

APPENDIX 2.7 - STRATEGIC TRANSPORT TECHNICAL REVIEW OF ALTERNATE ROUTES AROUND WELSHPOOL

MID WALES (POWYS) CONJOINED WIND FARMS PUBLIC INQUIRY

TRANSPORT STRATEGIC

TECHNICAL REVIEW OF ALTERNATIVE AIL ROUTES AROUND WELSHPOOL

(Final – 19 December 2013)

Submission to the Public Inquiry on behalf of:

Renewable UK Cymru
RWE Npower Renewables
RES
Vattenfall
Celtpower

in consultation with:

Welsh Government (Transport)
Powys County Council (Highways)

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1.0 INTRODUCTION

Background

- 1.1 Following the Prime Minister's decision to increase the number of wind farms in the UK in 2008, the Welsh Assembly Government (WAG) (now Welsh Government) has subsequently concluded that for efficiency and environmental reasons, large scale onshore wind farms should be concentrated to seven specific areas known as Strategic Search Areas (SSAs). These strategic areas are considered to be the most suitable for accommodating large wind farms. Two of these (SSA B – Carno North & SSA C – Newtown South) are situated within Powys County Council's administrative boundary.
- 1.2 Welsh Government has previously commissioned a series of studies to investigate options for the safe delivery of turbine components into all SSAs in Wales¹. These assessments considered a number of routes for the transportation of Abnormal Indivisible Loads (AILs) and recommended that, as far as possible, the trunk road network should be used. Various options were considered as part of these studies for the movement of abnormal loads, around or across the urban areas of Welshpool and Newtown, to reduce the impact on the local communities.
- 1.3 The strategic Traffic Management Plan (sTMP), produced by Grontmij on behalf of Renewable UK Cymru, examines the proposed strategic AIL delivery route for transportation of wind turbine components to potential wind farm sites in Mid Wales. The document sets out the general principles for managing delivery of turbine components and proposes that all AILs can be transported from Ellesmere Port (Cheshire) to the proposed wind farm sites principally via the trunk road network (controlled by the Highways Agency and Welsh Government) and on short sections of the county roads (Cheshire and Powys). The strategic route set out in the sTMP is consistent with the recommended options outlined in studies commissioned by the Welsh Government (Capita Reports).
- 1.4 The sTMP proposes that turbine components will be moved in convoy under police escort from Ellesmere Port south along the trunk road network (M53, A55, A483) to Welshpool. From here, the routes diverge to provide access to

1. *Capita Symonds Ltd for Welsh Assembly Government Transport and Strategic Regeneration, Powys Wind Farms – Access Routes Study, October 2008*

SSA B (North), SSA B (South) and SSA C. Whilst the sTMP proposes that all AILs would travel south from Ellesmere Port to Welshpool, it has not specifically reported on route choices through and around Welshpool. Furthermore, no comment has been made regarding why the A458 from Shrewsbury to Welshpool was deselected in favour of the A483 route, south of Oswestry.

- 1.5 Welsh Government and the Highways Agency have advised that they have no objection to AILs using the Strategic Road Network (SRN). Similarly Powys County Council (PCC) had requested that, where feasible, AILs should be transported along the SRN rather than along non-strategic roads through rural villages. This criterion to direct AILs along the trunk roads has been reflected in the sTMP.
- 1.6 Further assessments of the various routes through and around Welshpool have previously been undertaken by Arup (Consultants to RWE Npower) as part of the original planning application process for Carnedd Wen (2008). These reviewed the potential for construction traffic to use Brook Street/Salop Road plus Brook Street/Berriew Road. However no assessment was made to establish the suitability of using these routes for AIL convoys.
- 1.7 Since the early study by Arup (2008), there have been significant modifications to the traffic management system within Welshpool Town Centre, with the creation of a one-way gyratory around the town. As such, Brook Street could only be used by construction traffic travelling away from the Carnedd Wen site.

Scope of Assessment

- 1.8 This report affirms the suitability and suitability of the A483 trunk road corridor, south of Oswestry (as proposed in sTMP Section 2) for AIL convoys in preference to the use of the A458 from Shrewsbury to Welshpool (not reported upon in the sTMP). Whilst this section of the A458 is used by heavy goods vehicles it is not considered to be suitable for AILs.
- 1.9 In addition, this report also examines the suitability of a number of alternative routes for the transportation of AILs towards and around Welshpool. It is demonstrated that the route via Welshpool Town Centre is the least constrained and most direct corridor and affirms the suitability of this corridor (as proposed in sTMP Section 3 of 6).

1.10 Consideration has been given to carriageway width and boundary treatments, vertical and horizontal constraints along the various routes, the extent of highway modifications required and the potential impact on adjacent properties and third party land. At certain locations along the routes, vehicle swept path analyses have been undertaken to examine the feasibility of transporting AILs along these sections.

1.11 This report sets out the findings of the route assessments carried out during February 2013 for the following route options:

Strategic Traffic Management Plan (Section 2)

- A5/A458 Shrewsbury to Welshpool:
The sTMP Section 2 proposes that the AILs will be transported along the A483 (T). The sTMP did not favour an alternative route via the M56, M6, A460 and M54 to Shrewsbury. This report therefore, for completeness, examines the A458 from Shrewsbury to Welshpool assuming AILs would use a longer convoy route via the A5/A458.

Strategic Traffic Management Plan (Section 3)

- Route Assessment 1: A495 from A458 to A483 at Llynclys
- Route Assessment 2: A490 and B4392 from A458 to A483 at Arddleen
- Route Assessment 3: Alternative Routes through Welshpool Town Centre

1.12 This appraisal has considered the suitability of these alternative routing options compared to the principal routes selected within the sTMP. Each route has been assessed based upon the feasibility of transporting turbine blades up to 45m long, tower sections up to 4.5m wide and components weighing up to 80 tonnes (nacelle units). These are anticipated to be moved in convoys of two AILs and will be undertaken with police escorts.

1.13 The following sections consider the suitability of the alternative routes and provide details of any potential points of conflict associated with the safe delivery of turbine components along each route (Sections 2.0 to 5.0 refer).

1.14 Whilst this report considers the suitability of alternative routes through Welshpool (Section 5.0 refers), Powys County Council (PCC) has confirmed that, subject to condition surveys and structural assessments of buildings' cellars and of the Canal Bridge at Severn Street, it considers the route through Welshpool, as proposed within the sTMP, to be the most appropriate.

1.15 Welsh Government has confirmed that it has no objection in principle to the route proposed in the sTMP.

2.0 STMP SECTION 2

2.1 The sTMP (Section 2) identifies the A483 from Chester to Welshpool as the most appropriate route for the transportation of AILs to Mid Wales (Areas SSA B and SSA C) from Ellesmere Port.

2.2 Whilst transporting AILs south along the A483 from Ellesmere Port to Welshpool is the most direct route, the sTMP has not reported upon the possible alternative route along the A5 and A458 from Shrewsbury. This would assume that AILs would be transported by convoy via the M56, M6 and A460 to the M54; then proceed west to the A5 and A458.

Route Assessment: A5/A458 Shrewsbury to Welshpool

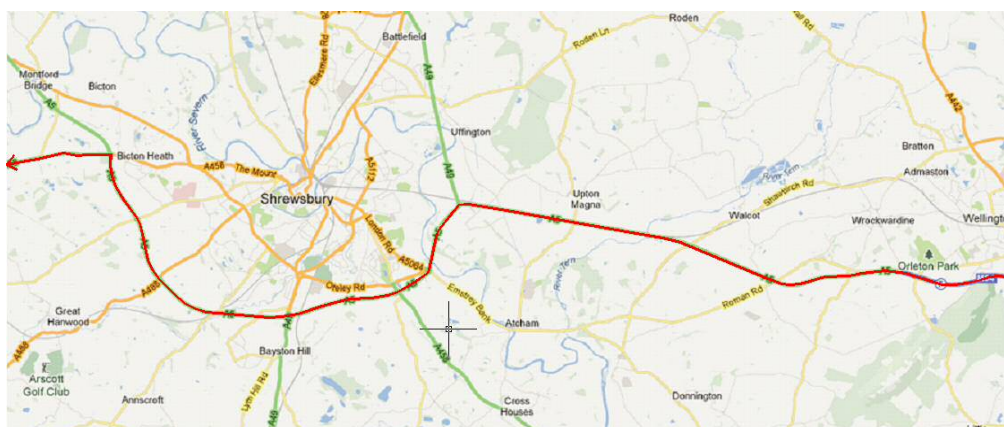


Diagram 1 – Route 1: A5 from M54, Junction 7, east of Shrewsbury to A5 at Bicton Heath

2.3 Both the M6 and M54 motorways are constructed to full HA Trunk Road Standard and, therefore, would easily be able to facilitate the transportation of turbine components without the need for any highway works.

2.4 It is currently not possible for motorists to diverge from the M6 onto the M54 from the southbound carriageway at Junction 10a. Consequently, southbound traffic join currently join the M54 at Junction 1 via the M6 Junction 11 and A460. The A460 is a single carriageway, subject to a 40mph speed limit through the centre of Shareshill. To facilitate AIL convoys along this section, temporary removal of street furniture would be required at a number of locations. These include:

- Temporary removal of central island adjacent to Church Lane;

- Pedestrian crossing at Monument Drive;
- Traffic Signals at New Road/Dark Lane Crossroads; and
- Central Island at The Avenue.

2.5 A review of the existing highway along the remainder of this route has been undertaken (**Diagrams 1, 2 and 3** refer). Consideration has been given to vertical and horizontal alignment, road width, the potential for passing places, potential impact on other roads users/adjacent properties and buildings, and anticipated highway modifications that would be required to facilitate ALL movements.

2.6 The overall route from junction 7 of the M54 (where the motorway connects to the A5) to the Buttington Cross roundabout (via A458) is approximately 28 miles. For ease of reference, the route has been split into a number of sections for this assessment.

A5 at M54 Junction 7 to A5/A458 roundabout at Bicton Heath

2.7 The A5 is a dual carriageway connecting the M54 (west of Telford) and the A458 trunk road to the west of Shrewsbury. This section of carriageway (approximately 14 miles) bypasses the centre of Shrewsbury to the south of the town.

2.8 The M54 turns into the A5 at junction 7, which continues west towards Shrewsbury as dual carriageway towards the junction of the A5/A49 (roundabout). There are 5 bridges along this section of carriageway, although these would not impact on ALL deliveries on the basis that they have been constructed to trunk road standard (standard bridge minimum clearance 5.30 metres). Along this unconstrained section ALLs would be able to travel with police escort without causing significant delay to other motorists.

2.9 The A5 dual carriageway bypasses the centre of Shrewsbury to the south of the town. There are a number of signalised and non-signalised roundabouts along this section, with two lane approaches and exits at most junctions. Table 2.1 provides a summary of each roundabout and identifies possible highway modifications that may be required to accommodate ALL movements.

Junction	Comments
A5/A49 Roundabout	2 lane approach which flares to 3 lanes at junction.
	2 lane exit (straight ahead)
	No highway works necessary to facilitate AILs
A5/B4380, Emstrey Bank/A5064, London Road	2 lane approach which flares to 3 lanes at signalised junction.
	3 lane gyratory on roundabout
	2 lane exit (straight ahead)
	No highway works necessary to facilitate AILs
A5/A49, Hereford Road/A5112	2 lane approach which flares to 3 lanes at signalised junction.
	Additional left filter lane to A49, Hereford Road
	2 lane exit from junction
	Temporary removal of chevron signage on central island.
	Temporary removal of traffic signal posts (x 2)
A5/A488, Hanwood Road	2 lane approach which flares at junction (hatching)
	2 lanes on gyratory with 2 lane exit
	Removal of chevron signage and direction sign on central island
	Existing kerblines to be reconstructed with additional strength and partial hardening of central island to accommodate over-run by AILs
A5/B4386, Mytton Oak Road - Royal Shrewsbury Hospital	2 lane approach to junction
	2 lanes on gyratory with 2 lane exit
	Removal of chevron signage and direction sign on central island
	Existing kerblines to be reconstructed with additional strength and partial hardening of central island to accommodate over-run by AILs
A5/A458, Welshpool Road	2 lane approach to roundabout
	2 lanes on gyratory with 1 lane exit onto A458
	Removal of up to three existing lamp columns to allow AILs to turn onto A458.
	Existing kerblines to be reconstructed with additional strength and partial hardening of grass verge to accommodate over-run by AILs
	Potential for third party land to be required to facilitate highway works

2.10 To help facilitate movements along this section of carriageway, and reduce the impact (journey times) upon other road users, there are a number of potential locations for passing places; either as extensions to existing lay-bys or newly constructed lay-bys adjacent to the carriageway. These would enable the AILs to pull over and allow following traffic to disperse if necessary.

2.11 Based upon the carriageway width and alignment along this section, it would be possible to transport AILs along the route without causing any significant disruption to other traffic. Movement of AILs outside the commuter peak periods (as proposed within the sTMP) would further minimise the traffic impact.

A5/A458 Roundabout at Bicton Heath

2.12 At the junction of the A5 with the A458 at Bicton Heath, it would be necessary for AILs to turn approximately 90° through the junction to join the A458 trunk road. Whilst there is a two lane approach to the roundabout, there is only a single lane exit onto the A458 trunk road. With the combined presence of street lighting and signage at the junction, this would require that these be temporarily relocated prior to convoys passing through. In addition to the temporary removal of signage on the splitter island it is likely that some of the grass verge adjacent to Churncote Coppice would need to be hardened to allow AILs to negotiate the junction as shown in **Figure 2-1**.



Figure 2-1 - A5/A458 Roundabout

A458, Bicton Heath to Middletown

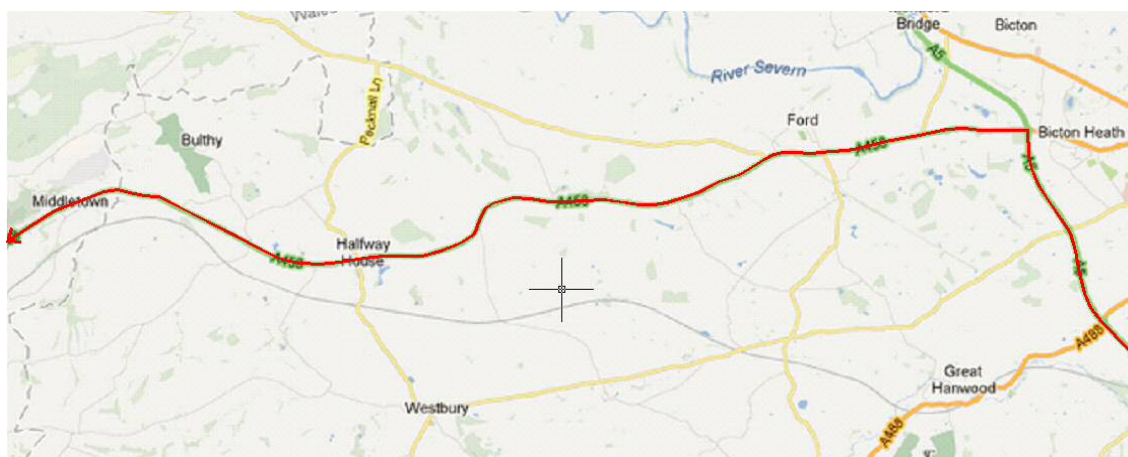


Diagram 2 - A458, Bicton Heath to Middletown

2.13 The A458 is a single carriageway trunk road running east/west between Shrewsbury and Welshpool. The A458 then continues west of Welshpool to Mallwyd. There are varying speed limits along the route with rural sections being generally de-restricted (60mph), with lower speed limits through the small villages and hamlets (40mph – 50mph), for example Ford and Wattlesborough.

2.14 It should be noted, however, that the Highways Agency (HA) have established guidelines for HGV speed limits along various road types. Speed limits for HGV's greater than 7.5 tonnes is as follows:

- Motorway – 60mph
- Dual Carriageway – 50mph
- Single Carriageway – 40mph
- Built-up Area – 30mph

2.15 Whilst this section of road is single carriageway and rural in character, AILs would safely be able to travel along the route between Bicton Heath (at the junction with the A5) and Wattlesborough without the requirement for highway modifications to facilitate their movement. There are a number of locations where passing places might be possible, either on the grass verge or on carriageway.

2.16 Between Wattlesborough and Middletown however, the road narrows with virtually no opportunity for passing places within the public highway. The sTMP has assessed the strategic road network based upon abnormal loads vehicles to 45m long (blade section), which has a ground clearance of 0.3 metres. This tortuous section is also very undulating and, as a result, would make it extremely difficult for AILs (particularly those carrying turbine blades) to use without the risk of grounding.

2.17 Based on the undulating vertical alignment near Wollaston, it is considered that there would be insufficient ground clearance at some points, which could result in grounding of the AILs and subsequent damage to the carriageway.

A458, Middletown to A458/A483 Buttington Cross Roundabout

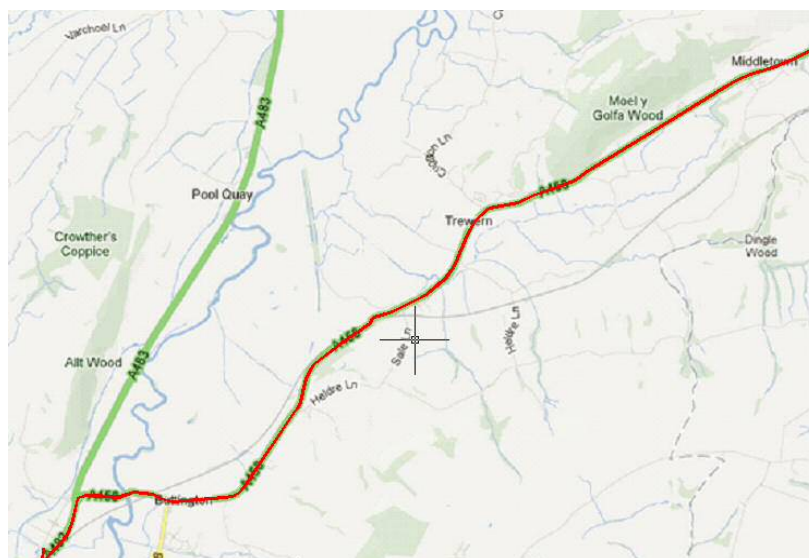


Diagram 3 - A458, Middletown to A458/A483 Buttington Cross Roundabout

- 2.18 Between the village of Middletown and the Buttington Cross roundabout, there are again very few opportunities to create passing places that are within the public highway. The provision of on-street passing places would require one-way shuttle working. Without regular passing places there is greater potential to cause queuing in both directions.
- 2.19 Whilst much of the route is relatively straight there are a number of bends that would restrict AIL movements. The railway bridge south west of Trewern is one such location that would prevent AILs from being able to use this route due to its horizontal alignment as **Figure 2-2** shows. It is considered that only major modification to the bridge would enable AIL movement. Reconstruction of the bridge would be required and should only be considered if no other alternative route is available.

Railway Bridge at Trewern



Figure 2-2 - Railway Bridge at Trewern

2.20 The Severn River Bridge at Buttington presents further obstruction to enabling delivery of turbine components. The horizontal alignment of the bridge, coupled with the adjacent residential property, would make it extremely difficult for AILs (carrying blades up to 45.0m long) to use this route (**Figure 2-3** refers).

River Bridge at Buttington



Figure 2-3 - River Bridge at Buttington

Summary

2.21 Whilst there would be no difficulty transporting the components along the M6 and M54 Motorways, there are a number of key constraints that would indicate that the transportation of AILs along the A458 (between Shrewsbury and Welshpool) would not be feasible.

2.22 The vertical alignment of the carriageway at Wollaston would severely restrict AILs (particularly turbine blades) from being transported along this route. The horizontal alignment of railway and river bridges (at Trewern and Buttington) also indicate that this route would be unfeasible for AILs. Any proposal to reconstruct the bridges would cause severe disruption on a key link between Mid Wales and the West Midlands for both road and rail traffic.

2.23 Despite the issues associated with this route in relation to AIL transportation, there are currently no weight restrictions or constraints to heavy goods vehicles. It is therefore considered that this route would be suitable for other construction traffic. Whilst manufacturers of various construction materials (sand, concrete, steel, etc) will be determined by each approved wind farm developer individually, there are a number of potential suppliers located in the Shropshire/West Midlands area. It is, therefore, likely that some construction materials would be sourced from this region and, as a result, could use the A458 from Shrewsbury.

3.0 STMP SECTION 3

3.1 This section examines the suitability of alternative routes in and around Welshpool town centre for the transportation of AIL convoys. For the purposes of this review, three alternative routes have been examined. Due to the length of a number of the routes, these have been divided into sections, as follows:

- A495, from A483 at Llynclys to A458
 - A495 from Llynclys to Llansantffraid-ym-Mechain (**Diagram 4**)
 - A495 from Llansantffraid-ym-Mechain to Meifod (**Diagram 5**)
 - A495 from Meifod to A458, Llanfair Caereinion (**Diagram 6**)
- A490 & B4392 from A483 at Arddleen to A458
 - Arddleen to Guilsfield (**Diagram 7**)
 - Guilsfield (Northern Route) (**Diagram 8**)
 - Guilsfield (Southern Route) (**Diagram 8**)
 - A490, from Guilsfield to A458 (**Diagram 9**)
- Alternative routes through Welshpool (**Diagram 10**)

Route Assessment 1: A495 from A483 at Llynclys to A458

3.2 This route could offer an alternative to the A483 at Pant and Llanymynech and avoid Welshpool Town Centre.

3.3 The A495 provides a link between the A483 at Llynclys and the A458 trunk road west of Llanfair Caereinion. This route has been considered as a potential alternative to the A483, south of Llynclys, but would only be relevant to sites within SSA B (north).

- 3.7 The route continues past a number of residential properties and becomes derestricted towards Porth-y-Waen. Footways are present on both sides of the carriageway at this point, with the footway on the southern side of the road extending approximately another 600 metres. Between this point and the junction with the B4396 the A495 continues as a relatively straight, flat rural road with no significant barriers to AIL movements.
- 3.8 At the junction of the A495/B4396, AILs would be required to make a sharp left turn, before continuing south along the A495 towards Llansantffraid-ym-Mechain. At this location the grass verges are relatively narrow. This provides limited space for AILs to turn within the public highway and on this basis, it is possible that third party land could be required to facilitate AIL convoys.
- 3.9 Approximately 600m south of this junction is a bridge over the Afon Tanat. It is considered that the severe crest (vertical profile) over this bridge would prevent AILs from being able to use this route, without significant modifications to the existing structure (**Figure 3-1** refers). A second bridge is located just beyond the first (over a dismantled railway), south of Pont Rhyd-Meredydd. Whilst the crest over this bridge is not as pronounced as the previous (over the Afon Tanat), there could still be potential for grounding of AILs at this point (**Figure 3-2** refers).



Figure 3-1 - Bridge over Afon Tanat



Figure 3-2 - Bridge over Dismantled Railway (South of Pont Rhyd-Meredydd)

3.10 Beyond the two bridges the route is relatively flat and straight until the village of Llansantffraid-ym-Mechain. To accommodate AILs it would be necessary to construct passing places at various points along the route. In light of the carriageway width along this section, in addition to the narrow grass verges along much of the route, it would be necessary to construct hardened verges to allow AILs to pull partly onto the verge to allow opposing and following vehicles to pass.

A495 from Llansantffraid-ym-Mechain to Meifod

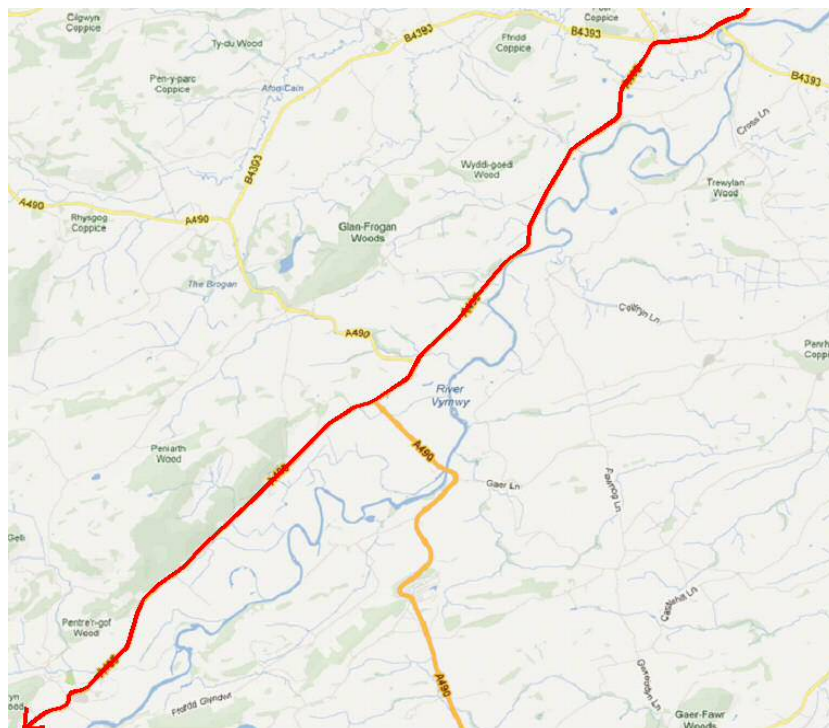


Diagram 5 - A495, Llansantffraid-ym-Mechain to Meifod

- 3.11 On the approach to Llansantffraid-ym-Mechain the speed limit reduces to 30mph. A footway is present to the south of the road in addition to street lighting. Within the village centre, residential properties front onto both sides of the carriageway with a number of access roads leading to residential streets on both sides.
- 3.12 The junction of the A495 and Ffordd Spooney (mini roundabout) would require some minor modification to accommodate AILs. As shown within **Figure 3-3**, it would be necessary to temporarily remove the existing bollards and roundabout signage. It will also be necessary for traffic to be held on all other approaches to the junction whilst the AILs negotiate the junction.



Figure 3-3 – A495/Ffordd Spooney Mini Roundabout

- 3.13 Based upon site observations, there are no other constraints to AIL movement within the village of Llansantffraid-ym-Mechain. The route then continues towards Meifod approximately 6 miles south. There are no material constraints along this section although a number of trees currently overhanging the carriageway would need to be trimmed.

A495, from Meifod to A458, Llanfair Caereinion

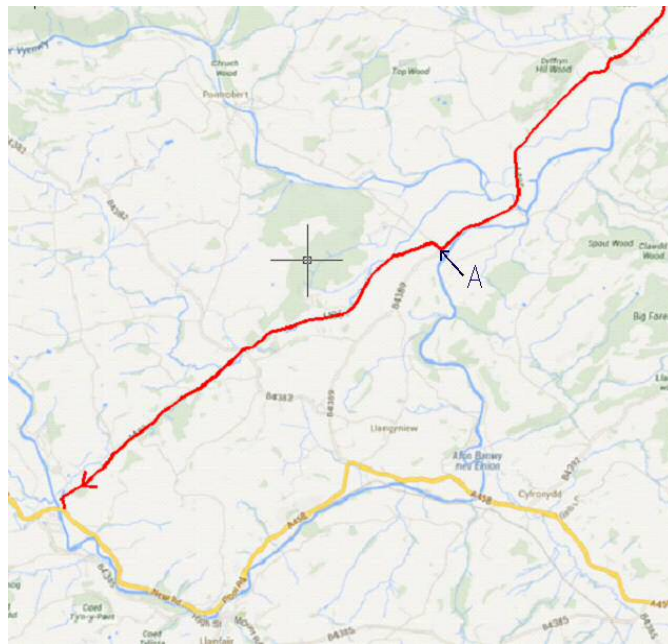


Diagram 6 - A495, Meifod to A458, west of Llanfair Caereinion

- 3.14 Through the village of Meifod the route is subject to a 30mph speed limit, with street lighting on both sides of the road. There is an s-bend through the village centre which AILs would need to negotiate. For this section it is likely that both sides of the carriageway would need to be used, with opposing traffic being held back by the local police. It was observed during the site visit that a number of cars were parked on the main road.
- 3.15 Whilst the Welsh Police do not have the power to temporarily restrict parking along this route, it would be beneficial to notify residents as part of a communication strategy. This would keep residents informed of when AIL deliveries were scheduled. By escorting AILs to the various wind farm sites outside of peak periods, this would also minimise the impact on other road users.
- 3.16 South of Meifod the speed limit becomes de-restricted (60mph). Between Meifod and the A458 trunk road there are a number of tight bends that could require use of both sides of the carriageway to facilitate AIL movements. The carriageway is again typical of a rural road with no pedestrian footways. There are trees overhanging the carriageway at various points and narrow grass verges. Passing places would, therefore, need to be constructed to hold convoys partly on carriageway.

- 3.17 A bridge over the River Vyrnwy is situated approximately 1.5 miles south of Meifod. This bridge is controlled by traffic signals, thereby, allowing one way movement at all times. In view of the vertical and horizontal alignment of the bridge, however, transportation of AILs would not be possible along this route (particularly blade sections).
- 3.18 A right angled bend is located approximately 2 miles south of Meifod, at the junction with the B4389 (Point A on **Diagram 6**). This is likely to require additional land in order to facilitate AIL movement. In view of the narrow verges on both sides of the carriageway (assumed to be the extent of available public highway), additional third party land is likely to be required.
- 3.19 A similarly tight bend is located immediately beyond this point, which is likely to require use of the whole carriageway (and potentially third party land) to negotiate. From this point until close to the A458 trunk road, the route has few constraints and is generally flat and straight, although a number of mature trees overhang the carriageway, which are likely to require trimming. There is another sharp bend at Cae Llewelyn, immediately prior to accessing the A458 trunk road. Again there would be little scope to widen this section of carriageway within the public highway to facilitate AIL movements.

Route Assessment 1 Summary:

- 3.20 Following inspection of the route between the A483 at Llynclys and the A458 west of Llanfair Caereinion, it is considered there are several constraints that would prevent AILs from being able to safely use this route without significant upgrade.
- 3.21 The key issues associated with the route include:
- Tight bend at A495/B4396 junction;
 - Hump bridges over Afon Tanat (danger of grounding)
 - Narrow route through Llansantffraid-ym-Mechain (risk of collision)
 - Double bends at Meifod (manoeuvring space)
 - Horizontal alignment of New Mechain bridge
 - Double bends south of New Mechain bridge
 - Sharp bend at Cae Llewelyn, prior to A458 junction

- 3.22 Extensive works would be necessary, including widening of the carriageway (with potential impact on third party land) and re-profiling of roads.
- 3.23 In view of the above constraints and potential disruption associated with attempting to facilitate AILs along this route, it is concluded that the proposed sTMP route (Section 2) along the A483, via Welshpool and along the A458 is the more appropriate. These are, for the most part, trunk road routes that are currently used by large heavy goods vehicles.

Route Assessment 2: A490 and B4392 from A483 at Arddleen to A458

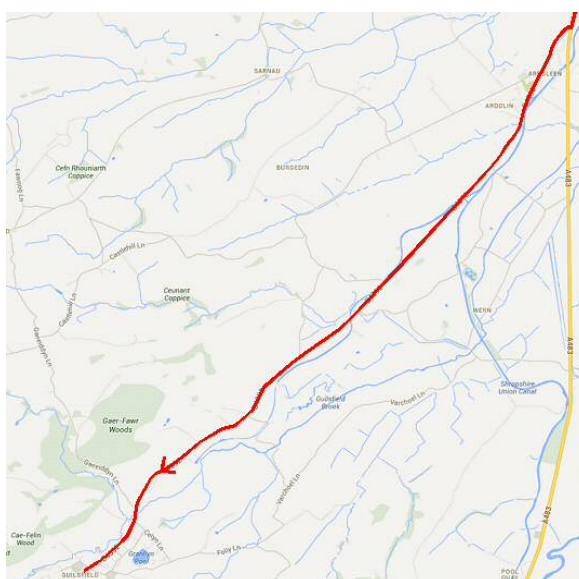


Diagram 7 - B4392, Arddleen to Guilsfield

Arddleen to Guilsfield

- 3.24 The B4392, between Arddleen and Guilsfield, is a single carriageway route with a derestricted speed limit along a large section of the route; with the exception of the villages of Arddleen and Guilsfield. Arddleen is subject to a 30mph speed limit, with footways on the eastern side of the carriageway.
- 3.25 At the commencement of this route, it would be necessary to temporarily remove the bollards on the splitter island at the junction of the A483 and B4392 to facilitate the movement of AILs. Both sides of the carriageway would be required to negotiate this junction and, therefore, traffic would need to be held temporarily on both the A483 (northbound carriageway) and the B4392.

- 3.26 Along this route there are also a number of trees overhanging the carriageway. These would need to be trimmed back prior to delivery of turbine components, to prevent branches being knocked onto the carriageway.
- 3.27 The route through Arddleen is relatively narrow. There are a number of bends and residential streets on both sides of the carriageway. As a result, traffic in the opposing direction would have to be held whilst AILs are transported through the village. Arddleen County Primary School is located alongside the B4392. To minimise the impact of AIL movements, convoys would need to be transported outside school peak periods.
- 3.28 The B4392 becomes derestricted to the south of Arddleen. Whilst the route is mostly straight through to Guilsfield, there are a couple of bends that would require AILs to traverse both sides of the carriageway. On this basis, and in view of the narrow carriageway width, it would be necessary for opposing traffic to be held back at a suitable location to allow AILs to pass safely.
- 3.29 Whilst there is little scope along this route to create passing places off carriageway, there would be potential to create hardened verges to hold the convoys partly off-carriageway.

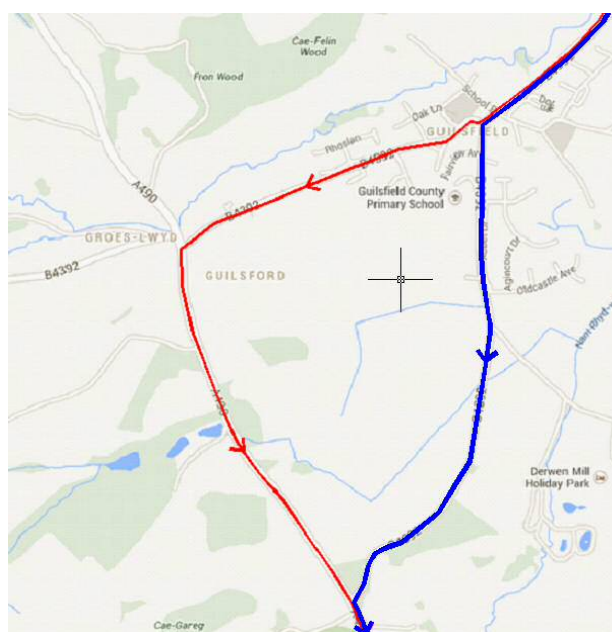


Diagram 8 - Guilsfield - Northern & Southern Routes

3.30 The speed limit changes at the entrance to Guilsfield, along with the character of the route (with residential dwellings, footways and the presence of street lighting). At the junction of the B4392, Arddleen Road and Park Road there are two potential route options to continue west or south to reach the A458 trunk road. The remainder of this section of the report considers the suitability of either of these options.

Guilsfield – Northern Route

3.31 As Diagram 8 indicates, the northern route would turn onto the B4392, Park Road towards Llanfair Caereinion and continue out of the village along the county road before turning left onto the A490 county road. AIL convoys would then continue towards Welshpool (A458/A490 roundabout – Raven Inn). This route through Guilsfield has a number of issues that would render the transportation of AILs impractical.

3.32 The main issue relates to the alignment of the road at the Arddleen Road/Park Road junction coupled with the narrow road width and the presence of properties directly fronting onto the carriageway.



Figure 3-4 - Arddleen Road/Park Road Junction

3.33 To examine the potential for AIL movements through this junction, swept path analyses has been completed for both a turbine blade (45m long) and tower base section (4.5m wide). The assessment indicates AILs of this size would not be able to negotiate the junction due to the alignment of the road and there would be severe risk of collision damage with the nearby residential property (**Figure 3-4** refers).

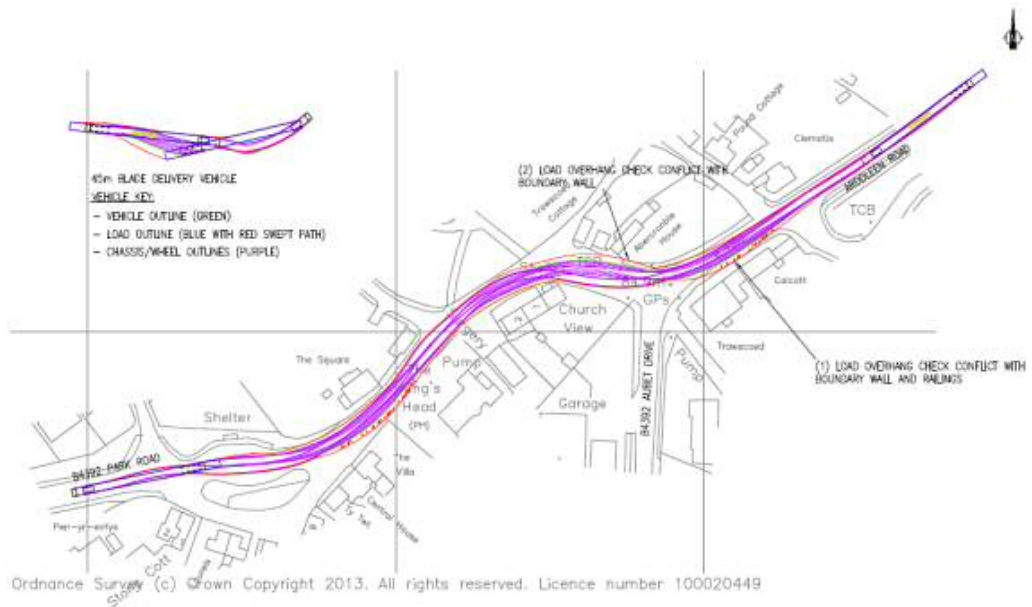


Figure 3-5 - Swept Path Analyses - Blade Section (45m long)

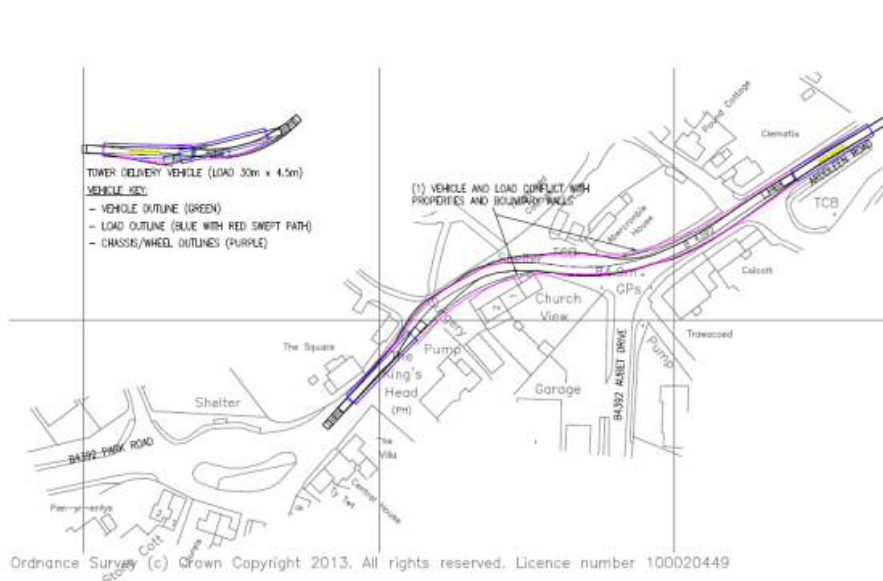


Figure 3-6 - Swept Path Analyses - Tower Base (30m x 4.5m)

3.34 As both **Figures 3-5** and **3-6** indicate both turbine components would be unable to negotiate this junction without serious risk of damage to existing residential properties.

Guilfield – Southern Route

- 3.35 The alternative route through Guilfield (Diagram 8 refers) would be to continue along the B4392, Arddleen Road. From site observations, however, there are also a number of constraints associated with this route which would render the movement of AIL convoys unsuitable.
- 3.36 The left turn at the junction of Park Road onto the B4392 would prevent large AIL's (Turbine blades) from being able to continue along this route. This had previously been assessed by Capita. The Capita Report (2008) referred to trial runs that were completed by Collett Transport on 10th and 11th April 2008 along this route. As part of their assessment both potential routes through Guilfield were considered. For this route it was noted that:

The left turn at Guilfield could not be made with the vehicle boxed out for a 48m blade; the radius of the junction and the proximity of the buildings meant that the junction could not be modified and therefore discounts the route for the longer blades. The vehicle was then reduced to simulate a 38m long blade and the turn was made successfully, although the vehicle did require the trailer to be manually steered. There would be long delays on this route if all the vehicles in the convoy required the trailers to be manually steered;

The vehicle then continued along the B4392 toward the A490; there were a number of corners where the rear of the vehicle overran the verge. The grass verges will require hardening to protect them or minor highway alignment improvements made which may require third party land to make movement easier.

- 3.37 The route passes through a 20mph zone adjacent to Guilfield County Primary School. In view of the proximity of the school it would be necessary to ensure that any convoy movements (for smaller turbine components) would be undertaken outside of the school peak periods.
- 3.38 Single lane traffic calming (speed humps and bollards) is located at either end of the 20mph zone (**Figures 3-7** and **3-8** refer). It is likely that a number of bollards would need to be temporarily removed to allow AILs to pass at these locations.

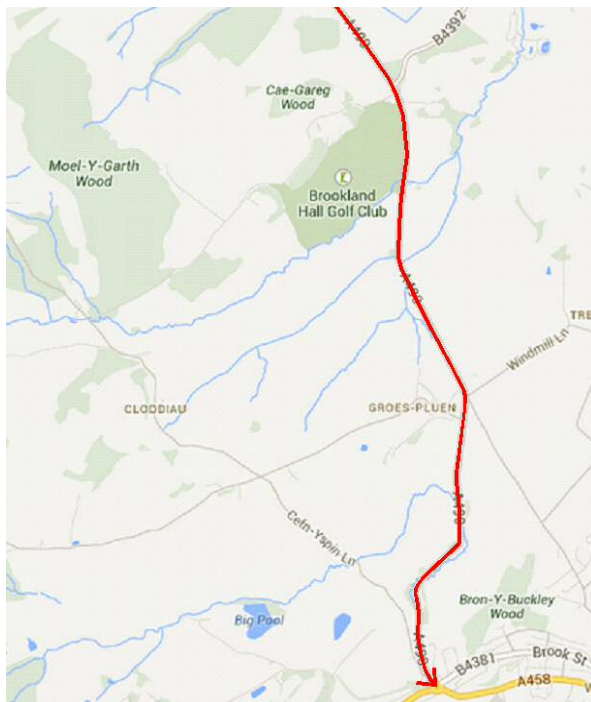


Figure 3-7 - B4392, Arddleen Road (20mph Zone)



Figure 3-8 - B4392, Arddleen Road (20mph Zone)

A490, from Guilsfield to A458



3.39

Diagram 9 - A490, Guilsfield to Welshpool

- 3.40 Beyond the village, travelling south along the A490, the route becomes more rural in character with a derestricted speed limit up to the A490. The road is approximately 6.0 metres along this section so one way working would be necessary (**Figure 3-9**).
- 3.41 Once onto the A490 (approximately 6.5m wide) the route then continues south (Diagram 9 refers), connecting to the A458 roundabout adjacent to the Raven Inn and Welshpool & Llanfair Light Railway. This section of the A490 is relatively straight although there are a number of trees overhanging the carriageway that would need to be trimmed to accommodate AIL movements.
- 3.42 As the route approaches the west side of Welshpool, there are a number of bends that would require use of the whole carriageway to enable AIL movements. Between Guilsfield and the A458/Brook Street roundabout there is little scope for passing places to be constructed entirely off the carriageway (without the use of third party land). It would, therefore, be necessary to provide hardened verges to hold the convoys partly off-carriageway to allow opposing vehicles to pass under police control.
- 3.43 At the junction of the A490/A458/Brook Street (**Figure 3-10**), it would be necessary to traverse the roundabout counter-clockwise. To enable this movement, the junction would require significant modification to both the central island and splitter islands. Existing bollards would also need to be temporarily removed. These issues had previously been identified within the 2008 Capita Report.



Figure 3-9 - B4392, West of Guilsfield



Figure 3-10 - A458/A490 Roundabout (Raven Inn)

Route Assessment 2 Summary:

- 3.44 Based upon the observations along this route and previous studies undertaken, there are a number of constraints that leads one to conclude that both of the routes through Guilsfield are unsuitable for the transportation of AILs.
- 3.45 With regard to the northern route, AILs would be unable to negotiate the B4392/Park Road junction adjacent to the church (Parish Church of Saint Aelhaiarn) without serious risk of collision with adjacent properties. This is illustrated in the swept path analyses shown in **Figures 3-5** and **3-6** for turbine blades and a tower base unit respectively.
- 3.46 A similar constraint at the B4392/Park Road junction is evident along the southern route. Similar concerns were reported by Capita (2008). As stated earlier in paragraph 4.14, during the dry runs undertaken by Colletts, AILs carrying turbine blades were unable to negotiate the bend at this junction. Further issues along this route include the existing traffic calming adjacent to the Primary School. This would require temporary removal. There are also constraints at the s-bends in proximity to the A490.
- 3.47 It is important to note that apart from the concerns raised over the suitability of the routes through Guilsfield, there are a number of additional constraints along the routes from the A483. These are between Arddleen and the A458/Brook Street junction. These are summarised below:
- Temporary removal of bollards on splitter island at the A483/B4392 junction to facilitate AIL movement;
 - Lack of opportunity for regular passing places off-carriageway;

- Narrow rural roads, requiring one-way shuttle working;
- Tree foliage overhanging parts of the carriageway. Would need to be trimmed and managed throughout AIL delivery process;
- Temporary removal of bollards at A490/A458 junction required to facilitate AILs.

Route Assessment 3: Alternative Routes through Welshpool Town Centre

- 3.48 The sTMP proposes that AILs would travel through Welshpool Town Centre, during specific periods of the day, along the B4381, Severn Street, High Street and Raven Street. The sTMP does not report upon the constraints of other AIL route options in and around Welshpool. This is because Powys CC had, it is understood, expressed concerns over any potential use of other roads in the town centre.
- 3.49 Earlier studies in 2008 undertaken by Arup (consultants to RWE Npower) had highlighted several constraints to movement at that time.
- 3.50 A review of alternative routes (to those examined by Arup) through Welshpool town centre has therefore, for completeness, been considered in this report.

Option 1

- 3.51 As Diagram 10 shows, this route would turn right at the A483/B4381/Smithfield Road roundabout onto Smithfield Road, before continuing along Mill Lane, round the one-way system and travelling up Union Street and Brook Street to the Raven Inn roundabout. This route would avoid the canal bridge on Severn Street and the High Street as shown in **Figures 3-11 to 3-16**.

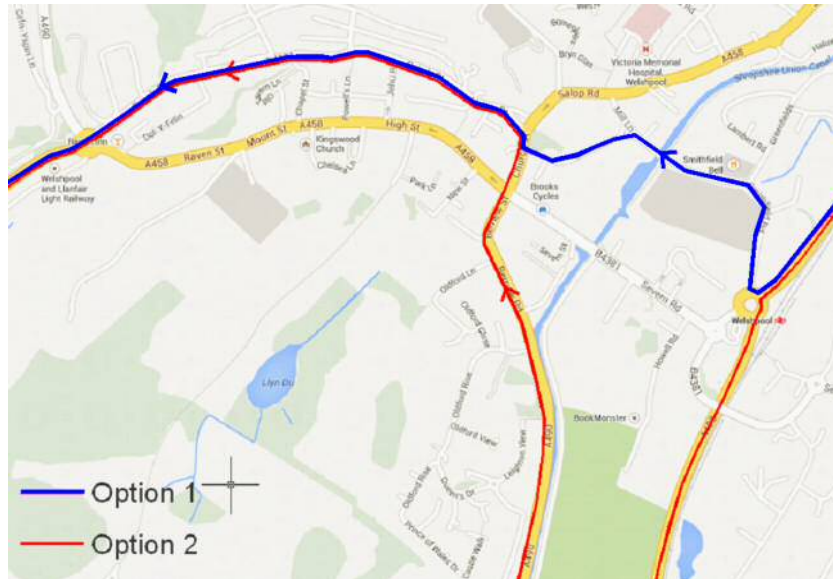






Diagram 10 - Route Options through Welshpool

3.52 Based upon site observations, there are a number of issues that would render this route unfeasible, as the remainder of this section illustrates.

3.53 Firstly, escorting AILs along this route would require a number of physical changes to the existing road layout and temporary removal of street furniture to accommodate AILs. These are in the following locations:

Description	Photo
<p>Bollards on splitter island at Tesco roundabout (northbound and southbound approaches)</p>	 <p>Figure 3-11 - Tesco Roundabout - Smithfields Road</p>

<p>Bollards on splitter island at second mini roundabout beyond Tesco (car park entrance to the Smithfield Bell Public House)</p>	 <p>Figure 3-12 - Smithfield Bell Public House Roundabout</p>
<p>Lamp column likely to be affected where route turns 90° beyond Clerks Court. Both sides of carriageway required so would require holding traffic on all other approaches</p>	 <p>Figure 3-13 - Bend adjacent to Clerks Court</p>
<p>Tight bend at Tourist Office – likely to require whole carriageway to negotiate (would require holding traffic on all other approaches)</p>	 <p>Figure 3-14 - Bend adjacent to Tourist Office</p>
<p>Removal of Pelican Crossing signal head and lamp column. Kerbline readjustment at pedestrian crossing island</p>	 <p>Figure 3-15 - Pelican Crossing</p>
<p>Removal of bollards (would require holding traffic on all other approaches)</p>	



- 3.54 In addition to the temporary removal of street furniture, this would require the AILs to travel in the opposing direction to the current (recently installed) one-way system up Union Street and Brook Street. This major change to the traffic management for every AIL delivery would impact on all routes through the town and create further disruption for other road users and pedestrians than would otherwise result from the preferred sTMP route.
- 3.55 In light of the total number of potential AIL movements through Welshpool, associated with the various wind farm proposals, this option is considered to be unsuitable and would be an unnecessary use of an indirect non-trunk road route through the town.
- 3.56 Furthermore, this route would also cause greater disruption to users of Tesco and to the residential dwellings fronting onto Union Street and Brook Street. It is considered that the proposed route through Welshpool town centre via Severn Street and the High Street would be the most appropriate and would cause the least disruption/delay to other road users.

Option 2

- 3.57 An alternative route through Welshpool via Berriew Road and Brook Street was previously considered for construction traffic by Arup (on behalf of RWE Npower).
- 3.58 The route would follow the A483 to the junction with the A490 (**Figure 3-17**). Due to the horizontal alignment of entry and exit at the junction, it would be necessary for AILs to negotiate the roundabout counter-clockwise. Opposing traffic would therefore be required to be held at a convenient location to allow the convoy to pass safely.



Figure 3-17 - A483/A490 Roundabout

- 3.59 To facilitate this movement it would be necessary to temporarily remove existing street lighting and create an area of hardened verge for AILs to utilise. Having negotiated the A483/A490 junction, the route into Welshpool is relatively straight. Based on the carriageway width, however, it would be necessary to hold opposing traffic. A potential passing place is available where the carriageway widens near the access to Coed-y-dinas Garden Centre. This would provide an opportunity for AILs to be temporarily held to allow opposing and following traffic to disperse.
- 3.60 The route continues straight towards the town centre passing a number of residential properties. On the edge of Welshpool the speed limit reduces from de-restricted (60mph) to 30mph.
- 3.61 Along this section there are a number of trees overhanging the carriageway that would need trimming prior to escort of AILs. Traffic signals are present at the access to the Morrisons' Store. In order to accommodate AILs it would be necessary to temporarily relocate the existing signal heads and bollards with the central splitter island.



Figure 3-18 – Overhanging Trees on A490, Berriew Road



Figure 3-19 - Traffic Signals at Access to Morrisons Supermarket

- 3.62 At Welshpool the new one-way system operating around the town would present a significant constraint to movement of AILs. For example, at the junction of Berriew Street and Broad Street, AILs would be unable to turn left onto Broad Street due to the proximity of properties close to the carriageway. The only alternative would be to continue straight towards Church Street and travel against the current one-way system.
- 3.63 As with Option 1, this would require complete reversal of the current traffic management regime that is operating along the existing one-way gyratory at Church Street, Union Street and Brook Street. Temporarily amending this traffic management to accommodate each AIL movement would cause severe disruption to other road users and pedestrians in the town.
- 3.64 It is, therefore, concluded that the transportation of AILs along this route would be severely constrained.

Alternative routes through Welshpool Summary:

3.65 Use of either Option 1 or Option 2 at Welshpool, in order to accommodate AIL movements, would require total reversal of the existing traffic management through the town centre. This would cause major disruption to the town. In addition to this main constraint, other concerns have been identified along the alternative routes through the town. These are:

Option 1

- Temporary removal of bollards on splitter island at Tesco Roundabout (northbound and southbound approaches);
- Bollards on splitter island at second mini roundabout (car park entrance to the Smithfield Bell Public House);
- Lamp column likely to be affected where route turns 90° beyond Clerks Court;
- Removal of Pelican Crossing signal head and lamp column on Church Street. Kerblines readjustment at pedestrian crossing island;
- Removal of bollards at Church Street/Union Street;
- Route through Welshpool would be on non-trunk roads.

Option 2

- Construction of hardened verge required to facilitate AIL movement at junction of A483/A490;
- Temporary removal of street lighting columns at junction of A483/A490;
- Narrow road, requiring one-way shuttle working into, and around, Welshpool;
- Tree foliage overhanging parts of the carriageway. Would need to be trimmed and managed throughout AIL delivery process;
- Temporary relocation of traffic signal heads and bollards at the access to Morrisons Supermarket;
- Route through Welshpool would use non-trunk roads (namely Union Street and Brook Street).

3.66 In view of the significant constraints along both of the alternative routes through Welshpool town centre, it is considered that the route proposed within the sTMP, via Severn Street and Broad Street, is the more straightforward, more convenient and would be less disruptive to businesses, residents and the travelling public. Apart from the short section of County Road (Severn Street and Severn Road), the sTMP route through Welshpool via the High Street, Mount Street and Raven Street is Trunk Road. WG has advised that it has no objection in principle to the use of this corridor through Welshpool.

- 3.67 As previously stated, PCC has confirmed that subject to condition surveys and structural assessments of buildings' cellars and of the Canal Bridge at Severn Street being completed, the route through Welshpool, as proposed within the sTMP, would be the most appropriate.

4.0 SUMMARY & CONCLUSIONS

- 4.1 Earlier studies commissioned by the Welsh Government had examined the potential strategic routes for transporting AILs to proposed wind farms in Mid Wales. Ellesmere Port was identified as an appropriate port of entry from which the AILs would be moved southwards along the SRN. Other studies carried out by Arup (consultants to RWE Npower) had focused upon local routes at and around Welshpool. Based upon this research, Grontmij was commissioned by Renewable UK Cymru to develop a strategic Traffic Management Plan (sTMP). This examined the routes in more detail from Ellesmere Port to the TAN 8 Strategic Search Areas B and C. It has identified highway works and traffic management measures considered necessary in order to enable AILs to be safely transported to the proposed wind farms.
- 4.2 The sTMP did not report on the suitability of other potential options for AIL routes, such as the A458 from Shrewsbury or with regard to various options at Welshpool town centre.
- 4.3 This report has therefore examined the suitability of those alternative routes towards and around Welshpool town centre to facilitate AILs and confirms the appropriateness of the approved sTMP route.
- 4.4 Consistent with the approach taken in the sTMP, it is assumed the turbine components will be typically up to 45m long (turbine blades) and 4.5m wide (tower sections) and weigh up to 80 tonnes (nacelle units). It is proposed that these will be transported in convoys of two AILs and be undertaken with police escorts.
- 4.5 The route options that have been reviewed include the A458 trunk road from Shrewsbury, the A495, A490 and various B-roads (B4392, B4381). This review has examined the suitability of each route for accommodating AIL movements. Numerous constraints along each route have been identified along with potential highway modifications that could be required to facilitate AIL convoys. **Table 6.1** provides a summary of the issues relating to each of the considered routes.

4.6 It has been demonstrated that there are potential impacts associated with each of the alternative routes assessed. These raise considerable doubts about the feasibility or desirability of using such corridors for AILs. It is therefore concluded that the route selected as part of the sTMP is the most appropriate to ensure the safe and commodious delivery of turbine components.

Route		Constraints		
Route 1: A5/A458 Shrewsbury to Welshpool		Vertical Alignment of carriageway at Wollaston		
		Potential impact on third party land at A5/A458 roundabout at Bicton Heath		
		Impact on railway bridge at Trewern		
		Impact on railway bridge at Buttington		
Route 2: A495 from A458 to A483 at Llynclys		Vertical alignment of two hump bridges on A495; over Afon Tanat and disused railway.		
		Narrow route through Llansantffraid-ym-Mechain		
		Double bends at Meifod		
		Alignment of New Mechain Bridge (over River Vyrnwy) restricts AIL movement		
		Double bends south of New Mechain bridge		
Route 3: A490 and B4392 from A458 to A483 at Arddleen		Sharp bend at Cae Llewelyn, immediately prior to A458 junction		
		Temporary Removal of bollards on splitter island at A483/B4392 junction		
		Lack of opportunities for passing places off-carriageway		
		Narrow roads requiring one-way shuttle working direction		
		Temporary Removal of bollards on splitter island at A490/A458 junction		
Route 4: Alternative Routes through Welshpool Town Centre		Major changes to one-way traffic management system through whole town centre		
		Temporary Removal of bollards on splitter island at Tesco Roundabout (Smithfields Road)		
		Temporary Removal of bollards on splitter island at Smithfield Bell Public House Roundabout		
		Lamp columns likely to be affected adjacent to Clerks Court		
		Removal of Pelican Crossing Signal Head and kerblin adjustment necessary to accommodate AILs		
		Option 1		Major changes to one-way traffic management system through whole town centre
				Construction of hardened verge required to facilitate AIL movement at junction of A483/A490;
				Temporary removal of street lighting columns at junction of A483/A490;
				Narrow road, requiring one-way shuttle working into, and around, Welshpool;
				Tree foliage overhanging parts of the carriageway. Would need to be trimmed and managed throughout AIL delivery process;
Option 2		Temporary removal of traffic signals and bollards on Central Island at access to Morrisons Supermarket.		

Table 4.1 - Summary of constraints associated with each route