



Chapter 12

Access, Traffic and Transport



**SCOTTISHPOWER
RENEWABLES**

Table of contents

12.1	Executive summary	1
12.2	Introduction	2
12.3	Approach to assessment and methods	2
12.3.1	Study area	2
12.3.2	Information and data sources	4
12.3.3	Effects scoped out	4
12.3.4	Consultation	5
12.3.5	Approach to assessment of effects	7
12.3.6	Sensitivity of receptor	8
12.3.7	Magnitude of impact	8
12.3.8	Significance of effect (potential effects)	9
12.3.9	Potential cumulative effects	9
12.3.10	Operational cumulative effects	9
12.3.11	Mitigation	9
12.3.12	Residual effects	10
12.3.13	Statement of significance	10
12.4	Baseline conditions	10
12.4.1	Existing road network	10
12.4.2	Access Route A: Hare Hill Windfarm access	11
12.4.3	Access Route B: Blackaddie Road / U432n Euchan Water, west of Sanquhar	11
12.4.4	Existing traffic flows	12
12.4.5	Road capacity	13
12.4.6	Access by public transport	14
12.4.7	Walking and cycling infrastructure	14
12.4.8	Accident records	14
12.4.9	Existing network performance	15
12.5	Proposed Development parameters	16
12.5.1	Site access and onsite tracks	16
12.5.2	Abnormal load access route	16
12.5.3	Construction Programme	16
12.5.4	Construction materials	17
12.5.5	Assessment scenarios	19
12.6	Trip generation	20
12.6.1	HGV trip generation calculations	20
12.6.2	Programme	21
12.6.3	HGV trip generation summary	22
12.6.4	Light vehicle trip generation	22
12.6.5	Total trip generation	23
12.6.6	Abnormal loads	23
12.6.7	Distribution	23
12.7	Assessment of effects	24

12.7.1	Impact screening	24
12.7.2	Abnormal loads	26
12.7.3	Potential effects	27
12.7.4	Mitigation	31
12.7.5	Cumulative effects	32
12.8	Summary and statement of significance	34
12.8.1	Summary of Significant Effects	34
12.9	References	37

Figures

Figure 12.1: Abnormal Load Routes

Figure 12.2: Study Area

Figure 12.3: Traffic Data Locations

Figure 12.4: Accident Data

Technical Appendices

Appendix 12.1: Traffic Data

Appendix 12.2: Accident Data

Appendix 12.3: Traffic and Access Scenario Assessments

Appendix 12.4: Outline CTMP



Chapter 12

Access, Traffic and Transport

12.1 Executive summary

1. This Chapter considers the environmental impacts of changes to access, traffic and transport as a result of the proposed Development. It sets out the assessment methodology adopted, existing conditions in the study area, proposed best practice methods and predicted effects prior to, and following, the application of mitigation measures to reduce potentially adverse effects on the road infrastructure, road users and local communities.
2. ScottishPower Renewables (SPR) prepared scoping material for discussion with Dumfries and Galloway Council (DGC) and other relevant organisations and stakeholders in the form of a Scoping exercise, issued in February 2020, as highlighted in **Chapter 6: Scoping and Consultation**. The scoping responses received from, and discussions undertaken with, DGC and Transport Scotland have informed the studies undertaken.
3. Access to the Site is via the Hare Hill Windfarm access (Access Route A) off the A76 or an access off the U432n to the south of Sanquhar (Access Route B), which is accessed via the C128n Blackaddie Road in Sanquhar. The use of Access Route A may include the use of Access Route B for some deliveries and personnel movements.
4. For the delivery of construction materials, two different delivery scenarios have been assessed. First, a scenario whereby all construction materials (e.g. concrete for foundations and aggregate for access tracks) are delivered to the Site, which is the worst case scenario and highly unlikely given borrow pit investigations. The second scenario, and the one preferred by SPR and therefore termed the 'likely scenario', is for 100% of access track aggregate to be sourced from the onsite borrow pits, thereby reducing the total number of heavy goods vehicle movements considerably. Both scenarios result in increases in heavy goods vehicle movements on the A76, but the likely scenario at a much lower rate (8.5% maximum increase) compared to the worst case (highly unlikely) scenario (48.3% maximum increase).
5. The use of Access Route B would result in large heavy goods vehicle increases on the C128n Blackaddie Road and U432n Euchan Water; however, the base flows on these roads are very low and therefore the increased traffic flows are within the theoretical capacity of the roads. In the likely scenarios that include Access Route B, the number of heavy goods vehicles on the C128n Blackaddie Road and U432n Euchan Water is forecast to be between one and four per hour in each direction in the peak months, which is negligible, particularly with the implementation of the Construction Traffic Management Plan and since the peak months would be for a small proportion of the overall construction programme.
6. The delivery of the wind turbines would be from either the Port of Ayr or King George V Dock, Glasgow. The vehicles would be regarded as abnormal loads and be around 5 m in width. Blade lift technology would be utilised to transport the blades between a location to the north of new Cumnock and the Site, to avoid pinch points along the routes. Some upgrades may be needed to the highway network to enable the safe delivery of the wind turbine parts in agreement with relevant authorities.
7. With the absolute worst case (and highly unlikely scenario of all construction materials coming by road) the maximum vehicular traffic associated with the construction of the proposed Development, including four other proposed windfarm projects (Sanquhar II, Pencloe, Sandy Knowe and Glenmuckloch) occurring simultaneously, would be a 30% increase on baseline traffic flows on the A76.
8. This assessment has found that no significant effects are predicted from the forecast increases in traffic with respect to driver delay and community severance. However, the increase could be significant without mitigation for pedestrian amenity, road

safety and with the delivery of the wind turbine components. These potential impacts would be controlled by best practice measures which would be outlined in a Construction Traffic Management Plan and Abnormal Load Management Plan. Consequently, no significant effects are predicted to occur as a result of the access, traffic and transport impacts.

12.2 Introduction

9. This Chapter considers the potential environmental impacts of changes to access, traffic and transport as a result of the proposed Development. It sets out the assessment methodology adopted, existing conditions in the study area, proposed best practice methods and predicted effects prior to, and following, the application of mitigation measures to reduce potentially adverse effects on the road infrastructure, road users and local communities.
10. Potentially significant access, traffic and transport related environmental effects may result from two forms of potential impacts:
 - transport arrangements made for the movement of turbines including blade, tower sections and nacelle of the wind turbines that are transported as abnormal loads. Abnormal loads are those which exceed the length, weight or height criteria defined in 'Abnormal Load Movements – A brief guide to Notification and Authorisation requirements' (Transport Scotland, June 2007); and
 - import of general construction materials transported via 'conventional' heavy goods vehicles (HGVs) and low loaders.
11. The assessment detailed within this Chapter includes worst case, yet highly unlikely, assumptions made for the purpose of forming a robust assessment of the proposed Development within the parameters identified in **Chapter 3: Description of the proposed Development** in addition to a more realistic (likely) scenario.
12. During operation, the proposed Development would generate occasional maintenance trips, which would not lead to any variation in the baseline traffic flows beyond that of everyday fluctuation.
13. The traffic impact assessment and the reporting required for the preparation of this Chapter has been undertaken by SLR Consulting Ltd.

12.3 Approach to assessment and methods

14. This Chapter takes an appropriate and topic specific approach to assessment of the proposed Development based on the design parameters set out in **Chapter 3: Description of the proposed Development**. This Chapter provides a reasonable worst-case assessment for Site access, traffic and transport and presents information for consultees and the decision makers to comment on and determine the application of the proposed Development.
 15. The approach for the assessment of Site access, traffic and transport effects has been to define the level of traffic anticipated to access the proposed Development during its construction phase, calculated from first principles and distributed over an anticipated construction programme of 22 months. The effects of the construction and operational phase traffic have been assessed against the measured baseline in terms of existing traffic levels and then compared to standard practice criteria.
- ### 12.3.1 Study area
16. The Site (as defined by the application boundary) is located within the administrative area of Dumfries & Galloway, whilst Access Route A is in East Ayrshire.

-
17. The study area for the assessment of access, traffic and transport is established on the proposed routes to Site from the external road network, for construction traffic, including Abnormal Indivisible Loads (AIL).
18. Access investigations have been undertaken for the potential ports of origin to transport the turbine components and the point of access into the Site from the public highway network. This includes the use of a Super Wing Carrier, and also a blade lift adapter, to overcome pinch-points on the highway network that would be difficult to navigate by standard transporter.
19. In summary, the options taken forward in the assessment within this Chapter are as follows:
- **port of origin for turbine (AIL) components** – Port of Ayr or King George V Dock, Glasgow, dependent on commercial and logistical considerations;
 - **Site access** – Hare Hill Windfarm access (Access Route A) off the A76 or an access off the U432n to the west of Sanquhar (Access Route B), which is accessed from the C128n Blackaddie Road in Sanquhar, or both accesses;
 - **general construction traffic, including workers** – from the A76 north and from the A76 south;
 - **aggregates (if using local quarries)** – from Barr Quarries on the A70 at New Cumnock and Barburgh Mill Quarry on the A76, to the south of Sanquhar; and
 - **concrete (if not batching on Site)** - concrete batching plant to the west of Ochiltree on the A70.
20. The routes that would be followed by the AIL from the two port options are described below. The choice of route will be dependent on commercial and logistical considerations:
- exit Ayr Docks onto Wagon Road;
 - continue on Wagon Road to junction with Allison Street;
 - continue on Allison street to roundabout junction with A719;
 - at roundabout turn left onto A719;
 - continue on A719 to roundabout junction with A77;
 - at roundabout turn left onto A77;
 - continue on A77 to roundabout junction with A76; and
 - at roundabout turn right onto the A76.
- or:
- exit KGV onto Kings Inch Drive;
 - continue on Kings Inch Drive through two roundabouts to junction with road leading towards M8;
 - continue on M8 to merge onto M74;
 - continue on M74 to junction 5; then exit M74 and circumnavigate roundabout to re-join M74 northbound;
 - continue on M74 to merge onto M8;
 - continue on M8 to junction with M77;
 - at junction take exit onto M77 and merge onto A77;
 - continue on A77 to roundabout junction with A76; and
 - at the roundabout turn left onto the A76.
- Then (for both options):
- continue straight on A76 at the roundabout junction with B7073;
 - continue straight on A76 at the roundabout junction with A719;
 - continue straight on A76 at the roundabout junction with B7083;
 - continue straight on A76 at the roundabout junction with A70;
 - continue straight on A76 at the roundabout junction with B7083;
 - continue straight on A76 at the roundabout junction with unclassified road;
 - at the roundabout junction with B741; turn left to continue on A76;
 - continue on A76 to:
 - Access Route A – the Hare Hill Windfarm access; or

-
- Access Route B - the junction with Blackaddie Road in Sanquhar; then continue, via the U432n Euchan Water to Site entrance at approximately NS 70872 06485.
21. The AIL routes between the ports at Glasgow and Ayr and the A77 / A76 junction are well established for the purposes of turbine component delivery (albeit some modifications to the highway may be required).
22. The main road for all of the vehicles associated with the construction phase is the A76, which is the major road which serves the Site and is a trunk road maintained by Transport Scotland between the junction with the A77 (a major trunk road) at Kilmarnock and the junction with the A75 at Dumfries, and also connects with the A70, which also provides access to the A77, at Ayr.
23. The routes for general construction traffic (including workers), aggregate and concrete, and AIL to Access Routes A and B are shown in **Figure 12.1: Abnormal Load Routes**.
24. Given the above, the core study area has been identified as follows:
- the A76 between the junction with the A77 at Kilmarnock (Hurlford) to Thornhill, to the south of Sanquhar, which includes the Hare Hill Windfarm access (Access Route A); and
 - C128n Blackaddie Road and U432n Euchan Water between the A76 at Sanquhar and Access Route B.
25. The study area is shown in **Figure 12.2: Study Area** and includes the sensitive receptors in the surrounding area, including Mauchline and New Cumnock in East Ayrshire and Kirkconnel, Sanquhar and Thornhill in Dumfries and Galloway. Beyond the study area, given the likely distribution of vehicles to the wider strategic road network, professional judgement suggests that effects relating to Site access, traffic and transport would be unlikely to be significant.
- ### 12.3.2 Information and data sources
26. To determine the baseline conditions against which effects of the proposed Development have been assessed, existing and new datasets have been used, as provided in **Technical Appendix 12.1: Traffic Data**. The location of the traffic count data is shown in **Figure 12.3: Traffic Data Locations**.
27. An Automatic Traffic Count (ATC) was installed on the A76 in the vicinity of the Site between 14th and 20th March 2020, prior to the travel restrictions associated with Covid-19.
28. Additionally, data from the Department for Transport (DfT) website have been obtained on the A76 between the A77 and Sanquhar. Annual traffic statistics are accrued via 12-hour manual traffic counts (MTCs), continuous data from ATCs, as well as robust estimation based upon previous data; however, all five of these datasets are actual counts from 2018 and one from 2017 and therefore within what is generally considered a suitable traffic count for use in a traffic impact assessment (not older than three years old). The validity and appropriateness of use of the traffic data used in the assessment has been agreed with TS.
29. No traffic data has been collected on the C128n Blackaddie Road or U432n; however, given the nature of the road, traffic levels are assumed to be very low and therefore professional judgment has been used to identify an estimate of 24-hour traffic flow for the purpose of assessment.
30. Additionally, road traffic collision (RTC) data for the most recent five-year period from 2017 to 2020 was obtained on the A76 and provided for by TS. The locations of the recorded injury accidents are shown on **Figure 12.4: Accident Data**. Supplementary information from the Crashmap website (www.crashmap.co.uk) has been obtained for Blackaddie Road.
- ### 12.3.3 Effects scoped out
31. It is estimated that the operational phase of the proposed Development would generate no more than five vehicular trips in any one day and zero trips on most days. Typical duties onsite would include routine maintenance, such as planned servicing, safety checks, and repairing faults. These visits would normally require light vans or similar vehicles and would use the same routes as those used during construction.
-

32. The trips generated by the operational activities onsite would be no greater than those expected and accounted for in the background variations to the existing traffic flows. As such negligible traffic flows would be indistinguishable from normal daily traffic flows and, therefore, assessment of operational effects has been scoped out of this assessment.
33. As the operational impact of the proposed Development on the study area is indiscernible, the operational cumulative effects have not been assessed.
34. The traffic generated from the replacement of wind turbines has also been scoped out. When wind turbines are replaced, it is currently expected the following elements would lead to future separate traffic movements:
- dismantling and removal of turbine components; and
 - the installation of new turbines.
35. Trip generation associated with these activities would not exceed the levels presented in the assessment of construction impacts and, therefore, has been scoped out of the assessment.
36. Consideration of noise effects of traffic is assessed within **Chapter 13: Noise** and are not considered in this Chapter.

12.3.4 Consultation

37. SPR prepared scoping material for discussion with East Ayrshire Council (EAC), Ayrshire Roads Alliance (ARA), Dumfries and Galloway Council (DGC) and TS in February 2020, as highlighted in **Chapter 6: Scoping and Consultation**. Account has been taken of the scoping responses received and any further discussions, as set out in **Table 12.1**:

Table 12.1 Scoping and consultation

Consultee	Summary of key issues	Action and where addressed in Chapter
EAC	Advised consulting Ayrshire Roads Alliance.	See below.
ARA	No Response.	Whilst the worst-case scenario assessed in this Chapter identifies a small number of daily concrete delivery vehicle movements along the A70, it is assumed that no roads in ARA's jurisdiction within the study area would be directly impacted in the likely scenario.
DGC	Advised avoiding the U405n Scar (sic) Water and U404n Auchenhessnane public roads due to weak structures, poor visibility, horizontal and vertical alignment issues and lack of passing places.	These roads do not form part of any access route.
	Requires the access routes will require to be re-assessed in full (as substantially larger than previous applications).	The assessment within this Chapter sets out how it is proposed to use both conventional turbine component transportation vehicles and a lift adapter vehicle (between a location to the west of New Cumnock and the site), and the potential implications along the abnormal load route. Should consent be granted, detailed assessments using the confirmed vehicle specifications will be undertaken and further discussions between SPR and DGC will be held to confirm the details of any mitigation
	Suggested the use of the access route for the proposed 'Sanquhar II Windfarm' (19/0490/S36) from the A76(T), to minimise the disruption and impact upon local communities.	
	Highlighted the need to assess any bridges/structures along the access route, many of which may be unsuitable for heavy HGVs and larger AILs, and that have limitations on safe axle loadings and/or restricted parapet widths.	
Requires Abnormal Loads to be assessed on an individual basis, proposed axle load configurations should be supplied and agreed at earliest opportunity.		

Consultee	Summary of key issues	Action and where addressed in Chapter
	<p>Confirmed the application should identify the access route(s) and the full extent of proposed offsite road accommodation and mitigation works necessary to permit 2-way construction traffic and the passage of cranes and component delivery vehicles.</p>	<p>that may be required on the highway network in DGC's jurisdiction.</p>
	<p>Requires all proposals for access routes, Site Access Route And all accommodation works be supported by swept path tracks.</p>	
	<p>Advised on a number of 'Core' paths including The Southern Upland Way that run through or adjacent to this Site and it would be appropriate that accommodations and mitigations be made to ensure the safety of walkers during construction works, and such accommodations and mitigations should meet with the approval of the Councils' Access Team.</p>	<p>This is addressed in the Outline Construction Traffic Management Plan (CTMP) in Technical Appendix 12.4: Outline CTMP and Outline Construction Environmental Management Plan (CEMP) in Technical Appendix 3.1: Outline CEMP.</p> <p>Also see assessment of effects on recreational and tourism users in Chapter 14: Socio-Economics, Tourism and Recreation.</p>
	<p>Set out the requirements for a Traffic Management Plan (TMP), which should include:</p> <ul style="list-style-type: none"> • a programme of delivery types/numbers by month, details of all proposed mitigation measures to minimise the impact on local communities and businesses, • agreed and excluded access routes and details of measures that will be implemented to ensure that: <ul style="list-style-type: none"> ○ no stacking of delivery vehicles occur on any part of the public road network; ○ the safety of the public using 'core' paths is maintained; and is to be agreed in writing with the Police and the Roads Authority prior to any works commencing onsite; and ○ Access Route A and excluded routes should be identified and agreed for all types of vehicles. 	<p>See Technical Appendix 12.4: Outline CTMP</p>
	<p>Suggested there may be some increase in traffic using other minor roads and the possibility of other unrelated windfarm projects being constructed in the vicinity concurrently with this project. Therefore, it would be appropriate that the TMP acknowledge that co-ordination phasing may be required to mitigate against the cumulative traffic impact.</p>	<p>See Technical Appendix 12.4: Outline CTMP</p>
	<p>In the event that suitable and sufficient aggregate not be available from onsite Borrow Pits, DGC requires the worst case scenario that 100% of the aggregate required for construction shall be imported to Site should be assessed.</p>	<p>See Sections 12.5.6 and 12.6</p>
<p>Transport Scotland</p>	<p>Identifies that the use of the Port of Ayr for the delivery of wind turbine components will result in these loads routing along the A77(T) to Bellfield Interchange then south on the A76(T), passing through the recognised pinch point at the mini roundabout in New Cumnock.</p>	<p>Turbine component route assessments were undertaken by Collet as follows:</p> <ul style="list-style-type: none"> • King George V docks via the A76 south and through Sanquhar; and

Consultee	Summary of key issues	Action and where addressed in Chapter
	<p>Identifies that that alternative use of King George V docks for the delivery of turbine components will result in these loads routing via the M8 to the M74/M6 to A75(t), then north on the A76(T) through Sanquhar and the pinch point at the Tollbooth.</p> <p>Advises that whilst Transport Scotland does not wish to discourage the use of blade lifter technology to overcome these pinch points, that they would wish to highlight that this technology has not yet been used in Scotland to any great degree. Identifies that significant work will therefore be required to satisfy them that the proposal can work technically and does not represent any risk to the safe and efficient operation of the trunk road network.</p>	<ul style="list-style-type: none"> King George V docks or Port of Ayr, via the A76 north and through New Cumnock. <p>The route via the A76 south was discounted due to physical restrictions. Through further assessment of the pinch points at New Cumnock (detailed swept path analysis using topographic survey) it was concluded that transporting the candidate blades using conventional turbine component transportation vehicles was unlikely to be feasible without significant disruption and therefore it is proposed to use a lift adapter to overcome the significant constraints.</p> <p>The assessment within this Chapter sets out how it is proposed to use the lift adapter vehicles between a location to the west of New Cumnock and the Site and the potential implications along this section of the abnormal load route. However, detailed assessments (potential vertical constraints and structural assessments of bridges) using the confirmed vehicle specifications will need to be undertaken post-consent together with further discussions between SPR and TS to confirm any mitigation that may be required on trunk roads along the route.</p>

12.3.5 Approach to assessment of effects

38. This assessment has been prepared according to the guidance document ‘*Transport Assessment and Implementation: A Guide*’ published by the Development Department of the Scottish Executive in August 2005. This Chapter also takes into account of the Institute of Environmental Management and Assessment (IEMA) ‘*Guidelines for the Environmental Assessment of Road Traffic*’ (IEMA, 1993), and other departmental design standards.
39. The likely significance of the potential effects from the proposed Development that relate to Site Access, Traffic and Transport have been determined by considering the magnitude of change in traffic movements and the sensitivity of the receptors which would be affected by these changes. This has been undertaken in accordance with the IEMA guidance (1993) and standard good practice, based on the experience of the assessor.
40. The IEMA guidance suggests that a day-to-day traffic flow variation of + or – 10% is to be expected in the baseline situation and that projected traffic flow increases of less than 10% would be imperceptible to the general public and would create no discernible environmental impact. Therefore, increases in traffic levels below 10% are considered insignificant.
41. Based on the IEMA guidance, the following factors have been identified as being the most discernible potential environmental effects likely to arise from changes in traffic movements. Therefore, these are considered in the assessment as potential effects which may arise from changes in traffic flows resulting from the proposed Development:
- driver severance and delay – the potential delays to existing drivers and their potential severance from other areas;
 - community severance and delay – the potential severance to communities and the delays to movements between communities;

- pedestrian amenity - relative pleasantness of a journey, and is considered to be affected by traffic flow, traffic composition and pavement width / separation from traffic;
- vulnerable road users and road safety – the potential effect on vulnerable users of the road (e.g. pedestrians/cyclists); and
- hazardous and dangerous loads – the potential effect on road users and local residents caused by the movement of abnormal loads.

42. The significance of likely effects has been determined by consideration of the sensitivity of receptors to change, taking account of the specific issues relating to the study area, and then the magnitude of that change.

43. **Chapter 5: Environmental Impact Assessment Report** provides further detail on the approach to assessment. Refer back to **Chapter 5** for the general approach and an explanation of the worst-case parameters being assessed in the EIA. **Chapter 5** also sets out the list of cumulative sites, and the approach to cumulative site assessment.

12.3.6 Sensitivity of receptor

44. The potential sensitivity of receptors to change in traffic levels has been determined by considering the study area and the presence of receptors in relation to each potential impact.

45. The IEMA guidelines provide two thresholds when considering predicted increase in traffic, whereby a full assessment of the impact is required:

- Rule 1 - where the total traffic would increase by 30% or more (10% in sensitive areas); and/or
- Rule 2 - where the HGV traffic would increase by 30% or more (10% in sensitive areas).

46. In this context, the IEMA guidance does not define a sensitive area and, therefore, the assessor makes a professional judgement based on experience and the nature of the study area. Each receptor has been assessed individually to determine its sensitivity and the assessment criteria chosen are shown in **Table 12.2**.

Table 12.2: Receptor sensitivity

Impact	Low sensitivity	Medium sensitivity	High sensitivity
Driver severance & delay	Road network not affected	Road network not experiencing congestion at peak times	Road network experiencing congestion at peak times
Community severance & delay	No presence of existing communities severed by road	Presence of existing communities with a moderate level of existing severance (subjective assessment)	Presence of existing communities with existing severance (subjective assessment)
Road Safety	High sensitivity receptor		
Vulnerable road users	High sensitivity receptor		
Wider disruption due to dangerous loads	No hazardous or dangerous loads on the road network	Some hazardous or dangerous loads on the road network. Loads are legally permitted on UK roads	Abnormal and oversized loads to use road network

12.3.7 Magnitude of impact

47. The magnitude of traffic impacts is a function of the existing volumes of traffic, the percentage increase and change due to a development, changes in the type of traffic and the temporal distribution of traffic. The determination of magnitude has been undertaken by considering the parameters of the proposed Development, establishing the scope of the receptors that may be affected and quantifying these effects utilising IEMA Guidelines and professional judgement.

48. Consideration is given to the composition of the traffic on the road network, under both existing and proposed conditions. For example, LGVs have less impact on traffic and the road system than HGVs. Similarly, HGVs can have less impact than abnormal load vehicles, depending on the frequency of the abnormal loads.
49. The magnitude of impact or change has been considered according to the criteria defined in **Table 12.3**.

Table 12.3: Magnitude of Impact

Impact	Negligible	Minor	Moderate	Major
Driver severance & delay	<10% increase in traffic	Quantitative assessment of road capacity based on existing traffic flows and predicted future traffic levels		
Community severance & delay	<10% increase in traffic	<30% increase in traffic	31% to 60% increase in traffic	>60% increase in traffic
Pedestrian amenity	Change in total traffic flows (or HGVs) <100%	Change in total traffic flows or HGVs >100% and a review based upon the actual number of vehicles, vehicles speed and likely pedestrian footfall.		
Road Safety / Vulnerable road users	<10% increase in traffic	Qualitative assessment of existing accident records and predicted increases in traffic		
Dangerous loads	0% increase in traffic	<30% increase in traffic	31% to 60% increase in traffic	>60% increase in traffic

12.3.8 Significance of effect (potential effects)

50. Sensitivity and magnitude of change as assessed under the detailed criteria have then been considered collectively to determine the potential effect and their significance. The collective assessment is a considered assessment by the assessor, based on the likely sensitivity of the receptor to the change (e.g. is a receptor present which would be affected by the change), and then the magnitude of that change. **Table 12.4** is used as a guide to determine the level of effect. 'Major' and 'moderate' effects are considered to be 'significant' in terms of the EIA Regulations.

Table 12.4: Level of effect

Sensitivity of Receptor	Magnitude of Effect			
	Negligible	Minor	Moderate	Major
Low	None	Slight	Slight	Moderate
Medium	Slight	Slight	Moderate	Major
High	Slight	Moderate	Major	Major

12.3.9 Potential cumulative effects

51. An assessment of the cumulative effect on the study area of all relevant developments, including the construction phases of local windfarms, within a 20 km radius of the Site (either with planning consent or under construction) which may utilise the same access routes as the proposed Development has been undertaken.

12.3.10 Operational cumulative effects

52. As the operational impact of the proposed Development on the study area is indiscernible, the operational cumulative effects have not been assessed.

12.3.11 Mitigation

53. Mitigation measures will be considered as part of construction good practice and would seek to offset any effects which have been assessed as significant.

12.3.12 Residual effects

54. Following consideration of mitigation measures, an assessment of the residual effects has been made. Residual effects are those likely to occur after mitigation measures have been incorporated into the scheme.

12.3.13 Statement of significance

55. A statement of significance is provided at the end of the Chapter which provides a summary of the complete assessment for each receptor, taking into consideration any proposed mitigation measures, and it reports the significance of the residual effects in compliance with the EIA Regulations.

12.4 Baseline conditions

56. This section details the baseline conditions that exist in the study area in relation to the existing road network, existing traffic flows and the current safety of the study area.

12.4.1 Existing road network

A76

57. The main focus of the study area for this assessment has been defined as the A76 between the junction with the A77 at Hurlford to the north and Thornhill to the south. The A76 is a single carriageway trunk road subject to the following speed limits:

- 60 mph between the A77 (Hurlford Junction) and Mauchline;
- 30 mph through Mauchline;
- 60 mph between Mauchline and New Cumnock;
- 30 mph through New Cumnock;
- 60 mph between New Cumnock and Kirkconnel;
- 30 mph through Kirkconnel;
- 60 mph between Kirkconnel and Sanquhar;
- 30 mph through Sanquhar;
- 60 mph between Sanquhar and Thornhill; and
- 30 mph through Thornhill.

58. The following sections of the A76 within the study area have been identified as having sensitive receptors:

- Mauchline;
- New Cumnock;
- Kirkconnel;
- Sanquhar; and
- Thornhill.

Mauchline

59. There are some residential, commercial and community buildings on the A76 through Mauchline, including a pub, convenience store and Fire Station, although the majority of facilities are on adjoining roads within the village. Well-lit and generally wide footways are present on both sides of the carriageway and there are a number of informal (with tactile paving and central refuges) and formal crossing locations for pedestrians.

New Cumnock

60. There are various residential, commercial and community buildings directly on the A76, which passes through the village including New Cumnock Primary and Nursery School, New Cumnock Community Centre and Evangelical Church. The footways on either side of the carriageway are well lit and generally wide. There are also a number of informal (with tactile paving and central refuges) and formal crossing locations for pedestrians within the village and the school has signage indicating that a crossing patrol operates.

Kirkconnel

61. There are a number of residential and community buildings adjacent to the A76 through the village including Kirkconnel Parish Church a convenience store and a pub. Footways are present on both sides of the carriageway, and whilst some have guard railing to protect pedestrians from the highway, the standard of provision is intermittent with some footways that are narrow. There is street lighting along the route through the village and various locations with tactile paving allowing safe crossing of the A76 and side roads.

Sanquhar

62. There are residential and community buildings within Sanquhar, directly adjacent to the A76, which narrows at the Toolbooth Museum. There are footways throughout the town, with some guard railing to protect pedestrians. Sanquhar Academy is directly adjacent to the A76; however, the access for pedestrians is taken from Broomfield, a side street. Sanquhar Academy sports facilities and other community sports facilities are also located directly adjacent to the A76 on both sides of the carriageway; however, these are also not accessed from the A76 itself.

Thornhill

63. The residential properties and local facilities in Thornhill are predominantly set back from the A76, separated by echelon parking spaces or wide verges. The A76 at this location is relatively wide, with ghost island hatchings and informal pedestrian crossing locations.

A70

64. Whilst the A76 would carry the majority of the construction traffic associated with the proposed Development, should aggregates and concrete be required to be brought in from offsite, this would likely be from Barr Quarries and concrete batching plant to the west of Ochiltree, accessed off the A70, which is a strategic distributor road linking the A77 Trunk Road at Ayr, to the west, with Junction 12 of the A74 (M) to the east.
65. The A70 also links the A77 with the A76 at Cumnock. The road is generally single carriageway and of a good standard. The road is predominantly subject to 60 mph speed limit; however, this reduces to 30 mph within the residential settlements along the route.
66. The A70 passes through the settlement of Ochiltree, which is considered a sensitive receptor, given there are residential properties adjacent to the carriageway and also Ochiltree Primary School, although not located directly on the A70, there is potential for pupil and staff interaction with the A70 on the journey to and from school.

12.4.2 Access Route A: Hare Hill Windfarm access

67. The Hare Hill Windfarm access (Site Access Route A) is a privately-owned single-track road which serves the existing Hare Hill Windfarm. The private access track also provides access to adjacent forestry and farm land and is used by their associated operational traffic. As this is a private track, no sensitive receptors have been identified.

12.4.3 Access Route B: Blackaddie Road / U432n Euchan Water, west of Sanquhar

68. Blackaddie Road is subject to a 30 mph speed limit from the junction with the A76 to the junction with John Baily Smith Way, where it changes to national speed limit and becomes rural in nature. This route has successfully been used for construction access for the Whiteside Hill Windfarm, the SP Energy networks (SPEN) substation and overhead line upgrades.
69. There are a number of residential properties, businesses and a playground adjacent to Blackaddie Road, and it also carries the Southern Upland Way across Blackaddie Bridge, and it is therefore considered to have high sensitivity.
70. The U432n Euchan Water connects from Blackaddie Road southwest of Blackaddie Bridge to Glenglass and is a single-track road subject to national speed limit, which has been upgraded with passing places associated with the Whiteside Hill Windfarm.
71. Given the absence of footways and potential for walkers and cyclists along the route, the U432n Euchan Water is considered to have high sensitivity.

12.4.4 Existing traffic flows

72. Baseline traffic flows have been obtained as follows:

- DfT Count 40748 on the A76 (east of the A77 at Hurlford), 2018;
- DfT Count 80239 on the A76 (at Mauchline), 2018;
- DfT Count 80238 on the A76 (north of Cumnock), 2018 (estimated from 2017);
- DfT Count 80520 on the A76 (west of New Cumnock), 2018;
- DfT Count 30752 on the A76 (east of New Cumnock), 2018;
- a new ATC on the A76 (at the Hare Hill Windfarm access), March 2020;
- DfT Count 50747 on the A76 (at Kirkconnel), 2018;
- DfT Count 80519 on the A70 (west of Ochiltree), 2018 (estimated from 2008 count);
- DfT Count 30753 on the A76 (south of Sanquhar), 2018; and
- DfT Count 10748 on the A76 at Thornhill, 2018 (estimated from 2015 count).

73. The ATC and DfT count data are provided in **Technical Appendix 12.1: Traffic Data** and a summary of the weekday 24 AADT and maximum peak, is provided in **Table 12.5** and **Table 12.6** respectively. The data include directional and two-way flows.

Table 12.5: 24-Hour AADT traffic flows (surveyed data)

Count Location	Source	Direction	24 Hour AADT		
			Total	HGV	% HGV
A76 (east of the A77 at Hurlford)	1.DfT Count, 2018	North	5573	343	6.2
		South	5656	296	5.2
		2-Way	11229	639	5.7
A76 (at Mauchline)	2. DfT Count, 2018	North	6335	332	5.2
		South	5970	337	5.6
		2-Way	12305	669	5.4
A76 (north of Cumnock)	3. DfT Count, 2017	North	5233	231	4.4
		South	5339	287	5.4
		2-Way	10572	518	4.9
A76 (west of New Cumnock)	4. DfT Count, 2018	North	3073	432	14.1
		South	3043	462	15.2
		2-Way	6116	894	14.6
A76 (east of New Cumnock)	5. DfT Count, 2018	East	1367	288	21.1
		West	1328	218	16.4
		2-Way	2695	506	18.8
A76 (at the Hare Hill Windfarm access)	6. ATC, 2020	East	1146	291	25.4
		West	1177	244	20.7
		2-Way	2323	535	23.0
A76 (at Kirkconnel)	7. DfT Count, 2018	East	1987	329	16.6
		West	1955	347	17.7
		2-Way	3942	676	17.1
A70 (west of Ochiltree)	8. DfT Count, 2018 (estimated from 2008 count)	East	3494	447	12.8
		West	3549	585	16.5
		2-Way	7043	1032	14.7

Count Location	Source	Direction	24 Hour AADT		
			Total	HGV	% HGV
A76 (South of Sanquhar)	9. DfT Count, 2018	North	1542	282	18.3
		South	1522	385	25.3
		2-Way	3064	667	21.8
A76 (at Thornhill)	1. DfT Count, 2018 (estimated from 2015 count)	North	2053	202	9.8
		South	2102	266	12.7
		2-Way	4155	468	11.3

74. A traffic count (2012) on the C125n (in the vicinity of the Site) has been identified in the Sandy Knowe Windfarm ES. The 12-hour two-way vehicle movements are:

- 287 Total vehicles; and
- 7 HGVs (2.4%).

75. The C125n is most similar to the C128n Blackaddie Road and therefore an estimate of 300 total two-way vehicles is considered a reasonable estimate of 24-hour AADT for the C128n Blackaddie Road.

76. The U432n Euchan Water is much more remote and therefore an estimate of 24-hour AADT is 100 total two-way vehicles. The 2.4% of HGVs identified in the C125n traffic survey is also considered suitable. The estimated baseline flows are summarised in **Table 12.6**.

Table 12.6: 24 hour AADT traffic flows (estimated)

Location	Source	Direction	Total	HGV	% HGV
C128n Blackaddie Road	Estimate	2-Way	300	7	2.4
U432n Euchan Water	Estimate	2-way	100	2	2.4

12.4.5 Road capacity

77. Using the Design Manual for Roads and Bridges (DMRB) Volume 5, Section 1 Part 3, TA 79/99 and TA 46/97 and Traffic Advisory leaflet 2/04 (DfT), estimated theoretical capacities for the links identified in **Table 12.5** and **Table 12.6** have been identified:

Table 12.7: Hourly link capacity estimates

Road	Type	Hourly		24 Hour (Two-Way)
		One-way	Two-way	
A76	A Class Single Carriageway Rural	1,500	3,000	72,000
A70	A Class Single Carriageway Rural	1,200	2,400	57,600
C128n Blackaddie Road	Minor Rural Road	500	1,000	24,000
U432n Euchan Water	Single Track Road	150	300	7,200

78. As **Table 12.7** indicates, the 24-hour AADT baseline flows in **Table 12.5** and **Table 12.6** are significantly less than the maximum theoretical capacities.

79. Whilst hourly data are not available for the majority of the links, on the A76, the maximum two-way flow per hour at the ATC count (location 6) was 256 vehicles, which is significantly less than the maximum hourly two-hour flow for the A76 in **Table 12.7**.

12.4.6 Access by public transport

80. The study area is accessible by bus and rail. Bus services run along the A76 between Cumnock and Sanquhar and various rail services provide direct access to and from Carlisle, Glasgow and Dumfries via Sanquhar and New Cumnock Railway Stations.

12.4.7 Walking and cycling infrastructure

81. The Southern Upland Way (one of Scotland's Great Trails), passes through the Site and a number of Core Paths, Rights of Way and Heritage Paths pass through the forest.

82. A small section of the Southern Upland Way uses Blackaddie Bridge (which carries the C128n Blackaddie Road) and is on the access route to site Access Route B. Non-motorised users of Blackaddie Bridge (such as those on the Southern Upland Way) do not currently have any footway provision; however, the alignment of the bridge is straight, with good visibility and therefore user safety is not compromised.

83. The assessment of likely significant recreation and tourism effects associated with users of these routes is undertaken in **Chapter 14: Socio-Economics, Tourism and Recreation** and whilst the assessment of likely significant traffic and transport effects are not explicitly set out in this Chapter compared to the forecast increases in traffic, measures to address the safety of users of these paths is set out in **Technical Appendix 12.4: Outline CTMP**

12.4.8 Accident records

84. Personal Injury Accident (PIA) data for the A76 have been obtained from TS for the period between 1 January 2017 and 3 April 2020 (inclusive), which comprises the most recent period of available data. The locations of recorded accidents are shown on **Figure 12.4**.

85. Data from Crashmap for 2017 to 2019 (inclusive) has been obtained for the local road network for Access Route B via Sanquhar, which comprises the A70 between the concrete batching plant and the junction with the A76, and Blackaddie Road

86. The raw data are included in **Technical Appendix 12.2: Accident Data** and includes the location, severity and number of vehicles involved in each accident. Data detailing the accidents and classification of the vehicles involved in the accidents are not available.

87. The accident analysis is used to inform the review of the proposed route where any deficiencies in the road layout and condition are identified.

88. For clarification, those accidents recorded which resulted in slight injury indicate that the victim was likely to suffer from slight shock with occurrences of sprains or bruises from the accident, whereas a serious accident accounts for breakages, lacerations, concussion or hospital admittance.

A76

89. On the A76, a total of 58 accidents were recorded across the study area (which is around 50 km of the A76) during the assessment period (between 2017 and 2019, plus three months of 2020). Of these, 46 resulted in slight injury, ten resulted in serious injury and two resulted in fatalities.

90. The accident analysis on the A76 has been broken down into three sections:

- the A77 to north of New Cumnock / Borland Bridge (approximately 25 km);
- north of New Cumnock / Borland Bridge to Hare Hill Windfarm access (approximately 11.5 km);
- Hare Hill Windfarm access to Sanquhar (approximately 13.5 km); and
- Sanquhar to Thornhill (approximately 20 km).

91. The number and severity of accidents recorded in each of the three sections is provided in **Table 12.8**:

Table 12.8: Accident records

Section	Slight	Serious	Fatal	Total
A77 to north of New Cumnock	30	6	1	37
North of New Cumnock to Hare Hill Windfarm access	11	3	0	14
Hare Hill Windfarm access to Sanquhar	5	1	1	7
Sanquhar to Thornhill	11	3	0	14
Total	57	13	2	72

92. The average casualty rate on roads in Scotland in 2018 was 17.47 per 100 million vehicle km¹. The casualty rate per 100 million vehicle kilometres for each of the sections identified in **Table 12.8** has been calculated (number of casualties / (AADT x 365 days x section length (km) x 3 years / 100,000,000)) to compare against the average rate from 2018 (the most recent year available), and are summarised in **Table 12.9**:

Table 12.9: Accident rate

Section	Number of casualties	AADT	Section length (km)	Accident rate (Per 100 million vehicle km)
A77 to north of New Cumnock	61	11,369	25.0	18.1
North of New Cumnock to Hare Hill Windfarm access	19	11,134	11.5	12.5
Hare Hill Windfarm access to Sanquhar	12	3,942	13.5	19.0
Sanquhar to Thornhill	14	4,155	20.0	15.4

93. **Table 12.9** shows the accident rates on the sections between the A77 and north of New Cumnock, between the Hare Hill Windfarm access to Sanquhar, and Sanquhar to Thornhill are similar to the 2018 rate and the rate on the section between north of New Cumnock and the Hare Hill Windfarm access is significantly less than the 2018 rate.

94. Three (five percent) of the accidents on the A76 to the north of the Site involved a non-motorised user, which is negligible; however, all of these were in the settlement of Mauchline and, therefore, reinforces this section of the A76 as a sensitive receptor.

A70

95. On the A70, a total of seven accidents were recorded across the study area (which is around 8 km of the A70) during the assessment period, all resulted in slight injury. Based on the Annual Average Daily Traffic (AADT) of 7,043 vehicles, the accident rate per 100 Million Vehicle Km is 11.3, which is significantly less than the 2018 rate. Therefore, it can be concluded there is no particular road safety issues on the section of the A70 that might be used for concrete deliveries.

C128n Blackaddie Road / U432n Euchan Water

96. On Blackaddie Road, one accident occurred within the assessment period, which was slight in severity and no accidents on the U432n Euchan Water have occurred within the assessment period. Therefore, there are no road safety issues on this section of Access Route B.

12.4.9 Existing network performance

97. The sections above provide an assessment of the existing baseline situation. The following may be concluded:

- the existing road network has a low proportion of HGVs on the A76 between the A77 and New Cumnock (average of around 5%);

¹ Key Reported Road Casualties Scotland 2018, Transport Scotland

- the existing road network has a moderate proportion of HGVs on the A76 between New Cumnock and Thornhill and the A70 (average of around 18%);
- the study area has a low to average accident rate, although all accidents involving non-motorised users were within Mauchline; and
- there are no identified improvement works associated with improved capacity or safety that have been proposed by other developers or by the highway authorities to the roads within the study area.

12.5 Proposed Development parameters

98. The proposed Development is described fully in **Chapter 3: Description of the proposed Development**. A summary is provided here highlighting those features of the proposed Development pertinent to the Traffic and Transport assessment.

12.5.1 Site access and onsite tracks

99. Approximately 32.7 km of new onsite access tracks and approximately 19.8 km of upgraded track would be required to provide access to the wind turbines, substation and control building compound and construction compounds (**Figure 3.11**). Indicative track construction details are shown on **Figure 3.10**.

100. Access Routes A and B are existing accesses off the highway network and, as the blades will arrive at the Site accesses using the lift adapter vehicles, these are considered suitable for use and have been used previously for the construction of neighbouring windfarms (not using a lift adapter). Further investigations will be required to ascertain if any modifications are required for the delivery of the tower sections, as these would not be delivered using the lift adapter.

12.5.2 Abnormal load access route

101. The proposed abnormal load route to the Site would be from the Port of Ayr or King George V Dock, Glasgow, to Access Route A or B, as shown in **Figure 12.1: Abnormal Load Routes**

102. It is likely the abnormal loads would be transported to the Site as follows:

- Blades:
 - **Port to laydown area 1** - use a Super Wing Carrier to transport the blades between the port and a suitable location off the A76 to the north west of New Cumnock, where there is pinch point cannot be negotiated by Super Wing Carrier;
 - **Laydown area 1 to Laydown area 2** - use a blade lift adapter to transport the blades between the location to the north west of New Cumnock and a laydown area on the Site access track (either Access Route A or B), which would enable the blades to be raised or rotated to avoid pinch points along the route; and
 - **Laydown area 2 to turbine location** - use a Super Wing Carrier to transport the blades from the laydown area on the Site access track to the turbine platform.
- Tower sections and nacelle:
 - **Port to Site** – use an appropriate conventional turbine transportation vehicle to transport these components between the port and the Site, without the need to transfer to a lift adapter vehicle.

12.5.3 Construction Programme

103. An indicative 22-month construction programme has been prepared and is set out in the construction timeline shown in **Chapter 3: Description of the proposed Development**.

104. For the purposes of this assessment, it is assumed that construction is likely to begin in the first quarter of 2024. The main construction works would be undertaken during months 6 to 13. The final two months of the construction programme would comprise a wind turbine (WTG) Reliability Run and snagging followed by take-over activities.

12.5.4 Construction materials

105. The proposed Development would require the transportation of a range of construction materials to the Site. The key elements of construction work which would result in trip generation have been summarised in **Table 12.10**.

Table 12.10: Construction activities requiring vehicle trips

Key work element	Details and assumptions	Conventional HGVs	Abnormal loads
Site establishment	Delivery of Site cabins and plant for construction activities at commencement of construction and later removal from Site.	Yes	No
Borrow pits	Delivery of plant associated with establishing the borrow pits.	Yes	No
Access track upgrade and construction	New onsite track, together with floating tracks, passing places and turning heads.	Yes	No
Turbine foundations and crane hardstandings,	Delivery of plant associated with construction of crane hardstandings. Delivery of plant and materials including concrete, aggregate and reinforcement materials for turbine foundations.	Yes	No
Control building and control building compound	Delivery of material for construction of building foundations, structure and finishings. Delivery of electrical equipment and storage batteries.	Yes	Yes
Electrical installation	Delivery of sand and cables to connect turbines to substation.	Yes	No
Wind turbine delivery	Delivery of turbine components to Site. Bringing in of crane equipment to erect turbines. Includes escort vehicles associated with movement of abnormal loads.	Yes	Yes

106. The precise quantities of construction materials required for the proposed Development would depend on the presence of onsite borrow pits.
107. While borrow pits are proposed on Site (and investigations have shown that these can provide the full quantity of appropriate material required during the construction phase), a robust assessment of a worst-case (and highly unlikely) scenario which assesses a greater volume of material to be imported to Site has been considered in this Chapter in order to allow for all eventualities and provide a sensitivity analysis.
108. Therefore, to accurately assess the potential impact of the transportation of construction materials to the Site, two construction material scenarios have been modelled, these are:
- **Worst case (highly unlikely):** all construction materials are assumed to be sourced from offsite locations, including all aggregate required for track construction and upgrade and concrete sourced from a local batching plant, thus ensuring that the estimated level of trip generation is considered as a worst case; and
 - **Likely case:** 100% of aggregate is assumed to be sourced from the proposed seven onsite borrow pits and a concrete batching plant onsite, with all remaining construction materials assumed to be sourced from offsite locations.
109. An estimation of the material quantities for all elements of the proposed Development has been made. **Table 12.11** provides a summary of the material quantities (aggregates only) which would be required to be imported when referring to a worst-case scenario.

Table 12.11: Estimated material quantities (aggregates)

Infrastructure		Material quantities	
		M ³	Tonnes
Access Tracks	Access track to Site (new) Access Route A only	47,320	96,640
	Access track to Site (existing upgraded) Access Route A only	4,378	8,756
	New tracks on Site (internal site track)	118,144	236,288
	New tracks on Site (forestry tracks)	17,267	34,535
	Existing tracks on Site to be upgraded	9,452	18,904
	Access track to met mast	1,216	2,432
	Access track to borrow pit (temporary)	336	672
	Passing places	13,440	26,880
Turbine Foundations	Turbine bases - formation only	4,939	9,878
	Fill above turbine bases	52,143	104,286
	Crane pads	63,000	126,000
	Crane pad boom support	6,048	12,096
	Blade laydown and ancillaries	1,680	3,360
	Turning heads	2,730	5,460
Substation & Energy Storage Facility	Substation	7,500	15,000
	Met mast working area	600	1,200
	Laydown area	5,000	10,000
Compounds	Security compound	2,500	5,000
	Main construction compound	5,000	10,000
	Construction compound secondary	3,750	7,500
	Construction compound secondary	1,250	2,500
Total (Imported for Worst Case / Highly unlikely, won on Site for Likely Case)		367,694	735,388*
* of which 103,396 t is only required for construction of Access A			

110. **Figure 3.1** shows the Site layout and infrastructure. The borrow pits are numbered BP01 to BP07 and are summarised as follows:

- **BP01** (approximately 260 m x 80 m) with an assumed 75,000 m³ of aggregate extraction;
- **BP02** (approximately 230 m x 140 m) with and assumed 24,000 m³ of aggregate extraction;
- **BP03** (approximately 220 m x 100 m) with and assumed 57,600 m³ of aggregate extraction;
- **BP04** (approximately 190 m x 100 m) with and assumed 204,000 m³ of aggregate extraction;
- **BP05** (approximately 230 m x 95 m) with and assumed 42,000 m³ of aggregate extraction;
- **BP06** (approximately 145 m x 80 m) with and assumed 48,000 m³ of aggregate extraction; and
- **BP07** (approximately 145 m x 80 m) with and assumed 30,000 m³ of aggregate extraction.

111. Therefore, there is a total potential aggregate extraction of 480,600 m³ available (approximately equivalent to 1 million tonnes).

112. Scenario 2 is the more realistic scenario whereby onsite borrow pits are used for aggregate supply. The borrow pits totalled together are expected to extract material won exceeding the amount required for importation in the worst-case scenario (Scenario 1); therefore, no additional importation of aggregates would be required for Scenario 2.

113. **Table 12.12** provides material quantities for all other materials other than aggregate.

Table 12.12: Estimated material quantities – excluding importation of aggregate

Infrastructure		Material quantities	
Bases, Substation, radar and met masts	Concrete	20,000 m ³	48,000 t
Turbine Foundations	Blinding	538 m ³	850 t
	Installation of Can/Bolts	21 no.	850 t
	Reinforcement	1,556 t	
	Plinth Shutter	65 m ³	130 t
	Base Slab Perimeter Shutter	91 m ³	182 t
	Ducts (200 mm diameter)	126 no.	166 t
	Ducts (75 mm diameter)	126 no.	
	Transformer Plinths	21 no.	
	Step Plinth	21 no.	
	Sand Layer – 6 m x 3 m x 3,400 m	1428 m ³	2142 t
Electrical Connection	Cable – Drums hold 500 m	6,263 m ³	13 t
	Reinforcement	90 t	12 t
Control Building	Imported type 1 running surface	1,085 m ³	2,169 t
Substation Compound	Imported 6F2 Capping	2,172 m ³	4,345 t
	Class 1C1 Roadbox bulk fill	5,428 m ³	10,855 t
	Class 1 general fill	14,533 m ³	29,066 t
	Crane hardstanding (70 m x 40 m x 1 m)	5,911 m ³	11,822 t
Met Masts	Blinding (10 m x 10 m x 0.075 m)	17 m ³	34 t
	Reinforcement (150 kg / m ³)	-	41 t
	Shuttering (8 m x 4 m sides x 2 m high)	64 m ²	135 m ²
	Shuttering (8 m x 4 m sides x 2 m high)	64 m ²	135 m ²

12.5.5 Assessment scenarios

114. Taking into account the worst (highly unlikely) and likely case scenarios for sourcing aggregate and concrete, and the Access Routes A and B, the following assessment scenarios have been taken forward:

- Scenario 1a: Access Route A only, worst case;
- Scenario 1b: Access Route A only, likely case;
- Scenario 2a: Access Route B only, worst case;
- Scenario 2b: Access Route B only, likely case;
- Scenario 3a: Access Routes A and B, worst case; and
- Scenario 3b: Access Routes A and B, likely case.

115. The full assessment of each of the above Scenarios is provided in **Technical Appendix 12.3: Traffic and Access Scenario Assessments**. This concludes that the scenarios with the lowest and greatest vehicular impact are:

- Greatest vehicular impacts – Scenario 2a: Access Route B only, worst case (highly unlikely); and
- Lowest vehicular impacts – Scenario 1b: Access Route A only, likely case.

116. The above two scenarios have been summarised in the remainder of this Chapter.

12.6 Trip generation

12.6.1 HGV trip generation calculations

117. The total number of HGV trips predicted during the construction phase of the proposed Development has been calculated based on the estimated material quantities provided in **Tables 12.10** and **12.11**. These have then been doubled to provide the two-way movements that would occur from delivery and then returning vehicles. The total two-way trip generation has been divided by the anticipated duration (number of months) of each construction activity and the number of operational days which are assumed to be:

- Access Route A – 7 days per week (LGVs and HGVs); and
- Access Route B – 5.5 days per week (no HGVs on Saturday afternoon and Sunday).

118. The HGV trip generation for Scenario 2a (Access Route B only, worst case) and Scenario 1b (Access Route A only, likely case) is shown in **Table 12.13**.

Table 12.13: Total number of HGV movements (conventional HGVs)

Construction activity	Scenario	Total movements (2-way)	Duration (months)	Total movements per month (2-way)	Total movements per day (2-way)
Forestry felling and export, including construction of access tracks for timber harvesting	2a Access Route B only, worst case	3,600	3	1,200	40
	1b Access Route A only, likely case	3,600	3	1,200	40
Site establishment and construction compounds	2a Access Route B only, worst case	8,750	2	4376	199
	1b Access Route A only, likely case	5,126	2	2,563	85
Construction of haul road & site access to borrow pits	2a Access Route B only, worst case	11,850	4	2962	135
	1b Access Route A only, likely case	0	4	0	0
Construction of access tracks and crane pad	2a Access Route B only, worst case	28,668	6	4,828	219
	1b Access Route A only, likely case	8,000	6	1,333	44
Turbine foundation construction	2a Access Route B only, worst case	19,598	6	3266	148
	1b Access Route A only, likely case	1,516	6	253	8
Substation/storage - civil and electrical works	2a Access Route B only, worst case	1,762	6	294	13
	1b Access Route A only, likely case	262	6	44	1
Cable trenching, installation and backfilling	2a Access Route B only, worst case	300	5	60	3
	1b Access Route A only, likely case	300	5	60	2
Cranes	2a Access Route B only, worst case	20	1	20	10
	1b Access Route A only, likely case	20	1	20	10
Turbine delivery, erection and commissioning	2a Access Route B only, worst case	230	8	21	3
	1b Access Route A only, likely case	230	8	21	2
Reinstatement and restoration works	2a Access Route B only, worst case	50	5	10	1
	1b Access Route A only, likely case	50	5	10	1

119. **Table 12.12** clearly illustrates that there would be significantly fewer vehicle movements expected in the likely scenario compared to the worst case (highly unlikely) scenario.

12.6.2 Programme

120. The two-way daily movements for HGVs are shown over the anticipated 22-month construction programme according to the relevant activity in **Table 12.14** and **Table 12.15** for the two scenarios:

Table 12.14: Two-way HGV movements per construction month: Scenario 2a: Access Route B only, worst case

Indicative Construction Activity	Months																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
Forestry felling and tree crop export including construction of access routes for timber harvesting	40	40	40																				
Site establishment		199	199																				
Access B road improvements			10	10	10	10																	
Construction of haul road & site access to borrow pits					135	135	135	135															
Construction of access tracks, crane pad and building compounds						219	219	219	219	219	219												
Turbine foundation construction							148	148	148	148	148	148											
Substation/storage - civil and electrical works								13	13	13	13	13	13										
Cable trenching, installation and backfilling									3	3	3	3	3										
Crane delivery													10										
Turbine delivery, erection and commissioning														20	20	20	20	20	20	20	20		
Reinstatement and restoration works																			5	5	5	5	
Daily Total	40	239	249	10	145	364	502	515	383	383	383	164	26	20	20	20	20	20	20	25	25	5	5

Table 12.15 Two-way HGV movements per construction month: Scenario 1b: Access Route A only, likely case

Indicative Construction Activity	Months																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
Forestry felling and tree crop export including construction of access routes for timber harvesting	40	40	40																				
Site establishment		85	85																				
Access B road improvements			0	0	0	0																	
Construction of haul road & site access to borrow pits					0	0	0	0															
Construction of access tracks, crane pad and building compounds						44	44	44	44	44	44												
Turbine foundation construction							8	8	8	8	8	8											
Substation/storage - civil and electrical works								1	1	1	1	1	1										
Cable trenching, installation and backfilling									2	2	2	2	2										
Crane delivery													10										
Turbine delivery, erection and commissioning														20	20	20	20	20	20	20			
Reinstatement and restoration works																				5	5	5	5
Daily Total	40	125	125	0	0	44	53	54	56	56	56	11	13	20	20	20	20	20	25	25	5	5	

12.6.3 HGV trip generation summary

^{121.} The maximum level of two-way HGV trip generation for each scenario is forecast to be:

- Scenario 2a - 515 (month 8); and
- Scenario 1b - 125 (months 3 and 4).

12.6.4 Light vehicle trip generation

^{122.} Light vehicles trips (smaller vehicles such as cars and vans, which would typically be associated with the workforce) have also been calculated to provide total two-way vehicle movements predicted to arise from the proposed Development.

123. Light vehicle trips would be generated by the approximately 150 workers who would be working on the Site during the peak months of the construction phase. As an absolute worst case, there would be a maximum of 300 two-way movements daily; however, it is more likely that the majority of the workforce will car share with 2 or more arriving and leaving together, and therefore 50% has been applied to the trip generation.

12.6.5 Total trip generation

124. For the total trip generation (HGVs and LGVs), the peak months are:

- Worst case: Month 8; and
- Likely case: Months 3 and 4.

125. The total trip generation (maximum daily and average) for a 22-month construction programme for HGV and LGV is set out in **Table 12.16**:

Table 12.16: Maximum and average daily two-way vehicle movements

	Scenario 2a (Access Route B only, worst case)			Scenario 1b (Access Route A only, likely case)		
	HGV	LGV	Total	HGV	LGV	Total
Maximum in peak month	515	100	615	125	150	275
Average	162	79	241	38	79	117

126. As **Table 12.17** shows, the average vehicle movements across the 22 month construction programme for each scenario are less than 50% of the peak month vehicle movements, which is also the case for the other assessment scenarios included in **Technical Appendix 12.3: Traffic and Access Scenario Assessments**. Therefore, it can be summarised that for the majority of the construction programme, the potential effects would be much less than for the peak months, which are the subject of the assessments in this Chapter and **Technical Appendix 12.3: Traffic and Access Scenario Assessments**.

12.6.6 Abnormal loads

127. The number of AILs would be (for any scenario):

- 63 (3 per turbine) for the blades; and
- 147 to 168 (7 or 8 per turbine) for the tower sections and nacelle.

12.6.7 Distribution

128. It is assumed that all construction vehicles (HGVs and personnel) would enter the Site from either Access Route A or B having travelled the length of the A76 either from the north or south and return to the A76 north or south. Therefore, for the purposes of the assessment:

- Scenario 2a (Access Route B only, worst case)
 - 50% - A76 north to Access Route B; and
 - 50% - A76 south to Access Route B.
- Scenario 1b (Access Route A only, likely case)
 - 50% - A76 north to Access Route A; and
 - 50% - A76 south to Access Route A.

129. For the worst case scenario (2a) it is assumed the aggregate would be sourced from local quarries such as Barr Quarries on A70 near Cumnock or Barburgh Mill Quarry to the south of Sanquhar and the concrete would be sourced from Breedon Killoch Depot, west of Ochiltree, accessed from the A70.

130. Therefore, for the purposes of the assessment:

- 50% aggregate from Barr Quarries;

- 50% aggregate from Barburgh Mill Quarry; and
- 100% concrete form Breedon Killoch Depot.

131. It has been assumed that staff working at the construction Site would either live locally or stay in bed & breakfasts, guest houses or hotels for the duration of the construction programme.

132. All abnormal loads would arrive from the A76 north.

12.7 Assessment of effects

133. The proposed Development has been designed to include a range of measures to mitigate potential effects. All such measures are described fully in **Chapter 3: Description of the proposed Development**.

134. The impact of the proposed Development has been assessed over 24-hour AADT. The increase in traffic flow has been calculated for all scenarios for the peak month of construction activity to identify the total vehicle flow and HGV percentage increases.

12.7.1 Impact screening

135. **Table 12.17** and **Table 12.18** show the predicted daily total and HGV traffic increases for the worst and likely case scenarios and, in accordance with the IEMA guidance (Rule 1 and Rule 2), a screening process has been undertaken for each link to identify routes that are likely to have sufficient changes in traffic flows and therefore require further impact assessment.

Table 12.17: Predicted increases in traffic – 24 hour flows (Scenario 2a – Access Route B only, worst case)

Link	Baseline		Development		Baseline + development		Increase (%)		Sensitivity	Threshold (%)	Assess further?
	Total	HGVs	Total	HGVs	Total	HGVs	Total	HGVs			
A76											
Hurlford	11,229	639	86	36	11,315	675	0.8	5.6	Low	30.0	No
Mauchline	12,305	669	86	36	12,391	705	0.7	5.4	High	10.0	No
Cumnock	10,572	518	86	36	10,658	554	0.8	7.0	Low	30.0	No
New Cumnock (W)	6,116	894	327	277	6,443	1171	5.3	30.9	High	10.0	Yes
New Cumnock (E)	2,695	506	327	277	3,022	783	12.1	54.7	High	10.0	Yes
Hare Hill Windfarm access	2,323	535	327	277	2,649	812	14.1	51.7	Low	30.0	Yes
Kirkconnel	3,942	739	327	277	4,269	1016	8.3	37.4	High	30.0	Yes
South of Sanquhar	3,064	667	276	226	3,340	893	9.0	33.9	High	10.0	Yes
Thornhill	4,155	468	276	226	4,431	694	6.6	48.3	High	10.0	Yes
A70											
West of Ochiltree	7,043	1,032	290	240	7,333	1272	4.1	23.3	Medium	30.0	No
Local Roads											

Link	Baseline		Development		Baseline + development		Increase (%)		Sensitivity	Threshold (%)	Assess further?
C128n Blackaddie Road	300	7	603	503	903	510	200.9		High	10.0	Yes
U432n Euchan Water	100	2	603	503	703	505	602.6		High	10.0	Yes

Table 12.18: Predicted increases in traffic – 24 hour flows (Scenario 1b – Access Route A only, likely case)

Link	Baseline		Development		Baseline + development		Increase (%)		Sensitivity	Threshold (%)	Assess further?
	Total	HGVs	Total	HGVs	Total	HGVs	Total	HGVs			
A76											
Hurlford	11,229	639	104	29	11,333	668	0.9	4.6	Low	30.0	No
Mauchline	12,305	669	104	29	12,409	698	0.8	4.4	High	10.0	No
Cumnock	10,572	518	104	29	10,676	547	1.0	5.6	Low	30.0	No
New Cumnock (W)	6,116	894	104	29	6,220	923	1.7	3.3	High	10.0	No
New Cumnock (E)	2,695	506	104	29	2,799	535	3.9	5.8	High	10.0	No
Hare Hill Windfarm access	2,323	535	104	29	2,427	564	4.5	5.4	Low	30.0	No
Kirkconnel	3,942	676	104	29	4,046	705	2.6	4.3	High	10.0	No
South of Sanquhar	3,064	667	104	29	3,168	696	3.4	4.4	High	10.0	No
Thornhill	4,155	468	104	29	4,259	497	2.5	6.2	High	10.0	No

Assessment screening summary

136. The results above identify the locations shown in **Table 12.19**, to be taken forward for assessment for the worst and likely scenarios:

Table 12.19: Assessment screening

Location	Scenario	
	2a (worst case)	1b (likely case)
A76 (at Hurlford)	No	No
A76 (at Mauchline)	No	No
A76 (north of Cumnock)	No	No
A76 (west of New Cumnock)	Yes	No
A76 (east of New Cumnock)	Yes	No
A76 (at the Hare Hill Windfarm access)	Yes	No
A76 (at Kirkconnel)	Yes	No

Location	Scenario	
	2a (worst case)	1b (likely case)
A70 (west of Ochiltree)	No	No
C128n Blackaddie Road	Yes	No
U432n Euchan Water	Yes	No

137. A summary of the impact assessment screening for the worst case (highly unlikely) scenario is:

- the A70 to the west of Ochiltree requires assessment in all worst-case scenarios;
- the A76 to the north of New Cumnock and the A70 west of Ochiltree do not require further assessment;
- the A76 from the west New Cumnock and at the Hare Hill Windfarm access requires further assessment; and
- the C128n Blackaddie Road and U432n Euchan Water require assessment.

138. A summary of the impact assessment screening for the likely case scenario is:

- no locations require further assessment.

139. Whilst no further assessment is required for Scenario 1b (Access Route A only, likely case), as the forecast percentage increases do not exceed the IEMA thresholds for assessment, with regards to the other two likely scenarios that include use of Access Route B, and which require further assessment on the C128n Blackaddie Road and U432n Euchan Water (as set out in **Technical Appendix 12.3: Traffic and Access Scenario Assessments**), it is worth noting the following:

- **Scenario 2b (Access Route B only)** - The majority of the peak month daily car / LGV vehicle movements (150 two-way) would most likely be at the start and end of the working day, and the forecast HGV deliveries (77 two-way) would be spread out throughout the 12 hour day. For the HGVs, this equates to around three or four in each direction per hour on these roads, which is considered negligible; and
- **Scenario 3b (Access Route A and B)** - The majority of the peak month daily car / LGV vehicle movements (75 two-way) would most likely be at the start and end of the working day, and the forecast HGV deliveries (29 two-way) would be spread out throughout the 12 hour day. For the HGVs, this equates to around one or two in each direction per hour on these roads, which is considered negligible.

140. Given the above, it can be concluded that the forecast vehicle movements for the likely scenarios that include Access Route B, could be accommodated on the C128n Blackaddie Road and U432n Euchan Water, without significant disruption to the existing users of these roads, particularly with the implementation of the CTMP (**Technical Appendix 12.4: Outline CTMP**) and as the forecast vehicle movements for the majority of the construction programme are much less than for the peak months (two or three months, out of 22 months).

12.7.2 Abnormal loads

141. Whilst the AIL vehicle movements would not occur during the peak months of construction of the proposed Development, (which are the focus of the assessment within this Chapter), and would only exceed the IEMA thresholds (Rule 1 or Rule 2) for requiring assessment on the U432n Euchan Water (which has a very low base flow), the delivery of the AILs has been taken forward for assessment in the Scenario 2a (worst case). The identified potential effects of the delivery of the AILs on the A76 between Hurford and the Hare Hill Windfarm access in Scenario 2a would also be applicable to Scenario 1b (likely case).

142. The AIL vehicles are large and will be around 5 m in width for the tower sections and nacelle. By comparison the A76 is a standard two-way road ranging between 6 m and 8 m in width. The vehicles would reduce in size to a typical HGV when leaving the Site.

143. The specific vehicle movements associated with the transportation of the turbine components constituting AILs are unknown at this stage, as this would depend on a number of parameters. However, this is a proven technology that has been used

around the world successfully and is being proposed at other sites in Scotland and around the UK. The specific arrangements for the vehicle movements would be agreed in detail between the haulier and Police Scotland.

144. The greatest impact is likely to be associated with the use of the lift adapter vehicles given the average speed would be lower than conventional component transportation vehicles due to the blades being required to be raised, lowered and rotated.

145. However, whilst there may be increased effects of the blade lift adapter being used in terms of delays, these would offset potentially larger delays & expense due to extensive highways upgrade works that would be avoided.

12.7.3 Potential effects

146. As the screening summarised in **Table 12.20** showed no locations required further assessment for the likely case (Scenario 1b) this section deals only with Scenario 2a (worst case).

Effect on driver severance and delay

147. The IEMA guidance states that there are a number of factors which determine driver severance and delay; these include delay caused by additional turning vehicles, delays at junctions due to increased traffic, as well as delays at side roads due to reduced gaps in the oncoming traffic.

148. As no sensitive junctions in terms of capacity constraints have been identified through scoping, and since the A76 (as a single carriageway rural link) is capable of accommodating significantly more than the total traffic with the conventional construction traffic associated with the proposed development in Scenario 2a (worst case), the magnitude of change is considered negligible resulting in a negligible adverse effect and therefore is not significant.

149. The only potential significant effects that are considered further relate to the transportation of AILs, which is set out in paragraphs 166 to 185.

Effect on community severance

150. The IEMA guidance identifies severance as “*the perceived division that can occur within a community when it becomes separated by a major traffic artery*”. As an example, a road that passes through a community such as a town or village, where perhaps amenities are located on one side of the road and residential properties are located on the other side, causes severance to the movements between those places. The degree of severance depends on the traffic levels on the road and the presence of adequate crossing opportunities.

151. There are local amenities directly fronting the A76 in all of the settlements along the route. HGVs will be travelling at low speeds through the settlements, which have 30 mph speed limits and there are both formal and informal crossing facilities available.

A76 (west of New Cumnock)

152. The increase in total vehicles would be less than 30% and therefore a negligible magnitude of change. Since the A76 at this location is classed as having high sensitivity, this equates to a slight adverse effect and is therefore not significant;

A76 (east of New Cumnock)

153. The increase in total vehicles would be less than 30% and therefore a negligible magnitude of change. Since the A76 at this location is classed as having high sensitivity, this equates to a slight adverse effect and is therefore not significant;

A76 (at the Hare Hill Windfarm access)

154. The increase in total vehicles would be less than 30% and therefore a negligible magnitude of change. Since the A76 at this location is classed as having high sensitivity, this equates to a slight adverse effect and is therefore not significant;

A76 (at Kirkconnel)

155. The increase in total vehicles would be less than 30% and therefore a negligible magnitude of change. Since the A76 at this location is classed as having high sensitivity, this equates to a slight adverse effect and is therefore not significant.

C128n Blackaddie Road

156. The increase in total vehicles would be more than 90% and therefore a major magnitude of change. Since the C128n Blackaddie Road is classed as having high sensitivity, this equates to a major adverse effect and is therefore significant.

157. It is worth noting that C128n Blackaddie Road would operate well within its theoretical link capacity with the additional vehicle movements associated with the likely or worst case scenarios for the construction phase and this would therefore reduce the magnitude of change to negligible and the effect to minor adverse and therefore is not significant.

U432n Euchan Water

158. The increase in total vehicles would be more than 90% and therefore a major magnitude of change. Since the U432n Euchan Water is classed as having high sensitivity, this equates to a major adverse effect and is therefore significant.

159. It is worth noting that the U432n Euchan Water would operate well within its theoretical link capacity with the additional vehicle movements associated with the likely or worst case scenarios for the construction phase and given there are no local facilities that need to be accessed in the vicinity, would therefore reduce the magnitude of change to negligible and the effect to minor adverse and therefore is not significant.

Effect on pedestrian amenity

160. The IEMA guidelines broadly define pedestrian amenity as the 'relative pleasantness of a journey'. It is affected by traffic flow, traffic composition, footway width and separation from traffic. A common threshold for changes in pedestrian use is where traffic flow is either halved or doubled.

161. Traffic conditions may cause pedestrians to be hesitant to walk adjacent to, or crossing, the carriageway. This potential impact is dependent on the speed and volume of traffic, the HGV composition and the proximity to people or the lack of protection caused by factors such as narrow footway widths.

A76

162. The increase in total vehicles or HGVs would be less than 100% at any location on the A76 and therefore a negligible magnitude of change. Since the locations on the A76 classed as having either low or high sensitivity, this equates to none or slight adverse effect and is therefore not significant.

C128n Blackaddie Road / U432n Euchan Water

163. The increase in total vehicles or HGVs would be more than 100% and therefore a major magnitude of change. Since the C128n Blackaddie Road is classed as having high sensitivity, this equates to a major adverse effect and is therefore significant.

164. In terms of actual numbers, there would be 25 vehicles (21 HGVs) in each direction per hour using the C128n Blackaddie Road and U432n Euchan Water, which is between 1 vehicle every 2.4 minutes. Given in this scenario the number of vehicles is fairly frequent, the magnitude of change can be reduced to minor, which equates to a moderate adverse effect and is therefore would still be significant.

Effect on road safety

165. **Tables 12.2 and 12.3** define road safety as a high sensitivity receptor with an increase of traffic levels greater than 10% requiring a quantitative assessment of existing accident records.

A76

166. The increase in total vehicles or HGVs would be slightly over 10% at the count locations to the west and east of New Cumnock, which would be classed as a minor magnitude of change. Since New Cumnock is classed as having high sensitivity, this equates to a moderate adverse effect and is therefore significant. On the A76, the section between New Cumnock and the Hare Hill Access has the lowest accident rate (significantly less than the Scotland average) and since there are formal crossing facilities in New Cumnock and HGVs will be subject to low speed, the magnitude of effect can be reduced to negligible, which equates to a slight effect and therefore is not significant.

C128n Blackaddie Road / U432n Euchan Water

167. The traffic flows would increase significantly more than 10% on the C128n Blackaddie Road and U432 Euchan Water in worst and likely case scenarios. There has only been one accident recorded on the C128n Blackaddie Road and U432n Euchan Water in the last five years and given HGVs will be subject to the 30 mph speed limit along the C128n, and 40 mph along the U432n the magnitude of effect is considered minor. Given these roads are classed as having high sensitivity, this equates to a moderate adverse effect and is therefore significant.

Effects due to the delivery of AILs

168. Transportation of the turbine components would lead to the following effects:
- the rolling closures of roads and footways causing temporary driver and pedestrian delay; and
 - the perceived effect to pedestrians and vulnerable road users caused by the movement of large turbine components in close proximity to property and infrastructure.

169. An assessment of these potential effects of each turbine component is set out below.

Tower Sections and Nacelle

170. The route is considered suitable and proven for such movements using conventional turbine component transportation vehicles, subject to the potential need for bridge structural assessments and any localised temporary works at junctions to facilitate movements.
171. Any modifications to junction layouts would be confirmed through a trial run and further surveys, and any modifications or works required to accommodate abnormal loads would be discussed with Transport Scotland, ARA and DGC and the necessary consents and permits would be obtained in advance of any works or delivery periods.
172. The residential properties, B&Bs, local shops and other facilities along the A76 on this section of the route are classed as receptors with high sensitivity associated with this potential effect.
173. The potential impacts are considered as follows:
- delays to drivers due to short term, temporary road closures would be inevitable, though abnormal loads would be timed to avoid the peak hours (overnight where possible) and, therefore, abnormal load movements occurring outside of the peak traffic hours; and
 - the perceived effect to residents is subjective and it is likely that the transport of abnormal loads close to properties could give rise to local public concern in the various settlements along the route (Mauchline, New Cumnock, Kirkconnel and Sanquhar to the west of the junction with Blackaddie Road).
174. The movement of AILs has the potential to create a general hazard on the highway. The AILs must be delivered to the Site under controlled conditions and under a suitable escort. The manner in which AILs are transported along the public highway/trunk road network would be subject to the approval of Transport Scotland, ARA, DGC and Police Scotland in advance and would be planned to ensure road safety is not compromised.
175. The magnitude of change of transporting the tower sections and nacelles during the day would be minor given the number of vehicles would be less than 30% of baseline flows. Due to the importance of the A76 to local residents and taking account of potential impacts on driver delays and the community, the A76 during daytime can be considered high sensitivity, resulting in a moderate level of effect during the day which is significant.
176. However, it would be SPR's preference to undertake the AIL movements using the conventional turbine transportation vehicles during the night-time to reduce the potential for disruption and delay. As the A76 could be considered low sensitivity at night, and the magnitude of impact of transporting the abnormal loads during the night would be minor, the level of effect during the night would be slight and therefore not significant.

Blades – Access Route A

177. The route from laydown area 1 (a suitable location off the A76 to the north west of New Cumnock) to Access Route A requires the use of a lift adapter to transport the blades through New Cumnock.
178. Any modifications or works required to accommodate the lift adapter vehicles would be discussed with Transport Scotland and the necessary consents and permits would be obtained in advance of any works or delivery periods.
179. The potential impacts are considered as follows:
- delays to drivers due to temporary road closures would be inevitable, though they would be timed to avoid the peak hours. The temporary road closures are estimated for up to 4 hours per day (to be confirmed once the speed of the blade lifter is verified) on the A76 (assuming 2 convoys per day); and
 - the perceived effect to residents is subjective and it is likely that the transport of abnormal loads close to properties could give rise to local concern in New Cumnock. Equally, the delivery of the blades using the lift adapters might be of interest to some residents, who may see it as 'an event'.
180. The residential properties, school and other facilities in New Cumnock are classed as high sensitivity associated with this potential effect during daytime.
181. The magnitude of change of transporting the abnormal loads would be minor given the number of vehicles would be less than 30% of baseline flows. Given the high sensitivity of the receptor, the level of effect would be major, and therefore significant.

Blades – Access Route B

182. The route from laydown area 1 to Access Route B requires the use of a blade lift adapter to transport the blades through New Cumnock (as set out above) and then the blades would need to be in the raised and lowered to navigate through various locations. However, a review of these locations indicates that the blades would likely only be raised and lowered at the following locations:
- raised on the approach to Kirkconnel and lowered within the village;
 - raised on the entry to Sanquhar and lowered immediately after the junction with Blackaddie Road; and
 - raised on the U432n Euchan Water and lowered at the laydown area within the Site.
183. Any modifications or works required to accommodate the lift adapter vehicles would be discussed with Transport Scotland and DGC. The necessary consents and permits would be obtained in advance of any works or delivery periods.
184. The potential impacts are considered as follows:
- delays to drivers due to temporary road closures would be inevitable, though they would be timed to avoid the peak hours. The temporary road closures are estimated for up to 4 hours per day on the A76 (assuming 1 convoy per day); and
 - the perceived effect to residents is subjective and it is likely that the transport of the blades using the lift adapters close to properties could lead to give rise to local concern being experienced in New Cumnock, Kirkconnel and Sanquhar. Equally, the delivery of the blades using the lift adapters is likely to be of interest to some residents, who will see it as 'an event'.
185. The residential properties, school and other facilities in New Cumnock, Kirkconnel and Sanquhar are classed as high sensitivity associated with this potential effect during daytime.
186. Also, there may be a short delay to vehicles and non-motorised users crossing Blackaddie Bridge (which carries the C128n Blackaddie Road), including those using the Southern Upland Way; however due to the straight alignment on the approach and exit across the bridge, a convoy of AILs should not cause a significant delay.

187. The magnitude of change of transporting the abnormal loads would be minor given the number of vehicles would be less than 30% of baseline flows. Given the high sensitivity of the receptor, the level of effect would be major, and therefore significant.

12.7.4 Mitigation

188. Prior to construction commencing, a Construction Traffic Management Plan (CTMP) would be put in place to actively mitigate the effects as discussed above. An Outline CTMP has been prepared and is provided as **Technical Appendix 12.4: Outline CTMP** at this stage and submitted as part of the planning application to outline the mitigation measures recommended during the construction stage. The purpose of the Outline CTMP is to provide preliminary details of proposed traffic management measures and associated interventions that would be implemented during the construction phase of the proposed Development in order to minimise disruption and ensure safety. The Outline CTMP would be supplemented with additional information as appropriate by SPR's appointed contractor(s), prior to commencement of construction activities. Should consent be granted, the Outline CTMP would be updated to a CTMP, the content of which would be agreed with DGC and EAC through consultation and enforced via a planning condition. The CTMP would be used during the construction phase of the proposed Development to ensure traffic to, from and on the Site is properly managed.

189. Potential types of measures would be:

- temporary road closures;
- temporary traffic management at pinch-points;
- temporary reduction in speed limit;
- signage; and
- advance information, to enable users of the highway network, or pedestrians walking in the area (including on the Southern Upland Way), to avoid the sections affected by any temporary delays or closures.

190. In addition, an Abnormal Load Assessment and Abnormal Load Traffic Management Plan (ALTMP) would be prepared to secure permissions for the movement of abnormal loads and would include details of any required temporary widening and other road improvement measures, together with detailed consideration of vehicle swept paths, loadings, structural assessments (where required) and temporary street furniture removal details. It would also provide details of potential passing places to assist in minimising the delay experienced by vehicles on the A76.

191. The document would be prepared in consultation with the Roads Authority, Transport Scotland and the emergency services, including Police Scotland. Information, with regards to abnormal loads, would be provided to local residents and users of amenities to alleviate any potential stress and anxiety, and allow them to plan their journeys to avoid disruption.

192. The potential for identifying alternative routes to avoid the A76 whilst the lift adapter is used to transport the blades to the Site would be discussed with Transport Scotland, DGC and ARA as part of the ALTMP.

193. The mitigation described above, which will be developed by the contractor and haulage firm in discussions with the Roads Authority, Transport Scotland and the emergency services, including Police Scotland, would be beneficial to all potential effects set out in the assessment in this Chapter (regardless of significance); however in particular, it would have the following reduction on the significant effects identified in this assessment on the C1258n Blackaddie Road and U432n Euchan Water:

- **Pedestrian Amenity** – the magnitude of change can be reduced to negligible, which equates to a slight effect and is therefore not significant;
- **Road Safety** - the magnitude of change can be reduced to negligible, which equates to a slight effect and is therefore not significant; and
- **Effects due to the delivery of AILs** – whilst the magnitude of change cannot be reduced to negligible according to IEMA guidance (this would be a 0% increase in vehicles), given there will not be any other vehicles permitted to use these roads whilst the AILs are delivered, this can be considered negligible, which equates to a slight effect and is therefore not significant.

Residual effects

194. There would be no residual effects with the implementation of the CTMP and ALTMP.

12.7.5 Cumulative effects

195. **Chapter 5: EIA Approach and Methodology, Table 5.2** provides further information on the cumulative projects.

196. There are a number of consented windfarm developments in the vicinity of the proposed Development, which may have overlapping construction periods; however, it is likely that the construction of these will commence prior to the planned start date of the construction of the proposed Development (2024). No other development projects have been identified which could have a potential for a cumulative impact.

197. The following windfarm projects considered in this cumulative assessment are as follows:

- Pencloe, a variation of condition was submitted last year;
- Sandy Knowe; which has recently been approved;
- Glenmuckloch, which was determined last year; and
- Sanquhar II, currently awaiting determination by Scottish ministers.

Cumulative impact

198. The maximum cumulative impact of construction traffic (excluding AILs) from the above four windfarms with the proposed Development on the A76 (the vehicle movements associated with these windfarms will not affect C128n Blackaddie Road or U432n Euchan Water) within the study area is shown in **Table 12.20** and **Table 12.21** for total vehicles in for the worst and likely scenario and **Table 12.22** and **Table 12.23** for HGVs for the worst and likely scenario.

Table 12.20: Maximum cumulative effects assessment (total vehicles – Scenario 2a, Access Route B only, worst case)

A76 Location	Baseline	Windfarms					Proposed Development	Cumulative Increase (%)	
		Sanquhar II	Sandy Knowe	Glenmuckloch	Pencloe				
Hurlford	11,229	100	186	59	105	86	536	4.8	
Mauchline	12,305	100	186	29	40	86	441	3.6	
Cumnock	10,572	100	186	29	40	86	441	4.2	
New Cumnock (W)	6,116	100	186	29	40	327	682	11.1	
New Cumnock (E)	2,695	100	186	29	40	327	682	25.3	
Hare Hill Access	2,323	100	186	29	40	327	682	29.3	
Kirkconnel	3,942	100	186	29		327	642	16.3	
South of Sanquhar	3,064		186			276	462	15.1	
Thornhill	4,155		186			276	462	11.1	

Table 12.21: Maximum cumulative effects assessment (total vehicles – Scenario 1b, Access Route A only, likely case)

A76 Location	Baseline	Windfarms					Proposed Development	Cumulative Increase (%)	
		Sanquhar II	Sandy Knowe	Glenmuckloch	Pencloe				
Hurlford	11,229	100	112	59	105	104	480	4.3	
Mauchline	12,305	100	112	29	40	104	385	3.1	
Cumnock	10,572	100	112	29	40	104	385	3.6	

A76 Location	Baseline	Windfarms					Cumulative Increase (%)	
		Sanquhar II	Sandy Knowe	Glenmuckloch	Pencloe	Proposed Development		
New Cumnock (W)	6,116	100	112	29	40	104	385	6.3
New Cumnock (E)	2,695	100	112	29	40	104	385	14.3
Hare Hill Access	2,323	100	112	29	40	104	385	16.6
Kirkconnel	3,942	100	112	29		104	345	8.8
South of Sanquhar	3,064		112			104	216	7.1
Thornhill	4,155		112			104	216	5.2

Table 12.22: Maximum cumulative effects assessment (HGVs – Scenario 2a, Access Route B only, worst case)

A76 Location	Baseline	Windfarms					Cumulative Increase (%)	
		Sanquhar II	Sandy Knowe	Glenmuckloch	Pencloe	Proposed Development		
Hurlford	639	55	136	29	40	36	296	46.3
Mauchline	669	55	136	29	40	36	296	44.3
Cumnock	518	55	136	29	40	36	296	57.2
New Cumnock (W)	894	55	136	29	40	277	537	60.0
New Cumnock (E)	506	55	136	29	40	277	537	106.0
Hare Hill Access	535	55	136	29	40	277	537	100.2
Kirkconnel	739	55	136	29		277	497	67.2
South of Sanquhar	667		136			226	362	54.3
Thornhill	468		136			226	362	77.4

Table 12.23: Maximum cumulative effects assessment (HGVs – Scenario 1b, Access Route A only, likely case)

A76 Location	Baseline	Windfarms					Cumulative Increase (%)	
		Sanquhar II	Sandy Knowe	Glenmuckloch	Pencloe	Proposed Development		
Hurlford	639	100	112	59	105	29	227	35.5
Mauchline	669	100	112	29	40	29	227	34.0
Cumnock	518	100	112	29	40	29	227	43.9
New Cumnock (W)	894	100	112	29	40	29	227	25.4
New Cumnock (E)	506	100	112	29	40	29	227	44.9
Hare Hill Access	535	100	112	29	40	29	227	42.4
Kirkconnel	739	100	112	29		29	187	27.7
South of Sanquhar	667		112			29	103	15.5
Thornhill	468		112			29	103	22.0

199. As **Table 12.20** shows, even with the absolute worst case (and highly unlikely scenario) of the maximum vehicular traffic associated with the construction of the proposed Development and four additional windfarms occurring simultaneously, the maximum impact on baseline traffic flows on the A76 would be around 30%.
200. The worst case cumulative impacts of HGVs on baseline HGV flows, the maximum impact would be around 100%, as shown in **Table 12.22**.
201. For the likely scenario, the maximum cumulative impact of total construction vehicles on total base flows would only be around 17%, as shown in **Table 12.21** with the maximum cumulative impacts of HGVs on baseline HGV flows around 45% as shown in **Table 12.23** and would be considered significant; however it is very unlikely that the peak period of construction of all cumulative windfarm sites would occur simultaneously and therefore the likely cumulative impact would be significantly less.
202. The assessment of the cumulative impact of abnormal loads has not been undertaken as these specific vehicle movements would not ever occur at the same time due to TS and police restrictions and would be planned fully in an Abnormal Load Traffic Management Plan (ALTMP) for each development.

12.8 Summary and statement of significance

12.8.1 Summary of Significant Effects

203. No significant effects are predicted with regard to the likely case (Scenario 1b). A summary of the likely significant effects as regards the worst case (scenario 2a) is provided in **Table 12.24**, which sets out the following significant effects prior to mitigation:

- there would be no significant driver severance and delay effects;
- there would be no significant community severance effects;
- there would be a significant pedestrian amenity effect on the C128n Blackaddie Road and U432n Euchan Water if Access Route B only is utilised and aggregate and concrete are brought in from off-site locations;
- there would be a significant road safety effect on the C128n Blackaddie Road and U432n Euchan Water if Access Route B only is utilised; and
- there would be significant effects with the AIL deliveries during the day.

Table 12.24: Summary of likely significant effects (Scenario 2a, worst case)

Type	Link	Sensitivity	Magnitude	Effect	Significance
Driver severance and delay	All	Low/high	Negligible	None/slight	Not significant
Community Severance	A76 at: <ul style="list-style-type: none"> • west of New Cumnock • east of New Cumnock • Kirkconnel • South of Sanquhar • Thornhill 	High	Negligible	Slight	Not Significant
	A76 at: the Hare Hill Windfarm access	Low	Negligible	None	Not Significant
Pedestrian Amenity	A76 at: <ul style="list-style-type: none"> • west of New Cumnock • east of New Cumnock • Kirkconnel 	High	Negligible	Slight	Not Significant

Type	Link	Sensitivity	Magnitude	Effect	Significance
	<ul style="list-style-type: none"> South of Sanquhar Thornhill 				
	A76 at: the Hare Hill Windfarm access	Low	Negligible	None	Not Significant
	C128n Blackaddie Road	High	Minor	Moderate	Significant
	U432n Euchan Water	High	Minor	Moderate	Significant
Road Safety	A76 at: <ul style="list-style-type: none"> west of New Cumnock east of New Cumnock Kirkconnel South of Sanquhar Thornhill 	High	Negligible	Slight	Not Significant
	A76 at: the Hare Hill Windfarm access	Low	Negligible	None	Not Significant
	C128n Blackaddie Road	High	Minor	Moderate	Significant
	U432n Euchan Water	High	Minor	Moderate	Significant
Delivery of AILs during the day	All	High	Minor	Moderate	Significant
Delivery of AILs at night	All	Low	Minor	Slight	Not Significant

204. Following the assessment of traffic impacts, the potential significant effects that could occur during construction both before and after proposed mitigation measures are presented in **Table 12.25**. Following the adoption of the proposed mitigation, there would be no residual significant effects.

Table 12.25: Summary of likely significant effects (worst case – pre, and post-mitigation)

Type	Link	Pre-Mitigation			Post-Mitigation	
		Magnitude	Significance		Magnitude	Significance
Pedestrian Amenity	C128n Blackaddie Road	Minor	Significant	Detailed modelling of AILs prior to commencement of construction.	Negligible	Not Significant
	U432n Euchan Water	Minor	Significant		Negligible	Not Significant
Road Safety	C128n Blackaddie Road	Minor	Significant	Road condition survey (including assessment of existing structures as appropriate) prior to the commencement of construction and a similar assessment following completion of the works.	Negligible	Not Significant
	U432n Euchan Water	Minor	Significant		Negligible	Not Significant
Delivery of AILs during the day	All	Minor	Significant	Provision of information to local residents and users of amenities, to involve the community in the safe operation of the Traffic Management Plan and to alleviate stress and anxiety.	Negligible	Not Significant

Type	Link	Pre-Mitigation			Post-Mitigation	
		Magnitude	Significance		Magnitude	Significance
				Good construction practices including wheel wash and careful loading.		

12.9 References

The Guidelines for the Environmental Assessment of Road Traffic (1993) from the Institute of Environmental Management and Assessment (IEMA)

Transport Scotland "Transport Assessment and Implementation: A Guide" (2012)

Design Manual for Roads and Bridges (DMRB) Volume 5, Section 1 Part 3, TA 79/99 and TA 46/97

Traffic Advisory leaflet 2/04 (DfT)

ScottishPower Renewables
9th Floor
320 St Vincent Street
Glasgow
G2 5AD

T +44 (0)141 614 0451

euchanheadrenewables@scottishpower.com



SCOTTISHPOWER
RENEWABLES