12 TRAFFIC AND TRANSPORT

12.1 INTRODUCTION

1. This Chapter of the Environmental Impact Assessment Report (EIA Report) evaluates the effects of the Heathland Wind Farm (the Development) on the Traffic & Transport resource. This assessment was undertaken by Arcus Consultancy Services Limited (Arcus).

2. This Chapter of the EIA Report is supported by the following Technical Appendix documents provided in Volume 3 Technical Appendices:

   - Technical Appendix A12.1 – Abnormal Indivisible Load Route Survey.

3. This Chapter of the EIA Report is supported by the following figures:

   - Figure 12.1: Route to Site;
   - Figure 12.2: Traffic Count Locations;
   - Figure 12.3a and b: Road Traffic Collision (RTC) Assessment;
   - Figure 12.4: Construction Development Programme;
   - Figure 12.5: Cumulative Wind Farms;
   - Figure 12.6 and 12.7: Site Entrance Junction ALV Tracking; and
   - Figure 12.8 Site Entrance Junction Visibility Splay Assessment.

   This chapter includes the following elements:

   - Legislation, Policy and Guidance;
   - Assessment Methodology and Significance Criteria;
   - Baseline Conditions;
   - Assessment of Potential Effects;
   - Mitigation and Residual Effects;
   - Cumulative Effect Assessment;
   - Summary of Effects;
   - Statement of Significance; and
   - Glossary.

12.2 LEGISLATION, POLICY AND GUIDANCE

4. Section 12.1 details relevant legislation, policy and guidance documents considered during preparation of this assessment.

Table 12.1 - Legislation, Policy and Guidance

Author	Title	Policy
The Scottish Government	The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017[1] (the EIA Regulations)	These regulations establish in broad terms what is to be considered when determining the effects of development proposals on the transport network.

[1] The Scottish Government (2017) The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 [Online] Available at: https://www.legislation.gov.uk/ssi/2017/101/contents/made (Accessed 24/09/2020)

Author	Title	Policy
The Scottish Government	Scottish Planning Policy (2014)[2]	This provides a statement of the Scottish Government's policy on nationally important land use planning matters including renewable energy and indicates that proposals for onshore wind should consider the impact on road traffic and on adjacent trunk roads.
The Scottish Government	National Transport Strategy[3]	This document provides an overview of the Scottish National Transport Strategy 2, which discusses sustainable freight movements.
The Scottish Government	Planning Advice Note 75 (PAN 75) – Planning for Transport	Provides guidance on sustainable transport planning in the context of new and existing development. The document also indicates that all planning applications that involve the generation of person trips should provide information which covers the transport implications of the development. The level of detail is to be proportionate to the complexity and scale of impact of the development.
Institute of Environmental Management and Assessment (IEMA, 1993)	Guidelines for the Environmental Assessment of Road Traffic[4]	Acknowledged that this guidance has been withdrawn, however in the absence of revised guidance this guidance still provides useful points on the principles of assessment. Sets out guidelines for determining the appropriate and significance of traffic effects as a result of a proposed development. The document focuses on the assessment of potential environmental effects associated with road traffic.

12.3 ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

12.3.1 Scoping Responses and Consultations

5. Consultation for this EIA Report topic was undertaken with the organisations shown in Table 12.2.

Table 12.2 Consultation Responses

Consultee	Type and Date	Summary of Consultation Response	Response to Consultee
South Lanarkshire Council	Scoping Response – 07/02/20	Additional Pinch Point Analysis referred to in the Scoping Request is to be included in the EIA Report It is agreed that operational traffic can be scoped out of the assessment	This has been included in Technical Appendix A12.1. Noted. The rationale is presented in Section 12.3.3 of this Chapter.

[2] The Scottish Government (2014) Scottish Planning Policy [Online] Available at: https://www.gov.scot/publications/scottish-planning-policy/pages/2/ (Accessed 24/09/2020)
[3] The Scottish Government (2020) – Scottish National Transport Strategy 2 [Online] Available at: https://www.transport.gov.scot/publication/national-transport-strategy-2/ (Accessed 24/09/2020)
[4] Institute of Environmental Assessment – Guidelines for the Environmental Assessment of Road Traffic

Consultee	Type and Date	Summary of Consultation Response	Response to Consultee
West Lothian Council	Scoping Response – 14/02/20	No comment on the route to site or scope of Traffic and Transport Assessment.	N/A
The Scottish Government – Energy Consents Unit	Scoping Response – March 2020	Transport Scotland will require to be satisfied that the proposed route can accommodate the increased length of turbine blades and that their transportation will not have any detrimental effect on structures within the trunk road route path. Given that the blade tip height has increased, the construction material volumes will also have increased as a result of the concrete quantities increasing to provide a larger foundation size for the bigger turbines. We would ask that if the material volumes do increase, then the previous percentage impacts should be reassessed to see if there is a requirement to undertake a detailed assessment of the potential environmental impacts associated with increased traffic.	Technical Appendix A12.1 provides additional Swept Path Analysis. This EIA Chapter considers the effect of increased tip height on traffic volumes.

12.3.2 Scope of Assessment

6. This assessment considers access, traffic and transportation effects of the Development during the construction, operational and decommissioning phases for the following:

- Traffic generation;
- Accidents and safety;
- Driver delay;
- Pedestrian amenity;
- Severance;
- Noise and vibration;
- Hazardous loads;
- Pedestrian delay;
- Visual effects; and

- Air quality.

12.3.3 Elements Scoped Out of Assessment

7. Traffic associated with operation of the Development is limited to maintenance and is expected to be insignificant in comparison to traffic generated during construction. General maintenance and site monitoring visits will likely be undertaken by car and LGV and can be expected to be in the region of three visits per day average. The effect of operational traffic is expected to be minimal and negligible in terms of existing traffic flow levels on routes within the vicinity of the Development. Assessment of operational traffic has therefore been scoped out of this assessment.

8. Traffic and transport effects associated with decommissioning of the Development are expected to comprise removal of the turbines and all associated above ground equipment. Turbine towers and blades are likely to be dismantled into smaller sections prior to their removal to ease transport requirements.

9. At this stage, it is not possible to forecast quantitatively or accurately the traffic effect during decommissioning of the Development as the baseline data would no longer be valid in 30 years. It is reasonable to assume that baseline traffic would continue to increase. The implication of applying further background traffic growth would be that the proportional impact of the decommissioning traffic would reduce in comparison to the construction traffic impact that has been assessed. It is expected that traffic flow on routes within the vicinity of the Site would continue to remain well below capacity.

10. The decommissioning effects would also be greatly reduced as the majority of the construction traffic is created by the import of concrete for turbine foundations, which is likely be left in situ at depth of greater than 1m below ground level as per current decommissioning best practice.

11. Prior to decommissioning of the Development, a traffic assessment would be undertaken and appropriate traffic management procedures agreed with the relevant authorities at the time.

12. For the above reasons assessment of decommissioning traffic effects will not be undertaken as part of this EIA.

13. The above approach was detailed in the Scoping Report and was supported by South Lanarkshire Council in their Scoping Response (detailed in Table 12.2).

12.3.4 Study Area

14. The Site is located approximately is located 1.5 kilometres (km) northeast of the village of Forth, at Heathland Forest, and is centred on National Grid Reference (NGR) 296917, 657090.

15. The Study Area has been defined by the public road network in the vicinity of the Development and potential delivery corridors to be used during construction by Abnormal Load Vehicles (ALVs) and by general construction traffic including staff.

16. The proposed Port of Entry (POE) for turbine components is the King George V (KGV) Dock in Glasgow and these will then be transported to the site via the M8. This port has been used by renewables deliveries in the past for a large number of wind farms, has sufficient quay and is well located for the trunk road network.

17. Whilst all ALVs will originate from the KGV Dock, the origin of general construction traffic is not currently known and is likely to be distributed throughout the region. It is assumed that general construction traffic will also utilise the M8 corridor, and therefore the route to site for general construction traffic for the purposes of this assessment is between the M8 and the site entrance (shown on Figures 12.6, 12.7 and 12.8).

18. The standard approach for an assessment such as this is to assess the impact on routes from the nearest major trunk road (in this case the M8), therefore this assessment will primarily focus on the effect of construction traffic on roads between the M8 and the site. That notwithstanding, the full route from the POE is outlined below:

    - Loads will exit the port via the Abnormal Indivisible Load (AIL) access gate onto Kings Inch Drive and proceed towards Kings Inch Drive / Mayo Avenue junction;
    - At the junction, turn left onto the M8 spur road and merge onto the M8 via the M8 Junction 25a Slip Road;
    - Exit the M8 at Junction 3 and take the A899 exit into Livingston and take the first exit onto the A899 at Livingston East Roundabout;
    - Continue along the A899 southbound and take the third exit at Lizzie Brice's Roundabout onto the A71 Bankton Road southwest bound;
    - Continue on the A71 through the settlements of Polbeth and West Calder and turn left onto the A704;
    - Continue on the A704 and turn left onto the A706;
    - Continue on the A706 southbound; and
    - Turn left into site entrance junction (shown on Figures 12.6, 12.7 and 12.8).

19. Figure 12.1 indicates the above route.

12.3.5 Baseline Survey Methodology

20. Baseline traffic flow conditions were established from publicly available information published by the Department for Transport (DfT) located on the construction traffic route as detailed in Section 12.3.4 and shown on Figure 12.2. The baseline traffic flows would inform the analysis to determine the impact of the development proposals on the road network.

21. The principal measurement which will be considered in this study is the Average Daily Flow (ADF), or the average number of vehicles which pass a traffic count location during a 24 hour period.

22. The latest available DfT data is for the year 2019. At all count locations the DfT data has been estimated using traffic growth factors from the last manual count, these factors have been applied by the DfT.

23. Due to significant uncertainty at the time of writing regarding future traffic growth patterns as a result of the Coronavirus Pandemic it is not considered appropriate to add further traffic growth factors to the collected data.

12.3.6 Methodology for the Assessment of Effects

12.3.6.1 Screening

24. In accordance with the IEMA guidance, a screening exercise has been undertaken for routes within the study area. The screening process uses two thresholds as follows:

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

25. Where the predicted increase in traffic flows is lower than the thresholds, the guidelines suggest the significance of effects can be stated to be low or not significant and further detailed assessments are not warranted. Peak traffic flows will be identified to assess a worst case scenario.

12.3.6.2 Consideration for Further Assessment

26. On routes where traffic is predicted to increase above the thresholds identified in the screening process further assessment has been undertaken. This considers the potential for receptors to receive effects as outlined in Section 12.5 of this chapter.

27. The approach to assessing sensitivity and magnitude of effects is a judgement based approach. The sensitivity of road networks to changes in traffic levels, of any given road segment or junction is assessed by considering the residual capacity of the network under existing conditions. Where there is a high degree of residual capacity, the network may readily accept and absorb an increase in traffic, and therefore the sensitivity may be said to be low. Conversely, where the existing traffic levels are high compared to the road capacity, there is little spare capacity, and the sensitivity to any change in traffic levels would be considered to be high.

28. The determination of the magnitude of the effects will be undertaken by reviewing the outline proposals for the Development, establishing the parameters of the road traffic that may cause an effect, and quantifying these effects.

29. In brief, the steps involved in this study would be as follows:

- Establish baseline traffic flow conditions;
- Carry out route inspections including detailed observations of each community potentially affected by the proposals within the study area;
- Based on the route inspections, sensitive receptors would be identified;
- An initial assessment of traffic generation from the proposed construction works would be undertaken. Traffic will be assigned to the network, and an initial assessment of effects undertaken. This will be based on professional judgement rather than transportation network modelling;
- Obtain refined project needs, refine traffic generation, and re-assess effects, using obtained baseline traffic data;
- Assess residual effects following the primary mitigation built in by virtue of the above-mentioned iteration, and any required residual mitigation needs; and
- Identify and assess the potential for cumulative effects based on other known developments.

12.3.6.3 Traffic Growth

30. Consideration was given to estimating future baseline traffic levels through the use of traffic growth factors; however, at the time of writing there is considerable uncertainty in the validity of traffic growth forecasting as a result of the global Coronavirus pandemic and the consequent reduction in travel. Longer term effects may result in changes in travel patterns and frequency of commuting and therefore existing traffic growth predictions may no longer be valid.

31. Therefore, this assessment will not apply traffic growth factors to the collected baseline traffic flow data. This approach is considered conservative as a lower baseline traffic level would result in a higher percentage increase in traffic, and thus a more significant change from baseline.

12.3.6.4 Sensitivity of Receptors

32. The sensitivity of the baseline conditions, including the importance of environmental features on or near to the Site or the sensitivity of potentially affected receptors, will be assessed in line with best practice guidance, legislation, statutory designations and / or professional judgement.

33. Table 12.3 details the framework for determining the sensitivity of receptors.

Table 12.3 Framework for Determining Sensitivity of Receptors

Sensitivity of Receptor	Definition
High	Receptors of greatest sensitivity to changes in traffic flow, would include: People whose livelihood depends upon unrestricted movement within their environment including commercial drivers and companies who employ them, local residents, schools and colleges. Accident hotspots would also be considered.
Medium	Traffic flow sensitive receptors, would include: People who pass through the area habitually, but whose livelihood is not wholly dependent on free access. Would also typically include: congested junctions, community services, parks, businesses with roadside frontage, and recreation facilities.
Low	Receptors with some sensitivity to changes in traffic flow: People who occasionally use the road network. Would also typically include: public open spaces, nature conservation areas, listed buildings, tourist attractions, residential roads with adequate footway provision and places of worship.
Negligible	Receptors with very low sensitivity to traffic flows: People not sensitive to transport effects. Would also refer to receptors that are sufficiently distant from the affected roads and junctions.

12.3.6.5 Magnitude of Effect

34. The magnitude of potential effects will be identified through consideration of the Development, the degree of change to baseline conditions predicted as a result of the Development, the duration and reversibility of an effect and professional judgement, best practice guidance and legislation.

35. The criteria for assessing the magnitude of an effect are presented in Table 12.4.

Table 12.4 Framework for Determining Magnitude of Effects

Magnitude	Description
High	The proposals could result in an appreciable change in terms of length and/or duration to the present traffic routes or schedules or activities, which may result in hardship.
Medium	The proposals could result in changes to the existing traffic routes or activities such that some delays or rescheduling could be required, which cause inconvenience.
Low	The proposals could occasionally cause a minor modification to routes, or a very slight delay in present schedules, or on activities in the short-term.
Negligible	No effect on movement of road traffic above normal level.

12.3.6.6 Significance of Effect

36. The sensitivity of the asset and the magnitude of the predicted effects will be used as a guide, in addition to professional judgement, to predict the significance of the likely effects. Table 12.5 summarises guideline criteria for assessing the significance of effects.

Table 12.5 Framework for Assessment of the Significance of Effects

Magnitude of Effect	Sensitivity of Resource or Receptor				
	Very High	High	Medium	Low	Negligible

High	Major	Major	Moderate	Moderate	Minor
Medium	Major	Moderate	Moderate	Minor	Negligible
Low	Moderate	Moderate	Minor	Negligible	Negligible
Negligible	Minor	Minor	Negligible	Negligible	Negligible

37. Effects predicted to be of major or moderate significance are considered to be 'significant' in the context of the EIA Regulations, and are shaded in light grey in the above table.

12.3.7 Assumptions

38. A worst case scenario has been assumed in which all traffic associated with the Development will pass each traffic count location identified in the study. Whilst all HGV traffic will use the defined route to site, no specific routes will apply for light traffic (i.e. cars and vans) and therefore their choice of route will be determined by their origin and is likely to be distributed across a variety of routes. The effect of increased traffic on the identified route is therefore likely to be lower than estimated in this assessment.

12.3.8 Limitations of Assessment

39. In the event that contaminated soils are required to be removed from site there would be a minor increase in HGV levels which has not been accounted for in this Chapter.

40. Excavated materials are expected to be fully re-used within the site and therefore movement of excavated materials would constitute internal movements. In the unlikely event that contaminated soils are identified then these would require to be removed to an off-site location for safe disposal.

12.3.9 Elements Scoped out of Assessment

41. The effect of operational traffic will be negligible in comparison with the construction effects. Therefore, consideration of operational traffic has been scoped out of this assessment. This approach was supported by South Lanarkshire Council in their Scoping Response, detailed in Table 12.2.

12.3.10 Grid Connection

42. The exact grid route and transmission type has not been confirmed to date and may comprise either overhead lines or underground cables between the Development and the agreed grid connection point in Wishaw. . Therefore, it is not yet possible to assess in detail the potential effects on sensitive receptors along the route.

43. The main potential traffic and transport impacts associated with grid connection would be related to traffic movements during the construction period. During construction, vehicles would access the grid route transporting construction staff, construction materials (aggregates, cement, steel bar etc.), plant items and overhead/underground grid components.

44. Traffic movements during the operational phase are likely to be restricted to routine maintenance visits. No significant operational traffic impacts are anticipated. Section 12.3.2 of the report outlines the effects recommended to be potentially important in the EIA guidelines, when assessing the traffic effects from an individual development.

45. The primary mitigation measure to help minimise the effects of the construction traffic would be careful consideration of the road network to identify a preferred route to and from the proposed grid route for construction traffic. This would involve the consideration

considered physical characteristics of the road network and the number and location of potentially sensitive receptors along the various routes.

46. A traffic management plan will be developed detailing the exact measures to be implemented during construction of the grid route. These measures will be undertaken to reduce the likelihood of any significant effects on sensitive receptors within the study area.

12.4 BASELINE CONDITIONS

12.4.1 Baseline Traffic Flow Data

47. Baseline traffic flow data collected at a number of locations on the proposed transport routes is presented in Table 12.6 below and the traffic count locations are shown in Figure 12.2.

Table 12.6: Baseline Traffic Flow Data

Ref.	Road	Location	Source	Year	ADT*	HGV
1	A899	Houston Interchange	DfT	2019	17,577	1,510
2	A899	South of Cousland Interchange	DfT	2019	14,231	503
3	A71	West of Williamston Interchange	DfT	2019	9,207	285
4	A71	Southwest of Wilderness Roundabout	DfT	2019	9,453	328
5	A71	near West Calder Train Station	DfT	2019	6,761	586
6	A704	North of Woodmuir Road	DfT	2019	3,630	629
7	A706	North of Levenseat	DfT	2019	5,192	559

*Average Daily Traffic

12.4.1.1 A899 Road

48. The A899 is a good standard 2 lane dual carriageway road with a carriageway width of approximately 15.0m. This route is subject to a 50mph speed limit and currently serves the main traffic distributor route from the M8 motorway into Livingston in West Lothian. A899 Road runs in a north – south direction and joins the A71 to the south by means of a 4-arm roundabout. The A899 provides access to the M8 motorway via the M8 Junction 3 Slip Road.

12.4.1.2 A71 Road

49. The A71 is a district distributor route which runs in an east - southwest direction and connects with the A720 City of Edinburgh Bypass to the east and the M74 Motorway to the southwest. A number of small settlements are located close to the A89 including Polbeth, West Calder and Allanton.

50. The A71 varies in width from approximately 7.5m to 8.0m and generally has no footways except at locations where there are residential properties adjacent to the road. Grass verges are present on both sides of the road at sections where footways are not available. The speed limit on the route is generally 60mph except at the built-up areas where the speed limit is 30mph.

12.4.1.3 A704 and A706

51. Both the A704 and the A706 are single carriageway routes designed as a local distributor road carrying traffic from rural settlements to district distributor roads such as the A71

and that A721. The A704 and A706 are single carriageway roads with a width of approximately 7.3m with a derestricted speed limit.

12.4.1.4 M8 Motorway

52. As stated above the M8 motorway can be accessed via the M8 Junction 3 Slip Road from the A899 Road. The M8 is a motorway trunk road with a speed limit of 70mph. The M80 motorway joins the A720 City of Edinburgh Bypass to the west and connects to the M73, M74 and M80 motorways to the west providing access to Glasgow and Stirling as well as other employment areas in the central belt.

12.4.2 Theoretical Road Capacity

53. Typical capacity values for a variety of road types are provided within the Design Manual for Roads and Bridges (DMRB). Capacity is defined as the maximum sustainable flow of traffic passing in one hour under favourable road and traffic conditions and depends on the road type, speed limit and width. Table 12.7 gives the estimated capacity of each of the roads within the Study Area.

Table 12.7: Theoretical Road Capacities

Road	Type	Speed Limit (kph)	Capacity (vehicles/hour/direction)	Two-Way Hourly Flow	Two – Way 24hr Flow
A899	Urban – Typical Dual 2 Lane	80	3000	6,000	144,000
A71	Urban – Typical Single 7.3 m	48/64	1,200	2,400	57,600
A704	Rural – Typical Single 6.0 m	96	900	1,800	43,200
A706	Rural – Typical Single 6.0m	96	900	1,800	43,200

12.4.3 Sensitive Receptors

54. A number of receptors of medium or high sensitivity to changes in traffic have been identified within the Study Area and are detailed in Table 12.8. These receptors are either located on the proposed delivery routes or located within close proximity and require access through the proposed delivery routes. The sensitivity of these receptors has been assessed using the criteria outlined in Section 12.3.6.4.

Table 12.8: Sensitive Receptors

Route	Receptor	Sensitivity	Justification
A71 West	Lizzie Brice's Roundabout	High	Noted as a Road Traffic Collision (RTC) hotspot. May be highly sensitive to changes in traffic flow/composition. Further info provided in Section 12.4.3 of this report.
A71 West	West Calder High School	High	Located near to the proposed delivery route. Students may use the delivery route on their journey to/from school and may be required to cross it.
A71 West	West Calder Community Education Centre	High	Located near to the proposed delivery route. Users may use the delivery route on their journey to/from school and may be required to cross it.

Route	Receptor	Sensitivity	Justification
A71 West	Parkhead Primary School, West Calder	High	Located near to the proposed delivery route. Students may use the delivery route on their journey to/from school and may be required to cross it.
A71 West	St Mary's R C Primary School, Polbeth	High	Located near to the proposed delivery route. Students may use the delivery route on their journey to/from school and may be required to cross it.
A71 West	Bellsquarry Primary School	Low	Located near to the proposed delivery route. Students may use the delivery route on their journey to/from school and may be required to cross it.
A71 West	Williamston Primary School, Bankton	Low	Located near to the proposed delivery route. Students may use the delivery route on their journey to/from school and may be required to cross it.
A71 West	Bankton Primary School	Low	Located near to the proposed delivery route. Students may use the delivery route on their journey to/from school and may be required to cross it.
A71 West	St Ninians R C Primary School	High	Located near to the proposed delivery route. Students may use the delivery route on their journey to/from school and may be required to cross it.
A71 West	Dedridge Primary School	Low	Located near to the proposed delivery route. Students may use the delivery route on their journey to/from school and may be required to cross it.
A71 West	Our Lady & St Bridget's Catholic Church	Low	Located near to the proposed delivery route. Users may be required to use/cross the route when accessing the service.
A71 West	Polbeth Harwood Parish Church	Low	Located near to the proposed delivery route. Users may be required to use/cross the route when accessing the service.
A71 West	Brucefield Industry Park	Low	Located near to the proposed delivery route. Users may be required to use/cross the route when accessing the service.
A71 West	Brucefield Industrial Estate	Low	Located near to the proposed delivery route. Users may be required to use/cross the route when accessing the service.
A71 West	Bankton Ashi Park	Low	Located near to the proposed delivery route. Users may be required to use/cross the route when accessing the service.
A71 West	West Calder Post Office	Low	Located near to the proposed delivery route. Users may be required to use/cross the route when accessing the service.

Route	Receptor	Sensitivity	Justification
A71 West	West Calder Police Station	Low	Located near to the proposed delivery route. Users may be required to use/cross the route when accessing the service.
A71 West	West Calder Library	Low	Located near to the proposed delivery route. Users may be required to use/cross the route when accessing the service.
A71 West	West Calder Medical Centre	Low	Located near to the proposed delivery route. Users may be required to use/cross the route when accessing the service.
A71 West	Polbeth Football Park	Low	Located near to the proposed delivery route. Users may be required to use/cross the route when accessing the service.
A71 West	West Calder Skate Park	Low	Located near to the proposed delivery route. Users may be required to use/cross the route when accessing the service.
A71 West	Residential and Commercial Properties on Delivery Route	High	A number of residential and commercial properties front directly onto the proposed delivery route, namely West Calder, Polbeith, Brucefield, and Bankton. Residents and businesses require unrestricted access to their homes/businesses.
A71 West	Polbeth Industrial Estate	Low	Located near to the proposed delivery route. Users may be required to use/cross the route when accessing the service.

12.4.4 Road Traffic Collision Assessment

55. Analysis of all 'slight', 'serious' and 'fatal' Road Traffic Collisions (RTCs) within the last five years was carried out, utilising Crash map[5] for the route between the M8 and the site entrance junction.

56. 'Slight' RTCs are defined as a collision in which nobody is fatally or seriously injured, but at least one person is slightly injured. 'Serious' RTCs are defined as those which result in hospitalisation of one or more of the parties involved. 'Fatal' RTCs are defined as those in which one or more parties dies within 30 days as a result of injuries sustained during the RTC.

57. In total 86 'slight', 12 'serious' and one 'fatal' RTCs were recorded within the study area between 2015 and 2019. The locations of each of the identified RTCs are noted on Figures 12.3a and 12.3b.

58. A cluster of RTCs is noted at the Lizzie Brice's Roundabout. At this location 14 'slight' RTCs and one 'serious' RTC were noted within the study. Seven of the 'slight' RTCs

[5] AGILYSIS (2019) CrashMap – UK Road Safety Map [Online] Available at: www.crashmap.co.uk (Accessed 16/11/20)

occurred at the A71 west arm of the roundabout with two 'slight' RTCs occurring on the A899 arm. While a review of the available RTC reports did not identify a common cause of the RTCs at this location, it was noted that a number of the 'slight' RTCs recorded were rear end impact type accidents. The 'serious' RTC included a car colliding with a cyclist. No HGVs were recorded in any of the identified RTCs.

59. As per the current design guidance[6], given the size of the roundabout, large entry angles can produce excessive entry deflection which can lead to sharp braking at entries, resulting in rear end impact type accidents, especially when approach speeds are high and that this may be a contributing factor in the recorded RTCs.

60. In response to the above findings the Lizzie Brice's Roundabout has been included as highly sensitive receptors within this assessment, as noted in Section 12.4.3 of this chapter.

12.5 ANTICIPATED CONSTRUCTION DEVELOPMENT TRAFFIC

61. An indicative programme of anticipated construction traffic associated with the Development is provided in Figure 12.4 and is expected to run for a total of 18 months. The following sub-sections provide detail for each element of work. A summary of all predicted construction traffic is provided at the end of this section.

12.5.1 Forestry Extraction

62. Forestry operations will be required in order to provide suitable working areas for construction. It is likely that felling will commence one month prior to construction site mobilisation and will continue for a duration of six months.

63. At the commencement of felling operations, plant and equipment will be required to be imported to site. This will be transported by low-loader HGVs and is likely to comprise seven deliveries, resulting in 14 vehicle movements, in the first month.

64. Timber extraction will require a total of 295 HGV loads resulting in 590 HGV movements over the 6 month duration of this phase of works.

65. Fuel deliveries to support forestry operations can be expected throughout the six month duration of this phase of works at a rate of approximately two deliveries per week, resulting in four vehicle movements per week or 16 vehicle movements per month.

66. Table 12.9 indicates the anticipated number of vehicle movements associated with forestry.

Table 12.9- Forestry Extraction

Operation	Vehicle Type	Operational Months	Total	Max Monthly
Forestry Plant Delivery	HGV	1, 3	120*	60*
Timber Extraction	HGV	1-3	590	197
Fuel Delivery	HGV Tanker	1-3	96	32
Sub-Total			**806**	**289**

*Includes transporter vehicle leaving and then returning to site during demobilisation

[6] Department for Transport (2020) – CD116, Geometric Design of Roundabouts [Online] Available at: https://www.standardsforhighways.co.uk/dmrb/search/2b5901c6-3477-4826-b780-cf99003fb5e0 (Accessed 23/09/20)

12.5.2 Site Mobilisation and Demobilisation

67. HGV and other vehicle movements will be required during site mobilisation. This will comprise the erection of welfare facilities, delivery of construction site vehicles and importation of plant and equipment including borrow pit equipment. The majority of these movements will be as HGVs and low loaders which will deliver and then depart the Site empty.

68. During site demobilisation, the majority of this equipment will be removed from Site. Vehicle movements for demobilisation will result from empty HGVs and low loaders travelling to Site and then departing loaded. Table 12.10 indicates the anticipated number of vehicle movements associated with site mobilisation and demobilisation.

Table 12.10: Anticipated Vehicle Movements - Site Mobilisation / Demobilisation

Operation	Vehicle Type	Operational Months	Total	Max Monthly
Site Mobilisation, junction and Construction Compound	HGV	2-4, 17-18	120	30
Sub-Total			**120**	**60**

12.5.3 Junction, Access Track and Hardstanding Construction

69. The site access junction, shown on Figures 12.6, 12.7 and 12.8, will be constructed during month 2 of the programme. For the prevention of the deposition of mud/gravel on the public road it is assumed that a short first section of this track will be sealed tarmac. Aggregate required for the formation of the sub-base will be imported to site along with binding and capping layers. It is estimated that 15 vehicle deliveries, resulting in 30 movements will be required during this phase of works.

70. For the internal site access tracks, hardstandings and turning heads, all stone required for construction will be imported to the site. The volume of material required for a 0.45m surface layer across all tracks, hardstandings and turning heads is estimated to be 73,359 metres cubed (m^3). Assuming each dump truck has a volumetric capacity of $9m^3$, this will result in approximately 8,151 loads, or 16,302 total vehicle movements over the duration of this phase of works.

71. That notwithstanding, it is common with windfarm developments that the majority of stone required can be won from the on-site borrow pits. However, due to the requirement for the top 0.15m layer of material to be crushed to a fine grade, this is usually imported to site. This assessment therefore assumes a worse case scenario where construction material required for all access tracks, hardstandings and turning heads will be imported to site.

72. Table 12.11 sets out the anticipated number of vehicle movements associated with access track and hardstanding construction.

Table 12.11: Anticipated Vehicle Movements - Access Track and Hardstanding Construction

Operation	Vehicle Type	Operational Months	Total	Max Monthly
Junction Construction	HGV	2	30	30
Stone Delivery	HGV Tipper	3-7	16,302	3,261

Operation	Vehicle Type	Operational Months	Total	Max Monthly
Sub-Total			**16,332**	**3,261**

12.5.4 Turbine Foundation Construction

73. The concrete for each turbine foundation will be formed from ready-mix concrete. Each foundation will have a volume of approximately 612m^3. Assuming a volumetric capacity of 7m^3 per concrete wagon, 88 wagons would be required to supply the required concrete for each foundation, resulting in 176 vehicle movements per foundation or 2,464 movements in total for foundation pouring. Assuming a 6 month period for this phase of works, 411 vehicle movements per month are expected, which will occur on 14 non-consecutive days.

74. Each foundation is required to be poured over a continuous (approximately) 10 hour period. Foundations would be poured on non-consecutive days during this period of works with 14 days of foundation pouring required to deliver concrete for the 14 turbines. Therefore, on concrete pouring days an additional 176 HGV vehicle movements will be experienced in addition to the deliveries experienced for other concurrent elements of work.

75. In addition to concrete, steel rebar will required to be imported. It is assumed that up to 4 HGV loads per turbine will be required, therefore 56 loads will be required for the 14 turbines resulting in 112 vehicle movements. Rebar will be delivered prior to the commencement of foundation pouring and would not coincide with concrete delivery. It is assumed that this will occur during month 6.

76. Additional miscellaneous items will be required to be delivered to support the foundation construction phase. These include shuttering, geotextiles and equipment. It is assumed that the majority of these deliveries would occur in month 6 prior to the commencement of pouring, and if further deliveries are required during the pouring phase then these would be timed to avoid pouring days so as to lower the peak traffic flow. An allowance for 40 miscellaneous deliveries during this phase of works has been made, this would result in up to 80 HGV movements.

77. Table 12.12 indicates the anticipated vehicle movements associated with turbine foundation construction.

Table 12.12: Anticipated Vehicle Movements - Turbine Foundation Construction

Operation	Vehicle Type	Operational Months	Total	Max Monthly
Foundation Pouring	HGV Concrete Wagon	7-12	2,466	411
Rebar	HGV Low-Loader	6	112	112
Miscellaneous	HGV	6	80	80
Sub-Total			**2,656**	**411**

12.5.5 Electrical Cabling Delivery

78. Electrical cabling for wind farm power distribution will require to be delivered and will constitute 30 HGV movements over the period of delivery. Table 12.13 indicates the number of vehicle movements associated with electrical cabling delivery.

Table 12.13: Anticipated Vehicle Movements - Electrical Cabling Delivery

Operation	Vehicle Type	Operational Months	Total	Max Monthly
Electrical Cabling Delivery	HGV	8-9	30	16

12.5.6 Crane Delivery

79. A large crawler or track mounted crane of approximately 1,000 tonne capacity will be required for turbine erection along with an additional 160 tonne pilot crane. The crawler crane will be transported in component form and assembled on the Site, this will require approximately 52 HGV movements to be undertaken prior to the commencement of turbine delivery. The pilot crane will be self-propelled although will constitute an Abnormal Load Vehicle (ALV) due to its weight.

80. The crane will remain on-site for the duration of the turbine assembly phase. Table 12.14 indicates the number of vehicle movements associated with crane delivery.

Table 12.14: Anticipated Vehicle Movements - Crane Delivery

Operation	Vehicle Type	Operational Months	Total	Max Monthly
Crawler Crane	HGV	10, 14	52	26
	Abnormal Load Vehicle**	10, 14	2	1
Overall			**54**	**27**

**Self-propelled vehicles which arrive in one month and depart in another

12.5.7 Turbine Delivery

81. Turbines will be delivered as separate components, the majority of which will require to be transported by ALV. The towers will be transported in three separate sections and each blade will be transported individually. Five further abnormal load vehicles will be required to transport the nacelle and hub. For 14 turbines, 154 ALV deliveries will be required, equalling 308 vehicle movements.

82. Following delivery of components, the ALVs will retract to the size of a standard HGV for the return journey. Two escort vehicles are likely to be required to accompany each ALV which will result in a worst-case of 616 additional vehicle movements. In practice, this figure may be reduced where ALVs approach the Site in convoy and fewer escort vehicles per ALV are required. Table 12.15 indicates the number of vehicle movements that are expected for turbine delivery.

Table 12.15: Anticipated Vehicle Movements - Turbine Delivery

Operation	Vehicle Type	Operational Months	Total	Max Monthly
Turbine Components	ALV	11-14	308	77
	Escort Car or Van	11-14	616	154
Overall			**924**	**231**

12.5.8 Control Building, Substation and Battery Storage Construction

83. Material for construction of the substation and battery compound hardstanding has been accounted for in Section 12.5.3. This section will therefore consider above ground material only.

84. Two transformers will require to be delivered by ALV due to their weight. Following delivery of components, the ALVs will retract to the size of an HGV for the return journey. This will result in four vehicle movements, 2 ALV movements and 2 HGV movements. Two escort vehicles are assumed to accompany each ALV resulting in eight vehicle movements.

85. Concrete will be required to be imported for construction of the substation building. This is assumed to require 10 HGV concrete wagon loads, resulting in 20 movements. An additional 20 HGV loads have been assumed for the delivery of the control building electrical components and switchgear, resulting in a further 40 HGV movements.

86. The battery storage element will require delivery of the battery modules themselves and additional ancillary equipment. Battery modules would be delivered via HGV low loader, or via shipping container and are assumed to result in up to 50 deliveries or 100 HGV movements. An allowance of 25 HGV deliveries resulting in 50 vehicle movements has been made for the ancillary equipment.

87. Table 12.16 indicates the number of vehicles associated with substation construction.

Table 12.16: Anticipated Vehicle Movements - Substation Construction

Operation	Vehicle Type	Operational Months	Total	Max Monthly
Concrete for Control Building	HGV Concrete Wagon	13	20	20
Electrical Components and Switchgear Delivery	HGV	13-14	40	20
Transformer Delivery	ALV	13	2	2
	HGV	13	2	2
	Escort Car/Van	13	8	8
Battery Storage Modules	HGV	13-14	100	50
Battery Ancillary Equipment	HGV	13-14	50	25
Overall			**222**	**127**

12.5.9 Fuel Delivery

88. Fuel will require regular delivery to the Site throughout the construction period and is expected to total 4 HGV fuel tanker deliveries per month from site mobilisation; totalling 72 vehicle movements over the duration of construction. Table 12.17 indicates the number of vehicle movements associated with fuel delivery.

Table 12.17: Anticipated Vehicle Movements - Fuel Delivery

Operation	Vehicle Type	Operational Months	Total	Max Monthly
Fuel Delivery	HGV Fuel Tanker	1-18	72	4

12.5.10 Construction Personnel and Staff

89. It is anticipated that during the construction phase, an average of 30 staff will be required on-site per day during the months with normal activities on site (months 1 - 5, 15 -18) and rising to 60 staff during the months with labour intensive activities on site (months 6 – 14). For the purposes of this assessment, the most recent available Scottish private vehicle occupancy rate of 1.57 people per vehicle was used, equating to approximately 20 vehicles per day during leaner months and 40 vehicles per day during busier months during the construction phase.

90. Assuming 26 work days per month, this will result in a total of 520 vehicles per month during the leaner months of the construction phase and a total of 1040 vehicles per day during the busier months resulting in an overall total of 14,040 vehicle trips for staff over the course of construction of the Development.

91. It is anticipated that Construction staff will arrive at the Development between 0600 and 0700 hours and leave the Development between 1800 and 1900 hours, Monday to Friday and between 1300 and 1400 hours on a Saturday.

92. Table 12.18 indicates the number of vehicle movements associated with staff.

Table 12.18: Anticipated Vehicle Movements - Staff

Operation	Vehicle Type	Operational Months	Total	Max Monthly
Staff	Car or Minibus	1-18	14,040	1040

12.5.11 Summary

93. Table 12.19 provides a summary of all deliveries expected throughout duration of construction.

Table 12.19: Anticipated Vehicle Movements - Summary

Operation	Vehicle Type	Operational Months	Total	Max Monthly
Forestry Extraction				
Forestry Plant Delivery	HGV	1, 3	120*	60*
Timber Extraction	HGV	1-3	590	197
Fuel Delivery	HGV Tanker	1-3	96	32
Subtotal			**806**	**289**
Site Mobilisation/Demobilisation				
Site Mobilisation, Junction and Construction Compound	HGV	2-4, 17-18	120	30
Subtotal			**120**	**60**
Junction, Access Track and Hardstanding Construction				
Junction Construction	HGV	2	30	30
Stone Delivery	HGV	3-7	16,302	3,260

Operation	Vehicle Type	Operational Months	Total	Max Monthly
Subtotal			**16,332**	**3,260**
Turbine Foundation Construction				
Foundation Pouring	HGV Concrete Wagon	7-12	2,464	411
Rebar	HGV Low-Loader	6	112	112
Miscellaneous	HGV	6	80	80
Subtotal			**2,656**	**411**
Electrical Cabling Delivery				
Electrical Cabling Delivery	HGV	8-9	30	16
Crane Delivery				
Crawler Crane	HGV	10, 14	52	26
	Abnormal Load Vehicle**	10, 14	2	1
Subtotal			**54**	**27**
Turbine Delivery				
Turbine Components	ALV	11-14	308	77
	Escort Car or Van	11-14	616	154
Subtotal			**924**	**231**
Control Building Substation and Battery Storage				
Concrete for Control Building	HGV Concrete Wagon	13	20	20
Electrical Components and Switchgear Delivery	HGV	13-14	40	20
Transformer Delivery	ALV	13	2	2
	HGV	13	2	2
	Escort Car/Van	13	8	8
Battery Storage Modules	HGV	13-14	100	50
Battery Ancillary Equipment	HGV	13-14	50	25
Subtotal			**222**	**127**
Fuel Delivery				
Fuel Delivery	HGV Fuel Tanker	1-15	72	4

Operation	Vehicle Type	Operational Months	Total	Max Monthly
Staff				
Staff	Car or Minibus	1-18	14,040	1,040
Totals			**Total**	**Max Monthly**
Total HGV and Abnormal Load Movements			20,594	4,194
Total Car and Van Movements			14,664	1,202
Overall Total			**35,258**	**5,396*****

*Includes transporter vehicle leaving and then returning to site during demobilisation

**Self-propelled vehicles which arrive in one month and depart in another

***Total flow in peak month

94. It is noted that there remains a mining risk beneath the proposed development site. Should it not be wholly possible to mitigate through the proposed micrositing limits, this may result in additional ground treatment of identified mineworkings (i.e., grouting up of voids) or piled foundations or a combination of grouting and piling to fully mitigate the ground conditions encountered. This may result in additional HGV movements to deliver quantities of grout, cement and steel reinforcement amongst other materials as well as the mobilisation and demobilisation of grouting and piling equipment.

95. In the event that these additional works are required, vehicle movements will be programmed in advance of the main construction period for grouting. Movements proposed for piled foundations are unlikely to be significantly more than conventional gravity foundations due the resulting reduced foundation footprint. In addition, further mitigation including stockpiling grout materials for onsite batching at designated temporary storage areas would also be implemented to minimise the impact on peak vehicle movements.

12.6 ASSESSMENT OF EFFECTS

12.6.1 Traffic Generation

96. A detailed breakdown of the distribution of vehicle movements in each month, and for each element of work, throughout the construction phase of the Development is included in Figure 12.4. The peak month of construction from a traffic perspective was identified and used to predict the increase in traffic flow on routes within the study area. A worst case scenario was assumed in which all predicted traffic passes each location within the study.

97. Due to the nature of foundation pouring, i.e. all concrete for one pour will be delivered within a single day, it is not appropriate to distribute this traffic across the month. Instead a calculation of the traffic flow increase on the 14 non-consecutive days of concrete pouring, and on days during the peak month with no concrete pouring has been made.

98. From inspection the peak month for vehicle flow is expected to be month 7 where 342 vehicle movements per day are predicted. During this month 176 vehicle movements per day are expected on concrete pouring days and 176 vehicle movements per day are predicted on all other days.

99. Tables 12.20 detail the anticipated vehicle flow in the peak month on days with no concrete deliveries and the percentage increase above the predicted baseline at each

point within the Study Area. For the purposes of this assessment a 26 working days per month has been assumed for all daily traffic calculations.

Table 12.20: Predicted Average Daily Traffic - Peak Month Non-Concrete Delivery days

Location	Total Vehicles			HGVs*		
	Baseline	Peak Month	% Increase	Baseline	Peak Month	% Increase
1 – Houston Interchange	37674	37840	0.4%	1029	1155	12.2%
2 – South of Cousland Interchange	34742	34908	0.5%	840	966	14.9%
3 – West of Williamston Interchange	17346	17512	1.0%	472	598	26.6%
4 - Southwest of Wilderness Roundabout	13934	14100	1.2%	510	636	24.6%
5 - near West Calder Train Station	11270	11436	1.5%	511	637	24.6%
6 - North of Woodmuir Road	2015	2181	8.2%	193	319	65.0%
7 - North of Levenseat	5192	5358	3.2%	559	685	22.5%

*For the purposes of this estimation, abnormal load vehicles are included in HGV

100. Table 12.21 details the anticipated vehicle flow in the peak month on days where concrete deliveries will take place; this will occur on a maximum of 14 non-consecutive days

Table 12.21: Predicted Average Daily Traffic - Peak Month Concrete Delivery days

Location	Total Vehicles			HGVs*		
	Baseline	Peak Month	% Increase	Baseline	Peak Month	% Increase
1 – Houston Interchange	37674	38016	0.9%	1029	1331	29.3%
2 – South of Cousland Interchange	34742	35084	1.0%	840	1142	35.9%
3 – West of Williamston Interchange	17346	17688	2.0%	472	774	63.9%
4 - Southwest of Wilderness Roundabout	13934	14276	2.5%	510	812	59.1%

Location	Total Vehicles			HGVs*		
	Baseline	Peak Month	% Increase	Baseline	Peak Month	% Increase
5 - near West Calder Train Station	11270	11612	3.0%	511	813	59.0%
6 - North of Woodmuir Road	2015	2357	16.9%	193	495	156.2%
7 - North of Levenseat	5192	5534	6.6%	559	861	53.9%

*For the purposes of this estimation, abnormal load vehicles are included in HGV

101. As detailed in the assessment methodology, a screening exercise was undertaken in order to determine which routes warrant detailed assessment.

102. The lower threshold of significance (10%) was considered appropriate for those locations with identified sensitive receptors. Each of these receptors are within or around the settlements along the A71 West and will be considered against location references 4 and 5.

103. The upper threshold of significance (30%) was considered appropriate for other routes within the study, which applies to references; 1, 2, 3, 6 and 7.

104. Using the above thresholds, and assessing the estimated percentage increases in overall traffic and HGV traffic, further detailed assessment will be considered in the following locations/ cases:

    1. On the A71 (Location Reference 4 and 5) on concrete delivery days as a result of HGV traffic increase; and
    2. On the A71, A899, A704 and A706 (Location Reference 2, 3, 6 and 7) throughout construction of the Development and on concrete delivery days as a result of HGV traffic increase.

12.6.1.1 1 – A71 (Location Reference 4 and 5) as a result of HGV Increase throughout Construction

105. Location reference 4 and 5 are located on the A71. HGV traffic is predicted to increase by a maximum of 59.1% during concrete delivery days, exceeding the lower 10% threshold. Overall traffic is expected to increase by a maximum of 3.0% during this time.

106. As detailed in the assessment methodology, where considering increases in traffic on roads with a low baseline traffic flow, it is important to consider the overall and residual capacity of the road in question.

107. As detailed in Table 12.7, the theoretical road capacity for this section of road is 1200 vehicles per hour per direction or 57,600 two-way vehicles per day (VPD). Comparing the theoretical capacity with the predicted total daily vehicle flow during the peak month of up to 14,276 vehicle movements per day, it can be seen that the theoretical capacity will not be exceeded and there is significant residual capacity on this route to accommodate the temporary increase in HGV traffic. The effect of increased traffic on this route is considered low and not significant as per the EIA Regulations.

12.6.1.2 2 – A71, A899, A704 and A706 (Location Reference 2, 3, 6 and 7) as result of HGV Increase throughout construction and During Concrete Delivery

108. Location reference 2 is located on the A899, Location reference 3 is located on the A71 while Location reference 6 and 7 are located on the A704 and A706 respectively. At

location 6, the predicted increase in overall traffic is 16.9% and for HGV traffic is 156.2% during concrete delivery days, exceeding the 30% threshold.

109. The theoretical capacities of these roads are 43,200 VPD. The absolute flow levels expected during the peak period at locations 6 and 7 are 2,357 VPD and 5,534 VPD, therefore there is sufficient residual capacity to accommodate the increase in traffic with a low magnitude of change.

110. At Location 2, the predicted increase in overall traffic is 1.0% and for HGV traffic 35.9% during concrete delivery days, exceeding the 30% threshold. The theoretical capacity of this road is 144,000 VPD. The absolute flow levels expected during the peak period at location 2 is 17,648 VPD, therefore the is sufficient residual capacity to accommodate the increase in traffic with a low magnitude of change.

111. At location 3, the predicted increase in overall traffic is 2.0% and for HGV traffic is 63.9% during concrete delivery days, exceeding the 30% threshold.

112. The theoretical capacities of these roads are 57,600 VPD. The absolute flow levels expected during the peak period at location 3 is 17,688 VPD, therefore there is sufficient residual capacity to accommodate the increase in traffic with a low magnitude of change.

    In addition to the above, the predicted increase is temporary and would be reversed following completion of construction of the Development. The effect of construction on traffic generation at reference Locations 2, 3, 6 and 7 is considered to be minor and not significant in terms of the EIA Regulations.

12.6.2 Accidents & Safety

113. As detailed in Section 12.4.4, 86 'slight', 12 'serious' and 1 'fatal' RTCs were recorded along the entirety of the general construction route, however these were distributed evenly across both the A899 and the A71. The single 'Fatal' RTC involved only a single vehicle colliding with a cyclist. The 'serious' RTC recorded on the A706 near site entrance was due adverse weather conditions at the time of the accident. As such, no effect on highway safety is anticipated due to the temporary increase in traffic associated with the Development using this section of the A706. In addition to that, there was no identifiable cause from the available data regarding the cluster of events at the Lizzie Brice's Roundabout, the most likely cause therefore being excessive speed. No further trends could be identified within the data.

114. In the absence of identifiable trends in RTCs or known accident hotspots, an increase in overall traffic flow or HGV composition is not sufficient to affect a change in safe operation of the road network.

115. Therefore, the temporary increase in overall traffic and HGVs for the duration of the construction of the Development is not likely to result in an effect on accidents and safety. The effect on accidents and safety is negligible and not significant as per the EIA Regulations.

12.6.3 Pedestrian Amenity,

116. Pedestrian amenity, fear and intimidation can be affected by changes to traffic flow and composition. The A71 do not have pedestrian footways, except where they pass through settlements.

117. HGV traffic levels are predicted to increase above the relevant thresholds of significance throughout construction at Reference Location 4 and 5.

118. A number of the identified sensitive receptors are located at the affected points of this route including St Mary's R C Primary School, West Calder Community Education Centre, Polbeth Industrial Estate, West Calder Medical Centre, West Calder Post Office, West

Calder Train Station, West and Calder Police Station. It is likely that students of these schools will walk on, and may cross, the delivery route on the way to and from school. In addition, patients and individuals using the services such as the Medical Centre and the Train Station are likely to cross this route.

119. It is considered that the increase in overall traffic flow and HGV flow may have an effect on pedestrian amenity at these sensitive receptors which is considered moderate, and therefore significant in terms of the EIA Regulations.

120. In accordance with the EIA Regulations, Section 12.8 of this Chapter details mitigation measures which are to be adopted to reduce this effect.

12.6.4 Driver Delay

121. All roads within the Study Area are operating significantly below capacity and are predicted to continue to do so even during construction of the Development. The effect of general increase in traffic on driver delay is therefore considered to be negligible and not significant as per the EIA Regulations.

122. Some driver delay can be expected to occur on routes due to the slow movement of ALVs between the port of delivery and the Site. Where safe to do so, ALVs will occasionally stop to allow traffic to pass if necessary. A total of 154 ALVs associated with turbine delivery, are anticipated. These will be distributed through the duration of this elements of works.

123. Due to the overall limited number of loads across the construction programme resulting in a low magnitude of change, and the short term nature of this phase of works, the anticipated effect of abnormal loads on driver delay is minor and not significant as per the EIA Regulations.

12.6.5 Severance

124. Severance is the perceived division that can occur within a community when it becomes separated by a major traffic artery. The A71 is the only route within the Study Area which passes through settlements which have the potential to be affected by severance, and is covered by Reference Location 4 and 5.

125. During construction of the Development, HGV traffic at Reference Location 4 and 5 is predicted to increase by a maximum of 47.4 % throughout the duration of the Development. In this case the temporary change in traffic falls above the thresholds of significance (10%) for this effect, however, given that A71 is the only route through these settlements, we assume that temporary increases in HGV traffic are not uncommon. Although the HGV traffic increase is above the 10% threshold, the total vehicle increase will only result in a maximum of 2.7% increase in the traffic passing through this area. The change in traffic is temporary, fully reversible and would only occur during construction hours. It has therefore been determined that the effect of severance is minor and not significant as per the EIA Regulations.

12.6.6 Noise and Vibration

126. Assessment of effects of Noise and Vibration as a result of off-site construction vehicle movements has been considered using the guidance contained in DMRB – LA 111.

127. In accordance with the guidance the following points have been noted when considering the need for a quantitative assessment of off-site construction traffic noise and vibration:

- The level of detail of a noise and vibration assessment shall be proportionate to the quality of data available and the risk of likely significant effects occurring; and

- Are there any noise sensitive receptors where there would be a reasonable stakeholder expectation that a construction noise/vibration assessment would be undertaken?

128. It should be noted that all on-site construction noise and vibration effects, including delivery vehicle use of the private access track off the A706 and operational noise effects are considered in Chapter 13 - Noise of this EIA.

129. Considering off-site transport related noise/vibration effects against the above bullet points, there are a number of sensitive receptors located close to the proposed general construction traffic route. However, this route is an established transport corridor, and there should be an expectation that it is used by HGV traffic. Therefore, there is no 'reasonable stakeholder expectation' that a quantitative noise/vibration assessment be undertaken for a temporary and fully reversible change in traffic flow as a result of the Development.

130. Furthermore ground-borne vibration resulting from HGV and AGV movements is generally only likely to be significant where vehicles traverse discontinuities, such as rough surfaces (including pot-holes) or speed-humps. Effects from the temporary increase in traffic are therefore only likely to be experienced at receptors located next to such road defects, in which case the maintaining authority (i.e. the local authority) would be responsible for enacting repairs.

131. Airborne vibrations resulting from low frequency sound emitted by vehicle engines and exhausts can result in detectable vibrations in building elements such as windows and doors and cause disturbance to local people. Due to the short-term and temporary nature of the increase in traffic movements, it is considered that the effect of vibration upon receptors along the route would be minor and not significant in terms of the EIA Regulations.

12.6.7 Hazardous Loads

132. Fuel will be regularly transported to the Site over the duration of construction of the Development. All fuel will be transported by suitably qualified contractors, and all regulations for the transportation and storage of hazardous substances will be observed. No other hazardous substances are expected to be transported to Site. It is therefore considered that the effect of the transportation of hazardous substances is negligible and not significant as per the EIA Regulations.

12.6.8 Visual Effects

133. The movements of ALVs could be considered visually intrusive. This effect would be short-term and would only occur during the movement of abnormal loads. It is therefore considered the visual effect as a result of the ALVs upon receptors along the routes would be negligible and not significant in terms of the EIA Regulations.

12.6.9 Air Quality

134. Maintaining good local air quality is essential for the human health and overall quality of life for people living in the area. Road transport accounts for a significant proportion of emissions of a number of pollutants including carbon dioxide (CO_2), nitrogen dioxide (NO_2), and particulate matter (PM10). Nitrogen oxide emissions are also of concern for nearby vegetation and ecosystems.

135. The DMRB gives guidance on matters relating to air quality in Volume 11 Section 3 and advises that significant impacts to local air quality may be found in the following cases:

- Where the road alignment will change by 5m or more; or

- Daily traffic flows will change by 1,000 Average Annual Daily Traffic (AADT) or more; or
- Heavy Duty Vehicle flows will increase by 200 AADT or more; or
- Daily average speed will change by 10km/hr or more; or
- Peak hour speed will change by 20km/hr or more.

136. Given the assessment of the expected volume of construction traffic, it is considered that none of the above criteria have been met or exceeded. It is therefore considered that the effect of the increase in traffic on local air quality would be negligible and not significant as per the EIA Regulations.

137. Due to the temporary nature of the increase in vehicles using the proposed access route, any effects on local air quality will be short term and reversible as a result of the wind carrying air contaminants away from their source, causing them to disperse.

12.6.10 Operational Effects

138. Traffic associated with operation of the Development is limited to maintenance and is expected to be insignificant in comparison to traffic generated during construction. General maintenance and site monitoring visits will likely be undertaken by car and LGV and can be expected to be in the region of three visits per day average. The effect of operational traffic is therefore expected to be negligible and not significant as per the EIA Regulations.

12.6.11 Decommissioning Effects

139. Traffic and transport effects associated with decommissioning of the Development are expected to comprise removal of the turbines and all associated above ground equipment. Turbine components and electrical equipment would be dismantled and removed in a similar manner to their delivery and erection. Turbine towers, nacelles and blades would be transported from the Site as abnormal loads. A route assessment will be undertaken prior to decommissioning to identify the best route to remove the components offsite. Turbine components would be broken up offsite in controlled environments ready for reuse, recycling or appropriate disposal.

140. At this stage, it is not possible to forecast quantitatively or accurately the traffic effect during decommissioning of the Development as the baseline data would no longer be valid in 30 years. It is reasonable to assume that baseline traffic would continue to increase. The implication of applying further background traffic growth would be that the proportional impact of the decommissioning traffic would reduce in comparison to the construction traffic impact that has been assessed. It is expected that traffic flow on routes within the vicinity of the Site would continue to remain well below capacity.

141. The decommissioning effects would also be greatly reduced as the majority of the construction traffic is created by the import of concrete for turbine foundations, which is likely be left in situ at depth of greater than 1 m below ground level as per current decommissioning best practice.

142. Prior to decommissioning of the Development, a traffic assessment would be undertaken and appropriate traffic management procedures agreed with the relevant authorities at the time.

12.7 CUMULATIVE EFFECT ASSESSMENT

143. Significant cumulative effects may occur during construction of the Development where this overlaps with construction of another nearby wind energy developments. Proposed developments which have the potential to result in cumulative traffic and transport effects include:

- Tormywheel Wind Farm (15 Turbines);
- Upper Haywood Wind Farm (1 Turbine);
- Pates Wind Farm (7 Turbines);
- Burnfoot Poulty Wind Farm (1 turbines); and
- Heathland Single Turbine.

144. The locations of these developments are shown in Figure 12.5. Table 12.22 provides an estimate of daily traffic generation figures that have been assumed for each of the identified developments. Exact traffic data is not available for the identified developments and in order to provide a reasonable assessment, it has been assumed that traffic generation for each project will be in proportion to that generated by the Development (calculated pro-rata, per turbine).

145. Traffic relating to the delivery of concrete during foundation pours has not been included as it is assumed that these events will be timed to ensure they do not coincide. It is unlikely that the local capacity for concrete production could accommodate several pours coinciding in any case.

Table 12.22: Extrapolated Cumulative Daily Traffic Movements from Identified Developments

Development	No. Turbines	Total Traffic	HGV
Tormywheel Wind Farm	15	177	135
Upper Haywood Wind Farm	1	12	9
Pates Wind Farm	7	83	63
Burnfoot Poulty Wind Farm	1	12	9
Heathland Single Turbine	1	12	9
Total	**25**	**296**	**224**

146. Table 12.23 indicates the anticipated total traffic (including baseline) and the percentage increase above baseline in the worst-case cumulative scenario.

Table 12.23: Cumulative Daily Traffic Increase - Peak Month (Non Concrete Pour Days)

Location	Total Vehicles			HGVs*		
	Baseline	Peak Month	% Increase	Baseline	Peak Month	% Increase
1 – Houston Interchange	37674	37970	0.8%	1029	1253	21.8%
2 – South of Cousland Interchange	34742	35038	0.9%	840	1064	26.7%
3 – West of Williamston Interchange	17346	17642	1.7%	472	696	47.5%
4 - Southwest of Wilderness Roundabout	13934	14230	2.1%	510	734	44.0%

Location	Total Vehicles			HGVs*		
	Baseline	Peak Month	% Increase	Baseline	Peak Month	% Increase
5 - near West Calder Train Station	11270	11566	2.6%	511	735	43.9%
6 - North of Woodmuir Road	2015	2311	14.7%	193	417	116.2%
7 - North of Levenseat	5192	5488	5.7%	559	783	40.1%

147. As indicated in Table 12.23, the addition of all construction traffic from the identified cumulative developments results in a worst-case increase of 116.2% at Location Reference 6, for overall flow, over baseline flow.

148. There is sufficient residual capacity on each of the roads within the Study Area to accommodate the predicted increase in traffic which may occur in the cumulative scenario. The likelihood of all of the identified developments receiving planning consent which coincides with construction of the Development is considered low. In the event that a number of the identified developments are scheduled to be constructed simultaneously, it is assumed that the respective TMPs would be agreed in consultation to minimise disruption, furthermore a number of the identified cumulative developments may route construction traffic via alternative routes. For these reasons the likely impact is expected to be significantly lower than stated in Table 12.23.

149. The impact on traffic and transport due to cumulative effects is therefore considered to be low and not significant in terms of the EIA Regulations.

12.8 MITIGATION AND RESIDUAL EFFECTS

12.8.1 Mitigation Measures

150. A significant effect was identified in Section 12.6.3 relating to pedestrian amenity at several sensitive receptors, including:

- St Mary's R C Primary School;
- West Calder Community Education Centre;
- Polbeth Industrial Estate;
- West Calder Post Office
- West Calder Train Station; and
- West Calder Medical Centre.

151. Due to the nature of the sensitive receptors in this location, a number of mitigation measures are proposed which are recommended for adoption in a TMP as follows:

- As far as reasonably possible, deliveries should be scheduled outside of school opening and closing times; and
- Drivers of all delivery vehicles to be made aware during induction of the presence of schools, medical centre and other amenities within these settlements.

152. The above measures are recommended; however, the TMP will detail the exact measures to be implemented during construction of the Development.

12.8.2 Residual Effects

153. It is considered that if the above mitigation measures are implemented through the TMP for the duration of construction, the effect on increased traffic on pedestrian amenity at

the sensitive receptors identified will be reduced to low and therefore considered as not significant in terms of the EIA Regulations.

12.9 SUMMARY OF EFFECTS

154. An assessment has been made of the potential for significant effects of the Development. This assessment identified potential significant traffic and transport effects (in terms of the EIA Regulations) on any receptors during the construction, operation and decommissioning of the Development.

155. By applying the mitigation measures outlined in Section 12.8.1, mainly through following best practice guidelines during construction and implementation of a TMP, the magnitude of residual effects of the Development, both alone and in combination with other schemes, are assessed as being low magnitude, and thus non-significant in terms of the EIA Regulations.