9. ACCESS, TRAFFIC AND TRANSPORTATION

INTRODUCTION

9.1. This chapter assesses the environmental impacts that are potentially significant where the proposed Brechfa Forest West Wind Farm is likely to give rise to changes in traffic flows.

9.2. Brechfa Forest West Wind Farm will accommodate 28 wind turbines that will generate approximately 56-84MW. Potentially significant traffic-related environmental impacts are likely to derive from the movement of Heavy Goods Vehicles (HGVs) and abnormal loads (vehicles longer than 17m and/or wider than 4m) using routes to and from the site during construction. Such movements will be associated with deliveries of concrete from off-site works and turbine equipment, for example. Impacts may also occur as a result of necessary upgrades to the site access point or restrictions that are implemented to accommodate the safe movement of construction traffic or worksite access.

9.3. Once the wind farm is operational, it is envisaged that the amount of traffic associated with the scheme will be minimal. Routine visits will be made to the site for maintenance checks. The vehicle used for these visits is likely to be a 4x4 and there might be occasional need for a HGV to access the site for maintenance and repairs. It is considered that the impacts of operational traffic will be negligible and therefore detailed consideration of the operational phase of the development is not included in this assessment.

9.4. The following key issues were identified at the scoping stage for consideration in the assessment:

<table>
<thead>
<tr>
<th>Key Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>The significance of the following impacts on users of local roads and the occupiers and users of land that front the local roads.</td>
</tr>
<tr>
<td>• Severance</td>
</tr>
<tr>
<td>• Driver Delay</td>
</tr>
<tr>
<td>• Pedestrian Delay</td>
</tr>
<tr>
<td>• Pedestrian Amenity</td>
</tr>
<tr>
<td>• Fear and Intimidation</td>
</tr>
<tr>
<td>• Accidents and Safety</td>
</tr>
</tbody>
</table>

9.5. Potential impacts regarding noise and vibration as a result of HGVs and abnormal loads are considered in Chapter 16: Noise and Vibration.

ASSESSMENT METHODOLOGY

9.6. The 2007 Welsh Assembly Government (WAG), Department for Communities and Local Government (DCLG) and Department for Transport (DfT) publication Guidance on Transport Assessment refers to Circular 02/99: Environmental Impact Assessment (Circular 02/99) published by the former Department of the Environment, Transport and the Regions (DETR), provides...
9. Access, Traffic and Transportation

details on environmental assessment in general. However, Circular 02/99 does not provide specific guidance on the approach to traffic and transport related assessment.

9.7. Therefore, this assessment has been undertaken in accordance with the guidance provided in the 1993 Institute of Environmental Assessment (IEA)\(^2\) publication Guidance Notes No. 1: Guidelines for the Environmental Assessment of Road Traffic, hereafter known as the IEMA guidelines. This guidance is the only document available which sets out a methodology for assessing potentially significant traffic-related environmental impacts where a proposed development is likely to give rise to changes in traffic flows.

9.8. The receptors that have been assessed are the users of local roads and the occupiers and users of land that front the local roads. This is because a change in characteristics, such as an increase in traffic and composition of HGVs, could adversely affect them.

9.9. The following rules, summarised from the IEMA guidelines, have been used as a screening process to define the scale and extent of this assessment:

- Rule 1: Include roads where traffic flows are predicted to increase by more than 30% (or where the numbers of HGVs are predicted to increase by more than 30%).
- Rule 2: Include any specifically sensitive areas where traffic flows are predicted to increase by 10% or more.

9.10. The IEMA guidelines elaborate on Rule 1 stating that projected changes in traffic of less than 10% create no discernable environmental impact, given that daily variations in background traffic flow may fluctuate by this amount, and that a 30% change in traffic flow represents a reasonable threshold for including a highway link within the assessment.

9.11. The IEMA guidelines also identify groups, locations and areas which may be sensitive to changes in traffic conditions and which should be considered for assessment. Groups, locations and areas could, for example, include pedestrians, cyclists, shopping areas, schools and accident hotspots. Where traffic flows are predicted to increase by 10% or more, those relevant sensitive groups, locations and areas will be assessed. It should also be noted that the IEMA guidelines also state that other affected parties could be added if the assessor considers it appropriate.

**Data Sources**

9.12. The following data sources have been used in the compilation of this assessment:

- Personal Injury Accidents recorded on the A485, between 2006-2009, obtained from Carmarthenshire County Council.
- Data from Automatic Traffic Counters\(^3\) (ATCs) located along the A485 which were obtained from Carmarthenshire County Council.

9.13. The 2009 Access Study of Abnormal Loads (the 2009 Access Study), which is presented at Appendix 9.1, considered potential routes to the site in order that the most appropriate route for abnormal loads could be identified. The highway authorities responsible for each section of the identified routes were consulted in order to:

- Identify any committed developments, proposed highways/infrastructure schemes or constraints that could have an impact on the feasibility of the proposed routes to the site for abnormal loads and general construction traffic.
- Identify the capacity of the local road network to accommodate traffic generated during construction.
- Identify the names/numbers of unclassified roads.
- Clarify the suitability of the proposed methodology for data gathering, determining traffic growth rates and sources of materials and the relevant policy guidance documents that should be considered.
- Identify any other organisations that require consultation.

9.14. Correspondence was issued to the following consultees in June 2009:

- Carmarthenshire County Council.
- Mid Wales Trunk Road Agency.
- South Wales Trunk Road Agency.
- Dyfed Powys Police.
- Welsh Assembly Government (WAG) (now the Welsh Government).

9.15. Carmarthenshire County Council indicated that they do not foresee any fundamental issues in terms of accessing the site. The main transport issue for Carmarthenshire County Council is ensuring that local residents are kept informed of proposals and that the impact of construction traffic is managed sensitively.

9.16. The response from WAG focused on the delivery of the turbine structures and the resulting impact on the trunk road network.

9.17. Account has been taken of the scoping responses received from, and discussions undertaken with, consultees set out in Table 9.1.

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\(^2\)Now the Institute of Environmental Management and Assessment (IEMA)

\(^3\)An ATC is a means of capturing traffic flow information by placing pneumatic tubes at particular locations across a road. Over a given time period, the ATCs collect data on the direction of passing traffic, the speed at which a vehicle is travelling, the number of vehicles and their classification based on axle length. Vehicles are classified into various groups, such as pedal cyclists, motorcyclists, cars, buses and HGVs.
### Table 9.1: Summary of Access, Traffic and Transportation Consultee Responses

<table>
<thead>
<tr>
<th>Consultee</th>
<th>Summary</th>
</tr>
</thead>
</table>
| Carmarthenshire County Council (CCC) | **Scoping Response:**  
- The Environmental Statement should provide information relating to the preferred route options for delivering the turbines etc. via the trunk road network.  
- The ES should address access issues.  
- Details of current traffic movements along the preferred construction routes need to be provided and the likely conflicts with other road users during the course of construction.  
- Total vehicular movements need to be estimated for the duration of the build process and after completion e.g. those relating to turbine delivery, excavation waste, cranes, maintenance, etc.  
- Where potential environmental impacts have been fully investigated but found to be of little or no significance, it is sufficient to validate that part of the assessment by stating in the report: the work has been undertaken, e.g. transport assessment; what this has shown i.e. what impact if any has been identified, and why it is not significant.  
- Accurate dimension details of the proposed hub and blades will be required in order to fully assess the impact of the delivery route.  
- **Discussions:**  
  - Agreed use of existing data collected by counters located along the A485.  
  - Approved the proposed methodology for data gathering, determining traffic growth rates and sources of materials, as well as the relevant policy guidance documents.  
  - Cumulative developments (i.e. Bryn Llywelyn Wind Farm), that could have an impact on the feasibility of the delivery of parts on the strategic road network.  
  - Provided contact details of other organisations that require consultation. |
| Mid Wales Trunk Road Agency (MWTRA) | No response                                                                                                                                                                                             |
| South Wales Trunk Road Agency (SWTRA) | No response                                                                                                                                                                                             |
| Dyfed Powys Police                 | No response                                                                                                                                                                                             |
| South West Wales Integrated Transport Consortium (SWITCH) | **Discussions:**  
  - The South Wales Trunk Road Agency will be critical in discussions on transporting parts on the strategic road network.  
  - Include reference to the Local Transport Plan for Carmarthenshire or the Regional Transport Plan.  
  - Traffic associated with construction should be considered alongside traffic from the access needs of current users of the land.  
  - Cumulative effects should be taken into account. |
| Department for Energy and Climate Change (DECC) | The ES should contain a Traffic Management Plan with regard to the transport issues. (Note: a TMP will be produced and is referenced in this chapter, but not appended to the ES). |

**Field Survey Methodology**

9.18. A visual inspection of the site and surrounding area was undertaken in May 2009 to review the local road network in the vicinity of the site, to identify potential access routes to Brechfa Forest West Wind Farm and to ascertain possible constraints to access.

9.19. The purpose of the visual inspection was also to identify groups, locations and areas (i.e. receptors) such as pedestrian and cycle crossing points and other areas of pedestrian activity, which may be sensitive to changes in traffic conditions as a result of the construction and operation of the proposed development.

9.20. The visual inspection also considered road links and junctions that could have queuing and capacity issues and that have the potential to be accident blackspots.

**SIGNIFICANCE CRITERIA**

9.21. The significance of each impact is considered against the criteria within the IEMA guidelines, where possible. However, the IEMA guidelines state that:

> “for many effects there are no simple rules or formulae which define the thresholds of significance and there is, therefore, a need for interpretation and judgement on the part of the assessor, backed-up by data or quantified information wherever possible. Such judgements will include the assessment of the numbers of people experiencing a change in environmental impact as well as the assessment of the damage to various natural resources.” (paragraph 4.5)

9.22. In this assessment, significance falls into two categories; not significant and significant. The latter corresponds to significant impacts in accordance with the EIA Regulations. In the absence of established significance criteria for traffic and transport impacts, professional judgement has been used to assess whether the impacts on traffic and transport are considered to be significant, using the IEMA guidelines to identify the scale and extent of the assessment to be undertaken.
9. Access, Traffic and Transportation

**PLANNING POLICY CONTEXT**

**National Policy Statements**

9.23. *Overarching National Policy Statement for Energy (EN-1) and National Policy Statement for Renewable Energy Infrastructure (EN-3)* were designated by the Secretary of State for Energy and Climate Change on 19 July 2011. These National Policy Statements set out national policy against which proposals for major energy projects will be assessed and decided on by the Infrastructure Planning Commission (IPC).

9.24. *EN-1* recognises that disturbance caused by traffic and abnormal loads generated during the construction phase of development will depend on the scale and type of the proposal.

9.25. *EN-1* states that a new nationally significant infrastructure project (NSIP) may give rise to substantial impacts on the surrounding transport infrastructure and the IPC should therefore ensure that the applicant has sought to mitigate these impacts, including during the construction phase of the development. Indeed, the consideration and mitigation of transport impacts is an essential part of the Government’s wider policy objectives for sustainable development.

9.26. *EN-1* elaborates on mitigation requirements, stating that the IPC may attach requirements to a consent where there is likely to be substantial HGV traffic that:

- control numbers of HGV movements to and from the site in a specified period during its construction and possibly on the routing of such movements;
- make sufficient provision for HGV parking, either on the site or at dedicated facilities elsewhere, to avoid ‘overspill’ parking on public roads, prolonged queuing on approach roads and uncontrolled on-street HGV parking in normal operating conditions; and
- ensure satisfactory arrangements for reasonably foreseeable abnormal disruption, in consultation with network providers and the responsible police force.

9.27. National Policy Statement for Renewable Energy Infrastructure (EN-3) states that the suitability of access routes, for both the construction and operation of wind farms, requires consideration and recognises that the former is likely to raise more significant issues, given that sites are often located in rural areas where access for the delivery of turbine components can be problematical. The construction of a wind farm will require sufficient access for long and wide load items. Some individual turbine components can also weigh in excess of 100 tonnes. Therefore, it is important that all sections of roads and bridges on the proposed delivery route can accommodate the weight of the loads.

9.28. Traffic and transport is a key consideration in the development of onshore wind farms, particularly given that public perceptions of the construction phase will derive mainly from the effects of traffic movements.

9.29. The IPC should be satisfied, taking into account the views of the relevant local highway authorities, that abnormal loads can be safely transported in such a way that minimises inconvenience to other road users and that the environmental effects of this and other construction traffic, after mitigation, are acceptable.

9.30. *EN-3* recognises that once wind farms are in operation, traffic movements to and from the site are generally very light, in some instances as little as a few visits each month by a light commercial vehicle or car. The need to replace machine components will generate heavier commercial vehicle movements, but these are likely to be infrequent. Therefore, it is very unlikely that traffic or transport impacts from the operational phase of a project would prevent it from being approved by the IPC.

9.31. *EN-3* also recognises that where cumulative effects on the local road network or residential amenity are predicted as a result of multiple wind farm developments, it may be appropriate for applicants for various projects to work together to ensure that the number of abnormal loads and deliveries are minimised and the timings of deliveries are managed and coordinated to ensure that disruption to local residents and other highway users is reasonably minimised. It may also be appropriate for the highway authority to set limits for and coordinate these deliveries through active management of the delivery schedules through the abnormal load approval process. Once consent for a scheme has been granted, applicants should liaise with the relevant local highway authority (or other coordinating body) regarding the start of construction and the broad timing of deliveries. It may be necessary for an applicant to agree a planning obligation to secure appropriate measures.

**Other Material Considerations**

**National Policy**

9.32. The IPC should also consider national policy such as Planning Policy Wales (PPW) (WAG, 2011), in which Chapter 8: Transport states that the following should be taken into account when determining a planning application for development that has transport implications:

- “the willingness of a developer …to provide infrastructure or measures to manage traffic, to overcome transport objections to the proposed development…;”
- “the environmental impact of both transport infrastructure and the traffic generated; and
- “the effects on the safety and convenience of other users of the transport network.”

9.33. *Technical Advice Note 18: Transport (TAN18)*, which supplements PPW, describes how to integrate land use and transport planning and explains how transport impacts should be assessed and mitigated.

**Carmarthenshire Unitary Development Plan**

9.34. Policy GDC11 (Access & parking facilities) states that, where appropriate, all development will need to be served by:

(i) an appropriate access incorporating visibility requirements so that all vehicles entering and leaving the site should be able to do so in a forward gear;

(ii) appropriate vehicle parking provision, not exceeding the council’s maximum parking standards.

9.35. Policy GDC12 (Generation of traffic) states that “it is the policy of Carmarthenshire County Council that proposals which would generate levels of traffic on the surrounding road network, which would cause harm to highway safety on that network or to the amenity of residents living alongside that network, will be refused.”
9.36. Policy T3 (Highway considerations of development) states that “it is the policy of Carmarthenshire County Council that development proposals (including changes of use) will be permitted, subject to other plan policies, provided that:

(i) the capacity of the local highway network is sufficient to serve the development without detriment to the safety of road users and pedestrians;

(ii) access provision, including turning areas, is of an appropriate standard for vehicles, cyclists and pedestrians.

Where the capacity of the local highway network is insufficient to meet the requirements of the development, upgrading will be required as part of any consent granted.”

9.37. Policy UT5 (Renewable energy) states that “it is the policy of Carmarthenshire County Council that proposals which develop, generate or capture energy from naturally sustainable sources or which minimise energy requirements will be permitted provided that:

(i) proposals either individually or cumulatively would not cause demonstrable harm by virtue of having significant adverse impact on the quality of the local environment…;

(ii) proposals do not have a significant adverse impact in terms of…traffic generation…;”

9.38. Policy UT6 (Wind energy) states that “it is the policy of Carmarthenshire County Council that proposals for wind turbines, wind farms or groups of wind turbines will be permitted provided that the following criteria are met in full:

(i) proposals either individually or cumulatively would not cause demonstrable harm by virtue of having a significant adverse impact on the quality of the local environment…;

(ii) proposals do not give rise to problems of highway safety or place unacceptable demands on the provision of public services.”

9.39. In order to conform with the Carmarthenshire UDP policies described, development on site needs to ensure that highway safety is maintained for all road users, that traffic impact is minimal and that any new infrastructure proposed is designed to standard.

Carmarthenshire Local Development Plan Deposit Draft (2011)

9.40. Policy SP11 (Renewable Energy) states that:

“Development proposals which incorporate… renewable energy production technologies will be supported in areas where the technology can operate effectively and the environmental and cumulative impacts can be addressed satisfactorily”

9.41. In addition, Policy SP11 states that:

“Large scale wind farms will only be permitted within refined Strategic Search Areas.”

9.42. The proposed scheme is predicted to generate most traffic during construction. It is important to note that this phase is temporary and that where the amenity of communities along the proposed construction routes are affected, effective mitigation measures will be implemented to ensure disruption is kept to a minimum.

Carmarthenshire County Council

Other Guidance

9.43. There are three main purposes to Carmarthenshire County Council’s (CCC) Supplementary Planning Guidance for Major Wind Farm Development in the Brechfa Forest Area (July 2008). These are:

• To provide information on the character of the Brechfa Forest Area and its short term development pressures and prospects;

• To encourage developers to design their proposals with maximum sympathy for the local environment;

• To assist determination of applications for major wind farm development.

9.44. The guidance identifies that the extent to which major wind farm development is compatible with safeguarding natural environments depends on factors such as the disturbance caused during construction.

9.45. When interpreting UDP Policy UT6, the guidance recognises that highway safety should be taken into account:

“The main aspect is that during construction, traffic would be managed safely and that changes to local highways should not increase traffic hazards. A detailed traffic management plan should be agreed with the County Council before any development takes place. A secondary aspect is the possibility of driver distraction if suddenly confronted by a view of a turbine. However TAN 8 advises that there is no evidence that motor vehicle accidents have been caused as a result of drivers being distracted by the movement of wind turbine blades. TAN 8 also advises that turbines should be set back by at least the height of the turbine (to blade tip) from the edge of any public highway.” (p.11)

9.46. The guidance also states that:

“Most, if not all, wind farm developments will require some modification to the local highway network and existing forest tracks to allow the delivery of large components, and are also likely to require new tracks to be constructed, together with remodelling of banks and cuttings on steeper slopes. The environmental impact of this can be considerable and should be taken into account when assessing the merits of a proposed development”. (7.7.1)

EXISTING CONDITIONS

Access to Brechfa Forest West Wind Farm

9.47. The construction of Brechfa Forest West Wind Farm will require delivery of abnormal loads, comprising the wind turbine components of the blades, tower sections and nacelle. The 2009 Access Study considered the transportation of Nordex 2.5MW turbines, incorporating a blade length of 44m, along the following routes:

• M4 ➔ A48(T) ➔ A40(T) ➔ A485 ➔ Unclassified Road towards Llanllawddog ➔ Site.

• M4 ➔ A48(T) ➔ A40(T) ➔ A485 ➔ Unclassified Road at New Inn ➔ Site.
9. Access, Traffic and Transportation

- M4 → A48(T) → A40(T) → A485 → Unclassified Road at Llanllwni → Unclassified Road at Clyn-melyn towards Clyniau → Site.

9.48. Based on the routes considered in the 2009 Access Study, and subsequent information available, RWE NRL decided that the unclassified roads would not be used. After the M4 motorway and A48 and A40 trunk roads, access to the wind farm would be via a new route across private land which will link the west of the site with a new priority junction arrangement off the A485. The proposed access route is shown on Figure 9.1. Consideration of alternative access routes and reasons for the selection of the preferred access point is provided in Chapter 3: Scheme Description and Design Strategy.

9.49. The A485 is a two-way single carriageway road that is the primary route between Carmarthen and Lampeter. It is important to note that it is only feasible to access the site via the A485. The A485 has been used by previous wind farm developments in the vicinity, such as Alltwalis Wind Farm which has been fully operational since January 2010, and is therefore suitable to accommodate abnormal loads and construction traffic.

9.50. Consultant Atkins has prepared a Technical Report and drawings (see Appendix 9.2) which describes the proposed access from the A485, including a new priority junction that has been designed to accommodate abnormal loads associated with the delivery of the wind turbine components (i.e. blades, tower sections and nacelles).

Traffic Flows

9.51. Carmarthenshire County Council provided traffic flow data recorded from a count location on the A485 at Alltwalis. This count is the nearest to where vehicles will turn off to access the wind farm. The traffic flows are summarised in Table 9.2.

9.52. The Carmarthenshire traffic counters do not classify vehicles. To make a robust assessment, it has been assumed that 10% of vehicles recorded are HGVs. This assumption is based on professional judgement.

Table 9.2: A485 Traffic Flows

<table>
<thead>
<tr>
<th>Location</th>
<th>Traffic Count</th>
<th>Year of Survey</th>
<th>Traffic Flows</th>
</tr>
</thead>
<tbody>
<tr>
<td>A485 at Alltwalis</td>
<td>2009</td>
<td></td>
<td>Weekday Average (07:00-19:00)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total HGVs Total HGVs</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Saturday (07:00-12:00)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3,096</td>
</tr>
</tbody>
</table>

9.53. Traffic flows recorded along the A40 and A48 sections of the route were not obtained as these are considered too far away from the site for development traffic to impact on existing traffic flows.

9.54. It should be noted that, although HGVs access Brechfa Forest regularly as part of FCW logging activities, these are not proposed within the main block of Brechfa Forest during the construction of the wind farm, however, FCW retain the right to fell, thin and haul timber in the wider Brechfa Forest. It is the intention, however, to minimise this where possible i.e. to within Forest Blocks called: Graig, Cwm Hust, Llystyn, Gwarallt, Dan y Graig, Dolgwyn.

9.55. Current felling undertaken by Forestry Commission Wales (FCW) within Brechfa Forest is phased and, therefore, there may be years where large scale felling (involving HGVs) does not take place. Table 9.3 shows FCW logging vehicle movements4 (provided by FCW) for the area of Brechfa Forest within which the proposed Brechfa Forest West Wind Farm lies. The figures are based on records of timber volume felled over these years (and the associated likely traffic generation) rather than vehicle count information and are, therefore, ‘best guess’ estimates.

Table 9.3: FCW logging vehicle movements

<table>
<thead>
<tr>
<th>Year</th>
<th>2006/07</th>
<th>2007/08</th>
<th>2008/09</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>516</td>
<td>226</td>
<td>348</td>
</tr>
</tbody>
</table>

9.56. Background traffic flows are predicted to increase on the local road network, even if the proposed development does not go ahead. This assumption is based on the forecasts of growth in the volume of motor traffic on roads in Great Britain until the year 2031, as described in the DETR publication National Road Traffic Forecasts (Great Britain) 1997 (NRTF). This issue is considered further under the Assessment of Construction Impacts below.

Sensitive receptors

9.57. Given that residential dwellings front the A485, they are considered to be sensitive receptors with regard to the potential impact of traffic increases. As such, the lower threshold of a 10% increase in traffic has been applied to this road above which an assessment of potentially significant traffic-related environmental effects will be triggered.

Personal Injury Accidents

9.58. Personal Injury Accidents (PIAs) are road traffic accidents where either slight, serious or fatal injuries to people have been recorded. The data includes information such as the location of the accident, number of casualties, the modes of travel involved, age and gender of those involved and the factors contributing to the accident.

9.59. Recorded PIAs were obtained from Carmarthenshire County Council for a section of the A485, between Carmarthen and the access route to Brechfa Forest West Wind Farm for a four year period between 2006 and 2009. The recorded PIAs were reviewed in order to determine whether there is a history of accidents in the vicinity of the site and the causation factors. The results are summarised in Table 9.4.

Table 9.4: Personal Injury Accidents

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4 Vehicle movements are taken to be a single movement i.e. a logging vehicle entering Brechfa Forest is one vehicle movement, the same vehicle exiting the Forest is a second vehicle movement.
9.66. Critical operations (e.g. a foundation concrete pour that cannot be stopped before completion or the lifting of turbine parts where the work has to continue to a safe condition) may also require working outside of standard hours.

9.67. Concrete batching will be undertaken off site. For the purpose of assessment, it has been assumed that all concrete batching will take place at Cross Hands (southeast of Carmarthen) and route to the site via the A485.

9.68. The onsite borrow pit will produce approximately 40,000m$^3$ of general aggregate for the access tracks, crane hardstanding areas etc. Stone that cannot be provided from the borrow pit for specification reasons (e.g. roadstone) is likely to be sourced from Dinas Quarry, located near Llansawel, and brought to site via the B4337 northbound (via Rhycymerynau) and then the A485 southbound. This route is indicative only at this stage, the actual routing will be finalised closer to construction.

9.69. For the purpose of calculating HGV movements, it is assumed that approximately half of the stone required for each element of the development can be provided by the onsite borrow pit.

9.70. All HGVs and abnormal loads will use the agreed access routes, which will specified in a Traffic Management Plan (TMP).

9.71. Estimated traffic generation during the construction phase has been based on the assumption that the following activities will take place:

- Felling.
- Ground clearance and preparation.
- Delivery and removal of plant and equipment.
- Establishment of borrow pit.
- Delivery of road stone for the temporary construction compounds.
- Delivery of road stone for the construction of access tracks, and crane and permanent anemometer mast hardstanding areas.
- Delivery of geogrid material for the construction of access tracks.
- Delivery of concrete for the construction of the turbine base foundations, permanent anemometer mast foundations, and substation foundations.
- Delivery of the materials required for the construction of the electricity substation.
- Delivery of cable to connect the turbines.
- Delivery of sand to backfill cable trenches.
- Delivery of formwork and reinforcing steel for the construction of the turbine foundations.
- Delivery and removal of mobile crane parts used to erect the turbines.

9.60. Of the 50 PIAs recorded over the past four years, only six involved vehicles over 7.5t, and none of these resulted in fatalities. No common causation factors were noted and no PIAs were recorded near the location of the proposed site access.

9.61. The fatality recorded in 2007 occurred on a wet road surface in dark conditions, between Pontarsais and Alltwalis, following a car skidding off the carriageway.

MODIFICATIONS TO SCHEME DESIGN

9.62. Modifications to the scheme design resulted in a decrease to the number of turbines proposed, as a result of ecological and landscape considerations. The evolution of the scheme is described in detail in Chapter 3: Scheme Description and Design Strategy.

ASSESSMENT OF CONSTRUCTION IMPACTS

Construction Activities

9.63. It is anticipated that construction of the wind farm will commence in 2013 and take place over a 22 month period. For the purpose of the assessment of traffic impacts, it has been assumed that the construction period will be preceded by approximately three months of felling to enable the works to proceed. This represents a ‘worst case’ scenario as felling works are likely to take place over a longer period than this and therefore traffic movements will be less intensive.

9.64. FCW do not intend to be undertaking any other felling, thinning and haulage of timber within the blocks of forest where Brechfa Forest West and Brechfa Forest East Wind Farms are proposed during construction (possibly excluding any felling relating to windthrow/fire or under The Plant Health (Forestry) Order 2005). Nor do they intend to be undertaking any felling, thinning and haulage of timber within the main block of Brechfa Forest known as Byrgwm/Dysgwylfa i.e. west of the Gorlech River to Byrgwm Forest Entrance. FCW retain the right to fell, thin and haul timber in the wider Brechfa Forest, however, it is the intention to minimise this where possible i.e. to within Forest Blocks called: Graig, Cwm Hust, Llystyn, Gwaralt, Dan y Graig, Dolgafros.

9.65. The construction programme will be based on a working week of 5.5 days (07:00 to 19:00 hours on weekdays and 07:00 to 12:00 hours on Saturdays). Generally, night time or Sunday work will not be permitted. However, work outside of these hours may occur should there be a requirement to disassemble, move and re-assemble the main cranes if, for any reason, this work is not completed within normal working hours.

<table>
<thead>
<tr>
<th>Year</th>
<th>Severity of Accident</th>
<th>No. of Casualties</th>
<th>PIAs involving pedestrians</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Slight</td>
<td>Serious</td>
<td>Fatal</td>
</tr>
<tr>
<td>2006</td>
<td>11</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>2007</td>
<td>13</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2008</td>
<td>12</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>2009</td>
<td>7</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>43</td>
<td>6</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 9.4: Summary of recorded PIAs
9. Access, Traffic and Transportation

- Delivery of the turbine components, including the nacelle, tower sections and blade sets.
- Delivery of foundation rings.
- Delivery of blade hubs.
- Delivery of the permanent anemometer mast.

9.72. These activities are outlined in more detail below. It should be noted that, in calculating traffic generation, account is taken of the return journey of the delivery vehicle. Therefore, deliveries are estimated as vehicle movements (i.e. a delivery vehicle entering the site is one vehicle movement and a delivery vehicle exiting the site is another vehicle movement).

9.73. It is estimated that the peak number of construction staff on site would be approximately 150, with a daily average of around 70. These staff will arrive/depart by various modes of transport from/to different locations and will vary according to which element of construction is taking place. Therefore, trip generation and trip distribution is difficult to predict. Assuming there are 70 arrivals and 70 departures during a 12 hour working weekday, this would equate to approximately 12 vehicle movements (6 arrivals and 6 departures) per hour being generated. Even if 150 staff were to travel to site per day, this would equate to 25 vehicle movements per hour being generated. It is considered that such minor traffic flows will be imperceptible on the local road network. Additionally, it is assumed that minibuses will be provided to transfer construction staff to site and that construction staff will share car, where possible, thereby further reducing anticipated traffic generation. Therefore, construction worker movements have not been considered in this assessment.

**Felling**

9.74. Areas of forestry will be felled to prepare the site ahead of commencement of the construction programme. However, the route to be taken by contractors’ vehicles has not been specified by FCW.

9.75. Forestry Commission Wales has run models of anticipated timber volumes associated with the wind farm felling. Using a forecast year of 2013, it is expected that approximately 6,957m³ of standing timber will be produced. Based on 1.24 tonnes per m³ of over bark standing (OBS, the unit for standing timber), the removal of 8627 tonnes of timber from site will be required. Assuming a lorry can carry 20 tonnes, this equates to 432 lorry loads or 864 vehicle movements.

**Site clearance**

9.76. It is estimated that approximately four HGVs will be required to deliver plant to undertake site clearance work i.e. mulching, prior to the arrival of construction plant and equipment. This is equivalent to 16 vehicle movements, to deliver and subsequently remove the plant from site.

**Plant & Equipment**

9.77. A range of plant and equipment is expected to be delivered to site near the onset of the works and will be removed as soon as practical at the end of the activity for which the equipment relates.

9.78. It is estimated that there will be approximately 16 portacabins; six containers; one excavator and a further 12 other items. If each of the above constitutes as one HGV trip per item, it is estimated that this will require 35 deliveries resulting in 70 vehicle movements for the delivery and similarly 70 vehicle movements for removal.

**Borrow Pit Establishment**

9.79. It is estimated that there will be approximately four excavators; six dumpers; one bull-dozer; and four crushers required to establish the borrow pit. Each excavator, bull-dozer etc. will be delivered on one low loader each. An estimated 15 deliveries would be required resulting in 30 vehicle movements for the delivery and similarly 30 vehicle movements for removal.

**Temporary Construction Compounds**

9.80. Two temporary construction compounds are required to accommodate the delivery of plant and equipment at the onset of the works. These areas will require a hardstanding footing of approximately 2,500m² (50m x 50m).

9.81. Based on a fill depth of 0.5m, each hardstanding area will be 1,250m³. Based on a density of 1.8t/m³, approximately 2,250 tonnes of stone would be required for each hardstanding area, 4,500 tonnes in total. It is assumed that half of this requirement can be met from the onsite borrow pit, leaving 2,250 tonnes of aggregate to be provided from off site. Assuming an HGV can carry 20 tonnes of stone, an estimated 113 deliveries of road stone will be required, resulting in a total of 226 vehicle movements.

**Access Tracks**

9.82. A total of 21,659m (21.8km) of track length will be required for Brechfa Forest West Wind Farm; the design of which will comply with the Forestry Civil Engineering Handbook (incorporating the Department for Transport’s ‘Design Manual for Roads and Bridges’).

9.83. It is anticipated that 9,055m (9.1km) of turbine spur roads and new access tracks will be required. For a robust assessment, and as a worst case scenario, a figure of 10% has been added to this anticipated requirement to take account of widening on bends, turning areas and passing places. Therefore, there is a total requirement of 9,961m (9.96km) of turbine spur roads and new access track to be constructed. Based on a fill depth of 0.5m for the running width of the tracks (5m) and a fill depth 0.25m for the 1m sloping shoulders either side, it is estimated that there will be an approximate requirement of 29,883m³ of crushed stone.

9.84. In addition to the new access track requirements, 12,604m (12.6km) of the existing FCW track will require upgrading to the necessary width of 7m. Again, for a robust assessment, and as a worst case scenario, a figure of 10% has been added to the anticipated requirement to take account of possible widening on bends, turning areas and passing places. Therefore, there is a total requirement of 13,865m (13.9km) of existing FCW access track that needs to be upgraded. Based on a fill depth of 0.5m for the running width of the tracks (5m) and a fill depth 0.25m for the 1m sloping shoulders either side, it is estimated that creating this length of new track would require approximately 41,595m³ of crushed stone. However, given that the tracks are just being upgraded and will have been constructed to the specification required in the Forestry Civil Engineering Handbook (although some tracks will require more upgrading than others), it is estimated that the amount of crushed stone actually required will be 20,798m³ (approximately half).
9.85. The total requirement of road stone equates to 50,681m³ (or 91,226 tonnes of stone, based on a density of 1.8t/m³). It is assumed that half of this requirement can be met from the onsite borrow pit, leaving 25,341m³ or 45,613 tonnes of aggregate to be provided from off site. Assuming an HGV can carry 20 tonnes of stone, it is considered that an estimated 2,281 deliveries of crushed stone would be required for this activity, resulting in a total of 4,562 vehicle movements.

Geogrid

9.86. The total length of access track (21,659m) will require construction using two layers of a reinforcing geogrid material. This equates to 43,318m (43.3km) of geogrid material.

9.87. Assuming that the geogrid material is delivered in 50m rolls that are 2.5m wide, 4 rolls will be required to cover one 50m stretch. Therefore, it is anticipated that 4 x 867 rolls of geogrid material will be required. This equates to 3,468 rolls of geogrid material. Given that an HGV can carry ten rolls, 347 deliveries will be required resulting in a total of 694 vehicle movements.

Turbine Base Foundations

9.88. Each turbine will require up to 400m³ of concrete per base (20m x 20m x 1m), including a 1m upstand. Given that 28 turbines are proposed for the site, a total volume of approximately 11,200m³ of concrete would be required.

9.89. Assuming a load capacity of 6m³ per HGV, 1,867 loads would be required which would result in 3,734 vehicle movements.

Turbine Crane Hardstanding Areas

9.90. Each turbine will require a crane operation area of approximately 1,000 m². Based on a fill depth of 0.5m, each crane operation area volume will be 500m³. Based on a density of 1.8t/m³, approximately 900 tonnes of road stone will be required per turbine. It is assumed that half of this requirement can be met from the onsite borrow pit, leaving 450 tonnes of aggregate per turbine to be provided from off site (12,600 tonnes in total).

9.91. Assuming an HGV can carry 20 tonnes, an estimated 23 deliveries of road stone would be required per turbine. Based on 28 turbines it is considered that an estimated 644 deliveries will be required, resulting in 1,288 vehicle movements in total.

Permanent Anemometer Mast Crane Hardstanding Area

9.92. The permanent anemometer mast will require a crane operation area of approximately 1,000 m² (25m x 40m). Based on a fill depth of 0.5m, the crane operation area volume will be 500m³. Based on a density of 1.8t/m³, approximately 900 tonnes of road stone will be required. Assuming half of this requirement can be met from the onsite borrow pit, 450 tonnes will be required from off site.

9.93. Assuming an HGV can carry 20 tonnes, an estimated 23 deliveries of road stone would be required for this activity, resulting in a total of 46 vehicle movements.

Permanent Anemometer Mast and Foundations

9.94. The permanent anemometer mast will be delivered between months 8-14 of the construction programme. Delivery will be undertaken by one HGV which would result in two vehicle trips (i.e. one vehicle arrival and one vehicle departure).

9.95. The mast will require concrete for its foundations. Assuming an area of 40m x 25m and a depth of 0.5m, this equates to 500m³ of concrete required. With a load capacity of 6m³ per HGV, 84 loads will be required, which equates to 168 vehicle movements.

9.96. In total, establishing the permanent anemometer mast and foundations will result in 170 vehicle movements.

Electricity Substation

9.97. Although the exact substation specification is yet to be confirmed, 10 loads are assumed to be required to deliver building materials, electrical equipment, associated fencing etc. resulting in 20 HGV movements (10 in and 10 out). In addition, it is assumed that 8 loads of concrete would be required for the substation foundations, resulting in 16 vehicle movements.

Electricity Substation Compound

9.98. The substation compound will be approximately 4,080m² (60m x 68m). Based on a fill depth of 0.5m, the substation compound area volume will be 2,040m³. Based on a density of 1.8t/m³, approximately 3,672 tonnes of road stone will be required. Assuming half of this requirement can be met from the onsite borrow pit, 1,836 tonnes will be required from off site.

9.99. Assuming an HGV can carry 20 tonnes of stone, an estimated 92 deliveries of road stone will be required for this activity, resulting in a total of 184 vehicle movements.

Cabling

9.100. Underground cabling will be installed onsite to connect the turbines with the substation. Based on the proposed turbine and substation arrangement, a maximum of 31,522m (31.5km) of cable would be required.

9.101. Assuming that the cable is delivered in 500m drums and an HGV can carry eight drums (i.e. 4km of cable), it is estimated that eight loads are required resulting in a total of 16 vehicle movements.

Sand

9.102. The 31,522m of cable will be laid in channels that will be protected by a maximum of 300mm (0.3m) of soft sand and, where appropriate, backfilled with material from excavations on the development site. The cable will be laid in the channels in the following arrays (based on an indicative cable layout):

- One cable: 7,483m.
- Two cable: 17,734m (8,867m x 2).
- Three cable: 861m (287m x 3).
9. Access, Traffic and Transportation

- Four cable: 5,444m (1.361m x 4)

9.103. The channels for the one cable arrays will be 1m deep x 0.625m wide. Given that 0.3m of sand will be required over 7,483m, 1,404m³ of sand will be required. Based on a density of 1.6t/m³, 2,247 tonnes of sand will be required which, based on a HGV carrying 20 tonnes per load, would result in 113 loads and 226 vehicle movements in total for the one cable arrays.

9.104. The channels for the two cable arrays will be 1m deep x 1.9m wide, which is a worst case estimate. Given that 0.3m of sand will be required over 8,867m, 5,055m³ of sand will be required. Based on a density of 1.6t/m³, 8,088 tonnes of sand will be required which, based on a HGV carrying 20 tonnes per load, would result in 405 loads and 810 vehicle movements in total for the two cable arrays.

9.105. The channels for the three cable arrays will be 1m deep x 1.9m wide. Given that 0.3m of sand will be required over 287m, 164m³ of sand will be required. Based on a density of 1.6t/m³, 263 tonnes of sand will be required which, based on a HGV carrying 20 tonnes per load, would result in 14 loads and 28 vehicle movements in total for the three cable arrays.

9.106. The channels for the four cable arrays will be 1m deep x 2.7m wide. Given that 0.3m of sand will be required over 1,361m, 1,103m³ of sand will be required. Based on a density of 1.6t/m³, 1,765 tonnes of sand will be required which, based on a HGV carrying 20 tonnes per load, would result in 89 loads and 178 vehicle movements in total for the four cable arrays.

Formwork & Reinforcing Steel

9.107. Formwork and reinforcing steel is required for the concrete turbine bases. Each turbine will require two deliveries of steel (37.5 tonnes of steel per delivery). In addition, a total of 14 loads of formwork will be required for all 28 bases.

9.108. Based on 28 turbines, a total of 70 deliveries will be required which would result in 140 vehicle movements.

Foundation Rings

9.109. Each turbine base includes a circular steel foundation ring to suit the base profile of the turbine tower. Typically, three foundation rings can be loaded onto an HGV. Therefore ten loads would be required, resulting in 20 vehicle movements.

Mobile Crane Parts: Delivery & Removal

9.110. It is assumed that mobile crane parts, including ballast, will be used to erect the 28 turbines and will be delivered on a maximum of ten HGVs. A total of 40 vehicle movements would be generated in total (i.e. 20 vehicle movements during delivery and 20 vehicle movements during removal).

Turbine Components

9.111. Eight vehicles are required to deliver the components for each turbine (assuming one for the nacelle, three for the blade set and four for the tower). Given that there are 28 turbines proposed on the site, a total of 224 loads would be delivered, resulting in 448 vehicle movements.

Blade Hubs

9.112. Each turbine requires a hub to attach the blades to the nacelle. Typically, three hubs can be loaded onto an HGV. Therefore ten loads would be required, resulting in 20 vehicle movements.

Traffic Generation

9.113. Table 9.5 summarises the predicted traffic generation associated with each activity during the construction phase, including estimated trips made to/from Dinas Quarry. Table 9.6 shows the total vehicle movements that will arrive / depart the wind farm across the indicative construction programme as shown in Chapter 3: Scheme Description and Design Strategy (with the addition of three months for felling).

9.114. In order to be comparable with the existing traffic flow data, the figures in Table 9.6 must be converted into daily flows. As such, the last row of Table 9.6 shows the total daily vehicle movements by month. These are based on an average of 4 weeks per month and 5.5 working days per week, which equates to 22 working days per month.

Table 9.5: Traffic Generation during Construction

<table>
<thead>
<tr>
<th>Activity</th>
<th>Total loads</th>
<th>Total vehicle movements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Felling</td>
<td>432</td>
<td>864</td>
</tr>
<tr>
<td>Ground Clearance and Preparation</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>Mobilisation and enabling works</td>
<td>35</td>
<td>70</td>
</tr>
<tr>
<td>Borrow Pit</td>
<td>15</td>
<td>30</td>
</tr>
<tr>
<td>Construction compounds</td>
<td>113</td>
<td>226</td>
</tr>
<tr>
<td>Access tracks</td>
<td>2,281</td>
<td>4,562</td>
</tr>
<tr>
<td>Turbine foundations</td>
<td>1,867</td>
<td>3,734</td>
</tr>
<tr>
<td>Crane hardstanding areas</td>
<td>644</td>
<td>1,288</td>
</tr>
<tr>
<td>Substation and anemometer mast</td>
<td>23</td>
<td>46</td>
</tr>
<tr>
<td>Permanent anemometer mast crane hardstanding area</td>
<td>855</td>
<td>170</td>
</tr>
<tr>
<td>Permanent anemometer mast and foundations</td>
<td>18</td>
<td>36</td>
</tr>
</tbody>
</table>

Table 9.6: Traffic Generation during Construction (with the addition of three months for felling)
<table>
<thead>
<tr>
<th>Activity</th>
<th>Total loads</th>
<th>Total vehicle movements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity substation compound</td>
<td>92</td>
<td>184</td>
</tr>
</tbody>
</table>

**Cabling and electrical works**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Total loads</th>
<th>Total vehicle movements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cabling</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>Sand</td>
<td>621</td>
<td>1,242</td>
</tr>
</tbody>
</table>

**Erection of turbines**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Total loads</th>
<th>Total vehicle movements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formwork &amp; reinforcing steel</td>
<td>70</td>
<td>140</td>
</tr>
<tr>
<td>Foundation rings</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>Mobile crane parts: Delivery</td>
<td>10</td>
<td>20</td>
</tr>
</tbody>
</table>

**Commissioning and restoration**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Total loads</th>
<th>Total vehicle movements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant &amp; equipment: Removal</td>
<td>35</td>
<td>70</td>
</tr>
<tr>
<td>Removal of Borrow Pit Equipment</td>
<td>15</td>
<td>30</td>
</tr>
<tr>
<td>Mobile crane parts: Removal</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>6,973</strong></td>
<td><strong>13,946</strong></td>
</tr>
</tbody>
</table>

### Table 9.6: Vehicle Movements per Month during Construction

| Activity                          | Felling 1 | Felling 2 | Felling 3 | Felling 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
|-----------------------------------|-----------|-----------|-----------|-----------|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Felling                           | 288       | 288       | 288       |            |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Ground Clearance and Preparation  |           |           |           | 4          | 4  | 4 | 4 |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Mobilisation and enabling works   |           |           |           | 26         | 22 | 22|   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Borrow Pit Establishment          |           |           |           | 10         | 10 | 10|   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Construction compounds            |           |           |           | 112        | 114|   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| Access tracks                     |           |           |           | 584        | 584| 584| 584| 584| 584| 584 | 584 | 584 | 584 | 584 | 584 | 584 | 584 | 584 | 584 | 584 | 584 | 584 | 584 |
| Turbine foundations               |           |           |           | 374        | 374| 374| 374| 374| 374| 374 | 374 | 374 | 374 | 374 | 374 | 374 | 374 | 374 | 374 | 374 | 374 | 374 | 368 |
| Crane hardstanding areas          |           |           |           | 144        | 144| 144| 144| 144| 144| 144 | 144 | 144 | 144 | 142 | 142 | 142 | 142 | 142 | 142 | 142 | 142 | 142 | 142 |
| Cabling and electrical works      |           |           |           | 180        | 180| 180| 180| 180| 180| 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 |
| Erection of turbines              |           |           |           | 94         | 94 | 92 | 92 | 92 | 92 | 92  | 92  | 92  | 92  | 92  | 92  | 92  | 92  | 92  | 92  | 92  | 92  | 92  | 92  | 92  |
| Commissioning and restoration     |           |           |           | 40         | 40 | 40 | 40 |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| **Total**                         | 288        | 288        | 288        | 4           | 4  | 4 | 4 | 4 | 4 | 732 | 730 | 990 | 1,022 | 1,164 | 1,344 | 1,344 | 1,344 | 1,344 | 758 | 790 | 782 | 234 | 92 | 132 | 132 | 40 |

**Daily Vehicle Movements**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Daily vehicle movements</th>
<th>Daily vehicle movements</th>
<th>Daily vehicle movements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>14</td>
<td>14</td>
<td>14</td>
</tr>
</tbody>
</table>

* Where monthly vehicle movements are low, the lowest possible whole vehicle movement has been used i.e. two: one vehicle entering the site and one vehicle exiting the site.

9.115. Table 9.6 shows that the maximum traffic impact associated with the construction of the proposed wind farm is predicted to occur during months 10, 11, 12 and 13 of the 22 month construction programme. During this period, an average of 62 vehicle movements is predicted on each working day, i.e. 31 vehicles in and 31 vehicles out. On average, this equates to approximately six HGV movements arriving/departing per hour over a 12 hour period (Monday to Friday, 07:00-19:00).

**Percentage Change**

9.116. Background traffic flows on the local road network are predicted to increase, even if the development does not go ahead, and these need to be established in order for a robust assessment of impacts to be made. This assumption is based on the forecasts of growth in the volume of motor traffic on roads in Great Britain until the year 2031, as described in the DETR publication National Road Traffic Forecasts (Great Britain) 1997 (NRTF).

9.117. Therefore, the traffic flows recorded along the A485 require a growth factor to be applied to them in order to estimate traffic flows in the year of assessment. In this case the assessment year is assumed to be 2013, the year during which construction activities are expected to commence.

9.118. A central growth estimate of 1.061 (6.1%) between 2009 and 2013 was derived from the NRTF. The central estimate is considered to be the most likely outcome in most cases.
9. Access, Traffic and Transportation

9.119. TEMPRO\(^1\) was used to adjust this estimate to take account of local growth in Carmarthenshire, from which a factor of 1.054 (5.4%) was determined. Table 9.7 shows the resultant predicted base traffic flows in 2013.

Table 9.7: A485 Traffic Flows - 2013

<table>
<thead>
<tr>
<th>Location</th>
<th>Year of Survey</th>
<th>Traffic Flows</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Weekday Average</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(07:00-19:00)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
</tr>
<tr>
<td>A485 at Alltwalis</td>
<td>2013</td>
<td>3,264</td>
</tr>
<tr>
<td></td>
<td>Saturday</td>
<td>1.912</td>
</tr>
</tbody>
</table>

9.120. A percentage impact exercise, comparing construction traffic against 2013 background traffic on the A485 was conducted for the month in which the maximum traffic generation is estimated during the construction programme, i.e. months 10, 11, 12 and 13.

9.121. Table 9.8 shows the predicted percentage impact at the traffic count locations.

Table 9.8: Movements per Day during Construction (2013)

<table>
<thead>
<tr>
<th>Location</th>
<th>Total number of vehicles</th>
<th>Number of HGVs</th>
<th>Number of construction HGVs</th>
<th>Percentage change (Total number of vehicles)</th>
<th>Percentage change (HGVs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekday</td>
<td>3,264</td>
<td>327</td>
<td>62</td>
<td>1.9%</td>
<td>19.0%</td>
</tr>
<tr>
<td>Saturday</td>
<td>1,912</td>
<td>192</td>
<td>30</td>
<td>1.6%</td>
<td>15.6%</td>
</tr>
</tbody>
</table>

9.122. It is predicted that there will be increases in HGVs during the assessment period of 19.0% on the A485 during the week and 15.6% on Saturdays. With regard to total traffic during the assessment period, it is predicted that there will be increases of 1.9% on the A485 during the week and 1.6% on Saturdays.

9.123. As mentioned above, the HGV trip generations used for the assessments are based on the months when traffic levels are estimated to be at their highest during the construction programme. However, as shown in Table 9.6, it is expected that during the remainder of the programme, traffic generations will be less than this figure.

9.124. Given that the IEMA threshold of a 10% increase is exceeded, a detailed assessment of potentially significant environmental impacts is therefore required for the A485. This is provided below.

\(^1\) TEMPRO provides forecast data on multi-modal trips. The program is designed to allow detailed analysis of pre-processed trip-end, journey mileage, car ownership and population/workforce planning data. The pre-processed data is itself the output from a series of models developed and run by the Integrated Transport and Economics and Appraisal (ITEA) division of the Department for Transport (DfT). Results can be presented either in terms of production (i.e. a trip origin) and attraction (i.e. a trip destination) growth factors or in terms of the raw trip-end data. Such data can enable National Road Traffic Forecasts (NRTF) growth factors to be adjusted to produce growth factors that are specific to a study area.

9.125. Severance is the perceived division that can occur within a community when it becomes separated by a major traffic artery. It may result from the difficulty of crossing a heavily trafficked existing road for example, or as a result of a physical barrier created by the road itself. However, there are no predictive formulae which give simple relationships between traffic factors and levels of severance.

9.126. As detailed above, IEMA guidelines suggest that only changes in traffic flows of 30% or more are likely to produces changes in severance on the A485. This threshold is unlikely to be exceeded by HGVs. Given that the existing HGV flows are low along the A485 at Alltwalis and that there is little pedestrian activity, it is considered unlikely that such temporary increases in traffic would result in difficulties for people to cross the A485.

9.127. Despite the increase in HGV traffic, the percentage increase in total vehicles is only 1.9% during a weekday and 1.6% on a Saturday. Furthermore, the implementation of the TMP will ensure site deliveries are co-ordinated and managed to minimise disruption to local residents and other highway users. Therefore the impact of severance is considered to be not significant.

Driver Delay

9.128. Delays to non-development traffic can occur on the network due to the additional traffic generated during construction. The IEMA guidelines note that these additional delays are only likely to be significant when the traffic on the network in the study area is already at, or close to, the capacity of the system.

9.129. Given the volume of existing traffic flows along the A485, there is considered to be ample capacity on the A485 to accommodate an increase in traffic generated by development.

9.130. Delivery of abnormal loads may result in modest and temporary localised delays which can be managed through a Traffic Management Plan (TMP) developed by the contractor in discussion with the local highways authority, which would address temporary road signage requirements, construction traffic routing and timing. Delays are therefore considered to be not significant.

Pedestrian Delay

9.131. Changes in the volume, composition or speed of traffic may affect the ability of people to cross roads. In general terms, increases in traffic levels are likely to lead to greater increases in delay. However, given the range of local factors and conditions which can influence pedestrian delay, IEMA does not recommend that thresholds be used as a means to establish the significance of pedestrian delay.

9.132. Onsite observations indicated that there is minimal pedestrian activity along the A485. As detailed above, an increase in total traffic of 1.9% during a weekday and 1.6% on a Saturday is unlikely to result in difficulties for people to cross the A485.

9.133. Taking these factors into consideration, the effect of development generated traffic on pedestrian delay is considered to be not significant.
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Pedestrian Amenity

9.134. Pedestrian amenity is broadly defined as the relative pleasantness of a journey and is considered to be affected by traffic flow, traffic composition and pavement width/separation from traffic. The IEMA guidelines note that changes in pedestrian amenity may be considered to be significant where the traffic flow (or its HGV component) is halved or doubled as a result of development activity.

9.135. As detailed above, taking into account minimal pedestrian activity, a total increase in total traffic of 1.9% during a weekday and 1.6% on a Saturday is unlikely to affect the pleasantness of pedestrian journeys along the A485. Furthermore, traffic flows on the A485 will not double as a result of an increase in HGVs generated during construction. Therefore, the effect of development related traffic on pedestrian amenity is considered to be not significant.

Fear and Intimidation

9.136. The scale of fear and intimidation experienced by pedestrians is dependent on the volume of traffic, its HGV composition, its proximity to people or the lack of protection caused by such factors as narrow pavement widths. However, there are no commonly agreed thresholds by which to determine the significance of the impact.

9.137. The estimated percentage increase in HGV traffic resulting from construction is above the 10% threshold for assessment of sensitive receptors. However, the level of pedestrian activity along the A485 up to the proposed site access is considered minimal. In addition, there are not considered to be any areas along this route that are exposed to higher than average levels of school children. Given that the A485 currently serves the settlement of Alltwalis, residents may experience fear and intimidation during the temporary construction phase. However, by ensuring that the TMP specifies construction traffic routes and specific times of the day (e.g. to reduce the risk of vehicles convoys), it is considered that the scale of fear and intimidation experienced by pedestrians would be not significant.

Accidents and Safety

9.138. Due to the numerous local causation factors involved in PIAs, the IEMA guidelines do not recommend the use of thresholds to determine significance.

9.139. Given that construction is temporary, the changes predicted are temporary (in that they relate only to the worst-case months), and that the estimated hourly traffic generation is low, there is unlikely to be an impact upon road safety and accident levels. As described earlier in this chapter, the A485 at Alltwalis is not considered to be an accident problem area.

9.140. The potential impacts of abnormal loads on highway safety are considered to be not significant, given that they will be relatively few in number. Furthermore, all abnormal loads will be escorted and the movement of these vehicles will be programmed to avoid busy periods.

9.141. A potential impact on highway safety relates to the transfer of dirt and debris from the site onto the carriageway. Mitigation measures will therefore be required to minimise this impact as detailed in the following section.

9.142. The final potential impact relating to highway safety is that of driver distraction. Paragraph 2.26 in Annex C of Technical Advice Note 8: Renewable Energy (TAN8), which supplements PPW, states that:

“There is no evidence that motor vehicle accidents have been caused as a result of drivers being distracted by the movement of wind turbine blades. Wind turbines should not be treated any differently from other distractions faced by a driver.”

9.143. In conclusion, the risk of accidents is considered to be not significant, prior to the implementation of any mitigation measures.

Proposed Mitigation Measures

9.144. Key to the success of the scheme, and in line with TAN8 policy, is ensuring effective communication with local communities prior to, and during, the construction of Brechfa Forest West Wind Farm. The purpose of liaising with local communities is to inform them about the nature and timing of construction activities and to help alleviate concerns they may have, such as fears over increases in road collisions, as a result of construction activities.

9.145. Newsletters have already been sent to over 3,500 homes and public exhibitions have occurred in Brechfa, Llansawel and Pencader. It is the intention of RWE NRL to provide local communities with information on the construction of the scheme and to also provide them with a point of contact that local communities can discuss matters with.

9.146. A TMP will be prepared for the construction phase of the proposed wind farm and will be linked with the construction programme. The TMP is likely to include measures to encourage multi-occupancy of vehicles in addition to the following mitigation measures aimed at controlling environmental impacts that could occur and that could be significant during construction:

- Restrict HGV access to the wind farm to the hours of 07:00 to 19:00, Monday to Friday, and 07:00 to 12:00 on Saturdays, where possible. Work outside of these hours may be required in certain circumstances.

- Minibuses to be provided to transfer construction staff to site.

- All construction vehicles and site personnel will be instructed to use only the approved access routes to the site.

- The timing of site deliveries will be co-ordinated and managed to ensure that disruption to local residents and other highway users is reasonably minimised.

- Construction plant, equipment and vehicles will be parked onsite to avoid ‘overspill’ parking on public roads. Prolonged queuing on approach roads and uncontrolled on-street HGV parking in normal operating conditions.

- Wheel washing facilities will be provided onsite in order to keep site entrances and routes used by construction vehicles free from vehicle deposits and debris.

- Road sweeping facilities will be provided, as required, in order to keep site entrances and routes used by construction vehicles free from vehicle deposits and debris. Road sweeping will also be undertaken at frequent intervals.
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- Following discussion and agreement with the local highway authority, appropriate information and signs will be provided on the approaches to the proposed site access.
- The police and relevant highway authorities will be notified when abnormal loads, i.e. turbine components, are being transported. Any works that are required to the highway in order to accommodate abnormal loads will need to be undertaken under the appropriate Acts/Agreements.
- Assessment of road conditions along routes taken by construction traffic for comparison with post-construction conditions.
- Management of borrow pit stone resources.

9.147. Mitigation measures will also be required to minimise potentially significant environmental impacts occurring from the transportation of construction materials (e.g. noise, dust and the potential risks to surface water). Whilst these impacts will be addressed elsewhere in the ES the following measures will be implemented:

- Ensure the proper transport of materials, e.g. vehicle loads will be enclosed/ tarpaulined to restrict the escape of particulate matter.
- Proper servicing and maintenance of vehicles will be undertaken to avoid any leaks or spills of oil, petrol or concrete.
- Drip trays will be placed under standing machinery to avoid localised oil and petrol pollution.

9.148. As outlined above, these measures will also be stipulated in a TMP which will be agreed between RWE NRL, the contractor, CCC and any other relevant bodies prior to the start of any construction works.

9.149. In some instances, it may be necessary to undertake modifications to the highway to facilitate delivery of components and/or minimise disruption to other highway users. Typically, a “dry-run” of the delivery of the largest components is undertaken to ensure delivery is possible in a way that minimises disruption. A dry-run of the access route (as described above) was completed on Monday 4 July 2011. The dry-run encountered no problems along the route, identified no requirements for off-site access works to be undertaken and that no direct impacts would be had on the trunk road network. The dry-run report can be found in Appendix 9.3.

9.150. Requirements for strengthening bridges may also be requested by the relevant highway authorities. It may also be appropriate for any non-permanent highway improvements carried out for the development (such as temporary road widening) to be made available for use by other subsequent wind farm developments.

Residual Impacts

9.151. Residual impacts are those likely to occur after mitigation measures have been incorporated into the scheme. Potential residual impacts are likely to be those associated with delivery of the abnormal loads and resultant temporary road/land closures.

9.152. In addition, an increase in traffic (particularly HGVs) will add to the risk of general wear and tear to roads and verges. On minor roads this may be more apparent as traffic flows are likely to be limited to private vehicles. Overall no significant residual impacts are predicted.

Cumulative Impacts

9.153. The impact of other developments, which could be constructed at the same time as Brechfa Forest West Wind Farm, also requires consideration. In this instance, the developments considered are Brechfa Forest East Wind Farm and Bryn Llywelyn Wind Farm. It should be noted that all construction traffic and abnormal loads will access each of the three proposed wind farms via the A485.

9.154. The maximum traffic generation of Brechfa Forest West Wind Farm and Brechfa Forest East Wind Farm is predicted to occur during month 10 of the respective construction programmes. The Environmental Statement for Bryn Llywelyn Wind Farm does not distribute traffic over the duration of the construction programme, but does indicate that the single busiest day will be when foundations for the transformer are poured. The number of movements anticipated on the transformer foundation pouring day would be a maximum of 167, assuming onsite borrow pits were not feasible.

9.155. The Environmental Statement for Bryn Llywelyn Wind Farm also assumes a 12 month construction period commencing January 2014, with the worst case months of traffic generation occurring between March and May 2014, whereas the construction of Brechfa Forest West Wind Farm and Brechfa Forest East Wind Farm is anticipated to commence in 2013. Furthermore, the Environmental Statement for Bryn Llywelyn Wind Farm demonstrates that the addition of 167 movements would result in a percentage increase in traffic below 5% on the A485. If borrow pits were used on site, the increase in traffic would be approximately 2.6%. In line with IEMA guidelines, projected changes in traffic flow of less than 10% would create no discernible environmental impact.

9.156. However, as a worst case scenario, it is assumed that the construction of Bryn Llywelyn Wind Farm could be constructed at the same time as Brechfa Forest East Wind Farm and Brechfa Forest West Wind Farm.

9.157. A percentage impact exercise, comparing the maximum traffic generation of the three wind farms, was conducted. The maximum traffic generation estimated during the Brechfa Forest West Wind Farm, Brechfa Forest East Wind Farm and Bryn Llywelyn Wind Farm construction programmes is as follows:

- **Brechfa Forest West Wind Farm:**
  - Weekday = 62
  - Saturday = 30

- **Brechfa Forest East Wind Farm:**
  - Weekday = 56
  - Saturday = 26

- **Bryn Llywelyn Wind Farm:**
  - Weekday = 167
  - Saturday = 167

9.158. **Table 9.9** shows the percentage change in traffic flows when the maximum traffic generation of the three wind farms is estimated (assumed to be month 10 of construction).
9.159. Table 9.9 shows that, during the worst case scenario, the percentage change in HGV traffic flows is way above the 10% and 30% thresholds for assessment.

9.160. However, existing HGV traffic flows are low along the A485 and therefore any increase in HGV traffic will result in high percentage increases. In reality, to have all three wind farms being constructed at the same time is unlikely and, if it were to happen, would certainly require a joint TMP to be prepared between the developers and certain activities scheduled for different days.

9.161. As mentioned, the Brechfa Forest West Wind Farm construction programme is longer than that of Bryn Llywelyn Wind Farm, given the greater number of turbines proposed. As a result, the worst case traffic generation of each is unlikely to occur at the same time or in the same year.

9.162. It should also be noted that the 167 movements generated by Bryn Llywelyn Wind Farm during transformer foundation pouring will only occur on one day of the 12 month construction programme, and that assumes that there will be no borrow pits provided onsite.

9.163. Given these factors, in addition to the fact that there is little pedestrian activity along the A485 up to the wind farm site accesses, it is considered unlikely that such temporary increases in traffic would result in significant environmental impacts. To further ensure that this is the case, the TMP for Brechfa Forest West Wind Farm would control traffic movements to reduce any effects that may be felt, particularly by the community of Alltwalis.

**ASSESSMENT OF OPERATIONAL IMPACTS**

9.164. It is estimated that the wind farm, once operational, will employ approximately 4-5 FTE jobs which will generate an average of approximately 40-50 vehicle movements per month. Typical duties on site would include routine maintenance, such as safety checks, and repairing faults. These visits will normally require light vans or similar vehicles, although larger vehicles or cranes may be required very occasionally for maintenance purposes. Operation traffic may use the same routes as those proposed for construction traffic, although non-abnormal loads may also use other FCW entrances.

9.165. Given the low staffing levels estimated, an assessment of potentially significant traffic-related environmental impacts arising from operation activities has not been included in this assessment.

**DECOMMISSIONING**

9.166. The proposed wind farm will be designed with an operational life of 25 years. At the end of this period, or before that time if necessary, the turbines will be decommissioned.

9.167. Decommissioning of the turbines may result in an impact on the local highway network due to the movements of HGVs associated with the removal of plant, equipment and materials from the site. However, only the above-ground elements (i.e. turbines, anemometer masts, substation and the crane hard standings) are to be removed. Furthermore, felling will not be required during decommissioning and, therefore, traffic generation during decommissioning is likely to be significantly lower during the construction phase. Any baseline data collected for the purpose of the current assessment will no longer be relevant at such an extended assessment horizon. Therefore, potentially significant traffic-related environmental impacts that could occur during decommissioning have not been considered in this assessment.

9.168. Mitigation measures will be agreed at the time of decommissioning, in line with contemporary standards, but are likely to be similar to those set out in this chapter.

**FUTURE SITUATION WITHOUT SCHEME**

9.169. Without the scheme, the traffic flows on the A485 are likely to increase in accordance with local traffic growth. This assumption is based on the forecasts of growth in the volume of motor traffic on roads in Great Britain until the year 2031, as described in the DETR publication National Road Traffic Forecasts (Great Britain) 1997 (NRTF).

**FUTURE MONITORING REQUIREMENTS**

9.170. The impacts are temporary, in that they relate only to the construction phase of the development, the only monitoring required is during the construction process for the presence of mud and site debris on the public roads in the vicinity of the site access. Daily inspections by nominated site staff will take place to confirm that the mitigation measures implemented onsite are impactive and that corrective action will be taken where necessary.

**SUMMARY OF IMPACTS**

9.171. Following the assessment of cumulative traffic, the significance of potential impacts that could occur during construction (before, and after, proposed mitigation measures are implemented) is provided in Table 9.10.

**Table 9.10: Summary of Construction Impacts**

<table>
<thead>
<tr>
<th>Potential Impacts</th>
<th>Significance</th>
<th>Proposed Mitigation/Enhancement</th>
<th>Residual Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severance</td>
<td>Not significant</td>
<td>Implementation of TMP and associated mitigation measures</td>
<td>Not significant</td>
</tr>
<tr>
<td>Driver delay</td>
<td>Not significant</td>
<td>Implementation of TMP and associated mitigation measures</td>
<td>Not significant</td>
</tr>
<tr>
<td>Pedestrian delay</td>
<td>Not significant</td>
<td>Implementation of TMP and associated mitigation measures</td>
<td>Not significant</td>
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</tbody>
</table>

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<table>
<thead>
<tr>
<th>Pedestrian amenity</th>
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<th>Implementation of TMP and associated mitigation measures</th>
<th>Not significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fear and intimidation</td>
<td>Not significant</td>
<td>Implementation of TMP and associated mitigation measures</td>
<td>Not significant</td>
</tr>
<tr>
<td>Accidents and safety</td>
<td>Not significant</td>
<td>Implementation of TMP and associated mitigation measures</td>
<td>Not significant</td>
</tr>
<tr>
<td>Cumulative Impacts</td>
<td>Not significant</td>
<td>Implementation of TMP and associated mitigation measures</td>
<td>Not significant</td>
</tr>
</tbody>
</table>

REFERENCES


RES (2010). Bryn Llewelyn Wind Farm Environmental Statement.
