

17 SUMMARY AND CONCLUSIONS

17.1 General

This ES has reported on the EIA undertaken for the Scheme and has been carried out in accordance with current legislation and guidance. It has highlighted adverse and beneficial impacts associated with the Scheme under a number of environmental topic headings and also described how any adverse impacts could be avoided, mitigated or compensated.

Significant environmental effects of the Scheme are summarised at the end of each environmental topic chapter (Chapters 5 to 14) under section 4 (prior to mitigation). Some concluding remarks associated with each environmental topic are highlighted below.

Any difficulties or limitations with the assessment process have been identified within the individual environmental topic chapters.

17.2 Environmental Topics – Concluding Remarks

17.2.1 Air Quality

Current air quality in the vicinity of the Scheme is generally very good, although exceedences of the nitrogen dioxide objective levels were monitored on the existing A487 through the centre of Caernarfon. There are no Air Quality Management Areas in the study area.

The area around the Scheme is not heavily populated, therefore there is limited potential for dust nuisance during construction. However, due to the scale of the Scheme and duration of activities there would be a medium potential for dust impacts at the limited numbers of properties close to the works. Good practice measures have been proposed across all areas of the site, with enhanced measures and monitoring (visual) of dust, in the vicinity of residential properties, site access points and plant crossing points.

The overall impact of the Scheme on air quality in relation to human health would be beneficial. Pollution levels alongside the A487 through Bontnewydd and Caernarfon would be significantly reduced with the Scheme.

Elsewhere pollution levels increase in the vicinity of the Scheme, but concentrations remain well within the UK's air quality objectives. Three designated nature conservation sites lie within the study area. At the designated sites, roadside impacts range from adverse over Glynllifon SAC/SSSI, neutral over Afon Gwyrfai a Llyn Cwellyn SAC/SSSI and beneficial over Pant Cae Haidd.

17.2.2 Cultural Heritage

The Scheme would lie within an area of significant cultural heritage interest. It comprises the hinterland of Roman Segontium and the medieval and post-medieval settlement of Caernarfon. Heritage assets span late prehistory to the modern period; upstanding monuments combine with buried archaeology.

In physical terms, the Scheme would impact on a short stretch of Roman road. A Grade II-listed milestone would require relocation to protect it from damage. In addition, a geophysical survey of the route corridor reveals numerous anomalies,

some of which could relate to buried archaeology. An evaluation has been undertaken to determine the character of some of these anomalies, and thus clarified the level of impact.

At construction stage, archaeological mitigation for the physical impacts of the Scheme would be implemented through a staged programme of investigation and recording. Indirect impacts would be expected on the setting of the Caerlan Tibot Scheduled Ancient Monument (a defended enclosure) and on Grade II Listed Buildings at Bryn Eglwys, Bryn Eden and Glanrafon Fawr.

Where possible the Scheme design would incorporate measures to lessen these impacts.

17.2.3 Landscape

The Scheme would lie within an open coastal plain and would therefore be theoretically visible across a large area, although due to the scale and complexity of the landscape it would be practically imperceptible from longer distances.

The introduction of substantial embankments and cuttings contrary to the prevailing topography, and the largely rural setting, would result in some long term significant impacts on landscape character. There would also be adverse impacts on many views within the study area, although those more distant ones, such as from upland locations and from Anglesey, would be less affected.

The impact on views would be greater at closer proximity and where engineered structures would be seen. Similarly the most significantly affected properties would be those closest to the Scheme or where they are elevated to provide more open views to the Scheme.

Mitigation measures would be provided in the form of extensive broadleaf woodland and hedgerow planting, in combination with the retention and protection of existing vegetation wherever possible.

Although the assessment illustrates that these measures would be less effective for visible structures such as the Afon Gwyrfaï and Seiont viaducts, they would in general reduce the adverse visual and landscape impacts of the Scheme over time.

17.2.4 Nature Conservation

The Scheme would not be anticipated to directly impact on any designated sites on a permanent basis. There would be however, a potential effect on the Glynllifon SAC and the Meirionnydd Oakwoods and Bat Sites and Gwydir Forest Mines SAC. There would be a direct effect on a number of habitats and protected species. The majority of these are considered to be of medium or lower value, and as a result the majority of predicted impacts are slight or moderate, both during the construction and operation of the Scheme.

Habitats affected include: broadleaved woodland and scrub, hedgerows and streams. Protected species affected include: reptiles, nesting birds, bats, dormice and otters. Mitigation measures would ensure that residual impacts on most of these receptors are avoided in the short and medium term, and that residual impacts on all ecological receptors are avoided in the long term.

Compliance with protected species licences and method statements would ensure impacts to protected species and habitats are avoided or reduced during the construction phase. Long term mitigation provided by the Scheme would include: approximately 13ha replacement woodland and 23km of hedgerow planting, 30ha of grassland, otter resistant fencing and safe crossing points for otters and bats (such as large box culverts, dry pipes and culverts with raised ledges). The Scheme would also provide habitat enhancement through the planting of wild flowers along verges, cutting slopes and embankments.

17.2.5 Geology and Soils

An assessment has been made on the potential impacts on geology, geomorphology and soils arising from construction and operation of the Scheme. Whilst there are no Regionally Important Geological Sites or geological SSSIs located within the Scheme, a geological SSSI and Regionally Important Geological Site is located in close proximity. However, the proposed construction and operation would be very unlikely to impact upon this feature.

Approximately 56ha of agricultural land is likely to be affected by the Scheme. During construction works, good working practices and adoption of an environmental management plan should serve to reduce the risk of soil stripping and associated impacts.

The 2015 Ground Investigation confirmed that there is little contamination present along the Scheme.

17.2.6 Materials

The Scheme has been developed to achieve an optimal balance between earthworks activities, minimise waste generated and maximise opportunities to recycle and re-use construction waste as secondary aggregates. Good management of materials during construction would ensure waste prevention, re-use and recycling and that disposal to landfill would be minimised.

The construction of the Scheme would require a large amount of raw materials and would generate some waste. The bulk of the material requirements are for the earthworks. It is currently estimated that approximately 24,461m³ of fill material would need to be supplied from quarry sources in the local region. However, approximately 642,730m³ of fill, would be site-won and used within the Scheme. Approximately 160,010m³ of unsuitable fill material would be exported offsite to a suitable landfill in the local region.

Additional materials are required for new structures, signage, fences and barriers for the Scheme. The impact on the manufacturing process is not included in this assessment and potential impacts are limited to the delivery of the materials to the site and the associated noise and air pollution on sensitive receptors from HGVs. Overall, it is considered that the effects of the Scheme in relation to materials and waste would be no more than minor, provided the detailed design provides for natural resource efficiency and the construction management plan is efficiently implemented. Materials usage during the operation of the Scheme is not predicted to be significantly adverse.

17.2.7 Noise and Vibration

During construction, noise and vibration limits and working periods would be agreed with Gwynedd Council Planning Department. An environmental management plan would be devised specifying control and reduction measures to be employed at each section of the Scheme. With suitable mitigation, most properties would not be subjected to significant noise or vibration, and properties positioned very close to works would be carefully considered. The noisiest activities would be limited in duration.

Night-time disturbances from construction would be highly unlikely. Noise from the completed Scheme would be reduced by using a low-noise surface throughout, together with cuttings to provide screening. The further benefits of noise barriers have been assessed against environmental impacts; such as on landscape and ecology, and also the wider scheme implications of providing such mitigation.

It is considered that the negative impacts of providing noise barriers outweigh the benefits achieved therefore none are proposed as part of the Scheme. Many residential and other sensitive properties would be expected to benefit from decreases in noise and vibration, primarily due to reductions in traffic flows through the centre of Bontnewydd and within Caernarfon. Nearly 900 properties of around 6,000 assessed are expected to experience significant road traffic noise reductions at Scheme opening. The Priority Areas identified by Welsh Government for noise action planning are included in the areas likely to see significant noise reductions. With the noise mitigation built into the Scheme, around 290 properties located near to the Scheme would be expected to experience significant increases in road traffic noise at Scheme opening. However, no properties are predicted to experience noise levels from road traffic that would justify a statutory offer of noise insulation under the Noise Insulation Regulations.

17.2.8 Effects on All Travellers

The Scheme would affect a number of Public Rights of Way surrounding Caernarfon and Bontnewydd. Temporary diversions and crossing places would be provided during the construction phase for all Public Rights of Way. Long term operational connectivity would be provided via a number of overbridges, underpasses and permanent crossing places.

Once operational, the Scheme would reduce traffic along the existing A487 and from within Caernarfon, Bontnewydd and surrounding settlements. This would have a beneficial effect for residents of these settlements by reducing severance caused by road traffic between residential areas, community facilities and places of employment. With regard to vehicle travellers, in summary the landscape mitigation and Scheme earthworks would result in a generally enclosed road corridor, but with a variety of characteristics along its length.

Woodland and hedge planting would primarily be native deciduous species and therefore, in places, seasonal changes would allow filtered views to the landscape beyond. During the construction phase there would be increased driver stress levels due to congestion caused by localised traffic management, but these would only operate for short durations.

The Scheme, once operational would result in a reduction in drivers' stress levels due to reduced congestion, enhanced surface quality and reduced frustration and fear of accidents.

17.2.9 Community and Private Assets

The Scheme would affect a number of private properties and associated land, but would not result in the demolition of any buildings. No land allocated for housing or employment development under the Adopted Gwynedd Unitary Development Plan or Deposit Joint Local Development would be acquired for the Scheme. No Protected Open Space or Play Areas would be affected by the Scheme.

The following non-agricultural businesses would be affected by land loss and severance: Glan Gwna Holiday Park, Dwyfor Oils Ltd and Parciau Solar Farm. The impacts of this would be mitigated by providing financial compensation, improvement works or changes to access where applicable. Much of the land affected by the Scheme is classified as Grade 3 and 4 agricultural land, with some Grade 5 on the published provisional Agricultural Land Classification plans. Due to climatic impacts, there can be no land of better quality than Grade 2.

There would be severance to the following farm businesses: Ty-Hen Farm, Geufron Farm, Dinas Farm, Cefn Werthyd Farm, Glanrafon Bach, Tyddyn Bach, Pengelli Isaf, Crug Farm and Coed Mawr. Mitigation in the form of underpasses, over bridges and new accesses would be provided to severed farmland where physically and operationally feasible and justifiable.

17.2.10 Road Drainage and the Water Environment

17.2.11 The Scheme would be located in an area that includes surface watercourses and protected sites of a high importance, groundwater bodies and areas of identified flood risk. An assessment has been made of the potential impacts on the water environment arising from construction and operation of the Scheme. Flood Consequence and Water Framework Directive Assessments have been completed and are incorporated into this ES.

A drainage strategy has been developed for the Scheme. This identifies the design principles to manage the quantity and quality of water through the introduction of mitigation measures such as swales, drainage pipe networks, drainage ditches, culverts and attenuation/treatment ponds along the length of the Scheme. Flood modelling for the larger river crossings demonstrates that the flood consequences to the Scheme would be acceptable and the Scheme would not significantly increase flood risk elsewhere. Qualitative assessments have been completed for the remainder of the Scheme.

With mitigation, the Scheme would not be expected to lead to an increase in flooding elsewhere and flood risk to the Scheme is considered acceptable. During construction some impacts to water quality are expected through release of sediments and potential release of contaminants. The impacts would be temporary and would not have a long term effect on the water environment. The Scheme would have some impacts on water quality through culverting of smaller watercourses. The mitigation included in the Scheme design reduces these impacts. The impacts are localised and are not sufficient to affect the ability of the affected waterbodies to meet the requirements of the Water Framework Directive.

With mitigation, the effects of the Scheme on the water environment are generally negligible or slight adverse. The Scheme is considered to have significant (moderate or higher) adverse effects on the quality of a few of the watercourses due to works in or near the watercourses during construction and the effects of new culverts.

The significance of effects is generally a result of the importance of the watercourses rather than the magnitude of the effect of the Scheme.

17.3 How Project Objectives are fulfilled

The project objectives are outlined in Section 1.4.2 of this ES. Table 17.3.1 below sets out how these have been fulfilled:

The Scheme largely supports those national, regional and development planning policy outlined in Section 4 and described within the individual specialist topic chapters.

Table 17.3.1. – How project objectives have been fulfilled

Project Objective	How this is fulfilled
<p><i>Objective 1</i></p> <p>Reduce journey time (between Llanwnda and Plas Menai) and improve journey time reliability to within +/- 3 minutes of the average journey time throughout the day.</p>	<p>Reductions in average journey time between Llanwnda and Plas Menai via the bypass following its implementation in 2018 (Opening Year), when compared to travelling via the existing route are as followed:</p> <p><i>AM:</i></p> <ul style="list-style-type: none"> • (-) 180 secs (NB) • (-) 114 secs (SB) <p><i>IP:</i></p> <ul style="list-style-type: none"> • (-) 103 Secs (NB) • (-) 94 secs (SB) <p><i>PM:</i></p> <ul style="list-style-type: none"> • (-) 117 secs (NB) • (-) 212 secs (SB)
<p><i>Objective 2</i></p> <p>Reduce journey time (between Llanwnda and Caernarfon) and improve journey time reliability to within +/- 3 minutes of the average journey time throughout the day.</p>	<p>Reductions in the average journey time between Llanwnda and Caernarfon via the bypass following its implementation in 2018 (Opening Year), when compared to travelling via the existing route are as followed:</p> <p><i>AM:</i></p> <ul style="list-style-type: none"> • (-) 113 secs (NB) • (-) 53 secs (SB) <p><i>IP:</i></p> <ul style="list-style-type: none"> • (-) 48 Secs (NB) • (-) 44 secs (SB)

Project Objective	How this is fulfilled
	<p><i>PM:</i></p> <ul style="list-style-type: none"> • (-) 44 secs (NB) • (-) 123 secs (SB)
<p><i>Objective 3</i></p> <p>Reduce the number of vehicles passing through residential communities; including Llanwnda, Dinas, Bontnewydd and Caernarfon.</p>	<p>The relative reduction in the number of vehicles passing through residential communities have been calculated for Llanwnda, Bontnewydd and Caernarfon. In 2018 (Opening Year) these are:</p> <p><i>Llanwnda:</i></p> <ul style="list-style-type: none"> • (-) 71% (NB) • (-) 72% (SB) <p><i>Bontnewydd:</i></p> <ul style="list-style-type: none"> • (-) 63% (NB) • (-) 64% (SB) <p><i>Caernarfon:</i></p> <ul style="list-style-type: none"> • (-) 42% (NB) • (-) 29% (SB)
<p><i>Objective 4</i></p> <p>Scheme to contribute to the Welsh Government casualty reduction targets:</p> <ul style="list-style-type: none"> • 40% reduction by 2020; • 25% reduction in motorcyclists by 2020; and • 40% reduction in the number of young children killed or seriously injured by 2020. 	<p>Using the Cost and Benefit to Accidents – Light Touch (COBALT) computer program, the projected impact on accidents (2018-2033) would be as follows:</p> <p>Total Number of accidents</p> <p>Do Minimum (DM): 1870</p> <p>Do Something (DS): 1463</p> <p>Total accidents saved by the Scheme: 407</p> <p>Casualty summary</p> <p>Fatal (DM): 31 Slight (DM): 2319</p> <p>Fatal (DS): 25 Slight (DS): 1816</p> <p>Serious (DM): 294</p> <p>Serious (DS): 230</p> <p>Total casualties saved by Scheme</p> <p>Fatal: 6 Serious: 64 Slight: 503</p>

Project Objective	How this is fulfilled
	<p>Total accident costs</p> <p>DM: £120 197 DS: £94 400</p> <p>Accident benefit: £25 797</p>
<p><i>Objective 5</i></p> <p>Improve network resilience – Increase the amount and/or capacity of alternative routes to improve the resilience of the network.</p>	<p>The analysis of the networks statistics show that the overall delay in the 2018 and 2033 'Do Minimum' (DM) scenarios would increase compared to the base year in each peak period as a result of additional trips on the network.</p> <p>Under the 'Do Something' (DS) scenarios, with the introduction of the Scheme, the overall delay would be reduced compared to that modelled in the DM scenarios. Accordingly, the overall travel time would be reduced and the average modelled speed would be increased in the DS relative to the DM scenarios.</p> <p>Analysis of the DS scenario shows that with the introduction of the bypass, the number of trips routing through Caernarfon and Bontnewydd town centres on the existing A487 routes would be reduced.</p>