

12 TRAFFIC & TRANSPORT

12.1 Introduction

12.1.1 This chapter presents an assessment of the potential impacts and subsequent effects arising from the traffic associated with construction, operation (including maintenance) and decommissioning of the Visual Impact Provision (VIP) Snowdonia Project, here on referred to as the 'Proposed Project'.

12.1.2 The chapter is supported by the following document:

- Outline Construction Traffic Management Plan (OCTMP) (provided as an appendix to the Outline CEMP (Appendix 2A)

12.1.3 Mitigation measures have been identified and incorporated into the design of the Proposed Project to minimise environmental impacts ('Embedded Mitigation'). The environmental assessment of Traffic and Transport matters contained within this chapter seeks to identify the need for mitigation, beyond the embedded mitigation, to further reduce impacts associated with traffic generated by the Proposed Project.

12.1.4 The OCTMP has been used to inform the assessment presented in this chapter. Equally, any mitigation identified as being required as a consequence of the assessment contained within this chapter is presented in the OCTMP.

12.1.5 This chapter refers to a series of working assumptions connected to construction practices and techniques and the likely traffic numbers and vehicle movements associated with them, outlined in Project Description, Chapter 2. These assumptions, and the resulting forecasts, are based on a range of factors including National Grid's experience and expertise from other similar schemes and are based on the best information available at the time of writing.

12.1.6 This chapter is accompanied by a number of figures, listed in Table 12.1.

Table 12.1: Traffic & Transport Figures

Figure	Description
12.1	Highway Link References
12.2	Construction Traffic Routes
12.3	Project Access Locations
12.4	Traffic Survey Locations
12.5	Public Rights of Way Network
12.6	Cycle Routes
12.7	Garth Visibility Splays
12.8	Cilfor Visibility Splays

12.1.7 Other chapters that are useful to review in association with this chapter, because of their consideration of traffic movements, are the Noise and Vibration Chapter 14, and Socio-Economic and Tourism Chapter 13. The structure of this chapter and methodology that informs the Environmental Appraisal of Traffic and Transport is presented in Chapter 3 (Environmental Appraisal Process) and Section 12.2 of this report.

12.2 Scope and Methodology

Introduction

12.2.1 This section describes the scope of the Traffic and Transport assessment. It also considers how feedback from consultation influenced the design of the Proposed Project and assessment work undertaken. A full consideration of consultation undertaken in relation to Traffic and Transport is presented within Section 12.4.

12.2.2 In addition, this section outlines the technical methods used to assess the potential impacts and effects which may arise as a consequence of the Proposed Project. From a Traffic and Transport perspective, these impacts and effects are linked to increased traffic volumes on roads local to the Proposed Project. The methodology was first proposed in the Screening and Scoping Report submitted to the local planning authorities in October 2018 and has been developed and refined in response to comments received on the above document and other consultation with stakeholders.

Scope

12.2.3 A key guidance document for determining an appropriate scope and methodology for the Traffic and Transport assessment was produced by the Institute of Environmental Assessment (IEA), now the Institute of Environmental Management and Assessment (IEMA), in the form of the 'Guidelines for the Environmental Assessment of Road Traffic' (1993).

12.2.4 The effects considered in this chapter have been assessed in the context of two 'rules of thumb' which are taken from the IEMA Guidelines, and which help to define the road links that need to be considered within the assessment.

- **Rule 1:** Include highway links where total traffic flows are predicted to increase as a consequence of a development by more than 30% (or where the number of Heavy Goods Vehicles (HGVs) is predicted to increase by more than 30%); and
- **Rule 2:** Include any specifically sensitive areas where traffic flows are predicted to increase as a consequence of a development by 10% or more. Sensitive areas may be defined as locations near to more vulnerable user groups, such as school children, people with disabilities or the elderly, or accident black spot areas, roads at or near capacity, or links with high pedestrian flow.

12.2.5 Whilst these rules are acknowledged, this assessment considers the effects arising from changes to total traffic and HGV volumes on all highway links that have been identified for the routing of construction traffic, regardless of whether they exceed either of the two 'rules of thumb'. This ensures the possible environmental effects arising from all traffic associated with the Proposed Project are subject to robust assessment.

12.2.6 Once the Proposed Project is operational, traffic volumes are expected to reduce significantly and will not be prescribed to specific routes, unlike for the construction phase. Similarly, it is anticipated that impacts, in terms of the type and number of vehicular movements for the decommissioning of each element of the Proposed project would be less intensive than that forecast for the construction phase. Decommissioning is not expected to take place for a number of decades, at which time the circumstances within the Study Area may be very different. As a consequence, other routes have not been considered in this assessment

12.2.7 Figure 12.1 provides a Link Reference plan which covers the geographic scope of this assessment, whilst Figure 12.2 shows highway links designated as construction traffic routes, including primary construction traffic routes and those identified as contingency routes. Each of these Figures presents the Study Area for the assessment of Traffic and Transport effects associated with the Proposed Project. Further information on the geographical scope of the Study Area is provided in the following sub-section.

Methodology

Introduction

12.2.8 The potential environmental effects of the Proposed Project have been assessed using the in accordance with the Institute of Environmental Assessment (now Institute of Environmental Management and Assessment (IEMA) 'Guidelines for the Environmental Assessment of Road Traffic' (1993) ('the IEMA Guidelines').

12.2.9 The IEMA guidelines identify the following environmental effects may be considered important when considering traffic from an individual development;

- Noise;
- Vibration;
- Visual Impacts;
- Severance;
- Driver Delay;
- Pedestrian Delay;
- Pedestrian Amenity;
- Hazardous Loads;
- Air Pollution;
- Dust and Dirt;
- Ecological Impact; and
- Heritage and Conservation.

12.2.10 Of these effects, many are to be considered in detail as part of other technical assessment in Chapters 6 to 15.

12.2.11 Whilst not on the recommended list within the IEMA Guidelines, reference is also given within this chapter to effects of Fear and Intimidation, and Highway Safety.

12.2.12 This chapter therefore considers the following specific effects, which are not addressed in other chapters of the Environmental Appraisal:

- Severance;
- Driver Delay;

- Pedestrian Delay;
 - Pedestrian Amenity;
 - Fear and Intimidation; and
 - Highway Safety
- 12.2.13 The Proposed Project is not anticipated to involve the transportation of hazardous loads (for example special wastes, toxic materials and chemicals) during construction, operation or decommissioning. Any unforeseen hazardous waste which is found, and which would require transportation would be managed and transported in a safe manner and in accordance with current regulations. As such hazardous loads are not covered in this chapter.
- 12.2.14 It is important to note that the guidelines do not distinguish between temporary and permanent changes in traffic flows, whereas, in reality, short duration increases are likely to be more tolerable than permanent increases, and therefore less significant. Therefore, although the impacts are initially reported for the peak year of construction, the methodology set out in the IEMA Guidelines assumes this is a permanent increase in traffic flows; as such professional judgement has been applied in considering the influence shorter durations may have on the overall impact and need for mitigation.
- 12.2.15 Typically, when assessing the impacts of additional traffic, there are a range of particular groups and locations which may be sensitive to changes in traffic conditions compliant with the 'rules of thumb' previously outlined.
- 12.2.16 These are outlined in the IEMA Guidance as 'Affected Parties' as follows:
- People at home;
 - People in work places;
 - Sensitive groups including children, elderly and disabled;
 - Sensitive locations, e.g. hospitals, churches, schools, historic buildings;
 - People walking;
 - People cycling;
 - Open spaces, recreational sites, shopping areas;
 - Sites of ecological/nature conservation value; and
 - Sites of tourist/visitor attraction.
- 12.2.17 The effects of the Proposed Project on sites of ecological and nature conservation value are dealt with in detail in Chapter 7 Terrestrial Ecology and Chapter 16 Marine Ecology. Effects on tourist and visitor attractions are considered in Chapter 13 Socio-Economic and Tourism. The IEMA guidance states that this list of affected parties is not exhaustive. One affected party that is not on the list but is nevertheless considered later in this assessment is 'road users'.

- 12.2.18 All of the affected parties have one thing in common; their potential exposure to changes in traffic volumes comes about through their proximity to a route used by traffic generated by the Proposed Project, mainly during construction.
- 12.2.19 In this assessment, a receptor is defined not by individual affected party, but by location. In this instance the receptor is identified as a highway link and its 'sensitivity' (as per IEMA guidance), referred to henceforth as its 'value', is defined by the presence of 'Built Environment Indicators' (BEIs) (e.g. schools, houses, places of work) that signal the presence of the potential affected parties listed above.

Study Area

- 12.2.20 For this assessment the Study Area is defined by identifying the links that construction traffic would be required to use in order to access the Proposed Project. The most appropriate and likely routes for vehicles to access and egress the Proposed Project have been identified and are listed in Table 12.5, considering their likely origins and destination points, the type of vehicles concerned, and the elements of the Proposed Project concerned. The Study Area assessed within this chapter is defined by a total of 15 highway links, comprising the Local and Strategic Highway Network.
- 12.2.21 In terms of highway links the study area commences from Porthmadog High Street and the A487 Porthmadog Bypass to the West and terminates on the eastern side of the Dwyryd Estuary, approximately 500m north and south of Cilfor, on the A496.
- 12.2.22 In addition to this, the Study Area was extended to encompass relevant BEIs and to consider non-motorised infrastructure relevant to the assessment - including the National Cycle Network and Public Rights of Way.
- 12.2.23 The Study Area for the assessment of Traffic and Transport impacts is presented on Figure 12.1 and Figure 12.2. Further description of the existing environment in relation to Traffic and Transport is provided in Section 12.5.

Baseline Data Gathering and Forecasting Methods

- 12.2.24 Baseline data has been collated using a variety of sources at the locations presented in Figure 12.4. These are outlined below.

Traffic Count Data

- 12.2.25 Traffic count data has been captured for all highway links which are identified as construction traffic routes, as shown on Figure 12.2. Automatic Traffic Count (ATC) data, using pneumatic tubes installed over the carriageway, have been used to derive 24-hour, 7 day per week flows, as well as traffic speed information. The ATC data were classified in order to derive the proportions of Light Goods Vehicles (LGVs) and Heavy Goods Vehicles (HGVs).
- 12.2.26 In addition to the ATC data, Manual Classified Turning Counts (MCTC) were undertaken in order to determine the traffic turning counts at key road junctions within the Study Area.
- 12.2.27 All traffic survey sites (ATC and MCTC) are presented in Figure 12.4.
- 12.2.28 The DfT 'Guidance for Transport Assessment' recommends that traffic flows are derived using a 'neutral' month (i.e. a month that is unlikely to feature school holidays). Data was therefore collected in September 2016, December 2016, and March 2019.
- 12.2.29 Table 12.2 presents the range of traffic survey data obtained for use in the assessment.

Table 12.2: Traffic Data Sources

Date	Data Type
September 2016	Classified ATC & Speed
September 2016	MCTC
December 2016	Classified ATC & Speed
March 2019	Classified ATC & Speed
March 2019	MCTC

Future Baseline Forecasting Methods

- 12.2.30 In order to determine a future baseline scenario, use has been made of the Trip End Model Presentation Program (TEMPro) database which determines background traffic growth on an annual basis for a specified time period.
- 12.2.31 The future baseline year assessed later in Section 12.7 is 2022. The anticipated peak construction year for the Proposed Development would be anticipated to be between 2022 and 2023 where several significant traffic generating activities are programmed to be undertaken; in particular shaft construction and tunnelling activities.
- 12.2.32 Whilst the peak year of construction traffic activity is forecast to take place across 2022 and 2023, the former has been selected as the year of assessment to ensure that a lower baseline of traffic across the local highway network is assessed. It is considered that this will ensure that the chapter reports the most significant potential effects arising from the Proposed Project on a given link and that the assessment is as robust as reasonably practicable.
- 12.2.33 The derivation of the future baseline traffic for 2022 is considered further in Section 12.6.

Proposed Development Traffic Forecasting

- 12.2.34 The potential Traffic and Transport effects of the Proposed Project would primarily relate to the construction phase which would occur over a period of around five years between 2021 and 2026.
- 12.2.35 There are three main elements to the Proposed Project that feature specific traffic generating construction activity. These are as follows:
 - Tunnel construction, shaft construction, and tunnel head house works;
 - Reconfiguration of the Garth Sealing End Compound (SEC) and construction of new SEC at Cilfor; and
 - Overhead line ('The VIP Subsection') removal.
- 12.2.36 A full description of the Proposed Project and the construction elements is provided in the Project Description Chapter 2.

- 12.2.37 The peak year of construction traffic activity (June 2022 to May 2023) is forecast to occur when the construction of the Cilfor tunnel shaft and tunnel drive from the Garth construction compound overlap.
- 12.2.38 The engineering team has estimated the number of likely trips associated with each activity based on the anticipated number of staff and vehicles required in order to complete a task each day. The daily traffic volumes have been aggregated separately for LGVs and HGVs and presented against a monthly programme of construction activity.
- 12.2.39 The peak construction activity in terms of traffic generation is expected to relate to the excavation of rock and soil during tunnelling. Tunnelling works are expected to take place for approximately 17 months. Current forecasts indicate that tunnelling will generate in the order of 30 loads per day, (60 two-way¹ HGV movements) undertaken by vehicles with a load carrying capacity of 15m³. During this period, worst-case forecasts indicate that tunnelling activities could generate 160 two-way Light Goods Vehicles (LGV) movements spread across three shifts.

Assigning Construction Traffic to the Highway Network

- 12.2.40 Once the construction traffic trips for each activity associated with the Proposed Project were determined, the next step was to assign this traffic to the local highway network.
- 12.2.41 At the time of writing, vehicular access associated with the Proposed Project is comprised of 13 temporary and permanent access locations (Figure 12.3). It should be noted that temporary (Construction Phase) and permanent (Operational Phase) access locations may be the same; however, they could be subject to a different construction specification or geometric design.
- 12.2.42 Further information regarding the access strategy is contained within the OCTMP. Access to the Garth and Cilfor compounds, for construction and operation is presented in Figure 12.7 and Figure 12.8.
- 12.2.43 Once the access locations for the Proposed Project were established, the next step was to determine construction traffic routes to serve each location.
- 12.2.44 The routing strategy is based on the following key principles:
- To provide safe and efficient construction access for the Proposed Project;
 - To reduce, so far as reasonably practicable and mitigate to acceptable levels, disruption to the public;
 - To avoid HGV use of the A497 Porthmadog High Street;
 - To avoid HGV use of the northern section of the A496;
 - Where practical use the shortest route between the access locations and the Strategic Road Network (A487); and
 - So far as reasonably practicable, to avoid high value receptors.

¹ Where 'two-way' vehicle movements are mentioned, these refers to the total number of movements; in other words, 40 'two-way' movements would consist of 20 inbound and 20 outbound trips.

- 12.2.45 It is intended that the above principles would, so far as reasonably practicable, minimise the environmental impacts of construction traffic as part of the embedded mitigation incorporated into the project design. Further detail on the access and routing strategy for the Proposed Project is presented in the OCTMP (appendix to the Outline CEMP).
- 12.2.46 Links comprising construction traffic routes are set out in Figure 12.1 and Figure 12.2.
- 12.2.47 For the purposes of the assessment the working assumption has been adopted that HGV traffic would have the same origin and destination within the Study Area. For example, if a vehicle arrives from the Porthmadog Bypass to collect excavated material from the Garth tunnel head house, it is assumed that they would travel back to the Porthmadog Bypass using the same links used for the outbound journey to the work site.
- 12.2.48 In order to present a robust, worst-case assessment, HGV construction traffic has been assigned to each construction traffic route in full. I.e. assuming a scenario where all HGV traffic uses only one route to a working location during the peak year.
- 12.2.49 In practice it is highly unlikely that all HGVs would arrive and depart from the Study Area in this way; they would arrive into the Study Area from a number of different directions, across a number of links. However, the all-or-nothing assignment of traffic was adopted for HGVs in order to consider a scenario in which, for example, all tunnel spoil was taken to one onwards location. Consequently, it is considered that the HGV volumes reported in this chapter reflect a highly robust, worst-case approach and are notably higher than might be expected on a typical day during the peak year of construction traffic activity.
- 12.2.50 A different approach has been adopted for the assignment of LGVs. Contractors and staff would arrive to working areas from home locations, places of work, and local temporary accommodation (B&Bs, Hotels etc). It is therefore considered that the approach adopted for HGVs would not be appropriate in this case – all LGVs would not arrive and depart from one direction, using the same links. Consequently, LGVs have been assigned to the construction traffic routes in line with the relative proportion of existing traffic flows. These proportions were derived from the traffic survey data listed in Table 12.2 For example, if 50% of all baseline traffic arrives into the Study Area from the A487 West towards Porthmadog, then 50% of LGVs would be assigned between a working location and this entry/exit point to the Study Area.

Categorising the Value of Highway Links

- 12.2.51 As discussed, a receptor is defined not by individual affected party, but by the link they are using at the time.
- 12.2.52 To expand on this, an individual cyclist (the affected party) might use multiple routes, some of which experience varying degrees of change to traffic flows as a consequence of the Proposed Project. It is considered inappropriate to take the highest degree of traffic flow change experienced by the cyclist and conclude that this is the impact of the Proposed Project, when there may be multiple routes used by the cyclist that have a considerably lower degree of change in traffic flows.
- 12.2.53 A review has been undertaken of all construction traffic routes and each link, or section of link, has been given an overall value based on the character and the presence of certain BEIs along the link.
- 12.2.54 Where a construction route does not feature, for example, residential dwellings, footpaths, cycle paths or other features of the built environment likely to be used by

the affected parties, then it is determined as having a low value, unless stakeholders have advised of, or site observations have revealed, noteworthy cycling and pedestrian activity on routes with no such features.

- 12.2.55 Table 12.3 considers affected parties and built environment indicators and describes the rationale behind assigning overall highway link value to individual links.

Table 12.3: Categorising the Value of Highway Links

Affected Party	Built Environment Indicator	Highway Link Sensitivity to Changes in Traffic Flow ('Value')
People at home	Residential Properties	Medium: Where there are a number of properties with direct frontage to the highway link being used as a construction route.
		Low: Where there are few properties with direct frontage to the highway link being used as a construction traffic route.
People in workplaces	Offices, industrial units, employment uses	Low
Sensitive groups (children, elderly and disabled)	Schools, play areas, care/retirement homes, disabled parking bays	High: Where there are multiple indicators of sensitive groups with direct frontage onto the highway link being used as a construction traffic route
		Medium: Where one indicator of sensitive groups is present with direct frontage onto the highway link being used as a construction traffic route
		Low: Where no indicator of sensitive groups is present
Sensitive locations (Hospitals, places of worship, schools, and historic buildings)	Hospitals, places of worship, schools, historic buildings	High: Where there are multiple indicators of sensitive locations
		Medium: Where one indicator of a sensitive location is present
		Low: Where no indicator of sensitive locations is present
People walking	Footways, PRow, crossings	Medium: Indicators present on highway link
		Low: Indicators not present on highway link
People cycling	On/off-road designated cycle routes	Medium: On-road designated cycle routes present along highway link
		Low: Off-road designated cycle routes present along highway link
Open spaces, recreational sites, shopping areas	Parks, play areas, shops, community centres	High: Where there are multiple instances or indicators likely to be used by sensitive groups (i.e. children)
		Medium: Where one indicator is present that is likely to be used by sensitive groups (i.e. children)
		Low: Indicators that are unlikely to be used by sensitive groups
Road users	Roads, junctions, road classification, baseline traffic volumes, signage.	Determined by the presence of other affected parties in this table

Assessing the Magnitude of Impacts

- 12.2.56 With the exception of highway safety, the magnitude of any potential impacts will be determined by the associated percentage increase in traffic arising from the forecast construction traffic along each link.
- 12.2.57 In considering highway safety a methodology has been adopted in which clusters are identified on construction traffic routes based upon the density and severity (clustering) of reported collisions within the most recent 60 months for which data is available. The likely impacts of construction traffic are then considered on the basis of the location specific contributory factors and a professional judgement of the likelihood of environmental effects arising from the proposed increases in construction traffic. This is presented in Section 12.7.
- 12.2.58 The magnitude of impact criteria for all other environmental effects are presented in Table 12.4.

Table 12.4: Magnitude Criteria

Magnitude Criteria				
Effect	Very Low	Low	Medium	High
Severance	Increase in total traffic flows of 29% or under (or increase in HGV flows under 10%).	Increase in total traffic flows of 30-59% (or increase in HGV flows of between %-39%.	Increase in total traffic flows of 60%-89% (or increase in HGV flows between 40%-89%.	Increase in total traffic flows or HGV flows of 90% and above.
Pedestrian Delay	Total traffic flows under 1,400 per hour.	Where traffic flows exceed 1,400 vehicles per hour the severity of the impact will be determined on a case-by-case basis based on receptor sensitivity.		
Pedestrian Amenity	Increase in total traffic flows of 49% or under.	Increase in total traffic flows of 50-69%.	Increase in total traffic flows of 70%-99%.	Increase in total traffic flows of 100% or above.
Fear and Intimidation	Increase in total traffic flows or HGV flows of 29% or under (or increase in	Increase in total traffic flows of 30-59% (or increase in HGV flows of	Increase in total traffic flows of 60%-89% (or increase in HGV flows between 40%-89%)	Increase in total traffic flows or HGV flows of 90% and above.

Magnitude Criteria				
Effect	Very Low	Low	Medium	High
	HGV flows under 10%).	between 10%-39%.		
Driver Delay	Increase in total traffic flow of less than 29%.	Increase in total traffic flow of between 30% and 59%.	Increase in total traffic flow of between 60% and 89%.	Increase in traffic flow of 90% and above.

Duration

- 12.2.59 Table 12.4 sets out the magnitude thresholds for the impacts considered.
- 12.2.60 Duration is considered when assessing the overall impact and need for mitigation, noting that the DMRB Volume 11 Section 2 Part 5 states in Paragraph 1.47: *'Recognition should be made that permanent impacts will be more significant than those of a temporary nature. For example, the impact may only occur during a single phase of the project construction and may be temporary. Alternatively, the impact may be long-term or irreversible and hence permanent. It is, therefore, important that the assessment distinguishes between permanent and temporary impacts.'*
- 12.2.61 All the Traffic and Transport impacts associated with the construction of the Proposed Project would be temporary. When determining the need for mitigation to further reduce impacts beyond the embedded mitigation, the duration over which effects are likely to be experienced, in addition to other link specific factors, has been considered, and professional judgement applied.

Reporting of Impacts and Mitigation

- 12.2.62 As discussed previously within this Traffic and Transport Chapter, embedded mitigation has been incorporated into the scheme design to minimise the impacts and associated environmental of additional traffic arising from the Proposed Project. These measures include, for example, the selected construction traffic routes, proposed access locations, and HGV delivery times. The assessment contained within this chapter therefore reflects these mitigation measures.
- 12.2.63 Any further requirement for mitigation, to further reduce any potentially unacceptable environmental effects, will take into account the impact magnitude criteria set out within Table 12.4, and a professional judgement of the duration of effects and location-specific factors.

12.3 Consultation Undertaken

- 12.3.1 This section describes the consultation with consultees that has influenced the scope of the assessment work. It also considers how feedback from the consultation influenced the Proposed Project and the assessment work undertaken in this chapter.
- 12.3.2 In late 2017, consultation was undertaken with the Stakeholder Reference Group (SRG). At that time concerns were raised in relation to the potential volumes of additional traffic arising from an east-west direction of tunnel drive, and the potential impact upon Pont Briwet. As a consequence the west-east tunnel drive from Garth

- was explored, in the interest of minimising the impact of Proposed Project traffic along Pont Briwet.
- 12.3.3 Subsequently, the project team met with Gwynedd Council highways officers to discuss the Traffic and Transport implications of the Proposed Project in August 2018. During this meeting the project team and Gwynedd Council officers discussed the potential impacts of the Proposed Project, including proposed access locations, traffic management, physical highway improvements, and the routing of construction traffic. The discussions during this meeting have informed the proposed construction traffic routing strategy, access locations and design, and the use of traffic management proposed in the OCTMP (appendix to the Outline CEMP).
- 12.3.4 Public consultation events were undertaken in late 2018. Members of the Traffic and Transport team attended events in Penrhyndeudraeth. The public were invited to view the proposals and ask questions in relation to the Proposed Project.
- 12.3.5 The methodology contained within this Chapter was first proposed in the Screening and Scoping Report, which was shared with Gwynedd Council and the Snowdonia National Park Authority.
- 12.3.6 Following this request for a Screening and Scoping opinion, Gwynedd Council² advised that the traffic unit were satisfied with the approach to the assessment of Traffic and Transport and mitigation measures proposed. Consequently, the methodology and scope of the assessment within this Chapter is consistent with the approach set out in the Screening and Scoping Report (Issue October 2018).
- 12.3.7 Further information on the response to screening and scoping and stakeholder engagement and consultation is contained within Chapter 3 (Environmental Appraisal Process) and Consultation Chapter 4 respectively.

12.4 Statutory and Planning Context

Introduction

- 12.4.1 This section sets out the legislation and planning policy framework that is relevant to the Traffic and Transport assessment. A full review of compliance with national and local planning policy is provided in Chapter 5 (Planning Policy).

Legislation

- 12.4.2 The Active Travel (Wales) Act 2013, is a document developed as landmark Welsh legislation to make it easier for people to walk and cycle in Wales.
- 12.4.3 It is intended to:
- Ensure more people can experience the health benefits of active travel;
 - Reduce greenhouse gas emissions;
 - Help address poverty and disadvantage; and
 - Help the economy to grow by unlocking sustainable economic growth.
- 12.4.4 The Act therefore requires planning authorities to make provision for mapping and promoting 'Active Travel' routes for pedestrians and cyclists. It is the developer's

² Gwynedd Council Screening Opinion C18/0962/08/SC 15.02.2019

responsibility to acknowledge the existing local Active Travel routes and ensure that there are enough connections from the development to the existing network, so that future residents have a clear, direct and safe route from their homes to the wider Active Travel network. With a focus on residential development, this legislation is not directly relevant to the Proposed Project; however, the principles have been considered in assessing the opportunities for active travel amongst employees and the impacts of the Proposed Project on local active travel routes.

National Policy

Planning Policy Wales (2016)

- 12.4.5 Planning Policy Wales (PPW) Edition 10 was published on 5 December 2018. It sets out the land use planning policies of the Welsh Government and its commitment to sustainable development.
- 12.4.6 Sections 4.1 and 5.3 of PPW set out how Welsh Government (WG) intends to achieve the aims of PPW relating to transport and transport infrastructure.
- 12.4.7 The PPW is supported by a number of Technical Advice Notes (TANs). TAN 18 is particularly relevant to the assessment of Traffic and Transport impacts associated with the Proposed Project.

Technical Advice Note (TAN) 18

- 12.4.8 PPW is supported by topic based Technical Advice Notes (TANs). TAN 18 Transport, published in March 2007, sets out the Welsh Government's aim for integration of land use planning and transport in order to achieve a sustainable pattern of development.
- 12.4.9 TAN 18 places emphasis on sustainability and the need for sustainable development patterns. Integration is identified as a means of helping the Welsh Government achieve its wider sustainable development policy objectives by:
- Promoting resource and travel efficient settlement patterns;
 - Ensuring new development is located where there is, or will be, good access by public transport, walking and cycling thereby minimising the need for travel and fostering social inclusion;
 - Managing parking provision;
 - Ensuring that new development and major alterations to existing developments include appropriate provision for pedestrians (including those with special access and mobility requirements), cycling, public transport, and traffic management and parking/servicing;
 - Encouraging the location of development near other related uses to encourage multiple-purpose trips;
 - Promotion of cycling and walking;
 - Supporting the provision of high quality, inclusive public transport;
 - Supporting provision of a reliable and efficient freight network;

- Promoting the location of warehousing and manufacturing developments to facilitate the use of rail and sea transport for freight;
 - Encouraging good quality design of streets that provide a safe public realm and a distinct sense of place; and
 - Ensuring transport infrastructure or service improvements necessary to serve new development allow existing transport networks to continue to perform their identified functions.'
- 12.4.10 Section 6 of TAN18 focuses on the needs of walkers and cyclists and the requirement to safeguard routes for walkers, cyclists and horse-riders.
- 12.4.11 The Proposed Project would require 13 access points in total. These are illustrated in Figure 12.3 and described in detail in the OCTMP (appendix to the Outline CEMP).
- 12.4.12 The requirements for new accesses are set out within Section 9.16 of TAN 18, with the visibility standards detailed within Annex B of TAN 18. In accordance with this, speed surveys have been undertaken along the links where new access junctions would be required to inform the visibility requirements. The location and design of the access junctions along with any required mitigation measures have been developed and informed through discussions with Gwynedd Council. This is documented in the OCTMP (appendix to the Outline CEMP).
- 12.4.13 Annex D of TAN 18 focuses specifically on 'Transport Assessment' and emphasises the importance of undertaking early scoping discussions with local authorities. Consultation has been undertaken with Gwynedd Council to discuss the scope of assessment required. Further information on scoping is provided within Section 12.3.

Local Planning Policy

Joint Local Development Plan

- 12.4.14 Gwynedd Council and the Isle of Anglesey County Council have an adopted Joint Local Development Plan (JLDP) which was adopted in July 2017.
- 12.4.15 The JLDP supersedes the;
- Gwynedd Unitary Development Plan (2001-2016);
 - Anglesey Ynys Mon UDP; and
 - Gwynedd Structure Plan and Ynys Mon Local Plan.
- 12.4.16 The JLDP is a land-use strategy developed for a period of 15 years which focuses on sustainable development in Gwynedd and the Isle of Anglesey.
- 12.4.17 Porthmadog is identified as a sub-regional centre within Gwynedd. The Joint Local Development Plan for Gwynedd (2017) also refers to the importance of the area, as a regional leisure and tourism centre.
- 12.4.18 The JLDP is made up of the Written Statements and the Proposals Maps. The policies within the JLDP are complemented by national planning policies set out below. The document aims to achieve the following;

- Guide the development of housing, retail, employment infrastructure and other uses;
 - Include policies which will aid the Local Planning Authority's decision with regard to planning applications; and
 - Protect areas to ensure the maintenance and enrichment of the natural and built environment.
- 12.4.19 The JLDP contains strategic policies that are relevant to the Traffic and Transport impacts of the Proposed Project and include;
- Strategic Policy PS2, Infrastructure and Developer Contributions;
 - Policy ISA1, Infrastructure Provision;
 - Policy TRA1, Transport Network Developments;
 - Policy TRA4, Managing Transport Impacts;
 - Policy PCYFF2, Development Criteria; and
 - Strategic Policy PS8, Proposals for Large Infrastructure Projects.
- 12.4.20 As above, Policy TRA1 has been considered which refers to transport network developments including:
- Improvements to existing infrastructure;
 - Transfer between transport modes;
 - Transport Assessments; and
 - Transport Schemes
- 12.4.21 Additionally, Policy TRA 4 refers to the expectations for developments proposals that would impact upon the safe and efficient operation of the highway, public transport and other networks including pedestrian and cycle routes and Public Rights of Way (PRoW).
- Snowdonia National Park Authority: Eryri Local Development Plan 2007-2022*
- 12.4.22 The Eryri Local Development Plan (ELDP) '*sets out the 15-year land use planning framework for Snowdonia National Park*'. The revised Local Development Plan was adopted in February 2019.
- 12.4.23 In relation to Traffic and Transport, the ELDP places a particular emphasis on achieving the following objectives:
- *"Encourage new development to locations that reduce the need to travel with reasonable access to community services and facilities and sustainable modes of transport.*
 - *Support initiatives aimed at encouraging use of sustainable modes of transport".*

12.4.24 In achieving these aims, the ELDP highlights the significance of existing walking and cycling routes, road safety, and the need for any highway improvement to maintain the distinct qualities of the national park.

12.4.25 Strategic Policy L: Traffic and Transport sets out the criteria for development that will be supported in Traffic and Transport terms. Strategic Policy L states that development will be supported where:

- *“The provision of services are located so as to minimise the need to travel.*
- *There is convenient access via footpaths, cycle paths and public transport, thereby encouraging the use of these modes of travel for local journeys, reducing the need to travel by private car and improving the accessibility of services to those with poor availability of transport.*
- *There is an improvement in accessibility for all, in particular disabled people. iv. Changes to the road network do not damage or cause detrimental effects to PRow, listed buildings or historic monuments or cause adverse effects to environmental designations.*
- *The highest priority will be given to the conservation and enhancement of the characteristic biodiversity of Snowdonia, particularly habitats and species designated under national and European legislation. Where possible, these improvements to the road network will feature provision for segregated pedestrian and cycling uses.*
- *It will reduce or remove vehicle traffic from within town centres and where possible from rural areas.*
- *The natural environment of the park is not adversely affected.*
- *Secure cycle parking facilities are provided where appropriate”.*

12.4.26 Furthermore, it is noted that the ELDP wishes to safeguard the recreational routes within the park from development that would prevent their future use as recreational routes.

12.4.27 Where relevant, these requirements have been considered as part of the Proposed Project.

North Wales Joint Local Transport Plan 2015-2020

12.4.28 The North Wales Local Transport Plan sets out joint aims to support economic growth and sustainable employment, addressing poverty and improving access for rural communities, among other priorities and strategic links to government priorities. The plan covers the period 2015 to 2020 and includes the following key transport issues for North Wales;

- The ability of the strategic trunk road and rail corridors to provide the necessary goods connectivity, for people and freight, within North Wales, to the ports and to the rest of the UK to support the economy and jobs, including tourism;
- The lack of resilience of the road and rail networks to planned and unplanned events including extreme weather;

- The need for good access to and between the three Enterprise Zones in North Wales;
 - The lack of viable and affordable alternatives to the car to access key employment sites and other services; and
 - The need for good road links to / from the trunk road network into the rural areas to help retain the viability of local businesses and support the Welsh language and culture.
- 12.4.29 These issues, outlined in the LTP, have been considered as part of the Proposed Project.

Mid Wales Joint Local Transport Plan (TRACC)

- 12.4.30 The Mid Wales Local Transport Plan 2015-2020 similarly outlines key transport priorities and the social, economic and health linkages that transport has with other strategic government priorities.
- 12.4.31 The Proposed Project will adhere to the requirements set out within these policy documents and proposals have been developed in accordance with appropriate design guidance and standards.

12.5 Existing Environment

Introduction

- 12.5.1 This section describes the existing environment in relation to Traffic and Transport within the Study Area of the Proposed Project.

Highway Network

- 12.5.2 In terms of the spatial extent of the assessment, the local Traffic and Transport network that has the potential to be affected by the Proposed Project covers major (A Roads), minor (B Roads and Classified Unnumbered Roads ('C' Roads)) and unnamed roads (UR) (unclassified) forming the road network local to the Proposed Project.
- 12.5.3 The network of roads within the Study Area includes the A487 and A497, with the A487 continuing to the north and east and the A497 continuing to the south west.
- 12.5.4 There is also a small network of unclassified local roads which serve the surrounding farms, residential dwellings, Snowdonia Business Park, and areas such as Portmeirion. Access across the Dwyryd Estuary is provided by Pont Briwet.
- 12.5.5 On the southern side of the Dwyryd Estuary, Pont Briwet meets the A496 which provides access to the north and south towards Maentwrog and Talsarnau respectively, as well as access to a network of local roads continuing to the east. Settlements are concentrated along the A496 with local lanes serving hamlets and isolated properties on the lower slopes of the mountain range.
- 12.5.6 For this assessment the Study Area is defined by identifying the links that construction traffic would be required to use in order to access the Proposed Project. The most appropriate and likely routes for vehicles to access and egress the Proposed Project have been identified and are listed in Table 12.5, considering their likely origins and destination points, the type of vehicles concerned, and the elements of the Proposed Project concerned.
- 12.5.7 The highway network across the Study Area may be classified as either the Strategic Road Network (SRN) or the Local Road Network (LRN). The SRN is

- defined as roads under the jurisdiction of the Welsh Government (i.e. the A487). The LRN is defined as roads under the jurisdiction of Gwynedd Council. Table 12.5 indicates whether each link is part of the SRN or LRN.
- 12.5.8 Construction routes have been identified based upon their suitability to accommodate HGV and LGV traffic. For the purposes of assessment HGVs are defined as any vehicle exceeding 3.5t gross weight³.
- 12.5.9 As far as reasonably practicable, HGV routes maximise use of the SRN.
- 12.5.10 Proposed construction traffic routes for LGVs and HGVs are presented in Figure 12.2. Further information on the identification of construction traffic routes and access locations is provided within the OCTMP.

Table 12.5: Proposed Project Highway Links

Link Reference	Road Name	Description	LRN/ SRN	HGV/ LGV
1	A487	Porthmadog Bypass	SRN	HGV
2	A497	Minffordd Roundabout to NCR8	LRN	HGV
3	NCR8	Between A497 and Existing Garth SEC Compound	LRN	HGV
4	A497	Britannia Terrace	LRN	LGV
5	A487	Between Minffordd Roundabout and Pont Briwet	SRN	HGV
6	A487	Between Pont Briwet and Cambrian View	SRN	HGV
7	Pont Briwet	Between Bron Meirion Surgery and A496	LRN	HGV
8	A4085	North of A487/ School Street Junction	LRN	LGV
9	A487	East of Cambrian View	SRN	HGV
10	Cambrian View	Between A487 and Pont Briwet	LRN	HGV
11a	A496N	Between Pont Briwet junction and access B9	LRN	HGV
11b	A496N	North of Access B9	LRN	LGV
12	A496S	South of Pont Briwet Junction	LRN	HGV*

³ Maximum authorised mass (MAM) means the weight of a vehicle or trailer including the maximum load that can be carried safely when it's being used on the road. This is also known as gross vehicle weight (GVW) or permissible maximum weight. <https://www.gov.uk/vehicle-weights-explained>

Link Reference	Road Name	Description	LRN/ SRN	HGV/ LGV
13	A497	Porthmadog High Street	LRN	LGV
14	Unclassified Road	Serving Maes Hendre, Adwyddu, and Maes Teg	LRN	LGV
*Contingency Route: This link would only be used if all other possible construction traffic routes are unavailable for example due to an emergency event on the highway network.				

12.5.11 The Proposed Project would also require the movement of Abnormal Indivisible Loads (AILs). AILs are defined as vehicles which fall outside the provisions contained within The Road Vehicles (Construction and Use) Regulations 1986⁴ and The Road Vehicles (Authorised Weight) Regulations 1998⁵.

12.5.12 AILs transported for the proposed project are anticipated to include, for example, the Tunnel Boring Machine (TBM) and cable drums. AIL movements are detailed in the Abnormal Indivisible Load Report included in Annex B of the OCTMP (appendix to the Outline CEMP).

Walking and Cycling

Public Rights of Way

Figure 12.5 presents the Public Rights of Way (PRoW) within the Study Area. PRoW affected by the Proposed Project are presented in Table 12.6.

Table 12.6: PRoW Affected by Proposed Project Activities

PRoW	Project Element	Description
Penrhyndeudraeth Restricted Byway 26	OHL Removal, Trackway Installation, Access Track Upgrade	Access to pylons for dismantling and OHL removal on the Dwryd Estuary (Pylon 4ZC032, 4ZC031 and 4ZC030) requires the use of Penrhyndeudraeth Restricted Byway 26 and Penrhyndeudraeth Footpath 26, including the installation of trackways and upgrading of Access Tracks.
Penrhyndeudraeth Footpath 26	OHL Removal, Trackway Installation, Access Track Upgrade	
Penrhyndeudraeth Footpath 24	OHL Removal, Pylon Foundation Removal, Access Track Upgrade	Penrhyndeudraeth Footpath 24 crosses the proposed working area for OHL removal between Pylon 4ZC032 and 4ZC033.
Talsarnau Footpath 52	OHL Removal, Pylon Foundation Removal, Access	Talsarnau Footpath 52 is located adjacent to Pylon 4ZC027. The proposed working areas for

⁴ The Road Vehicles (Construction and Use) Regulations 1986. SI 1986:1078 (as amended)

⁵ The Road Vehicles (Authorised Weight) Regulations 1998. SI 1998:3111 (as amended)

PRoW	Project Element	Description
	Track Upgrade, Puller/ Tensioner Platform	dismantling of 4ZC027 and installation of the replacement terminal pylon 4ZC027R are expected to interact with this PRoW

- 12.5.13 It is anticipated that a temporary closure of each PRoW may be required in order to facilitate resurfacing and widening of the access tracks, installation of temporary trackway to provide access to these Pylons, and during OHL and foundation removal (Figure 2.1). Notwithstanding that, it is expected that there may be opportunities to adopt alternative approaches to minimise the duration of closures.
- 12.5.14 Where possible and safe to do so, to minimise disruption to PRoW users, effort will be made to limit the duration of temporary closures. In these instances, alternative approaches such as diversion routes and management of the PRoW will be discussed and agreed in consultation with Gwynedd Council PRoW officers.
- 12.5.15 Where activities affecting PRoWs are of a sufficiently short duration or where temporary access tracks follow an existing PRoW, management might include the use of contractor staff to hold PRoW users for short periods (a few minutes) while construction vehicles pass or while construction activities are undertaken.
- 12.5.16 All locations where a PRoW would be impacted by the Proposed Development would have appropriate signage, which would advise of dates and hours affected together with signs warning drivers of construction vehicles using the temporary access track of the likely presence of PRoW users crossing the temporary access track. The location of signs providing information on temporary diversions and closures would be discussed with the PRoW Officer. Where applicable; maps showing temporary diversions and alternative PRoWs would be provided at the site. Signage erected would be bilingual in Welsh and English.
- 12.5.17 Aside from these locations the Proposed Project, and associated construction traffic is not expected to interact with any other PRoW. No permanent closures or diversions are proposed as a consequence of the Proposed Project.
- 12.5.18 Mitigation relating to PRoW, including the management of on-site traffic during the construction phase, is provided in Section 12.10 of this Chapter and the OCTMP (appendix to the Outline CEMP).

Wales Coast Path & Other Recreational Routes

- 12.5.19 It is also noted that the Wales Coast Path (WCP) runs through the Study Area, approaching Minffordd from the south, following the estuary, utilising the Pont Briwet over the Dwyryd Estuary and the continuing south on the east side of the estuary⁶.
- 12.5.20 Across the Study Area, the WCP utilises segregated pedestrian infrastructure, namely footways alongside the carriageway. Consequently, site construction traffic would not directly interact with users of the WCP.
- 12.5.21 It is also noted that a number of other recreational long-distance walking routes are located within the Study Area, including Snowdonia Way, Taith Ardudwy Way, O Fon I Fynwy, Mawddach-Ardudwy Trail, and Meirionydd Coast Walk.

⁶ <https://www.walescoastpath.gov.uk/plan-your-visit/interactive-coast-path-map/?lang=en>

- 12.5.22 These walking routes are presented on Figure 13.3, Socio-Economic and Tourism Chapter 13.
- 12.5.23 The presence of the WCP or other long-distance walking routes along links will inform the link values presented later in this chapter and the impacts and potential environmental effects on users of the WCP is assessed.
- 12.5.24 Where these routes are located along existing PRow closures would be required as described in the chapter above or, where possible, managed to minimise disruption and inconvenience to tourists and the local community. Local walking groups and other relevant stakeholders would be informed of any planned closures or diversion and signage would be located along the routes in advance of any nearby works, closures, or diversions to ensure that any changes are communicated well in advance.

Cycle Routes

- 12.5.25 Figure 12.6 presents the National and Local Cycle Network within the Study Area; comprised of National Cycle Route 8 (NCR8) and NCR82.
- 12.5.26 NCR8 is located along a number of links within the Study Area. The route is comprised of sections of shared routes and section where cyclists and vehicular traffic are segregated. Figure 12.6 distinguishes between segregated and unsegregated section of each of the cycle routes within the Study Area.
- 12.5.27 Link Ref. 3 - the route to the Garth tunnel head house - is used by both cyclists and walkers. Cyclists and walkers are not segregated on this route and share the carriageway with vehicular traffic. This link is proposed to be used as an HGV route, particularly during the peak year tunnelling phase of the construction programme where it would be trafficked by HGVs transporting spoil away from the drive site. Baseline levels of HGVs are currently very low, and the Proposed Project would therefore result in a notable increase in HGVs during the tunnelling phase of the Proposed Project.
- 12.5.28 Classified Automatic Traffic Counts were undertaken over two-week periods in August 2016, in order to capture the peak local tourist period. These provided data on the number of cyclists using this route. A summary is presented in Table 12.7.

Table 12.7: ATC Cyclist Data - NCR8 (Link Ref 3)

Date	Weekday Average (Cycles)	7-Day Average (Cycles)	Daily Maximum (Cycles)	Hourly Maximum (Cycles)
August 2016	31	30	41	5

- 12.5.29 It is considered that Proposed Development traffic, particularly HGVs, can be managed alongside the existing volumes of cyclists.
- 12.5.30 NCR82 is located along the northern section of the A4085 (Link Ref. 8), adjoining NCR8 via an unclassified road to the west of the A4085. The A4085 (Link Ref. 8) is designated as an LGV route. Cyclists are not segregated from vehicular traffic on this route.
- 12.5.31 The presence of cycle routes, and quality of cycle infrastructure on them, has been used to inform the identified link values in Section 12.3 in accordance with the criteria set out in Table 12.4.

12.5.32 Mitigation is presented within Section 12.10 and the OCTMP (appendix to the Outline CEMP) but it is intended that this would include (in agreement with Gwynedd Council):

- Signage alerting cyclist to the present of HGVs along the route to the tunnel head house;
- Widening of the carriageway along NCR8 to provide passing places;
- Use of traffic marshals and radio-communication between the NCR8/ A497 junction and tunnel head house access to hold on site traffic where cyclists are using the route;
- If required, a temporary speed limit reduction would be introduced along the route; and
- HGVs used for the construction of the Proposed Project would be to the required Euro Class and could have additional cycle friendly measures such as cameras, sideguards, full length door windows, blind spot warning systems and additional mirrors (Class V and Vi).

Public Transport

Bus

12.5.33 Bus service routes within the Area of Search are classed as Connecting Bus Routes to Main Bus Routes such as Services 1, T2 1B and S97. These services provide routes to Caernarfon, Waunfawr, Penygwryd and Aberystwyth and to Rail Stations Blaenau Ffestiniog, Porthmadog and Rheilffordd Eryri Welsh Highland Railway.

Rail

12.5.34 Railway tracks cross at Minffordd, with the Cambrian Line continuing south of the 4ZC OHL towards the Dwyryd Estuary, before running north up the estuary banks, under the 4ZC OHL and following the route of Pont Briwet over the water. On the east side of the river, the railway track leaves the line of Pont Briwet once over the water at Llandecwyn station and continues south, crossing the 4ZC line again. Minffordd, Penrhyndeudraeth, and Llandecwyn railways stations are all included within the Area of Search, offering local train services between Pwllhelli to Aberystwyth and Birmingham.

Collision History

12.5.35 As described in the methodology (Section 12.2), a cluster analysis methodology has been adopted to assess the impact and environmental effect of the Proposed Project on highway safety.

12.5.36 Clusters have been identified for collisions of all severities (Slight, Serious, Fatal). Clusters are defined as locations where 3 or more collisions have been reported within 100m, in the most recent 60 months for which data is available.

12.5.37 Data has been sourced from the CrashMap⁷ database.

12.5.38 On this basis a total of 3 clusters have been identified. They are presented in Table 12.8.

⁷ <https://www.crashmap.co.uk/Search>

Table 12.8: Collision Clusters

Cluster Reference	Location	Link Reference	Fatal	Serious	Slight
1	Porthmadog High Street	13	0	3	0
2	A497 High Street	2	0	0	3
3	A487 Penrhyndeudraeth High Street A4085	6 & 8	0	2	1

12.5.39 Each of the cluster sites have experienced a total of three collisions in the most recent 60-month period for which data is available. Cluster site 1 is comprised of three serious collisions. Cluster site 2 is comprised of 3 slight collisions. Cluster site 3, which comprises collisions on the A487 and A4085 involves two serious collisions and one slight.

12.5.40 In order to understand the underlying contributory factors, and potential impact of Proposed Project traffic, the collision reports have been analysed for each cluster (Table 12.9).

Cluster Site 1: Porthmadog High Street

Table 12.9: Cluster Site 1 Summary

Collision Reference	Severity	Description
201460R062760	Serious	Moving vehicle rear end shunt with parked car.
201760V115899	Serious	Head-to-head collision between a motorcycle and moving vehicle.
201760V192726	Serious	Right turning vehicle collision with pedestrian.

12.5.41 Each of the reported collisions were serious in severity. Within the cluster, the reported collisions took place at a number of locations along the High Street. The collision reports (Appendix 12A) do not indicate any consistent contributory factor, or consistent presence of any vulnerable user group (Pedestrians, Children, Elderly, Cyclists, Motorcyclists) involved in the reported collisions.

*Cluster Site 2: A497 High Street***Table 12.10: Cluster Site 2 Summary**

Collision Reference	Severity	Description
201560S170796	Slight	Moving vehicle offside collision with wall/fence
201760V103534	Slight	Moving vehicle front on collision with road sign
201760V106338	Slight	Moving vehicle front on collision with wall/fence

- 12.5.42 Each of the reported collisions were slight in severity. The cluster occurs within a very localised section of the A497 at the bottom of a steep incline travelling westbound. It appears that each of the reported collisions involved only one vehicle and no vulnerable user groups. It is therefore considered likely that these collisions were single driver loss of control incidents.

*Cluster Site 3: A487/ A4085***Table 12.11: Cluster Site 3 Summary**

Collision Reference	Severity	Description
201660U024536	Serious	Reversing vehicle collision with pedestrian
201660U113365	Slight	Right turning vehicle to A4085 front on collision with opposing vehicle
201760V079337	Serious	Goods vehicle over 7.5t collision with pedestrian during pedestrian phase at signal-controlled junction

- 12.5.43 At cluster site 3, two of the three reported collisions were categorised as serious in severity. Collisions reference 201660U024536 occurred on the A4085 and involved a pedestrian being struck by a reversing vehicle. The other serious collision occurred on the A487, and involved an HGV colliding with a pedestrian during the pedestrian green at the TOUCAN crossing south of the A487/A4085 junction.
- 12.5.44 In summary, this section presents the baseline conditions for highway safety across the Study Area. The data presented in this section has been used to assess the impacts, and subsequent environmental effects of construction traffic associated with the Proposed Project on highway safety in Section 12.7 and Section 12.10.

12.6 Key Parameters for Appraisal

12.6.1 The following are considered to be the key parameters for the Traffic and Transport assessment:

- Baseline and Future Baseline ('peak year') HGV and LGV traffic flows for construction traffic routes;
- Forecast LGV and HGV Proposed Project peak year traffic flows;
- Construction traffic routes and access locations (embedded mitigation); and
- Value of highway links along construction traffic routes.

12.6.2 Each of these is required for the assessment and is set out in detail within this section. Further information on how these parameters were determined may be found in the methodology in Section 12.2.

Embedded Mitigation

12.6.3 Mitigation by design has been an important process in managing the potential effects of the Proposed Project. In relation to Traffic and Transport mitigation by design has included the selection and specification of access points off the public highway. Construction traffic routes have been selected to reduce, where possible, traffic effects on links that would be more sensitive to changes in traffic volumes, due to the presence of built environment indicators used by sensitive affected parties.

12.6.4 These are summarised in Table 12.16.

Table 12.16: Embedded Mitigation Summary

Embedded Mitigation Measure	Description
Access Location	Access locations have been selected to be located along routes that are suitable for the category of traffic proposed to use it.
Access Design	Accesses have been designed to accommodate the category of traffic to be served from each access. Visibility splays have been provided in accordance with TAN18 requirements and informed by speed survey data where relevant.

Embedded Mitigation Measure	Description
Construction Traffic Route Strategy	<p>Construction traffic routes have been selected to:</p> <ul style="list-style-type: none"> • To provide safe and efficient construction access for the Proposed Project; • To reduce, so far as reasonably practicable and mitigate to acceptable levels, disruption to the public; • To avoid HGV use of the A497 Porthmadog High Street; • To avoid HGV use of the northern section of the A496; • Where practical use the shortest route between the access locations and the Strategic Road Network (A487); and • So far as reasonably practicable to avoid high value receptors. <p>Furthermore, the A496 has been identified as a contingency route. This acknowledges that it is desirable to reduce HGV traffic on routes where possible (and to prioritise use of the strategic road network).</p>

Assumptions and Limitations

12.6.5 Various assumptions have been made in order to undertake the assessment of the potential environmental effects associated with the Proposed Project. Some of these assumptions have been made to add robustness to the assessment and represent a worst-case scenario. The following assumptions are used in the assessment:

- An overall link value has been applied to each link based upon the number of built environment indicators present;
- All HGV construction traffic is assumed to originate from the Strategic Road Network (A487);
- The maximum forecast daily HGV movements across the peak year are assigned to every possible HGV construction traffic route, which is highly

unlikely to occur in practice given that materials will be transported in and out of the Study Area from a number of links.

- LGV movements have been distributed based on the level of existing traffic flows from entry/exit links into the Study Area;
- The assessment considers all vehicles with a weight in excess of 3.5 tonnes as HGVs;
- LGV movements are assumed to take place across three hours (representing three shifts changeovers each day); and
- All vehicles movements quoted are assumed to be two-way; i.e. 40 movements would consist of 20 inbound and 20 outbound trips.

Baseline Traffic Flows

- 12.6.6 As set out in the methodology (Section 12.2), a future baseline has been derived using traffic survey data obtained in 2016 and 2019 and factored up to a future baseline using TEMPro growth factors.
- 12.6.7 All baseline traffic flows are presented as 24-hour AADT equivalent as per the IEMA Guidelines.
- 12.6.8 A future year of 2022 has been selected to reflect the peak calendar year of construction traffic activity. Forecast 2022 future baseline and forecast 2022 future baseline with Proposed Project (AADT) traffic flows are presented in Table 12.14 later in this chapter.

Development Traffic Assumptions

- 12.6.9 The assessment identifies an average day of vehicle movements for individual links across a peak year. This therefore represents a typical daily scenario during the peak year of construction activity and enables a realistic assessment of environmental impacts and associated effects that directly relate to an increase in traffic numbers.

Assessment of HGVs

- 12.6.10 For HGVs, Peak Year AADT traffic has been assessed for each construction traffic route in accordance with the IEMA Guidelines. In other words, the assessment considers a scenario for every possible link where all HGV traffic arrives and departs the Study Area via this construction traffic route on a given day. This ensures that worst potential impacts and subsequent environmental effects are reported.
- 12.6.11 For example, if 10 HGV movements (AADT) are forecast to take place during the peak year associated with tunnel drive at the Garth tunnel head house, the assessment considers the total AADT (10 HGV Movements) on each link along every construction traffic route, when in practice they would likely be distributed across a number of routes and links.
- 12.6.12 Whilst HGV movements are expected to be distributed evenly across a 12-hour working day, the assessment considers a 10-hour working day to add a degree of sensitivity to the assessment.

Assessment of LGVs

- 12.6.13 For LGVs, peak year AADT traffic has been assessed based on the existing proportions of traffic arriving and departing the Study Area. That proportion of traffic has then been assigned along each link along the construction traffic route from that origin/destination.
- 12.6.14 For example, if 50% of baseline traffic arrives into the Study Area from the A487 West towards Porthmadog, then 50% of LGVs would be assigned between a working location and this entry/exit point to the Study Area.
- 12.6.15 Where hourly increases in LGV traffic are reported, total daily LGV traffic has been assumed to take place across three separate hourly periods to reflect the anticipated shift patterns associated with the tunnelling element of the Proposed Project as this is the activity that generates the overwhelming majority of LGV traffic.
- 12.6.16 The volume of LGV traffic has been based on the number of employees required during the tunnelling elements and other contractor/ staff vehicle requirements including vans and other vehicles below a gross weight of 3.5T. For staff vehicles the assessment has assumed a car occupancy of 1.5. In practice, it is expected that lift sharing and the use of a shared minibus from local accommodation etc would result in an increased average car occupancy. The assessment is therefore considered to overrepresent the likely number of LGV movements occurring on links during the peak year.
- 12.6.17 Furthermore, it has been assumed that all LGVs would arrive or depart during shift handovers. However, other LGV movements would occur that are not associated with staff shift patterns. Consequently, assessed hourly increases in LGVs are higher than could be expected in practice.
- 12.6.18 Further information on the derivation and assignment of development traffic may be found in the methodology (Section 12.2).

Value of Highways Links for Assessment

- 12.6.19 Table 12.12 provides a summary of the review of built environment indicators located along each link justifying the assumed link value taken forward for assessment in Section 12.10.

Table 12.12: Value of Highway Links

Link Ref.	Link	Link Value	Built Environment Indicators
1	Porthmadog Bypass	Very Low	Minimal Built Environment Indicators
2	Minffordd Roundabout to NCR8	Medium	Footways, Residential Dwellings with Frontage onto a Construction Traffic Route
3	Between A497 and Existing Garth SEC Compound	Medium	NCR8 and Cemetery present along link
4	Britannia Terrace	Low	Minimal Built Environment Indicators – segregated cycle route
5	Between Minffordd Roundabout and Pont Briwet	Medium	Footways, Residential Dwellings with Frontage onto a Construction Traffic Route
6	Between Pont Briwet and Cambrian View	Medium	Footways, Residential Dwellings with Frontage onto a Construction Traffic Route
7	Between Bron Meirion Surgery and A496	Low	Minimal Built Environment Indicators
8	North of A487/ School Street Junction	Medium	Footways, Residential Dwellings with Frontage onto a Construction Traffic Route. NCR82 Present along link.
9	East of Cambrian View	Medium	Footways, Residential Dwellings with Frontage onto a Construction Traffic Route
10	Between A487 and Pont Briwet	Medium	Footways, Residential Dwellings with Frontage onto a Construction Traffic Route. NCR8 Present along link.
11a	North of Pont Briwet Junction to B9	Medium	Footways, Residential Dwellings with Frontage onto a Construction Traffic Route
11b	North of Access B9	Very Low	Minimal Built Environment Indicators
12	South of Pont Briwet Junction	Low	Minimal Built Environment Indicators
13	Porthmadog High Street	High	Footways, Residential Dwellings with Frontage onto a Construction Traffic Route
14	Unclassified Road	Medium	Footways, Residential Dwellings with Frontage onto a Construction Traffic Route

12.7 Predicted Impacts During Construction

- 12.7.1 This section considers the impacts of the Proposed Project relating to Traffic and Transport during construction.
- 12.7.2 Impacts, in Traffic and Transport terms specifically relate to the magnitude of impacts arising on each link, for each category of environmental effect, as a consequence of additional traffic on that link.
- 12.7.3 As stated previously in this chapter, the assessment contained within the Traffic and Transport chapter considers in detail the likely impacts and subsequent effects arising from construction traffic associated with the proposed project during the peak year of construction traffic activity. This is forecast to occur from June 2022 to May 2023. It is expected that the following traffic-generating activities will occur during the peak year:
- Tunnel Drive (From Garth tunnel head house);
 - Cilfor Tunnel Shaft Construction; and
 - Tunnelling Site Management.
- 12.7.4 Traffic generating activities outside the peak year (e.g. removal of the 'existing VIP subsection') are not listed above. It is anticipated that the level of construction traffic activity outside of the peak year would be significantly less than the levels assessed within this Traffic and Transport chapter.
- 12.7.5 In accordance with the methodology (Section 12.2), only the peak year is assessed within this chapter.
- 12.7.6 Consequently, and in order to ensure that the impacts outside the peak year are reported, the likely traffic impacts at these times are described below in addition to the peak year construction activities listed above.

Tunnel Head House, Sealing End Compounds and 400kV Cable (Undergrounding)

Infrastructure Western Side of the Dwyryd Estuary

- 12.7.7 It is proposed to serve the western 'Garth' construction compound via up to two new access points along NCR8 (Link Ref. 3). Visibility splays would be provided, requiring vegetation clearance, in accordance with TAN18 requirements and informed by speed survey data.
- 12.7.8 During construction, access for OHL removal would be achieved via the existing SEC access. However, access for reconfiguration of the SEC would be taken via the tunnel compound. Further detail on access locations for the construction phase is provided on Figure 12.3 and in the OCTMP (appendix to the Outline CEMP).
- 12.7.9 The following construction activities would take place at the western (Garth) construction compound:
- Site establishment and enabling works;
 - Construction of launch shaft, base slab and tunnel eye;
 - Tunnel Boring Machine (TBM) assembly and launch and tunnel drive;

- Preparation of tunnel and installation of high voltage cable;
 - Tunnel head house activities including mechanical and electric fit-out and installation of vent plant; and
 - Reconfiguration of SECs.
- 12.7.10 The main Traffic and Transport impacts associated with these activities is anticipated to be the increase of HGVs on the surrounding highway network routing to / from the Garth construction compound.
- 12.7.11 In particular, the removal of spoil by 20T tippers during the tunnel drive activity would most notably increase HGV traffic on routes to the western construction compound. As discussed previously, this is forecast to occur during the peak year of the construction programme (June 2022 to May 2023).
- 12.7.12 The impacts (i.e. HGV and LGV movements) during this period are notably higher than at any other time in the construction programme.

Infrastructure Eastern Side of the Dwyrdd Estuary

- 12.7.13 It is proposed to serve the eastern 'Cilfor' construction compound via a single, new access point on the A496 (Link Ref. 11a). Visibility splays would be provided in accordance with TAN18 requirements and informed by speed survey data. Further detail on access locations for the construction phase is provided on Figure 12.8.
- 12.7.14 The following construction activities would take place at the eastern (Cilfor) construction compound:
- Site establishment and enabling works;
 - Construction of tunnel reception shaft;
 - TBM removal from reception shaft;
 - Preparation of tunnel and installation of high voltage cable;
 - Tunnel head house activities including mechanical and electric fit-out and installation of vent plant; and
 - Construction of sealing end compound.
- 12.7.15 The main Traffic and Transport impacts associated with these activities are anticipated to be the increase of HGVs on the surrounding highway network routing to/ from the eastern construction compound during construction of the tunnel reception shaft.
- 12.7.16 This activity is forecast to occur during the peak year of construction, coinciding with movements associated with the tunnel drive generated at the Garth tunnel head house. As such the combined impact of these movements will be considered in the assessment, in line with the proposed methodology in Section 12.2.
- 12.7.17 Construction traffic associated with the new section of overhead line between the proposed sealing end compound and replacement pylon 4ZC027R is anticipated to result in impacts and subsequent effects significantly lower than those forecast during the peak year of construction. As described in Section 12.5 it is expected that these activities, and associated construction traffic would interact with Talsarnau Footpath 52.

Removal of Existing Infrastructure (VIP subsection)

- 12.7.18 The removal of the existing VIP subsection is forecast to take place in 2026, following the construction of the tunnel head houses, sealing end compounds, and 400kv underground cable.
- 12.7.19 Overhead line removal would take place across nine access locations, which would be modified to accommodate the LGV and HGV traffic required. These are presented in Figure 12.3.
- 12.7.20 Conductor removal is anticipated to be the most traffic-intensive activity associated with the removal of the existing infrastructure. This would typically involve eight low-loaders, 10 no. 20T tippers, four vans/cars and eight tractor/trailers per activity (i.e. each location).
- 12.7.21 Peak total monthly activity during the removal of overhead lines is anticipated to be around 580 HGV movements and 270 LGV movements (two-way). This is equivalent to 27 HGV and 15 LGV per working day across all working locations, respectively.
- 12.7.22 Further information on the proposed access locations and associated highway works and traffic management is provided within the OCTMP (appendix to the Outline CEMP).

Peak Year Construction Traffic Impacts

- 12.7.23 This section sets out the increase in volume of LGV and HGVs, above the forecast future baseline of traffic along all construction routes. As described in the methodology (Section 12.2), these increases are reported on a link-by-link basis to reflect the link values assigned in Table 12.12.
- 12.7.24 Table 12.13 and 12.14 present the anticipated increases in HGV and total traffic (AADT) forecast for all construction traffic routes during the peak year (June 2022 to June 2023). The subsequent assessment of effects will initially be informed by the calculated increases in traffic volumes and associated magnitude of impact.
- 12.7.25 The need for mitigation will then be assessed considering embedded mitigation, the forecast duration of effects, and other location-specific factors. This is reported in Section 12.10.

Table 12.13: Predicted Peak Year Construction Traffic Impacts

Link Reference	Highway Link	2022 Future Baseline			Project Peak Year AADT			2022 with Project (AADT)					Peak Hour 2022 Future Baseline			Peak Hour with Project (AADT)				
		Total	HGV	% HGV	LGV	HGV	Total	Total	HGV	% HGV	% increase HGV	% increase Total	Total	HGV	% HGV	Total	HGV	% HGV	% increase HGV	% increase Total
1	A487	9,653	263	3%	43	54	96	9,749	316	3%	20%	1%	1,134	34	3%	1,155	41	4%	19%	2%
2	A497	7,160	91	1%	95	46	142	7,301	138	2%	51%	2%	812	12	1%	849	18	2%	49%	5%
3	NCR8	175	1	0%	122	46	168	343	47	14%	6058%	96%	27	0	2%	73	6	9%	1393%	174%
4	A497	5,678	265	5%	26	-	26	5,704	265	5%	0%	0%	574	34	6%	583	34	6%	0%	2%
5	A487	14,787	284	2%	58	54	112	14,898	338	2%	19%	1%	1,715	35	2%	1,741	42	2%	19%	2%
6	A487	9,151	522	6%	38	54	91	9,242	575	6%	10%	1%	799	54	7%	819	60	7%	12%	2%
7	Pont Briwet	3,884	64	2%	33	54	87	3,971	118	3%	84%	2%	460	9	2%	478	15	3%	77%	4%
8	A4085	2,355	102	4%	10	-	10	2,365	102	4%	0%	0%	223	15	7%	226	15	6%	0%	1%
9	A487	7,889	595	8%	32	54	86	7,975	649	8%	9%	1%	767	66	9%	785	72	9%	10%	2%
10	Cambrian View	468	37	8%	4	4	8	476	41	9%	10%	2%	95	8	8%	97	8	9%	6%	2%
11a	A496N	1,359	11	1%	18	7	25	1,384	18	1%	66%	2%	149	2	1%	155	3	2%	48%	5%
11b	A496N	1,359	11	1%	5	-	5	1,364	11	1%	0%	0%	149	2	1%	150	2	1%	0%	1%
12	A496S	4,878	79	2%	20	54	73	4,951	132	3%	68%	1%	565	11	2%	579	17	3%	63%	2%
13	A497	7,181	347	5%	29	-	29	7,210	347	5%	0%	0%	693	46	7%	703	46	7%	0%	1%
14	Unclassified Road	514	7	1%	-	-	-	514	7	1%	0%	0%	51	1	3%	51	1	3%	0%	0%

Table 12.14: Magnitude of Environmental Effects

Link Reference	Link	Description	Magnitude				
			Severance	Fear and Intimidation	Pedestrian Amenity	Driver Delay	Pedestrian Delay
1	A487	Porthmadog Bypass	Low	Low	Very Low	Very Low	Very Low
2	A497	Minffordd Roundabout to NCR8	Medium	Medium	Very Low	Very Low	Very Low
3	NCR8	Between A497 and Existing Garth SEC Compound	High	High	Medium	High	Very Low
4	A497	Britannia Terrace	Very Low	Very Low	Very Low	Very Low	Very Low
5	A487	Between Minffordd Roundabout and Pont Briwet	Low	Low	Very Low	Very Low	Low
6	A487	Between Pont Briwet and Cambrian View	Low	Low	Very Low	Very Low	Very Low
7	Pont Briwet	Between Bron Meirion Surgery and A496	Medium	Medium	Very Low	Very Low	Very Low
8	A4085	North of A487/ School Street Junction	Very Low	Very Low	Very Low	Very Low	Very Low
9	A487	East of Cambrian View	Very Low	Very Low	Very Low	Very Low	Very Low
10	Cambrian View	Between A487 and Pont Briwet	Very Low	Very Low	Very Low	Very Low	Very Low
11a	A496N	North of Pont Briwet Junction to Access B9	Medium	Medium	Very Low	Very Low	Very Low
11b	A496N	North of Access B9	Very Low	Very Low	Very Low	Very Low	Very Low
12	A496S	South of Pont Briwet Junction	Medium	Medium	Very Low	Very Low	Very Low
13	A497	Porthmadog High Street	Very Low	Very Low	Very Low	Very Low	Very Low
14	Unclassified Road	Serving Maes Hendre, Adwyddu, and Maes Teg	Very Low	Very Low	Very Low	Very Low	Very Low

Collision Analysis

- 12.7.26 As stated in the methodology (Section 12.2) a different approach has been taken to assess the impact, and environmental effects, of construction traffic associated with the Proposed Project on highway safety.
- 12.7.27 A collision cluster analysis was carried out in Section 12.5 to understand baseline highway safety conditions. This section expands upon that analysis to consider the potential impact of additional traffic in this location, before assessing the likely environmental effects in Section 12.10.
- 12.7.28 Table 12.15 presents commentary regarding each cluster site and the likely impact of construction traffic in this location.

Table 12.15: Development Traffic Impact at Cluster Sites

Cluster Reference	Commentary
1	This cluster site relates to three serious collisions that have occurred along Porthmadog High Street adjacent to a number of shops. As part of the embedded mitigation, and routing strategy set out in Section 12.2, Porthmadog High Street would not be used for HGV traffic. It is expected that a modest volume of LGV traffic would use this route on their way to work areas, associated with workers staying in local accommodation in Porthmadog. The analysis in Section 12.5 did not highlight any patterns in the collision data. It is therefore considered that given the nature of the collisions, and likely additional traffic arising from the Proposed Project in this location, that there would not be an unacceptable effect on highway safety.
2	This cluster site relates to three collisions, all slight in severity, on the A497 High Street. It was noted that all occurred at the bottom of a steep incline and involved single vehicles only. The Proposed Project would result in a notable increase in traffic along this section associated with the Garth construction compound, particularly during tunnelling activities. It is therefore considered, that in order to manage speeds and to warn drivers of the increase in turning vehicles and presence of HGVs, advanced warning signage, a temporary speed limit, and high friction surfacing (if deemed necessary by the Highways Authority) will be introduced by the appointed contractor on this approach to ensure that there would be no unacceptable effect on highway safety.
3	This cluster site relates to three collisions – two serious, one slight – in the vicinity of the A487/A4085 junction. The analysis conducted in Section 12.5 did not identify any consistent trend across these accidents. It is noted that one incident involved an HGV (over 7.5T) on the A487. The Proposed Project would increase traffic on this section of the A487; however, it appears that the reported collision resulted from driver error, failing to stop for pedestrians crossing on the pedestrian green phase. Consequently, it is not considered that the Proposed Project would have an unacceptable effect here that would require further site-specific mitigation.

- 12.7.29 Table 12.14 presents the magnitude of impact for each environmental effect. This provides the 'starting point' for determining the requirement for mitigation beyond embedded mitigation.

12.8 Predicted Impacts During Operation

- 12.8.1 It is anticipated that impacts during operation, associated with inspection and maintenance activities, will be considerably less than those experienced during the construction phase of the Proposed Project.
- 12.8.2 In line with the response to the Screening and Scoping Report, a detailed assessment of the impacts of traffic during operation have been scoped out of this chapter. Notwithstanding that, to demonstrate the significantly reduced impacts in comparison to the construction phase, the likely impacts during the operational phase are set out briefly under the subheadings below.
- 12.8.3 Activities expected to occur at this time are set out within the OCTMP (appendix to the Outline CEMP).
- 12.8.4 Further information regarding the operational phase is contained within the Project Description Chapter 2.

12.9 Predicted Impacts During Decommissioning

- 12.9.1 This section discusses the predicted impacts during the decommissioning phase of the Proposed Project. It should be noted that this does not include decommissioning of the existing overhead lines, which are considered as part of the construction phase above.
- 12.9.2 Broadly speaking it is anticipated that impacts, in terms of the type and number of vehicular movements for the decommissioning of each element of the Proposed project would be less intensive than that forecast for the construction phase. This is because the removal of spoil material represents the most significant traffic generator associated with the Proposed Project. The decommissioning phase would not require the same transportation of aggregate material, which would significantly reduce the number of HGVs required.
- 12.9.3 In any case, it is expected that decommissioning of the Proposed Project would not take place for several decades. Consequently, it is considered that local conditions, particularly in relation to Traffic and Transport could be very significantly different from the conditions at present. It is therefore difficult to predict the scale and type of impacts on Traffic and Transport at that time.
- 12.9.4 A full description of decommissioning activities is provided in Project Description Chapter 2.

12.10 Mitigation and Summary of Residual Effects

12.10.1 Following the calculation of impacts presented in Table 12.14, this section considers anticipated residual environmental effects.

Proposed Mitigation

12.10.2 Proposed mitigation measures are set out in the following subheadings. As the impacts of the Proposed Project primarily relate to the impacts of additional traffic during the construction phase, these mitigation measures are the focus of this section.

12.10.3 They have been identified in conjunction with the OCTMP (appendix to the Outline CEMP) and the assessment of likely Traffic and Transport Impacts in Section 12.7 of this Chapter.

12.10.4 Notwithstanding that, and where relevant, proposed mitigation measures for the operational phase are reported. As discussed in Section 12.7, it is expected that decommissioning of the Proposed Project would not take place for several decades. Consequently, it is considered that local conditions, particularly in relation to Traffic and Transport, could be significantly different from the conditions at present. It is therefore considered to be difficult to predict the scale and type of impacts, and mitigation required, for decommissioning of the Proposed Project.

During Construction

12.10.5 Table 12.16 presents the location-specific mitigation proposed during the construction phase of the Proposed Project, to reduce impacts and potential environmental effects arising as a result of the forecast increases in traffic volumes. A full list of mitigation measures across the proposed Project are presented in Table 7.1 of the OCTMP (provided as an appendix to the Outline CEMP).

Table 12.16: Proposed Mitigation During Construction

Link Ref	Location	Justification	Location Specific Mitigation Proposed
2	A497	Severance, Fear and Intimidation, Highways Safety (Cluster Site 2).	Traffic management to be agreed with Highways Authority on the approach to the A497/NCR8 junction. This would include, if required, a temporary speed limit reduction, introduction of high-friction surfacing, and advanced warning signage.
3	NCR8	Severance, Fear and Intimidation, Pedestrian Amenity and Driver Delay	Carriageway widening along route to tunnel head house access to provide passing places/ total carriageway width of 6.0m minimum. Traffic management along route to include a temporary speed limit reduction, and advanced warning signage.

Link Ref	Location	Justification	Location Specific Mitigation Proposed
			<p>The use of traffic marshals located at tunnel head house access and A497/ NCR8 to communicate presence of walkers and cyclists or to hold release of HGVs from site compound.</p> <p>Typical HGVs used for the construction of the Proposed Project would be to the required Euro Class and could have additional cycle friendly measures such as cameras, sideguards, full length door windows, blind spot warning systems and additional mirrors (Class V and Vi).</p>
11a	A496N	Severance and Fear and Intimidation.	<p>Traffic management along route to include advanced warning signage and temporary speed reduction to 30mph from Pont Briwet /A496 junction to site access.</p> <p>Where long distance walking routes (LDWRs) and cyclists cross the link, additional signage would be located to alert drivers to the presence of crossing pedestrians and cyclists.</p>

12.10.6 The proposed mitigation measures set out in Table 12.16 above, reflects the assessment of potential impacts associated with the Proposed Project. This is based upon the methodology, and assumptions and limitations set out in Section 12.3 and 12.7 respectively.

12.10.7 It is important to note that the magnitude of impacts has been arrived at assuming worst-case traffic figures along each route during the peak year of construction activity for the Proposed Project.

12.10.8 The following sub-section assesses these other factors which would reduce the overall significance of residual environmental effects.

Summary of Residual Effects

12.10.9 When considering the residual environmental effects of the Proposed Project relating to Traffic and Transport, the following key considerations have been taken into account, as set out in Section 12.2:

- Traffic Assessment Assumptions (e.g. assignment of construction traffic, working hours, car occupancy);

- Traffic types (i.e. LGV or HGV) and volumes along link;
 - BEIs and Link Value;
 - Duration of impacts;
 - Proposed Mitigation; and
 - Other location specific evidence (e.g. traffic data, on-site observations, collision data).
- 12.10.10 Across the majority of links within the Study Area the magnitude of impacts for all environmental effects is anticipated to be 'Very Low' or 'Low'. However, there are some locations expected to see impacts with a magnitude of 'Medium' or 'High'.
- 12.10.11 Notwithstanding the above, after consideration of the magnitude of impacts set out in Table 12.14 and considering the embedded and additional mitigation presented within this section (Table 12.16) it is considered that the environmental effects associated with the Proposed Project would be maintained at acceptable levels.
- 12.10.12 Where impacts are expected to be of a medium or high magnitude for any environmental effect, and where the link has a medium or higher value, Table 12.17 provides a commentary of the anticipated impact, associated mitigation, and justification for the conclusions set out above. Where the assessment has identified existing accident clusters, the potential effect on highway safety is indicated by reference to the cluster site (For example Cluster Site 1 (CS1)).

Table 12.17: Environmental Effect Commentary

Please note the use abbreviations in Table 12.17: **S** (Severance), **F&I** (Fear and Intimidation), **PA** (Pedestrian Amenity), **DD** (Driver Delay), **PD** (Pedestrian Delay) and **HS** (Highway Safety).

VL (Very Low), **L** (Low), **M** (Medium), **H** (High) **CS** (Cluster Site)

Link Ref	Highway Link	Link Value	S	F&I	PA	DD	PD	HS	Commentary
1	A487	Very Low	L	L	VL	VL	VL	-	
2	A497	Medium	M	M	VL	VL	VL	CS2	<p>Severance/ Fear and Intimidation</p> <p>It is not anticipated that the peak year traffic levels would extend beyond a period of 17 months. During this period, average daily two-way HGV movements (AADT) are anticipated to be in the region of 46 HGVs (AADT) along this link.</p> <p>The adopted IEMA methodology relates to permanent changes in traffic and DMRB guidance advises <i>Recognition should be made that permanent impacts will be more significant than those of a temporary nature</i> the impact across the life of the proposed project would therefore be considerably lower than has been assessed. Average daily HGV movements (AADT) across the entire construction phase of the Proposed Project are approximately 18 two-way HGV movements along this link. This would represent a 'Low' impact as per the criteria set out in Table 12.4.</p> <p>Specific mitigation measures (presented in Table 12.16) are proposed along this link to minimise the effects of Severance and Fear and Intimidation as far as reasonably practicable.</p> <p>Highway Safety</p> <p>Cluster Site 1: See commentary provided in Table 12.15. Location-specific measures are proposed in this location (Table 12.16) to mitigate the potential risk to highway safety in this location.</p> <p>Conclusion</p> <p>In light of the limited duration of peak impacts and associated DMRB guidance on the consideration of duration of impacts, and proposed mitigation set out in Table 12.16 it is considered that the effects on Severance, Fear and Intimidation, and Highway Safety on this link would be acceptable.</p>
3	NCR8	Medium	H	H	M	H	VL	-	<p>Severance/ Fear and Intimidation</p> <p>The magnitude of impact is based upon very low existing baseline HGV flows along this link. As a consequence the assessment of magnitude is very sensitive to changes in HGVs. In this case, the baseline AADT is 175 vehicles and one HGV. The calculated percentage impact is therefore reported as 6058% and considered as a high impact.</p> <p>Furthermore, the link was assigned a medium value due to the presence of NCR8. However, survey data indicates that daily average cycle movements during the peak tourist period in August are modest; in the region of 30 per day (Table 12.7).</p> <p>Notwithstanding it is acknowledged that peak year traffic associated with tunnelling would represent a notable proportional increase from the baseline and it is considered that mitigation measures will be required during this phase of the Proposed Project. Mitigation measures outlined in the OCTMP and presented in Table 12.16 seek to minimise the effects of HGV traffic on vulnerable road users. The location specific mitigation measures proposed to reduce Severance and Fear and Intimidation along this link includes</p> <p>Carriageway widening, Traffic management (temporary speed limit reduction, advanced warning signage), and the use of traffic marshals located at tunnel head house access and A497/ NCR8 (to communicate presence of walkers and cyclists or to hold release of HGVs from site compound).</p> <p>Furthermore, as the adopted IEMA methodology relates to permanent changes in traffic and DMRB guidance advises <i>'recognition should be made that permanent impacts will be more significant than those of a temporary nature'</i>. It is not anticipated that the peak year traffic levels would extend beyond a period of 17 months. Average daily HGV movements (AADT) across the entire construction phase of the Proposed Project are approximately 18 two-way HGV movements. This would represent a 'Low' impact as per the criteria set out in Table 12.4. Following completion of the tunnelling phase and SEC reconfiguration, OHL removal is anticipated to reduce in significantly lower volumes of traffic.</p>

Link Ref	Highway Link	Link Value	S	F&I	PA	DD	PD	HS	Commentary
									<p>Consequently when considering the duration of peak traffic along this route, the temporary nature of the overall construction phase, and proposed mitigation measures it is considered that the effect on Severance and Fear and Intimidation would not be significant.</p> <p>Pedestrian Amenity</p> <p>The total number of vehicles anticipated in the peak year, including those generated by the proposed project, is 343 (AADT). Across 12 hours this is equivalent to approximately 30 two-way vehicular movements per hour, or one vehicle movement every two minutes.</p> <p>Mitigation measures proposed along this link include traffic management, including the use of traffic marshals, and safety equipment (e.g. specialist mirrors), and hazard warning signage are likely to reduce the effect on pedestrian amenity to a level that would not be significant. Traffic marshals would be instructed to prioritise delay to pedestrians and cyclists; holding construction traffic to allow pedestrians and cyclists to pass where appropriate.</p> <p>Driver Delay</p> <p>The actual number of vehicles including those generated by the proposed project is 343 (AADT). Across 12 hours this is equivalent to approximately 30 two-way vehicular movements per hour. This total level of traffic, even considering the low baseline of traffic on the link, is not considered likely to significantly increase journey times along the route; it is not expected that the proposed traffic would materially increase queueing or delays on the link. The impact of construction traffic is therefore not considered to have a high impact on driver delay in practice.</p> <p>Conclusion</p> <p>In light of the factors set out above and proposed mitigation set out in Table 12.16 It is considered that the effects on Severance, Fear and Intimidation, Pedestrian Amenity, and Driver Delay would be acceptable.</p>
4	A497	Low	VL	VL	VL	VL	VL	-	
5	A487	Medium	L	L	VL	VL	L	-	
6	A487	Medium	L	L	VL	VL	VL	CS3	<p>Highway Safety</p> <p>Cluster Site 3: See commentary provided in Table 12.15. No specific trend in the reported collisions clusters was identified. It is therefore considered that no likely significant impacts would occur as a consequence of additional traffic in this location. It is therefore considered that no site-specific mitigation would be required in this location.</p> <p>Conclusion</p> <p>In light of the commentary set out in Table 12.15 it is considered that the Proposed Project would not have an unacceptable effect on Highway Safety.</p>
7	Pont Briwet	Low	M	M	VL	VL	VL	-	
8	A4085	Medium	VL	VL	VL	VL	VL	CS3	See Link Ref 6 commentary.
9	A487	Medium	VL	VL	VL	VL	VL	-	
10	Cambrian View	Medium	VL	VL	VL	VL	VL	-	
11a	A496N	Medium	M	M	VL	VL	VL	-	<p>Severance/ Fear and Intimidation</p> <p>The adopted IEMA methodology relates to permanent changes in traffic and DMRB guidance advises <i>Recognition should be made that permanent impacts will be more significant than those of a temporary nature</i> the impact across the life of the proposed project would therefore be considerably lower than has been assessed.</p>

Link Ref	Highway Link	Link Value	S	F&I	PA	DD	PD	HS	Commentary
									<p>During the peak month of activity at Cilfor, it is anticipated that shaft construction activities at the Cilfor tunnel head house would result in an additional 17 two-way HGV movements (AADT). However, peak activities are forecast to be completed across a five-month programme between June 2022 and October 2022. Across the peak year, the increase in HGVs is anticipated to be 7 (AADT) as other activities at the Cilfor compound are expected to generate considerably lower volumes of daily HGV traffic movements.</p> <p>Mitigation measure are proposed to minimise the impacts of additional traffic on walkers and cyclists, which are presented in Table 12.16. In light of these factors it is considered that the residual effects on Severance and Fear and intimidation would not be significant.</p> <p>Conclusion</p> <p>In light of the factors set out above and proposed mitigation set out in Table 12.16 It is considered that the environmental effects of the Proposed Project on this link would be acceptable.</p>
11b	A496N	Very Low	VL	VL	VL	VL	VL	-	
12	A496S	Low	M	M	VL	VL	VL	-	
13	A497	High	VL	VL	VL	VL	VL	CS1	
14	Unclassified Road	Medium	VL	VL	VL	VL	VL	-	

12.11 Cumulative Effects

Inter-Projects Effects

- 12.11.1 Inter-Project Effects refers to the combined effects of the proposed project with other relevant projects. On an individual basis the effects of any one project may be insignificant; however, together (i.e. cumulatively), the combined effects of multiple projects may result in significant residual effects.
- 12.11.2 Notwithstanding the above, both Gwynedd Council and Snowdonia National Park Authority have now confirmed that there are no cumulative developments to be assessed for the Proposed Project.
- 12.11.3 Consequently, there are no cumulative, inter-project effects to consider for the Proposed Project.

Intra-Project Effects

- 12.11.4 As described within this Traffic and Transport Chapter, impacts and residual environmental effects arising from the Proposed Project have been considered using a link-based assessment. The presence of built environment indicators (Section 12.2 and Table 12.3) determined the value of each link, and the volume of additional traffic (HGV and Total Traffic) determined the impact. After consideration of these values, along with proposed mitigation measures and other location-specific factors, it was concluded that the overall effects of the Proposed Project on Traffic and Transport would be acceptable.
- 12.11.5 Highway safety was considered separately using an alternative methodology as set out in Section 12.2. However, again, consideration of the location-specific factors, nature of the collisions, and proposed mitigation led to the conclusion that the Proposed Project would not have an unacceptable highway safety effect.
- 12.11.6 Intra-Project Effects are the combined effects arising as a result of the Proposed Project, for example upon a single receptor. This section considers the potential for intra-projects effects upon shared receptors i.e. those impacted by other environmental disciplines.
- 12.11.7 As described in Section 12.10 and Table 12.17, no unacceptable environmental effects are anticipated relating for Traffic and Transport.
- 12.11.8 However, it is considered that there is a potential for intra-project cumulative effects where either:
- Impacts were reported as being higher than 'very low' for any environmental effect for Traffic and Transport in Section 12.10; or
 - the link value is 'very low' (Table 12.12).
- 12.11.9 For example, where environmental impacts or link value are very low, it has been assessed that there is no potential for an intra-project cumulative effect to arise.
- 12.11.10 Table 12.18 identifies the locations where there is potential for intra-project cumulative effects to arise. It should be noted that Highway Safety is not included as the residual effects on links across the Study Area are not considered likely to result in any intra-project cumulative effects.

Table 12.18: Potential Intra-Project Cumulative Effects

Link Ref	Value	Built Environment Indicators	Severance		Fear and Intimidation		Pedestrian Amenity		Driver Delay		Pedestrian Delay	
			Magnitude	Potential for Intra-Project Effect	Magnitude	Potential for Intra-Project Effect	Magnitude	Potential for Intra-Project Effect	Magnitude	Potential for Intra-Project Effect	Magnitude	Potential for Intra-Project Effect
1	Very Low	Minimal Built Environment Indicators	Low	No	Low	No	Very Low	No	Very Low	No	Very Low	No
2	Medium	Footways, Residential Dwellings with Frontage onto a Construction Traffic Route	Medium	Yes	Medium	Yes	Very Low	No	Very Low	No	Very Low	No
3	Medium	NCR8 and Cemetery present along link	High	Yes	High	Yes	Medium	Yes	High	Yes	Very Low	No
4	Low	Minimal Built Environment Indicators – segregated cycle route	Very Low	No	Very Low	No	Very Low	No	Very Low	No	Very Low	No
5	Medium	Footways, Residential Dwellings with Frontage onto a Construction Traffic Route	Low	Yes	Low	Yes	Very Low	No	Very Low	No	Very Low	No
6	Medium	Footways, Residential Dwellings with Frontage onto a Construction Traffic Route	Low	Yes	Low	Yes	Very Low	No	Very Low	No	Low	Yes
7	Low	Minimal Built Environment Indicators	Medium	Yes	Medium	Yes	Very Low	No	Very Low	No	Very Low	No
8	Medium	Footways, Residential Dwellings with Frontage onto a Construction Traffic Route. NCR82 Present along link.	Very Low	No	Very Low	No	Very Low	No	Very Low	No	Very Low	No
9	Medium	Footways, Residential Dwellings with Frontage onto a Construction Traffic Route	Very Low	No	Very Low	No	Very Low	No	Very Low	No	Very Low	No
10	Medium	Footways, Residential Dwellings with Frontage onto a Construction Traffic Route. NCR8 Present along link.	Very Low	No	Very Low	No	Very Low	No	Very Low	No	Very Low	No
11a	Low	Footways, Residential Dwellings with Frontage onto a Construction Traffic Route	Medium	Yes	Medium	Yes	Very Low	No	Very Low	No	Very Low	No
11b	Very Low	Minimal Built Environment Indicators	Very Low	No	Very Low	No	Very Low	No	Very Low	No	Very Low	No
12	Low	Minimal Built Environment Indicators	Medium	Yes	Medium	Yes	Very Low	No	Very Low	No	Very Low	No
13	High	Footways, Residential Dwellings with Frontage onto a Construction Traffic Route	Very Low	No	Very Low	No	Very Low	No	Very Low	No	Very Low	No
14	Medium	Footways, Residential Dwellings with Frontage onto a Construction Traffic Route	Very Low	No	Very Low	No	Very Low	No	Very Low	No	Very Low	No

Intra-Project Effects Summary

- 12.11.11 Table 12.10 reports those links where shared receptors exist that could result in intra-project cumulative effects.
- 12.11.12 These have been identified where the reported impacts associated with the Traffic and Transport assessment are considered to be above very low and/or the link value is greater than 'very low'. At these locations, any environmental disciplines with shared receptors may give rise to intra-project cumulative effects.
- 12.11.13 To summarise, these locations and effects are as follows:

Table 12.19: Intra-Project Effects Summary

Link Reference	Description	Potential for Intra-Project Effect				
		S	F&I	PA	DD	PD
2	Minffordd Roundabout to NCR8	✓	✓			
3	Between A497 and Existing Garth SEC Compound	✓	✓	✓	✓	
5	Between Minffordd Roundabout and Pont Briwet	✓	✓			
6	Between Pont Briwet and Cambrian View	✓	✓			✓
7	Between Bron Meirion Surgery and A496	✓	✓			
11a	North of Pont Briwet Junction to B9	✓	✓			
12	South of Pont Briwet Junction	✓	✓			