

Adran Seilwaith yr Economi
Department for Economic Infrastructure



Llywodraeth Cymru
Welsh Government

**THE LONDON TO FISHGUARD TRUNK ROAD (A40) (LLANDDEWI
VELFREY TO PENBLEWIN IMPROVEMENT AND DE-TRUNKING) ORDER
201-**

**THE LONDON TO FISHGUARD TRUNK ROAD (A40) (LLANDDEWI
VELFREY TO PENBLEWIN IMPROVEMENT) (SIDE ROADS) ORDER 201-**

**THE WELSH MINISTERS (THE LONDON TO FISHGUARD TRUNK ROAD
(A40) (LLANDDEWI VELFREY TO PENBLEWIN IMPROVEMENT))
COMPULSORY PURCHASE ORDER 201-**

PROOF OF EVIDENCE

ANDREW SUMNER CMLI

WELSH GOVERNMENT, ENVIRONMENT

DOCUMENT REFERENCE: WG 1.4.2.

Contents

1. Author	1
Links with other Proofs of Evidence	4
2. Environmental Impact Assessment process	5
Introduction	5
EIA Screening and scoping	5
Consultations	7
Design Commission for Wales	8
Description of the setting.....	8
Designated sites	10
Prevailing weather conditions	11
Environmental Surveys	11
2016 Environmental surveys.....	12
Environmental surveys from 2017 to 2019.....	12
Land taken for the purposes of mitigation	16
3. Appropriate Assessment.....	16
4. Environmental Impact Assessment by topic	16
Assessment methodologies	16
Geology and soils	16
Road drainage and water environment	20
Nature conservation	24
Landscape and views.....	24
Landscape designations	27
Landscape impact assessment.....	28
Visual impact assessment.....	29

Landscape mitigation	30
Impacts with mitigation.....	31
Community and private assets.....	38
Agricultural assessment.....	40
Air quality	41
Noise and vibration	43
All travellers	43
Materials	45
Population and human health	47
Climate Change	48
Cumulative effects	49
5. Environmental management	50
6. Preliminary design of the Scheme.....	53
Introduction	53
Scheme environmental objectives	53
Horizontal and vertical alignment.....	55
Alignment for the western length Penblewin Roundabout to Henllan Lodge (Ch. 0+00 to 1+200),	56
Penblewin Roundabout.....	57
Penblewin to Henllan Lodge (chainage 0+00 to 1+240)	57
Alignment of the central length overlapping with the existing A40: Henllan Lodge to Ffynnon Wood (Ch. 1+200 to 1+900).....	58
Henllan Lodge to Penrhiw Cottage (Chainage 1+240 to 1+610).....	58
Ffynnon Wood (Chainage 1+610 to 1+840).....	59
Ffynnon Wood to the staggered junction (Chainage 1+840 to 2+100)..	60
Alignment of eastern length of the Scheme: Ffynnon Wood to Bethel (Chainage 2+100 to 4+300)	61

Staggered junction to farm underpass (Chainage 2+100 to Ch2+635) .	61
Farm underpass (Chainage 2+635) to Ch 2+940.....	62
Large embankment (Ch 2+940 to 3+460)	63
Chainage 3+460 to Bethel roundabout (Chainage 3+780).....	65
Bethel roundabout (Chainage 3+780 to 4+000) and side roads.....	66
Bethel Roundabout to the eastern tie-in (Ch 4+000 to 4+300).....	66
Proposals for the current A40 road	67
Landscape and environmental mitigation strategy	67
Woodland and hedges	67
Proposed tree and shrub planting	68
Watercourses.....	70
Habitat and species mitigation	70
Connectivity and severance	71
Traffic noise	72
Cultural Heritage	72
7. Land taken for Essential Mitigation	72
Essential Mitigation plots.....	73
Plot 1/2d.....	73
Plots 1/2j & 1/2k	73
Plots 1/2x, 1/3a, 1/3d	74
Plots 2/2e & 2/2g.....	74
Plots 2/3b, 2/3d, 2/3f, 2/3h	74
Plots 2/8a & 2/8c.....	75
Plots 2/8g, 2/8h, Plot 2/8k & 2/9a	75
Plot 2/8g & 2/8j.....	75
Plot 2/9d.....	75
Plot 3/3d.....	75

Plot 3/2j.....	76
Plot 3/4b & 3/4e	76
Plot 3/3g & 3/3m	76
Plot 3/3y, 3/3ab, 3/6d, 3/6e	76
Additional Plot north of Plot 3/4k.....	76
Plot 3/3ae, 3/3af, 3/6j & 3/6k.....	76
Plot 3/4r.....	77
8. Objections to the Scheme	78
Woodland Trust (R0053).....	78
Loss to areas of restored Ancient Woodland sites	78
National Planning Policy	81
Loss of trees and canopy over roads	82
Effects on ground on surface water	83
Pollution from vehicles	83
Root protection during construction	86
Natural Resources Wales (Ref R0046).....	87
Mr & Mrs Peett, Caermaenau Fawr, Clunderwen (R0024).....	87
Letters of Objection from Mr Cullingford (R0058) and Ms Rowlands (R0060).....	89
Letter of Objection from Sally Amoore (R0069)	91
9. Conclusion and Declaration	93
10. Appendices (Separate Volume).....	94
Appendix A - Agricultural Land and Businesses	94
Appendix B - Ffynnon Wood Ancient Woodland.....	94
Appendix C - Blaen-Pen-Troydin Wood Ancient Woodland	94

Appendix D - Cross Section at Caremaenau Fawr 94

1. Author

- 1.1 I am Andrew Sumner, a Chartered Landscape Architect with 38 years of working experience and 32 years as a full or chartered member of the Landscape Institute. I qualified in 1981 with the 4-year Diploma in Landscape Architecture (Honours Degree and Post graduate diploma equivalent).
- 1.2 Following graduation, I spent 8 years working as a landscape architect in Local Government, gaining professional membership of the Landscape Institute in 1987.
- 1.3 In 1988 I joined Richards Moorehead & Laing Ltd., as Senior Landscape Architect and since 1990 as Principal Landscape Architect.
- 1.4 My relevant highways experience includes the following projects, on which I was Project Landscape Architect (a to c below) and subsequently Environmental Coordinator (d to l below):
 - a) A5 Padog Bends Improvements (Key Stage 1 to 3) Welsh Office – 1989 to 1992;
 - b) A55 Anglesey, Llanfairpwllgwyngyll to Nant Turnpike (Key stages 1 to 5) for the Welsh Office - 1992 to 1998;
 - c) A53 Hodnet Bypass in Shropshire (Key Stages 1 to 4) for Shropshire County Council - 1993 to 1996;
 - d) A487 Penygroes Improvements (Key Stages 2 to 4) for the Welsh Office – 1990 to 1993;
 - e) A470 Blaenau Ffestiniog to Cancoed Design and Build Contract (Key Stage 6) for Welsh Government - 2006 to 2009;
 - f) A5 Ty Nant to Dinmael Rock Cutting Remediation Design and Build Contract (Key Stage 6) for North Wales Trunk Road Agency – 2006;
 - g) M4 Widening Junction 29 to 32 Early Contractor Involvement (Key Stage 1 to 6) for Welsh Government - 2005 to 2014;

- h) A487 Glandyfi Improvements Design and Build Contract (Key Stage 6) for Welsh Government – 2011 to 2013;
- i) A40 Llanddewi Velfrey to Penblewin Improvements ECI (then consultancy appointment), (Key Stages 3 and 4) Welsh Government – 2017 onwards;
- j) A40 Penblewin to Redstone Cross consultancy appointment (Key Stages 3 and 4) Welsh Government - 2019 onwards;
- k) A55 Junctions 15 and 16 Improvements Consultancy Contract (Key Stage 3 to 4) for Welsh Government - 2016 onwards;
- l) Green Corridors Initiative North Wales Trunk Road Strategy Plan for North and Mid Wales Trunk Road Agent 2018 to 2019.

1.5 I am the Environmental Coordinator for the A40 Llanddewi Velfrey to Penblewin Improvements Scheme (hereby referred to as the “Scheme”). My role involves the key tasks of:

- a) Coordinating activities of environmental specialists in design of the Scheme and the identification of environmental mitigation or avoidance measures;
- b) Coordinating the production of the Environmental Statement (ES);
- c) Coordinating meetings, consultations and liaison on environmental aspects of the Scheme;
- d) Working towards achieving the environmental Project Objectives and compliance with environmental quality standards.

1.6 My Proof of Evidence provides an overview of the environmental aspects of the Scheme and sets out the reasons for the proposed environmental mitigation and associated requirement for the compulsory purchase of land for that purpose.

1.7 My specialist field is Landscape Architecture and I have expressed my expert opinion on this topic within my proof. However, as my role as Environmental Coordinator, I have outlined the key points that I think should be communicated except where the topics are covered by other environmental specialists who have prepared proofs of evidence.

- 1.8 The opinions expressed are my own, unless I state otherwise. I have been assisted by colleagues from within the project team in the various tasks that are reported in this document. Colleagues are also presenting evidence within their specialist environmental expertise.
- 1.9 It is not my intention to reproduce large sections of text from the ES, but simply to cross refer to, or highlight key procedural and technical matters that are pertinent to the assessment of the published Scheme. Consequently, I will refer in this Proof of Evidence to supporting material contained within the ES and the ES Supplements where relevant.
- 1.10 My Proof of Evidence covers a wide spread of environmental topics and is structured in the following manner:
- Part 2 Environmental Impact Assessment process – deals in turn with screening and scoping, environmental surveys and consultations;
 - Part 3 Appropriate Assessment
 - Part 4 Environmental Impact Assessment by topic – summarises each of the key environmental topics reported in the Environmental Statement. This was based on the designed Scheme taking into consideration all the proposed mitigation described in Section 4. Where a topic is covered in detail by the proof of evidence of another specialist, I provide a cross reference to the relevant proof;
 - Part 5 Environmental management – explains the role of environmental management in the further development of the project through construction, aftercare and handover;
 - Part 6 Preliminary design of the Scheme – environmental objectives, environmental considerations in development of the route, design of landscape and environmental mitigation, application of the strategy to the Scheme

Part 7 Land taken for Essential Mitigation - refers to each plot and explains why mitigation is needed;

Part 8 Objections to the Scheme - provides a summary of the matters raised in the objections that are relevant to my Proof of Evidence;

Part 9 Conclusion and Declaration.

Part 10 Reference Design

Links with other Proofs of Evidence

1.11 I will rely on the following expert witnesses to cover their respective specialist fields:

- a) Philip Thiele BEng (Hons) MRes CEng MICE (Traffic and Economics) (WG 1.2)
- b) Tom Edwards MEng CEng MICE MCIHT (Engineering) (WG 1.3)
- c) Pete Wells BSc MSc MCIEEM CEnv (Ecology) (WG 1.5)
- d) David Hiller BSc MSc PhD CEng MIOA MIMMM FGS (Noise) (WG 1.6)
- e) John Davies MBE BSC MRTPI (Planning & Sustainable Development) (WG 1.7).

1.12 The proof of evidence of Tony Kernon, covering the agricultural assessment, is included in Appendix A of my evidence (WG 1.4.3).

1.13 Because landscape and ecology are interlinked topics, there will be some crossover between my proof and that of Pete Wells. However, it should be noted that Pete Wells is the ecological expert.

1.14 I have worked closely with Tom Edwards in the development of the design for the Scheme. There will also be cross referencing and cross over between my proof and that of Tom Edwards because we have worked closely together. I am not an expert in Engineering and so my

references to design apply to avoidance of environmental impacts and mitigation.

2. Environmental Impact Assessment process

Introduction

- 2.1 An Environmental Impact Assessment (EIA) has been carried out for the Scheme in accordance with EIA Directive EC2014/52/EU (Doc 4.6.34), which amended the existing 2011 Directive 2011/92/EU. In December 2017, the Harbours, Docks, Piers and Ferries Environmental Protection - The Environmental Impact Assessment (Miscellaneous Amendments Relating to Harbours, Highways and Transport) Regulations 2017 (EIA Regulations 2017) (Doc. 4.6.35) came into force, transposing the 2014 Directive for projects under the Highways Act. These regulations changed the way Screening and Scoping are carried out and require additional topics to be considered in the scope of the EIA.

EIA Screening and scoping

- 2.2 The Regulations require that an EIA is carried out if a scheme is determined to be a 'relevant project'. A screening exercise was carried out and reported in the Notice of Determination published by Transport Wales. The Screening Report is included within the appendices to the ES Appendix 4.3 (Doc 3.04.03). The Scheme was not considered to be an Annex I project but it does fall within the scope of Annex II, because the Scheme involves highway construction or widening and the aggregate area of the temporary construction and completed works would exceed 1 hectare. The Scheme was therefore subject to Determination by the Welsh Ministers.
- 2.3 Annex II projects require a determination to be undertaken to confirm whether the project is considered likely to have a significant environmental effect. The selection criteria are set out in Annex III of the EIA Directive. The selection criteria include the characteristics of the project, its location and its potential impacts. The Welsh Ministers

determined that the proposed works, whilst not set within a sensitive location, are of more than local importance, and are anticipated to have significant adverse effects on the receiving and surrounding environment. To ensure that all environment effects are considered during the design process, a Statutory EIA has been undertaken on the proposed project.

- 2.4 The scope of the EIA was examined, and the findings set out in a Scoping Report, which is included within the ES Appendix 4.1 (Doc. 3.04.03).
- 2.5 New topics were listed in the EIA Directive EC2014/52/EU and the Harbours, Docks, Piers and Ferries Environmental Protection - The Environmental Impact Assessment (Miscellaneous Amendments Relating to Harbours, Highways and Transport) Regulations 2017 (EIA Regulations 2017). The Scoping Report considered these new topics and included those that were considered relevant.
- 2.6 The ES structure and chapters were prepared in accordance with the new DMRB Volume 11 Section 1 Introduction and Section 2 General Principles of Environmental Impact Assessment, which were published in July 2019. The environmental topics, which formed the basis for the ES chapters were based on the previous version of DMRB Volume 11 Sections. However new topics were considered subsequently to meet the scope required in the EIA Directive EC2014/52/EU. These included Population and Human Health, Climate Change, Major Accidents and Disasters and Heat and Radiation. The latter two topics were scoped-out of the ES.

2.7 The EIA process was reported in an ES which was issued to statutory consultees in a draft form and subsequently published on 31 July 2019. The ES consists of:

- Volume 1 Environmental Statement (topic chapters)
- Volume 2 Figures for Volume 1 chapters
- Volume 3 Appendices to Volume 1 including specialist reports;
Non-Technical Summary

Consultations

2.8 A Public Consultation Exhibition was held in September 2006, but consultations with SEBs commenced in February 2016. The first meeting was between Mott MacDonald and Natural Resources Wales (NRW) to: discuss the Scheme design, to agree the scope of ecological surveys and agree contact details for relevant staff within NRW. A subsequent meeting with the Welsh Government Environmental Co-ordination and Advice Team (ECAT) followed. The results of these meetings formed the basis for the 2016 ecological surveys listed in my evidence. Further meetings to discuss the results of surveys with ECAT were held on 13 September 2016 and 25 January 2017. ECAT indicated that contact with the SEBs should only be undertaken with prior agreement with ECAT.

2.9 Following the appointment of Carillion as the Early Contractor Involvement (ECI) contractor in February 2017, a programme of Environment Liaison Group (ELG) meetings was commenced in April 2017. These were attended by representatives of Arcadis and Morgan Henshaw (representing the client); Carillion, Arup and RML (contractor's team); South Wales Trunk Road Agency (SWTRA), NRW, Pembrokeshire County Council (PCC) and Cadw (the SEBs).

2.10 Further ELG meetings were held on:

- a) 23 August 2017;
- b) 27 September 2018;
- c) 29 November 2018;
- d) 18 June 2019;
- e) 3 October 2019.

2.11 Between the periodic ELG meetings, further contact between the project team and SEBs continued to address more focussed matters. The ELG were invited to assist in the development of environmental objectives and to comment on the EIA Screening and Scoping Reports, the draft Environmental Masterplans and subsequently on the draft ES. In addition to the ELG meetings, a meeting was held with NRW on 22 November 2018, when the consultation draft of the ES was published, to discuss the results of surveys and the development of mitigation proposals. A further meeting with NRW was organised in November 2019 to discuss objections raised by the NRW following the publication of draft Orders regarding mitigation for protected species.

Design Commission for Wales

2.12 A sequence of meetings with the Design Commission for Wales (DCfW) was completed with an initial design review in June 2017. The DCfW responded with a Design Review Report that same month (Doc. 4.03.10). Subsequent meetings were held in November 2018 and 12 December 2019 and Design Review Reports were provided (Doc. 4.03.11 and Doc. 4.03.12 respectively).

Description of the setting

2.13 The Scheme lies between Carmarthen (Carmarthenshire) and Haverfordwest (Pembrokeshire). The Preseli Hills lie 12km to the north and Carmarthen Bay is 10km to the south. Two kilometres to the west are the upper reaches of the Afon Cleddau, while the closest boundary of the Pembrokeshire Coast National Park (PCNP) lies 7km away to the

south-west. The setting of the existing A40 within the Pembrokeshire administrative area is shown in ES Figure 2.1. ES Figure 2.2 shows the statutory designations near the Scheme. ES Figure 2.3 shows the geographical characteristics and environmental constraints within which the Scheme is set. A series of photographs which illustrate the setting are provided in ES Figures 2.5A and 2.5B.

- 2.14 The Scheme is set in the rural, lowland agricultural setting of east Pembrokeshire with a mainly dispersed population in individual agricultural holdings and small villages. The land is rolling in character and fields are enclosed with hedges and hedge-banks with areas of woodland along watercourses and on steeper slopes. There is some arable cultivation on better soils. Wide views are possible from the Llanddewi Velfrey ridge towards more elevated locations such the Preseli Hills and the intervening ridges visible to the north.
- 2.15 The existing A40 follows a route on more elevated ground by following a series of ridges and traversing valley slope, but at Llanddewi Velfrey it follows the crest of a ridge with relatively steep slopes falling to the north and south. Here, the north slopes of the ridge are broken by several narrow steep-sided and wooded valleys containing small northwards flowing watercourses fed by a line of springs along the ridge. These watercourses eventually flow west into the Afon Cleddau SAC or south into the Afon Taf. Further west, approaching Llanddewi Velfrey from the west, the A40 passes through an area of more gently undulating farmland, close to the floor of the valley.
- 2.16 Settlements in the area are dispersed, mainly along the roads, while individual farms and houses are widely spaced and often hidden from each other and from roads by landform and vegetation. Houses coalesce into small groups along the A40. The village of Llanddewi Velfrey was originally a scattering of settlements centred around the medieval church which stands on the south-facing slope of the ridge. When the 18th century turnpike and then the current ridge-top road was made in the 19th century, the centre of settlement migrated northwards

to form a linear development, known by the name of Commercial, along both sides of the A40 at an important junction with the Llanfallteg Road. This linear settlement expanded north and south along side roads.

- 2.17 The modern village of Llanddewi Velfrey, which includes residential areas and recreational/community facilities, lies close to the existing A40. Immediately adjacent to the south side of the A40, in the centre of the study area is a triangle of land, formerly known as Cross Hands, formed between roads and occupied by a large group of mainly 20th century properties. The second group, at Commercial Cross, lies on the north side of the A40 less than 200m to the west. The third group, the old village of Llanddewi Velfrey, is scattered loosely around St David's Church and lies approximately 1km to the south of the A40.
- 2.18 Because the existing A40 follows the crest of a ridge for much of its route between Pengawse and Robeston Wathen, it passes along the tops of the catchments of numerous small watercourses. These receive water from a series of springs along the slopes of the ridge.

Designated sites

- 2.19 The Scheme would be within 10km of five Special Areas of Conservation (SAC) and one Special Protection Area (SPA), but no Ramsar Sites are present within this 10km distance. It would also be within 30km of two SACs which have been designated for bat species. My colleague Pete Wells will address nature conservation designations in his proof of evidence (WG.1.5.2).
- 2.20 The habitats along the route support populations of European Protected Species (EPS), including bats, otter, dormouse and barn owl. There are populations of badger and reptiles.
- 2.21 There are a number of Listed Buildings (LB), along the existing A40 and the surrounding countryside. In the wider setting, there are several Scheduled Ancient Monuments (SAM) dating from prehistory that are located on higher ground, for example Llanddewi Gaer Promontory Fort

which lies to the south of the Scheme. There are also a wide range of archaeological sites on the Historic Environment Record (HER) that include, for example, a number of burnt mounds of Prehistoric origin along the lower north slopes of the Llanddewi Velfrey ridge. Designated cultural heritage sites are shown in ES Figure 10.1.

2.22 Pembrokeshire Coast National Park (PCNP) is made up of several different zones around the coast and the location and extent of these is shown in ES Figure 9.4.

Prevailing weather conditions

2.23 The area receives a typical maritime climate characterised by weather that is often cloudy, wet and windy, but mild. Air quality is good and there are no Air Quality Management Areas within the setting.

2.24 The Metrological Office data indicates that weather conditions are typical for the region, with an annual rainfall of 1,038mm, with November being the wettest month of the year. Over the year the mean annual temperature is 11°C ranging from a low of 4°C and a high of 19°C. The coldest month on average is February. The prevailing winds are from the west and southwest with wind speeds averaging 12mph over the year. The windiest month is December.

2.25 Llanddewi Velfrey is identified as a Noise Action Plan Priority Area. (NAPPA) and this is considered further in the proof of evidence of my colleague David Hiller (WG 1.6.2).

Environmental Surveys

2.26 A programme of environmental surveys to support the environmental assessment has been completed for the Scheme; these commenced in 2016 and completed in 2019. In all cases, the field work was guided and supported by desk studies (mapping, aerial photography, databases, historical records) and consultations with local stakeholders and statutory consultees. NRW, PCC and Dyfed Archaeological Trust were

consulted regarding the scope, extent and method of the surveys and investigations.

2016 Environmental surveys

2.27 Mott MacDonald carried out a programme of ecology surveys over the period from February to November 2016, before the ECI contract was awarded. The surveys covered badger, bat (roost and activity), bird (including barn owl), dormouse, great crested newt, otter, water vole, reptile and vegetation. Mott MacDonald also supervised a ground investigation in 2016 which required boreholes, trial pits and onsite testing, ground water level monitoring, sampling and laboratory tests. The survey data was supplied to the contractor's team, which included Arup and RML in January 2017.

Environmental surveys from 2017 to 2019

2.28 To augment the 2016 ecology survey data, a further season of surveys was completed with the purpose of completing the ES in 2017 and 2018. Surveys included:

- a) Great crested newt eDNA sampling which provided a negative result in a pond where they were suspected at the end of 2017;
- b) Bat surveys and emergence surveys of buildings within 50m of the route, with static activity surveys to identify bat flight routes;
- c) No further dormouse, surveys were completed because the 2016 surveys confirmed the species was present at either end of the route. For EIA and mitigation purposes, it was assumed dormice were present throughout the route;
- d) No further otter surveys were completed because it was assumed the species was present;
- e) No further water vole surveys were required because the 2016 surveys were negative;
- f) No further barn owl or wintering and breeding surveys were required because 2016 surveys were sufficient;

- g) No further reptile surveys were completed because it was assumed the species was present in suitable habitat;
- h) A badger survey was carried out to confirm the location and activity of the species and setts identified in 2016;
- i) No further ground investigation was undertaken prior to the EIA because data from the 2016 surveys was deemed adequate;
- j) Surveys of water resources in 2017 included a walkover survey to identify watercourses and waterbodies and a questionnaire for landowners to identify their sources of water;
- k) Landscape and visual surveys were carried out in 2017 and early 2018 and included a visual assessment carried out from publicly accessible viewpoints, followed by verification visits. Photographic surveys were also made to record characteristic views of the landscape and to show particular viewpoints from which the road might be visible;
- l) Tree surveys were carried out in 2017 for all areas affected by the Scheme and for a further width of approximately 50m either side of the proposed centreline;
- m) Archaeology walkover surveys were completed in spring and autumn 2017 to observe the landscape setting, and views from historic assets, designated sites and sites on the HER, with a repeat visit in drier summer conditions in 2018 to observe any parch marks that might be visible;
- n) A geophysical magnetometer survey was completed in autumn 2017 covering the extent of the Scheme;
- o) Agricultural surveys included the use of farm questionnaires and meetings with affected parties during 2017 and 2018;
- p) To complete the EIA, traffic data was obtained from Welsh Government and Dyfed Powys Police in 2017. This data was sufficient for the assessment of water, air, noise and the effects on travellers;
- q) Air Quality assessments were based on the results of routine monitoring in automatic monitoring stations by Pembrokeshire and

Carmarthenshire County Councils. For the assessment, additional monitoring of NO₂ was carried out by Arup in 2017;

- r) Noise surveys to establish the baseline for assessments were carried out in 2017 at 13 locations distributed along the Scheme adjacent to residential properties;
- s) The use of Public Rights of Way, the trunk road and local roads was surveyed in May 2017 to determine the level of use by walkers, cyclists and horse-riders (WCHR).

2.29 The results of the 2016 and 2017 formed the basis for the EIA, but delays to the project between January and August 2018 (due to the liquidation of Carillion) resulted in a full survey season being missed. This meant that survey data from 2017 and before could be deemed to be out of date by the time construction starts. Welsh Government requested that the project team carry out a full suite of relevant environmental surveys in 2019. In late 2019, a further noise baseline survey was carried out at Caermaenau-fawr.

2.30 Mitigation

2.31 Mitigation measures that are integral to the design of the published Scheme are both essential and fully committed to by the Welsh Government. I define essential mitigation as measures affecting and reducing the significance of adverse effects, i.e. those measures taken into account when assigning significance in EIA terms, and that can be provided under the requirements and powers of the Highways Act 1980 (as amended) (Doc. 4.01.03). Mitigation measures and other commitments are set out in the Register of Environmental Actions and Commitments (ES Appendix 2.3) (Doc. 3.02.03).

2.32 Section 105A of the Highways Act 1980 (Doc. 4.01.03) sets out the minimum information that an ES must include as defined by Annex IV of Directive 97/11/EC. Annex IV includes, at (5) (b), '*a description of the measures envisaged in order to avoid, reduce, and, if possible, remedy significant adverse effects*' (i.e. mitigation measures).

2.33 Section 246 of the Highways Act 1980 (as amended) (Doc. 4.01.03) provides the power for a highway authority to *‘acquire land for the purpose of mitigating any adverse effect which the existence or use of a highway constructed or of land for improved by them, or proposed to be constructed or improved by them, has or will have on the surroundings of the highway’*.

2.34 HA205/08¹ describes the hierarchical approach to mitigation at paragraph 1.42. It states that *‘the iterative assessment and design processes should seek to incorporate measures to avoid or reduce the significant environmental effect following a hierarchical system, where avoidance is always the first mitigation measure to be considered:*

- a) *Avoidance: measures to prevent the effect (for example, consider alternative design options or phase the project to avoid environmentally sensitive periods).*
- b) *Reduction: measures to lessen the effect where avoidance is not possible.*
- c) *Remediation: measures to offset the effect where it is not possible to avoid or reduce a significant adverse effect.’*

2.35 A variety of words are used to mean mitigation, including avoid, reduce, prevent, remedy and offset, with the last two being used interchangeably.

2.36 Mitigation measures are designed firstly:

- a) To avoid or prevent a main or likely significant adverse effect; or
- b) To reduce a main or likely significant adverse effect; or
- c) To remedy or offset a main or likely significant adverse effect.

2.37 Whilst proposed as mitigation, some measures can result in an enhancement of the existing situation.

¹ DMRB Volume 11 Part 2 Section 5: HA205/08 – Assessment and Management of Environmental Effects

Land taken for the purposes of mitigation

2.38 Land identified in the draft Orders is required for various engineering purposes. Where possible, environmental mitigation has been provided within that permanent land take and is therefore within the Compulsory Purchase Order (CPO) as 'Title'. Some further land, required for environmental mitigation only, would be taken as 'Title Mitigation' for landscape integration, visual screening or ecological purposes.

3. Appropriate Assessment

3.1 A Statement to Inform an Appropriate Assessment (SIAA) has been prepared covering Stage 1 (Test of Likely Significant Effect) and Stage 2 (Appropriate Assessment) of the Assessment of the Implications on European Sites (AIES). The full documents are available as (Doc. 4.6.12). The process will be addressed in the proof of evidence of Pete Wells (WG 1.5.2).

4. Environmental Impact Assessment by topic

Assessment methodologies

4.1 The project team have developed the EIA in accordance with the Scoping Report contained within ES Chapter 2 Appendix (Doc. 3.02.03). The methods of assessment applied are set out in each chapter of the ES.

Geology and soils

4.2 The assessment of the environmental effects on the geology and soils of the Scheme has been carried out in accordance with the requirements of DMRB Volume 11, Section 3, Part 11, whilst the detailed assessment on the magnitude of impacts and significance criteria for effects has been undertaken using the methodology outlined in HA205/08.

4.3 Sufficient information has been available for the completion of the assessment of geology, geomorphology and contaminated land. Based

on published information presented in an Envirocheck report (which is included in ES Appendix 6.1), no significant ground hazards are present within the proposed Scheme corridor.

- 4.4 The identification of baseline conditions in relation to site geology, geomorphology and land contamination has been undertaken based on a review of available published information and information obtained during the preliminary ground investigation that was undertaken on behalf of the Welsh Government by WYG Environment Planning Transport Ltd in June 2016. The ground investigation was specified and supervised by Mott MacDonald. The ground investigation was undertaken by WYG between April and May 2016. The ground investigation information is presented in the WYG factual report 26 and is contained in ES Appendix 6.2, with the interpretation presented in the Arup Ground Investigation Report in ES Appendix 6.3 (Doc 3.06.03).
- 4.5 The bedrock underlying the proposed Scheme is classed as a Secondary B aquifer and glaciofluvial deposits comprising sands and gravels and are classed as a Secondary A aquifer. Groundwater beneath the Scheme is of 'poor' WFD status due to point source pollution from abandoned mines within the wider catchment area. There are private abstraction points in the study area.
- 4.6 The detailed review of the groundwater monitoring undertaken during the ground investigation showed that groundwater strikes were recorded in the majority of the borehole locations between 1m and 6m below ground level. It is anticipated that these seepages and springs are associated with groundwater flows through more permeable bands in the weathered bedrock and are not necessarily associated with the main groundwater body.
- 4.7 The area of the Scheme has been reviewed for the potential presence of Unexploded Ordnance (UXO) and the risk for the Scheme is low and the presence of UXO is considered to be very unlikely.

- 4.8 Potential sources of contamination identified in relation to the study area and a review of chemical testing of soils and groundwater, and ground gas monitoring indicates that no past industrial uses or petrol filling stations have been identified within the Scheme area.
- 4.9 No visual or olfactory evidence of contamination with hydrocarbons or asbestos was observed during the field works in 2016. The encountered made ground materials in the majority of the cases comprised reworked natural materials with low potential for significantly elevated levels of contaminants.
- 4.10 The assessment of the risk of pollution releases as a result of operational or construction activities and potential impacts on hydrogeology are covered in ES Chapter 7 (Road Drainage and Water Environment) (Doc 3.07.01).
- 4.11 To mitigate for the potential effects, mitigation would include best working practice during construction. Pollution control measures based on best working practices will be implemented. The management of environmental issues arising during construction (for example groundwater management during excavations, or dust generation as a result of transport of materials) will be undertaken in line with best practice outlined in the Preliminary Construction Environmental Management Plan (Pre-CEMP) presented in the ES Appendix 2.2 and as such will not have an impact on identified receptors.
- 4.12 In addition, any discharge to the watercourse will only be carried out with an appropriate environmental permit or consent from NRW or Local Flood Authority, where required, following monitoring, and if needed, treatment to ensure it is of acceptable quality.
- 4.13 The reuse of site won or import of materials to the Scheme will be managed by a verification system applied via the MCHW Series 600²,

² Manual of Central Documents for Highway Works, Volume 1 – Specification for Highway Works, Series 600 Earthworks

and only materials found suitable will be acceptable for construction works.

- 4.14 The construction of the embankments is unlikely to result in an impact on the groundwater movement, with a negligible impact on groundwater abstraction. The significance of effect of the construction of the earth embankments on the geology is considered to be neutral.
- 4.15 The construction of the cutting to depths of up to 15m is likely to remove mineral resources from within the Scheme footprint, but the effect on the mineral resources is considered to be slight adverse.
- 4.16 The construction of the cuttings may result in lowering of the groundwater level in proximity of the works. This may also lead to a reduction in water entering the catchment area of the local surface watercourses. Therefore, the construction of the cuttings may impact the quantity of water fed into springs and associated downstream watercourses. An assessment of potential impact of the three proposed cuttings on the identified surface water features and groundwater abstraction is presented in ES Chapter 7 (Road Drainage and Water Environment) (Doc. 3.07.01).
- 4.17 The Scheme would affect discrete areas of made ground, possibly associated with the existing road network, agricultural activities or historical infilled quarries or gravel pits, which could be a potential source of contamination. Potential sources of contamination such as sewage works, burial grounds or other infilled quarries are also present in the study area but are remote from the Scheme. Land contamination would have a neutral to slight adverse effect on construction works in relation to the identified human and environmental receptors. Applying best practice construction management measures would reduce the risks to the environment.

Road drainage and water environment

- 4.18 The assessment follows the guidance set out in the HD45/09³, which provides the methodology and criteria for identifying likely impacts of a proposed road on the water environment and for predicting their magnitude and the significance of the resulting effects.
- 4.19 The accuracy of the baseline condition described in the assessment is dependent upon the accuracy of information obtained from NRW. Due to the lack of flow data available for the watercourses in the study area, the flow was estimated using a method set out by the Institute of Hydrology. Based on evidence from the site walkover, it has been assumed that the existing A40 is drained via conventional gullies that discharge to local watercourses with no attenuation and no pollution control.
- 4.20 The main sources of baseline data come from the ground investigation undertaken by WYG in 2016 (Reports included in Appendix 6.2 and 6.3 of the ES - Doc. 3.06.03). As part of these investigations, three rounds of groundwater monitoring were undertaken. A desktop survey of available mapping and Envirocheck data was undertaken. A site walkover was completed by a suitably qualified geomorphologist in June 2017. A questionnaire survey of landowners identified features including private water supplies, abstractions and springs.
- 4.21 The surroundings of the Scheme include minor watercourses in the Marlais, Cleddau and Taf catchments. The Scheme broadly follows the watershed between these catchments. Whilst the road alignment would generally follow a ridgeline, there would still be five watercourse crossings. Surface water features identified within the study area are shown on ES Figure 7.1 A&B and include:

³ DMRB Volume 11 Section 3 Part 10: HD45/09 – Road Drainage and the Water Environment (November 2009)

- a) Longford Brook and several of its unnamed tributaries, which would be crossed approximately midway along the proposed route in Ffynnon Wood (Ch. 1+700 and 1+800) and Pen-troydin-fach (Ch.2+640);
- b) The Afon Daulan and a number of its unnamed tributaries. which would be crossed by the Scheme to the north of Llanddewi Velfrey, near Pentroydin-fawr (between Ch. 2+900 to 3+500);
- c) The Afon Marlais and its tributaries and catchment lie close to southern boundary of the existing route of the A40, at its closest 80m from the Scheme's western edge;
- d) Two unnamed tributaries of the Afon Taf, which would not be crossed by the Scheme, but are within 200m and 500m from the eastern boundary of the proposed route; and
- e) Springs at multiple locations. As the proposed route spans the watershed between multiple catchments, the watercourses described above arise across the study area, with the majority indicated on OS mapping as being spring-fed.

4.22 The study area includes three Water Framework Directive (WFD) river water bodies and two WFD groundwater bodies. These are shown in the ES Figure 7.5 A&B. These are:

- a) Afon Taf water body between Felin Cwrt and Gronw;
- b) Longford Brook – Headwaters to confluence with Eastern Cleddau river water body;
- c) Afon Marlais – headwaters to confluence with Afon Taf river water body;
- d) Afon Tywi, Afon Taf and Afon Gwendraeth groundwater body; and
- e) Cleddau and Pembrokeshire groundwater body.

4.23 A standalone WFD compliance assessment was completed and this is included in ES Appendix 7.1. The Cleddau and Taf are included within Special Areas of Conservation (SAC) and so water quality of both these rivers is relevant to any Appropriate Assessment of development in the surroundings.

- 4.24 Some limited areas (in the vicinity of watercourse crossings and along the proposed western section) are classified as having a low to medium surface water flood risk. A low risk of surface water flooding equates to a chance of flooding of between 1 in 1000 and 1 in 100 years, whilst a medium risk equates to a chance of between 1 in 100 and 1 in 30 years. These areas are shown on ES Figure 7.4.
- 4.25 The Western Wales Flood Risk Management Plan⁴ and PCC's Flood Risk Management Strategy⁵ do not indicate any measures to reduce flood risk in the study area. All sections of the Scheme corridor are designated as Zone A on Welsh Government's TAN15 mapping. Areas designated as Zone A are considered to be at little or no risk of fluvial or coastal/tidal flooding.
- 4.26 The design philosophy of the carriageway drainage includes a series of measures to ensure that flood risk is not increased in the vicinity of the Scheme and to ensure that soluble and suspended pollutants in carriageway runoff are reduced to acceptable levels prior to discharge to groundwater or local watercourses. Mitigation measures, are described in the paragraphs below and key features shown on the General Arrangement drawings for the Scheme which are included in ES Appendix 2.6.
- 4.27 Where possible, highway runoff would be infiltrated into the ground using attenuation/ infiltration basins. If infiltration is not possible, surface water runoff would be restricted to the 1-year return period Greenfield Runoff Rate and discharged into a local watercourse.
- 4.28 Attenuation would be provided in basins/ponds, sized to accommodate the 1 in 100- year event plus 30% to allow for climate change. This allowance has been agreed with PCC.

⁴ Western Wales Flood Risk Management Plan NRW

https://naturalresources.wales/media/675146/final_frmf_-_western-wales_pk26b82.pdf

⁵ Flood Risk Management Strategy (Pembrokeshire County Council)

https://www.pembrokeshire.gov.uk/objview.asp?object_id=6717&language=

- 4.29 Where the Scheme crosses watercourses, the flows would be maintained within their catchment through culverts designed to convey flow equivalent to the 100-year storm event plus 30% allowance for climate change. Where the catchment area draining to the cross-drainage culvert is not readily defined, the minimum culvert diameter would be 1200mm in accordance with the DMRB.
- 4.30 The carriageway drainage would consist of a three-stage treatment train of filter drains, catch-pits and attenuation basins to remove and retain soluble and suspended pollutants to ensure discharges to groundwater or local watercourses are at acceptable levels.
- 4.31 A positive drainage system would be provided for the Scheme which would ensure that there is no surface water flooding for a 1 in 5-year return period event. This design standard is in accordance with DMRB which includes an allowance for climate change. In cuttings, the surface water runoff would be drained to combined surface water/ groundwater filter drains in the verge. Water drained in areas of cutting will be discharged via deep gravity systems.
- 4.32 Cut-off ditches would intercept natural runoff and any existing land drains encountered would be intercepted and diverted to cut-off ditches. Attenuation/infiltration basins would be designed to ensure that groundwater would not impede their performance.
- 4.33 Standard good practice measures to protect water resources would be implemented during construction and would be set out in the contractor's Construction Environmental Management Plan (CEMP). ES Appendix 2.2 contains the Pre-CEMP. The measures would be based on the Guidance for Pollution Prevention (GPPs)⁶ and the Pollution Prevention Guidelines (PPG)⁷.

⁶ <https://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/>

⁷ <https://www.gov.uk/government/collections/pollution-prevention-guidance-ppg>

- 4.34 During operation of the Scheme, slight adverse impacts are anticipated to the flows of four minor streams due to localised changes in groundwater drainage at road cuttings. Slight adverse impacts are expected to these watercourses and groundwater beneath the Scheme due to the infiltration of water from the road drainage.
- 4.35 The design of culverts and the road drainage treatment system would mitigate localised impacts as far as practicable. No impacts to flood risk are expected. Overall, it is anticipated that the impacts on the water environment as a result of the construction and operation of the Scheme would not result in any significant adverse effect.

Nature conservation

- 4.36 This environmental topic is addressed in the proof of evidence of my colleague Pete Wells (WG 1.5.2). A brief summary of the conclusions of the nature conservation assessment is provided here, but this topic is considered in greater detail in ES Chapter 8 (Ecology and Nature Conservation) (Doc. 3.08.01).
- 4.37 The impacts during construction on all identified ecological receptors are not considered significant. As a result of the mitigation measures to be implemented and incorporated into the design, impacts during operation would not be significant.

Landscape and views

- 4.38 The assessment of landscape and visual effects was carried out in accordance with the methodology described within IAN 135/10 (W)⁸, which replaced guidance in DMRB⁹. IAN 135/10 (W) refers to Guidelines for Landscape and Visual Impact Assessment Third Edition (GLVIA3)¹⁰.

⁸ Interim Advice Note 135/10 (W), Landscape and Visual Effects Assessment (Wales only), Welsh Government, 2014

⁹

¹⁰ Guidelines for Landscape and Visual Impact Assessment Third Edition (GLVIA3), published by the Landscape Institute and the Institute of Environmental Management and Assessment, 2013

- 4.39 Other guidance used includes: Photography and Photomontage in Landscape and Visual Impact Assessment, Advice Note 01/11 (Landscape Institute, 2011)¹¹; Roads in Lowland Areas Design Guide (Welsh Office, 1993)¹²; Natural Resources Wales Guidance Notes on LANDMAP including GN4 LANDMAP and the Cultural Landscape (2016), and GN5 LANDMAP and the Geological Landscape (2016)¹³.
- 4.40 The gathering of baseline data commenced with a desk study review of the landscape resource and topography. The principal source is the LANDMAP data system¹⁴, a formally adopted approach for landscape assessments. The Landscape Character Assessment (Pembrokeshire Coast National Park Authority)¹⁵ was also used.
- 4.41 The visual assessment was carried out from publicly accessible viewpoints without direct access to residential properties or business premises.
- 4.42 A study area was identified using LANDMAP and refined with field visits in March and July 2017, which also allowed the identification of potentially significant effects upon the existing landscape resource as well as views and visual amenity that are likely to occur because of the Scheme.
- 4.43 Information contained within LANDMAP's five aspect layers forms the basis for the identification of those Landscape Character Areas (LCA) which are areas of distinct, consistent and recognisable character that overlap with the study area. The key characteristics of an area include: landcover and pattern, scale and appearance, human interaction and

¹¹ <https://landscapewpstorage01.blob.core.windows.net/www-landscapeinstitute-org/migrated-legacy/LIPhotographyAdviceNote01-11.pdf>

¹² Roads in Lowland Areas Design Guide (Welsh Office, 1993): currently available on: <http://bailey.persona-pi.com/Public-Inquiries/M4-Newport/C%20-%20Core%20Documents/10.%20Landscape%20and%20Visual%20Effects/10.1.2%20-%20Welsh%20Office%20-%20Roads%20in%20Lowland%20Areas%20-%20A%20Design%20Guide%201993.pdf>

¹³ LANDMAP guidance documents available from: <https://naturalresources.wales/guidance-and-advice/business-sectors/planning-and-development/evidence-to-inform-development-planning/landmap-the-welsh-landscape-baseline/?lang=en>

¹⁴ Countryside Council for Wales and maintained by Natural Resources Wales
<http://landmap-maps.naturalresources.wales/>

¹⁵ <https://www.pembrokeshirecoast.wales/default.asp?PID=249>

tranquillity, sense of place and scenic quality, seasonal interest and night time activities.

4.44 The Landscape and Visual Impact Assessment (LVIA) required further field work during 2017. Field work was carried out:

- a) When deciduous trees and plants were leafless during March 2017;
- b) When the vegetation was in full leaf during July 2017;
- c) Further site visits were made to review specific receptor impacts and to take winter photographic records from key viewpoints.

4.45 A survey of trees along the route was undertaken in July 2017. This provided the location, size, canopy spread and initial assessment of condition for individual trees and groups along the route. The survey results are included in ES Appendix 9.3 (Doc. 3.09.03).

4.46 Thirteen representative and publicly accessible viewpoints were selected to assess the effect of the Scheme on LCAs from a range of directions and distances. The results of the assessments of effects from these viewpoints is important to the landscape assessment as well as to the assessment of overall visual effect.

4.47 To assess the change in view from locations without public access, or from specific dwellings, the terrain model was used to generate a Zone of Theoretical Visibility (ZTV) which was analysed and simple visualisations created to show areas of cut, fill and road surface. This allowed me to determine the extent to which the Scheme would be visible without intervening vegetation and structures.

Landscape designations

- 4.48 There are a range of landscape designations in the region that could be affected by the Scheme. These include Pembrokeshire Coast National Park (PCNP). The Daugleddau Estuary section of the National Park is more than 5km west of Penblewin Roundabout at its nearest point in Canaston. The ZTV intersects a very small section to the north and west of the Eastern Cleddau where the A40 marks the boundary of the National Park and an area of Picton Park and Slebech Park. A significant amount of woodland and hedgerows with trees interrupts eastward views. There would be no view of the proposal from the Cleddau Estuary section of the National Park.
- 4.49 The Preseli Hills Section of the National Park is more than 10km north of the Scheme at its nearest point near Llangolman. The ZTV intersects the ridge and south facing slopes of the Preseli Hills. The Hills provide a dramatic backdrop to northward views from Llanddewi Velfrey. From the Preseli Hills, the Llanddewi Velfrey ridge is not a prominent feature of southward views. The ridge from between Templeton and Tavernspite further south is higher and is more prominent.
- 4.50 The LVIA shows that the significance of landscape effect on the two areas of the PCNP is judged as neutral.
- 4.51 There are several Parks and Gardens on the Cadw Register. The assessment shows that these sites are either outside the ZTV or are screened by intervening vegetation and landform. These include:
- a) Blackaldern Registered Park and Garden is a Grade II registered garden;
 - b) Landshipping Registered Park and Garden is a Grade II* registered garden;
 - c) Slebech Park Registered Park and Garden is a Grade II* registered park;

- d) Picton Castle Registered Park and Garden is a Grade II* registered park;
- e) Molleston Baptist Chapel Registered Park and Garden.

4.52 There are several Historic Landscapes in the study areas. These include the Milford Haven Waterway Historic Landscape, which is more than 5km due west of Penblewin Roundabout at its nearest point at Canaston Bridge. The ZTV intersects the area, but there would be no effect on this landscape designation.

4.53 Preseli Historic Landscape is located about 7km due north of the Scheme at its nearest point at Efailwen. The ZTV intersects with those upland areas that are on the southern side of the Preseli Mountain. Many of these upland areas have few trees and an open aspect with uninterrupted southward views. There are predicted to be landscape and visual effects on these. The LVIA shows that the significance of landscape effect is judged as neutral.

4.54 Taf and Tywi Estuary Historic Landscape is located more than 11km due east of Bethel Chapel. The ZTV intersects only a very small part of an area of rolling farmland east of the Afon Taf. Due to the long distance and a combination of surface features, there would be no effect on the Taf and Tywi Estuary Historic Landscape.

Landscape impact assessment

4.55 The study area includes 16 LCAs identified using LANDMAP. These range from Medium to High Quality and are considered to be susceptible and sensitive to change to varying degrees. The effects on these LCAs vary from neutral to large adverse. 14 LCAs would experience a neutral effect. Two LCAs would experience an adverse effect overall which include:

4.56 **LCA5: Templeton:** An LCA with moderate sensitivity which is influenced by the presence of the existing A40 trunk road infrastructure, as well as power distribution and settlement within the area. The LCA would be

directly affected with the western end of the Scheme passing through it.

A summary is provided below:

- a) Construction effect on landscape - large adverse;
- b) Winter of Year 1 of Operation - large adverse;
- c) Summer of Year 15 - moderate adverse.

4.57 LCA6: Mid Tâf Vale: An LCA with high sensitivity which is based on the high landscape value, scenic quality and visual relationship between the lowland valley and the Llanddewi Velfrey ridge, and the absence of main roads. A summary is provided below:

- a) Construction effect on landscape - large adverse;
- b) Winter of Year 1 of Operation - large adverse;
- c) Summer of Year 15 - moderate adverse.

Visual impact assessment

4.58 The potential effects of the Scheme upon views were assessed from each of the representative viewpoints, from: LCAs, residential properties, Public Rights of Way (PRoWs), other land with public access, schools, community facilities and business properties identified. The assessment covered day and night effects.

4.59 The results of the assessment are presented in the schedules included in the Representative Viewpoints in ES Appendix 9.4. The schedules are accompanied by a series of visual receptor location plans (ES Figures 9.7 and 9.8), which are cross referenced to the Visual Effects Schedules (included in ES Appendices 9.5 and 9.6), by means of a unique number. The predicted significance of effect for each receptor for each phase of the Scheme is shown graphically on these plans.

4.60 For the 16 LCAs, the assessment showed that adverse visual impacts were experienced in LCA 5 and 6 (Templeton and Mid Taf Vale). I have concentrated on providing the results of the assessment for these LCAs only, because all others would experience a neutral effect.

4.61 In Templeton, the assessment examined the effects on the nine viewpoints in this LCA. A summary is provided below:

- a) Construction effect, daytime - overall neutral to very large adverse visual impact on receptors;
- b) Winter of Year 1 of operation - overall large adverse significance of effect;
- c) Summer of Year 15 of operation - overall a moderate adverse significance of effect.

4.62 In Mid Taf Vale the assessment examined the effect on one viewpoint in the LCA. A summary is provided below:

- a) Construction effect, daytime - slight adverse visual impact on receptors;
- b) Winter of Year 1 of operation - overall large adverse significance of effect;
- c) Summer of Year 15 of operation - overall moderate adverse significance of effect.

Landscape mitigation

4.63 Section 5 of this evidence describes the proposed mitigation for the Scheme. ES Chapter 9 (Landscape and Visual Impact) (Doc 3.09.01) Section 7 describes the mitigation measures in more detail, and these are shown on the Environmental Masterplans in ES Appendix 2.5. Section 7 of this evidence also includes an end-to-end description of the Scheme and sets out the approach to mitigation that has been incorporated within the alignment to avoid or reduce impacts.

Impacts with mitigation

4.64 The assessment takes mitigation into account to indicate the residual effects of the Scheme on visual receptors. Table 1 below (copied from the ES Chapter 9 (Doc 3.09.01) Table 9.13), lists the total number of residential and business properties that are affected by the Scheme. Not all of these properties experience an adverse effect on views.

Table 1 Significance of Visual Effects on Dwellings and Rural Businesses

Predicted Significance of Visual Effect	Number of properties		
	Construction	Winter Year 1	Summer Year 15
Very large adverse	1	0	0
Large adverse	2	6	1
Moderate adverse	7	13	7
Slight adverse	32	29	23
Neutral	80	41	55
Slight benefit	0	29	32
Moderate benefit	0	4	4
Large benefit	0	0	0
Very large benefit	0	0	0

4.65 Of the 258 properties assessed, 120 are predicted to experience a change in view. Of these, 10 properties are predicted to experience a temporary significant adverse visual effect during construction, and 19 during winter of Year 1. Significant residual adverse visual effects are predicted for the following eight properties:

- a) Trefangor Farm (south side of the Scheme at Chainage 0+800) - planting to screen the Scheme and traffic would interrupt more distant northward views currently available from the property;

- b) Brominau (north side of the Scheme at Chainage 1+200) - the new alignment of the A40 and the new access road to Trefangor Burial Ground would bring the view of road and traffic nearer to the property;
- c) Pen-ca'rmaenau Farm (north side of the Scheme at Chainage 1+200) - would experience views of Scheme traffic in an eastward direction where the road bypasses Llanddewi Velfrey on the north-facing slopes of the ridge;
- d) Bryn Dwyrain, and Castell Dwyrain - would experience a broad view of Scheme traffic in a southward direction across the north-facing slopes of the Llanddewi Velfrey ridge;
- e) Pen-troydin-fawr (north side of the Scheme at Chainage 2+800) - would experience views of Scheme traffic in a westward direction in addition to the view of Llanfallteg Road overbridge from outdoor spaces;
- f) Castell (north side of the Scheme at Chainage 3+300) - would experience a broad view of earthworks and traffic in a south-westward direction across north facing wooded slopes of the Llanddewi Velfrey ridge. A view of part of Llanfallteg Road Overbridge would also be available;
- g) The Vestry (north side of the Scheme at Chainage 4+000) - would experience a view of the new access road to Bethel Chapel, that would also be used by other scattered dwellings and rural businesses.

4.66 Significant residual beneficial effects are predicted for four properties: 19 Maes y Dderwen, 1 to 2 Bryn Helog, and Awelfa. These currently have direct and uninterrupted views of road and traffic on the existing A40. These properties would benefit from the reduction in traffic visible and screening of Scheme road surface and traffic.

4.67 Table 2 below (copied from the ES Chapter 9 Table 9.14) lists the total number of PRoW that would be affected by the Scheme. Not all of these would experience an adverse effect on views.

Table 2 Significance of Visual Effects on Public Rights of Way

Predicted Significance of Visual Effect	Number of rights of way		
	Construction	Winter Year 1	Summer Year 15
Very large adverse	2	2	2
Large adverse	2	7	3
Moderate adverse	8	8	8
Slight adverse	8	3	4
Neutral	6	5	7
Slight benefit	0	0	0
Moderate benefit	0	1	2
Large benefit	0	0	0
Very large benefit	0	0	0

4.68 Of the 69 byways, bridleways and footways assessed, 26 are predicted to experience a change in view. Of these, 12 are predicted to experience a temporary significant adverse visual effect during construction, and 17 during winter of Year 1. Significant residual adverse visual effects are predicted for the following 13 PRoWs:

- a) Footpath SP19/31/3 (connecting A40 at Ca'rmaenau-fach to fields north of Bounty Farm) - would experience uninterrupted views of the Scheme including Trefangor Burial Ground access road from the southern end of the path;
- b) Footpath CA1/25/1 (running from the community boundary with Llanddewi Velfrey at the Afon Daulas to the road connecting the A548 at Clynderwen to Llanfallteg Road) - would experience a broad southward view of the Scheme crossing the north facing slopes of the Llanddewi Velfrey ridge;
- c) Footpath SP19/36/3 (connecting the access road to Trefangor Burial Ground to Pen-ca'rmaenau Farm) - would experience views

of Scheme traffic in an eastward direction where the road bypasses Llanddewi Velfrey on the north-facing slopes of the ridge;

- d) Footpath SP/19/38/2 (connecting Pen-troydin-fach to Pen-troydin-fawr) - would experience a view of an agricultural underpass and Llanfallteg Road overbridge. The dominant feature of Pen-troydin-fach embankment would interrupt southward views and traffic in Pen-troydin-fawr cutting would be visible;
- e) Footpath SP/19/1/1 and 19/1/2 (connects the A40 in Llanddewi Velfrey at Commercial Cross to Castell-fawr) - the section that would be affected runs from north of Blaen-pentroydin to south of Castell. The path would be detoured through a new underpass and would experience a view of road surface and traffic. The Pen-troydin-fawr embankment would be a dominant feature;
- f) Footpath SP 19/3/1 and 19/3/2 (connects the A40 at Glenfield to a sunken lane (footpath SP19/2)) - would be detoured through a new underpass and would experience a view of road and traffic within Bethel Cutting and on Pen-troydin-fawr embankment;
- g) Footpath SP 19/2/1 and 19/2/2 (connects the A40 at Cross Inn Cottage to the access track from Bethel Chapel to Castell-mawr follows a sunken lane) - would be detoured through a new underpass. The path would experience a view of road and traffic on Pen-troydin-fawr embankment;
- h) Footpath SP 19/4/3, 19/4/4 and 19/4/6 (connect Bethel Chapel to Castell) - the path would experience views of Llanfallteg Road overbridge, Pen-troydin-fawr cutting and embankment slopes, Bethel Cutting, Bethel Roundabout and Bethel Chapel access road.

4.69 Significant residual beneficial effects are predicted for two PRowS:

- a) PRow SP19/37/1 (connecting Ffynnon Chapel to Parc-y-delyn) - which would benefit from native species planting to screen views of the Scheme
- b) PRow SP19/17/1 (connecting the A40 near to Bethel Chapel cemetery to the Landsker Borderlands Trail in the Lampeter Vale) -

would benefit from native species planting to screen views of the Scheme and an attenuation basin/pond to add visual interest. The paths currently have direct and uninterrupted views of road and traffic on the A40 from a short section.

4.70 Proposals for monitoring the development of planting mitigation are contained in the ES and these would form a duty for the future contractor during the construction and aftercare period of the contract. The purpose of monitoring will be to identify and undertake any management interventions that are required to ensure mitigation satisfies the objectives.

4.71 Archaeology and cultural heritage

4.72 HA208/07¹⁶ splits the cultural heritage resource into three related sub-topics: Archaeological Remains, Historic Buildings, and Historic Landscape. Annex 8 of HA208/07 provides guidance on how the processes described within this section of the DMRB may need to be adapted within the devolved administrations. In addition to the above, the following Chartered Institute for Archaeologists' Standard and Guidance documents were utilised within the programme of baseline data gathering:

- a) Standard and guidance for historic environment desk-based assessment (Chartered Institute for Archaeologists, 2017);
- b) Standard and guidance for archaeological geophysical survey (Chartered Institute for Archaeologists, 2014a).

4.73 A desk-based assessment was prepared following a walkthrough survey. Full coverage of the regional HER for the main study area was acquired from the Dyfed Archaeological Trust (DAT), together with details of defined Historic LCAs. Information regarding scheduled monuments, listed buildings and Registered Parks, Gardens and Landscapes of

¹⁶ DMRB Volume 11 Section 3 Part 2: HA208/07 - Cultural Heritage

Special Historic Interest was obtained from Cadw and published sources.

- 4.74 The walkthrough survey was conducted in September 2017. Further visits to specific locations associated with the geophysical survey were made during that Autumn. Additional visits were undertaken during the dry summer of 2018 to assess the degree to which the fields were developing parchmarks and cropmarks. The degree to which designated sites could be seen from the project boundary, or views from the designated sites affected were assessed during the site visits.
- 4.75 Geophysical survey in the form of a fluxgate gradiometer survey was undertaken. The areas were selected for survey on the basis of the Scheme design and potential impact and the overall archaeological potential. The effects of land use on the magnetic survey was also considered. A report on the results of this programme of magnetometer survey is presented in ES Appendix 10.1.
- 4.76 LiDAR information contained in the Lle website (lle.gov.wales) and satellite imagery and historic aerial photographs were examined and used to provide information on earthworks and topography across the study area.
- 4.77 No intrusive archaeological investigation within the Scheme boundary has been undertaken to date. Remote sensing has identified a number of locations that potentially contain buried archaeological evidence. Some appear to be of natural or very recent origin.
- 4.78 The guidance requires two study areas: a 500m study area that includes all known assets and a 5km study area that lists designated sites. A Gazetteer of historical assets in the 500m study area is shown in ES Chapter 10 Cultural Heritage (Doc 3.10.01) Table 10.9 and detailed in ES Appendix 10.2 (Doc 3.10.03). Designated sites within a wider 5km study area are presented in ES Appendix 10.3 (Doc 3.10.03) and ES Figure 10.1 (Doc 3.10.02).

- 4.79 There are 123 cultural heritage sites within the Scheme study area. Most of the archaeological and cultural heritage assets contained within the area covered by the Scheme are from the last two hundred years, with a range of features stretching back through the medieval to the Prehistoric period.
- 4.80 The Scheme would result in physical damage (a direct major impact) on 23 non-designated heritage features, including: three cottages, a possible leat and 19 other sites identified in the geophysical survey. There would be a moderate impact on: two burnt mounds, the site of a cottage near Henllan and the line of the former Turnpike Road. Impact of a minor nature is anticipated at two assets: a cottage site and the field system that is distributed across the area.
- 4.81 A programme of archaeological evaluation is outlined in the ES Chapter 10.5 (Doc 3.10.1) and a draft mitigation plan is provided in ES Figure 10.3 (Doc 3.10.02). This includes proposals for the archaeological recording of buildings and parts of the field system which would be demolished as part of the Scheme. Depending on the results of the evaluation, there may be a requirement for mitigation recording of archaeological deposits found at these locations. The implementation of this programme of archaeological work will not result in the avoidance or reduction of the potential impacts and effects described above. It would rather serve to 'offset' the adverse nature of the effects through the provision of information which can be disseminated through appropriate media to the widest possible audience.
- 4.82 Indirect impacts would occur to several designated sites. There would be negligible adverse impacts to two Scheduled Ancient Monuments: Caerau Gaer Rath and the Roman Road East of Bryn Farm Road. Two Grade II Listed Buildings and Llanddewi Velfrey War Memorial would be affected in a positive manner as a result of traffic on the existing A40 being reduced. Ffynnon Baptist Chapel would benefit from the Scheme as traffic would be further away and a narrow strip of intervening land

being planted as a light screen. There would be a negligible effect on six other listed buildings.

Community and private assets

4.83 The assessment of effects on Community and Private Assets has been carried out in accordance with DMRB Volume 11 Section 3 Part 6 Land Use. This guidance does not specify a study area for the assessment, but references the need to establish local travel patterns and the identification of key community facilities and their catchment areas. For private assets the guidance references the need to establish the numbers of properties that would need to be demolished or from which land would be taken, including residential, commercial, industrial and other properties. The study area for community facilities must therefore, take account of the manner in which community facilities are provided in a rural setting. For these reasons, the study area includes the settlement of Llanddewi Velfrey and its hinterland, as well as the adjacent settlements of Narberth, Llanfallteg, Whitland and Clynderwen.

4.84 Consultation was held through two Public Information Exhibitions and individual meetings with owners or those responsible for community facilities and private assets potentially affected by the proposed Scheme (either directly or indirectly), in order to achieve a design that contributed to both the business and design objectives of the proposed Scheme.

4.85 Exhibitions were held in April 2017 and October 2017 in the Llanddewi Velfrey Village Hall. At the April 2017 exhibition, the initial Scheme design was presented, with areas highlighted for consideration and comment. At the October 2017 exhibition, updated designs were presented which incorporated improvements and amendments identified in the first consultation. Following publication of draft Orders, draft Orders Exhibitions were held on 15 August 2019 and 5 September 2019.

4.86 The baseline includes a range of community facilities in the village of Llanddewi Velfrey. These include St David's Church, Bethel and

Ffynnon Chapels, a fuel station, village hall, Post Office and convenience store.

- 4.87 Narberth provides a railway station, museum, castle, a range of independent shops, art galleries, boutiques, gift and antiques shops and community halls. The town contains the Castle Private School and two state primary schools. The town of Whitland, villages of Llanfallteg and Clynderwen also provide local community facilities.
- 4.88 There are no doctor's surgeries, aged people homes, libraries, leisure centres or schools in Llanddewi Velfrey, but these are available in the surrounding settlements, in particular Narberth. Hospitals are located in more major towns in the region.
- 4.89 Llanddewi Velfrey consists of approximately 150 homes with a mix of agricultural holdings. Trefangor Cottage (located at Chainage 1+070) would be demolished. There are also a small number of business premises in the village of Llanddewi Velfrey which could potentially be affected by the Scheme. These include Preseli Fuel Station and convenience store, Preseli Car Sales and Hank Marvin Fish & Chip Shop. There is a single area of allocated housing land beside Llanfallteg Road on the north side of Llanddewi Velfrey. This would lie close to the Scheme.
- 4.90 After mitigation proposed in other assessments is taken into consideration, there are several potentially positive and adverse effects of the Scheme. There would be a slight adverse effect on Preseli convenience store, Ffynnon Chapel, Hank Marvin Fish & Chip Shop and Preseli Car Sales. There would be a moderate adverse effect on Preseli Fuel Station and Bethel Chapel. There would be a slight beneficial effect on the post office facilities at Preseli convenience store, Llanddewi Velfrey playing field and play area, and Llanddewi Velfrey village hall.

- 4.91 Access to doctor surgeries, hospitals, primary schools, secondary schools, shops, aged people homes, parks, play areas or visitor attractions would not be directly affected by construction.
- 4.92 Non-motorised access to community facilities in Llanddewi Velfrey would generally be improved due to a reduction of traffic using the existing A40. An enhanced network of walking, cycling and equestrian routes with underpasses crossing the Scheme in three locations, would allow easier crossing between the north and south of Llanddewi Velfrey and the A40 corridor. There would be long-term localised benefit with increased access to facilities as a result of the Scheme.

Agricultural assessment

- 4.93 This assessment was carried out by Tony Kernon, an Agricultural Consultant, who has over 30 years' experience in the assessment of the effects of development on agricultural land and businesses. He specialises in assessing the effects of development on rural businesses, and in agricultural and rural business development and diversification. More detail of his experience, background and qualifications are set out in Kernon's proof of evidence (and the associated appendices) are contained in Appendix A of my evidence (WG 1.4.3).
- 4.94 The agricultural assessment is included in ES Chapter 12 (Community and Private Assets: Agriculture).
- 4.95 The Scheme will involve the permanent loss of approximately 27.4ha of agricultural land. The Scheme has been designed to minimise the impact on agricultural land by avoiding unnecessary severing and isolation of land parcels where possible. None of this land is of the best and most versatile agricultural quality. Overall, the loss of this land would be of minor adverse significance.
- 4.96 Seven farms would be affected by the Scheme. All will experience significant changes in day-to-day operations, but the viability and continued farmability of the holdings is not threatened. A farm

underpass will be provided for Pen-troydin-fach, while Pen-troydin-fawr will be able to use the Llanfallteg Road Overbridge to cross the Scheme. Routes will be provided to ensure continued access to farms and fields. In all cases, the effect is of minor adverse significance.

Air quality

- 4.97 A baseline assessment of air quality conditions in the vicinity of the Scheme and an assessment of the likely air quality impacts associated with the construction and operation of the Scheme have shown that existing pollutant concentrations in the study area are low, and meet air quality objectives. There are no areas where air quality is poor.
- 4.98 An NO₂ air quality monitoring survey was carried out to inform the air quality assessment for the section of the A40 between Llanddewi Velfrey and Penblewin. The monitoring survey covers the area between Redstone Cross and Bethel with seven monitoring location spread throughout the study area. The results from this monitoring survey were used in the baseline and in the model verification process. The results of the monitoring survey were processed (annualised and bias-adjusted) to allow for comparison against the annual mean NO₂ objective.
- 4.99 The monitoring shows that local air quality concentrations are well below the air quality objectives. Even at roadside locations, annual mean NO₂ concentrations are not at risk of exceeding the air quality objectives. These pollutant concentrations are considered to be representative of the Scheme area.
- 4.100 Background pollutant concentrations and vehicle emissions are predicted to improve with time. In most cases, this improvement will outweigh air quality impacts of potential future traffic growth, and therefore the worst case with regards to air quality would be the opening year 2022 of the Scheme.

- 4.101 Baseline traffic data was obtained for the year 2019. The data can be considered representative of a 2017 baseline for the air quality assessment.
- 4.102 Twenty-two receptor locations were identified throughout the study area. The annual mean background NO₂ and PM₁₀ concentrations at each receptor is very low. During construction, appropriate mitigation to control dust will result in no significant effect from the dust-generating activities. There are no designated ecological receptors sensitive to dust within 50m of the Scheme boundary, and therefore the sensitivity of the area to ecological impacts is negligible.
- 4.103 The assessment shows that there would be no exceedances of the annual mean PM₁₀ objective. For PM₁₀, the impact at the majority of receptors is predicted to be negligible, however minor beneficial impacts are predicted at two receptors in both the opening year and the design year.
- 4.104 Dust and particulate emissions related to the construction of the Scheme will be temporary for the duration of the construction period. Mitigation proposed for construction is designed so that there would be no significant effects from construction on air quality. Therefore, there will be no residual effects from construction on air quality.
- 4.105 With mitigation, the operational assessment predicted no significant effect from the Scheme on assessed receptors in the opening year (2022). There are no significant residual effects from the Scheme on air quality. The Scheme will move the main A40 traffic away from the existing road alignment. Many receptors would experience a beneficial impact as a result of the Scheme.

Noise and vibration

4.106 A brief summary of the conclusions of the noise and vibration assessment is provided here, but this topic is considered in greater detail in the ES Chapter 14 and is addressed in the evidence of David Hiller (WG 1.6.2).

4.107 Construction noise levels during the proposed works were assessed as not significant. Overall, the assessment showed that there are predicted to be significant permanent direct beneficial effects for the community of Llanddewi Velfrey, although some properties close to the proposed bypass would experience increased noise.

All travellers

4.108 I have summarised the main points of the All Travellers assessment, but details of PRowS, diversions and highways are addressed in the evidence of my colleague Tom Edwards (WG 1.3.1).

4.109 The main guidance documents for this assessment are contained in the DMRB (Doc. 4.01.61) Volume 11 and include:

- a) Section 2, Part 5, HA 205/08;
- b) Section 3, Part 8 'Pedestrians, Cyclists, Equestrians and Community Effects' (Highways Agency, 1993a);
- c) Section 3, Part 9 'Vehicle Travellers' (Highways Agency, 1993b);
- d) Interim Advice Note 125/09(W) Supplementary guidance for users of DMRB Volume 11 'Environmental Assessment' (Wales Only) (Welsh Assembly Government, 2009).

4.110 A desk-based study to identify baseline conditions has been undertaken to establish the existing provision of walking, cycling and horse-riding facilities, vehicle routes and the existing travel patterns and use of these resources. Baseline conditions have also been established by undertaking site visits and PRow condition and user surveys. These were carried out over a number of days in May and November 2017

between the hours of 0700 and 1900. The user surveys provided data on Walking, Cycling and Horse Riding (WCHR) flows and the nature of WCHR, which is set out in the WCHR Assessment Report which is provided in ES Appendix 15.1 (Doc 3.15.03).

- 4.111 In addition to the road network linking the small settlements (of Llanddewi Velfrey, Ffynnon and Penblewin), pedestrians, cyclists and equestrians have access to a network of PRowS. These predominantly comprise public footpaths and public bridleways. PRowS are mainly used for recreation.
- 4.112 There is one bus service that stops at Llanddewi Velfrey. The 322 service operates six days a week from Monday to Saturday and travels between Haverfordwest and Carmarthen.
- 4.113 The Scheme includes permanent diversions for a number of PRowS that will be affected by the proposed new section of trunk road. In addition, two new public bridleways and two new public footpaths will be created as part of the Scheme. In addition to these permanent diversions, new routes will be created and three new underpasses will provide for safe crossings of the Scheme.
- 4.114 The PRowS that will be temporarily stopped up or subject to traffic management during the construction stage are listed in ES Chapter 15 (Doc 3.15.01) Table 15.10 and shown on ES Figures 15.2A and 15.2B (Doc 3.15.02).
- 4.115 Consultation has been undertaken with PCC and the local community, in relation to these resources and measures that have been incorporated into the Scheme to minimise the impacts on them.
- 4.116 Taking into account the measures in the Scheme for the diversion of permanently affected routes and the mitigation measures proposed to provide temporary diversions for those PRowS affected during construction, no significant adverse effects on PRowS or other routes are predicted.

- 4.117 During construction, the existing A40, together with most local roads crossing the Scheme or linking to it, will remain open under traffic management, where required, except for some overnight weekend road and lane closures during works such as utility diversions and tie-in works. Llanfallteg Road will be temporarily stopped-up during construction with a temporary diversion put in place to allow for the construction of a new overbridge. This, together with the temporary impacts on PRowS used by pedestrians, will result in a construction effect on community severance i.e. some residents may be dissuaded from making trips and some trips will be made longer or less attractive. However, this effect will be temporary and for the duration of construction only.
- 4.118 The only public transport that currently operates in the vicinity of the Scheme is a bus service. The bus stops will be located on the section of bypassed existing road that will be detrunked. The bus services will need to leave the proposed A40 and travel through the village using the proposed junctions. It is envisaged that the bus services will continue to function as they do presently and therefore there will be no effects arising from the operation of the proposed new section of trunk road.
- 4.119 In operation, the Scheme would have significantly beneficial effect on vehicle travellers. Bus services would be able to function as they do presently. Taking account of mitigation measures, no significant adverse effects on PRowS or other routes are predicted.

Materials

- 4.120 The evidence of my colleague Tom Edwards (WG 1.3.2) provides details of bulk earthworks and the results of the geotechnical investigations.

- 4.121 The assessment has been conducted in accordance with the guidance set out in IAN153/11¹⁷. The IAN reflects best practice guidance and as there is no suitable Welsh equivalent guidance, it has been used to inform the proposed method of assessment. It is acknowledged that references to the National Planning Policy Framework (NPPF) set out in the IAN is not relevant in the Welsh context.
- 4.122 The assessment of material resources and generation and management of waste arisings is still a developing area; detailed guidance is therefore not yet available on some aspects of the assessment process. This limitation has been considered and IAN 153/11 has formed the basis for the assessment.
- 4.123 The sources from where material resources would be obtained for the construction of the Scheme, and their mode of transport is yet to be finalised. The quantities are estimated based on the Scheme design as described in ES Chapter 2. The quantities of the waste likely to arise are estimated. It is anticipated that the estimated quantities would not be significantly different, and therefore would not produce a greater magnitude of impact.
- 4.124 An estimated total of 370,000m³ of topsoil, superficial deposits and rock would be excavated during construction; all of which would be reused within the Scheme boundaries (where suitable for reuse) without causing unacceptable impacts on the end users and the environment. The reuse of site won excavated material would minimise the amount of raw material that would otherwise be imported to site and minimise the requirement for offsite disposal at a waste facility thus minimising traffic on public roads.
- 4.125 Carriageway construction would require the import of an estimated 50,000m³ of stone and road surfacing materials. These are not available on site, but where possible, these would be from local suppliers.

¹⁷ DMRB Interim Advice Note IAN153/11 Guidance on the Environmental Assessment of Material Resources

4.126 During operation, there would not be a significant requirement for the importation or disposal of materials other than those required for routine maintenance operations, such as resurfacing materials. The effects on materials during operation would not be significant. Overall, it is anticipated that the potential impacts on the material resources as a result of the construction and operation of the Scheme would not result in any significant adverse effect on the material resources.

Population and human health

4.127 A Health Impact Assessment (HIA) was undertaken to meet the requirements of the EIA Regulations (2017) and also the Well-being of Future Generations Act (2015) and the Equality Act 2010. The Scheme has the potential to influence the health and wellbeing of communities as a result of changes to environmental, social and economic determinants of health factors.

4.128 The Scheme is located in a rural area with low population density, and lower than average rates of ethnic and religious diversity. Pembrokeshire has an older population than the Welsh average, with higher proportions of residents in groups aged 50 and over, and smaller proportions of residents in younger age groups. This is reflected in a higher than average proportion of residents who are retired. Unemployment is low, and the workforce is relatively highly skilled, particularly in the local study area where the proportion of working-age residents with a degree-level qualification is above the national average. The largest sector for employment is public administration, education and health, and the agriculture and tourism sectors. These provide a higher proportion of employment than the Welsh average.

4.129 Health deprivation is low across the study area, with some pockets of higher deprivation. Life expectancy is above the average for Wales, and mortality rates, including from cancer, respiratory and cardiovascular diseases, are lower than average. There are higher than average levels of alcohol consumption and smoking, but lower than average mortality

rates attributable to these. The proportion of adults who are overweight or obese is slightly higher than average, although a higher than average proportion of adults meet the recommended level of physical activity. Crime is generally low, but there are more antisocial behaviour and drugs offences than in England and Wales as a whole.

4.130 The HIA did not identify any significant adverse health impacts arising from the Scheme during either the construction or operation phases. However, minor beneficial health outcomes were identified due to a reduction in residential noise and air pollutant exposure. Construction-stage employment, investment and training, and operational phase improvements to the accessibility of services and reduced journey costs are predicted to have socio-economic health and well-being benefits. The impacts on physical fitness and permeability are on balance likely to be neutral.

4.131 No specific disproportionate impact on individuals or groups based on their gender, race, ethnicity, religion, sexual orientation or sexual preference were identified.

Climate Change

4.132 The Scheme has the potential to influence the climate and so an assessment of climate change was completed. The assessment addresses the potential effects of the Scheme on Greenhouse gas (GHG) emissions; the resilience to the consequences of climate change (CCR); and the in-combination climate change impact (ICCI), which evaluates the combined effect of the proposed development and potential climate change impacts on the receiving environment during construction and operation.

4.133 The GHG assessment identified that over the whole life of the Scheme there will be an increase in emissions associated with the Scheme. Over the 60-year appraisal period, the total emissions from the construction, operation and use of the road are expected to increase by

8.4%, compared to if the Scheme was not constructed. Of this 97.6% of the increase would be due to vehicles using the road during operation. The increase in user emissions is due to an increase in average speed of vehicles and a slight increase in distance travelled due to the alignment of the roads.

4.134 The CCR and ICCI assessments did not identify any significant risks associated with climate change.

Cumulative effects

4.135 Cumulative effects are those impacting on receptors but arising from multiple sources. For example, these could arise from combined noise and visual impact from traffic. Alternatively, there could be cumulative effects arising from separate developments in the area, for example a nearby housing development.

4.136 The assessment has shown that those people living near the existing A40 trunk road or using public rights of way in the vicinity would see beneficial changes in relation to noise, air quality and visual change. Overall the cumulative impact of this is a significant beneficial effect.

4.137 A review of planning applications and permissions in the area showed that cumulative effects of the Scheme with other proposed developments could result in cumulative traffic, air quality and noise impacts if construction on more than one coincides. The impacts would be minor with a low risk of coincidence.

4.138 Summary of the EIA

4.139 The Scheme would provide an improved carriageway built to current standards with good overtaking opportunities. The volume of vehicular traffic passing through Llanddewi Velfrey is estimated to be substantially reduced, making crossing the road and walking around the village safer. Side roads and cycleways will provide local access to residential

properties, farms and fields, with safer and more attractive routes for cyclists, walkers and horse riders.

4.140 The environmental assessments determined that there would be both beneficial and adverse impacts on the local environment as a result of the Scheme. Where adverse impacts were identified, these were mitigated where feasible as part of the design. The mitigation measures were developed in collaboration with the statutory environmental bodies, landowners and other key stakeholders. The ES also considered the effects of the Scheme in combination with other proposed developments in the area and concluded that there would be no significant cumulative effects.

5. Environmental management

- 5.1 Commitments made in the Environmental Statement and in consultation with landowners, residents and consultees must be carried through to detailed design, construction and routine maintenance. Furthermore, construction and operation of the Scheme must be carried out in a manner that is compliant with environmental legislation and the conditions of any formal approvals, consents, permits and licences.
- 5.2 Potential construction effects, including surface water or sediment runoff and accidental spillages, would be mitigated by the implementation of industry best practices, which are described in the Pre-Construction Environmental Management Plan (Pre- CEMP).
- 5.3 The proposed mechanism to manage the environmental performance of the contractor during construction is the Construction Environmental Management Plan (CEMP). The CEMP is prepared to operate within the framework of the AMCP Environmental Management System and it will include a number of key components including:
- a) A Register of Environmental Actions and Commitments (REAC) including all commitments made in the Environmental Statement, in meetings and correspondence is included in ES Appendix 2.3 (Doc

3.2.03). The next draft will also include any additional commitments that might be made at this Public Local Inquiry (PLI). The REAC takes the form of a spreadsheet with columns that describe the actions and commitments. There are also columns to record the process of implementation and monitoring as required in the future.

- b) Method Statements that demonstrate a commitment to minimising environmental impacts during construction and to completing proposed environmental mitigation.
 - c) Environmental Masterplan (plans provided in the ES Appendix 2.5 - Doc 3.02.03) which define the form, extent and environmental function of all environmental components of the proposed Scheme.
 - d) Any additional documents defining mitigation that is identified during the PLI, for example the Protected Species Conservation Strategy provided in response to comments from Natural Resources Wales (included in Pete Wells' Evidence Appendix - WG 1.5.3)
 - e) A basis for monitoring and recording the Contractors environmental performance during construction.
- 5.4 The CEMP is a document that should be periodically updated to include any new commitments, design changes, staff changes, new environmental legislation or standards. So far the CEMP has been issued in an outline draft in ES Appendix 2.2 (Doc 3.02.03).
- 5.5 Following a decision by Welsh Ministers to proceed to construction, the components of the CEMP will be developed during detailed design and will be integrated within tender documents and the Design and Build Contract with the requirement for the CEMP and the ES to form a key component of the successful contractor's environmental management system.
- 5.6 When construction is complete, the updated CEMP will form the basis for the aftercare documents and handover documents.

6. Preliminary design of the Scheme

Introduction

- 6.1 In 2016 Carillion, with Arup and RML were commissioned to develop the preferred route under an Early Contractor Involvement (ECI) contract for Key Stages (KS) 3, 4 and 6. The Carillion team were required to review the Preferred Route using the Welsh Transport Appraisal Guidance (WelTAG) process stages 1 and 2. A programme of environmental surveys were commenced, building on the results of surveys carried out before 2016. Following the demise of Carillion, Arup and RML were commissioned to continue the design through KS3 and 4.
- 6.2 The environmental surveys completed before 2016 and those carried out since, have identified constraints that have influenced preliminary design and provided the basis for the Environmental Impact Assessment and for the design of environmental mitigation proposals.
- 6.3 Opportunities for beneficial measures and enhancements are also proposed where these are achievable on land contained within the Compulsory Purchase Order (CPO). Further beneficial measures are also proposed that would form part of the detrunking proposals that lie outside the limits of the CPO, but within the existing trunk road land ownership.

Scheme environmental objectives

- 6.4 We brought together the Statutory Environmental Bodies (SEB) in a series of Environmental Liaison Group (ELG) Meetings. One of the earliest tasks was to develop and agree a set of environmental objectives. I developed a draft set in discussion with the project team which were then debated at the first ELG meeting to ensure they were appropriate to the Scheme and addressed relevant policy and legislation. The SEBs were invited to update these at the subsequent ELG meetings. These environmental objectives have guided the team's design and the development of mitigation.

6.5 Our environmental objectives were set out in three sets:

- 1 Avoid or mitigate impact to:
 - i. Minimise net loss of important habitat
 - ii. Maintain of existing habitat connectivity.
 - iii. Avoid adverse impacts on biodiversity.
 - iv. Protect watercourses and water quality.
 - v. Provide effective landscape integration.
 - vi. Provide effective visual screening of the new road.
 - vii. Achieve an overall reduction in visual impact caused by through traffic.
 - viii. Provide safe carriageway crossings.
 - ix. Zero waste to landfill.
 - x. Minimise the carbon footprint.
 - xi. Protect farms and other local businesses.
 - xii. Avoid or mitigate impact on cultural heritage to provide no permanent adverse impact on historic environment assets.

- 2 Benefits of the Scheme:
 - i. Overall reduction in traffic noise for residential properties.
 - ii. Research effective soil and vegetation management as a means of reducing whole life cost of the soft estate.
 - iii. Support community life and economic viability through enhanced cohesion and destination creation.
 - iv. Improved air quality for the residents of Llanddewi Velfrey.
 - v. Habitat creation and improved habitat connectivity integrated effectively with the landscape through good design.
 - vi. Improve the impact of road drainage on water quality.
 - vii. Improve access to and enhance enjoyment of the landscape and of any visible historic assets associated with the road corridor.
 - viii. Enabling walking, cycling and healthy lifestyles.
 - ix. Support education, learning and community involvement by maximising educational opportunities based on cultural and natural heritage assets.

- x. Research effective soil and vegetation management as a means of reducing whole life cost of the soft estate.
- xi. Support community life and economic viability through enhanced cohesion and destination creation.

3 How we want to achieve it:

- i. Compliance with legislation.
- ii. Delivery of Welsh Government policy.
- iii. Work effectively together throughout the development of the project.
- iv. To offer a full and open exchange of information and views during project development to make sure that the right project for Wales is published.
- v. To work together to develop deliverable and effective environmental mitigation.

Horizontal and vertical alignment

- 6.6 Our design of the vertical and horizontal alignment takes into consideration the natural topography and other environmental constraints such as the presence of woodland, watercourses, settlement landscape and views from residential properties. Examples of the alignment being modified to minimise environmental impacts are included in my description of the Scheme.
- 6.7 Within the limits of design standards, as defined by the DMRB, we have adjusted the vertical alignment to minimise the height of embankments and use cuttings for the maximum beneficial effect on traffic noise and visual impact.
- 6.8 Our design has also optimised the cut and fill balance with the intention of minimising the need for disposal of surplus excavated material and the import of additional fill material. A near balance has been achieved with material being taken from cuttings to form embankments.
- 6.9 Small changes of the vertical and horizontal alignment reduce or avoid adverse impacts on biodiversity by avoiding direct impact on important or sensitive habitat. By adjusting the vertical alignment to make the land

take for cuttings and embankments narrower, we reduced the extent of land take. Examples of where this has been a design consideration are:

- a) in the western part of the Scheme, to the west of Ffynnon Wood, the proposed trunk road was moved away from the existing A40 to provide physical separation of the two roads and to provide a refuge for wildlife crossing from north to south. The intervening land would be planted with trees and shrubs and seeded to create species rich grassland.
- b) In the Ffynnon Wood area, the Scheme has been aligned to make the best use of the existing A40 embankment to minimise impacts on the woodland on either side. On the south side lies an area of Ancient Woodland and by careful design the area of Ancient Woodland affected has been kept to a minimum.
- c) In the eastern part of the Scheme, we modified the alignment to reduce the effect on existing Ancient Woodland located in close proximity to Blaen-Pen-Troydin.

Alignment for the western length Penblewin Roundabout to Henllan Lodge (Ch. 0+00 to 1+200),

6.10 The proposals include parallel roads passing through a gently undulating landform of hedged improved pasture with some mature hedgerow trees.

6.11 The following sections provide a description of how the baseline has been developed, against which the various environmental assessments have compared the effectiveness of environmental mitigation. I describe the Scheme starting at Penblewin in the west. Chainage references are generally given to the nearest 10m and place names given are those used in the General Arrangement drawings and the EMPs in the ES Appendix 2.5 (both found in Doc 3.02.03).

Penblewin Roundabout

6.12 At Penblewin, the proposed road would join the existing A40 at a new roundabout. This would have a larger diameter than the existing one to accommodate the Scheme. To minimise impacts on Penblewin Farm to the south east the roundabout is located so that it would extend into fields mainly to the west and north, taking land from agricultural use and requiring the loss of existing hedges.

Penblewin to Henllan Lodge (chainage 0+00 to 1+240)

6.13 From Penblewin roundabout the new A40 would be constructed to the north of the existing road and these two would run roughly parallel, but then gradually converging at Henllan Lodge at Chainage 1+240. The horizontal alignment of the proposed A40 is constrained by the need to:

- a) Pass through Ffynnon to the east with minimum impact on the woodland,
- b) Avoid damage to the historic Henllan Avenue, which is principally composed of mature beech trees,
- c) Avoid Henllan Lodge, a historic building that terminates the avenue.
- d) Minimise impacts on properties along the existing A40.

6.14 For environmental reasons the width of the strip between the two roads was widened by moving the route north so that a strip of existing hedges and proposed vegetation could be retained to visually separate the roads, to provide a visual barrier and to serve as an ecological refuge for wildlife crossing the corridor. The proposed alignment requires the demolition of Trefangor Cottage (Ch1+080). Avoiding this building by moving the route to the north would have caused greater impacts on farmland to the north of the existing A40 between Penblewin and Henllan and on Ffynnon Wood to the east. Moving the route south would have increased impacts on Caermaenau fach and Trefangor Farm to the south.

- 6.15 The vertical alignment of the proposed A40 between Penblewin and Henllan Lodge was designed to be as low as possible to better integrate the carriageway within the landscape. A culvert is required at Chainage 0+290) to carry a small watercourse which meant that the alignment needs to be raised to allow sufficient headroom for the culvert. The culvert is proposed to be 1.8m in diameter to serve as a wildlife crossing.
- 6.16 A proposed attenuation basin/pond (Attenuation Pond A, Ch0+300) would receive surface water runoff from the proposed trunk road and would include a penstock for pollution control, should there be a spillage on the road. The basin/pond would discharge south through the proposed culvert into a west flowing tributary of the Cleddau River.
- 6.17 On the north side of the proposed road, a further single lane local road with passing places is proposed. Originally this was a proposed as a Private Means of Access (PMA), following an entirely different route further to the north and serving Penca'maenau Farm, Brominau and Trefangor burial ground. To reduce the severance and disturbance caused by this PMA, and to ensure full access to the properties and to fields to the north of the A40, the route was moved to run parallel with the proposed A40 and to follow the ground surface with minimal visual impact and reduce disturbance to field hedges and trees.

**Alignment of the central length overlapping with the existing A40:
Henllan Lodge to Ffynnon Wood (Ch. 1+200 to 1+900)**

- 6.18 The proposals include on-line improvement of the existing A40 through a landscape of woodland and trees, with the Henllan Avenue and low-lying Ffynnon Wood as the main features.

Henllan Lodge to Penrhiw Cottage (Chainage 1+240 to 1+610)

- 6.19 From Henllan Lodge, the Scheme would follow the existing A40 in a slight 'S' curve to allow the alignment to continue east across the low ground of Ffynnon Wood on the existing A40 embankment with minimal

land take from the adjacent woodland. The 2+1 carriageway arrangement tapers to a 2-lane carriageway over this length.

- 6.20 The alignment of this length has been developed to protect established woodland on the south and roadside trees on the north. The existing layby on the north side would be removed and associated weighbridge (Ch1+390) would be demolished.
- 6.21 The stopped up bridleway, which meets the A40 at Ch1+240 would be replaced by a new route east along the northside of the layby to a crossing point in Ffynnon Wood, it would then return west along the south side of the A40 to join the north end of Henllan Avenue. Initially an equestrian underpass was proposed at Chainage 1+280, but to reduce the impact on woodland at this location and to make better use of the structure, the decision was taken to locate it further east in Ffynnon Wood, where it would better serve the community of Ffynnon and also serve as a crossing for bats.
- 6.22 At Penrhiw Cottage (Ch 1+600) the proposed road was moved several metres further south than the existing A40 to increase the separation from this property and the adjacent Ffynnon Chapel. The space is sufficient to allow a single lane road to be provided to serve the bridleway, access to Penrhiw Cottage and to a field to the west. There would also be space to provide some form of visual mitigation for the residents of Penrhiw Cottage.

Ffynnon Wood (Chainage 1+610 to 1+840)

- 6.23 To minimise land take from woodland beyond the existing A40 embankment, adjustments to the alignment were made to keep this length of the Scheme mostly within the existing land take of the old A40. The vertical alignment of the Scheme is raised above the existing road and the additional width required for the 2 lane carriageway would require some additional strips of land to the north and south to

accommodate the embankment. Trees planted on the existing roadside embankment slopes will be lost.

6.24 More trees could be lost from the designated Restored Ancient Woodland (RAW) to the south to provide space, varying between 3 to 6 metres wide, for the lower slopes of proposed embankments. During construction the felling of trees in the RAW would be kept to a minimum. Space would also be required for the proposed bridleway route. Detailed design of this path should aim to retain most of the mature trees.

6.25 The single lane side road to the north, which serves properties within Ffynnon Wood, and the proposed new bridleway and cycleway to the south would be linked by an underpass for horse riders, pedestrians and cyclists. The underpass would also serve as a bat crossing and so would remain unlit at night.

6.26 Two watercourses flow north through Ffynnon Wood and cross beneath the existing A40 through separate but converging culverts. The two culverts will be affected by the proposed road, but only the western culvert is expected to be extended to accommodate the proposed Scheme.

Ffynnon Wood to the staggered junction (Chainage 1+840 to 2+100)

6.27 Towards the eastern edge of Ffynnon Wood, the Scheme would draw to the north of the existing A40, to allow the carriageway alignment to pass between properties further east. A staggered junction, serving the settlement of Ffynnon Wood to the north and the existing A40 to Llanddewi Velfrey to the south would create a large area of hard surfacing with signs and road markings. A PMA for Pen-troydin-fach Farm would be required from the Ffynnon Wood arm of the junction on the north side of the A40. A length of redundant carriageway would mostly be broken out and the proposed footpath and cycleway routed

through the area to link from the detrunked A40 to Llanddewi Velfrey to the underpass at Ffynnon.

- 6.28 To the south of the old A40 (CH1+950) a proposed balancing pond (Attenuation Pond B) would be located to receive water from the proposed trunk road. The outfall would include a penstock for pollution control should there be a spillage on the road. The pond would discharge south into to a water course which flows north through Ffynnon Wood.

Alignment of eastern length of the Scheme: Ffynnon Wood to Bethel (Chainage 2+100 to 4+300)

- 6.29 The proposals include a new road along the northern slopes of the Llanddewi Velfrey ridge which become increasingly steeper to the east.

Staggered junction to farm underpass (Chainage 2+100 to Ch2+635)

- 6.30 Continuing east from the junction and drawing away to the north of the existing road to avoid the village of Llanddewi Velfrey, the proposed road would climb from the low ground of Ffynnon Wood onto a gently north-facing slope. From here eastwards, the road continues to climb the increasingly steep north slope of the Llanddewi Velfrey ridge. This alignment would require the carriageway to traverse the slope, with a shallow embankment on the north side and a cutting to the south. To better integrate the Scheme into the landscape a lower alignment was considered which would reduce the embankment. For engineering reasons this was not feasible.

- 6.31 Aligned to pass between Pen-troydin-fach Farm to the north and Maes-y-Ffynnon and Maes-y-Rhos to the south, a sunken lane that descends the slope from the existing A40 to Pen-troydin-fach would be severed (Ch2+310). A PMA is provided for the farm linking west to the staggered junction. Pen-troydin-fach farmhouse is on the north side of the group of farm buildings and does not overlook the proposed Scheme. Maes-y-Ffynnon and Maes-y-Rhos to the south are more elevated than the farm

and would overlook the proposed road where it is in cutting and would retain existing views to the north towards the Preseli Hills. A public footpath along the lane to Pen-troydin-fach would be diverted east to cross the Scheme at proposed underpass at Chainage 2+630.

6.32 To the east of the lane to Pen-troydin-fach, the proposed road would continue ascending on an embankment. An underpass for the diverted PRow and for watercourse is proposed at Chainage 2+630.

Farm underpass (Chainage 2+635) to Ch 2+940

6.33 The Scheme continues to climb higher onto the Llanddewi Velfrey ridge and the land forms a series of spurs extending northwards from the higher slopes of the ridge. The spurs are divided by small valleys containing minor tree-lined watercourses arising from springs closer to the crest of the ridge. This landform extends through most of the eastern end of the Scheme, often with steep slopes and woodland in the valleys. Variations of this alignment were mooted by the landscape architect, but the alignment must provide enough headroom for the proposed Llanfallteg overbridge (Ch.2+840) to the east and the proposed PRow underpass (Ch. 2+640) to the west.

6.34 The Scheme would continue eastwards with the embankment tapering away into a deep cutting through a spur. The cutting slopes are expected to be partly formed in rock. The visual quality and character of the cut rock face is uncertain at this stage. The cutting slopes would screen the proposed road and traffic from views north from properties in Llanddewi Velfrey and south from Pen-troydin-fawr.

6.35 The Llanfallteg Road descends northwards from Llanddewi Velfrey and would retain its existing alignment as it crosses the Scheme on an overbridge. A public footpath in the field to the west would be stopped-up and the bridge would provide an alternative route for walkers. Pen-troydin-fawr farm would use the bridge to access severed fields to the

south of the proposed road. Local equestrians have indicated that the road would be used for horses.

Large embankment (Ch 2+940 to 3+460)

- 6.36 Continuing to climb, and gradually curving to the south east around Llanddewi Velfrey, the proposed road would be on a large embankment up to 18 metres in height to cross several watercourses and intervening spurs. The small watercourses would be culverted under the embankment.
- 6.37 The route would cut through strips of woodland and belts of trees along the watercourses. At Chainage 3+100 the proposed embankment would pass through a narrow strip of Restored Ancient Woodland. Protecting the woodland was a significant factor in the development of the route through this area. The initial alignment was further south and closer to Llanddewi Velfrey. This would have required a substantial area of woodland to have been cleared. Moving the route north was made possible when the proposed staggered junction at Bethel was changed to a roundabout, which allowed greater articulation of the alignment at the roundabout. In realigning the route further north to avoid the Ancient Woodland the designers were constrained by the need to:
- a) tie in with the roundabout at Bethel (Ch 3+800) and avoid increasing the depth of the cutting for the link to Llanddewi Velfrey. The deep cutting here is a major change in the landscape. Increasing the depth would widen the slopes and either take more farmland on the west side of the link road or have an adverse impact on the adjacent houses on the old A40.
 - b) Avoiding an increase in the height of the embankment between 2+950 and 3+450, particularly at the east end, with the result that there would be an imbalance between cut and fill and the larger embankment would cause a greater visual and landscape impact.

- c) keep the route away from Pen-troydin-fawr and Pen-troydin-fach to the north and so avoiding a worsening of environmental impacts on these residential properties.

6.38 In my opinion the proposed route in this length is the optimum because it avoids or minimises various environmental impacts while not compromising the objective of achieving an earthworks balance.

6.39 The long northern slopes of the embankment would have a gradient of 1:2.5. The slope and carriageway would be visible in views from distant viewpoints to the north. Traffic on the road would also be visible from some closer viewpoints and from residential properties such as Castel and Tir-bach which lie approximately 200 metres away. The road would also provide a wide view north to the Preseli Hills which would be a dramatic interlude for vehicle passengers.

6.40 At the back of the northern road verge a low, grassed false cutting (600mm high) is proposed for the full length of the embankment from Chainage 2+930 to 3+460. Whilst this is proposed as mitigation, it is included within the earthworks design and is part of the baseline Scheme. The false cutting is kept low in height to retain views from the embankment for vehicle passengers, whilst also providing a low-level visual barrier to reduce the impact of vehicles on the road, particularly for closer viewpoints, which are at a lower elevation than the carriageway. This measure is not proposed to provide noise attenuation but has been incorporated within the noise model as part of the earthworks.

6.41 At the base of the slope a proposed balancing pond is proposed (north side Ch. 3+040 to 3+090). The proposed balancing pond (Attenuation Pond C) would be located to receive water from the proposed trunk road. The outfall would include a penstock for pollution control should there be a spillage on the road. The pond would discharge south into to a watercourse which would be culverted under the proposed road at Chainage 3+100.

6.42 A public footpath (SP19/2/2) follows a green lane, crosses the proposed road at Chainage 3+460 and would be diverted to use the pedestrian underpass at Chainage 3+260.

Chainage 3+460 to Bethel roundabout (Chainage 3+780)

6.43 Continuing to climb and still curving to the south east around Llanddewi Velfrey, the proposed road would transition into a deep cutting to pass through the most easterly spur of the Llanddewi Velfrey ridge and emerge on a nearly straight alignment at the Bethel roundabout. The depth of excavation is likely to expose bedrock under the surface soils and the treatment of the finished slopes will depend on the extent and competence of the rock that is exposed. The depth of the cutting is sufficient to contain the road and its traffic from viewpoints to north and south.

6.44 A proposal for a footbridge at approximately Chainage 3+600 was included in the Scheme at commencement of the ECI contract, but this was considered to be visually intrusive in views from the north. The decision was taken to relocate the footpath crossing under the embankment at Chainage 3+290. Subsequently, in addressing concerns about the location of this underpass from the NRW, it was moved west to Chainage 3+260.

6.45 This cutting and the adjacent cutting for the link road into Llanddewi Velfrey are sufficiently close for the two cutting slopes to meet at an acute angle to form a narrow ridge. To mitigate for this potentially unnatural landform, the top of the two slopes would be 'rolled-over' to provide a more naturalistic transition from cut slope to natural landform. A footpath (SP19/3/2) would be diverted west along the proposed boundary to meet the pedestrian underpass at Chainage 3+280.

Bethel roundabout (Chainage 3+780 to 4+000) and side roads

- 6.46 The four arm Bethel roundabout would be sited on where the north facing slope of the ridge is at its steepest. As mentioned previously, the roundabout was introduced instead of a staggered junction. The reasons for this are covered in the proof of evidence of my colleague Tom Edwards (WG 1.3.2). Introducing a roundabout of the size required means that the south side of the roundabout is in a cutting, while the north side is on an embankment on an already steep slope. Landform constraints have pushed the roundabout further south than was required to accommodate the staggered junction.
- 6.47 The southern arm of the roundabout, also in cutting, serves Llanddewi Velfrey would climb steeply from the roundabout to meet the old A40 beside Glenfield Farm and is aligned to allow properties along the existing A40 to be served by a cul-de-sac. The northern arm is a PMA serving Bethel Chapel and properties to the north and east. The steep topography requires the PMA to traverse the slope.

Bethel Roundabout to the eastern tie-in (Ch 4+000 to 4+300)

- 6.48 East of the roundabout the proposed road returns to the line of the existing A40 and ties in at the top of Fron Hill. On the north side the Scheme retains the existing roadside boundary hedges, but to the south, the cutting tapers away to be replaced by a widening of the existing embankment. The alignment as it leaves the roundabout passes closer to Bethel Chapel, Bethel Cottage and The Vestry than the existing A40.
- 6.49 At the base of the embankment slope at Chainage 4+100 to 4+200 a proposed balancing pond would be located. The proposed balancing pond (Attenuation Pond D) would be located to receive water from the proposed trunk road. The outfall would include a penstock for pollution control should there be a spillage on the road. The pond would discharge south into to a watercourse which flows southwards.

Proposals for the current A40 road

- 6.50 The existing road would be detrunked and responsibility passed from the Welsh Ministers to Pembrokeshire County Council, with the exception of the section between Penblewin Roundabout and the Rest Area. The detrunked road would serve local traffic with priorities changed to discourage through traffic. Further detrunking measures are addressed in the proof of evidence of my colleague Tom Edwards (WG 1.3.2).
- 6.51 In combination with the proposed cycleways, footpaths, underpasses and new public rights of way these measures, which should enhance Active Travel measures in the area, would provide a network for the local communities to reconnect along traffic free or virtually traffic free routes.

Landscape and environmental mitigation strategy

- 6.52 The environmental objectives have guided the development of the design of the road and the proposed environmental mitigation. Some of our key environmental considerations during refinement of the route alignment are described in the following paragraphs. These are based on the details set out in the ES Chapter 9 Landscape and Visual Impact (Doc 3.09.01) and ES Chapter 2 Description of the Scheme (3.02.01). Mitigation measures are shown in the Environmental Masterplan which is included in the ES Appendix 2.5 (Doc 3.02.03).

Woodland and hedges

- 6.53 Woodland in the immediate setting of the Scheme tends to occupy steep slopes and wet ground associated with local watercourses and hollows. Woodland in the area is important for wildlife and for its contribution to the form and character of the landscape. Woodland can also be important for production of timber and there are areas where trees have been felled in recent years. There are two areas of scheduled Ancient Woodland at Ffynnon Wood and close to Blaen-Pen-Troydin. Our design has minimises adverse effects on areas of woodland, and on designated Ancient Woodland in particular.

- 6.54 The loss of hedges is necessary to allow the Scheme to cross the landscape., but wherever possible, existing hedges would be retained as close as possible to the back of the verge or the edge of earthworks.
- 6.55 Hedges that are removed for the Scheme would be translocated to maximise the potential benefits to biodiversity and landscape. Translocation would include all suitably sized and regularly trimmed trees and shrubs and any larger specimens that can be coppiced. Large hedgerow trees are likely to be too mature for effective translocation and so would be felled.
- 6.56 Healthy trees, such as hedgerow or specimen trees located within the Compulsory Purchase Order (CPO) boundary, but outside the carriageway, earthworks and verges, would be protected from damage, unless they cannot be retained in an adequately stable condition. Trees within the CPO and identified for retention would be surveyed by an arborist and where necessary remedial surgery carried out. We have made changes to the alignment between Penblewin and Ffynnon Wood to enable the protection of an increased number of individual mature hedgerow trees.

Proposed tree and shrub planting

- 6.57 We propose tree and shrub planting for the following purposes:
- a) to integrate the earthworks and carriageway with the existing landscape in the context of woodland and field boundaries;
 - b) to provide visual screening of traffic to reduce or avoid visual impact in views from receptors such as residential properties and public footpaths;
 - c) to repair the edges of woodland or scrub and to create new areas of these habitats to benefit or mitigate the adverse effects on biodiversity.

- 6.58 Our planting proposals would be carried out using mainly locally indigenous species of trees and shrubs at sizes suited to their purpose. These would generally be small transplants planted at relatively close centres to form woodland, woodland edge, scrub, narrow belts and hedges. Some larger specimens would be included to form specimen trees, hedgerow trees or for special purposes such as bat ‘hop-over’ crossings of the road.
- 6.59 Bat hop-over planting would be provided in the locations shown on the Environmental Master Plan (EMP) drawings (ES Appendix 2.5) and in the Protected Species Conservation Strategy plans (included in Pete Wells’ Evidence Appendix - WG 1.5.3). The purpose of the hop-overs and other protected species mitigation are addressed in more detail in the proof of evidence of Pete Wells (WG 1.5.2). The key considerations are:
- a) To plant advanced nursery stock trees of long lived species such as oak, planted and kept alive in sufficient numbers to form a long-term canopy over 4 to 5m above road level, to guide bats from existing flight line vegetation to the back of the verge so that they can fly across the proposed road above vehicles. The same planting arrangement would be provided on the opposite side of the road;
 - b) To plant willow, or other fast growing native species, among and around the advanced nursery stock trees to provide a short-term fast-growing dense canopy 4 to 5m high in the early years after planting. These would be progressively removed from the mix as the long-term species develop a dense canopy.

Watercourses

6.60 Our design retains the existing watercourse alignment within oversized culverts and providing attenuation basins/ponds to control the discharge of road surface water runoff. The existing culverts under the A40 in Ffynnon Wood would remain but would be extended to accommodate the wider embankment.

Habitat and species mitigation

6.61 The proof of evidence of Pete Wells (WG 1.5.2) addresses habitat and protected species in more detail. We have developed measures to mitigate for the loss of habitat and habitat connectivity using:

- a) Mammal underpasses, and associated planting and fencing provided in accordance with the Protected Species Conservation Strategy (included in Pete Wells' Evidence Appendix - WG 1.5.3);
- b) Replacement woodland and scrub habitat created on land taken within the CPO;
- c) Soils in woodland would be stripped and used in areas of proposed woodland planting;
- d) New species rich grassland to be seeded on all verges, cutting and embankment slopes, ditches and enclosures around attenuation basins/ponds. Topsoil would not be replaced on areas cleared for construction to ensure a relatively low-fertility substrate. The topsoil would be retained for use in proposed areas of tree and shrub planting. All areas would be seeded with a range of native species of grasses and wildflowers would replace agricultural species poor grassland. This reflects the purposes of the Welsh Government Green Corridors Initiative (Doc 4.01.25), and 'The State of Roads in Wales' Welsh Government, October 2018 (Doc 4.06.38) and would also be an enhancement as defined in the Environment (Wales) Act 2016 (Doc 4.01.05).

6.62 Our design for landscape and habitat would provide a lateral wildlife corridor along the roadside from Penblewin to Bethel, a measure reflecting the purposes of the Welsh Government Green Corridors Initiative.

Views to and from the Scheme

6.63 In our mitigation design we have given priority to screening or reducing the adverse effect of views of the road and traffic from residential properties. In some locations, where the Scheme is on embankment or shallow cuttings, gaps in tree and hedge planting would allow views to the surrounding landscape to enhance the experience of vehicle travellers. These are carefully placed to minimise adverse visual impacts for nearby residential properties with views towards the Scheme. An example of this is the wide, long distance view to the Preseli Hills from the Scheme between Chainage 2+900 to 3+460.

Connectivity and severance

6.64 The need for connectivity to address severance is addressed in more detail in the proof of evidence of Tom Edwards (WG 1.3.2). Links across the road are necessary to maintain, mitigate or enhance connectivity for farms, Public Rights of Way (PRoWs), and proposed Active Travel routes. We have sought to include crossings of the Scheme to avoid pedestrians, horse-riders and cyclists using local roads and paths having to crossing the carriageway. Apart from the proposed at-grade crossing at Bethel roundabout, our proposed crossings take the form of underpasses designed to be adequate in size for the required users. The three underpasses, at Ffynnon Wood (Ch. 1+680), at Pen-Troydin-fach (Ch2+630) and Blaen-Pen-Troydin (Ch 3+260) are also intended to provide a crossing for wildlife. Lighting is not proposed for any underpasses to encourage use by bats. The length of underpasses would be kept to the minimum.

6.65 The location and design of PRowS, active travel routes and underpasses are proposed to overcome existing community severance and to improve connectivity between settlements. These are all addressed in more detail in the proof of evidence of Tom Edwards (WG 1.3.2).

Traffic noise

6.66 The road alignment has been designed to reduce the overall effects of the Scheme on residential properties, and no location specific noise mitigation is proposed. The proposed carriageway would have a low noise surface to provide a general reduction in traffic noise. Traffic noise is addressed in detail in the proof of evidence of David Hiller. (WG 1.6.2).

Cultural Heritage

6.67 A programme of recording and investigation is proposed. These measures are set out in the ES Chapter 10 Cultural Heritage (Doc 3.10.1).

7. Land taken for Essential Mitigation

7.1 General points

7.2 The environmental mitigation scheme was designed to minimise additional land take over and above the land required for engineering purposes.

7.3 Environmental fencing is provided to exclude badger and otter from the carriageway. Where this mammal fencing forms the permanent boundary to the Scheme the right to enter the land outside the boundary is required for maintenance of the fence. Examples of this are Plots 1/2a and 1/2b. In all cases the presence of the mammal fence is required to meet the requirements of protected species mitigation. The justification for the fencing is set out in the ES Chapter 8 (Doc 3.08.02). and will be addressed in the proof of Pete Wells (WG 1.5.2).

7.4 Surveys have shown that dormouse are present in the area. Woodland and hedgerow habitat suitable for dormice would be cleared for the Scheme and so all proposed hedges, woodland and tree and shrub planting would contribute to the replacement of dormouse habitat at the rate of double the area lost. This matter is addressed in the ES Chapter 8 (Doc 3.08.02) and the proof of evidence of Pete Wells (WG 1.5.2), as well as in the Protected Species Conservation Strategy prepared for NRW (included in Pete Wells' Evidence Appendix - WG 1.5.3). The land required for this replacement dormouse habitat needs to be owned and managed by Welsh Government to ensure it continues to serve as dormouse habitat. Therefore, all areas of proposed woodland and hedge are considered essential to meet the dormouse mitigation requirements.

Essential Mitigation plots

Plot 1/2d

7.5 This small area lies between the existing road and boundary hedge and a proposed side road to Trefangor Burial Ground. The area would be used for tree and shrub planting to integrate the side road with the setting and to screen potentially conflicting headlights.

Plots 1/2j & 1/2k

7.6 Strip of pastureland and field hedges between the existing and proposed A40. The land would be planted with trees and shrubs to provide a visual screen Penblewin Farm and the Rest Area from views of the proposed Scheme, as it extends east onto a low embankment. This area will also separate the two roads, reducing the apparent width of hard surfacing and providing a refuge for wildlife, particularly bats, crossing the road corridor. The roadside hedge to the old A40 would be retained to sustain the landscape character and setting of the old road.

Plots 1/2x, 1/3a, 1/3d

- 7.7 Strip of pastureland and field hedges between the existing and proposed A40. The land would be retained to separate the two roads, reducing the apparent width of hard surfacing and providing a refuge for wildlife, particularly bats, crossing the road corridor. The retained roadside hedge would help to protect the landscape character of the old road, particularly following detrunking, when it will be reduced in width.
- 7.8 The severed sections of each field will be treated in a different manner with some planted with woodland or scattered trees or retained as grassland to provide varied habitat and to provide visual interest to travellers. Existing severed hedges are bat flightlines and will be retained and enhanced with additional trees planted to guide bats across the new road. (included in Pete Wells' Evidence Appendix - WG 1.5.3).

Plots 2/2e & 2/2g

- 7.9 A strip of land to be planted as woodland as landscape integration. This area, once planted, will provide woodland habitat connectivity for bats and other species. At the west end of the plot, tree planting would include beech trees to reflect the existing beech avenue on the south side of the Scheme. The woodland would separate the diverted bridleway from the road.

Plots 2/3b, 2/3d, 2/3f, 2/3h

- 7.10 An existing plantation from which many of the larger trees have recently been felled. The plots would be taken to be replanted as landscape integration, to reinstate the woodland setting of the road, to provide habitat connectivity along the Scheme. The diverted bridleway, and a cycleway, will extend east - west along the southern boundary of the woodland, with the proposed planting providing visual separation from the road.

Plots 2/8a & 2/8c

- 7.11 Land that would be severed from the adjacent field by the proposed side road. The land would be used for woodland planting to integrate the Scheme with the woodland setting, provide connectivity habitat, and to provide a visual screen for residential properties to the north.

Plots 2/8g, 2/8h, Plot 2/8k & 2/9a

- 7.12 Land that would be severed from the adjacent field by the proposed PMA for Pen-troydin fach. The western end of the plot would be planted with woodland to provide the same mitigation functions as Plots 2/8a and 2/8c to the west. The remaining area would be planted with scattered trees and woodland to integrate the Scheme with the setting and to screen views from Pen-troydin-fach. Bat cross-overs would be required in two locations and these would be enhanced with additional tree planting.

Plot 2/8g & 2/8j

- 7.13 Land severed from a field to the north which is required for woodland planting for landscape integration.

Plot 2/9d

- 7.14 A small area of the former lane to Pen-troydin-fach. This would be required for measures to provide a bat cross-over.

Plot 3/3d

- 7.15 An area of woodland and severed pasture that would be required to provide screening and landscape integration of the proposed embankment and road. The woodland is included to ensure that it is managed by Welsh Government as woodland to serve the screening for Pen-troydin-fawr and as dormouse habitat and bat flightline. The pastureland is required for woodland planting to replace the area of Restored Ancient Woodland to the east.

Plot 3/2j

7.16 This is a remnant of a field, most of which has been taken for engineering purposes. This small remaining area is required to provide replacement habitat of scrub woodland, in particular for dormouse.

Plot 3/4b & 3/4e

7.17 A remnant of a field, most of which has been taken for engineering purposes. This small remaining area is required to provide replacement habitat of scrub woodland for dormouse.

Plot 3/3g & 3/3m

7.18 These two narrow strips of the land are on either side of a diverted footpath which followed the green lane which would cross the proposed Scheme at Chainage 3+460. These strips are required to provide raised hedge banks to replicate the character of the green lane for landscape integration and to develop as an alternative bat flightline from the green lane to the pedestrian underpass.

Plot 3/3y, 3/3ab, 3/6d, 3/6e

7.19 Required for a proposed hedge to provide habitat connectivity and to provide a bat flightline.

Additional Plot north of Plot 3/4k

7.20 A small triangle of land (located on the north side of the proposed Scheme at Chainage 3+350) which is a remnant of a field taken for engineering purposes. This plot was not included in the CPO, but the landowner has requested that it be included because it is of no value to them. The area would contribute to the replacement dormouse habitat.

Plot 3/3ae, 3/3af, 3/6j & 3/6k

7.21 These are remnants of two fields, most of which have been taken for engineering purposes and a length of the lane used as public footpath

SP19/2/1. This small remaining area is required to provide replacement habitat of scrub woodland, in particular for dormouse.

Plot 3/4r

7.22 A small remnant of a field, most of which is taken for engineering purposes. This small area is steeply sloping and is required for tree and shrub planting for landscape integration and to contribute to screening views of the roundabout from the north west, including residential properties at Tir-bach and Castell.

8. Objections to the Scheme

8.1 Objections have been made that raise matters that fall within the scope of my proof of evidence or that of one of my colleagues. I will address each and where appropriate I will refer to the proofs of others.

Woodland Trust (R0053)

Loss to areas of restored Ancient Woodland sites

- 8.2 The objection is on the basis that the proposed Scheme would cause damage and loss to two areas of ancient woodland which are both recorded as restored Ancient woodland (rAW) on the Ancient Woodland Inventory (AWI)¹⁸. Woodland Trust is concerned about direct loss of ancient woodland at Ffynnon Wood and another woodland to the north of Llanddewi Velfrey. In particular the Woodland Trust identify fragmentation of woodland that they consider would be the consequence of the Scheme.
- 8.3 The Woodland Trust correctly identify that the Scheme will pass two areas of restored (replanted) Ancient Woodland. Appendices 2 and 3 includes two plans which show the areas of ancient woodland and the Scheme. I will comment on each section of woodland in turn in the following paragraphs.
- 8.4 Ffynnon Wood (unique ID 4537), shown on drawing A40LVP-ARP-EHR-SWI-DR-LH-0001 contained in Appendix B of my evidence, is an area of semi-natural woodland which lies to the north and south of the existing A40. The part designated as restored Ancient Woodland is to the south. The existing A40 embankment is shown as lying within the designation boundary. I include a cross-section drawing (A40LVP-ARP-ELS-SR01-DR-LE-0001) demonstrating this in Appendix B of my evidence (WG 1.4.3)

¹⁸ Ancient Woodland Inventory (AWI) were compiled during the 1980s and 1990s by the Nature Conservancy Council and subsequently maintained by successor organisations. It is generally assumed that the areas were identified from historical maps.

- 8.5 The non-native coniferous species, concentrated on this roadside embankment slope, were planted during the construction of the A40 improvements, possibly as long ago as the 1960s and therefore predating the designation process that identified the area as ancient woodland. The Environmental Statement (ES) Chapter 8 Ecology and Nature Conservation (Doc 3.08.01) (para 8.6.8) states that ‘The area of Ffynnon Wood which is affected is mainly mixed plantation on the embankment which is therefore of lower value than more semi-natural woodlands’. This conclusion is based on the results of surveys carried out between 2016 and 2018.
- 8.6 We have measured the extent to which the proposed Scheme would affect the ancient woodland designation. An area of 1,387m² is included within the permanent land take of the Scheme. Of this, an area of 2,085m² is already within the existing A40 highway boundary and has therefore been cleared of trees and woodland soil and replanted with coniferous trees. In other words, the trees and the embankment on which they grow no longer have the characteristics of ancient woodland. That means that an area of only 542m² would be taken from the ancient woodland.
- 8.7 The proposed alignment through the Ffynnon wood area has been designed to closely follow the existing A40 alignment and utilise the existing road embankment as far as practically possible, whilst meeting required highway standards. This minimises the area of the woodland to the north and south that would need to be cleared for construction of the Scheme.
- 8.8 The proposed carriageway is wider than the existing road and would approach the western fringe of the wood with the widening mainly on the south side of the existing road for a distance of about 220 metres (from Chainage 1+580 to 1+800). However, only about 130 metres of that length (Chainage 1+680 to 1+810) would extend beyond the existing road embankment and into the Ancient Woodland. This intrusion would be for the widening but would also provide space for a new Public Right

of Way (PRoW) along the foot of the embankment. Extending east through Ffynnon Wood the proposed Scheme curves slightly to the north of the existing A40 and this alignment would affect woodland on the north side (approximately Chainage 1+780 to 1+900), which is outside the boundary of the Restored Ancient Woodland. The extent of the clearance of this woodland can be seen on Sheet 3 of the Environmental Masterplan, contained within the ES Volume 3 Appendix 2.5 (Doc 3.02.03).

8.9 Blaen-Pen-Troydin Wood (Unique ID 5801) shown on drawing A40LVP-ARP-EHR-SWI-DR-LH-0002, is the second area of restored or replanted Ancient Woodland and is associated with the small valley of a minor watercourse. The ES Chapter 8 Ecology and Nature Conservation (Doc 3.08.01) states that surveys undertaken between 2016 and 2018 showed the area is semi-natural woodland and paragraph 8.6.8 of the chapter records that this area of woodland was considered of value. Clearance of a strip through this woodland would be required to provide space for the proposed road, which would be on embankment. The extent of the clearance is shown in Appendix B of my evidence (WG 1.4.3) and which show the area of ancient woodland. The area of the woodland is shown in context on the Environmental Masterplan Sheet 5, contained in the ES Volume 3 Appendix 2.5 (Doc 3.02.03).

8.10 The alignment through the area of Blaen-Pen-Troydin was considered to minimise the area of the woodland that would need to be cleared for construction whilst meeting required highway standards and minimising impact on habitats and on farm businesses. Tom Edwards provides further detail in his evidence (WG 1.3.2).

8.11 The area of the designated Ancient Woodland that would be cleared for the Scheme is a narrow finger of trees extending north from the main block of Ancient Woodland. This represents an area of 2,666m² that would be lost. A small area of the northern end of the ancient woodland designation would be severed.

8.12 The extent of the clearance is shown in Appendix C of my evidence which show the area of ancient woodland as green outline and hatch. The land take for the Scheme is shown in red lines and pink tone. The main block of the woodland can be seen extending over 200 metres to the south of the proposed Scheme. A small area to the north of the proposed Scheme will be retained. The CPO Plot 3/2j is required for Essential Mitigation, but the woodland in this plot would not be cleared. Instead this plot and CPO Plot 3/3d and 3/2u will be used to plant replacement woodland and woodland soils stripped from the Ancient woodland will be placed here to conserve the resource and enrich the new planting.

National Planning Policy

8.13 The Woodland Trust objection stated that Welsh national planning policy was to conserve declining but irreplaceable ancient woodland as well as ancient, veteran and heritage trees, as an important biodiversity resource. This includes loss, fragmentation and deterioration. Such trees and woodlands should be afforded protection from development which would result in their loss or deterioration unless there are significant and clearly defined public benefits; this protection should prevent potentially damaging operations. Woodland Trust quote Planning Policy Wales Edition 10 (PPW10) (Doc, 4.01.30) to suggest that authorities should consider the advice of Natural Resources Wales (NRW).

8.14 We agree that Planning Policy Wales Edition 10 indicates that Ancient Woodland is an irreplaceable resource. This was taken into consideration during the selection and design of the route for the proposed road. My proof describes the measures that have been taken to avoid and reduce the impacts of the Scheme on Ancient Woodland and the proposed mitigation that is included to replace the woodland area that would be lost. The Scheme would provide community and environmental benefits, including the creation of more than 6.66 hectares of new/replacement woodland.

Loss of trees and canopy over roads

8.15 The objection states that:

- a) the Scheme could result in the loss of whole or parts of trees and their canopy where the wood edge overhangs the road network.
- b) Temporary works for the Scheme could cause long term damage to habitats.
- c) There are concerns about construction dust.

8.16 The team have considered the loss of trees and branches, and the potential for adverse effects on the woodland canopy. It is clear that the Scheme will require the felling of trees and that there will be a need to clear overhanging branches in some locations. We have set out the approach to environmental protection in the ES. The approach to be undertaken for branch clearance would also be outlined in the Contractor's Environmental Management Plan (CEMP), which would commit them to adhering to the measures outlined in the ES. Chapter 9 (Doc 3.09.01) and includes landscape design objectives which set out the approach to protecting landscape features such as hedges, trees and woodland. These objectives reflect the guidance set out in Design Manual for Roads and Bridges (DMRB) (Doc 4.01.61) and, Environmental Design, as well as Welsh Government duties under the Well-Being of Future Generations Act (FGA) (Doc 4.01.10).

8.17 It is WG's intention to protect and retain as many trees as possible throughout the construction period of the proposed Scheme. The need for protection of vulnerable trees and their Root Protection Area (RPA) will be a requirement set out in the CEMP so as to accord with BS 5837:2005. Those trees, RPAs and associated areas of woodland soils that lie along the edge of the land take will be protected by fencing to totally exclude machinery, unauthorised personnel and the storage of materials.

Effects on ground on surface water

- 8.18 The Woodland Trust are concerned that changes brought about by the Scheme could alter ground and surface water quantities. The effects on water are set out in ES Chapter 7 Road Drainage and the Water Environment (Doc 3.07.01) and, and Chapter 6 Geology and Soils (Doc 3.06.01) and . Section 10 of ES Chapter 7 covers the mitigation proposals, while the ES section following paragraph 7.11.18 considers some of the potential effects on ground water. Paragraphs 7.11.46 onwards to the end of Section 7.11 discusses the impacts on groundwater in areas adjacent to cuttings.
- 8.19 In the case of Ffynnon Wood the effect of embankment drainage, at the foot of the embankment slope, would be to carry away water from the embankment slope. The proposed drainage provision would replace existing drainage along the current A40 embankment through the wood. This aims to replicate the existing conditions in the soil.
- 8.20 In the case of the wood at Blaen-Pen-Troydin the effect of embankment drainage, at the foot of the embankment slope would be to remove surface water from the engineered slope. While the drain might also receive surface and ground water from the woodland, the effect would be localised because ground and surface water will be flowing down slope, in parallel with the drain.
- 8.21 Our assessment published in the ES does not indicate changes of the kind that the Woodland Trust suggest would occur in the two areas of Ancient Woodland.

Pollution from vehicles

- 8.22 The Woodland Trust express the concern that the remaining woodland, would suffer additional impacts from increased noise and light pollution from traffic and that they will also be subjected to increased nitrogen oxide emissions from vehicles, which can change the character of

woodland vegetation (in terms of species composition) through altering nutrient conditions.

- 8.23 The ES Chapter 14 (Doc 3.14.01) and addresses noise and noise is addressed in the proof of evidence of my colleague David Hiller (WG 1.6.2). The noise and vibration assessment shows that a benefit of the Scheme is that traffic noise, as well as headlight spillage and vehicle exhaust is moved further away from places where people are concentrated in Llanddewi Velfrey. The Scheme is not predicted to substantially increase the number of vehicles. This is set out in ES Chapter 2 (Doc 3.02.01) Table 2.1 (A summary of the total annual average daily traffic flow of all vehicles for the new trunk road in the Base Year, Opening Year and Design Year). The Scheme has been designed to create free-flowing traffic which should reduce and change the nature of emissions. Noise mitigation includes road surfacing which will reduce the noise caused by vehicles. Air quality is addressed in the ES Chapter 13 (Doc 3.13.01).
- 8.24 In the area of Ffynnon wood, the Scheme will follow the existing A40 embankment with previously exposed areas of woodland experiencing the same, or similar, pollution. Traffic noise would be no greater than the existing situation with low noise surfacing used on the carriageway, while headlight spill would be mitigated after a few years of growth by replacement of woodland edge planting. Any predicted changes in traffic, and therefore to air quality, are set out in the ES Chapter 13 (Doc 3.13.01). At Blaen-Pen-Troydin Ancient Woodland traffic on the proposed road would be elevated approximately 1 to 10 metres above the remaining woodland and would be horizontally separated from it by approximately 30 metres of embankment. The effects of oblique light spill and traffic noise will be reduced by distance and intervening trees and shrubs, while vehicle emissions will be more readily dispersed in the atmosphere than if the road was at ground level and contained by trees in the ancient woodland.

Root protection during construction

- 8.25 The Woodland Trust propose that a buffer zone of at least 30 metres should be provided, protected by a fence and planted before construction commences to avoid root damage and allow for the effect of pollution from the Scheme.
- 8.26 We confirm that areas of woodland and other vegetation will be protected by a temporary or permanent fence along the boundary of the construction works. The fence would protect the retained trees. It would be carefully installed to protect any retained portions of the Root Protection Area (RPA) of trees considered worth retaining in a complete form or retained following appropriate remedial works. Advice from a professional arborist will be taken and if necessary remedial tree surgery would be carried out by a qualified tree surgeon. All materials storage, plant and construction activity will be excluded from the RPA. We cannot guarantee that a 30 metres wide buffer zone will be protected. Within the works area defined by the temporary or permanent boundary all trees and hedges would normally be felled. For this Scheme we propose to excavate suitable small and coppiced trees and hedges for translocation. Where we disturb Ancient Woodland soils we intend transferring this soil to the completed embankment slopes, or replaced in the original location with care, for use in proposed woodland planting areas. During detailed design and construction any additional trees within the construction area that can be retained would be protected.
- 8.27 In mitigation of impacts on woodland and hedges, Welsh Government have committed to providing replacement woodland at a ratio of 2 hectares for every one that is to be cleared. We have addressed this commitment to the Scheme by proposing the planting of native species of local provenance to form woodland habitat, connectivity and landscape integration at a ratio of 2.15 hectares to every one lost. Section 8.7 of the Ecology and Nature Conservation chapter of the ES sets out proposed biodiversity mitigation and enhancements that would

be achieved by the Scheme. My colleague Pete Wells will address this matter in his proof of evidence (WG 1.5.2).

8.28 Further benefits are set out in the ES, in particular in the chapters addressing Noise (Chapter 14) (Doc 3.14.01), Landscape and Visual Impact Chapter 9) (Doc 3.09.01), Community Effects (Chapter 11) (Doc 3.11.01), All Travellers (Chapter 15) (Doc 3.15.01) and Population and Human Health (Chapter 17) (Doc 3.17.01).

8.29 Based on the information above we believe that we have demonstrated that the direct loss of Ancient woodland has been minimised in designing a scheme that provides significant benefit for the community of Llanddewi Velfrey.

Natural Resources Wales (Ref R0046)

8.30 Welsh Government have treated the NRW letter of the 20 September 2019 as an objection to the Scheme. A meeting was held on the 21 November 2019 between members of the Project Team and Natural Resources Wales (NRW) to discuss matters relating to this objection. The meeting is discussed in the proof of evidence of Pete Wells (WG 1.5.2).

8.31 In the letter from NRW, dated 20 September 2019, and at the meeting on 21 November 2019, NRW raised concerns relating to the Scheme. A Protected Species Conservation Strategy (included in Pete Wells' Evidence Appendix - WG 1.5.3) was prepared and sent to NRW on the 28th January 2020. These concerns, as well as the project team's strategy, are addressed in the Proof of Pete Wells (WG 1.5.2).

Mr & Mrs Peett, Caermaenau Fawr, Clunderwen (R0024)

8.32 The Letter of Objection made several points, but I will address elements of two of points a) and b) below, that fall within the scope of my proof of evidence:

- a) Adverse effects on the Bed & Breakfast business located at your clients' property both during and after construction.
- b) Noise monitoring surveys have not been undertaken at Caermaenau Fawr.

8.33 In response to Point a) above, we do not agree that the Scheme will adverse visual effects on Caermaenau Fawr. This response sets out why this is the case in terms of visual impact, air quality.

8.34 Visual Impact: the Scheme is separated from the property by a low ridge which rises approximately 15m above ground level at Caermaenau Fawr. The Scheme lies to the south of the ridge and is sufficiently low in relation to the crest of the ridge for the carriageway and vehicles moving along it to be hidden from view. Sections A-A, B-B and C-C drawing number A40LVP_ARP-HSR-J01-SK-C-0001 contained in Appendix D of my evidence demonstrate the relative ground levels and show that the Scheme would not create an adverse visual effect on the Bed & Breakfast business located at the property.

8.35 Air quality in the vicinity of Caermaenau Fawr both during and after construction is addressed within ES Chapter 13 Air Quality. A construction phase dust assessment and a local operational air quality assessment was completed for the existing A40 between Llanddewi Velfrey and Penblewin roundabout and for the Scheme. Following implementation of the proposed mitigation set out in ES Chapter 13 Section 13.11, no significant effects are anticipated during the construction phase. The operation of the Scheme does not result in any significant effects on local air quality and therefore mitigation is not required.

8.36 In response to Point b), that noise monitoring surveys have not been undertaken at Caermaenau Fawr. We advise that an assessment of Noise and Vibration has been conducted as part of the EIA and this is reported in ES Chapter 14 Noise and Vibration. This element of our

response to this objection is addressed in the proof of evidence of David Hiller (WG 1.6.2).

Letters of Objection from Mr Cullingford (R0058) and Ms Rowlands (R0060)

8.37 The Letters of Objection from Mr Cullingford and from Ms Rowlands make the same points, and I will address those points that are within my expertise as Environmental Coordinator. The objections state that the Scheme would:

- a) have an impact on climate change,
- b) would damage the environment (including visual impact),
- c) would impact on the farming community,
- d) would impact on the need to protect natural resources.
- e) Similar schemes would not be acceptable in other areas such as areas of pristine landscape and National Parks.

8.38 Point a) Chapter 19 of the Environmental Statement (ES) (Doc 3.19.01) outlines the climate change assessments undertaken for the Scheme. The conclusion of the assessment indicates that there will be an increase in carbon emissions as a result of the Scheme. In the first year of Scheme operation, user emissions would be equivalent to approximately 0.1% of the current annual emissions from the transport sector in Wales.

8.39 Whilst there is an increase in carbon emissions as a result of this Scheme, the Welsh Government is taking action across all areas for which it has responsibility to meet its ambitions to tackle climate change. This matter is addressed in the proof of evidence of my colleague John Davies (WG 1.7.2).

8.40 Point b) ES Chapter 9 Landscape and Visual Impact (Doc 3.09.01) addresses the effects of the Scheme and sets out the proposed mitigation measures that will form part of the Scheme. It is considered that there would be a neutral impact on 14 of the 16 local Landscape

Character Areas (LCA) that fall within the study area. A residual adverse landscape effect is predicted on two of these, Templeton and Mid Tâf Vale LCAs. The ES Chapter 9 also describes a number of viewpoints that fall within these two LCAs and describes the nature of the changes brought about by the Scheme, which do not necessarily affect whole LCA.

- 8.41 Point c) The ES Chapter 12 Community and Private Assets (Agriculture) (Doc 3.12.01) outlines the assessment of impacts on agricultural community and private assets. In summary, the Scheme will involve the permanent loss of approximately 27.4ha of agricultural land. None of this is shown to be of the best and most versatile agricultural quality. This is an impact of slight magnitude on a resource of medium sensitivity, leading to an overall impact of minor adverse significance.
- 8.42 There are seven farms affected. All will experience significant changes in day-to-day operations, but the viability and continued function of the holdings is not threatened. The effect on these farm holdings has been assessed to be of minor adverse significance.
- 8.43 Point e) Similar schemes would not be acceptable in other areas such as areas of pristine landscape and National Parks. The ES Chapter 9 Landscape and Visual Effects (Doc 3.09.01). considers the impacts on the landscape and views. Welsh Trunk Road improvement schemes are carried out to address economic, road safety, social and other matters. If a scheme is justifiable, the route and the design will be considered with equal care and consideration whether it is within or outside a National Park or Area of Outstanding Natural Beauty. For example, trunk road improvements have been successfully completed along the A470 within Snowdonia National Park.
- 8.44 While modern trunk roads are often wider and have a more strictly defined vertical and horizontal alignment than their predecessors, the design uses a range of measures to adjust the alignment to fit environmental constraints, but also adopts elements of the character of

the adjacent landscape. This takes the form of tree and shrub planting, boundary hedges, walls, hedge-banks and the shaping of new landform.

Letter of Objection from Sally Amoores (R0069)

- 8.45 The Letter of Objection from Sally Amoores states that ‘we have strong objections to the new bypass planned for Llanddewi Velfrey on the grounds that it will put the petrol station out of business. This is the hub/heart of our village and without it we will have no post office, petrol, gas and local shop. It will be at the cost of wildlife, biodiversity and hundreds of acres of prime farmland. There will be an increase in the noise level however much the planners profess to this not being the case.’
- 8.46 I will respond to the point concerning agricultural land, which the Objector states that the new bypass ‘.....will be at the cost of and hundreds of acres of prime farmland.’
- 8.47 I have assumed that the objection relates to the full Scheme from Penblewin Roundabout to Bethel Chapel, rather than just the section from Ffynnon to Bethel which bypasses Llanddewi Velfrey.
- 8.48 The Agricultural Specialist, Tony Kernon, has provided a proof of evidence which is in Appendix A of my evidence (WG 1.4.3). The ES includes Chapter 12 Community and Private Assets: Agriculture (Doc 3.12.01), which reports on the agricultural assessment of the Scheme. The assessment has examined the various farm businesses affected by the Scheme and the agricultural land resource that would be taken under the CPO. I quote the relevant areas of land below:
- a) The Scheme would require a total area of 31.5ha (77.84 acres) of land for construction (this figure does not include the area that might also be required for a contractor’s construction compound).
 - b) 4.1ha (10.13 acres) of this would be required only temporarily for the construction phase. Once construction is completed this land would be returned the landowner.

- c) The Scheme would result in the permanent loss of approximately 27.4ha (66.72 acres).

8.49 The land that would be affected is composed of Grade 3 and 4 agricultural land, none of which is shown to be the ‘best and most versatile’¹⁹. This is an impact of slight magnitude on a resource of medium sensitivity, leading to an overall impact of minor adverse significance.

8.50 On the basis of the information quoted from the ES, I do not agree that the Scheme will be at the cost of ‘hundreds of acres of prime farmland.’

¹⁹ The best and most versatile land is defined as Grades 1, 2 and 3a by policy guidance (see Annex 2 of NPPF). This is the land which is most flexible, productive and efficient in response to inputs and which can best deliver future crops for food and non food uses such as biomass, fibres and pharmaceuticals

9. Conclusion and Declaration

- 9.1 My proof of evidence includes facts which I regard as being relevant to the opinions which I have expressed, and the Inquiry's attention has been drawn to any matter which would affect the validity of that opinion.
- 9.2 As Environmental Coordinator I have overseen the environmental design process and sought, with the engineering and environmental specialists in the team, to minimise overall environmental impacts of the Scheme and to optimise the effectiveness of proposed mitigation.
- 9.3 In my opinion the Environmental Impact Assessment, the Appropriate Assessment have been carried out and published in accordance with legislation and professional guidance.
- 9.4 In my opinion the development of measures to mitigate the effects of the Scheme are effective, justifiable and achievable within the proposed CPO.
- 9.5 I believe the facts I have stated in this proof of evidence are true and that the opinions expressed are correct.
- 9.6 I understand my duty to the Inquiry to assist it with matters within my expertise and believe that I have complied with that duty.

10. Appendices (Separate Volume)

Appendix A - Agricultural Land and Businesses

Document - Agricultural Land and Businesses Proof of Evidence - and
attached appendices

Appendix B - Ffynnon Wood Ancient Woodland.

Drawing - A40LVP-ARP-EHR-SWI-DR-LH-0001 Impact of Scheme on
Ffynnon Wood Ancient Woodland

Drawing -A40LVP-ARP-ELS-SR01-DR-LE-0001 Ancient Woodland
Cross Section

Appendix C - Blaen-Pen-Troydin Wood Ancient Woodland

Drawing - A40LVP-ARP-EHR-SWI-DR-LH-0002 Impact of Scheme on
Blaen-Pen-Troydin Wood Ancient Woodland

Appendix D - Cross Section at Caremaenau Fawr

Drawing - A40LVP_ ARP-HSR-J01-SK-C-0001 Caremaenau Fawr Cross
Sections