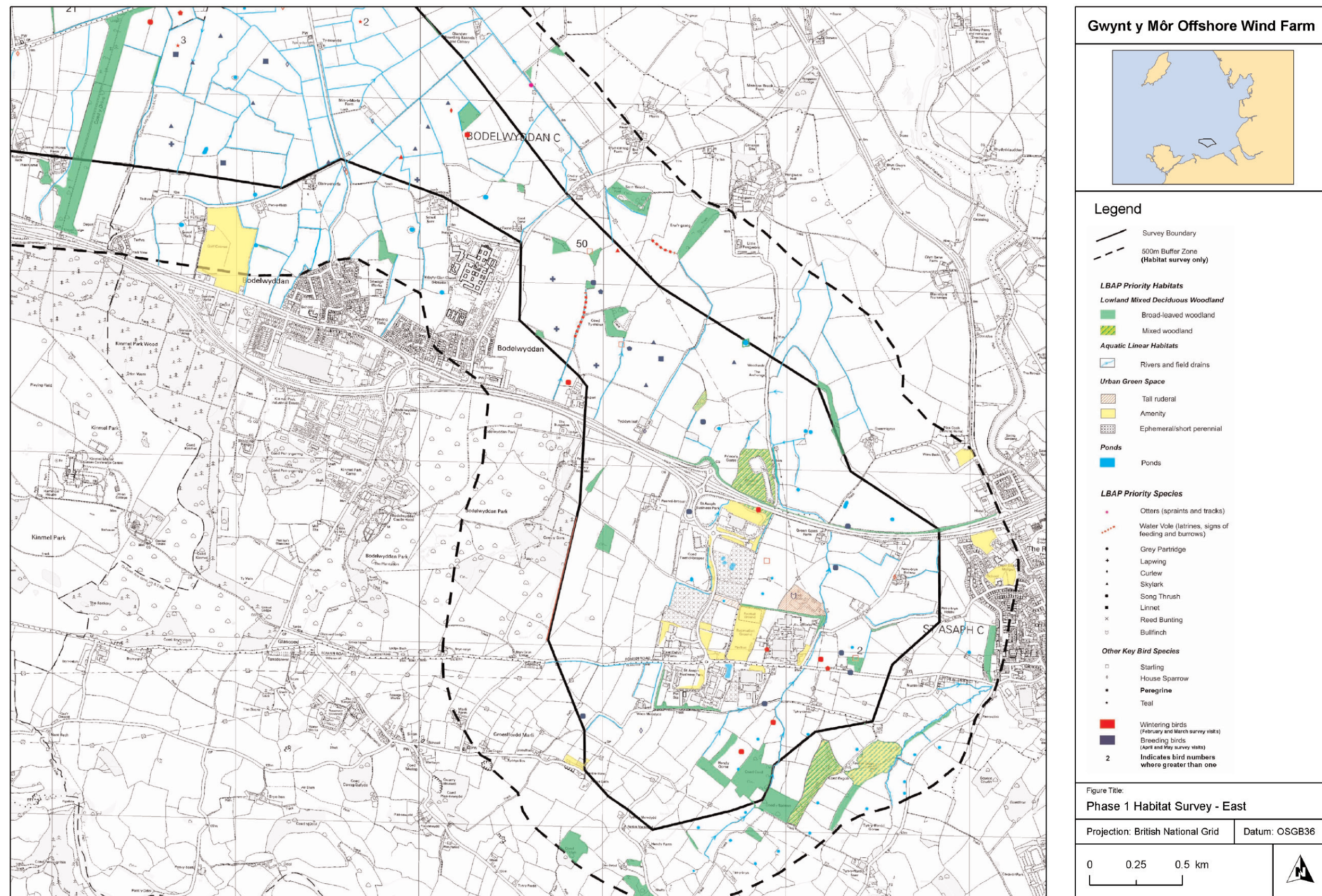




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**Figure 11.1** Priority species/habitat identified during phase 1 habitat survey, western area





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Figure 11.2 Priority species/habitat identified during phase 1 habitat survey, eastern area



The associated NGT works, notably the placement of the two overhead towers and associated cable end sealing compound could result in the permanent loss of small areas of improved grassland of low nature conservation value and hedgerow of high local nature conservation value. However, given the abundance of these habitats in the wider area the impacts of this habitat loss are predicted to be of **Negligible** significance.

In summary, the onshore substation has the potential to result in the loss of pond habitats. Were this to be the case, the impacts on the local habitats could be of **High** significance, with associated impacts on species of conservation interest. Careful siting of the substation to avoid these habitats would reduce this potential effect to **No Impact**. However were it not possible to avoid these habitats, the mitigation or habitat compensation would act to reduce the residual significance of any such losses.

Impacts on the ditches around the potential substation location are considered to be of **Negligible** significance.

*Mitigation:* Careful siting of the substation site in particular, may avoid any significant impact on the pond habitats. If it is not possible to avoid permanent impacts on these habitats, consideration will be given, in consultation with CCW and the local authority, to providing compensatory habitat. Depending on the final location of the substation, it may be appropriate to undertake further surveys of the woodland and pond habitats to establish the occurrence of species of conservation importance and to assist in the design of the final mitigation or compensation proposals in consultation with CCW and the local authority.

*Monitoring:* None proposed.

**Potential effect 11.5: The construction of the onshore components could lead to permanent impacts to species of conservation interest**

The following section discusses the potential permanent impacts to the species of note recorded during the site specific surveys of the area.

**Potential effects on bats**

Depending on the final onshore cable route selected, scattered trees that have the potential to provide roosting habitat for bats may be lost (the location of these are described in Section 6.8). A detailed bat survey will be conducted once the cable route has been finalised to determine if any roosts will be affected by the proposals, therefore allowing refinement of the cable route or the identification of the need and scope of any additional mitigation. If any trees that support bats do require removal then a licensed bat surveyor will be present to supervise the tree removal. Bat boxes will be erected at least six months prior to the felling of trees thereby in part ameliorating any potentially significant impacts.

However, even where tree loss is necessary, overall impacts to bat foraging habitat will be of **Negligible** significance given that there is an abundance of suitable habitat in the wider area.

**Potential effects on otter and water voles**

Signs of otter and water vole were recorded on the River Gele and field drains within the survey area, some water vole burrows were noted but no otter holts found. However, the installation methods proposed for the River Gele and the ditches means that permanent loss of these habitats will not occur therefore **No long term impacts** are predicted to these species. Temporary effects may occur and are considered separately in the following sections.

**Potential effects on badger setts**

Five badger setts were located within the boundary of the proposed cable route corridor and up to 30 m outwith the boundary. It is noted that a licence will be required from CCW for the operation of heavy machinery within 30 m of any badger sett. A badger survey will be conducted prior to installation to inform the management and mitigation of the potential effects on badger setts.

However, in the event that it is not possible to avoid all badger setts, works within 30 m of setts should be carried out under licence from CCW outwith the breeding season (July to October inclusive). Given the amount of suitable habitat for the badgers to create new outlying setts the permanent impacts on badgers resulting from cable installation are assessed to be of **Low** significance. The siting of the substation, pylons and cable sealing compound will have **No permanent impacts** on badgers. Temporary impacts of construction activity are considered separately below.

**Potential effects on great crested newts**

The proposed location of the substation could result in the loss of two ponds, depending on the final siting and design, as has been described previously. These ponds have the potential to support great crested newt and may, therefore, be of high nature conservation interest.

CCW have confirmed that there are historical records of great crested newt from St Asaph Business Park and Ty'n-y-llyn. The Extended Phase 1 Survey identified several ponds within the cable route corridor and the adjacent buffer area that have the potential to support populations of great crested newt. The cable route will be designed to avoid any permanent impacts to ponds likely to support breeding populations of great crested newts and thereby minimise impacts to this species.

Once the final cable route and onshore substation site have been selected a detailed survey will be undertaken for populations of great crested newts along the cable route and in the vicinity of the substation location during the spring season. There are likely to be **Highly** significant impacts to great crested newt in the event that pond habitats are permanently lost due to the construction of the onshore components. Where this is the case, it will be necessary to apply for a licence from CCW to remove the great crested newt populations from the ponds prior to their loss. Consideration will also be given, through discussion with CCW and the local authority, to providing compensatory habitat for great crested newts. Suitable mitigation and compensation will reduce the residual effect on the conservation of great crested newt in the areas affected to an acceptable level of **Low** significance.

**Potential effects on bird species**

A number of red list birds and other common species have also been recorded within the survey area. Species of note recorded during winter include grey partridge, lapwing, curlew, skylark and song thrush. These were also observed during the breeding bird season along with quail, starling, house sparrow, linnet, bullfinch and reed bunting. Given that the habitats affected by cable installation are to be restored on completion of the cabling works, the land-take for the onshore substation, overhead pylons and end sealing compound is considered to be small in comparison to the available, suitable foraging and nesting habitat for these species in the wider area. Therefore, **No permanent impacts** are predicted to any of these bird species. However, where habitat is subject to permanent land-take, such as for the substation location, cable end sealing compound, access road development or overhead line towers, it is recommended that the land is cleared outside of the breeding bird season.

The installation of up to 500 m of overhead line from the substation to the existing 400 kV line will have some permanent impacts on bird species present but this is considered to be of **Negligible** significance. One species present that has the potential to collide with the overhead line is buzzard. However the section of overhead line is short and there are currently existing lines and pylons in the area.

#### Summary of potential permanent impacts on species of conservation interest

Depending on the final location of the permanent loss of any key habitat there is the potential for permanent impacts to a number of protected species particularly from the construction of the onshore substation site, the access road development and the associated grid connection works. This could be of **High** significance for great crested newts where pond habitats are permanently lost to the development and of **Negligible to Low** significance for bats and badgers. Permanent impacts on otters or water vole are not anticipated. Careful siting of the onshore cable route, substation components and the associated grid connection works combined with an appropriate programme of monitoring and mitigation measures will reduce the significance of the potential impacts on these species to an acceptable level of **Negligible** impact.

*Mitigation/Monitoring:* Mitigation related to the potential impacts on each particular species may be appropriate depending on the final siting of the Gwynt y Môr onshore components. This will be combined with survey works of the final cable route and locations of the other onshore components prior to installation in order to further inform an appropriate mitigation package in agreement with CCW, the Environment Agency and the local authorities.

#### Potential effect 11.6: The onshore construction works could temporarily affect onshore habitats

Habitats of nature conservation value within the area being considered for the Gwynt y Môr onshore components include broad-leaved woodlands, ponds, hedgerows and watercourses which provide foraging and breeding habitat for bats, badger, otter, water vole, great crested newt and birds.

Temporary effects may arise from the installation of the onshore cables or temporary disturbance to land during the construction of the other onshore components. For the purposes of this assessment it has been assumed that all vegetation could be lost as a result of the temporary disturbance associated with these activities (a worst case of circa 40 ha including the onshore cable route, cable construction areas and the buried cable from the substation to the cable end sealing compound).

The construction will take place over a period of approximately 18 months, although the habitats will be restored along the cable route immediately after the cable has been laid and as cable laying progresses.

The area of habitat that may be temporarily affected by the onshore works (but excluding the areas of permanent habitat loss considered above) includes:

- circa 37 ha for the construction of the cable route
- circa 1 ha for two construction compounds adjacent to the cable route and the substation site; and
- circa 2 ha for the NGT buried cable circuit route.

The final location of the onshore works and associated potential habitat loss will be determined following detailed project design, and therefore the assessment is based on the 'worst case' situation.

#### Potential temporary effects on field and hedgerow habitats

The majority of habitat that would be temporarily affected by these activities is agricultural land comprising improved grassland and arable fields of low local nature conservation value although they do

provide some foraging habitat for birds and badgers. The temporary loss of this habitat is expected to have a **Negligible** impact. The hedgerows across much of the cable route corridor are generally species poor and they support a number of common bird species. Where the cable route passes through hedgerows a maximum of 40 m of the hedgerow will be removed to allow a maximum of six cables to be laid. This temporary loss of habitat will have a **Negligible** impact, although it is proposed that hedgerow habitat is removed outwith the breeding bird season (March to July inclusive) to minimise potential effects.

Following the installation of the cables, any hedgerows that have been removed will be replanted. There is, therefore, the opportunity to improve the nature conservation value of the hedgerows by planting a variety of species of local provenance, providing the opportunity for a long term beneficial impact. Details of the proposed landscape planting will be agreed with CCW and the local authority once the cable route has been finalised.

#### Potential temporary effects on rivers, drains and ditches

The River Gele runs west to east across the northern part of the cable route corridor, it supports populations of otter and water vole. Direct impacts to the watercourse are unlikely since the cables will be laid in pipes that pass underneath the watercourse using directional drilling technology; there will, therefore, be **No Impacts** to this watercourse.

Drains and ditches within the northern section of the survey area are of high local nature conservation value as they support species of note such as otter, water voles and red list breeding bird species such as reed bunting and other bird species of conservation interest such as teal. During the cable installation, ditches will be temporarily dammed using sandbags which will be removed once the cable has been buried and the ditches restored. Surface water that flows into the trenches during construction would be pumped via settling tanks or ponds to remove sediment before being discharged into local drains or ditches, which will mitigate against the risk of sediment pollution to these habitats. The temporary impact to this habitat type is therefore of **Low** significance. The final method for the crossing of these ditches and treatment of surface water will be discussed in association with the Environment Agency to mitigate any potential effects on these habitats and the species they support.

In addition, the Environment Agency have raised the possibility of there being salmon and sea trout in the River Gele and the connecting large drains at certain times of the year, although this presence has not been confirmed. Impacts on the water quality of these watercourses could affect the movement of these species and affect the migratory success of salmon and sea trout locally. However, given the mitigation set out in regard of the control and treatment of surface water runoff from the cable trenches, described above, significant impacts on these species would not occur since adverse impacts on water quality would not occur. Nonetheless, the final treatment of surface water pumped from cable trenches will be developed in consultation with the Environment Agency.

#### Potential temporary effects on ponds

Many of the ponds located across the onshore cable route corridor have the potential to support great crested newt as has been noted previously. As far as possible the cable route will be designed to avoid ponds. Nonetheless, where cable works are in close proximity to pond habitats, the use of Sustainable Drainage Systems (SUDS) measures will reduce the risk of sediment pollution to the water-bodies.

#### Potential temporary effects on urban green spaces

Urban green spaces are designated as priority habitats in the LBAP. Within the cable route corridor these



comprise amenity grasslands and brownfield sites which typically are abandoned areas of land that have been colonised by ruderal and ephemeral species and can support invertebrate populations. Invertebrate populations can be of importance but are typically transitional. These habitats are of low local nature conservation interest. Restoration of the topsoil containing the seed-bank on completion of construction is, however, recommended in order to ensure that **No Impacts** will occur to these habitat types.

#### Summary of potential temporary impacts on habitats

In summary, there is the potential for temporary impacts on a variety of habitats as a result of the temporary works, notably the cable installation (including the buried cables connecting the substation to the grid) and the temporary construction areas. However, the temporary nature of the impacts, the relatively low nature conservation value of much of the land affected and the appropriate management of the proposed works, including appropriate routing of the cable works or siting of the construction compounds, means that these temporary effects are considered to be of **Negligible to Low** significance where they occur. Nonetheless, a series of management or mitigatory measures have been set out in line with best practice in order to further minimise potential effects and ensure appropriate recovery or enhancement of habitats post-installation.

*Mitigation/Monitoring:* A series of mitigation or management procedures related to the potential temporary impacts on each particular habitat has been set out in order to ensure best practice and to minimise the significance of the potential temporary effects. These will be discussed and developed in agreement with CCW, the Environment Agency and the local authorities.

#### Potential effect 11.7: The onshore construction works could temporarily affect species of conservation interest

It is likely that the onshore construction works could result in disturbance to some common bird species (Section 6.8) and other faunal species in close proximity to the various onshore construction sites. The potential temporary impacts to species of conservation interest are discussed in the following assessment.

#### Potential temporary effects on bats

The scattered mature trees on site have the potential to support roosting bats. The cable route and substation construction compounds may be floodlit for the duration of the 18 month construction period. If these floodlit compounds are located in an area known to support bats there will be the potential to deter foraging bats from the area and to disturb roosting bats (Jones, 2000).

Where possible, construction compounds will be situated away from any potential bat roosts and foraging habitat such as hedgerows, scattered trees, woodland boundaries, watercourses, ditches and ponds. However, if it is not possible to situate the construction compounds away from bat roosts, measures will be put in place to reduce the impacts of lighting to bats including using hoods to prevent light spillage and using as low level lighting as possible.

The areas that will be floodlit are small and taking account of the mitigation measures set out, the temporary impacts on bat roosts are considered to be of **Negligible** significance. Nonetheless, in seeking to minimise impacts on bat habitats, lighting will be designed and positioned to avoid effects on bats. This mitigation will be informed by further detailed bat habitat survey once the final cable route, construction compound and substation location are finalised.

In addition, the cable route is expected to cross hedgerows, which may provide foraging corridors for bats and this interruption could disturb foraging activity. Given the abundance of hedgerows in the wider area, however, this temporary effect is expected to have a **Negligible** impact on bat foraging.

#### Potential temporary effects on badgers

Five badger setts were identified within the cable route corridor. The impacts to badgers from construction may include direct impacts such as loss of foraging habitat and indirect impacts such as disturbance or fragmentation of territory. Badgers are most likely to forage on areas of improved grassland. A considerable area of this habitat type will be temporarily affected by the cable installation works or temporary construction compounds.

However, given the agricultural land use in the wider area and therefore the amount of foraging habitat available to badgers, the impact of this loss of foraging habitat is likely to be Negligible. Nonetheless, the area of the cable installation activity will be minimised to ensure access across areas of habitat for badgers, including minimising as far as practical the length of the cable trench that is open at any one time. Fencing will also be provided around the active cable installation site and the construction compounds to prevent badger access.

There is also the potential for disturbance to one outlying badger sett in the vicinity of onshore substation as a result of noise and human presence, for which a licence from CCW may be required. It is possible, depending on the final cable route and siting of the other onshore components that this sett will need to be closed. There is also the potential for further disturbance to a main badger sett in the vicinity of Bodelwyddan hospital and a subsidiary sett on the eastern boundary of the cable route corridor. The final cable route will be at least 30 m from these setts to minimise disturbance and any works involving heavy machinery (for example drilling rigs) will be at least 100 m from these setts. However, if these distances are not achievable, the works will require a licence from CCW.

In developing the final mitigation for the temporary disturbance of badgers, a survey will be undertaken closer to the time of installation in order to determine the location of setts within each badger territory and to ensure that badgers will be able to move to another sett if they are disturbed during the cable installation process. If the nature of the badger territories allows movement between setts the impacts of disturbance will be of **Negligible** significance. The sett in the vicinity of the substation is an outlying sett and, therefore, used seasonally. Impacts resulting from disturbance to this sett are predicted to be of **Negligible** significance.

There is also the potential for the onshore cable construction corridor to temporarily sever badger runs and access to their wider territory. To avoid this it will be necessary to ensure that badgers can cross the cable route corridor, for example, by minimising the size of the active construction area at any one time.

#### Potential temporary effects on otters and water voles

Indirect impacts to otters in the form of disturbance from noise and vibration as a result of the directional drilling under the River Gele could occur. The significance of these potential impacts will depend on the timescale and depth of the drilling activity. It is noted that such works may need to be undertaken under licence from CCW.

Signs of otter activity were noted on the field drains in the northern part of the survey area. The field drains



are to be temporarily dammed to allow construction of the cable route. Construction works will be undertaken in such a way as to ensure that otters will be able to access either side of the dammed section and following discussion with the Environment Agency and CCW. This being the case and given the very temporary nature of such damming, the potential impacts to otter are predicted to be **Negligible**.

Water vole burrows were also noted on both the River Gele and the large field drain to the south of the river. Other signs of activity were observed on the smaller field drains in the area. The final design of the cable route will take into account the records of water vole burrows in seeking to minimise the temporary disturbance of this species. If this cannot be achieved, the potential exists for impacts of **Moderate** significance to this species. CCW, the Environment Agency and the Local Authority will be consulted to determine appropriate mitigation measures in seeking to reduce the residual significance to an acceptable level.

#### Potential temporary effects on great crested newts

The cable route and temporary construction compounds will ideally be sited to avoid impacts on ponds as far as possible. However, it may be necessary to use fencing to prevent great crested newt from accessing or crossing the working areas. The need for such mitigation will be determined following further survey and consultation with CCW.

#### Potential temporary effects on birds

A number of red list and common bird species were recorded foraging and breeding within the onshore survey area. It has been assumed that all habitats that fall within the cable installation working area will be temporarily lost (i.e. including the trenching, haul road area etc). This habitat loss could have a direct impact on all bird species that forage and breed in the areas affected.

The displacement of birds from the cable route construction area will be a short term impact and there is an abundance of suitable alternative habitat in the wider area. Therefore, the impacts on bird species are considered to be of **Negligible** significance. Any hedgerows, woodland, scrub or scattered trees that need to be removed from the construction corridor will be removed outwith the breeding bird season (March-July inclusive, although it may extend beyond this for some species) to minimise impacts to breeding birds.

Onshore construction works may also result in some significant localised disturbance to birds in the immediate surrounding areas. The main sources of disturbance will be from the noise and dust created by machinery and construction vehicles, from the floodlighting of the construction compounds and from the human presence on the site. Whilst the disturbance will occur over an 18-month period, it will generally be short lived in any one area, as the work will be progressive. The impacts are predicted to be of **Negligible** significance.

#### Summary of potential temporary impacts on species of conservation interest

In summary, there is the potential for temporary impacts on a variety of species of conservation interest as a result of the temporary works, notably the cable installation (including the buried cables connecting the substation to the grid) and the temporary construction areas. However, the temporary nature of the impacts combined with the mitigation programme set out means that these temporary impacts are considered to be of **Negligible** significance. Potentially significant effects on water vole are noted as a result of cable installation across a number of drainage ditches. Where this is a possibility, following finalisation of the cable route, it has been recognised that further mitigation would be required and would be developed in association with the relevant statutory bodies.

*Mitigation/Monitoring:* A series of mitigation or management procedures related to the potential temporary impacts on species of conservation interest has been set out in order to ensure best practice and to minimise the significance of the potential temporary effects. These will be discussed and developed in agreement with CCW, the Environment Agency and the local authorities.

#### Potential effect 11.8: The operation of the onshore components may affect habitats or species of note

The onshore grid connection and substation is expected to be operational for 50 years, as defined under the Crown Estate lease agreement. During this period disturbance from future maintenance operations, including noise and human presence, is likely to be temporary, occasional and restricted to the onshore substation site and cable end sealing compound. Should any maintenance activities be required to field drains and ditches possible damage or pollution to habitats associated with watercourses and ditches could occur but will be minimised by restricting access to the immediate area of the works. Disturbance will be infrequent and **No Significant Impacts** to wildlife are predicted.

Drainage measures for the new onshore substation and cable end sealing compounds will reduce the risk of pollution of existing watercourses in the area. Drainage is considered further under Section 11.2.2.

Post-construction, habitats will be reinstated with the potential to provide ecological benefits in the longer term so that any impacts during the operational phase may ultimately be beneficial to local wildlife. This could include, for example, the landscaping of the substation site and cable end sealing compound and the re-instatement of the affected hedgerows. Opportunities for enhancing habitats as a result of the onshore components of Gwynt y Môr will be explored with CCW, the Environment Agency and the local authorities.

#### Potential effect 11.9: Decommissioning of the onshore components of the Gwynt y Môr project could affect habitats and species of note

Decommissioning of the onshore components may be required at the end of the 50 year operational period. It is likely that the onshore cables would be left in the ground as is standard practice. If the cables are fluid filled the fluid could be removed by an approved contractor and disposed of accordingly. The cable ends would then be sealed and buried and the ground restored. This will be a short term activity and will have a **Negligible** impact on habitats.

Decommissioning of the onshore substation will be carried out in accordance with all applicable regulations at that time. The level of decommissioning will be determined in discussion with the National Grid operator and local authorities, and will depend on any proposed future use of the substation or development of grid infrastructure in the area.

These works are likely to cause temporary impacts to habitats and species of conservation interest; these are predicted to be similar to those described for the construction period.

#### Summary of potential effects and proposed mitigation for onshore construction works

The assessment of the onshore components of Gwynt y Môr and the associated grid connection works on terrestrial habitats, species of conservation interest and birds has considered the potential for both permanent and temporary effects to occur.



The potential effects may be summarised as follows:

#### Potential permanent impacts

- the loss of agricultural land (including arable fields, improved grassland and hedges) which provide foraging and breeding habitat for breeding and wintering birds and badger, as a result of the potential substation site, overhead lines, cable end sealing compound and access road development
- the potential loss of two ponds that may support populations of great crested newt, depending on the final siting of the substation
- the potential loss of two ditches of low local nature conservation value, depending on the final siting of the substation
- the potential loss of scattered trees that provide roosting habitats for bats, depending on the final onshore cable route, access road route and location of the onshore substation
- the potential closure of one outlying badger sett, depending on the final cable route and substation location.

#### Potential temporary impacts

- the temporary disturbance of agricultural land (including arable fields, improved grassland and hedges) which provide foraging and breeding habitat for breeding and wintering birds and badger, as a result of cable installation and the construction compounds
- potential disturbance to roosting and foraging bats as a result of construction activity
- potential disturbance to badger and fragmentation of territory as a result of construction activity and cable installation
- potential disturbance to breeding birds as a result of construction activity and hedgerow removal
- potential for pollution to watercourses and ponds from run-off and spills as a result of the pumping out of cable trenches or from run-off from construction compounds.

#### Summary of proposed mitigation

A range of mitigation measures have been set out below. These will be implemented to reduce the risk of significant impacts to habitats and species of nature conservation importance.

- the final siting of the onshore components will consider the findings of this assessment in seeking to minimise the potential effects on habitats and species
- habitat loss will be limited to the minimum needed for safe implementation of the works
- topsoil and subsoil will be stripped and stored separately within the construction area and reinstated appropriately
- best site management practices will be adopted during construction to minimise the risk of secondary impacts to adjacent habitat (including direct incursions, pollution, draining of adjacent wet habitats etc)
- impacts on areas of nature conservation interest identified in the development plans, including Wildlife Sites and LBAP habitats will be avoided as far as possible. Where these areas are to be affected, best practice measures will be adopted to minimise any adverse impacts
- temporary work areas (including site accesses) will be situated on areas of relatively low nature conservation value where possible (e.g. arable fields). Construction staff will be given ecological awareness training prior to the onset of construction
- if any invasive alien species listed on *Schedule 9, Part II of the Wildlife and Countryside Act 1981* and amendments are identified on site prior to construction these will be removed from site at the start of works following best practice guidance to ensure they are not spread inadvertently along the study area
- opportunities will be taken to enhance existing habitats of nature conservation interest that are retained and

to create new habitats of value within the study area. Any new planting will be undertaken using native species typical of the area, obtained from local sources wherever possible and in consultation with CCW and the local authorities

- check surveys for protected species will be undertaken along the cable route, substation location and construction compound location prior to work commencing. Any further necessary mitigation measures that are required will be agreed with the CCW, the Environment Agency and the local authorities. In addition, the works will comply with the requirements of relevant legislation
- appropriate licences will be sought from CCW for any protected species that will be disturbed by the project
- where necessary, the closure of outlying badger setts will be undertaken following consultation with CCW and the local authorities. The sett closure will take place between July and October inclusive
- all mature and dead trees and buildings or other built structures to be affected by the scheme will be checked for bats prior to construction and appropriate mitigation measures agreed with CCW and implemented if bats are found. If any trees that support roosting bats require felling a licensed bat surveyor will be present to supervise the tree removal works
- bat boxes will be erected in areas close to where mature trees are to be felled during construction to provide new roosting habitat. Where appropriate, landscape restoration will be undertaken to enhance existing hedgerows and provide new foraging habitat
- where possible all woodland, scrub and other suitable habitat will be removed outwith the breeding bird season (approximately mid March to the end of July, although this can extend beyond July for some species) to avoid impacts on nesting birds. Where this is not possible all suitable habitats will be checked for nesting birds before removal. If any are identified appropriate mitigation measures will be agreed with CCW and the local authorities and implemented
- the mitigation of impacts to wildlife will be consistent with species and habitat priorities set out in the LBAPs.

## 11.4 Potential impacts on the human environment

### 11.4.1 Potential effects on onshore archaeology and cultural heritage

The following sections provide an assessment of the potential effects of the onshore components of the Gwynt y Môr Offshore Wind Farm on archaeology and cultural heritage. The onshore archaeological study area within which the assessment of the onshore components has been completed is described under Section 7.13.

As the design and location of the onshore components is yet to be finalised, the principal underlying the approach to the assessment of the potential effects upon cultural heritage has been based on a sensitivity audit, encompassing all the known and potential cultural heritage receptors in the onshore archaeological study area which could conceivably be affected by the project as currently defined.

The assessment has been undertaken with reference to the standards and guidance described in the Institute of Field Archaeologists document 'Standard and Guidance for Archaeological Desk-Based Assessments' (1999) and the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations (1999).

It is worth noting, as a background to the assessment of the possible effects of the Gwynt y Môr onshore



development, that the landscape of the archaeological assessment area is not a pristine environment containing an unaltered collection of archaeological sites and features. Onshore, the land around the cable route corridor has been systematically drained since the late eighteenth or early nineteenth century, potentially affecting the archaeological resource of the coastal plain. More recently modern field drainage systems have been installed across much of the farmland crossed by the onshore cable route. Land use also includes arable farming which may have significantly damaged any shallow sub-surface remains. On the higher land towards the south of the cable route and around the substation site and grid connection works there is a longer history of arable land use and recent construction episodes; for example the construction of the A55 and St Asaph Business Park may have had an impact upon the archaeological resource of the area.

*Potential effect 11.10: The installation or decommissioning of the onshore development such as the onshore cable, the onshore substation and the associated grid connection works could damage archaeological resource*

The onshore components of the Gwynt y Môr project that have the potential to disturb the archaeological or cultural heritage resource, as defined for the assessment process, may be summarised as follows:

- establishment of a construction compound
- construction of temporary haul roads
- excavation of drainage ditches
- laying of the cable
- construction of the substation
- construction of access roads and/or widening of existing roads
- construction of overhead lines and further buried cables for grid connection
- construction of the cable end sealing compound.

Similarly the decommissioning of the onshore components could disturb features of archaeological interest.

Vehicle movements, especially those associated with the onshore cable installation, substation construction and associated grid connection works could also have a temporary adverse impact on the historic environment, such as the settings of historic buildings and the settings of historic parks or gardens.

The known features of archaeological or cultural heritage interest that may be affected by the onshore components of the Gwynt y Môr project have been described in Section 7.13 and are summarised in Figure 7.33, but in summary include:

- deposits containing palaeoenvironmental data beneath the sands of Abergele and Kinmel beaches
- the remains of WWII anti invasion defences on Abergele beach
- the site of a crashed Supermarine Spitfire Mk I at Penybont Morfa near Abergele
- the site of a crashed Miles Magister training aircraft near Borth Crossroads, near Abergele
- the site of a crashed Supermarine Spitfire at Llandullas Beach.
- the site of a crashed Avro Anson at Prestatyn Beach
- the site of a crashed Airspeed Oxford at the low tide mark at Kinmel Bay.
- the site of recovered Roman finds at Bodelwyddan
- the site of Cae Carreg Lwyd ('field of the ancient stone')
- the site of Perth Saint ('hedge/bush of the saint', possible early Christian site)
- the sites of two extant boundary markers at Sun Farm

- the site of Glan y Gors brickworks – industrial archaeology complex
- the route of the Varae-Kanovium Roman Road, memorialised in the fieldname Werenglodd y Palmant
- the site of post-medieval finds at Bodelwyddan
- the site of Faenol Fawr pond
- the site of the Abergele floodplain drainage system – a post-medieval landscape improvement scheme the earthworks and subsurface features of which survive
- the site of the Kinmel Park military railway
- the site of the Royal Observer Corps Monitoring Post
- the landscape features of Kinmel Park
- ridge and furrow earthworks near Pen y Bryn Farm
- waen Meredydd Field Boundary – a low bank representing the physical remains of a former field boundary shown on early cartographic sources
- the Glascoed Road milestone
- the pond and associated earthworks near Prince's Gorse
- ridge and furrow earthworks in field to the north of the A55
- the generator station for the Rhuddlan Chain Home Radar Station
- ridge and furrow earthworks near to the Faenol Fawr Hotel.

The installation or construction of the onshore components of the Gwynt y Môr project has the potential to have a **Highly** significant effect were they to impact on these known or potential unknown features of archaeological significance.

However, it is considered that the detailed mitigation programme that is set out will reduce the residual impacts on the onshore archaeological resource to a **Low** significance. The impacts of traffic movements on the cultural setting and the effects of the operational stage of the project are considered to be of **Low** and of **Temporary** significance with regard to the archaeological and cultural heritage.

*Detailed archaeological mitigation programme*

In order to minimise the potential for adverse effects on cultural heritage and archaeological features arising from the onshore development, all reasonable and practicable efforts will be made to accommodate a programme of mitigation measures. The mitigation programme is summarised in the following sections. The mitigation programme has been developed with due reference to the context of the current archaeological research framework for Wales (Briggs, 2003) and the positive opportunities that the Gwynt y Môr project affords for advancing the archaeological knowledge base.

*The mitigation programme*

The overall mitigation strategy will be predicated on the concept that all internationally and nationally important archaeological remains are preserved *in situ* and that all potential, direct impacts upon such remains are avoided by sensitive design and implementation of the construction, maintenance and decommissioning of the onshore components. For all other remains a programme of detailed evaluation and survey will be conducted, where the detailed design indicates a direct impact, in order to qualify the exact scope of the overall mitigation response and to also provide additional data on the archaeological resource of north Denbighshire and Conwy.

No mitigation measures have been considered for the protection of Listed Buildings within the onshore archaeological assessment area as none of these sites will be directly impacted upon by the scheme and, while there may be a temporary, indirect, adverse impact on the setting of such buildings, these are



reversible within the duration of construction. Furthermore, no mitigation measures have been specified where the significance of the feature of cultural heritage or archaeological interest and the magnitude of the impact upon it are considered to be **Negligible**.

Where the assessment area coincides with the boundaries and essential settings of Kinmel Park and Bodelwyddan Castle, again, no mitigation measures have been considered. While no statutory protection is afforded to these sites, the construction works will avoid these areas and any detrimental visual impact will be temporary and, ultimately, reversible.

Ultimately the mitigation methods outlined above will form a staged approach in response to the level of importance of a receptor and the impact of the works upon that receptor.

The ultimate mitigation for the onshore areas may take the form of a combination of preservation *in situ* (by means of mitigation by design) and archaeological excavation, archaeological watching brief and survey of standing structures and earthworks (which achieves preservation ‘by record’).

The final mitigation and monitoring approach will be agreed through discussion with Cadw and the relevant unitary authorities’ Planning Archaeologists.

#### Mitigation by design

The project design of the onshore components of Gwynt y Môr will be within the limits defined in Chapter 4. The facility exists for the detailed design of these components to be advanced with the intent to design out any significant impacts on cultural heritage assets and permit preservation *in situ* of these assets.

The onshore component of the wind farm does not appear to impact upon any known cultural heritage asset which is of such importance that it warrants preservation *in situ*. However, in order to inform the route selection for the onshore cabling and the siting of the onshore substation the advanced selection and design tasks will be undertaken with reference to all available archaeological data with the aim of avoiding impact. Where impact is unavoidable or in the event that archaeological remains are discovered during construction, a suitable archaeological response will be agreed with the Local Authority.

#### Mitigation by ‘preservation by record’

Where physical preservation of cultural heritage assets is not feasible or is not warranted, archaeological, or other works, may be implemented for the purposes of preservation by record. This is a common and acceptable method of mitigation for sub-surface and upstanding archaeological remains.

The following Table 11.1 acts as a guide to the methods that are available for preservation by record. However, the application of the appropriate mitigation will be designed in consultation with the local authority and will be commensurate with the potential risk to any features of archaeological interest and the sensitivity of that feature to the various onshore components of the development.

Geophysical/topographical	
Geophysical/topographical survey	Where there is a possibility that sub-surface archaeological remains are present within an area that is likely to be impacted upon during construction, a suitable programme of geophysical survey will be implemented to locate and quantify the resource. The results of this will enable further mitigation measures (e.g. watching brief, evaluation etc) to be formulated. In the instance of earthwork features, a topographical survey will be carried out prior to any works commencing in order that a full record of the original land surface is created.

Watching brief	During works requiring watching brief monitoring, a suitably qualified archaeologist will be on site at all times to inspect groundworks. A written record of the extent and depth of the observed groundworks will be kept in tandem with detailed stratigraphic records of any exposed deposits. In the event that significant archaeological deposits were encountered, groundworks would cease and a strategy for further investigation would be agreed with the Local Authority Archaeologist as necessary.
Evaluation	If a site of sufficient interest is identified through initial survey, then a programme of limited archaeological evaluation will be implemented. This would entail the excavation of a series of trial trenches (usually representing approximately 5% of the total site area), targeted to elucidate information regarding the form, nature and condition of the heritage resource, and to create full stratigraphic records of the exposed deposits. The results of the evaluation will lead either to the formulation of further mitigation proposals (which may include full excavation or preservation in-situ), or it may be considered sufficient work given the quality/nature of the archaeological remains.
Excavation	Full excavation may be considered necessary if any of the evaluation measures above produce evidence for significant archaeological remains. Open area excavation would be targeted using the results of previous work to gain as much information as possible about the archaeological resource, including its environmental, economic and social history and to create a data archive which is sufficient to recreate the events which formed the site and its significance within the wider landscape. A post-excavation assessment report would be prepared following on-site works to draw together the data archive and inform a way forward for further analysis and publication as necessary.

**Table 11.1** Guide to possible methods for the preservation by record of the archaeological record

Realistic and positive timetabling and management of the process by which the mitigation strategies are advanced will allow all parties to arrive at sensible, achievable solutions which take account of the best interests of the cultural heritage and fall within the constraints of the Gwynt y Môr project.

#### Monitoring of potential effects on the archaeological resource

The developer, Denbighshire County Council Archaeologist and the archaeological officer from the Gwynedd Archaeological Trust (who advises Conwy County Borough Council) will monitor the impact of any mitigation strategies implemented. The monitors would seek to agree a measure of the efficiency in avoiding, reducing or remedying the impacts.

Where necessary this measure would highlight any problem areas and ways in which the measures can be made more effective. When undertaking any monitoring of potential impacts arising from the onshore components there will be performance indicators agreed between the parties against which the efficacy of the mitigation strategies can be gauged. Furthermore an appropriate time-frame for the monitoring programme will be developed, particularly as some deliverables arising from the mitigation actions may have a long-term life-span.

Monitoring will also take the form of regular appraisals undertaken by the local authority in liaison with the developer, the relevant construction contractor and the organisation/individual commissioned to supply archaeological services.

### 11.4.2 Potential visual effects of onshore development

#### 11.4.2.1 Introduction

The following assessments consider the potential visual impacts of the onshore components of the Gwynt y Môr project and associated grid connection works.



The broad nature and extent of the proposed onshore works have been described in Chapter 4. Four options for a possible landfall site near Towyn, Belgrano and Pensarn are currently being considered. From the site that is ultimately selected underground cabling would provide a connection to the onshore substation which would be located just south of the St Asaph Business Park, approximately 7.5 km inland. An access road to the onshore substation would also be required.

An overhead line, together with a separate buried cable circuit, will then connect the new substation with the nearby 400 kV National Grid, via a cable end sealing compound. This new section of overhead line would be a maximum of circa 500 m in length and would incorporate one or two intermediate towers and a single tee-junction tower replacing one of the existing towers on the 400 kV line. A cable end sealing compound would be constructed immediately adjacent to the tee-junction tower. In addition, 'reactive compensation equipment' would be required.

The proposals for the overhead lines will be the subject of a separate consenting process under Section 37 of the Electricity Act. National Grid Transco (NGT) will be preparing the consent application. The potential landscape and visual impacts are, however, considered as part of the following assessment of the onshore components of the Gwynt y Môr project.

#### 11.4.2.2 Methodology

The visual impact assessment for the onshore components has involved site visits to gain an understanding of the character and quality of the landscape, its component features and also identify the likely visual receptors. Reference has been made to published documents which help evaluate landscape quality, particularly the Countryside Strategy for Conwy (1998–2003), the Clwyd Landscape Assessment (1995) and the Denbighshire Landscape Strategy (2003). Having evaluated the local landscape, its capacity to accommodate the new works has been assessed and an assessment of the likely impacts is provided.

For the assessment of visual impacts a 4-point scale has been adopted. The definitions are based on Department of Transport guidance (Design Manual for Roads and Bridges 1993 et seq.) for the assessment of visual impacts of highways schemes. The definitions are frequently adapted for use in assessments for non-highway projects. These definitions can also cover the temporary effects during the construction period.

Substantial adverse effects would arise where the proposed development (or construction activities) would cause a significant deterioration in the existing view enjoyed by highly sensitive receptors, e.g. people in residential or landscape-related recreational situations.

Moderate adverse effects would occur where the proposed development (or construction activities) would cause a noticeable deterioration in the existing view. This can occur in a variety of situations, for example:

- a noticeable deterioration experienced by moderately sensitive receptors e.g. most road users
- a slight deterioration in the existing view enjoyed by highly sensitive receptors
- a significant deterioration in the existing view experienced by relatively insensitive receptors e.g. people at work.

Moderate adverse effects would occur, for example, where new development would be seen by residents or recreational walkers but is proposed in an already developed area or would occupy a large part of the view but would be seen through a partial screen.

Slight adverse effects would occur where the proposed development (or construction activities) would cause a barely perceptible deterioration in the existing view for any receptors, e.g. development which

would occupy a small area of the overall view or would be largely screened by trees and hedges.

No change – this would apply where it is considered that there would be no discernible deterioration in the existing view. This assessment can apply if the components of the view would change, but the quality of the view is assessed as remaining the same.

For the underground cable works, the majority of adverse visual impacts would be temporary in nature and restricted to the construction phase. The construction and operation of the new substation, the short section of overhead transmission line and the cable end sealing compound could, by contrast, also lead to permanent landscape effects.

For the assessment of likely landscape impacts, general comments are made on the character, quality and capacity of the landscape that would be affected, and any potential effects on landscape features such as mature trees and hedgerows are identified. An indication of the potential visual impact of the cable routing, onshore substation, associated road development, the overhead lines and the cable end sealing compound have been conducted based on the current project details and are based around an assessment of the worst case scenario in terms of the area of development and the maximum dimensions of the substation, the cable end sealing compound and the overhead lines.

The onshore development area falls within two broad landscape character zones that were identified in the Clwyd Landscape Assessment (1995). These are LA7 'Coastal and Estuarine Flats' and LA8 'Vale Farmlands'. The existing onshore landscape quality has been summarised in Section 7.4.4.

In considering the potential landscape and visual impacts of the onshore development, the assessment has considered the relevant planning policy context.

#### Colwyn Bay Adopted Local Plan (1999)

Conwy Borough Council has advised that the Colwyn Bay Adopted Local Plan (1999) should be used in considering planning applications.

The principal policy affecting the study area relates to Green Barriers – Policy CN5. This relates to the restriction of development in areas designated as green barriers and includes an area between Abergele and Towyn, immediately to the south of the developed coastal strip. Development in areas covered by Policy CN5 will only be permitted where it does not detract from the open character of the area. All of the proposed works within this area would be underground.

Policy CR4 relates to the provision of new major public open spaces and allocates a number of sites for this purpose. One such site lies immediately to the southwest of the Tir Prince raceway and may be crossed by the buried onshore cables should the cable landfall be made at Towyn. Another such space is allocated under this policy at the Pensarn Gap where cables landed at the Pensarn option would be routed.

Policy CN3 covers 'Special Landscape Areas'. This policy covers the landscape to the south of Abergele but it does not extend north of the A55 and hence lies outside the study area for the onshore works.

#### Conwy County Borough Council Draft UDP (2001)

In addition to the Colwyn Borough Adopted Local Plan it is noted that there is a draft UDP produced by Conwy County Borough Council in 2001 but which remains un-adopted pending the anticipated preparation of a Local Development Plan.



This includes the following notable, which have also been considered as part of this assessment:

*Policy E6: Areas of Landscape Value (ALV).* This policy protects areas of landscape value that would by virtue of their design have adverse effects on landscape quality and visual amenity. The designated area includes the coastal plain between the A55 and the coastal settlements of Belgrano, Towyn and Kinnel Bay, as well as the limestone ridges inland to the south. All of the proposed works within this area would be underground.

*Policy E8: Green Barrier.* This policy (reflecting Policy CN5 in the Adopted Plan) aims to protect land from development that would adversely affect its openness, thereby preventing the coalescence of settlements such as Belgrano and Towyn. All of the proposed works within this area would be underground.

*Policy BE11: Historic Landscape and Gardens.* This policy protects historic landscapes and gardens from development which would have detrimental effects on the character of such features. Kinnel Park, to the southwest of Bodelwyddan and the A55, is covered by this policy. This area would be unaffected by the proposed onshore works.

#### Denbighshire County Council UDP (Adopted 2002)

This UDP contains the following notable policies:

*Policy ENV2: Areas of Outstanding Natural Beauty (AONB).* The UDP policies protect the Clwydian Range AONB but this designated area lies well beyond the zone of visual influence of the proposed onshore works.

*Policy ENV3: ENV3: Local Landscape Area.* These are areas outside the AONB which are considered to be of particular local landscape value. The policies aim to protect these areas from developments that are not capable of being integrated into the landscape without harming the qualities and character which led to its designation. An area of local landscape value is associated with Bodelwyddan Castle, a Cadw Registered Historic Park and Garden on the western boundary of the County. The onshore cabling may pass to the west of the St. Asaph Business Park through an area identified under policy ENV3. None of the major onshore components such as the onshore substation or grid connection would lie in an area covered by this policy.

#### 11.4.2.3 Assessment of the potential landscape and visual impacts of the onshore development

The following sections address the potential effects of the Gwynt y Môr onshore components and associated grid connection works on the landscape character of the surrounding areas and views from within these areas. The assessments address the following specific potential impacts:

- the potential landscape and visual effects of the installation or decommissioning of the buried onshore cables
- the potential landscape and visual effects of the construction, operation and decommissioning of the onshore substation, access road development, overhead lines and the cable end sealing compound.

Section 4.15.7 outlines the work carried out in identifying potential locations for the onshore components of the project. Consideration was given to technical, environmental and feasibility issues including potential visual sensitivities.

#### Potential effect 11.11: The installation or decommissioning of the buried onshore cabling could affect the landscape quality within the cable route corridor

Because all of the onshore cables between the offshore cable landfall and the onshore substation will be installed underground there would be no need for any new overhead transmission lines between these two facilities. An overhead line will only be required over a maximum distance of circa 500 m to connect the 400 kV component of the new substation with the existing 400 kV overhead line which runs close to the southern boundary of the substation location.

The decision to bury all of the cables from the beach landfall to the onshore substation location has been taken by npower renewables in order to avoid adverse landscape and visual effects on the coastal plain to the south of Abergele and Towyn. The avoidance of around 9 km of new overhead lines and associated transmission towers is a major advantage in terms of avoiding significant landscape and visual impacts and represents a key piece of designed-in mitigation for the onshore components of the Gwynt y Môr development as a whole.

The underground cabling works will comprise the installation of between 3 and 6 cable circuits, which would require an installation corridor of up to 40 m wide (this includes not only the cable trenches but also the required temporary haul road). For the purposes of this assessment the potential landscape effects of the cable installation are considered in two discrete sections:

- the 'developed coastal strip', between the landward side of the beach and the inland edge of the housing/caravan sites, including the mainline railway and A548
- the 'open countryside', between the inland edge of the housing/caravan sites and the St. Asaph Business Park.

#### Developed coastal strip

Four potential landfall sites have been identified, which exploit existing gaps (complete or partial) in the almost continuous belt of development along the coastal edge. They are referred to as 'Gaps' in the following descriptions:

#### Pensarn Gap

This, the westernmost gap, lies between the housing developments at Pensarn and Belgrano. The works would include directional drilling through the coastal defences (along which the North Wales Path runs) and underneath the railway line. Inland of the railway are two grassed fields which also abut the A548 and a single grassed field to the south of the A548 which is bordered by housing on both sides.

These fields are over 100 m wide (east-west) and could readily accommodate the 40 m wide construction corridor with no disruption to the landscape pattern. The disturbed ground would be re-instated to grassland upon completion of the works and would not result in any permanent adverse landscape impacts. There would be a temporary, slight adverse visual impact on those properties which front onto the open space during the construction period.

#### Belgrano Gap

Land to the north of the A548 here is occupied by the Ty Gwyn caravan park and there is also an area of derelict land east of the Windjammers Social Club. South of the A548 there is an open gap between housing and a caravan site, which comprises grazing land mostly enclosed by post and wire fencing. As with the Pensarn Gap, the works would include drilling through the coastal defences (route of the North Wales Path) and underneath the railway line.

The gap to the south of the A548 is wider than the Pensarn Gap, and is approximately 400 metres east to west. The cabling works would temporarily disrupt the caravan park and lead to a temporary, moderate adverse visual impacts on units immediately adjacent to the cable route during the construction period.

As with the Pensarn Gap, the cabling works could be readily accommodated within the pastures to the south of the A548 significant disruption of the landscape pattern are anticipated and the land would be reinstated when the works were complete. There are no landscape constraints here in terms of mature tree cover or other landscape features. Most of the properties along the western boundary of the site would be screened from view of the construction works by existing planting therefore neither temporary nor permanent adverse visual impacts are anticipated.

#### Towyn Gap – east and west

At this location the width of the developed zone is wider than further west and the area incorporates a holiday park to the north of the A548 which is slightly further inland at this point. Two potential routes have been identified in this location. The western option would entail a longer length of cabling between the sea wall and the railway. Both options would follow a common route south of the railway. Because this Gap is more developed than the more westerly options, a larger area of caravan park could be temporarily disrupted.

To the south of the A548 there is an open strip of land between residential development to the west and the Tir Prince Raceway and associated attractions to the east. This open space has been landscaped to create a public park with a small lake, playground facilities and sports pitches. A ditch runs along its eastern boundary, although it is bridged to provide pedestrian access between the park and Tir Prince Raceway. A 5 m wide grassed corridor runs along the eastern boundary of the park. There is also open space directly to the east of the public park which may act as potential cable route.

The 40 m wide corridor for the cabling route could encroach into the eastern edge of the public park, requiring the removal of some of the tree and shrub planting, which mostly comprises willows. Replanting of the same species would allow for rapid re-establishment. There could also be temporary loss of the use of the playing fields in the southern part of the park and it may be necessary to re-locate some of the children's play equipment close to the entrance off the A548.

Further south, the cable corridor would cross the existing paddocks adjacent to the string of properties to the west. This would disrupt field boundaries and hedgerows and result in the loss of some mature willows. There would be temporary moderate adverse visual impact on these properties with clear views during the construction phase. Upon completion of the works, the corridor would be reinstated to match the original pattern and there would be no long term adverse landscape or visual impacts.

#### Open countryside

Immediately to the south of the developed coastal strip, the land is flat and comprised mainly of agricultural land. The fields are generally bordered by simple post and wire fencing although there are occasional remnants of hedges. This character continues inland although there is slightly more tree and hedgerow cover, including occasional copses, further to the south.

Progressing further inland the hedgerow and tree cover increases markedly and there are some fine mature oaks in the hedgerows. The land is still flat and below 10 m AOD. At the very eastern end of the cable corridor the topography becomes more varied where the density of tree cover increases.

Potential impacts within the open countryside principally relate to disruption of the landscape pattern. Closer to the coast, to the north of the A547, this would be very limited because the land is flat and fields

are mostly bordered by fences. There are no particular visual constraints on the routing of the cables, other than occasional scattered trees. There are a few scattered properties but visual impacts on these would only occur during the construction phase and be temporary in nature.

The cable route would be installed beneath the River Gele by the use of directional drilling.

As the cable corridor extends further inland there would be more constraints on alignment, and the cable route should be selected to avoid copses and mature tree cover wherever possible. It would be important to reinstate the boundaries to match the character of the neighbouring boundaries which would remain undisturbed.

A cable construction compound will be required for offices, mess rooms, stores and a lay-down area and this would be located adjacent to the cable route at a site yet to be determined. Floodlighting will be required for security and safety reasons. These have the potential to have a moderate adverse visual impact on nearby properties and over the full circa 18 month cable installation period.

However, the potential impacts of the construction compound will be mitigated by appropriate lighting which would minimise night-time visual impacts on any nearby properties, for example use of full cut off lights.

#### Summary of potential visual impacts of cable installation

The potential impacts of the onshore, buried cable installation process will be temporary in nature. Full re-instatement of the cable route, including any affected hedgerows or trees would ensure that **No Long Term, Permanent Visual Impacts** would occur.

The cable installation works do have the potential to cause a short term, temporary visual disturbance to properties adjacent to the works, most notably as the cabling is installed through the coastal strip. In some cases these temporary effects may be of a **Moderate** adverse significance. Mitigation is proposed which will minimise the residual visual impacts to an acceptable level of **Slight Adverse**.

Note that visual effects from the decommissioning process will not occur since it is likely that the onshore buried cables would be left in-situ rather than being removed.

*Mitigation:* Consideration will be given to the need to screen the cable installation works where they pass through the coastal strip to mitigate against any adverse visual effects at adjacent properties. Any need for screening will be further evaluated in association with the Local Authority in defining the final cable installation methodology.

Following cable installation, all land and hedgerows affected will be fully re-instated in order to ensure that no longer term landscape effects occur.

#### Potential effect 11.12: The construction, operation or decommissioning of the onshore substation and cable end sealing compound and the associated overhead lines could affect local landscape quality and give rise to adverse visual impacts

The following assessment considers the potential visual impacts on the permanent onshore components of Gwynt y Môr (that is the onshore substation, road access, overhead lines and cable end sealing compound) in the context of the surrounding landscape. All of these components lie immediately to the south of the St Asaph Business Park.



This contemporary business park has been constructed about 1 km to the west of St. Asaph, with access from the A55 and B5381. The park occupies land which is about 35–40 m AOD, lying in the transition zone between the flat coastal plain and the higher ground of the limestone hills to the south. It straddles the B5381 and extends southwards to a track which runs between Waen Meredydd and St. Asaph, further to the east. The buildings within the business park are mostly two or three storey offices and of high quality design set within landscaped grounds. Older industrial buildings lie to the east.

The general location of the proposed onshore substation lies within a number of fields just to the south of the St Asaph Business Park (Figure 11.3). This area is a flat, farmed landscape with relatively small, rectangular fields bordered by hedgerows and there are several copses within and adjacent to the general substation site. The field pattern is distinctively geometric, with hedgerows oriented on a SW-NE or SE-NW axis and the broadly rectangular copses conform with this overall pattern. The overhead lines and cable end sealing compound will lie within the same landscape but slightly further south.

#### The onshore substation and access road

The precise form and layout of the onshore substation has yet to be determined but it would occupy a plot set within a broad envelope of land to the south of the St Asaph Business Park (Figure 11.3). The overall area within which the substation would be located measures approximately 600 m by 325 m (19.5 ha) and embraces 14 fields, mostly in part but some in their entirety.

Two possible generic designs are being considered for the substation, either of which would have distinct potential visual effects: an air insulated substation (AIS) where all the substation equipment would be open to the environment and a gas insulated substation (GIS) where the equipment would be housed within a building.

The footprint for the AIS option (approx. 220 m by 190 m), would be circa 4.2 ha and the majority of components would be 7 m high, but with a maximum height for a small number of components of up to circa 12 m.

The footprint for the GIS option would be considerably smaller (0.53 ha), although the structures would be higher. The substation components would be largely housed within a building, the height of which would vary between 11 m and 15 m for the 132 kV and 400 kV components respectively.

The final substation design could entail a combination of GIS and AIS components, so that part of the substation might be housed in a GIS building whilst other parts are open as for the AIS option.

In either case, in addition to the substation itself, an area of Reactive Compensation Equipment is also required. This would comprise banks of capacitors and reactors, and a switching and control building. It would have a footprint of approximately 85 m by 95 m and its design, like the substation, could either be of an ‘open’ type or an enclosed building.

Preliminary feasibility studies suggest that it should be possible to site the new substation within the geometric arrangement of fields and copses with only modest disruption to the hedgerow pattern. The majority of hedgerow boundaries would remain intact. Furthermore it is anticipated that all of the surrounding copses could be retained fully intact.

The new access road to the onshore substation will entail either the upgrading of existing tracks or the construction of a new access road to the east or south of the business park. In either case, the proximity of existing roads and development together with the proposed mitigation measures suggests that the visual effect of the access road will be limited within the existing landscape context.

#### Overhead lines and the cable end sealing compound

On the southern edge of the new substation, whether GIS or AIS, a new intermediate tower will be required and this will be in the order of 22 m high. A further new intermediate tower of comparable height will be needed approximately 30–40 m to the south of the substation, providing an intermediate link with a new tee-junction tower (indicative height of 48 m) which would be erected to replace an existing tower of similar height on the Deeside-Pentir 400 kV line. This new tower will be no more than 500 m from the substation. In addition there will be a short section of buried cable connecting the onshore substation to the existing 400 kV lines. This may locally breach an existing hedgerow, which would be fully re-instated following cable installation.

In close proximity to the new tee-junction tower, a cable end sealing compound will be required. This will occupy a footprint of approximately 40 m by 30 m and contain vertical structures with a maximum height of 8 m. It will be surrounded by security fencing.

#### Visual impacts assessment

The closest view of the substation site and associated works will be gained from Waen Meredydd – a property at the end of the lane to the west of the business park. There will also be views from isolated properties on the higher ground to the south and west, for example Pentre Mawr, Tyddyn Meredydd, Pentre Meredydd and Hendy Farm. Views towards the substation site from these locations are, however, partially concealed by landform and tree/hedgerow cover and the views already encompass the existing overhead transmission lines and the rooftops of buildings within the St. Asaph Business Park.

The introduction of one or two new overhead line towers and the new substation (whether of AIS or GIS format) will tend to lead to an intensification of the built ‘urban’ elements within this predominantly rural landscape. Potential adverse visual impacts are considered to be of **Slight to Moderate** and adverse. Views from the east and north will be screened by existing copses and built development within the business park so that impacts in these areas will be significantly less. However, a range of potential mitigation with regard to the onshore substation, cable end sealing compound and the effects of cable installation or temporary construction activity are suggested, which, if fully implemented, will reduce the residual visual impact of the development to an acceptable level of **Slight Adverse** significance.

*Mitigation:* It is proposed that the mitigation of the potential landscape effects of the onshore components of Gwynt y Môr is refined in consultation with the Local Authority. However, the following are currently proposed as the general approach to be considered in relation to the final location and design of the onshore substation and associated grid connection works:

- siting of new works to minimise loss of existing hedgerow and tree cover
- design of the GIS substation (if the selected option) to create a building form which is sympathetic to the local setting
- reinstatement of temporarily disturbed hedgerows and planting of new hedgerow boundaries and copses to help visually contain the new structures
- consideration of strengthening nearby existing hedgerows to reinforce the natural screen
- consideration of locally raising ground levels and planting of severed corners of fields to help screen the new works
- temporary screening of construction works.

Collectively these mitigation measures will act to reduce the potential visual impacts of the substation and the associated grid infrastructure.

#### 11.4.2.4 Summary of likely visual impacts of the Gwynt y Môr onshore development

The preceding assessments of the potential visual impacts of the onshore components of the Gwynt y Môr project has concluded that:

- buried cable installation works will have only temporary adverse visual effects which may be mitigated where necessary by suitable screening
- the permanent onshore development, notably the onshore substation, overhead lines and cable end sealing compound have the potential to cause adverse visual impacts on nearby properties, particularly those to the south of the proposed development, on higher ground
- a range of mitigation is proposed in the form of appropriate planting, screening and design works which when fully implemented will reduce the visual impact to an acceptable level
- the substation and associated grid works should be viewed in the existing context of the St Asaph Business Park and the existing overhead transmission lines in close proximity to the proposed Gwynt y Môr works and grid connection.

In considering the overall visual impact of the onshore components of the Gwynt y Môr project consideration has been given to the principal mitigation adopted by npower renewables in proposing burial of the onshore cables between the landfall point and the onshore substation. In proposing this mitigation, the developer has significantly reduced the potential landscape and visual impacts of the Gwynt y Môr project on the North Wales coastal plain.

#### 11.4.3 Potential noise effects of onshore development

The following sections provide an assessment of the potential impacts on ambient airborne noise levels in relation to the construction, operation and decommissioning of the onshore components of Gwynt y Môr.

##### 11.4.3.1 Relevant guidance

In order to place the predicted noise levels of the construction phase of the onshore components into a proper context and as a basis for judging the likely significance of noise effects generated by construction activities, it is appropriate to refer to the guidance in BS5228: 1997. BS5228 provides advice regarding a number of factors that are likely to affect the acceptability of construction noise including 'site location, existing ambient noise levels, duration of site operations, hours of work, attitude of the site operator and noise characteristics of the work being undertaken'.

Relevant guidance is also given in the Department of the Environment (DoE) Advisory Leaflet (AL) 72, which advises on construction noise limits applicable at residential locations during daytime hours (07:00 – 19:00 hours). Although AL72 is out of print, it remains relevant as guidance on acceptable levels of noise. The publication states that the noise level outside the nearest occupied room of a receptor should not exceed:

- 75 dB(A) in urban areas near to main roads in heavy industrial areas; or
- 70 dB (A) in rural, suburban and urban areas away from main road traffic and industrial noise.

These limits are taken as LAeq,T noise levels. 'T' equates to the period in hours over which construction activities would be undertaken. These guidelines would be applied to all areas of the proposed scheme with the exception of the extremely quiet rural areas. The advice given in the WHO 'Guidelines for Community Noise' which recommend a maximum sound pressure level of 55 dB LAeq to protect the majority of people from being seriously annoyed during the daytime has also been considered. Although these guidelines are intended for a permanent steady, continuous noise source, they are appropriate due to the very low background noise. The 55 dB LAeq specified above would not necessarily indicate that a significant impact would occur in any given area but rather would identify areas where there might be potential for particular disturbance from time to time due to very low ambient noise levels. At night, the WHO guidance recommends that sound pressure levels at the outside façades of the living spaces should not exceed 45 dB LAeq and 60 dB LAmay, so that people may sleep with bedroom windows open.

The Institute of Acoustics/Institute of Environmental Assessment Working Party have recently published draft guidelines for noise impact assessment. These findings are only at a consultation stage. However, they are of some assistance in this assessment. The guidelines provide advice on the issues that need to be considered in a noise impact assessment and whether the appropriate conclusions are being reached. The factors include:

- the appropriateness of the noise parameters used for the situation
- the reference time period used in making the assessment
- the level, character and frequency content of the noise sources under investigation
- how the predicted noise levels relate to relevant standards and guidelines.

The following sections address the potential noise effects that could arise from the onshore components of the Gwynt y Môr project, specifically:

- noise arising from the offshore construction laydown yard (i.e. the noise generated at the port which provides the onshore base for the offshore activities)
- noise generated during the installation of the onshore buried cables
- noise associated with the construction of the onshore facilities, principally the onshore substation
- noise generated by the movement of construction vehicles or associated with road improvements
- noise associated with the decommissioning process
- operational noise arising from the onshore components, notably the onshore substation.

In each case, the likely noise generated by each activity has been defined in relation to the nature of the surrounding environment and the likely sensitivity of potential noise receptors. Therefore, although the precise location or nature of the onshore components has yet to be defined, the likely maximum noise effect from the proposed development has been identified and assessed.

#### Potential effect 11.13: The offshore construction laydown area could affect noise sensitive dwellings

The offshore construction laydown yard will incorporate a large area for storage and assembly of components, temporary office and mess accommodation for construction crew and project engineers and



minor workshop facilities. Such an area would be located at a major construction port within the Liverpool Bay area.

For urban areas near to main roads in heavy industrial areas a significant construction noise impact ( $\geq 75$  dB(A)) may be registered within 50 m of the source. Noise sensitive dwellings at distances of greater than 50 m within urban areas or rural, suburban and urban areas away from main road traffic and industrial noise would not experience a significant construction noise impact ( $\geq 70$  dB(A)). In extremely quiet rural areas, the WHO limit of 55 dB(A) would be exceeded at noise sensitive dwellings within approximately 200 m of the source.

An assessment of the predicted resultant noise levels against the relevant guidance indicates that for noise sensitive receptors within 200 m of the laydown area the predicted increase in noise level would be discernible and, therefore, would be classified as a noticeable impact. However, since the laydown yard will be located at an existing port facility, any effects of noise are assessed to be of **Low** significance and in line with the existing activities at such a site.

*Mitigation/Monitoring:* None required

**Potential effect 11.14: The installation of the onshore cables could result in adverse noise impacts**

Cable trenching activities will be necessary from the onshore cable landfall point to the onshore substation as described in Chapter 4. It is anticipated that the dominant noise sources, such as earth moving plant will be progressing through the proposed cable route corridor as the work proceeds and, as such, any noise effects are expected to be temporary and transient in respect of any given receptor. The predicted noise level from onshore cabling works is presented in Table 11.2.

Distance from source (m)	Site preparation works
0–50	$\leq 75$
50–100	$\leq 69$
100–200	$\leq 62$
200–400	$\leq 55$
400–600	$\leq 52$

**Table 11.2** Predicted noise levels (LAeq, T) from the onshore cabling works

Within the current cable route corridor there are a total of 1,590 properties, of which 130 are commercial. The majority of these properties are located within the coastal strip, for example around Towyn, Belgrano and Pensarn, with a lower density of mainly business properties at the St Asaph Business Park. Along the majority of the onshore cable route, only occasional isolated properties are identified, mainly composed of farm buildings and occasional, isolated residences.

For urban areas near to main roads in heavy industrial areas a significant construction noise impact ( $\geq 75$  dB(A)) may be registered within 50 m of the source. Noise sensitive dwellings at distances of greater than 50 m within urban areas or rural, suburban and urban areas away from main road traffic and industrial noise would not, therefore, experience a significant construction noise impact ( $\geq 70$  dB(A)).

In extremely quiet rural areas, the WHO limit of 55 dB(A) would be exceeded at noise sensitive dwellings within approximately 200 m of the source. An assessment of the predicted resultant noise levels against

the relevant guidance suggests that for noise sensitive receptors within 200 m of the cable installation works the predicted increase in noise level would be discernible and, therefore, would be classified as a noticeable impact.

Therefore, where cable installation occurs within 200 m of dwellings located in quiet rural setting, or within 50 m of dwellings in more urban areas, noise impacts may occur although these would be temporary, intermittent and transient. Where these occur, they are considered to be of potentially **Moderate** significance for those dwelling affected. However, the proposed mitigation will act to reduce the noise effects to an acceptable level, giving a residual significance adjudged to be **Low**. It is also notable that cable installation will be a temporary effect as the installation process proceeds along the cable route, so that noise exposure at any given receptor will be relatively short term.

*Mitigation:* Generic measures for mitigating noise from onshore construction works will be followed, as detailed in the Control of Pollution Act 1974. Any restrictions on periods of operation and locations of specific construction activities should be agreed with the relevant Local Authority.

*Monitoring:* None

**Potential effect 11.15: The construction of the onshore substation and cable end sealing compound could result in adverse noise impacts**

The onshore substation is being proposed at a location immediately to the south of the St Asaph Business Park. The cable end sealing compound is being proposed at one of two locations further south from the substation, beneath the existing overhead 400 kV lines.

The following analysis, presented in Tables 11.3 and 11.4., considers the potential noise generated by the construction of the substation, cable end sealing compound and the new overhead towers together with noise derived from the transport of the major components (for example, the new transformers) to the construction sites.

Distance from source (m)	Site preparation works
0–50	$\leq 73$
50–100	$\leq 66$
100–200	$\leq 59$
200–400	$\leq 52$
400–600	$\leq 48$

**Table 11.3** Predicted noise levels (LAeq,T) from the site preparation works for the onshore substation, cable end sealing compound or new overhead towers

Distance from source (m)	Construction works
0–50	$\leq 74.7$
50–100	$\leq 67.7$
100–200	$\leq 60.6$
200–400	$\leq 53.5$
400–600	$\leq 49.4$

**Table 11.4** Predicted noise levels (LAeq,T) from the construction of new substation, cable end sealing compound or new overhead towers

The transformers required for the onshore substation together with the major components for the cable end sealing compound will be required to be transported to site in one piece on a multi axle heavy loader or similar large vehicle. The predicted noise levels associated with such works are presented in Table 11.5.

Distance from source (m)	Transfer to site
0–50	77.2
50–100	70.1
100–200	63.0
200–400	55.9
400–600	51.8

**Table 11.5** Predicted noise levels (LAeq, T) from transformer transfer

Noise sensitive dwellings at distances of greater than 50 m within urban areas or rural, suburban and urban areas away from main road traffic and industrial noise will not experience a significant construction noise impact ( $\geq 70$  dB(A)). In extremely quiet rural areas, the WHO limit of 55 dB(A) would be exceeded at noise sensitive dwellings within approximately 200 m of the source. An assessment of the predicted resultant noise levels against the relevant guidance suggests that for noise-sensitive receptors within 200 m of the works the predicted increase in noise level would be just discernible and, therefore, would be classified as a noticeable impact.

In common with some of the other onshore construction noise impacts, the area potentially affected by the noise from the substation construction and transformer transfer and the cable end sealing compound works is wide, having not yet been finalised. However the transfer of the transformers to the substation site or major components to the cable end sealing compound area would be an event of short duration; for example, no more than three transformers are required at the substation site.

For urban areas near to main roads in heavy industrial areas a significant construction noise impact ( $\geq 75$  dB(A)) may be registered within 50 m of the source. Noise sensitive dwellings in rural, suburban and urban areas away from main road traffic and industrial noise at distances within 100 m of the source would also experience a significant construction noise impact ( $\geq 70$  dB(A)). In extremely quiet rural areas, the WHO limit of 55 dB(A) could be exceeded at noise sensitive dwellings within just over 200 m of the source. An assessment of the predicted resultant noise levels against the relevant guidance suggests that for noise-sensitive receptors within 200 m of transfer operations the predicted increase in noise level would be just discernible and, therefore, could be classified as a noticeable impact.

It is worth noting that a review of the ordnance survey data for the area to the south of the St Asaph Business Park indicates that there are only a few residential properties within 200 m of the potential substation site or the cable end sealing compound (Figure 11.3).

The effect of the noise generated by the onshore substation is assessed to be of **Low to Moderate** significance for dwellings that occur within 200 m of the substation site in quiet rural settings or at 50 m range for other settings, but will be temporary and intermittent. However, the application of suitable mitigation will act to reduce the residual level of significance to an acceptable level of **Low**.

*Mitigation:* Generic measures for mitigating noise from onshore construction works will be followed, as detailed in the Control of Pollution Act 1974. Restrictions on periods of operation and locations of specific construction activities will be agreed with the relevant Local Authority.

*Monitoring:* None.

**Potential effect 11.16: The movement of construction vehicles engaged in the onshore works or noise from road improvements could result in adverse noise impacts**

Noise sensitive dwellings near the start of the cable route access track (as well as those along public roads leading to access cable access points/tracks) could be subject to elevated noise levels over the entire cable installation period. However, noise sensitive dwellings away from the public highway will be subject to the noise from this transportation source over a far shorter period of time. In addition, traffic noise is likely to be intermittent and transient in nature.

Furthermore, it is anticipated that as construction work progresses along the cable route the access points onto the haul road are also likely to change. Therefore, any noise-sensitive receptors along the cable route are unlikely to be subject to noise from vehicle movements for prolonged periods during the circa 18 month construction period. An indicative assessment of noise levels during the worst case period for noise sensitive dwellings at increasing distances from the source is provided in Table 11.6.

Distance from source	LAeq,T
0–50	$\leq 54.0$
50–100	$\leq 49.9$
100–200	$\leq 45.8$
200–400	$\leq 41.7$
400–600	$\leq 39.3$

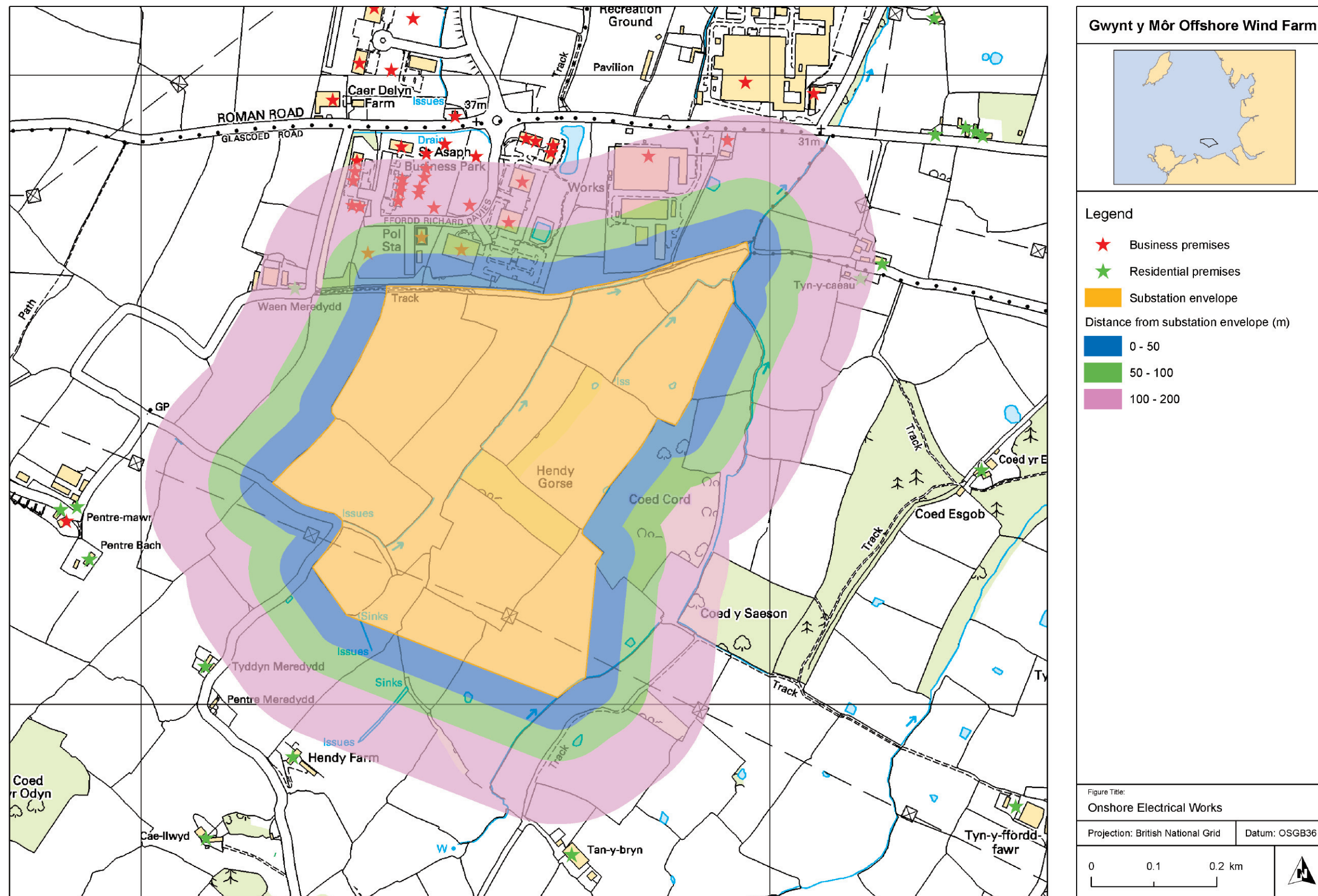
**Table 11.6** Predicted noise levels (LAeq, T) from HGV movements

The predicted noise levels for vehicle movements along access tracks will only be distinct during periods when there were no other construction activities in progress. The noise generated by the specific construction activities is consistently more than 10 dB(A) greater than vehicle noise when both sources are at equivalent distances from a notional noise sensitive property.

Where there is no contribution from construction noise, noise from HGV movements will be more noticeable at close proximity to the source. However the extent of this effect would depend on the existing background noise levels in any given area. Generally, it is unlikely that a significant noise impact will result from vehicle movements, although certain noise sensitive dwellings positioned close to the cable route access tracks and nearer to the start of the tracks will be affected more frequently and over a longer time period than others. Vehicles involved in the construction of the substation or cable end sealing compound would also access those sites via the local road network.

As a general rule, the smallest change in road traffic noise levels which is perceivable to humans is considered to be an increase or decrease in noise levels of 3 dB(A). In order to achieve this magnitude of change, the number of road traffic movements has to double or halve respectively. Therefore for most locations, except for the most lightly trafficked roads in rural areas, it is unlikely that the increase in vehicles due to construction traffic will have any significant effect on noise sensitive properties located close to the local road network. In rural areas where the ambient noise levels are extremely low, the increase in road traffic due to vehicles involved in the construction process could form a noticeable impact from time to time at roadside properties.





**Figure 11.3** Location of residential and business properties within 200 m of the onshore substation, cable end sealing compound and associated grid connection works

Within the cable route corridor there are some 1,460 residential properties. The majority of these properties are located within the coastal strip, for example near Towyn, Belgrano and Pensarn, or near to the A55 and as such would be expected to experience noise from existing road traffic noise sources. In addition, any impacts from construction traffic will be temporary in nature and will not be at a constant level throughout the construction period as site traffic levels would vary considerably. These movements will only occur during the normal working hours, which will minimise disturbance at the nearest noise sensitive properties. As the precise route of the onshore cable, and therefore associated noise impact arising from the associated construction traffic has not yet been defined, a worst case assessment has been adopted to determine potential effects at a range of sensitive receptors

It is likely that during the construction of the new substation it will be necessary to undertake a number of road improvement or construction works to provide an appropriate access route. Further works may also be necessary around access points to the haul routes. Typically, these improvements will be undertaken as part of the circa 18 month onshore construction programme and will consist of some limited earthworks and ground profiling activities, concreting and asphaltting works. Landscaping and fencing works would also be undertaken where appropriate.

Noise sensitive dwellings in rural, suburban and urban areas away from main road traffic and industrial noise within 50 m of these activities will experience a significant construction noise impact ( $\geq 70$  dB(A)). Noise sensitive dwellings in urban areas near to main roads in heavy industrial areas would not experience a significant construction noise impact from this activity. An assessment of the predicted resultant noise levels against the relevant guidance suggests that for noise-sensitive receptors within 50 m the predicted increase in noise level would be discernible and, therefore, would be classified as a noticeable impact.

A slight adverse impact, assessed to be of **Low** significance, will therefore be observed associated with the road access and improvement operations at noise-sensitive receptors located in rural locations within 100 m of the works. Traffic levels will increase during the construction period but it is considered unlikely that the increase in noise levels will impact greatly upon noise sensitive locations and is considered to be of **Low** significance.

*Mitigation:* Generic measures for mitigating noise from onshore construction works will be followed, as detailed in the Control of Pollution Act 1974, restrictions on periods of operation and locations of specific construction activities should be agreed with the relevant Local Authority.

*Monitoring:* None proposed.

#### **Potential effect 11.17: The decommissioning of the onshore components of Gwynt y Môr could result in noise impacts**

It is anticipated that noise arising from the decommissioning of the wind farm will be much less than during the construction phase and the noise generated by this phase is therefore considered to be of **Low** significance.

#### **Potential effect 11.18: The operation of the onshore substation could result in noise impacts**

The onshore substation may have an impact on the surrounding area in terms of the noise generated during its operation. Although the immediate area around the substation is predominantly of commercial use, for residential properties that are located near to the site there could be noise from the operation of

the substation which may be significant when compared to other background sounds during the quietest periods of the night-time.

The impact from the operation of the substation is likely to be limited to those receiver locations in the immediate vicinity of the installation and will therefore be small in number (see Figure 11.3). Vehicle movements related to operation and maintenance of the substation are most likely during normal working hours and are therefore considered insignificant compared to local traffic present in this area.

Control of noise from the substations has been approached in a different way to the operational noise from the turbines. The final design of the substation is yet to be confirmed but the contract for supply of the components to be installed will contain specific criteria to be met. The use of criteria in this way would ensure that any noise emitted is reduced to a level unlikely to give rise to noise problems.

Therefore, although the operation of the substation could give rise to noise effects at the closest dwellings and during quiet night time period which could be of **Moderate** significance, the application of suitable design mitigation will ensure that any noise emitted by the substation is below the acceptable guideline limits and therefore of **Low** significance.

*Mitigation:* To ensure there are no significant noise impacts from the operation of the onshore substation, noise control at point of supply will be implemented. This will seek to ensure that the following criteria are applied in the final substation design and procurement process:

- *power transformers:* noise control shall be provided around the transformers to ensure that the frequency components of the noise at any residential property (measured in one-third octave frequency bands of 100 Hz and its harmonics) are 5 dB or more below existing background noise levels (measured in the same one-third octave frequency bands)
- *cooling fans:* noise control shall be applied to the cooling fans to ensure that noise levels at all residential properties does not exceed 5 dB(A) above prevailing background noise levels.

Calculations done on other installations of this type indicate that the criteria above are achievable in practice. It is not anticipated therefore that noise from the substation is likely to result in residual impacts at nearby residential properties.

#### **11.4.4 Potential effects on traffic**

The construction of the various elements of the Gwynt y Môr Offshore Wind Farm, both offshore and onshore, will involve the transportation of equipment, components, personnel and plant to the various construction or operation sites. The potential impact on traffic movements (or disruption to existing traffic) in the surrounding areas during construction, operation and decommissioning is considered below, based on a site specific traffic study completed in relation to Gwynt Môr (Scott-Wilson, 2005).

The traffic study has considered the potential effects on the following aspects of the Gwynt y Môr project:

- traffic associated with the onshore construction lay down yard for the preparation of the main offshore components during construction
- traffic associated with the onshore cable installation
- traffic associated with the construction of the onshore substation and associated grid connection works
- traffic associated with the operational facilities for the maintenance and control of the offshore components
- road closures to facilitate the construction of the cable route.



The traffic assessment has considered the potential effects of the various onshore components of the Gwynt y Môr project. The assessment has been informed through consultation with the relevant Highway Authorities with regard to road closures to facilitate the construction of the cable route and other onshore works. Consultation has been completed with the following authorities:

- North East Wales Trunk Road Agency – Trunk Road Management Unit
- Conwy County Borough Council – Street Works Section
- Denbighshire County Council – Street Works Section.

*Potential effect 11.19: The construction or decommissioning of the principle offshore components could have an effect on the local traffic network*

Onshore traffic movements associated with offshore construction or decommissioning works are likely to be minimised as it is likely that the majority of offshore components and equipment will be delivered or removed by sea. This may involve the shipping of components to a laydown yard at a port (such as Barrow, Heysham, Holyhead, Liverpool or Mostyn) or alternatively, the shipping of components straight to/from the Gwynt y Môr project area itself.

The main source of traffic associated with the offshore construction will be generated as a result of construction personnel travelling to the area and LGV and HGV deliveries of smaller components. Personnel movements are likely to be related to either on-site laydown yard workers or intermittent offshore construction crew changes.

It is considered that the road network associated with any of the ports being considered will be able to accommodate any temporary increase in traffic flow and potential impacts would therefore be of **Negligible to Low** significance.

*Mitigation:* The suitability of the surrounding road network and its ability to accommodate the temporary increase in traffic flow during construction or decommissioning phases will be taken into consideration when selecting the port to be used.

*Potential effect 11.20: The installation (or removal) of the onshore cables could have an effect on the local traffic network*

Although the precise onshore cable route has yet to be finalised, the cable route corridor being considered has been described in Chapter 4, along with estimated traffic associated with the cable installation process.

It is currently estimated that there will be up to 30 people on site associated with the cable installation at any given time throughout the circa 18 month installation period. An appropriate assumption for the purposes of estimating traffic impacts would be to assume a worst case vehicle occupancy of two persons. On this basis 30 two-way vehicle movements for personnel could be generated per working day. This figure could be significantly reduced if contractors implemented a traffic management strategy that promotes vehicle sharing and mini-bus pick up.

In addition, a considerable number of HGV movements will be required for component delivery, currently estimated to be in the order of 3,500 HGV movements, 216 cable delivery lorry movements and 1,725 miscellaneous vehicle movements over the circa 18 month installation period.

The cable route will also cross a number of roads during installation. Where the route crosses the A55

directional drilling is proposed to avoid the need for any disruption to this key trunk road. All other road crossings will be undertaken by open cut installation methods where temporary road closures would be necessary. This may lead to some localised disruption of traffic during the road crossing process, particularly during the busy summer tourist season.

The increase in traffic associated with the cable installation has the potential to add significantly to the volume of traffic currently using the main haul road access routes – the A547 and A548, although notably both of these are considered suitable for HGV traffic. It should also be noted that HGV movements will be intermittent – at very low levels during certain periods of installation and conversely relatively frequent at other times. Personnel traffic will be more regular, but at circa 30 vehicle movements per day is not considered a significant burden to the local highways network. The impact of all of this traffic must also be related to the seasonal nature of traffic in the region, with significant increases in traffic in North Wales during the peak summer months, particularly July and August.

The impacts of the cable installation process, particularly during the summer season, has the potential to have an effect on the local traffic network which is considered to be of **Moderate** significance, although mitigation is proposed which will reduce the residual level of significance to **Low**.

Decommissioning of the onshore cables by removal is not anticipated. However, were the onshore cables to be removed, a similar level of significance could be expected which would need to be suitably mitigated with regard to the prevailing traffic density and road network at that time.

*Mitigation:* Careful management of the cable installation process together with early and detailed liaison with local authorities will ensure that the disruption caused to local traffic movements is minimised throughout the construction period. The appropriate control and timing of cable installation, particularly where trenching across roads, will be agreed with the local authorities. Particularly traffic sensitive roads such as the A55 (T), A547 and A548 will receive specific attention to avoid significant traffic disruption during cable installation which may include a consideration of the timing of installation activity.

It is proposed that a working party involving representatives of the North Wales Trunk Road Agency, Conwy County Borough Council and Denbighshire County Council is established to consider road closures and diversionary routes during the cable route construction phase

More generally the generation of traffic will be appropriately minimised in so far as practicable throughout the cable installation process, be it HGV movements or traffic associated with construction personnel. For example, this would include adoption of a traffic management strategy that promotes vehicle sharing and mini-bus pick up for construction personnel.

Once the final onshore cable route has been determined further consultation with the National Assembly for Wales (NAW), Local Authorities and other interested parties will be required. In particular, a detailed submission to the NAW for permission to cross the A55 (T) may be required.

In addition the main routes to the nearby Bodelwyddan Hospital will not be affected by the cable installation works.

*Potential effect 11.21: The construction (or demolition) of the onshore substation could effect the local traffic network*

The onshore substation will be located to the south of St Asaph Business Park and although the

surrounding road network is good, an access road will be required from the existing public highway to the proposed substation site. The construction of the access road and onshore substation is described in Chapter 4, including estimated vehicle movements.

The proximity of the A55 means that impacts on local traffic will be minimal with the exception of the area around the St Asaph Business Park where, at times, significant increases in traffic could be noticeable, if intermittent and temporary. These increases are assessed to be of **Low to Moderate** significance, although appropriate mitigation and management procedures will be applied to reduce the residual significance in this area to **Low**.

*Mitigation:* In seeking to minimise any disruption to traffic around the St Asaph area, traffic movements will be kept to a minimum, including where possible the phased deliveries of major HGV loads to reduce local disturbance.

In addition, the main routes to the nearby Bodelwyddan Hospital will not be affected by the substation construction works.

*Potential effect 11.22: The operation of Gwynt y Môr Offshore Wind Farm could have an effect on the local traffic network*

An operational base will be established at a suitable port facility. Traffic to and from this facility will include personnel and LGV/HGV movements. However, it is considered that the road access to the port facility will be suitable to accommodate the additional volume of traffic so that the effects of these operational activities is assessed to be of **Negligible to Low** significance.

Traffic movements to/from the onshore substation, once operational, will be occasional and no significant effects on the surrounding road network are envisaged.

*Mitigation:* Traffic movements will be kept to a minimum with phased deliveries to reduce disturbance. The suitability of the surrounding road network and its ability to accommodate the increase in traffic flow associated with operational maintenance activities should be taken into consideration when selecting the port to be used.

#### 11.4.5 Potential effects on amenity use

The installation of the export cables at the beach landfall location and onshore to the substation location, has the potential to disrupt existing amenity use in and around those areas affected.

*Potential effect 11.23: The installation or removal of the export cables at the beach landfall and across country to the onshore substation could affect amenity use of the cable route area*

The greatest potential for adverse effects on coastal recreation and tourism in the area derives from the installation or removal of the export cable route across the beach at the chosen landfall point (between Pensarn and Kinmel Bay) and cross country to the site of the onshore substation, adjacent to the St Asaph Business Park. The cable crossing will involve a small stretch of beach (circa 100 m wide) from which normal recreational use would be expected to be excluded for the short period of installation (circa 3 to 4 weeks). The installation process will also produce noise which may have an effect on a greater area of the beach.

Many coastal resorts in North Wales rely heavily on tourism as a major source of employment and local economy income. The local beach is one of the features of the area and is important to the local tourism industry. The beach is frequented throughout the year by local residents. In the July to September period the numbers visiting the beach increase with the annual influx of tourists and day-trippers, with numerous activities such as swimming, sun bathing, walking, wind-surfing, jet skiing and dinghy sailing being popular. In the area of the beach landfalls are numerous caravan parks suggesting that the adjacent beach will be used during the peak summer months.

There is the potential for the export cable installation or removal, particularly at the beach landfall location and in the immediate coastal strip behind the beach, to have an adverse effect on the recreational amenity use of the beach and surrounding coastal areas, particularly if installation or removal occurs during the peak July to September period. The area occupied by the installation or removal process will also restrict the space available for recreation, although this is not anticipated to be a significant proportion of the beach. The duration of the temporary exclusion zones and noise disturbance will also be short and proper re-instatement will ensure that there will be no lasting effects. Therefore, although some disturbance will occur, this is predicted to be temporary and spatially restricted and therefore is assessed to be of **Low** significance with regard to amenity use and effects on tourism business.

The remainder of the cable route could involve the temporary closure of some footpaths, bridleways, bye-ways and small coastal amenity roads. Within the cable route corridor a number of footpaths and bridleways are identified by the Ordnance Survey data. These include:

- a footpath between Abergele and Towyn, following in part the route of the River Gele
- a footpath running south from Towyn to the A547
- a footpath running approximately west-east to the south of Towyn Leisure Centre
- a footpath running south-east from the coast at Kinmel Bay and following the River Clwyd along the route of a disused railway
- a footpath and a bridleway both running from the A547 south to Bryn Carrog Farm
- the North Wales coastal path which largely follows the coastline from Abergele east towards Towyn and a number of short footpaths between the coast and the A548
- a number of footpaths running south or south west from the A547 at its interception with the A525 and towards Bryn Carrog Farm or Hall Farm Park
- a continuation of the footpath from Hall farm Park south-east towards St Asaph
- a footpath to the north of Junction 26 of the A55(T).
- a footpath running north-south from Bodelwyddan Hospital to just east of the Marble Church
- a bridleway running approximately west to east to the north of the St Asaph Business Park and joining a further bridleway running approximately north-south to the east of the main business park access road from the A55(T)
- a footpath and a bridleway to the east of the St Asaph Business Park.

Where the cable installation or other construction works necessitate the closure of any of these footpaths or bridleways, this will temporarily restrict the use of these routes and temporarily restrict access to their destinations. In addition, construction noise may have a temporary affect on the amenity use of adjacent routes not subject to closure.

After construction, the cable route and any affected footpaths or bridleways will be reinstated to a high level and through agreement with the Local Authority so that no lasting effect will occur. Decommissioning



of the cable is likely to have similar effects where the removal of cables is required.

The construction of the permanent components of the development, such as the onshore substation or cable end sealing compound, do not directly affect any footpaths or bridleways based on the data shown by the Ordnance Survey.

Effects on amenity use of footpaths or bridleways may, therefore, be subject to some localised and temporary disruption but this is considered to be of **Negligible to Low** significance.

*Mitigation:* To ensure that any disturbance to the amenity use along the cable route is minimised, the following mitigation measures are proposed:

- the installation corridor and exclusion zones will be kept to an appropriate minimum
- the installation duration will be kept to a minimum with sympathetic timings for temporary exclusions being in operation. Details will be agreed with the Local Authority
- notification will be given to local residents along the final cable route of timings and locations of works, including the proposed closure of any pathways, bridleways or roads and areas of the beach
- the visual and noise disturbance that may be generated will be minimised by appropriate construction screening and noise reduction measures. The details of this should be agreed with the Local Authority.

*Monitoring:* The re-instatement of the beach and onshore cable route should be subject to monitoring in association with the Local Authority to ensure the effectiveness of the mitigation proposed and to ensure that there are no long lasting effects on amenity use of the areas affected.

#### 11.4.6 Potential effects on utilities, cables and pipelines

A variety of utilities (cables, pipelines etc) are known to occur across the onshore cable route corridor. The final route design and installation procedure will ensure that the onshore cable crossings required will not impact upon those services present. A major high pressure gas pipeline also runs through the general area proposed for the onshore substation site. The substation location and works will be designed to avoid any effects on this pipeline. Impacts on buried services across the onshore cable route and the gas pipeline at the substation site will be of **Negligible** significance, provided that suitable mitigation is applied.

Mitigation in this respect will include discussions with the local authorities and the relevant utilities companies and owners of all buried assets to confirm the locations of all utilities and to agree the cable installation methodology. Where necessary, the positions of the buried services, cables and pipelines should be accurately established by survey, detection equipment and trial holing.

Any excavated trenches above the existing utilities should take due note of the elevations and positions of all utilities. If the target depth of burial of the new cables in the vicinity of these utilities cannot be safely achieved without compromising their integrity, special measures would be designed to protect the utility and the newly installed cables.

#### 11.4.7 Potential effects on coastal defence and flood risk

The following section provides an overview of the potential effects of the onshore development on coastal

defence and associated flood risk. It is noted that only the onshore cables are relevant to this assessment as they involve a crossing of the flood defence and areas subject to historic flooding. The onshore substation and associated works lie on higher ground to the south and are not subject to current flood risk (www.environment-agency.gov.uk, July 2005).

The North Wales coast from the Dee estuary in the east to Anglesey in the west is identified by the Environment Agency as a flood watch area, having been historically susceptible to flooding. This includes the area between Abergele and Towyn within which the export cables will be landed and the onshore cables run south towards the substation location. The cable route corridor crosses an extensive area of flat coastal flood plain to the north of the A55(T) trunk road. To the south of the A55 the land rises towards the Clwydian Range.

Extensive flooding at the coast in the vicinity of the export cable landfall points last occurred in 1990, when Towyn was extensively flooded following tidal inundation as a result of high tides and gale force winds. Since that time the coastal defences along North Wales, including in the vicinity of Towyn, have been the subject of extensive improvement works, so that extensive flooding has not been experienced since the 1990 event.

The historic flooding of this part of the North Wales coast combined with the need to breach the sea walls during the installation of the export cables for Gwynt y Môr gives rise to the potential for an increase in flooding risk which needs to be carefully considered.

In the preparation of this assessment, both during the scoping process and subsequently in the preparation of this Environmental Statement, the Environment Agency has been consulted with regard to this risk and the proposed methods for the export cable installation. The results of these consultations, together with the acknowledged flood risk in the coastal plain have been taken into account in completing the following assessment.

#### *Potential effect 11.24: The installation of the export cables through the coastal defences and the installation of the onshore cables to the substation could increase the risk of flooding*

In installing the export cables for Gwynt y Môr, the cables will arrive from the offshore array, across the beach and will need to cross through the coastal defence works before being joined to the onshore cables. The onshore cables will then be trenched across the coastal flood plain towards the substation location.

Where the cable needs to be installed in an area protected by hard sea defences (i.e. the landfall options at Pensarn, Belgrano and Towyn East), it is proposed to use directional drilling to drill up to 18 channels beneath the coastal defences, before installing ducting and pulling the single core cables through the ducting. Note that the alternative method of breaching the sea wall and installing the cables before re-instatement of the coastal defence works has been discounted following discussions with the Environment Agency.

The use of directional drilling, whilst the preferred option, nonetheless gives rise to the situation where a number of ducts would be installed under the sea defences for a period of up to two to three years, before all of the export cables were finally installed (installation being phased over the project construction period). This gives rise to the possibility of reducing the integrity of the defences and allowing sea water to flood through the ducts. Suitable methods will be employed to reduce the risk of this possibility and will be agreed with regulators as necessary.

If directional drilling is not technically feasible, alternative methods of crossing the sea wall would be required. These methods would be designed to maintain the integrity of the coastal defence throughout the entire construction process, for example utilising temporary coffer dams.

Installation of the buried cables across the flood plain could also potentially affect flood risk were it to affect the existing drainage systems in that area. The fields covering the coastal plain are understood to have an extensive drainage system installed and are also surrounded by an extensive system of drainage ditches. This area is also crossed by the River Gele which itself has been subject to flooding in the past, although it is now understood to be protected by flood defences (www.environment-agency.gov.uk, July 2005). Disruption of drainage systems, ditches or the flood defences of the River Gele could also increase flood risk in the area.

Cables in this area will be trenched which will temporarily disturb the field drainage and block some of the drainage ditches. However, both systems will be fully re-instated following the cable installation process so that any effects will be temporary and of low significance. Directional drilling of the cables beneath the River Gele is proposed so that effects on the river or the flood defences will not occur.

The installation of the export cables, particularly where this involves directional drilling below the coastal defence and the installation of open ducting, clearly poses a risk to the flood risk in this area. This is potentially of **High** significance, but with suitable mitigation in place any residual effect would be **Negligible**. Effects arising from the installation of the onshore cables across the coastal plain will temporarily disrupt the existing drainage systems and thereby potentially affect flood risk but this is considered to be of **Negligible** significance providing that installation and re-instatement are appropriately designed and completed.

*Mitigation:* The method for installation of the ducting beneath the coastal defences will consider the maintenance of flood defence integrity so that the installed ducting is appropriately blocked to prevent the ingress of sea water.

The precise design of the coastal defence at the chosen landfall will be confirmed, if necessary by on-site surveys, in order to ensure the integrity of the defence through the appropriate design of the cable installation methods.

Drainage ditches and the field drainage system will be fully re-instated following cable installation to ensure there is no change to flood management within the coastal plain.

Methods for the cable installation will be agreed in advance with the Environment Agency and the Local Authority through the provision of detailed method statements.

*Monitoring:* The cable installation works and re-instatement of all drainage and flood defences will be subject to appropriate monitoring in agreement with the Environment Agency and the Local Authority.