

Adran yr Economi a'r Seilwaith
Department for Economy and Infrastructure



Llywodraeth Cymru
Welsh Government

The M4 Motorway (Junction 23 (East of Magor) to West of Junction 29 (Castleton) and Connecting Roads) and The M48 Motorway (Junction 23 (East of Magor) Connecting Road) Scheme 201-

The M4 Motorway (Junction 23 (East of Magor) to West of Junction 29 (Castleton) and Connecting Roads) and The M48 Motorway (Junction 23 (East of Magor) Connecting Road) (Amendment) Scheme 201-

The London to Fishguard Trunk Road (East of Magor to Castleton) Order 201-

The M4 Motorway (West of Magor to East of Castleton) and the A48(M) Motorway (West of Castleton to St Mellons) (Variation of Various Schemes) Scheme 201-

The M4 Motorway (Junction 23 (East of Magor) to West of Junction 29 (Castleton) and Connecting Roads) and the M48 Motorway (Junction 23 (East of Magor) Connecting Road) and The London to Fishguard Trunk Road (east of Magor to Castleton) (Side Roads) Order 201-

The Welsh Ministers (The M4 Motorway (Junction 23 (East of Magor) to West of Junction 29 (Castleton) and Connecting Roads) and the M48 Motorway (Junction 23 (East of Magor) Connecting Road) and the London to Fishguard Trunk Road (East of Magor to Castleton)) Compulsory Purchase Order 201-

The M4 Motorway (Junction 23 (East of Magor) to West of Junction 29 (Castleton) and Connecting Roads) and The M48 Motorway (Junction 23 (East of Magor) Connecting Road) (Supplementary) Scheme 201-

The Welsh Ministers (The M4 Motorway (Junction 23 (East of Magor) to West of Junction 29 (Castleton) and Connecting Roads) and The M48 Motorway (Junction 23 (East of Magor) Connecting Road) and The London To Fishguard Trunk Road (East of Magor to Castleton)) Supplementary Compulsory Purchase Order 201-

Proof of Evidence

Keith Jones BSc (Hons) PhD MRSB CBiol

Welsh Government, Ecology and Nature Conservation

Document Reference: WG 1.18.1

M4 CORRIDOR AROUND NEWPORT**Proof of Evidence – Ecology and Nature Conservation****Contents**

1.	Introduction	5
1.1	Author	5
1.2	Scope of Evidence	6
2.	Methodology and Consultation	10
2.1	Introduction	10
2.2	Baseline Data Collection	11
2.3	Ecology Surveys	12
2.4	Assessment of Implications for European Sites (AIES).	16
2.5	Consultations	18
2.6	Summary	23
3.	Option Selection and Scheme Design	27
3.1	Introduction	27
3.2	Changes to conceptual design	28
3.3	Summary	31
4.	Nature Conservation Baseline, Designations and Policies	33
4.1	Introduction	33
4.2	International Statutory Sites	33
4.3	National Statutory Sites	34
4.4	Non-statutory Sites	34
4.5	Designated Sites in the Vicinity of the Scheme	34
4.6	River Usk SAC and River Usk (Lower Usk) SSSI	36
4.7	Severn Estuary SAC, SPA, Ramsar Site and SSSI	37
4.8	Wye Valley and Forest of Dean Bat Sites SAC, Mwyngloddfa Mynydd-Bach SSSI and Wye Valley Lesser Horseshoe Bat SSSI	38
4.9	Gwent Levels SSSIs	39
4.10	Newport Wetlands SSSI, National Nature Reserve (NNR) and RSPB Reserve	43
4.11	Magor Marsh SSSI and Gwent Wildlife Trust Reserve	44
4.12	Rogiet Meadow SSSI	45
4.13	Penhow Woodlands SSSI and NNR	45
4.14	Ruperra Castle and Woods SSSI	45
4.15	Plas Machen SSSI	46
4.16	Non-statutory Designated Sites	46
4.17	Nature Reserves	52
4.18	Habitats	53

4.19	Species (Flora)	66
4.20	Species (Fauna)	66
4.21	Migratory Fish	79
4.22	Estuarine and Marine Fish	81
4.23	Terrestrial Invertebrates	82
4.24	Aquatic Invertebrates	85
4.25	Nature Conservation Policies	88
4.26	Legislation	95
4.27	Summary	96
5.	Potential Ecological Effects and Mitigation	102
5.1	Introduction	102
5.2	Potential Ecological Effects	106
5.3	Ecological Mitigation and Monitoring	107
5.4	Construction phase mitigation measures	126
5.5	Monitoring	134
5.6	Summary	135
6.	Effects of the published Scheme on Ecology and Nature Conservation	141
6.1	Introduction	141
6.2	Changes in Air Quality	143
6.3	Designated Sites	145
6.4	Rivers (Usk and Ebbw) Ecological Unit	149
6.5	Reens, Ditches, Reedbeds and Ponds Ecological Unit	151
6.6	Grazing Marsh Ecological Unit	155
6.7	Farmland Ecological Unit	159
6.8	Industrial Land Ecological Unit	162
6.9	Summary	166
7.	Consultees' Responses and Objections to the M4CaN Scheme	171
7.1	Introduction	171
7.2	Incomplete or inadequate surveys	172
7.3	Inadequate, incorrect or missing information	181
7.4	Incorrect or inadequate assessment	206
7.5	Additional recommendations	218
7.6	Inadequate or uncertain mitigation and monitoring	222
7.7	Criticism of the Scheme	245
7.8	Matters of policy/guidance	251
7.9	Summary	254
8.	Conclusions	262

References

Tables

Table 1: Habitat Provision in the Environmental Masterplan

Table 2: Loss of Reens and Ditches

Table 3: Loss of SINC's

Table 4: Summary of Mitigation Areas

Table 5: Land Take within the Gwent Levels SSSIs

Appendices

Appendix A: Summary of Likely Significant Effects on Ecology and Nature
Conservation

Appendix B: Aerial photographs of location of woodland at Pye Corner (1945 and
1979)

1. INTRODUCTION

1.1 Author

1.1.1 My name is Alan Keith Jones and I am a Senior Director (Environmental Sciences) at RPS Planning and Environment. I hold a BSc Honours Degree in Geography and Biology and a PhD in Plant Ecology. I am a Member of the Royal Society of Biology and a Chartered Biologist.

1.1.2 I have been a professional ecologist since completing my PhD research in 1979. From 1979 until 1983 I was a Research Fellow in the Botany Department of Liverpool University investigating ecological aspects of the restoration of contaminated land for the Department of the Environment. From 1983 to 1990 I was Senior Environmental Consultant and Technical Director of Land Capability Consultants Ltd, responsible for ecological surveys and assessment of impacts of development; design of restoration schemes for contaminated land, mineral workings and other disturbed land; and management of restored land.

1.1.3 I joined RPS in 1990 and have been responsible for assessment of the ecological effects of a wide range of public and private sector development projects in the United Kingdom, the Republic of Ireland and the Mediterranean region. I have presented ecological evidence at many Public Inquiries. This has included, on behalf of the Ministry of Defence, ecological evidence relating to use of the Otterburn and Warcop Training Areas at Public Inquiries in 1997, 1999 and 2001. From 2002 to 2004 I advised the UK Sovereign Base Areas Administration in Cyprus on the effects of new communication facilities on ecological interests at the Akrotiri Salt Lake Ramsar Site. In 2003 I presented ecological and ornithological evidence on behalf of P&O and Shell (UK) Limited at the London Gateway Port Public Inquiry. In 2004 I presented ecological evidence relating to the Ffos-y-fran Land Reclamation Scheme project at Merthyr Tydfil. In 2006 I gave evidence on behalf of Southern Water Services Limited at the

Public Inquiry into the Brighton and Hove Wastewater Treatment Project, including measures to protect breeding peregrine falcons. In 2007 I led a Habitats Regulations Assessment of the East of England draft Regional Spatial Strategy, which RPS carried out for the Government Office for the East of England and the Planning Inspectorate. In 2008 I gave ecological evidence at the Public Inquiry into the proposed Westbury Bypass on behalf of Wiltshire County Council. In 2014 I gave ecological evidence on behalf of the Welsh Government at the Public Inquiry into the proposed improvements to Section 2 of the A465 Heads of the Valleys Road. This section of the road passes through the Clydach Gorge and the Usk Bat Sites and Cwm Clydach Woodlands SACs.

- 1.1.4 My evidence is concerned with ecology and nature conservation in the context of the M4CaN Scheme.
- 1.1.5 I have led the team responsible for undertaking the ecological baseline surveys and the ecological aspects of the Environmental Impact Assessment following appointment of the Costain/Vinci Joint Venture as the Welsh Government's Contractor in 2015. Whilst parts of my evidence are based on surveys carried out by others, including those carried out by Arup and their specialist consultants in 2014, and my colleagues in RPS and other specialist consultants in 2015 and 2016, I adopt their findings as the basis of my evidence, and confirm that all the opinions expressed in this Proof of Evidence are my own.
- 1.1.6 The evidence which I have prepared and provide in this Proof of Evidence is true, and has been prepared and is given in accordance with the guidance of the Royal Society of Biology's Code of Professional and Ethical Conduct. I confirm that the opinions expressed are my true and professional opinions.

1.2 Scope of Evidence

- 1.2.1 My evidence is concerned with the ecological and nature conservation interests of the land which would be affected by the published

scheme, and adjoining areas, and the effects on those interests resulting from the construction and operation of the road.

1.2.2 RPS was instructed in this regard in March 2015 by the Arup/Atkins Design Joint Venture on behalf of the Costain/Vinci Joint Venture and in turn the Welsh Government Department for Economy, Science and Transport (subsequently the Department for Economy and Infrastructure) and has been responsible for the Environmental Impact Assessment of the published Scheme, including ecological surveys and assessments necessary to inform the March 2016 Environmental Statement (Document 2.3.2) and subsequent surveys and assessments.

1.2.3 I was not involved in the development of the route selection or initial work on the Scheme before March 2015.

1.2.4 The proposed new section of motorway would run between Junction 29 at Castleton and Junction 23 at Magor. Approximately two thirds of the route for the proposed new section of motorway crosses the Gwent Levels. The Gwent Levels is an area of flat reclaimed coastal grazing marshes adjoining the Severn Estuary that comprises the Wentlooge Levels and Caldicot Levels to the west and east of Newport respectively. The Gwent Levels are low lying with an elevation typically of between 5 – 6 m above ordnance datum (AOD).

1.2.5 The Gwent Levels is designated as a series of Sites of Special Scientific Interest (SSSIs) comprising:

Gwent Levels - Rumney and Peterstone SSSI.

Gwent Levels - St. Brides SSSI.

Gwent Levels - Nash and Goldcliffe SSSI.

Gwent Levels - Whitson SSSI.

Gwent Levels - Redwick and Llandevenny SSSI.

Gwent Levels - Magor and Undy SSSI.

Magor Marsh SSSI

Newport Wetlands SSSI

- 1.2.6 The Caldicot and Wentlooge Levels are dissected by extensive networks of tide locked freshwater drains known locally as reens with connecting field ditches. The water levels in the reens are controlled by a series of sluice structures and are divided into winter penning levels and summer penning levels. Winter penning levels are kept lower to provide additional storage capacity. In summer, the penning levels are kept higher to provide a water source for agricultural purposes.
- 1.2.7 The reens and ditches within the Gwent Levels support a wide range of aquatic plants, including many rare or scarce species that in turn support a wide variety of other wildlife. There is a diverse community of insects and other invertebrates inhabiting the reens and ditches. The unmown ditch banks and rough grassland areas provide habitat for the shrill carder bee. The reens and ditches also provide habitat for protected species including otter, water vole, grass snake and amphibians.
- 1.2.8 The route for the proposed new section of motorway would cross the Rivers Usk and Ebbw. At the location of the proposed crossing, the River Usk is designated nationally and internationally as a SSSI and Special Area of Conservation (SAC). The Severn Estuary to the south is also subject to national and international designations as a SSSI, SAC, Special Protection Area (SPA) and Ramsar Site.
- 1.2.9 Around the proposed junctions at the western and eastern ends of the Scheme, the ground is higher and agricultural use is a mixture of grazing and arable. Field boundaries are generally hedgerows and there are small areas of woodland, including some which are ancient woodland. An access road is proposed at the eastern end of the Scheme connecting to Ifton Quarry. There are extensive woodlands (including both ancient woodlands and plantations) to the west and north of Ifton Quarry.

- 1.2.10 A section of the route passes through the southern section of the Tata Steel Llanwern Steelworks site. This section of the steelworks site has been used as settlement and water treatment lagoons, many of which are now naturally revegetated.
- 1.2.11 In this evidence I describe the methodology of the surveys and assessments which have been undertaken to establish the ecological baseline conditions and to assess the effects of the proposed Scheme on ecology and nature conservation. I also refer to the consultations which have been held, particularly with Natural Resources Wales (NRW). I summarise the significant effects of the Scheme with reference to Chapter 10 Ecology and Nature Conservation of the March 2016 Environmental Statement (ES) (Document 2.3.2), the September 2016 ES Supplement (Document 2.4.4) and the subsequent December 2016 ES Supplement (Document 2.4.14).
- 1.2.12 I respond to objections which have been made to the Scheme relevant to my expertise, and finally draw conclusions based on the evidence which I present.
- 1.2.13 Where appropriate in my evidence I also refer to that of the other ecology witnesses; Mr Jon Davies (dormouse and water vole) (WG 1.19.1), Mr Richard Green (bats) (WG 1.20.1) and Dr Simon Zisman (birds) (WG 1.21.1).
- 1.2.14 At the end of each sections 2 to 7 of this Proof of Evidence is a summary.

2. METHODOLOGY AND CONSULTATION

2.1 Introduction

- 2.1.1 The effects of the published Scheme on ecology and nature conservation are described in Chapter 10 of the March 2016 Environmental Statement (ES) (Document 2.3.2). This explains that the assessment was carried out taking account of the guidance provided in:
- a) Guidelines for Ecological Impact Assessment in the UK Chartered Institute of Ecology and Environmental Management. CIEEM 2006 (Document 11.2.9).
 - b) Guidelines for Baseline Ecological Assessment Institute of Environmental Assessment, 1995 (Document 11.2.2).
 - c) Design Manual for Roads and Bridges (DMRB) Volume 11, Section 2, Part 5, HA 205/08: Assessment and Management of Environmental Effects. Highways Agency, 2008 (Document 13.2.6).
 - d) Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 4: Ecology and Nature Conservation (Highways Agency, 1993).
 - e) Interim Advice Note 116/08 (W) Nature Conservation in Relation to Bats. Welsh Assembly Government, 2009 (Document 11.2.13).
 - f) Interim Advice Note 130/10 Ecology and Nature Conservation: Criteria for Impact Assessment. Highways Agency, 2010 (Document 11.2.19).
 - g) Technical Advice Note (TAN) 5: Nature Conservation and Planning. Welsh Assembly Government, 2009. (Document 11.2.14).
 - h) Welsh Transport Planning and Appraisal Guidance: WelTAG. Welsh Assembly Government, 2008 (Document 6.1.4).
- 2.1.2 As stated in paragraph 10.3.2 of the March 2016 ES (Document 2.3.2), CIEEM issued updated Guidelines for Ecological Impact

Assessment in January 2016 (Document 11.2.32). These guidelines update the previous 2006 version (Document 11.2.9).

2.1.3 Publication of the updated guidance occurred too late to be considered for the purposes of the ecological assessment (which had been completed using the 2006 guidelines. Since publication of the March 2016 ES (Document 2.3.2), the updated guidance has been reviewed. The 2016 guidance has clarified and amplified the previous guidance in some areas, particularly with regard to establishing the baseline; assessment of cumulative impacts; and the approach to avoidance, mitigation, compensation and enhancement. The updated guidance also refers to the role of ecologists in ecosystem services assessments in providing the relevant data to inform the assessments of social and economic value. However, the overall approach to ecological impact assessment set out within the guidance has not changed significantly from that of the CIEEM 2006 guidelines, which was taken into account in the assessment methodology set out in ES Chapter 10 and thus the assessment set out in the March 2016 ES remains valid.

2.1.4 The scope of the assessment was 'detailed' as defined by DMRB Volume 11, Section 2, Part 1 (HA201/08) (Highways Agency, 2008) and considers all potential effects.

2.1.5 An Assessment of Implications (of highways and/or roads projects) on European Sites (AIES) has been carried out in accordance with DMRB Volume 11, Section 4, Part 1 (HD44/09) (Highways Agency, 2009) and was reported on separately in the Statement to inform an Appropriate Assessment (SIAA) (Document 2.3.4).

2.2 Baseline Data Collection

2.2.1 The baseline data collection was divided into two separate tasks: desk study, and surveys undertaken specifically for the M4CaN Scheme.

- 2.2.2 The desk study was based on data provided by the South East Wales Biological Records Centre (SEWBRc). An initial request for data was made in 2014 (reported in Appendix 10.2 of the March 2016 ES (Document 2.3.2) and this was updated in 2015 (reported in Appendix 10.17 of the March 2016 ES). A separate aquatic desk study was carried out in 2015 (reported in Appendix 10.18 of the March 2016 ES).
- 2.2.3 The updated desk study (reported in the March 2016 ES Appendix 10.17) was based on search areas which varied depending on the level of protection afforded to the site or species in question. The search areas used were:
- a) 5 km - statutory designated sites and bat records;
 - b) 2 km - protected and priority species; and
 - c) 1km - other species of conservation concern, SINC's and Wildlife Trust reserves.
- 2.2.4 The search area was extended to 5 km for statutory designated sites, and also for bats as these are mobile species, some of which may travel considerable distances between roosts and feeding areas.
- 2.2.5 A review of European designated sites up to 30 km from the new section of motorway was also undertaken for an Assessment of Implications on European Sites (AIES) which is reported separately.

2.3 Ecology Surveys

- 2.3.1 On 25 November 2013, Arup met with NRW to present work undertaken previously in 2006 and 2009 and to review with NRW the changes in standards and design criteria since that time. A further meeting was held on 6 December 2013, the principal purpose of which was to discuss the ecological survey approach and programme in view of the future EIA process. On 7 February 2014 Arup wrote to NRW seeking confirmation that the proposed scope, methodology

and timing of species specific ecological surveys was appropriate to inform any EIA and assessment under the Habitats Regulations. NRW responded in a series of emails welcoming the survey proposals and making detailed comments with respect to individual surveys.

2.3.2 On 2 July 2014 a meeting was held at which Arup briefed Hyder (as advisers to the Welsh Government Department for Economy Science and Transport) and NRW on ecological survey methodologies and results.

2.3.3 Ecology surveys for the M4CaN Scheme were carried out on behalf of the Welsh Government in 2014 by or for Arup, and comprised the following (reports at March 2016 ES (Document 2.3.2) Appendices 10.2, 10.4 to 10.15 and 10.37):

Extended Phase 1 Habitat Survey.

National Vegetation Classification (NVC) Survey.

Hedgerow Survey.

Great Crested Newt Presence/Absence Surveys.

Bat Activity Survey.

Otter and Water Vole Survey.

Dormouse Survey.

Full Badger Survey.

Hedgehog Survey.

Reptile Survey.

Wintering Bird Survey.

Breeding Bird Survey.

Aquatic Macrophyte Survey.

Invertebrate Survey.

2.3.4 In addition to these surveys, Hyder carried out a survey of wintering birds over the winter of 2014/2015 and this is reported in the

Wintering Bird Survey Report 2015 (Appendix 10.16 of the March 2016 ES (Document 2.3.2)).

- 2.3.5 A meeting was held between Hyder and NRW on 30 January 2015, a note of which was attached as Appendix A to the Scope of Ecological Surveys report, itself forming Appendix 9.1 of the EIA Scoping Report which was Appendix 5.1 of the March 2016 ES (Document 2.3.2). The aim of the meeting was to facilitate the ecology survey scoping for the 2015 season, specifically to inform the Contractor's ecologist (once appointed) with regard to the level and extent of survey likely to be required to inform the Environmental Statement (ES).
- 2.3.6 In particular, the intention was to agree how the scope of the 2015 work could be rationalised once the alignment was fixed as this should allow the surveys to be targeted on a reduced footprint compared with the 2014 surveys.
- 2.3.7 The meeting established key principles regarding the scale and extent of survey work required to complete the ecological baseline for the Scheme. The note, alongside a detailed review of the 2014 survey reports and desk study information, informed the Ecological Scoping Report for the 2015 ecology surveys.
- 2.3.8 Following the appointment of the Costain/Vinci Joint Venture in March 2015, RPS undertook verification and review of these previous survey reports to identify gaps in the survey coverage (largely as a result of lack of access to land at the time of survey). In the case of some surveys, the findings of the Arup reports themselves gave rise to the need for additional surveys.
- 2.3.9 The recommendations made in the reports of the surveys carried out by Arup in 2014, and subsequent discussions with Arup, Hyder and NRW are set out in the Ecology Survey Scoping Report. A draft of this report was discussed with NRW at a meeting on 9 April 2015, and at subsequent meetings on 12 May and 15 May 2015. NRW's comments were taken into account in the scope and methodologies of

the ecology surveys. NRW's formal response to the Scoping Report (including some comments on the scope of ecology surveys) was provided in a letter of 18 September 2015.

2.3.10 Based on these discussions further surveys were carried out in 2015 by RPS (or sub-consultants commissioned by RPS) in order to inform the assessment of the Scheme.

2.3.11 Surveys undertaken by or for RPS in 2015 are as follows (March 2016 ES (Document 2.3.2)), Appendices 10.18 to 10.33 and 10.38:

Extended Phase 1 Habitat Survey.

National Vegetation Classification Survey.

Hedgerow Survey.

Great Crested Newt eDNA Survey.

Bat Activity Surveys.

Bat Roost Surveys.

Otter Survey.

Water Vole Survey.

Dormouse Survey.

Badger Survey.

Reptile Survey.

Breeding Bird and Breeding Wader Surveys.

Barn Owl Survey.

Aquatic Macrophytes Survey.

Terrestrial Invertebrate Surveys.

River Corridor Survey.

Wax Cap Survey.

2.3.12 Further surveys have been completed in 2016 in order to supplement the previous surveys and in some cases to resolve shortcomings in those previous surveys. These additional surveys have included:

Bat Hibernation Roost Survey
Winter Bird Survey 2015/2016
Great Crested Newt survey 2016
Breeding Bird Survey 2016
Bat Emergence Survey 2016
Dormouse Survey 2016

- 2.3.13 The reports of the Bat Hibernation Roost Survey, Winter Bird Survey 2015/2016, Great Crested Newt Survey 2016 and Breeding Bird Survey 2016 were appended to the September 2016 Environmental Statement Supplement (ES Supplement) (Document 2.4.4) submitted in. The reports of the Bat Emergence Survey 2016 and the Dormouse Survey 2016 were appended to the December 2016 Environmental Statement Supplement (ES Supplement) (Document 2.4.14).

2.4 Assessment of Implications for European Sites (AIES).

- 2.4.1 The European Community Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Flora and Fauna (the Habitats Directive) (Document 3.1.21) provides legal protection for habitats and species of European importance. The Directive is transposed into UK law by the Conservation of Habitats and Species Regulations 2010 (the ‘Habitats Regulations’) (Document 3.1.22).
- 2.4.2 The Regulations require the competent authority, before deciding to give consent for a plan or project which:
- “a) is likely to have a significant effect on a European site (either alone or in combination with other plans or projects); and*
 - b) is not directly connected with or necessary to the management of that site,*

to make an ‘appropriate assessment’ of the implications for that site in view of its conservation objectives. In the light of the conclusions of the assessment, the competent authority may agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the European site.”

- 2.4.3 All plans and projects should identify any possible impacts early in the plan-making process, and then either alter the plan to avoid them, or introduce mitigation measures to the point where no adverse impacts remain. The competent authority shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if they consider it appropriate, having taken the opinion of the general public.
- 2.4.4 If the conclusion is that there would be an effect on the integrity of a European Site then the project can only proceed if there are no alternatives and there are imperative reasons of overriding public interest. Where this is the case compensatory measures must be adopted.
- 2.4.5 The Design Manual for Roads and Bridges (DMRB) in Volume 11, Section 4, Part 1 (HD44/09) (Highways Agency, 2009 – included in Document 6.1.8) provides guidance for the assessment of transport schemes known as Assessment of the Implications for European Sites (AIES).
- 2.4.6 AIES is a five stage process. These stages are:
- Stage 1: Screening
 - Stage 2: Appropriate Assessment
 - Stage 3: Alternative Solutions
 - Stage 4: Imperative Reasons of Overriding Public Interest (IROPI)
 - Stage 5: Compensatory Measures

- 2.4.7 Stages 3 to 5 are only required if the Appropriate Assessment at Stage 2 concludes that there is an adverse effect on the integrity of a European Site
- 2.4.8 The AIES also takes account of the guidance provided in Welsh Government TAN 5: Nature Conservation and Planning (Document 11.2.14), in particular Section 5: Development affecting designated sites and habitats.
- 2.4.9 Insofar as one of the qualifying interests of the Wye Valley and Forest of Dean Bat Sites SAC is the Lesser Horseshoe Bat, the AIES also has regard to the guidance of Interim Advice Note (IAN) 116/08(W) Nature Conservation Advice in Relation to Bats 1 (Document 11.2.13).
- 2.4.10 The AIES also had regard to the Guidelines on Ecological Impact Assessment produced by the Chartered Institute for Ecology and Environmental Management in 2006 (Document 11.2.9).
- 2.4.11 The Statement to Inform an Appropriate Assessment (SIAA) (Document 2.3.4) submitted with the draft Orders covers the Screening and Appropriate Assessment stages.
- 2.4.12 The conclusion of the SIAA report was that there would be no adverse effect on the integrity of the European sites considered either alone or in-combination with other plans and projects. Therefore, there was no requirement to undertake the further stages of the AIES process.

2.5 Consultations

- 2.5.1 The full process of consultation during the development of the M4CaN Scheme is summarised in the Proof of Evidence of Mr Matthew Jones (WG 1.1.1). I have referred above to the consultations with NRW regarding the scope of the EIA and of the ecological surveys. A list of consultation meetings since March 2016, including meetings with NRW, is appended to the Proof of Evidence of Dr Peter Ireland (WG 1.7.1).

- 2.5.2 Regular meetings have been held with NRW throughout the development of the proposals. In particular, approximately monthly liaison meetings have been held with NRW, with other meetings to discuss particular aspects of the Scheme as required.
- 2.5.3 NRW wrote to the Welsh Government on 4 May 2016 in response to the consultation on the draft Orders and supporting documents. NRW commented that due to the nature, size and complexity of the proposals, the draft Orders raised a number of environmental issues within their remit. Key topics relevant to this evidence were:
- a) Protected Species
 - b) Designated Sites
- 2.5.4 With regard to protected species NRW summarised their position as being, from the information provided, that they were unable to agree with the conclusions of the Environmental Statement that adverse effects on dormice, bats, great crested newt, otter and water vole can be avoided. It should be noted that the March 2016 ES (Document 2.3.2) did not conclude that there would be no adverse effects on any of these species. It is the case that, taking into account the proposed mitigation, the assessment was that there would be no significant effects on these species other than that there would be significant land take effects in the short or medium term, or significant effects during construction, on otter and bats. Operation of the new section of motorway would also have significant long term effects on otter and bats.
- 2.5.5 NRW requested the following additional information:
- a) Additional survey information particularly with regard to great crested newts and bats;
 - b) The provision of a comprehensive strategy for the conservation of dormice; and

- c) Detailed conservation strategies for bats, great crested newt, otter and water vole.

2.5.6 Additional great crested newt surveys were carried out in spring 2016 and the results set out in a report which was issued to NRW on 2 August 2016 and was Appendix S10.6 of the September 2016 ES Supplement (Document 2.4.4).

2.5.7 An additional bat hibernation roost survey was carried out in winter 2016, and tree and building roost emergence surveys were carried out during spring and summer 2016. The hibernation roost survey report was issued to NRW on 16 June 2016 and was Appendix S10.7 of the September 2016 ES Supplement (Document 2.4.4). The reports of the tree and building roost surveys were appended to the December 2016 ES Supplement (Document 2.4.14) as Appendices SS10.2 and SS10.3 respectively.

2.5.8 Further surveys carried out subsequent to the submission of the draft Orders were the wintering bird survey 2015/2016, submitted to NRW on 16 June 2016 (Appendix S10.4 to the September ES Supplement (Document 2.4.4) and the 2016 Breeding Bird Survey, submitted to NRW on 28 July 2016 (Appendix S10.5 to the September 2016 ES Supplement).

2.5.9 A further dormouse survey was carried out in 2016 (Appendix SS10.1 of the December 2016 ES Supplement (Document 2.4.14)).

2.5.10 Mitigation strategies for bats, great crested newt, water vole, and dormouse have been discussed with NRW and drafts were appended to the December 2016 ES Supplement (Document 2.4.14). The mitigation strategy for bats is described by Mr Richard Green in his Proof of Evidence (WG 1.20.1), and those for water vole and dormouse by Mr Jon Davies (WG 1.19.1).

- 2.5.11 NRW have agreed that since no evidence of otter holts or resting places have been found within the Scheme corridor there is no requirement for a specific mitigation strategy for otter.
- 2.5.12 NRW have also agreed that mitigation strategies for badger and barn owl are not required at this stage and can be prepared in advance of commencement of construction.
- 2.5.13 With regard to designated sites, NRW's position in their response to the draft Orders consultation may be summarised as, from the information provided, they were unable to agree with the conclusions of the Environmental Statement that adverse effects can be avoided during both the construction and operational phases on:

Gwent Levels: Redwick and Llandevenny SSSI

Gwent Levels: Whitson SSSI

Gwent Levels: Nash and Goldcliff SSSI

Gwent Levels: St. Brides SSSI

- 2.5.14 In addition, at that stage, they were unable to rule out indirect adverse effects on:

Gwent Levels: Magor and Undy SSSI

Magor Marsh SSSI

Gwlyptiroedd Casnewydd/ Newport Wetlands SSSI

Gwent Levels: Rumney and Peterstone SSSI

- 2.5.15 Specifically, NRW were not satisfied that the proposed construction methodologies, combined with the Drainage Strategy (Appendix 2.2 of the March 2016 ES (Document 2.3.2)), Reen Mitigation Strategy (Appendix 2.3 of the March 2016 ES) and SSSI Mitigation Strategy (Appendix 10.35 of the March 2016 ES) would fully mitigate for the loss of SSSI area, and disruption to the drainage network on those

Gwent Levels SSSIs which would be directly affected by the proposals.

- 2.5.16 A meeting was held with NRW on 6th September 2016 to discuss revisions to the SSSI Mitigation Strategy, along with the Reen Mitigation Strategy and the Drainage Strategy. A Supplementary File note on the Reen Mitigation Strategy and a Supplementary Drainage Strategy Report were appended (Appendices 2.1 and 2.2 respectively) of the September 2016 ES Supplement (Document 2.4.4). The revised SSSI Mitigation Strategy was Appendix SR10.35 of the December 2016 (ES Supplement Document 2.4.14).
- 2.5.17 NRW wrote to the Welsh Government on 18 October 2016 in response to the consultation on the September 2016 ES Supplement (Document 2.4.4). The letter stated that the additional information did not alter NRW's view, as expressed in the letter of 4 May 2016, that the Scheme:
- a) would cause adverse effects on European Protected Species and water vole;
 - b) would cause adverse effects on the Gwent Levels Sites of Special Scientific Interest; and
 - c) is contrary to Welsh Governments's Technical Advice Note (TAN) 15: Development and Flood Risk.
- 2.5.18 NRW stated that the additional information did not address their concerns with respect to dormouse, bats, great crested newt otter and water vole as set out in the letter of 4 May 2016.
- 2.5.19 With respect to matters relevant to my evidence, subsequent to this letter the December 2016 ESS (Document 2.4.14) included publication of further ecological surveys relating to dormouse and bats (Appendices SS10.1, SS10.2 and SS10.3), and mitigation strategies for dormouse, bats, great crested newt and water vole, and

(Appendices SS10.4, SS10.5, SS10.6 and SS10.7). A revised SSSI Mitigation Strategy was also published as Appendix SR10.35).

- 2.5.20 These additional documents have addressed many of the matters referred to the letter of 18th October. To the extent that there remain some matters of concern to NRW, discussions continue between NRW and the design team with a view to their resolution.

2.6 Summary

- 2.6.1 In this section I have described the methodology of the assessment of ecological effects of the Scheme as set out in Chapter 10 of the March 2016 ES (Document 2.3.2) including the relevant guidance. I have explained that CIEEM issued updated Guidelines for Ecological Impact Assessment in January 2016 (Document 11.2.32) which update the previous 2006 version (Document 11.2.9). Publication of the updated guidance occurred too late to be considered for the purposes of the ecological assessment which had been completed using the 2006 guidelines. However, the overall approach to ecological impact assessment set out within the guidance has not changed significantly from that of the CIEEM 2006 guidelines, which was taken into account in the assessment methodology set out in Chapter 10 of the March 2016 ES and therefore that assessment remains valid.
- 2.6.2 I have described the process of baseline data collection which was divided into two separate tasks: desk study and surveys undertaken specifically for the M4CaN Scheme. The baseline surveys commenced in 2014, continued through 2015, and some surveys have continued in 2016. The reports of the ecology surveys completed in 2014 and 2015 were appended to the March 2016 ES (Document 2.3.2). Further surveys were appended to the September 2016 ES Supplement (Document 2.4.4), and the dormouse and bat surveys carried out in 2016 were appended to the December 2016 ES Supplement (Document 2.4.14).

2.6.3 NRW were consulted on the scope and methodologies of the surveys and regular meetings have been held with NRW throughout the development of the proposals. NRW wrote to the Welsh Government on 4 May 2016 in response to the consultation on the draft Orders and supporting documents. NRW commented that due to the nature, size and complexity of the proposals, the draft Orders raised a number of environmental issues within their remit. Key topics relevant to this evidence were:

- a) Protected Species
- b) Designated Sites

2.6.4 With regard to protected species NRW summarised their position as being, from the information provided, that they were unable to agree with the conclusions of the Environmental Statement that adverse effects on dormice, bats, great crested newt, otter and water vole can be avoided. In response to these comments further dormouse, bat, otter and great crested newt surveys have been carried out, and mitigation strategies for dormouse, bats, great crested newt and water vole are being developed in consultation with NRW. Drafts of these strategies were appended to the December 2016 ES Supplement (Document 2.4.14).

2.6.5 With regard to designated sites, NRW's position in their response to the draft Orders consultation was that they were not satisfied that the proposed construction methodologies, combined with the Drainage Strategy, Reen Mitigation Strategy and SSSI Mitigation Strategy will fully mitigate for the loss of SSSI area, and disruption to the drainage network on those Gwent Levels SSSIs which would be directly affected by the proposals.

2.6.6 The SSSI Mitigation Strategy was published as Appendix 10.35 of the March 2016 ES (Document 2.3.2). A meeting was held with NRW on 6th September 2016 to discuss revisions to the SSSI Mitigation

Strategy, along with the Reen Mitigation Strategy and the Drainage Strategy. A Supplementary File note on the Reen Mitigation Strategy and a Supplementary Drainage Strategy Report were appended (Appendices 2.1 and 2.2 respectively) to the September 2016 ES Supplement (Document 2.4.4). The revised SSSI Mitigation Strategy was Appendix SR10.35 of the December 2016 ES Supplement (Document 2.4.14).

- 2.6.7 NRW wrote to the Welsh Government on 18 October 2016 in response to the consultation on the September 2016 ES Supplement (Document 2.4.4). The letter stated that the additional information did not alter NRW's view, as expressed in the letter of 4 May 2016, that the Scheme:
- a) would cause adverse effects on European Protected Species and water vole;
 - b) would cause adverse effects on the Gwent Levels Sites of Special Scientific Interest; and
 - c) is contrary to Welsh Governments 's Technical Advice Note (TAN) 15: Development and Flood Risk.
- 2.6.8 NRW stated that the additional information did not address their concerns with respect to dormouse, bats, great crested newt otter and water vole as set out in the letter of 4 May.
- 2.6.9 With respect to matters relevant to my evidence, subsequent to this letter the December 2016 ESS (Document 2.4.14) included publication of further ecological surveys relating to dormouse and bats (Appendices SS10.1, SS10.2 and SS10.3), and mitigation strategies for dormouse, bats, great crested newt and water vole, and (Appendices SS10.4, SS10.5, SS10.6 and SS10.7). A revised SSSI Mitigation Strategy was also published as Appendix SR10.35).

- 2.6.10 These additional documents have addressed many of the matters referred to the letter of 18th October. To the extent that there remain some matters of concern to NRW, discussions continue between NRW and the design team with a view to their resolution.
- 2.6.11 An Assessment of Implications (of highways and/or roads projects) on European Sites (AIES) has been carried out in accordance with DMRB Volume 11, Section 4, Part 1 (HD44/09) (Highways Agency, 2009 – included in Document 6.1.6.8) and was reported on separately in the Statement to inform an Appropriate Assessment (SIAA) (Document 2.3.4). The conclusion of the SIAA report was that there would be no adverse effect on the integrity of the European sites considered either alone or in-combination with other plans and projects. Therefore, there was no requirement to undertake further stages of the AIES process.

3. OPTION SELECTION AND SCHEME DESIGN

3.1 Introduction

3.1.1 Mr Matthew Jones and Mr Ben Sibert explain in their Proofs of Evidence (WG 1.1.1 and WG 1.5.1 respectively) the process of route selection and scheme design undertaken for the published Scheme. Chapter 4 of the March 2016 ES (Document 2.3.2) also outlines the main alternatives considered during the development of the Scheme. It also sets out the main reasons for the selection of the key elements of the Scheme, including the following.

- a) Selection of a motorway option (compared to non-motorway solutions).
- b) Selection of the broad route corridor to the south of Newport (compared to alternative route options).
- c) Selection of the design options included within the draft Statutory Orders (compared to alternative design solutions at locations along the route).

3.1.2 In this section, I outline the ecological and nature conservation considerations which informed the Scheme development subsequent to the award by the Welsh Government of the Professional Services contract for the Scheme development and environmental surveys, including publication of draft Statutory Orders, and up to the Public Local Inquiry.

3.1.3 The main components of the conceptual design at the time of the award of the contract included the following.

- a) Castleton Junction – an all movements free flowing interchange to accommodate the existing M4 and M48 (to Cardiff) and the new section of M4.
- b) Magor Junction – an all movements interchange comprising a large gyratory to accommodate the slip roads to and from the existing M4 and the B4245 and a new smaller gyratory on the

M48 to accommodate the M48 (from Chepstow) together with a new section of dual carriageway and a link between the two gyratories.

- c) An all movements junction comprising two underbridges at Docks Way from the new section of M4 and a link to the Southern Distributor Road.
- d) An all movements junction comprising a gyratory with two overbridges at Glan Llyn on the new section of M4 providing a link to the A4810 road.

- 3.1.4 The conceptual design included bridge crossings of the River Usk and River Ebbw.

3.2 Changes to conceptual design

- 3.2.1 Changes were made to the conceptual design prior to submission of the draft Statutory Orders, some of which have implications for ecology and nature conservation. Some of these changes responded directly to the aim of minimising the effects of the Scheme on the Gwent Levels SSSIs, in some cases following requests from NRW. These include:

Water Treatment Areas

- 3.2.2 The conceptual design proposed twelve Water Treatment Areas at regular intervals along the route of the new section of motorway. In the adopted design, the number, location and size of the Water Treatment Areas have been rationalised, including moving them at the request of NRW where practicable to the north side of the new section of motorway across the Gwent Levels. The advantage of the changes is to reduce the amount of land required within the Gwent Levels SSSIs on the south side of the new section of motorway thereby minimising impacts on the greater part of the designated sites.

Reen Mitigation

- 3.2.3 The conceptual design for reen mitigation across the Gwent Levels was to provide new lengths of reen along both sides of the new section of motorway to mitigate for the loss of those lengths lost to the footprint of the road. These replacement lengths would connect to the existing reens and ditch network to maintain hydraulic connectivity. During consultation, NRW expressed concern about the length of replacement reen being proposed due to potential maintenance requirements and the possible drying out of land due to the much higher density of drainage channels. Consequently, an alternative solution has been adopted, providing reen connectivity on one side of the new section of motorway.
- 3.2.4 The alternative solution incorporated into the adopted design provides a combination of reens and smaller field ditches that reflects the existing historic landscape. The solution has replacement reens along the north side of the new section of motorway to allow conveyance of rainfall flows in a flooding event, with smaller field ditches to the south.
- 3.2.5 The Reen Mitigation Strategy was published as Appendix 2.3 of the March 2016 ES (Document 2.3.2). A Supplementary File Note on the Reen Mitigation Strategy was published as Appendix S2.1 to the September 2016 ES Supplement (Document 2.4.4).

Highway Cross Section and Fence Line

- 3.2.6 In the conceptual design, the highway fence line was located 3 metres from the toe of the highway embankments in accordance with the standard design set out in the Design Manual for Roads and Bridges (Document 6.1.8). In the current design, that 3 metres offset has been reduced to 1 metre across the Gwent Levels, which decreases the amount of highway land inside the highway fence line within the Gwent Levels SSSIs by approximately 3 hectares.

Other Changes

- 3.2.7 Other changes related to the need to realign Lighthouse Road to provide an overbridge for the Welsh Coast Path and a private means of access on the current alignment of Heol Pont-y-Cwch, to shorten the River Ebbw crossing, to re-design the Docks Way Junction, to realign and shorten the River Usk crossing, to realign North Row, to realign the Nash Road/Meadows Road Junction and to move the Glan Llyn Junction.
- 3.2.8 Some of these changes have resulted in slight increases in the extent of the works within the Gwent Levels SSSIs compared to the conceptual Scheme and these were taken into account in the assessment of effects in the March 2016 ES (Document 2.3.2).
- 3.2.9 For the River Usk Crossing the conceptual design was based on a skewed structure, resulting in a main span of 500 metres in order to ensure that the piers were not located within the wetted channel of the river and therefore ensuring that there was no effect on the integrity of the SAC.
- 3.2.10 The design was reviewed taking into account the desire to simplify the approach to construction, minimise adverse impacts on the River Usk and consider impacts on Newport Docks and Stephenson's Industrial Estate.
- 3.2.11 The adopted design would reduce the horizontal skew of the River Usk Crossing structure. This would result in a simpler construction approach for the River Usk Crossing. The main span would be reduced in length from approximately 500 metres to approximately 440 metres. One of the disadvantages of the adopted revised design was that the east tower of the structure would be located closer to the river edge of the saltmarsh but still outside the wetted channel.
- 3.2.12 The highway drainage outfall was redesigned to enable the eastern half of the bridge to drain more directly to the River Usk which

alleviates the need for a much larger Water Treatment Area within the Nash and Goldcliff SSSI adjacent to Nash Road. Such drainage would be via pollution control measures on the bridge and a storage lagoon so as to ensure that there is no impact on the integrity of the SAC.

3.3 Summary

3.3.1 In this section I have outlined the ecological and nature conservation considerations which informed the Scheme development subsequent to the award by the Welsh Government of the Professional Services contract for the Scheme development and environmental surveys, including publication of draft Statutory Orders, and up to the Public Local Inquiry.

3.3.2 Changes were made to the conceptual design prior to submission of the draft Statutory Orders, some of which have implications for ecology and nature conservation. Some of these changes responded directly to the aim of minimising the effects of the Scheme on the Gwent Levels SSSIs, in some cases following requests from NRW. These include:

- a) The number, location and size of the Water Treatment Areas have been rationalised, including moving them at the request of NRW, where practicable, to the north side of the new section of motorway across the Gwent Levels.
- b) At the request of NRW, providing reed connectivity along the north side of the new section of motorway to allow conveyance of rainfall flows in a flooding event, with smaller field ditches to the south.
- c) Reducing the 3 m off set for the highway fence line from the toe of the highway embankments to 1 m across the Gwent Levels which decreases the amount of highway land within the Gwent Levels SSSIs.

3.3.3 Other changes related to the need to realign Lighthouse Road, to provide an overbridge for the Welsh Coast Path and a private means of access on the current alignment of Heol Pont-y-Cwch, to shorten the River Ebbw crossing, to re-design the Docks Way Junction, to realign and shorten the River Usk crossing, to realign North Row, to realign the Nash Road/Meadows Road Junction and to move the Glan Llyn Junction. Some of these changes have resulted in slight increases in the extent of the works within the Gwent Levels SSSIs compared to the conceptual Scheme and these were taken into account in the assessment of effects in the March 2016 ES (Document 2.3.2).

4. NATURE CONSERVATION BASELINE, DESIGNATIONS AND POLICIES

4.1 Introduction

- 4.1.1 In this section I summarise the information on statutory and non-statutory designated nature conservation sites within the study area for the published Scheme, the boundaries of which are shown on March 2016 ES (Document 2.3.2) Figures 10.1 (International Statutory Sites), 10.2 (National Statutory Sites) and 10.3 (Non Statutory Sites).
- 4.1.2 I also summarise the baseline information for, and status of, the main habitats and species present in the area of the Scheme.

4.2 International Statutory Sites

- 4.2.1 EC Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (the Habitats Directive) (Document 3.1.21) requires member states to establish a series of protected sites for habitats and species of “Community Interest”. These sites are Special Areas of Conservation (SAC). The requirements of the Habitats Regulations are transposed into UK law by the Conservation of Habitats and Species Regulations 2010 (the Habitats Regulations) (Document 3.1.22).
- 4.2.2 Special Protection Areas (SPAs) are sites classified in accordance with Article 4 of the EC Directive 79/409/EEC on the conservation of wild birds (Document 11.3.35) which came into force in April 1979. They are classified for rare and vulnerable birds (as listed on Annex I of the Directive), and for regularly occurring migratory species.
- 4.2.3 The Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention) (Document 11.3.36) is also relevant and covers all aspects of wetland conservation and wise use. The Convention has three main 'pillars' of activity: the designation of wetlands of international importance as Ramsar sites;

the promotion of the wise-use of all wetlands in the territory of each country; and international co-operation with other countries to further the wise-use of wetlands and their resources. The UK ratified the Convention in 1976. The UK has generally chosen to underpin the designation of its Ramsar sites through prior notification of these areas as Sites of Special Scientific Interest (SSSIs). Accordingly, these receive statutory protection under the Wildlife & Countryside Act 1981(as amended) (Document 3.1.7). Government has issued policy statements relating to the special status of Ramsar sites. This extends the same protection at a policy level to listed Ramsar sites in respect of development as that afforded to sites which have been designated under the EC Birds and Habitats Directives.

4.3 National Statutory Sites

- 4.3.1 Sites of Special Scientific Interest (SSSIs) are notified under section 28 of the Wildlife and Countryside Act 1981 (as amended) (Document 3.1.7).
- 4.3.2 National Nature Reserves are declared by the statutory country conservation agencies (in this case NRW) under the National Parks and Access to the Countryside Act 1949 (Document 10.1.1) and the Wildlife and Countryside Act 1981 (as amended) (Document 3.1.7).

4.4 Non-statutory Sites

- 4.4.1 Sites of Importance for Nature Conservation (SINC) are non-statutory designated sites, typically identified in Local Development Plans and protected by appropriate policies. Nature Reserves are areas of land, usually owned by nature conservation organisations, which are managed for the purpose of nature conservation.

4.5 Designated Sites in the Vicinity of the Scheme

- 4.5.1 The following designated sites have been considered in assessing the effects of the published Scheme:

- a) River Usk SAC

- b) River Usk (Lower Usk) SSSI
- c) Severn Estuary SAC
- d) Severn Estuary SPA
- e) Severn Estuary Ramsar Site
- f) Severn Estuary SSSI
- g) Wye Valley and Forest of Dean Bat Sites SAC
- h) Mwyngloddfa Mynydd-Bach SSSI
- i) Wye Valley Lesser Horseshoe Bat SSSI
- j) Gwent Levels – Rumney and Peterstone SSSI;
- k) Gwent Levels – St Brides SSSI;
- l) Gwent Levels – Nash and Goldcliff SSSI;
- m) Gwent Levels – Whitson SSSI;
- n) Gwent Levels - Redwick and Llandevenny SSSI;
- o) Gwent Levels – Magor and Undy SSSI.
- p) Newport Wetlands SSSI
- q) Newport Wetlands NNR
- r) Newport Wetlands RSPB Reserve
- s) Magor Marsh SSSI
- t) Magor Marsh Gwent Wildlife Trust Reserve
- u) Rogiet Meadow SSSI
- v) Penhow Woodlands SSSI
- w) Penhow Woodlands NNR
- x) LG Duffryn Site 1 (South Lake Drive) SINC
- y) LG Duffryn Site 2 SINC
- z) Afon Ebbw River SINC
- aa) Marshall's SINC
- bb) Solutia Site SINC
- cc) Spencer Works 3 SINC
- dd) Alpha Steel Site SINC
- ee) Spencer Works 3 SINC
- ff) Elver Pill Reen Grassland and Pond SINC
- gg) Greenmoor Pool SINC
- hh) Bowkett Field, Barecroft SINC

- ii) Barecroft Fields SINC
- jj) Land at Barecroft Common SINC
- kk) Upper Cottage Pond SINC
- ll) Blue House Farm SINC
- mm) Blackwall Lane Field SINC
- nn) Grange Road SINC
- oo) Upper Grange Farm Field SINC

4.5.2 The ecological interests of these sites, their relationship to the Scheme, and the important features of the sites potentially affected by the Scheme are summarised below.

4.6 River Usk SAC and River Usk (Lower Usk) SSSI

4.6.1 The River Usk/Afon Wysg SAC extends from the Black Mountains in the west of the Brecon Beacons National Park and flows east and then south to enter the Severn Estuary at Newport. The primary reason for the designation of the SAC is the presence of a range of fish species (including sea lamprey, brook lamprey, river lamprey, twaite shad, Atlantic salmon and bullhead) and otter. The citation for the SAC also notes the presence of watercourse habitat (watercourses of plain to montane levels with *Ranunculus fluitantis* and *Callitriche-Batrachion* vegetation) and allis shad as qualifying features, although not the primary reason for designation.

4.6.2 The River Usk is also designated at the national level as a SSSI. The relevant part of the river through Newport forms part of the River Usk (Lower Usk) SSSI, which extends from Abergavenny to the confluence with the River Ebbw at Newport where it enters the Severn Estuary. The SSSI citation notes that the river is one of the largest in Wales and that the Lower Usk represents an example of a large lowland river not subject to significant modification. Upstream of Abergavenny the River Usk (Upper Usk) SSSI extends along the course of the river to Glasfynydd Forest on the northern edge of Fforest Fawr in Powys.

4.6.3 The special features of the SSSI are as follows.

- a) Running water supporting *Ranunculion* vegetation.
- b) Otter.
- c) Fish species.
- d) A group of rare craneflies.

4.6.4 The SSSI citation indicates that in addition to the fish and otter populations, the invertebrate fauna is characteristic of a large lowland river, with craneflies of particular interest. Scarce higher plant communities at the river's tidal reaches are also of special interest. Although not a special feature of the site, there is a good range of breeding birds associated with the riverine habitats. The SSSI designation includes some areas of adjacent habitat, such as woodland, marshy grassland, stands of tall herb, swamp and fen vegetation, saltmarsh and coastal grassland.

4.6.5 The new section of motorway would cross the River Usk by means of a cable stayed bridge with approach viaducts at either side. The bridge has been designed to avoid the wetted channel of the River Usk but the east pylon of the crossing would be located in an area of saltmarsh on the east bank of the river. This saltmarsh is included in the River Usk (Lower Usk) SSSI and in the River Usk SAC. Saltmarsh is a feature of the SSSI but not of the SAC.

4.7 Severn Estuary SAC, SPA, Ramsar Site and SSSI

4.7.1 The Severn Estuary/Môr Hafren is designated as a European Marine Site, incorporating SAC, SPA and Ramsar site designations. The European Marine Site includes the following features.

- a) Estuary.
- b) Subtidal sandbanks.
- c) Intertidal mud and sand.

- d) Atlantic salt meadow/saltmarshes.
- e) Reefs.
- f) Migratory fish (river and sea lamprey, twaite shad, salmon, eel, sea trout and allis shad) and assemblage of fish species.
- g) Internationally important populations of migratory and wintering bird species.
- h) Internationally important populations of waterfowl.
- i) Rocky shores.
- j) Freshwater grazing marsh/neutral grassland.

4.7.2 The River Severn is also designated at the national level as a SSSI. The citation refers to the estuarine fauna, which includes invertebrate populations of considerable interest, in addition to the internationally important populations of wintering waterfowl and migratory fish. In addition, the estuary fringes include areas of saltmarsh supporting a range of saltmarsh types.

4.7.3 The Severn Estuary designated sites, at the closest point (the River Ebbw), are some 400 m south of the Scheme. There is the potential for indirect effects on the Severn Estuary designated sites, for example through disturbance of wintering birds, for which the estuary is important.

4.8 Wye Valley and Forest of Dean Bat Sites SAC, Mwyngloddfa Mynydd-Bach SSSI and Wye Valley Lesser Horseshoe Bat SSSI

4.8.1 The Wye Valley and Forest of Dean Bat Sites/Safleoedd Ystlumod Dyffryn Gwy a Fforest y Ddena SAC is designated for lesser horseshoe and greater horseshoe bats.

4.8.2 The site comprises a complex of sites on the border between England and Wales containing the greatest concentration of lesser horseshoe bats in the UK, equivalent to approximately 26% of the national population. The complex also represents the northern part of the

range for greater horseshoe bats and supports approximately 6% of the UK population. The sites contain maternity bat roosts, as well as suitable hibernation habitat in disused mines.

4.8.3 The SAC includes four SSSIs, of which two are within the study area: The Mwyngloddfa Mynydd-Bach SSSI and Wye Valley Lesser Horseshoe Bat SSSI.

4.8.4 The Mwyngloddfa Mynydd-Bach SSSI provides habitat for the lesser horseshoe bat, including disused mines providing hibernation habitat. The Wye Valley Lesser Horseshoe Bat SSSI is a composite bat site, including summer nursery roosts for lesser horseshoe bat. Collectively, these form the most important population centre for the species in the UK.

4.8.5 The Mwyngloddfa Mynydd-Bach SSSI is the closest of these sites to the proposed new section of motorway and at its closest is some 6.2 km to the north east of the Scheme. Part of the Wye Valley Lesser Horseshoe Bat SSSI is some 7.4 km from the Scheme. To the extent that the Scheme has the potential for adverse effects on the greater and lesser horseshoe bats which are the important features, then there is the potential for effects on the designated sites.

4.9 Gwent Levels SSSIs

4.9.1 Much of the Gwent Levels is designated as SSSIs. The SSSIs within the study area are:

- a) Gwent Levels – Rumney and Peterstone SSSI;
- b) Gwent Levels – St Brides SSSI;
- c) Gwent Levels – Nash and Goldcliff SSSI;
- d) Gwent Levels – Whitson SSSI;
- e) Gwent Levels - Redwick and Llandeenny SSSI; and
- f) Gwent Levels – Magor and Undy SSSI.

- 4.9.2 The special features of these SSSIs are reens and ditch habitat; insects and other invertebrates (aquatic); and shrill carder bee. The reens and ditches within the Gwent Levels support a wide range of aquatic plants, including many rare or scarce species, which in turn support a wide variety of other wildlife. There is a diverse community of insects and other invertebrates (for example, water beetles) inhabiting the reens and ditches. The assemblage of water beetles found across the Gwent Levels is unique in Wales and includes the great silver beetle, which is found nowhere else in Wales and is restricted to only a few other sites in southern England.
- 4.9.3 The unmown ditch banks and rough grassland areas provide habitat for the shrill carder bee, as they contain the flowers preferred by the bee for sources of nectar and pollen, such as red clover, creeping thistle and black knapweed.
- 4.9.4 The reens and ditches also provide habitat for protected species including otter, water vole, grass snake and amphibians.
- 4.9.5 In addition to these features, which are common to all of the Gwent Levels SSSIs, there are specific interests associated with the individual SSSIs.
- 4.9.6 The Rumney and Peterstone SSSI supports a number of important plant species including the nationally rare brackish water-crowfoot *Ranunculus baudotii* and several regional rarities, including the pondweeds *Potamogeton obtusifolius* and *Potamogeton berchtoldii*. The northern section of this SSSI is a stronghold on the Gwent Levels for the flowering rush *Butomus umbellatus*. It also supports a rich and important invertebrate fauna with a number of nationally notable species largely confined to this SSSI including the marsh flies *Pherbellia brunnipes* and *Lamprochromus elegans*, the water beetle *Plateumaris braccata* and the variable damselfly *Coenagrion pulchellum*.

- 4.9.7 The reens in the St Brides SSSI support a number of interesting plant species most notably thread-leaved water crowfoot *Ranunculus trichophyllus* and small pondweed *Potamogeton berchtoldii*. Reen bank and green lane habitats in this area are also important for relict meadow plant species, such as the regionally notable grass vetchling *Lathyrus nissolia* and common meadow-rue *Thalictrum flavum*. The St Brides SSSI also supports rich invertebrate communities with a number of nationally notable and notable marshland species, e.g. the true fly *Chrysogaster macquarti* and the beetle *Hydaticus transversalis*. It is the only area on the Gwent Levels where the rare fly *Stenomicra cogani* has been recorded.
- 4.9.8 The Nash and Goldcliff SSSI is of particular botanical interest as it is the only area in Wales for the least duckweed *Wolffia arrhiza*. There is also an interesting community where two species of hornwort *Ceratophyllum submersum* and *C. demersum* grow together. The invertebrate interest is also high, as rare and notable species such as *Odontomyia ornata*, *Oplodontha viridula* and *Hydaticus transversalis* are present.
- 4.9.9 The Whitson SSSI is of particular importance for its large number of nationally rare and notable invertebrate species. A total of 65 of these rare invertebrates have been recorded in this area, including *Anthomyza bifasciata*, *Coptophlebia volucris* and *Hydrophilus piceus*. This area is also important for its botanical interest as it contains the nationally rare hairlike pondweed *Potamogeton trichoides* and is the only location in Gwent for the tussock sedge *Carex elata*. Arrowhead *Sagittaria sagittifolia* also grows in abundance in several main reens in this area.
- 4.9.10 The Redwick and Llandeenny SSSI supports rich assemblages of invertebrate species, including *Chalcis sispes* a parasite of the *Stratiomys* fly larvae, the beetle *Scirtes orbicularis* and the drone fly *Pharhelophilus consimilis*. The SSSI also contains a number of nationally rare plant species, including the rare *Myriophyllum*

verticillatum located in peaty ditches in the northern part of the site and the brackish water crowfoot *Ranunculus baudotii* associated with the ditches bordering the sea wall.

4.9.11 The Magor and Undy SSSI is the most easterly of the Gwent Levels SSSIs supporting a total of 43 nationally rare and notable invertebrate species such as the soldier fly *Stratiomys furcata*, the snail killing fly *Pherbellia brunnipes* and the water beetle *Haliphus mucronatus*. This area also supports a number of rare and notable aquatic plant species, including the pondweed *Potamogeton trichoides* and *P. berchtoldii* and the narrow-leaved water plantain *Alisma lanceolatum*. The sea wall back ditch contains brackish water fauna and flora such as the water beetle *Agabus conspersus* and the nationally rare brackish water crowfoot *Ranunculus baudotii*.

4.9.12 NRW has provided SSSI Feature Sheets for these SSSIs. The SSSI Feature Sheets were attached at Appendix S10.1 of the September 2016 ES Supplement (Document 2.4.4), and the important features of those SSSIs that would be crossed by the proposed new section of motorway are summarised in Table 1 of Appendix S10.1 alongside the features referred to in the SSSI Site Management Statements and citations summarised above for comparison.

4.9.13 It can be seen that the key features of the Gwent Levels SSSIs as set out in Site Management Statements and citations available at that time (comprising reed and ditch habitat, and a range of aquatic and marginal plant species, aquatic invertebrates and shrill carder bee) are essentially as set out in the SSSI Features Sheets, although there are differences in the lists of key plant and invertebrate species between the individual SSSIs.

4.9.14 NRW have confirmed that shrill carder bee is a qualifying feature of the following sites.

- a) Gwent Levels: Rumney and Peterstone SSSI.
- b) Gwent Levels: St Brides SSSI.

- c) Gwent Levels: Nash and Goldcliff SSSI.
- d) Gwent Levels: Whitson SSSI.
- e) Gwent Levels Redwick and Llandeenny SSSI.
- f) Gwlyptiroedd Casnewedd/ Newport Wetlands SSSI (see below).

4.9.15 There are also populations within Gwent Levels: Magor and Undy SSSI and Magor Marsh SSSI (see below), but these are not regarded as of qualifying status at present, although it is recognised that they are likely to be part of the same meta-population as the other Gwent Levels SSSIs.

4.9.16 The new section of motorway would cross the Gwent Levels St Bride's, Nash and Goldcliff, Whitson, and Redwick and Llandeenny SSSIs. There would thus be direct land take within these SSSIs and infilling of reens and ditches which support the important aquatic vegetation and invertebrates for which the SSSIs are designated. There would also be losses of vegetation of importance to shrill carder bee (also an SSSI feature) particularly along the margins of reens and ditches.

4.10 Newport Wetlands SSSI, National Nature Reserve (NNR) and RSPB Reserve

4.10.1 Newport Wetlands is an SSSI, NNR and RSPB Reserve and is of importance for its bird species. The special features are as follows.

- a) Reens and ditches.
- b) Reedbeds.
- c) Higher plants.
- d) Over-wintering birds.
- e) Breeding birds.
- f) Insects and other invertebrates (aquatic).

4.10.2 In winter the site supports nationally important numbers of shoveler and black tailed godwit, together with other over wintering species.

During summer, the wet grassland, saline lagoons and reedbeds support a variety of breeding birds, including populations of avocet, redshank, lapwing, water rail, Cetti's warbler and bearded tit. The habitats also support a diverse assemblage of aquatic invertebrates and aquatic plants. As referred to under the Gwent Levels SSSIs above NRW has confirmed that the shrill carder bee is also a qualifying feature of this SSSI.

- 4.10.3 At its closest point the Newport Wetlands SSSI is some 1.4 km south of the proposed new section of motorway. There would thus be no effects on the site.

4.11 Magor Marsh SSSI and Gwent Wildlife Trust Reserve

- 4.11.1 Magor Marsh SSSI is the largest remnant of the formerly extensive fenlands near the Gwent coast. The special features of the site are as follows.

- a) Marshy grassland.
- b) Neutral grassland.
- c) Swamp.
- d) Standing water.
- e) Wetland invertebrate assemblage.

- 4.11.2 The site supports a range of plant species including common reed (*Phragmites australis*), sedges (*Carex* spp.) and submerged and emergent aquatic plants. Areas of wet meadow and both willow (*Salix* spp.) and alder (*Alnus glutinosa*) carr (woodland) with an intersecting system of drainage ditches, reens and ponds are present. The site is an important breeding site for water and marsh birds.

- 4.11.3 Magor Marsh SSSI is some 700m east of the new section of motorway and would not be affected by the Scheme. The SSSI is owned by the Gwent Wildlife Trust and forms part of the Trust's Magor Marsh Nature Reserve. The trust owns other land further to the west, including at Barecroft Fields (designated as a Site of

Importance for Nature Conservation (SINC)), a small area of which falls within the footprint of the Scheme.

4.12 Rogiet Meadow SSSI

4.12.1 Rogiet Meadow SSSI is the only extant and recorded native site of meadow clary (*Salvia pratensis*) in Wales.

4.12.2 Rogiet Meadow SSSI is some 160m south east of the proposed haul road to Ifton Quarry at the eastern end of the Scheme, and some 530m from the eastern end of the Scheme itself. The SSSI would not be affected by the Scheme.

4.13 Penhow Woodlands SSSI and NNR

4.13.1 Penhow Woodlands SSSI includes two areas of ancient semi-natural woodland situated mainly on steep slopes and summits of limestone hills covered with superficial deposits of a calcareous nature. The dominant canopy tree species are lime (*Tilia cordata*), ash (*Fraxinus excelsior*), gean (*Prunus avium*), wych elm (*Ulmus glabra*), field maple (*Acer campestre*) and localised pendunculate oak (*Quercus robur*). The absence of birch (*Betula* spp.) and oak from much of the wood and the presence of a number of fine ancient pollarded trees along with a complex of parish boundaries are additional features. The ground flora includes a number of nationally rare and locally distributed species, including upright spurge (*Euphorbia serrulata*), green hellebore (*Helleborus viridis*), bird's nest orchid (*Neottia nidus-avis*) and wild daffodil (*Narcissus pseudonarcissus*).

4.13.2 Penhow Woodlands SSSI is some 1.3 km north of the Scheme at Magor and would not be affected by the Scheme.

4.14 Ruperra Castle and Woods SSSI

4.14.1 Ruperra Castle and Woods SSSI is of special interest as one of only five known nursery roosts for the greater horseshoe bat (*Rhinolophus ferrumequinum*) in Wales. The buildings at Ruperra Castle support a colony of greater horseshoe bats of national and international

importance. A small number of lesser horseshoe bats (*Rhinolophus hipposideros*) also use the cellar of the old castle as a hibernation roost during the winter. Coed Craig Ruperra, the woodland area to the north of the roost, is well used by the bats for foraging and commuting to more distant feeding and roosting areas. Other protected species present at the site include a breeding population of great crested newts (*Triturus cristatus*) and dormouse (*Muscardinus avellanarius*).

- 4.14.2 Ruperra Castle and Woods SSSI is some 3.1 km north of the western end of the Scheme at Castleton, and would not be affected by the Scheme.

4.15 Plas Machen SSSI

- 4.15.1 Plas Machen SSSI is designated for its native broadleaved woodland with associated diverse ground flora. A number of streams and waterlogged areas support an interesting flora that includes plants such as greater tussock sedge (*Carex paniculata*) and yellow flag iris (*Iris pseudacorus*), which are of rare or local distribution in the county.
- 4.15.2 Plas Machen SSSI is also north of the western end of the Scheme, some 3.2 km away, and would not be affected.

4.16 Non-statutory Designated Sites

- 4.16.1 Non-statutory designated sites are shown on March 2016 ES (Document 2.3.2) Figure 10.3 and details of these sites are provided in March 2016 ES Appendices 10.2, 10.17 and 10.34. Thirty eight non-statutory Sites of Importance for Nature Conservation (SINCs) are located within the study area. In addition, two Gwent Wildlife Trust reserves and one Royal Society for the Protection of Birds (RSPB) reserve are located within the study area. The closest non-statutory designated sites to the proposed new section of motorway are summarised below.

LG Duffryn Site 1 (South Lake Drive) SINC

- 4.16.2 The LG Duffryn Site 1 (South Lake Drive) SINC comprises a pond with a reedbed and supports Cetti's Warbler.
- 4.16.3 The site is some 600 m north of the line of the new section of motorway and would not be affected by the Scheme.

LG Duffryn Site 2 SINC

- 4.16.4 The LG Duffryn Site 2 SINC is a large area of neutral grassland adjacent to the Gwent Levels.
- 4.16.5 The site is some 350 m north of the line of the new section of motorway and would not be affected by the Scheme other than potentially from increased noise.

Afon Ebbw River SINC

- 4.16.6 The Afon Ebbw River SINC is a major river system with associated semi-improved neutral grassland and marshy grassland, swamp, scrub and semi-neutral woodland. Associated species include bulbous foxtail near the confluence with the River Usk, kingfisher, sand martin and grass snake.
- 4.16.7 The new section of motorway would cross the river. There would be some minor incursion into the SINC. The main effect would be reduction of plant growth as a result of shading effects of the vegetation on the adjoining saltmarsh. In addition to the permanent works for the new viaduct supports and drainage outfalls there would be additional areas for construction within saltmarsh adjacent to the SINC.

Marshall's SINC

- 4.16.8 The Marshall's SINC comprises a mosaic of neutral grassland, post-industrial land and wetland.

- 4.16.9 The SINC includes the saltmarsh on the east bank of the River Usk, the effects on which I have described earlier. There would be further minor permanent incursion into the SINC by the supports of the eastern approach viaduct of the bridge, as well as temporary loss of SINC habitats during construction. In addition to the land for the permanent works, there would be additional land take for construction within the saltmarsh and in areas of industrial land to the east.

Solutia Site SINC

- 4.16.10 The Solutia Site SINC is a series of improved and semi-improved grasslands with traditional ditches and ponds. The site supports a range of species, including nesting birds such as Cetti's warbler and invertebrates such as hairy dragonfly.

- 4.16.11 The new section of motorway would cut through the southern part of the SINC and Water Treatment Area 6 would be located in the south eastern part of the site.

Spencer Works 3 SINC

- 4.16.12 The Spencer Works 3 SINC in the Tata Lagoons area is designated for marshy grassland with wet drains.

- 4.16.13 The new section of motorway would remove a series of embankments and drains forming the southern part of the site. In addition to the permanent land take there would be further loss for construction comprising an area of scrub in the east of the SINC. The combined effect of the temporary and permanent land take would be the removal of most of the vegetation within the SINC.

Alpha Steel Site SINC

- 4.16.14 The Alpha Steel Site SINC is described as an area of former Levels, scrub and other habitats, which supports a range of species including scarce moth species, birds such as Cetti's warbler and plants including orchids. It largely comprises a series of sludge lagoons.

- 4.16.15 The SINC is some 100m to the south of the proposed new section of motorway and would not be affected by the Scheme other than potentially from increased noise.

Elver Pill Reen Grassland and Pond SINC

- 4.16.16 The Elver Pill Reen Grassland and Pond SINC comprises a lagoon with a mosaic of swamp and marshy and dry semi-improved neutral grassland and supports Cetti's warblers.

- 4.16.17 This site is some 200 m south of the line of the new section of motorway and would not be affected by the Scheme other than potentially from increased noise.

Greenmoor Pool SINC

- 4.16.18 The Greenmoor Pool SINC was formerly standing water, which now supports reedswamp which itself supports bird populations including Cetti's warbler.

- 4.16.19 The site is adjacent to the north east corner of the operational Tata Steelworks some 850 m north of the line of the new section of motorway and would not be affected by the Scheme.

Bowkett Field, Barecroft SINC

- 4.16.20 The Bowkett Field, Barecroft SINC in the Bareland Street area is a large, linear, flat field, which comprises tall swamp/marshy grassland. Around the field margins, the reens, particularly on the eastern edge, support mature willow scrub, and host many bird species. A small piece of land at the entrance to the site (in the north) comprises overgrown willow scrub and some interesting herb species, including common knapweed and tall melilot which supports abundant invertebrate life.

Barecroft Fields SINC

- 4.16.21 The Barecroft Fields SINC in the Bareland Street area is formed of two large, flat fields, comprising semi-improved, relatively species-

poor damp grassland/wet pasture. However, there are some localised and widespread patches of uncommon species such as common meadow rue and meadow thistle.

Land at Barecroft Common SINC

4.16.22 The Land at Barecroft Common SINC comprises three large, flat fields on the Gwent Levels at Magor. All the fields comprise semi-improved damp grassland. The reens adjacent to the field support aquatic species.

4.16.23 The new section of motorway would cut through the north west corners of Bowkett Field, Barecroft SINC and Barecroft Fields SINC, and a very small section of Land at Barecroft Common SINC. These sites would also be subject to increased operational noise.

Upper Cottage Pond SINC

4.16.24 The Upper Cottage Pond SINC is described as a pond surrounded by agriculturally improved fields. It is grazed up to the margins and used for drinking by stock. The pond lacks diversity and the main interest lies with the abundance of whorl grass *Catabrosa aquatica*. There are mature oaks *Quercus robur* to the south of the pond.

4.16.25 This pond site is some 600 m to the north of the line of the new section of motorway and would not be affected by the Scheme.

Blue House Farm SINC

4.16.26 The Blue House Farm SINC comprises a botanically interesting tall mosaic of damp and dry grassland habitats, lying on fairly level ground and enclosed by ditches and reens. These ditches are accompanied along the north, west and much of the eastern boundary by bramble scrub and grown up hedges/tall tree lines. A potential native black poplar tree (coppiced) is located at the western edge of the northern most field.

- 4.16.27 The site is some 230 m to the south of the line of the new section of motorway and would not be affected by the Scheme other than potentially from increased noise.

Blackwall Lane Field SINC

- 4.16.28 The Blackwall Lane Field SINC is a small, horse grazed, flat meadow. The un-grazed half comprises tall species rich grassland with occasional hawthorn scrub establishing from the overgrown hedge with some mature/approaching veteran trees. The reën to the east supports a herb-rich community.

- 4.16.29 The site is some 900 m south of the line of the new section of motorway and would not be affected by the Scheme.

Grange Road SINC

- 4.16.30 The Grange Road SINC in the Magor area is formed of two fields, including a flat low lying field with a watercourse and a gentle to moderately sloping field towards the east of the site. The site includes an unmodified stream that runs north to south along the western boundary. The fields include species-rich neutral grassland on the steeper slopes to the east of the site and semi-improved neutral grassland between the more diverse slope and the stream to the east. The richer grasslands include a range of forbs indicative of the unimproved nature of the vegetation.

- 4.16.31 The new section of motorway would skirt the northern edge with some loss of the designated site. The drainage outfall pipe from Water Treatment Area 11b would be installed across the westernmost field to a headwall at the discharge point into St Bride's Brook (also referred to as Mill Reën).

Upper Grange Farm Field SINC

- 4.16.32 The Upper Grange Farm Field SINC is a species-rich grassy bank comprising some areas of rank, tussocky grass. This bank forms the

south eastern boundary of a larger field comprising improved grassland, which is cattle grazed.

4.16.33 The March 2016 ES (Document 2.3.2) stated that the Upper Grange Farm Field SINC would be subject to some loss as a result of the construction of the new section of motorway and works to the St Bride's Underbridge. The new section of motorway and associated construction works would actually remove all of this SINC.

4.17 Nature Reserves

4.17.1 The nature reserves in the vicinity of the proposed new section of motorway are shown on March 2016 ES (Document 2.3.2) Figure 10.3.

4.17.2 The Newport Wetlands reserve is managed as a partnership between (NRW), (RSPB) and Newport City Council and is located within the western part of the Newport Wetlands SSSI referred to above.

4.17.3 The Magor Marsh Gwent Wildlife Trust Reserve comprises the Magor Marsh SSSI referred to above together with three additional blocks of land within the Gwent Levels - Redwick and Llandeenny SSSI to the west.

4.17.4 The Great Traston Meadow Gwent Wildlife Trust Reserve is located to the south of Pye Corner. The main habitat is grazing marsh, with associated ditches, reens and grips. Much of the reserve is within the Gwent Levels – Nash and Goldcliff SSSI referred to above.

4.17.5 Neither the new section of motorway nor its construction would result in land take from the Newport Wetlands or Great Traston Meadow Nature Reserves. There could be some disturbance from construction and operation of the road in the north western part of Great Traston Meadows Nature Reserve. Similarly there would be no effects on the main part of Magor Marsh Nature Reserve which is open to the public. As explained earlier, the Gwent Wildlife Trust also owns the land at Barecroft Fields designated as a SINC, the north

west corner of which is within the footprint of the new section of motorway, and the remainder of which would be subject to increased noise.

4.18 Habitats

- 4.18.1 The habitats mapped along the route of the new section of motorway are shown on March 2016 ES (Document 2.3.2) Figure 10.4. In this section I focus on the habitats of most nature conservation importance, both intrinsically, and as habitat for wildlife.

Woodland

- 4.18.2 As shown on the habitat survey plan at March 2016 ES Figure 10.4, areas of woodland are relatively infrequent across the surveyed areas, typically comprising small, discrete units of broadleaved semi-natural woodland and broadleaved plantation woodland.
- 4.18.3 The larger areas of woodland are located within the Castleton area and to the north of Magor.
- 4.18.4 Plantation woodland occurs mainly alongside the existing motorway and road network. The woodlands are predominantly broadleaved or mixed with species including hazel, hawthorn, ash and Scots pine.
- 4.18.5 Woodlands at Pwll Diwaelod, Pound Hill, Berryhill Farm, Pye Corner, Magor Road, Roggiett Brake and Rectory Woods were included in more detailed NVC/botanical surveys. Of the woodlands included in the NVC survey, the woodlands at Pwll Diwaelod, Berryhill Farm, Roggiett Brake and Rogiet Rectory Wood are considered to constitute the Lowland mixed deciduous woodland UK BAP/Section 42 priority habitat. The smaller, more scrubby, woodlands and plantations are not.
- 4.18.6 The woodlands at Pwll Diwaelod, Berryhill Farm, Pye Corner, Roggiett Brake and Rogiet Rectory Wood are included in the Forestry Commission Ancient Woodland Inventory. These woodlands are

shown on the plan at Figure 10.5 of the March 2016 ES (Document 2.3.2).

- 4.18.7 The three main areas of woodland at Pwll Diwaelod are classified as semi-natural ancient woodland. A few parts are currently in poor condition due to tipping and over-grazing, but they still retain a diverse structure and ground flora, and sufficient old woodland indicators to be evaluated as having county significance for nature conservation.
- 4.18.8 The woodland at Berryhill Farm retains large mature oak trees and significant patches with ancient woodland indicator species, but these features are in a relatively poor condition, with the ground flora having to compete with non-native invasive species, tipping and dense nettles.
- 4.18.9 The two woodlands at Roggiett Brake and Rogiet Rectory Wood have been subject to felling and replanting but still retain a mostly broadleaved canopy and a diverse ground flora with high proportion of old woodland indicator species.
- 4.18.10 The small scrubby plantation at Pye Corner includes a small part of an area that is shown as ancient semi-natural woodland in the ancient woodland inventory. However, with the exception of a narrow strip of mature trees beside Picked Lane there does not appear to be any evidence of old woodland. An aerial photograph from 1945 clearly shows that the area was a field at that time (attached at Appendix B of this Proof of Evidence). An aerial photograph from 1979 again shows the site as a field through which a pipeline had recently been installed (also attached at Appendix B of this Proof of Evidence). It is clear that most of the current wooded area has been established relatively recently.
- 4.18.11 Lowland mixed deciduous woodland (including wet woodland) is a UK BAP/Section 42 habitat. The Newport Local BAP (Document 11.2.30) includes a Woodland Habitat Action Plan, which covers a range of woodland types including Lowland Mixed Deciduous Woodland. The

Monmouthshire Local BAP (Document 11.2.8) includes a Habitat Action Plan for Woodlands. The Trunk Road Estate BAP (Document 6.1.1) includes a Habitat Action Plan for Woodlands and Planted Native Trees and Shrubs.

4.18.12 Overall the plantation woodlands are valued at District (Low) value and the semi-natural woodlands at County (Medium) value.

Grassland

4.18.13 Grassland is the most widespread broad habitat type across the survey area as shown on March 2016 ES (Document 2.3.2) Figure 10.4. There are extensive areas of improved grassland in the Castleton and Magor areas. Improved grassland is also extensive across the Gwent Levels where there are also areas of poor semi-improved grassland and semi-improved neutral grassland.

4.18.14 Marshy grassland occurs only locally within the western section of the survey area from Castleton through to Pye Corner. East of Pye Corner, marshy grassland becomes more evident.

Coastal and Floodplain Grazing Marsh

4.18.15 The Gwent Levels grasslands, together with the reens and ditches, which divide the fields constitute Coastal and Floodplain Grazing Marsh UK BAP/Section 42 habitat (see below).

4.18.16 A number of areas of grazing marsh were included in the NVC surveys. These were at Lighthouse Road, New Dairy Farm, Whitecross Farm, Solutia, Broadstreet Common, Tatton Farm, Green Moor Fields and Greenmoor Lane. The detailed survey data are set out in the reports at March 2016 ES (Document 2.3.2) Appendices 10.4 and 10.20.

4.18.17 The most diverse grasslands within the surveyed sites tend to be those that are wetter and have been subject to lower levels of agricultural improvement.

- 4.18.18 The pasture sites within the Gwent Levels qualify as UK BAP/Section 42 priority habitat Coastal and Floodplain Grazing Marsh if considered together with the network of ditches. The grassland is of value in this context, even though its botanical diversity is limited.
- 4.18.19 The Newport Local BAP (Document 11.2.30) includes a Wetland Habitat Action Plan. This includes Coastal and Floodplain Grazing Marsh. The Monmouthshire Local BAP (Document 11.2.8) includes a Habitat Action Plan for Species-rich Grasslands and Floodplain Pastures. The Trunk Roads Estate BAP (Document 6.1.1) includes a Habitat Action Plan for Coastal and Estuarine Habitats which in turn includes Coastal and floodplain grazing marsh.
- 4.18.20 Almost all of these grasslands (the only exception being the Solutia fields) are within the Gwent Levels SSSIs. The coastal and floodplain grazing marsh habitat as a whole is thus considered to be of National (High) value.

Lowland Meadow

- 4.18.21 Grassland sites (other than those within the Gwent Levels described above under coastal grazing marsh), which were included in the NVC surveys were at Pwll Diwaelod, Pound Hill and Magor Road. The detailed survey data are set out in the reports at March 2016 ES (Document 2.3.2) Appendices 10.4 and 10.20.
- 4.18.22 The grassland at Pound Hill qualifies as the UK BAP/Section 42 priority habitat Lowland Meadow. The ungrazed road verge habitat adjacent to the A48M and existing M4, at Pound Hill and adjacent to Pwll Diwaelod, are considered to be of local value for nature conservation. Cattle-grazed grassland Pwll Diwaelod was mostly species-poor, but locally a few drier patches graduated into slightly more diverse vegetation, while some damper areas supported species-poor rush pasture. Grassland adjacent to Rectory Woods at Rogiet is close to the Rectory Meadow - Rogiet SSSI which is notified for meadow clary, but there was no sign of this rare plant within the

survey area. The pasture at these sites is considered to be of no more than local importance for nature conservation.

4.18.23 The Newport Local BAP (Document 11.2.30) includes a Lowland Grassland and Heathland Action Plan. The Monmouthshire Local BAP (Document 11.2.8) includes a Habitat Action Plan for Species-Rich Grasslands And Floodplain Pastures. The Trunk Roads Estate BAP (Document 6.1.1) includes a Lowland Meadows Habitat Action Plan.

4.18.24 The waxcap survey (March 2016 ES (Document 2.3.2) Appendix 10.33) identified a total of eight species of waxcap at the Pwll Diwaelod site and seven species at the Pound Hill site.

4.18.25 The Newport Local BAP (Document 11.2.30) includes a Fungi Action Plan. This is primarily concerned with waxcaps and other grassland fungi. The Monmouthshire Local BAP (Document 11.2.8) includes species action plans for Pink Waxcap and Olive Earth Tongue grassland fungi.

4.18.26 The majority of the lowland grassland habitat recorded is of no more than District (Low) value. The grasslands at Pound Hill and Pwll Diwaelod are of County (Medium) value on account of their grassland vegetation and waxcap fungi respectively.

Swamp and Reedbeds

4.18.27 There are large areas of swamp habitat within the Tata Steelworks associated with the settlement and water treatment lagoons. The swamp habitat at the western end of Tata Steelworks predominantly comprises beds of common reed and is part of the water treatment system for the steelworks. The areas of swamp mapped in the central area and further east of the Tata Steelworks are both managed and unmanaged reedbeds and the unmanaged areas are at various stages of succession of scrub encroachment predominantly by sedge and willow species. Smaller reedbeds are present in other

parts of the steelworks site and beside the Ebbw saltmarsh. Many of the reens and ditches in the study area support relatively species poor common reed or bulrush habitat.

4.18.28 Reedbed is a UK BAP/Section 42 habitat. As explained above under Coastal and Floodplain Grazing Marsh, the Newport Local BAP (Document 11.2.30) includes a Wetland Habitat Action Plan. This includes reedbeds. The Trunk Road Estate BAP (Document 6.1.1) includes a Habitat Action Plan for Waterbodies. This includes Reedbeds.

4.18.29 The swamp and reedbed habitats are considered to be of County (Medium) value.

Rivers

4.18.30 The proposed new section of motorway would cross the Rivers Usk and Ebbw.

4.18.31 The River Usk is a tributary of the Severn Estuary and the tidal limit extends upstream approximately 29 km to the weirs at Newbridge on Usk. The River Usk is flanked by intensively developed land within the city of Newport and the Newport Docks areas, and through Newport the course of the River Usk is controlled by piled walls and wharves. Along the tidally influenced banks of the Usk, the river is bounded by the extensively developed land of Newport and Caerleon and open spaces with flood protection.

4.18.32 In the lower reaches of the estuary, the Uskmouth coastline through to the Goldcliff promontory is fronted by areas of both locally accreting and locally eroding saltmarsh.

4.18.33 The River Ebbw is in the western part of Newport and converges with the Usk just before entering the Severn Estuary.

4.18.34 There are a number of streams within the Castleton, Coedkernew and Magor areas, which are small watercourses which do not form part of

the managed drainage system of the Gwent Levels and are therefore distinct from reens.

4.18.35 Rivers are a UK BAP/Section 42 habitat. The Newport Local BAP (Document 11.2.30) includes a Freshwater Habitat Action Plan, which in turn includes Rivers and Streams. The Trunk Road Estate BAP (Document 6.1.1) includes a Rivers and Streams Habitat Action Plan.

4.18.36 The river habitat of the River Usk is of National (High) value based on the SSSI designation. Although also included in the River Usk SAC, the tidal river habitat is not an SAC feature. The River Ebbw is designated as a SINC and is of County (Medium) value. Other streams are of no more than District (Low) value. The reens and ditches of the Gwent Levels are considered under Eutrophic Standing Waters below.

Ponds

4.18.37 Ponds were recorded at Druidstone, in the Castleton area, in the Coedkernew area, to the east of the River Usk, within the Solutia land, within the Tata Steelworks, in the Knollbury area at Upper Grange Farm and in the Rogiet area. There are also waterbodies within the Newport Landfill site and Household Waste Recycling Centre.

4.18.38 Ponds are a UK BAP/Section 42 habitat. The Newport Local BAP (Document 11.2.30) includes a Freshwater Habitat Action Plan, which includes ponds. The Trunk Road Estate BAP (Document 6.1.1) includes a Waterbodies Habitat Action Plan, which includes Ponds.

4.18.39 The pond habitat is considered to be of County (Medium) value.

Eutrophic Standing Waters

4.18.40 As shown on the habitat survey plan at March 2016 ES (Document 2.3.2) Figure 10.4 reens and ditches (both standing and slow flowing

running water) are present throughout the Gwent Levels section of the survey area.

4.18.41 A total of 36 sites, plus four control sites, were surveyed for aquatic macrophytes within the survey corridor in 2014 (March 2016 ES (Document 2.3.2) Appendix 10.14). A total of 81 species of aquatic macrophytes were recorded from the ditches, reens and ponds surveyed. Species-richness varied from 2 species to 32 species per site. The majority of the plant species recorded are common throughout the UK.

4.18.42 Tubular water dropwort was recorded, which is a UK BAP/Section 42 species and is listed under the International Union for Conservation of Nature (IUCN) rarity criteria as 'Vulnerable'. This species was recorded from five locations.

4.18.43 During the 2015 aquatic macrophyte survey (March 2016 ES (Document 2.3.2) Appendix 10.30) samples were taken at a total of 40 sampling points in areas not previously surveyed during 2014. These sample points covered main rivers, reens and field ditches.

4.18.44 Where reens were not covered by specific sampling points, but aquatic macrophyte data was collected during the river corridor survey, this data was also analysed (an additional four sample points). A total of eighteen nationally or locally rare species were found during the survey.

4.18.45 The River Corridor Survey report (March 2016 ES (Document 2.3.2) Appendix 10.32) provides baseline information for the nineteen watercourses surveyed between August and October 2015. The reens surveyed during the RCS survey period were at various stages and types of management. Each reen provides different ecological niches potentially supporting a diverse range of wildlife.

4.18.46 The Newport Local BAP (Document 11.2.30) includes a Wetland Habitat Action Plan. This includes Coastal and Floodplain Grazing

Marsh with the associated reens and ditches. The Trunk Road Estate BAP (Document 6.1.1) includes a Rivers and Streams Habitat Action Plan.

4.18.47 All of the reens and ditches surveyed are within the Gwent Levels SSSIs and are main features for which the SSSIs have been designated. The reen system is consequently of National (High) value.

Saltmarsh

4.18.48 Saltmarsh was mapped along both the River Usk and River Ebbw as shown on the habitat survey plan at March 2016 ES (Document 2.3.2) Figure 10.4.

4.18.49 The saltmarshes on the west bank of the Ebbw and east bank of the Usk both support stands of typical saltmarsh vegetation that include locally uncommon species.

4.18.50 Much of the east bank of the Ebbw is unmanaged and largely dominated by dense scrub and reedbeds with limited vegetation diversity. However, the strip of low growing vegetation in the vicinity of the Scheme supports a diverse saltmarsh flora. The saltmarsh is a little unusual in this location because much of it is formed over stony material, but the flora is relatively diverse and includes a good range of typical saltmarsh plants, grading into grassland and scrub further up the shore.

4.18.51 The River Usk east bank saltmarsh is included in the River Usk (Lower Usk) SSSI and also in the River Usk SAC (although not one of the features for which the SAC is designated). It is also part of the Marshall's SINC.

4.18.52 Coastal saltmarsh is a UK BAP/Section 42 habitat. The Newport Local BAP (Document 11.2.30) includes a Marine and Coastal Habitat Action Plan. This includes a section on Coastal Saltmarsh. As I explained above under Coastal and Floodplain Grazing Marsh, the

Trunk Roads Estate BAP (Document 6.1.1) includes a Habitat Action Plan for Coastal and Estuarine Habitats. This includes saltmarshes.

4.18.53 The saltmarsh on the east bank of the River Usk is part of the River Usk (Lower Usk) SSSI. It is also within the River Usk SAC but is not one of the features for which the SAC is designated. It is thus valued at the National (High) level. The saltmarshes on the banks of the River Ebbw are valued at the County (Medium) level.

Intertidal Mudflats

4.18.54 As shown on the habitat survey plan at March 2016 ES (Document 2.3.2) Figure 10.4 and the plan of intertidal habitats at Figure 10.6, there are intertidal mudflats within the channels of the Rivers Ebbw and Usk. The intertidal areas of the River Usk are characterised by intertidal mud and saltmarsh habitats (which I have described above) with patchy areas of fucoids in the lower intertidal, particularly around the Newport Docks area, and patchy algal turf at the mouth of the River Usk.

4.18.55 Similar to the River Usk, the intertidal areas of the River Ebbw are characterised by intertidal mud, with small patches of algal turf on localised areas of rock armour/rubble, and saltmarsh habitats.

4.18.56 Estuarine intertidal mud habitat in the Rivers Usk and Ebbw qualifies as an OSPAR priority habitat (Document 11.3.37) and UK BAP priority habitat/Section 42 habitat of principal importance in Wales.

4.18.57 As explained above for Coastal and Floodplain Grazing Marsh, the Trunk Roads Estate BAP (Document 6.1.1) includes a Habitat Action Plan for Coastal and Estuarine Habitats. This includes Mudflats.

4.18.58 The intertidal muds of the River Usk are part of the River Usk (Lower Usk) SSSI. They are also within the River Usk SAC but are not one of the features for which the SAC is designated. They are thus valued at the National (High) level. The intertidal muds of the River Ebbw are valued at the County (Medium) level.

Subtidal Habitats

4.18.59 The subtidal sediments in the centre of the river channel in the lower reaches of the River Usk are dominated by muddy sediments.

4.18.60 The subtidal sediments in the main channel of the lower reaches of the River Ebbw are similar to those in the River Usk and the wider Severn Estuary.

4.18.61 Subtidal mixed muddy sediments are a UK BAP/Section 42 habitat. The subtidal habitats of the River Usk are part of the River Usk (Lower Usk) SSSI. They are also within the River Usk SAC but are not one of the features for which the SAC is designated. They are thus valued at the National (High) level. The subtidal habitats of the River Ebbw are valued at the County (Medium) level.

Hedgerows

4.18.62 As shown on the habitat survey plan at March 2016 ES (Document 2.3.2) Figure 10.4, hedgerows typically border the fields along the route of the new section of motorway (within the Gwent Levels section often adjacent to the reën or ditch forming the field boundary). Species-rich intact hedgerows, species-rich defunct hedgerows and species-rich hedgerows with trees were often recorded, many of which were categorised as Important Hedgerows under the Hedgerow Regulations 1995.

4.18.63 Hedgerows are a UK BAP/Section 42 habitat. The Newport Local BAP (Document 11.2.30) includes a Farmland Habitat Action Plan, which includes hedgerows. The Monmouthshire Local BAP (Document 11.2.8) includes a Boundary and Linear Features Habitat Action Plan. This includes hedgerows. The Trunk Road Estate BAP (Document 6.1.1) includes a Habitat Action Plan for Boundary Features, which includes hedgerows.

4.18.64 Given that the hedgerows within the corridor for the new section of motorway include species-rich hedgerows, a number of which are

‘important’ hedgerows in the context of the Hedgerow Regulations, they are valued at the County (Medium) level. However, it must be appreciated that within the Gwent Levels SSSIs, NRW regard hedgerows as detrimental to the important aquatic macrophytes and invertebrate communities as they can cause excessive shading and overgrowth of ditches.

Other Habitats

- 4.18.65 Other habitats that were mapped within the survey area and which are shown on the habitat survey plan at March 2016 ES Figure 10.4 (Document 2.3.2) include arable fields, amenity grassland, ephemeral/short perennial habitat, spoil, waste tip, caravan sites, sea walls, buildings, bare ground and hard-standing or peripheral habitats including tall ruderal and non-ruderal vegetation.
- 4.18.66 The main areas of developed land are the Newport Docks area and the Solutia area industrial zones. These are dominated by hardstanding, buildings, bare ground, standing water, areas of scrub, invasive species and tall ruderal habitat. A detailed NVC/botanical survey was carried out of open areas within Newport Docks between the River Ebbw and the operational area of the port (described below).
- 4.18.67 The only operational landfill site within the survey area is the Newport Landfill Site and Household Waste Recycling Centre, located to the east of the River Ebbw. There are areas of spoil within the Tata Steelworks site, which have been colonised by scattered scrub, buddleia and tall ruderal species. Land within the Tata site was also subject to NVC/botanical survey (as described below).
- 4.18.68 There are areas of amenity grassland around residential areas such as Castleton, Marshfield, Magor and Rogiet and within the Parc Golf Course in Coedkernew. These take the form of gardens, managed road verges and urban parks. Many of these areas contain scattered planted trees.

- 4.18.69 Arable fields are largely located on the higher ground at the west and east of the survey area. In the west, arable land is located at Gwaunshonbrown Farm to the north of the existing M4, and at The Stud Farm and several nearby fields to the south of the A48. At the east of the survey area, there are arable fields present to the north west of Magor and to the north of Rogiet.
- 4.18.70 There is some arable land within the Gwent Levels (notably at Maerdy Farm south east of Coedkernew).
- 4.18.71 Brownfield sites included in the NVC survey were Great Pencarn – Duffryn, Solutia, Green Moor, Alexandra Dock and land at the south of the Tata Steelworks at Llanwern. The detailed survey data are set out in the reports at March 2016 ES (Document 2.3.2) Appendices 10.4 and 10.20.
- 4.18.72 Brownfield land is often formed on man-modified substrata, such as concrete rubble at Solutia and steelworks slag at Tata Steel and Green Moor, and this can sometimes create conditions that favour unusual plant communities and locally notable species.
- 4.18.73 These diverse brownfield habitats qualify as the UK BAP/Section 42 priority habitat Open Mosaic Habitats on Previously Developed Land. The Newport Local BAP (Document 11.2.30) includes a Brownfield and Urban Action Plan, which in turn includes open mosaic habitats on previously developed land. The Monmouthshire Local BAP (Document 11.2.8) includes a Built Environment and Associated Green Spaces Habitat Action Plan, which in turn includes 'Wasteground', 'Brownfield' and Industrial Sites.
- 4.18.74 Given the extent of the brownfield sites within the corridor for the new section of motorway, and the diverse invertebrate communities they support (which I refer to later in this section), they are valued at the County (Medium) level.

4.19 Species (Flora)

- 4.19.1 The March 2016 ES (Document 2.3.2) Table 10.8 summarises the occurrence of notable species within the survey area, using the list of Rare, Scarce and Declining species from the Guidelines for the Selection of Wildlife Sites in South Wales (Document 11.2.7) identified in the NVC botanical survey reports (March 2016 ES Appendices 10.4 and 10.20). Additional notable plant species were recorded during the aquatic macrophyte survey. Sites supporting one or more of the guidelines' primary species or five or more contributory species can be considered significant in a county context.
- 4.19.2 One species recorded, tubular water dropwort, is included in the list of species of principal importance for biodiversity in Wales (Section 42 of the Natural Environment and Rural Communities Act 2006) (Document 3.1.13).
- 4.19.3 The notable species identified included a high proportion of plants characteristic of wet grassland habitats. The assemblage of wet grassland plants is assessed overall as being of County (Medium) value.
- 4.19.4 The aquatic macrophyte community of the watercourses as a whole is considered to be of National (High) value.
- 4.19.5 Other individual species of interest are associated with woodlands and with the vegetation of industrial sites and are covered by the value of these habitats which I referred to earlier in this section.

4.20 Species (Fauna)

- 4.20.1 Information on the faunal species within and in the vicinity of the new section of motorway was gathered through desk study and ecology surveys carried out by or on behalf of Arup in 2014 and RPS in 2015. Hyder also carried out a wintering bird survey over the winter of 2015/2016. The reports of these surveys form Appendices 10.2 to 10.33 of the March 2016 ES (Document 2.3.2). Further reports of

surveys carried out in 2016 were appended to the September 2016 ES Supplement (Document 2.4.4) and the December 2016 ES Supplement (Document 2.4.14).

- 4.20.2 I refer below to those species for which surveys were considered necessary in order to inform the EIA. Other species recorded in the desk study included brown hare (UK BAP, Section 42), harvest mouse (UK BAP, Section 42), polecat (UK BAP, Section 42, Red Data Book, Newport BAP), fallow deer (Newport BAP), stoat (Newport BAP), weasel (Newport BAP), water shrew (Newport BAP), common shrew (Newport BAP) and common porpoise (European Protected Species, Wildlife and Countryside Act (WCA), UK BAP, Section 42, Red Data Book).

Otter

- 4.20.3 Otters were considered widespread throughout the UK up until the 1950s when they underwent a rapid decline through to the 1970s. This was considered to have largely been the result of the use of organochlorine pesticides, exacerbated by hunting and habitat fragmentation. There has since been a significant recovery in the number and range of otters in England and Wales. The Newport BAP (Document 11.2.30) reports that locally, otter numbers are increasing and populations are known to be present on all the rivers in Newport - the Usk, Ebbw and Rhymney as well as in the reens of the Gwent Levels SSSIs and the Monmouthshire-Brecon Canal.
- 4.20.4 The key findings of the 2014 and 2015 otter surveys are shown on March 2016 ES (Document 2.3.2) Figure 10.8. The Arup survey in 2014 found otter field signs across the study area (March 2016 ES Appendix 10.8). It was concluded that otters are finding a niche amongst the industry, housing and farming within the study area, utilising suitable habitat that has good water quality, prey availability and that provides cover.

- 4.20.5 No otter field signs were found during the surveys within the narrower 2015 survey area despite there being an abundance of suitable habitat (March 2016 ES (Document 2.3.2) Appendix 10.25). A recent otter spraint was identified during a visit to land to the south east of the Tata Steel landholding, outside the 2015 survey area.
- 4.20.6 The majority of the reens, main rivers and field ditches that were surveyed were within the Gwent Levels SSSIs. The regular management of many of these watercourses provides an abundance of good otter habitat. The surveys indicated that although otters are present along the length of the proposed new section of motorway, they are widely dispersed throughout the Gwent Levels part of the new section of motorway.
- 4.20.7 As reported in the September 2016 ES Supplement (Document 2.4.4) an otter survey of the landfill site to the east of the River Ebbw was carried out during 2016. Many of the areas shown on aerial imagery as being of potential value to otters have been infilled and/or are located within the areas of disturbance on site. Therefore, although the land may occasionally be used by otters (e.g. foraging for fish in ponds in the area), it is unlikely to have potential for a maternal or nursery holt due to the level of disturbance and limited vegetation cover.
- 4.20.8 Otter is included in the Newport Local BAP (Document 11.2.30). The Trunk Road Estate BAP (Document 11.2.8) includes a species action plan for Otter.
- 4.20.9 Otter is a designated feature of the River Usk SAC and is found along most of the length of the river and its tributaries upstream of Newport. To the extent that otters will move up and down the Usk through Newport, the SAC population will interact to a degree with the otters found across the Gwent Levels. Otter is not a feature for which the Gwent Levels SSSIs are notified. However, given the potential for interaction between the otters in the Gwent Levels and River Usk, the

otter population in the vicinity of the proposed new section of motorway is considered to be of National (High) value.

Dormouse

4.20.10 Mr Jon Davies describes the findings of the dormouse surveys in his Proof of Evidence (WG 1.19.1). There is an apparently strong population of dormouse in the area of the Castleton Interchange which is associated with the extensive mature tree planting around the existing junction, and there are additional occurrences of the species at the south of the Tata Steelworks and to the north of Magor.

4.20.11 Dormouse is included in the Newport Biodiversity Action Plan (Document 11.2.30). The Trunk Road Estate BAP (Document 6.1.1) includes a species action plan for dormouse.

4.20.12 Recognising the protected status of dormouse and its inclusion in the Newport Local BAP, the population of dormouse in the area of the M4 is considered to be of County (Medium) value.

Bats

4.20.13 Mr Richard Green describes the findings of the bat surveys in his Proof of Evidence (WG 1.20.1).

4.20.14 There is a species action plan for bats in the Newport Local BAP (Document 11.2.30). The Trunk Road Estate BAP (Document 6.1.1) includes a species action plan for bats.

4.20.15 Recognising that all bats are European Protected Species and taking the results of the 2014 and 2015 surveys together, the corridor of the proposed new section of motorway is of at least district level importance for lesser horseshoe bats and brown long-eared bats and between district and county level importance for pipistrelles. For all other bat species, results of the surveys indicate that the route is of regional value with regard to foraging and commuting behaviour.

Overall the route corridor was thus assessed as being of Regional (Medium) value.

Water Vole

4.20.16 Mr Jon Davies describes the findings of the water vole surveys in his Proof of Evidence (WG 1.19.1).

4.20.17 The Newport Local BAP (Document 11.2.30) states that a major objective for water voles is to enhance and create suitable habitat to re-establish links within its range along the coastal floodplains and restore water vole populations to these areas. The Trunk Road Estate BAP (Document 6.1.1) includes a species action plan for water vole.

4.20.18 Recognising that water vole is protected under the Wildlife and Countryside Act 1981 and that the population in the Gwent Levels is robust and increasing as a result of the work of the Gwent Wildlife Trust, the population in the area of the new section of motorway is considered to be of County (Medium) value.

Badger

4.20.19 Details of the locations of badger setts are considered to be sensitive information and the reports of the badger surveys were provided as Confidential Appendices to the March 2016 ES (Document 2.3.2).

4.20.20 The Arup 2014 survey identified 20 badger setts, which were considered likely to present 13 family groups of badgers within the study area (March 2016 ES (Document 2.3.2) Confidential Appendix 10.37).

4.20.21 Six new setts were identified during the 2015 survey. These include two active main setts and four outliers (one active and three disused) (March 2016 ES (Document 2.3.2) Confidential Appendix 10.38).

4.20.22 Further pre-construction surveys would be required to confirm the status of the badger setts identified and to identify any additional setts

that may be established in the period prior to commencement of the works.

4.20.23 The badger is protected under the Protection of Badgers Act 1992.

The badger is a common species and this protection is mainly concerned with welfare and the prevention of cruelty, rather than conservation. The population of badgers within the corridor of the new section of motorway is considered to be of District (Low) value.

Hedgehog

4.20.24 The Arup 2014 hedgehog survey (March 2016 (Document 2.3.2)

Appendix 10.10) covered ten separate areas of potentially suitable habitat within the study area. Hedgehog presence was recorded in one location at Heol Pont-Y-Cwch near the River Ebbw. In addition, incidental sightings confirmed hedgehog to be present near Castleton and Cleppa Parc and at Magor in the eastern end of the study area. Given that hedgehog had been recorded within the Gwent Levels near the River Ebbw it was assumed that they are likely to be present throughout the study area.

4.20.25 Hedgehog is partially protected under the Wildlife and Countryside Act 1981 and is a UK BAP and Section 42 list species. The species appears to be in steep decline and the total population is unknown. The biggest threat to hedgehogs is probably habitat loss, with the change from pastoral farming to arable crops and increasing field size with the removal of hedgerows over the last 30 years. The use of chemicals in gardens and for intensive farming kills the invertebrates hedgehogs need for food and may also poison them directly. Many are also killed on roads.

4.20.26 Given the decline in the population of the hedgehog, and the continuing threats to the species, the population of hedgehog within the corridor of the new section of motorway is considered to be of District (Low) value.

Reptiles

- 4.20.27 The locations of reptile records (other than grass snake) in the 2014 and 2015 reptile surveys are shown on March 2016 ES Document 2.3.2) Figure 10.8 (. The Arup 2014 reptile survey covered ten separate areas of potentially suitable habitat within the study area (March 2016 ES Appendix 10.11). Two species of reptiles were recorded. The most frequently recorded species was grass snake. Overall, small numbers of snakes were recorded infrequently during the survey and were not recorded in half of the areas surveyed. Taking a precautionary approach, it was assumed that grass snakes were present in low numbers throughout the study area within suitable habitats.
- 4.20.28 Single adult common lizards were recorded at the eastern edge of Magor Services and at the former laboratory site at Pye Corner. There were no records of adder or slow worm during the survey.
- 4.20.29 The 2015 survey (March 2016 ES (Document 2.3.2) Appendix 10.27) within the Tata Steelworks site recorded grass snakes under artificial refugia. Within Newport Docks, common lizard, grass snake and slow worm were found under artificial refugia.
- 4.20.30 The rest of the land within Newport Docks in the vicinity of the proposed new section of motorway is not suitable habitat for reptiles and the populations are likely to be confined to the grassland and open scrub within the site. However, they are likely to extend further northwards within grassland and scrub areas within the adjoining landfill site and the bank of the River Ebbw outside the survey boundary.
- 4.20.31 There were a number of incidental sightings of grass snake during other surveys in 2015. These were at Whitecross Farm, west of Pye Corner, near Bareland Street Reen, Tata reedbed and Newport Docks.

4.20.32 All reptile species receive some level of protection under UK law. The species recorded in the corridor of the new section of motorway (grass snake, common lizard and slow-worm) are partially protected under the Wildlife and Countryside Act 1981. All are UK BAP Priority Species and listed under Section 42 of the Natural Environment and Rural Communities Act (Document 3.1.13). The Trunk Road Estate BAP (Document 6.1.1) includes a species action plan for reptiles.

4.20.33 The extensive suitable habitat provided by the reens and ditches of the Gwent Levels means that a substantial population of grass snake is likely to be present. This is considered to be of County (Medium) value.

4.20.34 Common lizard and slow worm were found in more localised areas of former industrial land where a mosaic of open and more vegetated areas provides suitable habitat. These populations are considered to be of District (Low) value.

Great Crested Newt and Other Amphibians

4.20.35 The desk study recorded five amphibians (common frog, common toad and great crested, palmate and smooth newts). Great crested newt was recorded near Marshfield in the south west of the search area for the desk study; in the centre/north of the search area near Caerleon; in the centre of the search area at Solutia SINC; and in the east of the search area at and around Ifton Quarry. The other amphibians were recorded in several locations in the western half of the search area and at ponds in and around Ifton Quarry to the east. Smooth newt, common frog and common toad were recorded frequently throughout the survey area and palmate newt was recorded in Newport and at Ifton Quarry.

4.20.36 No great crested newts were recorded during the Arup 2014 presence/absence survey despite the presence of suitable habitat and previous records (March 2016 ES (Document 2.3.2) Appendix 10.6).

Populations of smooth/palmate newt were identified in all three of the areas surveyed.

4.20.37 These surveys only covered a small number of waterbodies within the survey area due to limitations on access at the time.

4.20.38 The report of the 2015 survey utilising the eDNA analysis technique is provided at March 2016 ES (Document 2.3.2) Appendix 10.22.

Locations of positive records of great crested newt eDNA are shown on March 2016 ES Figure 10.8.

4.20.39 The analysis of the results identified water samples from four waterbodies (out of a total of 283 that were sampled) to be positive for great crested newt presence. Three of these four waterbodies were located at the eastern end of the survey area near Magor. One was near Nash.

4.20.40 None of the waterbodies where great crested newt DNA was located were within the footprint of new section of motorway but were located within 250 m of it.

4.20.41 During the reptile survey, a female and a juvenile great crested newt were recorded twice under the same mat within the eastern survey area within the Tata steelworks land. This location is also shown on the plan at March 2016 ES (Document 2.3.2) Figure 10.8.

4.20.42 As reported in the September 2016 ES Supplement (Document 2.4.4) further great crested newt presence/absence (eDNA technique) survey was carried out in 2016. Population Size Class Estimate Surveys and Presence / Absence Surveys (traditional methods) were also undertaken. The survey report is Appendix S10.6 to the September 2016 ES Supplement.

4.20.43 In 2016 no great crested newts were found using traditional survey methods. Great crested newt DNA was detected at the same locations as in 2015. In addition, great crested newt DNA was

detected at one location where not previously detected. This was in a watercourse adjacent to the location where great crested newts were found underneath reptile survey mats during the 2015 Reptile Survey (March 2016 ES (Document 2.3.2) Appendix 10.27).

4.20.44 Based on the traditional survey data and the eDNA analysis results, it is considered that a small population of great crested newts is present within the survey areas, and that where they are present they are in small, potentially isolated pockets. The presence of populations of predatory fish and the limited availability of habitat suitable for great crested newt, with no extensive 'fish-free' areas within which a significant and sustainable metapopulation of great crested newt could exist, is likely to be a significant constraint on the population within the vicinity of the proposed new section of motorway and more widely within the Gwent Levels.

4.20.45 Great crested newt is a European Protected Species. The other four amphibian species are protected from sale only under the Wildlife and Countryside Act 1981 (as amended) (Document 3.1.7). All five amphibians are included in the Trunk Road Estates BAP (Doc 6.1.1) and great crested newt is also a local BAP species in Monmouthshire (Document 11.2.8). Great crested newt and common toad are UK BAP Priority Species and listed under Section 42 of the Natural Environment and Rural Communities Act 2006 (Document 3.1.13).

4.20.46 Recognising that great crested newt is a European Protected Species, but that surveys indicate only localised populations within the survey area, the population is considered to be of County (Medium) value.

4.20.47 Recognising the protection afforded to amphibian species, and the extensive habitat available for amphibians generally, the community of other amphibians is considered to be of District (Low) value.

Breeding Birds

4.20.48 Dr Simon Zisman describes the findings of the breeding bird surveys in his Proof of Evidence (WG 1.21.1).

4.20.49 The Llanwern area is known to be a stronghold in Gwent for Cetti's warbler and this was confirmed by the breeding bird surveys. Cetti's warbler is specially protected under the Wildlife and Countryside Act 1981 (Document 3.1.7). The population of Cetti's warbler present in the study area is of National (High) value.

4.20.50 The results of the barn owl survey (March 2016 ES (Document 2.3.2) Appendix 10.29) and the other 2014 and 2015 breeding bird surveys indicate that a barn owl nest may be located in a poplar tree near Greenmoor Farm. Barn owl is specially protected under the Wildlife and Countryside Act 1981 (Document 3.1.7).

4.20.51 The Trunk Road Estate BAP (Document 6.1.1) includes a species action plan for barn owl. Taking into account the protected status of barn owl, the status of the species in the vicinity of the proposed motorway is valued as County (Medium) value.

4.20.52 Following records of common cranes in the Gwent Levels in 2014 and 2015, the M4CaN team recorded the species in 2016. The survey information has been shared with NRW and RSPB and the report of the survey was published as confidential Appendix SS10.8 of the December 2016 ES Supplement (Document 2.4.14). A single pair of cranes successfully bred and the fledging of one chick was confirmed. This is the first known breeding of the species in Wales after an absence of some 400 years. On this basis Common crane is treated as a nationally important bird, and thus of High value.

4.20.53 The value of all remaining bird species recorded within the study area during the breeding season was judged to be District (Low).

Wintering Birds

- 4.20.54 Dr Simon Zisman describes the findings of the wintering bird surveys in his Proof of Evidence (WG 1.21.1).
- 4.20.55 As set out in the March 2016 ES (Document 2.3.2) Chapter 10, the species value within the study area is National (High) for three wintering species. These are redshank, gadwall and pintail.
- 4.20.56 The species value within the study area is County (Medium) for four wintering species. These are teal, pochard, tufted duck and shoveler.
- 4.20.57 The species value within the study area is District (Low) for five wintering species. These are shelduck, wigeon, curlew, lapwing and mallard.
- 4.20.58 The value of the unnamed Severn Estuary SPA and Ramsar wintering assemblage population in the study area has been judged to be District (Low).
- 4.20.59 The value of all remaining species recorded within the study area during the winter has been judged to be District (Low).

Freshwater Fish

- 4.20.60 The Trunk Road Estate BAP (Document 6.1.1) includes a species action plan for aquatic species including salmonids (i.e. salmon, trout, grayling and charr) and other fish (i.e. allis and twaite shad and bullhead).

Freshwater fish - Reens and Ditches

- 4.20.61 As reported in the March 2016 ES (Document 2.3.2) Chapter 10, the reen systems of the Gwent Levels are known to support a mixed population of coarse fish, including roach, tench, bream and carp; all characteristic of slow-flowing or still water. The reens also support a large population of European eel, which dominate the fish stocks in these features.

- 4.20.62 The conservation designations for the Severn Estuary and its tributaries include the following species: sea, river and brook lamprey, twaite and allis shad, sea trout, Atlantic salmon, European eel, and bullhead. While not all of these species are likely to occur within the watercourses of the study area, reens and ditches may be significant habitats for some species such as lampreys (river, brook and sea), and European eel.
- 4.20.63 Llanmartin Brook, which merges into Monks Ditch and becomes part of the Caldicot Levels drainage system, has previously been considered to be the most diverse in the southern Gwent area for freshwater fish. Species recorded in the upper parts of this brook include the minnow, stone loach, European eel, bullhead, gudgeon and brown trout. The majority of these species favour sandy and gravelly rivers and streams and three-spined stickleback, with nine-spined stickleback and roach were more common further downstream in the Monks Ditch area. Records from 2006 from the brook around Underwood also indicated signs of spawning brook lamprey.
- 4.20.64 Recognising that the eels that occur in the reens and ditches of the Gwent Levels are part of the population that is one of the reasons for notification of the Severn Estuary Ramsar site, this population should be considered to be of International (Very high) value. Given the diversity of the fish populations in some of the other watercourses and the extent of freshwater habitat, these should be considered to be of County (Medium) value.

Freshwater fish - Rivers

- 4.20.65 Other freshwater fish species that are common in larger rivers and are likely to be present in parts of the River Usk and the River Ebbw include species such as dace, pike, the spined loach, chub and barbel. Rudd and tench are also common freshwater species in the area, although these have generally been recorded further north after being introduced to local reservoirs and rivers as game fish.

- 4.20.66 Other species likely to be present in the rivers include the gudgeon, bullhead, minnow and the nocturnal stone loach, which inhabit small to medium sized flowing rivers and larger lake environments. Bullhead is widespread throughout the River Usk, with the exception of the estuarine area surrounding the mouth of the river. This species is a feature of the River Usk SAC.
- 4.20.67 The River Usk also supports a healthy population of brook lamprey and is considered to provide exceptionally good quality habitat likely to ensure the continued survival of the species in this part of the UK. Brook lamprey is listed as a primary reason for the selection of the River Usk SAC.
- 4.20.68 Given the nature conservation importance of the River Usk and that fish population form part of the reason for its notification as a SAC and SSSI, but acknowledging that the freshwater fish interest (particularly brook lamprey and bullhead) is primarily associated with the river upstream of Newport, the freshwater fish community (excluding the migratory species described below) is considered to be of National (High) value.

4.21 Migratory Fish

- 4.21.1 There are a number of species of migratory fish that transit through the lower reaches of the River Usk in particular, but also potentially the River Ebbw, to reach natal freshwater spawning grounds. These include Atlantic salmon, twaite shad, allis shad, river lamprey, sea lamprey and brown/sea trout. European eel also migrates through the River Usk and Ebbw estuaries.
- 4.21.2 The River Usk has been designated as an SAC for, amongst other features, the presence of some of these migratory fish species.
- 4.21.3 Sea and River Lamprey. The River Usk supports a healthy population of river lamprey. Adult river lampreys generally enter UK rivers in late autumn. Sea lampreys migrate upstream and enter rivers such as the

Usk in early spring. The survey of juveniles and observation of spawning adults indicate that sea lampreys are mainly restricted to the lower reaches of the River Usk catchment.

4.21.4 Twaite and Allis Shad. The River Usk is one of only four remaining rivers in the UK that are known to support a spawning population of twaite shad; the others are the Rivers Wye, Tywi and Severn (including its tributary the River Teme). Allis shad are rare in the UK and, although formerly known to spawn in several British river systems, the only recently confirmed spawning site is in the Tamar Estuary. The upstream migration of allis and twaite shad to spawning areas in the River Usk occurs between March and June, reaching a peak in May. The fish remain in fresh and/or estuarine waters during the summer, juveniles move into the Severn Estuary from July, before migrating seaward in autumn.

4.21.5 Atlantic Salmon. The River Usk is famous for its Atlantic salmon and the species is a primary reason for the selection of the River Usk SAC. Adult Atlantic salmon migrate upstream primarily between July and September, but also in earlier months of the year. Atlantic salmon smolts (life stage which changes body chemistry in preparation for living in salt water) migrate downstream towards marine feeding grounds between April and June; evidence suggests that this migration occurs largely during the night in surface waters.

4.21.6 European Eel. European eels begin their life as eel larvae and it is thought that these larvae drift from their birthplace in the Sargasso Sea for three years across the Atlantic Ocean on ocean currents to the Severn Estuary. Here they metamorphose into 'glass eels' and subsequently develop into more pigmented 'elvers', grow larger (yellow eel) before reaching reproductive maturation. The majority of upstream migration of elvers (juveniles) occurs between April and September (inclusive) and this freshwater phase is a feeding and growing stage, before they migrate out of the estuary. The peak downstream migration of adult eel takes place between September

and November. Spawning (assumed to be in the Sargasso Sea area) takes place in late winter and spring.

4.21.7 Sea Trout. Sea trout generally enter the rivers of South Wales between June and September, with smaller numbers entering at other times of the year. The timing of the downstream migration of sea trout smolts is similar to that of Atlantic salmon (April to June).

4.21.8 Recognising that the migratory fish that pass through the Usk Estuary comprise the community for which the River Usk SAC is partially designated, that these fish form part of the Severn Estuary SAC population and that the European Eel is one of the reasons for designation of the Severn Estuary Ramsar Site, the community of migratory fish is considered to be of International (Very high) value.

4.22 Estuarine and Marine Fish

4.22.1 A number of other marine and estuarine species of fish have the potential to be present in the waters of the River Usk and River Ebbw in the vicinity of the proposed new section of motorway.

4.22.2 The Severn Estuary ranks as one of the top ten estuaries in the UK for the number of marine estuarine-opportunistic species it supports. Marine estuarine-opportunists can be present in the Severn Estuary in very large numbers at particular times of year. These include sprat, herring, whiting, bib/pouting, poor cods, bass and common goby.

4.22.3 A few estuarine species spend their entire life-cycle within the Severn Estuary including common goby, black goby, sand smelt and three-spined stickleback.

4.22.4 Marine species typically spend their entire life-cycle in the sea and only occasionally enter estuaries; these species therefore have a reduced likelihood of being present in the lower reaches of the rivers Usk and Ebbw. Those recorded in any notable numbers from the Severn Estuary include conger eel, Norway pout, red mullet and plaice. Some elasmobranch species such as the common dogfish

and the thornback ray are also frequently recorded around the coastal areas of South Wales, including the areas of the Bristol Channel and Severn Estuary around Newport.

4.22.5 Spawning by marine fish species generally occurs further out into the Bristol Channel, well outside the study area, with many species including whiting, sole, plaice, sprat and bass spawning in the spring. Over the summer months the fish larvae drift through the Bristol Channel inshore and up the Severn Estuary to their coastal nursery grounds in autumn or, for migratory species, further inland to the freshwaters of the River Usk and River Ebbw. Nursery areas tend to occur in the shallower inshore areas of the Severn Estuary and for species including plaice, sole and whiting are likely to coincide with the areas around the mouth of both the River Usk and River Ebbw where these rivers enter the Severn Estuary.

4.22.6 Several species of fish and elasmobranch have notable nursery areas within the study area and for many marine species, the Severn Estuary and its supporting habitats (e.g. intertidal mudflats, saltmarsh, freshwater rivers etc.) represent both a regionally, and in some cases nationally, important nursery habitat. These species include whiting, plaice, sole and anglerfish.

4.22.7 Recognising that the fish populations of the estuary are an integral part of the ecosystem for which the Severn Estuary SSSI is designated, the community of marine and estuarine fish (excluding the migratory species referred to above) is considered to be of National (High) value.

4.23 Terrestrial Invertebrates

4.23.1 In the 2014 survey (March 2016 ES (Document 2.3.2) Appendix 10.15), 289 species of terrestrial invertebrate were recorded across the survey area. This total only included true species, rather than genus-only records. The majority of the terrestrial invertebrate

sampling points were associated with watercourses on or close to the line of the proposed new section of motorway.

- 4.23.2 From the terrestrial invertebrate total, one Red Data Book (IUCN 'rare') species was recorded. This was the yellow-horned horsefly (*Hybomitra ciurea*). The species has been recorded from the south and south east coasts of England. One record exists for the west; this is from 1987 when the fly was taken from Magor Marsh. As far as could be determined, the record from this survey was the second for Gwent.
- 4.23.3 Three 'nationally notable' species of terrestrial invertebrate were recorded. These were a rove beetle (Staphylinidae) *Paedurus fuscipes*; a fruit-fly or picture-winged fly (Tephritidae) *Dioxyna bidentis*; and a true fly (Muscidae) *Coenosia atra*.
- 4.23.4 The 2015 terrestrial invertebrate surveys covered land within Newport Docks and Tata Steel, and a survey of shrill carder bee *Bombus sylvarum* and brown-banded carder bee *B. humilis* across those sections of the Gwent Levels along the proposed new section of motorway corridor.
- 4.23.5 The survey within Newport Docks (March 2016 ES (Document 2.3.2) Appendix 10.31) identified 329 species. Of these 32 (9.7%) were considered to be 'Key Species', seven of them of Red Data Book or equivalent status. One species, a fly *Liriomyza intonsa*, was new for Britain. This represents a good diversity for such an open site, indicating an area of significant invertebrate conservation value.
- 4.23.6 Four UK BAP/Section 42 species were recorded including two important bumblebees, the brown-banded carder bee and the shrill carder bee, for which this part of South Wales is an important stronghold.
- 4.23.7 Both these bumblebees require a larger landscape scale habitat mosaic in order to maintain viable populations and many open

habitats in and around the survey site will be important for the viability of these populations. The results of the targeted survey for these species are summarised below.

- 4.23.8 The survey showed that the saltmarsh beside the River Ebbw is of particular importance for invertebrates.
- 4.23.9 The survey within Tata Steel's land (March 2016 ES (Document 2.3.2) Appendix 10.31) recorded 378 species. Of these 31 (8.2%) were considered to be 'Key Species', nine of them of Red Data Book or equivalent status (2.4%). This is a good diversity for the habitat types present, indicating an area of significant invertebrate conservation value.
- 4.23.10 Of particular interest were a fly *Hydrophorus viridis* and a hoverfly *Sphaerophoria loewi*, both very rare nationally.
- 4.23.11 Four UK BAP/Section 42 species were recorded including the two important bumblebees, the brown-banded carder bee and the shrill carder bee.
- 4.23.12 Reens and ephemeral pools were particularly important for the rarest species found. Reedbeds and sedge beds were also important for a number of scarce species and general biodiversity. Old poplar trees were also of interest.
- 4.23.13 The survey for bumblebees (March 2016 ES (Document 2.3.2) Appendix 10.31) recorded 56 shrill carder bees from 16 fields/compartments and 67 brown-banded carder bees from 18 fields/compartments. This confirms the continuing importance of the Gwent Levels for these two UK BAP bumblebees. An additional ten species of bumblebee were recorded.
- 4.23.14 The great majority of the populations of both target species occurred on or south of the proposed route of the new section of motorway. Although they were found across the whole of the survey area,

records were noticeably clumped in areas of floral diversity and abundance. Ungrazed open areas such as the Tata Steel land seem to be important in providing a greater diversity of floral resources. Hedgerows and reens were important where pasture was improved or semi-improved.

4.23.15 The small ranunculus moth, recorded within the Tata Steel land, is the subject of a Species Action Plan in the Newport BAP (Document 11.2.30). The small ranunculus is strongly associated with brownfield sites as its main larval host plant, prickly lettuce, is a ruderal species requiring disturbed ground and is often found at such sites.

4.23.16 The shrill carder bee is also a Newport BAP species recognising that one of the remaining populations of this species is on the flower rich grasslands of the Gwent Levels SSSIs.

4.23.17 Recognising that shrill carder bee is very restricted in its UK distribution and is one of the features for which the Gwent Levels SSSIs are designated, the population of shrill carder bee in the vicinity of the new section of motorway is of National (High) value.

4.23.18 The high proportions of other species of conservation importance indicate that the overall terrestrial invertebrate assemblage within the corridor of the new section of motorway is of Regional (Medium) value.

4.24 Aquatic Invertebrates

4.24.1 As reported in the March 2016 ES Chapter (Document 2.3.2), NRW provided reports of invertebrate surveys of the Gwent Levels SSSIs carried out on its behalf.

4.24.2 In the survey of the Whitson SSSI in 2009 (Document 11.3.14), 90 aquatic invertebrate species were recorded during the sampling programme, with two, the water beetles *Hydaticus transversalis* and *Hydrophilus piceus*, being Red Data Book species. A further six

nationally scarce species and 16 that are thought to have a high fidelity to grazing marsh habitats were noted.

4.24.3 Species richness and habitat quality were low compared to grazing marsh ditches sampled in other parts of southern Britain, such as the Somerset Levels. Two main factors were thought likely to contribute to the relatively low invertebrate diversity at Whitson. Firstly, many of the ditches were choked with growth of duckweeds, including the alien invasive species least duckweed *Lemna minuta*. The presence of abundant duckweed is thought to indicate a high degree of eutrophication. Dense mats of duckweed also suppress the growth of submerged beds of aquatic macrophytes, these being a very important niche for aquatic invertebrates.

4.24.4 Secondly, most of the ditches were subject to a very regular programme of clearing out, which also prevents the development of late-successional ditch habitats with diverse aquatic and emergent vegetation that supports the greatest diversity of invertebrate species.

4.24.5 In 2011, 24 grazing marsh ditches were sampled on the Redwick & Llandeenny and St. Brides SSSIs (Document 11.3.17). In all, 101 aquatic invertebrate species were recorded during the sampling programme, with two, the great silver water beetle *Hydrophilus piceus* and the soldierfly *Odontomyia ornata*, being Red Data Book species. A further five nationally scarce species and 17 that are thought to have a high fidelity to grazing marsh habitats were noted.

4.24.6 As for the previous survey of the Whitson SSSI, species richness and habitat quality were low compared to grazing marsh ditches sampled in other parts of southern Britain, such as the Somerset Levels. The two main causes were again considered to be choking of the ditches with duckweed and the regular clearing of ditches.

4.24.7 In 2012, aquatic invertebrate sampling was undertaken in grazing marsh ditches in the Magor & Undy, Nash & Goldcliff, Newport Wetlands and Rumney & Peterstone SSSIs (Document 11.3.18).

Forty four main reën sections, plus five field ditches, were sampled. In all, 148 aquatic invertebrate species were recorded during the sampling programme, with three, the king diving beetle *Dytiscus dimidiatus*, the great silver water beetle *Hydrophilus piceus* and the soldierfly *Odontomyia ornata*, being Red Data Book species. A further nine nationally scarce species and 18 that are thought to have a high fidelity to grazing marsh habitats were noted.

- 4.24.8 As for the previous surveys of the Whitson, Redwick & Llandeveyney and St. Brides SSSIs species richness and habitat quality were low compared to grazing marsh ditches sampled in other parts of southern Britain. The two main causes were again considered to be choking of the ditches with duckweed and the regular clearing of ditches.
- 4.24.9 The report of a survey carried out for the Scheme in 2014 was at Appendix 10.15 of the March 2016 ES) (Document 2.3.2). 130 species of aquatic invertebrate were recorded across the survey area.
- 4.24.10 One Red Data Book species (IUCN Near Threatened) was recorded. This was the Great Silver Water Beetle *Hydrophilus piceus*.
- 4.24.11 One Nationally Scarce species was recorded. This was the water beetle *Hydaticus transversalis*.
- 4.24.12 The requirement for further survey of aquatic invertebrates was discussed with NRW and it was agreed that this was not necessary. For the purposes of the EIA it was assumed that all reens and ditches within the various SSSI boundaries are capable of supporting the individually qualifying and invertebrate assemblage of each specific SSSI. On the basis that the invertebrate community of the reens and ditches is a key feature of the Gwent Levels SSSI designations it is considered to be of National (High) value.

4.25 Nature Conservation Policies

4.25.1 In this section I refer to the planning policies and guidance relevant to the consideration of the ecological and nature conservation effects of the project.

National Planning Policy

Planning Policy Wales

4.25.2 Planning Policy Wales (PPW) Edition 9 (Document 5.1.12) provides a national planning policy framework for Wales. Chapter 5 of PPW covers 'Conserving and Improving Natural Heritage and the Coast'. A number of objectives are listed in paragraph 5.1.2, of which the following are of relevance:

'promote the conservation of landscape and biodiversity, in particular the conservation of native wildlife and habitats;

ensure that action in Wales contributes to meeting international responsibilities and obligations for the natural environment;

ensure that statutorily designated sites are properly protected and managed;

safeguard protected species, and

promote the functions and benefits of soils, and in particular their function as a carbon store'.

4.25.3 Paragraph 5.5.1 states that:

'Biodiversity and landscape considerations must be taken into account in determining individual applications and contributing to the implementation of specific projects. The effect of a development proposal on the wildlife or landscape of any area can be a material consideration. In such instances and in the interests of achieving sustainable development it is important to balance conservation

objectives with the wider economic needs of local businesses and communities. Where development does occur it is important to ensure that all reasonable steps are taken to safeguard or enhance the environmental quality of land. Pre-application discussions between the developers, local planning authorities and statutory advisers such as Natural Resources Wales are recommended.'

4.25.4 Chapter 5 of PPW (para 5.5.8) also sets out the duty imposed on all public bodies by Section 28G of the Wildlife and Countryside Act 1981 (Document 3.1.7) “...*to take reasonable steps, consistent with the proper exercise of the authority’s functions, to further the conservation and enhancement of the flora, fauna or geological or physiographical features by reason of which the site is of special scientific interest.*”

4.25.5 PPW (para 5.2.2) also refers to the Natural Environment and Rural Communities Act 2006 Document 3.1.13), which under Section 40(1) requires that every public authority must “...*in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity.*”

Technical Advice Note 5: Nature Conservation and Planning

4.25.6 Technical Advice Note (TAN) 5 (Document 11.2.14) provides advice about how the land use planning system should contribute to protecting and enhancing biodiversity and geological conservation. The TAN provides advice for local planning authorities on:

- a) the key principles of positive planning for nature conservation;
- b) nature conservation and Local Development Plans;
- c) nature conservation in development management procedures;
- d) development affecting protected internationally and nationally designated sites and habitats; and
- e) development affecting protected and priority habitats and species.

Action Plan for Pollinators in Wales

- 4.25.7 The Action Plan for Pollinators in Wales (Document 11.2.28) recognises that:

‘Pollinators are an essential component of our environment. Honeybees and wild pollinators including bumblebees, solitary bees, parasitic wasps, hoverflies, butterflies and moths and some beetles are important pollinators in Wales, for crops such as fruit and oil seed rape, clovers and other nitrogen fixing plants that are important to improving the productivity of pasture systems for livestock grazing, and wild flowers.’

- 4.25.8 It recognises the value of pollination as a contribution to UK crop production and that bee and pollinator health and declining populations have been increasingly highlighted as a cause for concern in the UK and globally. The Welsh Government has thus worked with industry and stakeholders to look in more detail at the evidence and issues around pollinators and their conservation in Wales. The plan describes the current situation in Wales and identifies areas where action is needed. It sets out the Welsh Government’s Vision for Pollinators in Wales, and puts that into the context of the Welsh Government’s priorities and policies. It also lays out an Agenda for Action comprising the outcomes and areas for action that have been identified and how the Welsh Government will work towards them.

Local Planning Policy

- 4.25.9 The Scheme lies within the administrative areas of Newport City Council and Monmouthshire County Council. The relevant policies of these authorities are set out in full at March 2016 ES Appendix 10.1 (Document 2.3.2). It should be noted that whilst these documents provide context, they are not determinative since the Scheme is being taken forward via the Highways Act (1980) as amended (Document

3.1.5). Consequently the Scheme is not governed by local planning policy, but does have regard to it.

Newport Local Development Plan 2011-2026 (Document 5.3.1)

4.25.10 Objective 6 – Conservation of the Natural Environment of the Plan is:

‘To protect and enhance the quality of the natural environment, including landscape, protected habitats and species of principal importance for biodiversity in Wales (regardless of greenfield or brownfield status) and the protection of controlled waters.’

4.25.11 The key policies relevant to ecology and nature conservation are:

SP5 Countryside;

SP9 Conservation of the Natural, Historic and Built Environment;

CE8 Locally Designated Nature Conservation and Geological Sites;
and

CE9 Coastal Zone.

4.25.12 Newport City Council’s River Usk Strategy (Document 11.2.16)

includes a section on Ecological Interests and Opportunities (Section 6). This describes the ecological designations of the river, including the qualifying features of the River Usk Special Area of Conservation (SAC); the requirements for Habitats Regulations Assessments, European Protected Species; the Newport Urban Otter Habitat Survey - Phase 2; development in the vicinity of the river; ecological opportunities; and consultations with relevant organisations.

4.25.13 The key recommendations of this section of the strategy are as follows.

‘To continue to work closely with the Environment Agency and Countryside Council for Wales to ensure that future proposals or plans do not adversely affect the nature conservation features of the River Usk.’

To comply with the Conservation (Natural Habitats &c) Regulations 1994 and carry out Habitats Regulations Assessments to ensure that development does not have a detrimental impact upon the Special Area of Conservation or the special features for which it was designated.'

Monmouthshire Local Development Plan 2011-2021 (Document 5.3.2)

4.25.14 The Plan recognises that:

'Monmouthshire has major biodiversity and landscape resources that need to be preserved and should be protected, managed and enhanced.

There is a need to improve connectivity within the landscape through protecting and improving existing wildlife networks and corridors and creating new linkages to allow species to move and adapt to climate change impacts.'

4.25.15 The LDP seeks to influence these issues through a range of measures, those relevant to ecology and nature conservation being:

'Ensuring that new development does not cause harm to international, national and locally protected sites and species and that where appropriate and necessary, avoidance, mitigation and compensation measures are incorporated, while ensuring that new benefits for Biodiversity are explored.

Undertaking a Habitats Regulations Assessment to ensure that the cumulative effects of development in Monmouthshire and adjoining areas do not result in harm to internationally designated nature conservation sites.

Ensuring that biodiversity is considered in any development in order to protect any existing interest on the site and encourage biodiversity enhancements where necessary.'

4.25.16 The relevant Objective - Valuing our Environment - of the plan is:

‘8. To protect, enhance and manage Monmouthshire’s natural heritage, including the Wye Valley AONB, the County’s other high quality and distinctive landscapes, protected sites, protected species and other biodiversity interests and the ecological connectivity between them, for their own sake and to maximise benefits for the economy, tourism and social well-being.’

4.25.17 The key policies relevant to ecology and nature conservation are:

Policy S13 – Landscape, Green Infrastructure and the Natural Environment.

Policy NE1 – Nature Conservation and Development.

Biodiversity Action Plans and Management Plans

4.25.18 The following Biodiversity Action Plans are relevant:

UK Post-2010 Biodiversity Framework (Document 11.2.27).

Newport Local Biodiversity Action Plan (Document 11.2.30).

Monmouthshire Local Biodiversity Action Plan (LBAP) (Document 11.2.8).

Trunk Road Estate Biodiversity Action Plan 2004-2014 (Document 6.1.1).

4.25.19 The UK Post-2010 Biodiversity Framework supersedes the UK Biodiversity Action Plan. In 2007 the UK Biodiversity Partnership published an updated list of priority UK species and habitats covering terrestrial, freshwater and marine biodiversity to focus conservation action for rarer species and habitats in the UK. The UK priority list contains 1150 species and 65 habitats. The UK list has been used as a reference to draw up the species and habitats of principal importance in Wales under Section 42 of the Natural Environment and Rural Communities Act 2006 (Document 3.1.13).

- 4.25.20 The Newport and Monmouthshire Biodiversity Action Plans contain Habitat Action Plans and Species Action Plans for some of the habitats and species recorded within the study area as does the Trunk Road Estate Biodiversity Action Plan. These have been taken into account in this assessment.
- 4.25.21 Selection of non-statutory sites of local wildlife importance is an important tool for conservation of local biodiversity enabling the planning system to recognise and thus protect or enhance areas of substantive nature conservation value outside the limited network of statutorily protected SSSIs. The Guidelines for the Selection of Wildlife Sites in South Wales (Document 11.2.7) set out a common set of guidelines for the selection of Wildlife Sites in the South Wales region. Similar guidance for the whole of Wales is provided in the Guidelines for the Selection of Wildlife Sites in Wales (Document 11.2.12).
- 4.25.22 Sites of Importance for Nature Conservation (SINCs) designated on the basis of these guidelines are identified in this chapter and the effects of the Scheme on them are assessed.
- 4.25.23 An important initiative in conservation of biodiversity in the Gwent Levels is the Living Levels Project. The partners in the project are the Royal Society for the Protection of Birds (RSPB), Gwent Wildlife Trust (GWT), Natural Resources Wales (NRW), Newport City Council (NCC), Monmouthshire County Council (MCC), Cardiff City Council (CCC), Rick Turner OBE, Cardiff Story Museum, Sustrans, National Trust, Bumblebee Conservation Trust and Buglife.
- 4.25.24 The project has been awarded funding of £2,865,300 through the Heritage Lottery Fund's Landscape Partnership programme, which provides grants for schemes aiming to conserve areas of distinctive landscape character. The project plans to work with volunteers, farmers and communities to collectively increase wildlife-friendly

management, provide interpretation and create new trails, increasing people's awareness of the area's unique features.

4.25.25 The initial development period of the project will run from January 2016 to June 2017. Subject to successful completion of the development stage, the delivery stage of the project would run from the end of 2017 to the end of 2020.

4.25.26 In addition, the following management plans are relevant:

Wye and Usk Catchment Flood Management Plan (Document 11.2.18).

Draft Shoreline Management Plan for the Severn Estuary (SMP2) (Document 11.2.23).

Severn Estuary Flood Risk Management Strategy (SEFRMS) (Document 17.2.12).

4.25.27 These plans set out the policies governing how catchment and coastal flood protection would be managed in the area and hence the future conditions which will prevail when the new road is operational.

4.26 Legislation

4.26.1 The requirements of the EC Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora ("The Habitats Directive") (Document 3.1.21) are brought into UK law through the Conservation of Habitats and Species Regulations 2010 (S.I. 2010/490) ("The Habitats Regulations") (Document 3.1.22).

4.26.2 There are statutory measures for nature conservation under the Wildlife and Countryside Act 1981 (Document 3.1.7), the Countryside and Rights of Way Act 2000 (Document 3.1.12), the Natural Environment and Rural Communities Act 2006 (Document 3.1.13), the Well-being of Future Generations (Wales) Act 2015 (Document 3.1.18) and the Environment (Wales) Act 2016 (Document 3.1.16).

4.26.3 The Welsh Government has particular responsibilities with respect to Sites of Special Scientific Interest (SSSIs) under section 28G of the Wildlife and Countryside Act 1981 (Document 3.1.7). An authority to which this section applies has the duty “...*to take reasonable steps, consistent with the proper exercise of the authority’s functions, to further the conservation and enhancement of the flora, fauna or geological or physiographical features by reason of which the site is of special scientific interest.*”

4.26.4 The duty under Section 40(1) of the Natural Environment and Rural Communities Act 2006 (Document 3.1.13) has been updated in respect of public bodies in Wales by the Environment (Wales) Act 2016 (Document 3.1.16). Section 6(1) of that Act states that:

“A public authority must seek to maintain and enhance biodiversity in the exercise of functions in relation to Wales, and in so doing promote the resilience of ecosystems, so far as consistent with the proper exercise of those functions.”

4.26.5 The difference between this duty and that in the Natural Environment and Rural Communities Act 2006 (Document 3.1.13) is that it includes both maintenance and enhancement.

4.27 Summary

4.27.1 In this section I have summarised the information on statutory and non-statutory designated nature conservation sites within the study area for the published Scheme, the boundaries of which are shown on March 2016 ES (Document 2.3.2) Figures 10.1 (International Statutory Sites), 10.2 (National Statutory Sites) and 10.3 (Non Statutory Sites).

4.27.2 I have also summarised the baseline information for, and status of, the main habitats and species present in the area of the Scheme.

4.27.3 The following statutory designated sites have been considered in assessing the effects of the published Scheme:

- a) River Usk SAC
- b) River Usk (Lower Usk) SSSI
- c) Severn Estuary SAC
- d) Severn Estuary SPA
- e) Severn Estuary Ramsar Site
- f) Severn Estuary SSSI
- g) Wye Valley and Forest of Dean Bat Sites SAC
- h) Mwyngloddfa Mynydd-Bach SSSI
- i) Wye Valley Lesser Horseshoe Bat SSSI
- j) Gwent Levels – Rumney and Peterstone SSSI;
- k) Gwent Levels – St Brides SSSI;
- l) Gwent Levels – Nash and Goldcliff SSSI;
- m) Gwent Levels – Whitson SSSI;
- n) Gwent Levels - Redwick and Llandevenny SSSI; and
- o) Gwent Levels – Magor and Undy SSSI.
- p) Newport Wetlands SSSI
- q) Newport Wetlands NNR
- r) Magor Marsh SSSI
- s) Rogiet Meadow SSSI
- t) Penhow Woodlands SSSI
- u) Penhow Woodlands NNR

4.27.4 Non-statutory designated sites are shown on March 2016 ES (Document 2.3.2) Figure 10.3 and details of these sites are provided in March 2016 ES Appendices 10.2, 10.17 and 10.34. Thirty eight non-statutory Sites of Importance for Nature Conservation (SINCs) are located within the study area. In addition, two Gwent Wildlife Trust reserves and one Royal Society for the Protection of Birds (RSPB) reserve are located within the study area.

4.27.5 The habitats mapped along the route of the new section of motorway are shown on March 2016 ES (Document 2.3.2) Figure 10.4. The habitats of most nature conservation importance, both intrinsically, and as habitat for wildlife include:

- a) Woodland
- b) Grassland
- c) Coastal and Floodplain Grazing Marsh
- d) Lowland Meadow
- e) Swamp and Reedbeds
- f) Rivers
- g) Ponds
- h) Eutrophic Standing Waters
- i) Saltmarsh
- j) Intertidal Mudflats
- k) Subtidal Habitats
- l) Hedgerows
- m) Open Mosaic Habitats on Previously Developed Land

4.27.6 The March 2016 ES (Document 2.3.2) Table 10.8 summarises the occurrence of notable plant species within the survey area. One species recorded, tubular water dropwort, is included in the list of species of principal importance for biodiversity in Wales (Section 42 of the Natural Environment and Rural Communities Act 2006) (Document 3.1.13).

4.27.7 Information on the faunal species within and in the vicinity of the new section of motorway was gathered through desk study and ecology surveys. Protected and otherwise notable species considered in detail in the ES include:

- a) Otter
- b) Dormouse
- c) Bats
- d) Water Vole
- e) Badger
- f) Hedgehog
- g) Reptiles
- h) Great Crested Newt and other Amphibians

- i) Breeding Birds
- j) Wintering Birds
- k) Freshwater Fish
- l) Migratory Fish
- m) Estuarine and Marine Fish Species
- n) Terrestrial Invertebrates
- o) Aquatic Invertebrates

4.27.8 I have referred to the planning policies and guidance relevant to the consideration of the ecological and nature conservation effects of the project. These comprise:

- a) Planning Policy Wales Edition 9 (Document 5.1.12)
- b) Technical Advice Note 5: Nature Conservation and Planning (Document 11.2.14)
- c) Action Plan for Pollinators in Wales (Document 11.2.28)
- d) Newport Local Development Plan 2011-2026 (Document 5.3.1)
- e) Monmouthshire Local Development Plan 2011-2021 (Document 5.3.2)

4.27.9 The following Biodiversity Action Plans are relevant:

- a) UK Post-2010 Biodiversity Framework (Document 11.2.27).
- b) Newport Local Biodiversity Action Plan (Document 11.2.30).
- c) Monmouthshire Local Biodiversity Action Plan (LBAP) (Document 11.2.8).
- d) Trunk Road Estate Biodiversity Action Plan 2004-2014 (Document 6.1.1).

4.27.10 An important initiative in conservation of biodiversity in the Gwent Levels is the Living Levels Project. The partners in the project are the Royal Society for the Protection of Birds (RSPB), Gwent Wildlife Trust (GWT), Natural Resources Wales (NRW), Newport City Council

(NCC), Monmouthshire County Council (MCC), Cardiff City Council (CCC), Rick Turner OBE, Cardiff Story Museum, Sustrans, National Trust, Bumblebee Conservation Trust and Buglife.

4.27.11 In addition, the following management plans are relevant:

- a) Wye and Usk Catchment Flood Management Plan (Document 11.2.18).
- b) Draft Shoreline Management Plan for the Severn Estuary (SMP2) (Document 11.2.23).
- c) Severn Estuary Flood Risk Management Strategy (SEFRMS) (Document 17.2.12).

4.27.12 The requirements of the EC Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (“The Habitats Directive”) (Document 3.1.21) are brought into UK law through the Conservation of Habitats and Species Regulations 2010 (S.I. 2010/490) (“The Habitats Regulations”) (Document 3.1.22).

4.27.13 There are statutory measures for nature conservation under the Wildlife and Countryside Act 1981 (Document 3.1.7), the Countryside and Rights of Way Act 2000 (Document 3.1.12), the Natural Environment and Rural Communities Act 2006 (Document 3.1.13), the Well-being of Future Generations (Wales) Act 2015 (Document 3.1.18) and the Environment (Wales) Act 2016 (Document 3.1.16).

4.27.14 The Welsh Government has particular responsibilities with respect to Sites of Special Scientific Interest (SSSIs) under section 28G of the Wildlife and Countryside Act 1981. An authority to which this section applies has the duty “...to take reasonable steps, consistent with the proper exercise of the authority’s functions, to further the conservation and enhancement of the flora, fauna or geological or physiographical features by reason of which the site is of special scientific interest.”

4.27.15 The duty under Section 40(1) of the Natural Environment and Rural Communities Act 2006 (Document 3.1.13) has been updated in respect of public bodies in Wales by the Environment (Wales) Act 2016 (Document 3.1.16). Section 6(1) of that Act states that

“A public authority must seek to maintain and enhance biodiversity in the exercise of functions in relation to Wales, and in so doing promote the resilience of ecosystems, so far as consistent with the proper exercise of those functions.”

5. POTENTIAL ECOLOGICAL EFFECTS AND MITIGATION

5.1 Introduction

- 5.1.1 The plan of the published Scheme design is shown on the revised Environmental Masterplan (September 2016 ES Supplement (Document 2.4.4) Figure R2.6). The proposed new section of motorway would extend from Junction 29 of the existing M4 at Castleton to Junction 23A at Magor.
- 5.1.2 The new section of motorway would be approximately 24 kilometres in length and would provide three lanes in both directions. After leaving the existing M4 motorway at Junction 29, the new section of motorway would pass to the south of Duffryn before crossing the Rivers Ebbw and Usk to the south of the A48 at Newport Docks. The new section of motorway would then continue to the south of the Solutia chemical works and the Tata Steel site at Llanwern before passing to the west of Magor and re-joining the existing M4.
- 5.1.3 In addition to the junctions at Castleton and Magor, two new junctions would be provided along the route of the new section of motorway at Newport Docks and at Glan Llyn.
- 5.1.4 New or diverted lengths of highway, public rights of way and private means of access would be provided to replace those affected by the Scheme.
- 5.1.5 The local highway network would also be realigned at ten locations and new road overbridges would be constructed at Church Lane, Lighthouse Road, New Dairy Farm, Nash Road and North Row. There would be new bridges over the London-Swansea railway line south of Duffryn and west of Magor.
- 5.1.6 Road drainage would discharge into a series of water treatment areas comprising attenuation ponds and reed beds along the new section of motorway. These water treatment areas would attenuate and treat the collected surface water prior to discharging it into existing reens.

- 5.1.7 Approximately two thirds of the route for the proposed new section of motorway crosses the Gwent Levels. The Gwent Levels are areas of flat reclaimed coastal marshes adjoining the Severn Estuary and comprising the Wentlooge Levels and Caldicot Levels to the west and east of Newport respectively. The Gwent Levels are low lying with an elevation typically of between 5 – 6 metres (m) above Ordnance Datum (AOD).
- 5.1.8 The Gwent Levels are dissected by an extensive network of tide-locked freshwater drains, locally known as reens with associated field ditches. As I have explained in section 4 of this evidence, the Gwent Levels include a number of Sites of Special Scientific Interest (SSSIs), four of which would be crossed by the new section of motorway. In addition, the River Usk is designated nationally and internationally for its nature conservation value. At the location of the proposed crossing, the river is designated as a SSSI and Special Area of Conservation (SAC).
- 5.1.9 Referring to the revised General Arrangement Drawings at September 2016 ES Supplement (Document 2.4.4) Figure R2.4, and the plans of international, national and non-statutory designated sites at March 2016 ES (Document 2.3.2) Figures 10.1, 10.2 and 10.3, after leaving the relatively high ground at Castleton, the new section of motorway would pass through the Gwent Levels-St Bride's SSSI from chainage (ch) 5000 to ch 8400. After crossing the river Ebbw (designated as a SINC), then passing through Newport Docks, crossing the River Usk (designated as SAC and SSSI) and Marshall's SINC, passing through the industrial area to the east of Newport Docks, and crossing the Solutia Site SINC, the new section of motorway would pass through the Gwent Levels - Nash and Goldcliff SSSI (ch 13000 to ch 14900), the Gwent Levels Whitson SSSI (ch 16550 to ch 17220) and the Gwent Levels - Redwick to Llandeenny SSSI (ch 17220 to ch. 20050).

5.1.10 The Scheme would also cross the following non-statutory nature conservation sites (from west to east):

Afon Ebbw River SINC (ch 8450 to ch 8550)

Marshall's SINC (ch 10300 to ch 10450)

Solutia Site SINC (ch 11400 to ch 12360)

Spencer Works 3 SINC (ch 15750 to ch 16370)

Bowkett Field, Barecroft SINC (ch 19600 to ch 19700)

Barecroft Fields SINC (ch 19700 to ch 19750)

Land at Barecroft Common SINC (ch 19800 to ch 19810)

Grange Road (ch 21300 to ch 21560)

Upper Grange Farm Field (ch 21400 to ch 21500)

5.1.11 The special features of the Gwent Levels SSSIs which would be crossed by the Scheme are in summary:

- a) reens and ditch habitat;
- b) insects and other invertebrates (aquatic); and
- c) shrill carder bee.

5.1.12 The reens and ditches within the Gwent Levels support a wide range of aquatic plants, including many rare or scarce species that in turn support a wide variety of other wildlife. There is a diverse community of insects and other invertebrates (for example water beetles) inhabiting the reens and ditches. The assemblage of water beetles found across the Gwent Levels is unique in Wales and includes the great silver beetle which is found nowhere else in Wales and is restricted to only a few other sites in southern England.

- 5.1.13 The unmown ditch banks and rough grassland areas provide habitat for the shrill carder bee, as they support the flowers preferred by the bee for sources of nectar and pollen, such as red clover, creeping thistle and black knapweed.
- 5.1.14 The reens and ditches also provide habitat for protected species including otter, water vole, grass snake and amphibians.
- 5.1.15 The crossing of the River Usk (SAC and SSSI) would be via a bridge with approach viaducts on either side, that on the west crossing the River Ebbw SINC) and the port area of Newport. There would be no structures within the channel of the River Usk.
- 5.1.16 An area of saltmarsh on the east bank of the River Usk is included in the River Usk SAC although it is not a qualifying feature for which the SAC is designated. The eastern pier of the bridge would be constructed within this area of saltmarsh.
- 5.1.17 The Severn Estuary SAC, Special Protection Area (SPA) and Ramsar site is also located within 1 km to the south of the Scheme.
- 5.1.18 Around the proposed junctions at the western and eastern ends of the Scheme, the ground is higher and agricultural use is a mixture of grazing and arable. Field boundaries are generally hedgerows and there are small areas of woodland, including some which are ancient woodland. An access road is proposed at the eastern end of the Scheme connecting to Ifton Quarry. There are extensive woodlands (including both ancient woodlands and plantations) to the west and north of Ifton Quarry.
- 5.1.19 A section of the route passes through the southern section of the Tata Steel Llanwern Steelworks site. This section of the steelworks site has been used as settlement and water treatment lagoons, many of which are now naturally revegetated.

5.1.20 In this section of my evidence, I first summarise the potential effects of road schemes on biodiversity and then describe the measures which are proposed to avoid or mitigate effects on the designated sites referred to above, and the key habitats and species present in the area of the published Scheme.

5.2 Potential Ecological Effects

5.2.1 Road schemes can affect biodiversity in various ways. Areas of potential impact which are relevant to road proposals as follows:

Effects of Land Take

- a) Direct loss of wildlife habitats through land take.
- b) Severance and/or fragmentation where a scheme may create a barrier and divide existing habitats or affect the continuity of wildlife corridors such as hedgerows.

Effects of Construction

- a) Road construction works can result in disturbance of sensitive species. There is also a risk of water pollution as a result of runoff from construction areas. Although the works are temporary the potential effects can be significant.

Effects of the Operational Road

- a) Wildlife casualties where animals are killed crossing the road. This can be a particular problem for animals that use traditional routes such as foraging badgers and breeding amphibians. Some birds, such as barn owls, are attracted to road verges by small mammal prey and are vulnerable.
- b) Disruption of hydrology may affect wetland sites and watercourses.
- c) Polluted runoff from roads may affect downstream watercourses.
- d) Road structures such as bridges and embankments, which reduce visibility, may have a deterrent effect on species that

prefer large open areas such as large waders and flocks of wildfowl.

- e) Road lighting can adversely affect invertebrates and disorientate birds.
- f) Air pollutants from road traffic may affect sensitive species and can result in changes in plant communities.
- g) Spray from road traffic containing de-icing salt can affect sensitive species. Within about 2 metres (m) of the carriageway a characteristic salt tolerant plant community may develop which in some areas includes species normally found in coastal saltmarshes.

5.3 Ecological Mitigation and Monitoring

5.3.1 Mitigation has been considered as an intrinsic and iterative part of the Scheme development and assessment process informed by consultation with stakeholders as required by Design Manual for Roads and Bridges (DMRB) Interim Advice Note 125/15 Environmental Assessment Update (Document 6.1.12).

5.3.2 The Design Manual for Roads and Bridges (DMRB) Volume 11, Section 2, Part 5 (HA 205/08) (Document 13.2.6) explains at paragraph 1.42 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 – consider and incorporate measures to prevent the effect (for example, consider alternative design options or phase the project to avoid environmentally sensitive periods).

b) Reduction – where avoidance is not possible, then methods to lessen the effect should be considered and incorporated into the project design. Consultation with the Overseeing Organisation will

determine whether any remaining ‘residual’ effect is considered to be environmentally acceptable.

c) Remediation – where it is not possible to avoid or reduce a significant adverse effect, then measures to offset the effect should be considered.’

5.3.3 Following this guidance I outline the mitigation measures relevant to this assessment of the ecological effects of the Scheme in this section. A significant element of such additional mitigation is the SSSI Mitigation Strategy. This was attached to the March 2016 ES as Appendix 10.35 (Document 2.3.2) and a revised version was published as Appendix SR10.35 of the December 2016 ES Supplement (Document 2.4.14). The aim of the strategy is to provide mitigation for the loss of coastal grazing marsh habitat as a result of the Scheme and, where practicable, to ecologically enhance land within the Gwent Levels SSSIs. As explained in the revised SSSI Mitigation Strategy, the temporary and permanent loss of grazing marsh would amount to some 86.4 ha.

5.3.4 Three mitigation areas have been identified, these being Maerdy Farm, Tatton Farm and Caldicot Moor. The total area of the land identified in the revised proposals within these three areas is 129.6 ha, of which 107.1 ha would be available for mitigation for loss of grazing marsh through arable reversion and enhancement of existing grassland.

5.3.5 The requirements for grazing marsh mitigation have been discussed with NRW and it has been agreed that, for arable reversion, a mitigation ratio of 1:1 has been used since the arable land is not considered to contribute in any material way to SSSI purposes. For grassland enhancement, recognising that the land already has biodiversity value, a mitigation ratio of 1.5:1 has been used, so for every hectare of grassland lost, 1.5 ha would be enhanced.

- 5.3.6 Considering grassland enhancement at Tatton Farm first, this amounts to 37.0 ha. At a ratio of 1.5:1 this mitigates for the loss of 24.7 ha of grazing marsh. Subtracting this from the total area lost of 86.4 ha leaves 61.7 ha. Maerdy Farm provides 33.9 ha of arable land which would be converted to grassland. At a ratio of 1:1, this leaves 27.8 ha to be found at Caldicot Moor. Caldicot Moor provides 12.2 ha of arable land which would be converted to grassland. At a ratio of 1:1 this leaves 15.6 ha to be mitigated by grassland enhancement. At a ratio of 1.5 to 1 this requires 23.4 ha of land. The total area of grassland within the land identified at Caldicot Moor is some 43 ha. However 19 ha of land in the north of this area has been identified as essential for mitigation for protected species. The area available for SSSI mitigation through grassland enhancement is thus 24.0 ha. Therefore the land identified in the revised proposals at Tatton Farm, Maerdy Farm and Caldicot Moor is sufficient, based on the ratios agreed with NRW, to satisfy the requirement for mitigation of the loss of grazing marsh.
- 5.3.7 As explained by Mr Barry Woodman in his Proof of Evidence (WG 1.6.1) the Scheme would include measures to control pollution during construction and these would be set out in a Construction Environmental Management Plan (CEMP) following the principles set out in the Pre-CEMP (December 2016 ES Supplement (Document 2.4.14) Appendix SR3.2).
- 5.3.8 In his Proof of Evidence (WG 1.7.1), Dr Peter Ireland explains in more detail the process of environmental management during and after construction of the new section of motorway.
- 5.3.9 Dr Peter Ireland also explains that the draft Register of Environmental Commitments which would be annexed to the CEMP formed Appendix 18.1 of the March 2016 ES (Document 2.3.2). It was retained in draft form to allow for additions and amendments following consultation with key-stakeholders. An updated version of the draft Register formed Appendix R18.1 of the September 2016 ES

Supplement (Document 2.4.4) and it was further updated as Appendix SR18.1 of the December 2016 ES Supplement (Document 2.4.14). This will continue to be updated during the course of the Public Inquiry.

- 5.3.10 Dr Peter Ireland also explains that an Environmental Liaison Group (ELG) was established by Welsh Government prior to the Early Contractor Involvement (ECI) contract start and comprises Welsh Government, the Government's advisers, the Contractor and statutory consultees (NRW, Newport City Council, Cadw, Monmouthshire County Council and Cardiff City Council. The Group would meet at regular intervals throughout the construction period to review progress of the Scheme and its construction, and to focus on specific environmental issues as required.
- 5.3.11 As explained in the Pre-CEMP (December 2016 ES Supplement (Document 2.4.14) Appendix SR3.2), an Environmental Co-ordinator (ECO) would be responsible for the interface between the environmental specialists and engineers. The ECO would have primary responsibility for managing environmental issues through the construction and post-construction monitoring phases and for obtaining relevant licences and consents.
- 5.3.12 The Environmental Clerk of Works (ECOW) would support the ECO during construction and aftercare. The ECOW would be the site representative for the ECO and would be responsible for overseeing construction activities to ensure all environmental commitments are met and compliance with the conditions of all licences and permits. The ECOW would be based on site full time and would have the authority to direct members of the Contractor's site staff on environmental issues.

Avoidance

- 5.3.13 Measures to avoid adverse effects include the following:

- a) No construction in the wetted channels of the Rivers Usk and Ebbw (defined as the channel below Mean High Water as explained in March 2016 ES (Document 2.3.2) Chapter 2: Scheme Description).
- b) Minimise land take within the Gwent Levels SSSIs and, where practical, avoid land take to the south of the line of the new motorway.

Reduction

5.3.14 Measures to reduce adverse effects include the following:

- a) Provision of water treatment areas to control the volume and quality of water discharged to the reen system.
- b) Maintaining all existing reen connections across the line of the new section of motorway.
- c) Provision of permanent mammal fencing along the new section of motorway.
- d) Avoidance of lighting other than at junctions and the river crossings.
- e) Design of lighting of the River Usk and River Ebbw crossings to avoid lighting of the river channels and banks.
- f) Minimise light spill through lighting design.
- g) Provision of mammal crossings at suitable locations across the line of the new section of motorway.
- h) Provision of mammal tunnels adjacent to all reen culverts.
- i) Design of planting to guide bats to culverts and other crossings.
- j) Provision of eel passes on all new sluices.
- k) Use of plant material from existing reens and ditches to encourage colonisation of new reens and ditches by aquatic macrophytes.

Remediation

5.3.15 Where it has not been possible to avoid or reduce adverse effects, in accordance with DMRB Volume 11, Section 2, Part 5 (HA 205/08) (Document 13.2.6) measures to offset such effects have been sought. These include the following:

- a) Replacement of reens at a ratio of 1:1.
- b) Replacement of field ditches at a ratio of 1:1
- c) Landscape/habitat provision shown on the revised Environmental Masterplan (EMP) (September 2016 ES Supplement (Document 2.4.4) Figure R2.6).
- d) Replacement of saltmarsh.
- e) Ecological enhancement of land (e.g. recutting of former ditches, removal of hedgerows, reseeding grassland) at Maerdy Farm, Tatton Farm and Caldicot Moor.
- f) Provision of three replacement badger setts.
- g) Provision of bat barn north of Magor.
- h) Use of woodland soils and rootstocks in new planting areas.
- i) Provision of bat boxes.
- j) Investigate the potential for translocation of waxcap turf.

5.3.16 I provide further details of the proposed mitigation measures in this section. Some of the mitigation measures are described in the evidence of others. In his Proof of Evidence, Mr Richard Green (WG 1.20.1) explains how the design of planting would guide bats to culverts and other crossings, the provision of a bat barn north of Magor, the removal of bat roosts at the appropriate season and provision of bat boxes. Jon Davies (WG 1.19.1) describes the capture and translocation of dormouse and water vole. Dr Simon Zisman (WG 1.21.1) describes the clearance of vegetation suitable for nesting birds outside the bird breeding season.

No Construction in the Wetted Channels of the Rivers Usk and Ebbw

- 5.3.17 As explained by Mr Ben Sibert in his Proof of Evidence (WG 1.5.1), the River Usk Crossing is proposed to take the form of an elevated structure including a cable stayed bridge over the river. As shown on March 2016 ES (Document 2.3.2) Figure 2.13b the bridge deck would be approximately 30 m above the saltmarsh on the eastern bank of the river.
- 5.3.18 The bridge pylons would be located outside the wetted channel of the River Usk which has been defined in discussion with NRW as being the extent of the channel below Mean High Water as explained in March 2016 ES (Document 2.3.2) Chapter 2: Scheme Description. The west pylon would be located within the Newport Docks area. The east pylon would be within the area of saltmarsh on the east bank of the Usk. The land take during construction of the pylon would result in loss of a total area of 0.69 ha of this saltmarsh vegetation. Following construction, much of the affected area would return to saltmarsh and the permanent land take would be 0.20 ha.
- 5.3.19 This would avoid impacts on the river habitat and associated species, particularly migratory and estuarine fish and otter.

Minimise Land Take within the Gwent Levels SSSIs and Avoiding Land Take to the South of the New Section of Motorway

- 5.3.20 So far as practicable the alignment of the new section of motorway has been designed to avoid the Gwent Levels SSSIs. It has thus been designed to follow a route which skirts the northern edge of the Levels. However, the nature of the corridor is such that in order to achieve suitable alignments and avoid developed areas, some land take in the northern part of the Wentlooge and Caldicot Levels could not be avoided. In discussion with NRW, development of land south of the line of the road has been avoided where this could be achieved. Thus the majority of the water treatment areas within the Levels

elements of the new section of motorway have been designed to be north of the road.

- 5.3.21 Construction land take has also been largely confined to the north of the alignment through the Levels.

Provision of Water Treatment Areas

- 5.3.22 As explained by Ben Sibert in his Proof of Evidence (WG 1.5.1), runoff from the new section of motorway would be intercepted into grassed channels in the road verge. These channels would route surface water overland from the drained carriageway to the water treatment areas. The use of grassed channels would reduce the flow rate and would allow for some sediment to be deposited, and oily residues and organic matter to be retained and broken down.
- 5.3.23 Where the carriageway is super-elevated the introduction of concrete barriers and maintenance restrictions excludes the use of grassed channels. Here concrete channels would be utilised.
- 5.3.24 With the exception of discharges to the River Usk and the River Ebbw, drainage from the new section of motorway would be treated through the water treatment areas. These would typically include provision for capture of hydrocarbons and grit prior to runoff entering the main attenuation lagoons.
- 5.3.25 The drainage of the River Usk Crossing would consist of kerb drainage to a pipe that would run along the central reservation. On the west side of the River Usk, drainage would discharge into the River Ebbw via an oil separator. On the east bank of the River Usk, as explained by Mr Ben Sibert in his Proof of Evidence (WG 1.5.1), the highway run off from the east side of the River Usk Crossing would discharge to the river via a pollution control lagoon with an oil separator. The purpose of this lagoon is to provide a pollution trap to capture oil/hydrocarbon contained within the highway runoff, and to provide storage for surface water to avoid flooding in a situation

where the level of the River Usk is high enough to stop water from discharging. Drainage from the lagoon would discharge to the River Usk via a ditch.

5.3.26 As explained by Mr Mike Vaughan in his Proof of Evidence (WG 1.17.1), the water treatment areas are capable of attenuating 1 in 100 year rain events (plus climate change). In his Proof of Evidence, Mr Richard Graham (WG 1.15.1) explains that they are capable of preserving ambient reën water quality in the long term and that short term impacts are within criteria which are acceptable for the protection of sensitive aquatic organisms for both 6 and 24 hour likely peaks in pollutant concentrations.

5.3.27 These measures would protect the watercourses and associated species, particularly aquatic macrophytes, freshwater fish and invertebrates, against potential effects of water pollution, and in turn the populations of water vole and otter which depend on them.

Maintaining Existing Reën Connections

5.3.28 As explained by Mr Ben Sibert in his Proof of Evidence (WG 1.5.1) culvert crossings or reën bridges would be provided for each main reën in order to maintain connectivity within the reën system. The proposed culverts would include 900 mm to 1.8 m diameter concrete pipes, and 1.8 m x 1.8 m to 4.0 m x 4.0 m precast concrete box culvert units. Following installation of a temporary piped crossing within the existing channel to one side of the works to accommodate the haul road, each culvert crossing would be installed on a half and half basis.

5.3.29 This would maintain the connectivity of the freshwater ecosystem which is the basis of much of the interest of the Gwent Levels SSSIs and allow the passage of wildlife, particularly fish, otter and water vole across the line of the road.

Provision of Permanent Mammal Fencing

- 5.3.30 As shown on the revised Environmental Masterplan (EMP) (September 2016 ES Supplement (Document 2.4.4) Figure R2.6), permanent mammal fencing would be provided along most of the length of the new section of motorway, other than the elevated section through Newport Docks and the viaduct to the east of the Usk where fencing would not be necessary. The mammal fencing would be specifically designed to prevent otter and badger from accessing the highway.

Avoidance of Lighting Other than at Junctions and River Crossings

- 5.3.31 Much wildlife is active at night, and the behaviour of species such as bats in particular is affected by light.
- 5.3.32 As explained by Mr Ben Sibert in his Proof of Evidence (WG 1.5.1), the proposed new motorway would generally be unlit, except at junctions. Road lighting would be provided at the new Castleton Junction, Docks Way Junction, Glan Llyn Junction and the Magor Junction. At the Docks Way Junction, the lighting would extend over the full length of the River Usk Crossing.

Design of Lighting of the River Usk and River Ebbw Crossings

- 5.3.33 The design of the permanent lighting for the River Usk and River Ebbw crossings would avoid lighting of the river channels and banks in order to reduce the effects of lighting on migratory fish, otter and bats in particular.

Minimise Light Spill through Lighting Design

- 5.3.34 As explained in the March 2016 ES (Document 2.3.2) Chapter 2: Scheme Description, luminaires would be designed to emit no light above the horizontal level. LED luminaires would be used, as these can be aimed more precisely, reducing light spill into adjoining habitats.

Provision of Mammal Crossings

5.3.35 As shown on the revised Environmental Masterplan (EMP) (September 2016 ES Supplement (Document 2.4.4) Figure R2.6), a number of mammal crossings are proposed along the length of the new section of motorway. At the western end around the Castleton Interchange, these would be provided primarily to provide means for dormice to cross the new road between areas of suitable habitat, both existing and to be provided as part of the Scheme. Over the remainder of the route, they would provide crossing points primarily for badger, otter and bats. The crossings would be constructed using 900 mm diameter concrete pipes and would be designed in accordance with the guidance provided in the DMRB Volume 10, Section 4, Part 2 (Highways Agency, 2001) and Part 4 (Highways Agency, 1999) (both included in Document 6.1.8). These crossings would enable species such as badger, otter, dormouse, water vole, hedgehog and some bats to cross the line of the new section of motorway.

Provision of Mammal Tunnels Adjacent to Reen Culverts

5.3.36 The locations of the culverts to be provided for the reens which would be crossed by the new section of motorway are shown on the revised EMP (September 2016 ES Supplement (Document 2.4.4) Figure R2.6). A separate dry underpass of 900 mm diameter would be provided adjacent to each culvert in accordance with guidelines published in DMRB Volume 10, Section 4, Part 4 (Highways Agency, 1999) (included in Document 6.1.8).

5.3.37 The permanent mammal fencing for the Scheme would be designed to guide animals to the culverts and other crossing points. These crossings would enable species such as badger, otter, water vole, hedgehog and some bats to cross the new section of motorway.

Provision of Eel Passes on New Sluices

- 5.3.38 As explained in the Supplementary File note on the Reen Mitigation Strategy (September 2016 ES Supplement (Document 2.4.4) Appendix S2.1) tilting sluices would regulate flows at the head and outflow of the cross flow culverts. This would allow the regulation of water level and flow along the entire length of the new section of motorway through the Gwent Levels. In addition, the sluices could be utilised when maintaining the reens and culverts by diverting flows from one catchment to another.
- 5.3.39 Eel passes would be provided on all new sluices which may be constructed as part of the Scheme. These would be designed in accordance with the Environment Agency guidance provided in *Elver and eel passes - A guide to the design and implementation of passage solutions at weirs, tidal gates and sluices* (Document 11.2.34).

Use of Plant Material from Existing Reens and Ditches to Encourage Colonisation by Aquatic Macrophytes

- 5.3.40 Where practicable, and subject to NRW approval, plant material from existing reens and ditches which would be lost, and also, by agreement, material arising from NRW dredging of watercourses would be used to encourage colonisation of new reens and ditches by aquatic macrophytes.

Replacement of Reens and Field Ditches

- 5.3.41 As explained in the Supplementary File note on the Reen Mitigation Strategy (September 2016 ES Supplement (Document 2.4.4) Appendix S2.1), 2755 m of reen and 9373 m of field ditches would be infilled or culverted during the construction of the new section of motorway. These would be replaced by a total of 2826 m of new reen and 10594 m of new field ditch.

- 5.3.42 New reens would be provided along the north of the new section of motorway in areas where existing reens would be cut off by the new motorway. The proposals are that the reens would generally be excavated to a depth of 2.0 m with 1 in 1 side slopes, a 0.7 m berm, and would be approximately 5.7 m wide at the surface. As stated in the Reen Mitigation Strategy (March 2016 ES (Document 2.3.2) Appendix 2.3), the dimensions of the replacement reens referred to are the general proposals but continuing advice would be sought from NRW on the specification for reen design.
- 5.3.43 These new reens would connect reens cut off by the new section of motorway, with sluices to allow management of water levels.
- 5.3.44 Where existing field ditches would be cut off by the new section of motorway, new field ditches would be provided. These would generally be 2.5 m wide with 1 in 1 slopes and a depth of 1 m. They would connect to the nearest main reens to provide connectivity. In addition to the new watercourses to be provided through the Reen Mitigation Strategy, the revised proposals for SSSI Mitigation (revised SSSI Mitigation Strategy (Appendix SR10.35 of the December 2016 ES Supplement (Document 2.4.14)) include recutting of some 5.9 km of former field ditches.
- 5.3.45 This would ensure that there was no reduction in the extent of the freshwater ecosystem which is the basis of much of the interest of the Gwent Levels SSIs. In addition, the provision of berms within the replacement reens, and the lack of shading hedgerows, would provide good opportunities for growth of aquatic macrophytes compared to some of the reens which they would replace.

Landscape/Habitat Provision Shown on the Environmental Masterplan

- 5.3.46 There have been some changes to the landscape/habitat provision shown on the Environmental Masterplan between the version at Figure 2.6 of the March 2016 ES (Document 2.3.2) and the revised

Figure R2.6 of the September 2016 ES Supplement (Document 2.4.4). These are summarised in Table 1 below.

Table 1: Habitat Provision in the Environmental Masterplan

Habitat	March 2016 ES	September 2016 ES Supplement
Woodland	83.1 ha	83.6 ha
Linear belts of trees and shrubs	19.8 ha	20.8 ha
Species-rich grassland	26.1 ha	38.1 ha
Reedbeds	9.9 ha	9.9 ha
Hedgerows and hedgerows with trees	3.60 km	4.10 km

5.3.47 The changes are relatively minor other than the significant increase in the provision of species-rich grassland as a result of more extensive areas of this habitat on the road embankments.

5.3.48 This habitat provision would serve to replace habitats that would be lost as a result of the construction of the Scheme.

5.3.49 Chapter 10 of the March 2016 ES (Document 2.3.2) explains at paragraph 10.7 145 that the total loss of semi-natural and plantation woodland as a result of the Scheme would be 49.8 ha. The total area of woodland and linear plantings of shrubs and trees shown on the revised Environmental Masterplan (September 2016 ES Supplement (Document 2.4.4) Figure R2.6) is 104.4 ha. The ratio of woodland that would be lost to new planting along the Scheme would be 1:2.1.

5.3.50 As explained at para 10.7.169 of the March 2016 ES (Document 2.3.2), based on the Phase 1 Habitat Survey mapping, the Scheme would result in the loss of some 7.01 ha of unimproved grassland. The landscape proposals shown on the revised EMP (September 2016 ES Supplement (Document 2.4.4) Figure R2.6) include some 38.1 ha of species-rich grassland. This is primarily on south facing road embankments and on the banks enclosing the water treatment

areas. On this basis the ratio of lost to replacement habitat would be 1:5.4.

5.3.51 Paragraph 10.7.63 of the March 2016 ES (Document 2.3.2) explains that a total of 6.59 ha of reedbed would be affected during the construction of the new section of motorway. Of this 3.24 ha would be taken for the permanent works and 3.35 ha would be temporarily used during the construction period and then returned to reedbed. There was an error in the March 2016 ES in that the area which would be taken for the permanent works was stated to be 3.19 ha. The total area of 6.59 ha was correct. The revised EMP (September 2016 ES Supplement (Document 2.4.4) Figure R2.6) includes 9.9 ha of reedbeds, thus the ratio of lost to replacement reedbeds would be 1:1.5.

5.3.52 The March 2016 ES para 10.7.160 (Document 2.3.2) explains that the new section of motorway would result in the loss of a total of some 35.8 km of hedgerows of which some 8.2 km are species-rich intact hedgerows. The remaining 27.6 km are species-poor and/or defunct hedgerows. The revised EMP (September 2016 ES Supplement (Document 2.4.4) Figure R2.6) shows some 4.1 km of hedgerow planting.

5.3.53 The March 2016 ES para 10.7.161 (Document 2.3.2) explains that NRW have indicated that hedgerow planting would not be appropriate within the Gwent Levels SSSIs. This is because hedgerows along the field boundaries can result in overgrowth/shading of the reens and field ditches with adverse effects on aquatic macrophytes and invertebrates which are the important features of the SSSIs.

Replacement of Saltmarsh

5.3.54 In order to mitigate for the permanent loss of 0.20 ha of saltmarsh habitat at the location of the River Usk Crossing (east pylon), replacement habitat would be created at the location of the bridge construction compound to the south of the River Usk Crossing

adjacent to the drainage attenuation lagoon as shown on the revised EMP (September 2016 ES Supplement (Document 2.4.4) Figure R2). This would involve creation of a new flood bank on the landward side of this area and reduction of the level of the site to that of the existing saltmarsh ranging from approximately 4.79 m above ordnance datum (AoD) (Mean High Water) at the river to around 7.00 m AoD at the inland end (a little above Mean High Water Springs).

- 5.3.55 The topography of the saltmarsh in the area affected by the River Usk Crossing construction compound would be reinstated to an elevation similar to that of the surrounding area. The restored area would be smoothed over to remove any deep depressions on completion of the works to encourage the recovery of saltmarsh vegetation.

Ecological Enhancement of Land at Maerdy Farm, Tatton Farm and Caldicot Moor

- 5.3.56 As explained in the revised SSSI Mitigation Strategy (Appendix SR10.35 of the December 2016 ES Supplement (Doc 2.4.14)), the Scheme would result in the loss of reën and ditch habitat which would have consequent effects on aquatic macrophytes, insects and other invertebrates associated with these habitats, and would result in loss of vegetation which supports shrill carder bee.
- 5.3.57 Specific mitigation measures are included as part of the Scheme to mitigate these effects, as explained in the Supplementary File note on the Reën Mitigation Strategy (September 2016 ES Supplement (Document 2.4.4) Appendix S2.1) which includes replacement of the lost lengths of reëns and field ditches, and through provision of suitable habitat for shrill carder bee, principally on the embankments of the new section of motorway.
- 5.3.58 However, some 125 ha of land within the Gwent Levels SSSIs would be affected by the Scheme, of which some 86 ha would be grazing marsh (measured as all grassland within the Gwent Levels SSSIs within the footprint of the proposed new section of motorway). Other

land includes arable land, areas of hardstanding and other land which does not contribute to the interest of the Gwent Levels SSSIs.

- 5.3.59 The aim of the revised SSSI Mitigation Strategy (Appendix SR10.35) of the December 2016 ES Supplement (Document 2.4.14)) is to provide mitigation for the loss of coastal grazing marsh habitat as a result of the Scheme and to ecologically enhance land within the Gwent Levels SSSIs.
- 5.3.60 Three areas have been identified as being of value with regard to the aims of the mitigation strategy: Maerdy Farm, Tatton Farm and Caldicot Moor. Section 2 of the revised strategy describes these sites, their locations, existing management, habitats and protected species known to utilise them.
- 5.3.61 The Tatton Farm mitigation area is located to the east of the River Usk, between Broadstreet Common and the A4810. The site covers approximately 44 ha, of which 37 ha would be available for grazing marsh mitigation, with 3.5 ha identified for protected species mitigation in the south of the site. Tatton Farm comprises species-poor semi-improved grassland fields bordered by reens, ditches and hedgerows. The farm is a Welsh Government owned and tenanted farm and forms part of the Gwent Levels - Nash and Goldcliff SSSI. The site was selected as it is land already in Welsh Government ownership within the Gwent Levels SSSIs where there is the potential to enhance the valued SSSI features.
- 5.3.62 The Maerdy Farm mitigation area is located to the west of the River Usk, south of Coedkernew and Duffryn. The site covers approximately 35 ha (of which 33.9 ha would be available for grazing marsh mitigation). The farm is a freehold arable farm. The land forms part of the Gwent Levels - St Bride's SSSI. The site was selected as it is largely arable land within the Gwent Levels SSSIs where there is the potential to enhance the valued SSSI features, particularly by reversion of arable land to grassland.

- 5.3.63 The Caldicot Moor mitigation area is located to the west of Undy, south of the existing M4. The site for SSSI mitigation covers 55.2 ha, of which 36.2 ha would be available for grazing marsh mitigation, with a further 19 ha identified for protected species mitigation in the north of the site. The land at Caldicot Moor comprises arable, improved grassland and species-poor semi-improved grassland fields bordered by reens, ditches and hedgerows (mostly species-poor). It is located outside the Gwent Levels SSSIs but immediately adjacent to the Gwent Levels – Magor and Undy SSSI. The land is in several freehold ownerships. The site was selected as there is the potential to enhance the habitats for which the SSSIs are valued, particularly by reversion of arable land to grassland, improving biodiversity value of the existing grasslands and re-cutting historic field ditches.
- 5.3.64 Section 3 of the SSSI Mitigation Strategy describes the objectives of the mitigation strategy with regard to each site, and Section 4 provides the broad prescriptions for mitigation and management measures proposed. The final detailed prescriptions for mitigation and management would be agreed with NRW and would be included in Mitigation Area Management Plans.
- 5.3.65 A range of enhancement measures are proposed for these areas including the following.
- a) Arable conversion to species diverse grassland using an appropriate grass seed mix.
 - b) Increase the area of species diverse grassland.
 - c) Enhance species diversity of existing grassland.
 - d) Increase the amount of reen and ditch habitat.
 - e) Enhance the biodiversity value of existing watercourses.
 - f) Maintain water level management.
 - g) Enhance and manage watercourses for water voles.
 - h) Manage grassland to encourage ground nesting birds and invertebrates.
 - i) Habitat improvements for reptiles and amphibians.

- j) Install bat boxes.
- k) Install barn owl nest boxes.

5.3.66 As well as mitigation for the loss of grazing marsh habitat as a result of construction of the Scheme, this would also enhance habitat for the range of wildlife associated with the Gwent Levels grasslands.

5.3.67 The long term management of the SSSI mitigation areas would be the responsibility of Welsh Government. In practice management is likely to be undertaken through arrangements with farm tenants or other local farmers and would be subject to management plans which would be agreed with NRW following the principles set out in the SSSI Mitigation Strategy (Appendix SR10.35 of the December 2016 ES Supplement (Document 2.4.14)).

Provision of Replacement Badger Setts

5.3.68 Three artificial setts would be constructed in order to provide alternative habitat for use by any badgers displaced from the three active main setts which would require closure to construct the new section of motorway.

5.3.69 The artificial setts would be constructed prior to closing the main setts and all closures of active setts would be carried out in accordance with the requirements of an NRW licence, which would be obtained prior to the commencement of licenced works. The artificial setts would be constructed in areas that would enable badgers to continue to gain access to parts of their existing home range which contain significant areas of habitat of potential value.

5.3.70 Should pre-construction surveys report the presence of new main setts that would need to be closed, one artificial sett would be constructed in place of each new main sett to be closed.

5.3.71 Outlier setts are less frequently used or may be used on a temporary basis only and replacement setts for these would not be constructed.

Use of Woodland Soils and Rootstocks in New Planting Areas

- 5.3.72 At Berryhill Farm, during clearance of the existing wood, to the extent practicable, coppice stools of hazel and other shrub species would be lifted and replanted in areas of woodland planting to the east of New Park Farm north of the new Castleton Interchange in an area which would not otherwise be disturbed. Woodland topsoil from this wood would also be stripped and placed in new planting areas to encourage the establishment of the woodland ground flora. Soils would not be taken from areas of the wood where invasive species (such as Himalayan balsam) are present.

Investigate the Potential for Translocation of Waxcap Turf

- 5.3.73 The potential for the translocation of waxcap turf from grasslands at Pwll Diwaelod and Pound Hill would be investigated.

5.4 Construction phase mitigation measures

- 5.4.1 As explained by Mr Barry Woodman in his Proof of Evidence (WG 1.6.1), water protection measures would be implemented throughout the construction phase as necessary and would be detailed in the Construction Environmental Management Plan (CEMP).
- 5.4.2 Measures to be implemented during construction, over and above the measures to control pollution referred to by Barry Woodman, would include the following.
- a) Biosecurity method statement for site works, including ecology surveys.
 - b) Capture and translocation of dormouse.
 - c) Capture and translocation of reptiles.
 - d) Capture and translocation of water vole.
 - e) Capture and translocation of great crested newt.
 - f) Removal of bat roosts at the appropriate season.
 - g) Closure of badger setts at the appropriate season.

- h) Pre-construction surveys for bats, badger, water vole, otter, great crested newt and features of importance to grass snake to confirm measures required during construction.
- i) Clearance of vegetation suitable for nesting birds outside the bird breeding season.
- j) Management of surface water and groundwater during construction including maintenance of water levels in reens and field ditches, de-watering of borrow pits and provision of temporary water treatment areas.
- k) Construction lighting would be designed and managed to minimise light spill outside the working area.
- l) Installation of piles for the east pylon of the River Usk crossing outside the main fish migration period.
- m) Provision of mammal fencing during construction if and where required.
- n) Provision of means of escape from excavations.
- o) Provision of barn owl nest boxes.
- p) Construction sites at Great Pencarn, Newport Docks and Tata Steel would be restored on completion of construction.

5.4.3 I provide further detail of these measures in this section.

Biosecurity Method Statement for Site Works, including Ecology Surveys

5.4.4 Works (including surveys and monitoring visits) would be undertaken in accordance with a biosecurity risk assessment and safe system of work, a copy of which would be included in the CEMP following the principles set out in the Pre-CEMP (December 2016 ES Supplement (Document 2.4.14) Appendix SR3.2). The risk assessment and safe system of work would take into account species-specific guidelines for management and control of non-native invasive species produced by the Non-Native Species Secretariat (NNSS) and NRW current at the time.

- 5.4.5 Any infected (disease or pest) plants, prunings or timber arisings would be dealt with in accordance with arboricultural best practice and up-to-date best practice guidelines published by NRW current at the time.
- 5.4.6 Such measures would be undertaken where invasive species are known to be present and whenever there is the potential to disturb, cause the spread of and/or incidentally transport off-site (e.g. on tyres, equipment, footwear or clothing) invasive species.

Capture and Translocation of Reptiles

- 5.4.7 Prior to commencement of construction in areas where common lizard and slow worm populations have been identified, reptile fencing would be installed and reptiles would be captured and transferred to suitable habitat on the margin of the Scheme, or to suitable habitat within the SSSI mitigation areas. The detailed mitigation strategy for the capture and translocation would be agreed with NRW in advance of commencement of construction.

Capture and Translocation of Great Crested Newt

- 5.4.8 The results of great crested newt surveys carried out in 2014, 2015 and 2016 using 'traditional' methods and also analysis of water samples for great crested newt DNA (eDNA method), have identified the presence of the species at only four locations along the Scheme, all east of the River Usk. Based on the survey results it is likely that only a small population is present, and in small potentially isolated areas.
- 5.4.9 Mitigation measures that would form part of any great crested newt licence application would be set out in a great crested newt mitigation strategy. The mitigation strategy has been discussed with NRW and a draft was published as Appendix SS10.6 of the December 2016 ES Supplement (Document 2.4.14). The measures, which would be

undertaken at an appropriate time of year and during appropriate local weather conditions, would include the following.

- a) Installation of great crested newt exclusion fencing around working areas within 250 m of habitat known to or likely to be inhabited by great crested newts, in order to prevent great crested newts from entering, but to enable them to leave, the construction site.
- b) If required pre-construction trapping in order to capture and translocate any great crested newts from within exclusion fenced areas to appropriate receptor sites outside working areas, for example in the SSSI mitigation areas.
- c) Clearance of habitat of potential value to newts from within exclusion fencing in order to capture any remaining newts and translocate them to the approved receptor sites.
- d) Installation of culverts.

5.4.10 Where necessary, habitat creation and/or enhancement measures would be undertaken in order to ensure receptor sites are in favourable condition prior to displacement or translocation. Measures could include construction of ponds, clearance of overhanging and over-shading scrub along the banks of watercourses/waterbodies in order to encourage the establishment and spread of aquatic vegetation, and provision of hibernacula, potentially using suitable materials derived from site clearance. These measures would also be beneficial to the other amphibian species recorded in the area.

Closure of Badger Setts at the Appropriate Season

5.4.11 Results of the 2014 and 2015 badger surveys (March 2016 ES (Document 2.3.2) Confidential Appendices 10.37 and 10.38) confirm that three main badger setts (one of which was inactive in 2015) and six outlier setts (three of which were inactive and three active) are located within or immediately adjacent to the footprint of the Scheme.

- 5.4.12 Therefore, in order to protect any badgers occupying the setts and prevent a breach of the Protection of Badgers Act 1992, badgers would need to be displaced from the setts prior to closing them and this would be covered by a mitigation strategy to be agreed with NRW prior to commencement construction of the Scheme.
- 5.4.13 As part of the mitigation for the Scheme, three artificial setts would be constructed to provide alternative setts for badgers that could be displaced from the three active main setts. Suitable locations have been included in the draft Orders for the Scheme.

Pre-construction Surveys to Confirm Measures Required during Construction

- 5.4.14 In order to inform the method statements which would support European Protected Species licence applications for disturbance of bats and great crested newt; a licence under the Protection of Badgers Act 1992 for closure of badger setts; and for a translocation licence for water vole if required, further surveys for these species would be carried out in advance of commencement of construction. Features of potential importance to grass snakes, such as leaf piles, would also be identified and, where these would be affected by the Scheme, would be moved to suitable locations at the Scheme boundary or elsewhere such as the SSSI mitigation areas.
- 5.4.15 Where licences are required, 'ghost' licence applications would be prepared and discussed with NRW in advance of the decision on the Orders in order to avoid delays when and if the formal applications are made. These 'ghost' licence applications would be supported by method statements based on the mitigation strategies currently being discussed with NRW, as well as by the results of the pre-construction surveys.

Management of Surface Water and Groundwater during Construction

- 5.4.16 As explained by Mr Barry Woodman in his Proof of Evidence (WG 1.6.1), the Outline Surface and Groundwater Plan (Annex G to the Pre CEMP which is 2016 ES (Document 2.3.2) Appendix 3.2) would form the basis for the final Surface and Groundwater Plan, which would consider all drainage required during the construction phase and would reference industry and regulatory pollution prevention guidelines.
- 5.4.17 Barry Woodman also describes the methodology for the excavation and installation for new culverts along reens and selected field ditches.
- 5.4.18 The layout of areas of land identified for temporary construction areas would seek to avoid existing reens and ditches to minimise the infilling of these features.
- 5.4.19 To facilitate the process of recolonisation of replacement reens and ditches by aquatic vegetation and invertebrates, subject to approval from NRW, material removed from existing reens and ditches proposed to be infilled (subject to timing) and material from annual maintenance of the reen network would be introduced into the new watercourses to speed up recolonisation.
- 5.4.20 For any watercourses which would be severed from the network for the duration of construction, consideration would be given to the translocation of fish from these watercourses to those still connected to the main reen network.
- 5.4.21 At some locations it may be necessary to temporarily de-water sections of reens prior to or following connection to culverts. In such instance care would be taken to avoid trapping fish in these sections.

Construction Lighting would be designed and managed to minimise Light Spill outside the Working Area

- 5.4.22 As explained by Mr Barry Woodman in his Proof of Evidence (WG 1.6.1), lighting would be provided as required during periods of normal working hours in autumn and winter and for night time working. As far as possible, task lighting would be used for specific works to direct light towards the working areas during the night time. Such task lighting would be positioned at low level on posts and directed at the most frequently used areas of work.
- 5.4.23 Inward facing security lighting would be provided at construction compounds on a 24 hour basis.
- 5.4.24 As Mr Barry Woodman explains in his Proof of Evidence (WG 1.6.1) a more detailed lighting strategy for the construction period would be developed to identify the type of lighting to be used and measures to be implemented to reduce light spill.

Installation of Piles for the East Pylon of the River Usk Crossing outside the main Fish Migration Period

- 5.4.25 As described by Mr Barry Woodman in his Proof of Evidence (WG 1.6.1) and set out in the Pre-CEMP (December 2016 ES Supplement (Document 2.4.14) Appendix SR3.2) piling to install the cofferdam and piles for the east pylon of the River Usk Crossing would be scheduled to avoid the period of highest sensitivity for underwater noise related impacts on migratory fish in the River Usk which has been identified as April to June (inclusive). Confirmation as to the requirement to include other piles (e.g. those for the west pylon and some of the viaduct piles) within this seasonal restriction would be determined following the installation of the cofferdam for the east pylon, with associated noise monitoring, and in consultation with NRW.

Provision of Mammal Fencing During Construction

- 5.4.26 As explained by Mr Barry Woodman in his Proof of Evidence (WG 1.6.1) and in the March 2016 ES (Document 2.3.2) Chapter 3: Scheme Construction temporary boundary fencing would be installed around the perimeter of the whole site to prevent unauthorised access. Areas out of bounds to construction activities (e.g. soil storage areas, ecologically sensitive areas or archaeological sites) would also be fenced off or suitably demarcated to ensure plant and machinery cannot enter. Where necessary to ensure that badgers and otters could not access the working areas, mammal fencing would be attached to the boundary fence.

Provision of Means of Escape from Excavations

- 5.4.27 Any excavations that are located outside the mammal exclusion fencing that are more than 0.5 m deep would be fenced individually; covered overnight where practicable; walls would be re-profiled so as to enable mammals and other wildlife to walk out of the excavation; or a means of escape would be provided, such as a wooden plank rested against the wall of an excavation that could act as a ladder.

Provision of Barn Owl Boxes

- 5.4.28 Barn owl nest boxes would be provided in trees around the boundaries of the mitigation land at Green Moor (chainage 17900 to 19100) in the same area as the potential barn owl nest but further from the construction area, and also within the SSSI mitigation areas.

Construction Sites at Great Pencarn, Newport Docks and Tata Steel would be restored on completion of Construction

- 5.4.29 As explained in March 2016 ES (Document 2.3.2) Chapter 3: Scheme Construction, following completion of the works all temporary construction work sites would be removed and the land affected would be restored. In restoring the construction sites at Great Pencarn, within Newport Docks and Tata Steel, elements of the open mosaic habitat on previously developed land would be incorporated

and the habitat requirements of shrill carder bee (and terrestrial invertebrates generally) and reptiles would be taken into account. In particular the seed mixes used in restoring these areas would include food plant species of value to shrill carder bee.

5.5 Monitoring

5.5.1 Monitoring would be undertaken both during the construction and operation of the new section of motorway to confirm the effectiveness of mitigation measures, and if necessary, to inform the need for any changes in management of impacts.

5.5.2 The Contractor would be responsible for implementing the Environmental, Landscape and Ecology Aftercare Plan (see March 2016 ES (Document 2.3.2) Section 18.8) and this would include monitoring the performance of the completed Environmental Design for the duration of the Aftercare Period (5 years from completion of construction). The environmental performance of the project would be monitored against the commitments, objectives and targets identified in the Environmental Management System and more specifically, the Register of Environmental Commitments (updated in Appendix SR18.1 of the December 2016 ES Supplement (Document 2.4.14)), which would include the mitigation requirements as set out in the AIES, ES, licences/consents, and other documentation.

5.5.3 As Dr Peter Ireland explains in his Proof of Evidence (WG 1.7.1) following the five year aftercare period responsibility for the management and maintenance of the Scheme's soft estate, including all elements of the environmental design and mitigation, would revert to Welsh Government. In common with other strategic highways that are the responsibility of the Welsh Government a specification for that ongoing management and maintenance would be produced at that time. It would incorporate measures to address ongoing commitments made previously with respect to the Scheme.

5.6 Summary

- 5.6.1 In this section I have described the potential ecological effects of the Scheme and the measures which are proposed to mitigate those effects. The plan of the published Scheme design is shown on the revised Environmental Masterplan (September 2016 ES Supplement (Document 2.4.4) Figure R2.6).
- 5.6.2 Approximately two thirds of the route for the proposed new section of motorway crosses the Gwent Levels. The Gwent Levels are dissected by an extensive network of tide-locked freshwater drains, locally known as reens with associated field ditches. Road drainage would discharge into a series of water treatment areas comprising attenuation ponds and reed beds along the new section of motorway. These water treatment areas would attenuate and treat the collected surface water prior to discharging it into existing reens.
- 5.6.3 The special features of the Gwent Levels SSSIs which would be crossed by the Scheme are in summary:
- a) reen and ditch habitat;
 - b) insects and other invertebrates (aquatic); and
 - c) shrill carder bee.
- 5.6.4 The crossing of the River Usk (SAC and SSSI) would be via a bridge with approach viaducts on either side, that on the west crossing the River Ebbw SINC and the port area of Newport. There would be no structures within the channel of the River Usk.
- 5.6.5 An area of saltmarsh on the east bank of the River Usk is included in the River Usk SAC although it is not a qualifying feature for which the SAC is designated. The eastern pier of the bridge would be constructed within this area of saltmarsh.
- 5.6.6 Areas of potential impact which are relevant to road proposals are effects of land take, effects of construction and effects of the

operational road. Mitigation has been considered as an intrinsic and iterative part of the Scheme development and assessment process informed by consultation with stakeholders.

- 5.6.7 I have outlined the mitigation measures relevant to the assessment of the ecological effects of the Scheme. A significant element of such additional mitigation is the SSSI Mitigation Strategy. This was attached to the March 2016 ES (Document 2.3.2) as Appendix 10.35 and a revised version was Appendix SR110.35 of the December 2016 ES Supplement (Document 2.4.14). The aim of the strategy is to provide mitigation for the loss of coastal grazing marsh habitat as a result of the Scheme and, where practicable, to ecologically enhance land within the Gwent Levels SSSIs. As explained in the revised strategy, the temporary and permanent loss of grazing marsh would amount to some 86.4 ha.
- 5.6.8 Three mitigation areas have been identified, these being Maerdy Farm, Tatton Farm and Caldicot Moor. The total area of the land identified in the revised proposals within these three areas is 129.6 ha, of which 107.1 ha would be available for mitigation for loss of grazing marsh through arable reversion and enhancement of existing grassland.
- 5.6.9 The requirements for grazing marsh mitigation have been discussed with NRW and it has been agreed that, for arable reversion, a mitigation ratio of 1:1 has been used since the arable land is not considered to contribute in any material way to SSSI purposes. For grassland enhancement, recognising that the land already has biodiversity value, a mitigation ratio of 1.5:1 has been used, so for every hectare of grassland lost, 1.5 ha would be enhanced. On this basis the land identified in the revised proposals at Tatton Farm, Maerdy Farm and Caldicot Moor is sufficient to satisfy the requirement for mitigation of the loss of grazing marsh.

5.6.10 The draft Register of Environmental Commitments which would be annexed to the CEMP formed Appendix 18.1 of the March 2016 ES (Document 2.3.2). It was retained in draft form to allow for additions and amendments following consultation with key-stakeholders. An updated version of the draft Register formed Appendix R18.1 of the September 2016 ES Supplement (Document 2.4.4) and it was further updated as Appendix SR18.1 of the December 2016 ES Supplement (Document 2.4.14). This will continue to be updated during the course of the Public Inquiry.

Avoidance

5.6.11 Measures to avoid adverse effects include the following:

- a) No construction in the wetted channels of the Rivers Usk and Ebbw (defined as the channel below Mean High Water as explained in March 2016 ES (Document 2.3.2) Chapter 2: Scheme Description.
- b) Minimise land take within the Gwent Levels SSSIs and, where practical, avoid land take to the south of the line of the new motorway.

Reduction

5.6.12 Measures to reduce adverse effects include the following:

- a) Provision of water treatment areas to control the volume and quality of water discharged to the reen system.
- b) Maintaining all existing reen connections across the line of the new section of motorway.
- c) Provision of permanent mammal fencing along the new section of motorway.
- d) Avoidance of lighting other than at junctions and the river crossings.
- e) Design of lighting of the River Usk and River Ebbw crossings to avoid lighting of the river channels and banks.
- f) Minimise light spill through lighting design.

- g) Provision of mammal crossings at suitable locations across the line of the new section of motorway.
- h) Provision of mammal tunnels adjacent to all reën culverts.
- i) Design of planting to guide bats to culverts and other crossings.
- j) Provision of eel passes on all new sluices.
- k) Use of plant material from existing reëns and ditches to encourage colonisation of new reëns and ditches by aquatic macrophytes.

Remediation

5.6.13 Measures to offset adverse effects include the following.

- a) Replacement of reëns at a ratio of 1:1.
- b) Replacement of field ditches at a ratio of 1:1
- c) Landscape/habitat provision shown on the revised Environmental Masterplan (EMP) (September 2016 ES Supplement (Document 2.4.4) Figure R2.6).
- d) Replacement of saltmarsh.
- e) Ecological enhancement of land (e.g. recutting of former ditches, removal of hedgerows, reseeding grassland) at Maerdy Farm, Tatton Farm and Caldicot Moor.
- f) Provision of three replacement badger setts.
- g) Provision of bat barn north of Magor.
- h) Use of woodland soils and rootstocks in new planting areas.
- i) Provision of bat boxes.
- j) Investigate the potential for translocation of waxcap turf.

5.6.14 As explained by Mr Barry Woodman in his Proof of Evidence (WG 1.6.1), water protection measures would be implemented throughout the construction phase as necessary and would be detailed in the Construction Environmental Management Plan (CEMP).

5.6.15 Measures to be implemented during construction, over and above the measures to control pollution referred to by Mr Barry Woodman in his Proof of Evidence (WG 1.6.1), would include the following.

- a) Biosecurity method statement for site works, including ecology surveys.
- b) Capture and translocation of dormouse.
- c) Capture and translocation of reptiles.
- d) Capture and translocation of water vole.
- e) Capture and translocation of great crested newt.
- f) Removal of bat roosts at the appropriate season.
- g) Closure of badger setts at the appropriate season.
- h) Pre-construction surveys for bats, badger, water vole, otter, great crested newt and features of importance to grass snake to confirm measures required during construction.
- i) Clearance of vegetation suitable for nesting birds outside the bird breeding season.
- j) Management of surface water and groundwater during construction including maintenance of water levels in reens and field ditches, de-watering of borrow pits and provision of temporary water treatment areas.
- k) Construction lighting would be designed and managed to minimise light spill outside the working area.
- l) Installation of piles for the east pylon of the River Usk crossing outside the main fish migration period.
- m) Provision of mammal fencing during construction if and where required.
- n) Provision of means of escape from excavations.
- o) Provision of barn owl nest boxes.
- p) Construction sites at Great Pencarn, Newport Docks and Tata Steel would be restored on completion of construction.

- 5.6.16 Monitoring would be undertaken both during the construction and operation of the new section of motorway to confirm the effectiveness of mitigation measures, and if necessary, to inform the need for any changes in management of impacts.
- 5.6.17 The Contractor would be responsible for implementing the Environmental, Landscape and Ecology Aftercare Plan (see March 2016 ES (Document 2.3.2) Section 18.8) and this would include monitoring the performance of the completed Environmental Design for the duration of the Aftercare Period (5 years from completion of construction). The environmental performance of the project would be monitored against the commitments, objectives and targets identified in the Environmental Management System and more specifically, the Register of Environmental Commitments (updated in Appendix SR18.1 of the December 2016 ES Supplement (Document 2.4.14), which would include the mitigation requirements as set out in the AIES, ES, licences/consents, and other documentation.
- 5.6.18 Following the 5 year aftercare period responsibility for the management and maintenance of the Scheme's soft estate, including all elements of the environmental design and mitigation, would revert to Welsh Government. In common with other strategic highways that are the responsibility of the Welsh Government a specification for that ongoing management and maintenance would be produced at that time. It would incorporate measures to address ongoing commitments made previously with respect to the Scheme.

6. EFFECTS OF THE PUBLISHED SCHEME ON ECOLOGY AND NATURE CONSERVATION

6.1 Introduction

- 6.1.1 The proposed new section of motorway would pass through European, nationally and locally designated sites, and would affect habitats that support protected and notable species, such as bats, otter, dormouse, water vole, badger, hedgehog, reptiles, great crested newt and other amphibians, birds, fish, invertebrates and plant species.
- 6.1.2 Effects on the European Sites have been assessed separately in a process known as Assessment of Implications (of highways and/or road projects) on European Sites, and the results of the assessment have been provided in the form of a Statement to Inform an Appropriate Assessment (SIAA) (Document 2.3.4).
- 6.1.3 In this section I describe the effects of the land take, construction and operation of the M4CaN Scheme on ecology and nature conservation as reported in Chapter 10 Ecology and Nature Conservation of the March 2016 ES (Document 2.3.2), and updated in the September 2016 ES Supplement (Document 2.4.4) and the December 2016 ES Supplement (Document 2.4.14), focussing on those effects which are assessed as significant in EIA terms. The table at Appendix A to this evidence summarises the significant effects of the Scheme on ecology and nature conservation.
- 6.1.4 For the purposes of the assessment the designated sites and nature reserves were considered in their own right, and the other Valued Ecological Receptors (VERs) were grouped together under Ecological Units based on the habitats and species present that would be affected in similar ways.
- 6.1.5 The Ecological Units and their component VERs are as follows.

Rivers (Usk and Ebbw)

- a) Rivers
- b) Sub-tidal benthic habitat
- c) Intertidal mudflats
- d) Coastal saltmarsh
- e) Migratory fish
- f) Estuarine migratory fish assemblage

Reens, ditches, reedbeds and ponds

- a) Eutrophic standing waters
- b) Ponds
- c) Reedbeds
- d) Aquatic macrophytes
- e) Otter
- f) Water vole
- g) Grass snake
- h) Great crested newt and other amphibians
- i) Freshwater fish assemblage
- j) Freshwater invertebrates

Grazing Marsh

- a) Coastal and floodplain grazing marsh
- b) Shrill Carder bee
- c) Wet grassland plants

Farmland

- a) Lowland mixed deciduous woodland
- b) Wet woodland
- c) Hedgerows
- d) Lowland meadow
- e) Dormouse
- f) Badger
- g) Hedgehog

Industrial land

- a) Open mosaic habitats on previously developed land
- b) Reptiles (Common lizard, slow worm)
- c) Terrestrial invertebrates

Bats**Breeding Birds****Wintering Birds**

- 6.1.6 Effects on dormouse and water vole are described in their Proofs of Evidence by Mr Jon Davies (WG 1.19.1), on bats by Mr Richard Green (WG 1.20.1), and on birds by Dr Simon Zisman (WG 1.21.1).

6.2 Changes in Air Quality

- 6.2.1 The changes in air quality which would arise as a result of the Scheme are described in the Proof of Evidence of Dr Michael Bull (WG 1.12.1). Chapter 10 (section 10.6) of the March 2016 ES (Document 2.3.2) describes the effects on ecology and nature

conservation resulting from the changes in air quality. This is updated in the December 2016 ES Supplement (Document 2.4.14).

- 6.2.2 The March 2016 ES (section 10.6) concluded with respect to the air quality effects of the operation of the new section of motorway that whilst there would be increases in annual mean NO_x concentrations and nitrogen deposition at the designated sites assessed, no exceedences of the critical loads are predicted and exceedences of the precautionary annual mean NO_x objective are limited to only two of the eleven designated sites assessed, and then only within 20 m of the centre line of each carriageway and thus only a very small proportion of the designated site would be affected. One of these sites is the Severn Estuary SAC, SPA and Ramsar Site. In the vicinity of the Scheme the habitats for which the Severn Estuary is designated are marine and intertidal habitats such as subtidal sandbanks, intertidal mud and sand, Atlantic salt meadow/saltmarshes, and rocky shores which are not considered to be sensitive to changes in oxides of nitrogen. Overall, the effect of the Scheme is considered to be 'not significant' for designated sites. Similarly for the habitats present along the corridor of the road, there would no significant effects as a result of NO_x concentrations.
- 6.2.3 With respect to nitrogen deposition, the critical loads of none of the habitats present along the corridor of the new section of motorway would be exceeded and there would be no significant effects.
- 6.2.4 The same conclusions can be drawn with respect to the effects of construction of the new section of motorway based on the air quality information provided in the September 2016 ES Supplement (Document 2.4.4).

6.3 Designated Sites

European Statutory Designated Sites

- 6.3.1 The only European designated site which would be affected by the land take for the Scheme would be the River Usk SAC where the east pylon of the River Usk crossing would be located within an area of saltmarsh. The saltmarsh would be replaced by creation of new saltmarsh in an area to be used for construction of the River Usk Crossing once the construction works are complete. Saltmarsh is not one of the features for which the SAC is designated. Thus there would be no loss or adverse effect on a key feature of the SAC as a result of land take. There would be no significant effects on the SAC as a result of land take, during construction, or during the operation of the Scheme.

National Designated Sites

- 6.3.2 As I have explained for the River Usk SAC, the east pylon of the new crossing of the River Usk would be located within an area of saltmarsh on the east bank of the river. This is also within the River Usk (Lower Usk) SSSI and the loss would be mitigated by the creation of a new area of saltmarsh once the construction works are complete.
- 6.3.3 As well as the River Usk (Lower Usk) SSSI, the new section of motorway would cross the Gwent Levels St Bride's SSSI, the Nash and Goldcliff SSSI, the Whitson SSSI, and the Redwick and Llandeenny SSSI. The land take for the Scheme would have significant effects on the SSSIs.
- 6.3.4 The maintenance of reed connections by culverting across the road and the replacement of infilled and culverted reeds and infilled field ditches are integral to the design of the Scheme. The proposals for mitigation for the loss of grazing marsh within the SSSIs are set out in the revised SSSI Mitigation Strategy (Appendix SR10.35 of the December 2016 ES Supplement (Document 2.4.14)).

- 6.3.5 Taking into account that this additional mitigation and enhancement would commence in advance of construction, and that improvements in the ecological interest of grasslands would be expected to be manifest within a few years, the magnitude of the land take impacts on the Gwent Levels SSSIs (National (High) value) is assessed as Moderate Adverse and the significance of effects as Moderate or Large in the short term. The magnitude of impacts would be Minor Adverse and the Significance of effects Slight or Moderate in the medium/long term. Taking a precautionary approach the short, medium and long term effects on the Gwent Levels SSSIs would be significant in EIA terms.
- 6.3.6 During construction, the assessment takes into account the replacement of saltmarsh within the River Usk (Lower Usk) SSSI, which would be affected by the construction of the new River Usk Crossing, and which forms part of the Scheme design; construction land take within the Gwent Levels SSSIs which would be restored to grassland; together with the additional mitigation set out in the revised SSSI Mitigation Strategy (Appendix SR10.35 of the December 2016 ES Supplement (Document 2.4.14)). The magnitude of the impacts would be Minor Adverse leading to effects of Slight or Moderate significance in the medium term. In the long term the magnitude of impacts would be Negligible Adverse and the significance of effects Slight. In EIA terms, taking a precautionary approach, the effects would be significant in the short and medium terms and not significant in the long term.
- 6.3.7 During operation of the Scheme some sections of the Gwent Levels SSSIs to the north of the new section of motorway would be severed from the major parts of the designated sites to the south. All of the grazing marsh areas could continue to be managed alongside the operation of the Scheme and the effects would not be significant.

Non-statutory Designated Sites

- 6.3.8 The land take for the new section of motorway would affect nine Sites of Importance for Nature Conservation (SINCs) and two areas of ancient woodland. Overall the magnitude of the impacts on these sites would be Major Adverse and the significance of effects Moderate or Large in the short term. The magnitude of impacts would be Moderate Adverse and the effects of Moderate significance in the medium and long term. In EIA terms the effects would be significant in the short, medium and long term.
- 6.3.9 There would be additional land requirements for construction within the Marshall's SINC (saltmarsh on the east bank of the River Usk as described above for International and National Designated Sites and areas of industrial land of minimal ecological value) and areas of scrub within the Spencer Works 3 SINC. These effects would not be significant in EIA terms.
- 6.3.10 The operation of the new section of motorway would have little ongoing severance effect on SINCs and there would be no effects of highway drainage on the sites other than the drainage discharges to the River Ebbw SINC and to the St Bride's Brook within the Grange Road SINC. The proposals for mitigation for the loss of grazing marsh set out in the revised SSSI Mitigation Strategy (Appendix SR10.35 of the December 2016 ES Supplement (Document 2.4.14) would result in creation of new grassland areas and improved management of existing grasslands, and would also serve to mitigate for the operational impacts on SINCs. The operational effects on SINCs would not be significant.

Nature Reserves

- 6.3.11 Nature reserves in the vicinity of the new section of motorway are the Newport Wetlands NNR and RSPB Nature Reserve, and the Magor Marsh and Great Traston Meadows Gwent Wildlife Trust Nature Reserves. The March 2016 ES (Document 2.3.2) reports that the

Scheme would not result in land take from any of these nature reserves and there would be no significant land take effects.

- 6.3.12 As reported in the September 2016 ES Supplement (Document 2.4.4) following publication of the March 2016 ES (Document 2.3.2), Gwent Wildlife Trust advised that part of an area of land at Barecroft Fields which is mapped as a Site of Interest for Nature Conservation (SINC) on the plan at Figure 10.3d of the March 2016 ES (Document 2.3.2), and which is owned by the Trust, is part of their Magor Marsh Nature Reserve. The information on the extent of Magor Marsh Nature Reserve which formed the basis for the boundary of the reserve shown on March 2016 ES Figure 10.3d was obtained from the South East Wales Biological Records Centre (SEWBRC). Plans of the Magor Marsh Nature Reserve are available on the board at the nature reserve and on the Trust's website. Neither the SEWBRC nor the Trust's plans indicated that any land at Barecroft was part of the Magor Marsh Nature Reserve.
- 6.3.13 Regardless of ownership the effects of the Scheme on Barecroft Fields SINC were assessed as part of the assessment of the effects on non-statutory designated sites and this identifies that there would be loss of a small area of land at the northwest corner of the SINC.
- 6.3.14 During construction, given their distance from the Scheme, the March 2016 ES (Document 2.3.2) reported that there would be no adverse effects on the ecology of either Magor Marsh Nature Reserve or Newport Wetlands Nature Reserve as a result of construction activities (No change).
- 6.3.15 There could be some disturbance from construction in the north western part of Great Traston Meadows Nature Reserve and also to the Barecroft Fields SINC which is now known to be owned by the Gwent Wildlife Trust and considered to be part of their Magor Marsh Reserve. These effects would not be significant in EIA terms.

- 6.3.16 During the operation of the Scheme, given their distance from the Scheme, the March 2016 ES (Document 2.3.2) reported that adverse effects on the ecology of either Magor Marsh Nature Reserve or Newport Wetlands Nature Reserve as a result of the operation of the new section of motorway are unlikely.
- 6.3.17 There could be some disturbance from traffic in the north western part of Great Traston Meadows Nature Reserve and also to the Barecroft Fields SINC which is now known to be owned by the Gwent Wildlife Trust and considered to be part of their Magor Marsh Reserve. The effects would not be significant in EIA terms.

6.4 Rivers (Usk and Ebbw) Ecological Unit

- 6.4.1 The Rivers (Usk and Ebbw) Ecological Unit includes the following VERS.

Rivers.

Sub-tidal benthic habitat.

Intertidal mudflats.

Coastal saltmarsh.

Migratory fish.

Estuarine fish assemblage.

Land Take

- 6.4.2 The major watercourses within the Scheme corridor are the Rivers Usk and Ebbw, both of which would be crossed by the new section of motorway. The river crossings have been designed to avoid any construction within the wetted channels of the rivers (which has been defined as within the limits of Mean High Water), and which includes the intertidal mud, in order to avoid any adverse effects on the river habitat.
- 6.4.3 The Scheme would result in the permanent loss of 0.2 ha of saltmarsh on the east bank of the River Usk through the land take for the east pylon of the River Usk Crossing. There would also be

permanent loss of some 0.74 ha of saltmarsh on the banks of the River Ebbw through a combination of land take for the bridge supports and shading by the new bridge which would be much lower than the River Usk Crossing. Saltmarsh on the east bank of the River Usk temporarily used for construction purposes would be reinstated on completion of construction. In order to mitigate for the permanent loss of the total of 0.94 ha of saltmarsh, a new area of saltmarsh would be established on the site of the construction compound to the south of the proposed River Usk Crossing on the east bank of the River Usk. This would cover some 2 ha, giving a ratio of new saltmarsh to that which would be permanently lost of 2.1:1.

- 6.4.4 In EIA terms the residual effects of land take on all these VERs would not be significant other than for coastal saltmarsh, the effects on which, as I have explained under National Designated Sites above, taking a precautionary approach, in the short and medium term would be significant, and in the long term not significant.
- 6.4.5 For the rivers habitat, taking into account the mitigation measures which are incorporated into the Scheme to minimise the risk of accidental pollution events and particulate pollution during construction (i.e. avoidance of construction in the wetted channel of the rivers), the CEMP following the principles set out in the pre-CEMP (December 2016 ES Supplement (Document 2.4.14) Appendix SR3.2), the Outline Pollution Control and Prevention Plan (Annex E to the pre-CEMP), and the Outline Surface and Groundwater Plan (Annex G to the pre-CEMP), and adherence to standard best practice guidance and Environment Agency Pollution Prevention Guidelines) the magnitude of the impacts is assessed as Minor Adverse and the significance of effects as Slight or Moderate for the River Usk (National (High) value) and Slight for the River Ebbw (County (Medium value)). Taking a precautionary approach, the effect on the River Usk in EIA terms is a medium term significant effect. The effect on the River Ebbw is not significant.

Construction

- 6.4.6 I have described the magnitude of the impact of construction on coastal saltmarsh habitats above under International and National Designated Sites. It would be Minor Adverse in the medium term and the significance of effects Slight for saltmarsh at the River Ebbw (receptor of Medium value) and Slight or Moderate for saltmarsh at the River Usk (receptor of High value). In the long term the magnitude of impacts would be Negligible Adverse and the significance Neutral or Slight for the River Ebbw saltmarsh (County (Medium) value) and Slight for the River Usk saltmarsh (National (High) value). In EIA terms the medium term effect on the River Usk saltmarsh would be significant. The other effects would not be significant.

Operation

- 6.4.7 During the operation of the Scheme, the incorporation of the drainage strategy as a key aspect of the Scheme design would provide the means by which to protect the Rivers Usk and Ebbw and associated habitats and species from contaminants associated with the routine highway runoff and pollution events. Measures to avoid the bridge lighting illuminating the rivers are also proposed to avoid adverse effects of lighting on fish.
- 6.4.8 The residual effects of the operation of the new section of motorway on the habitats and species included in the Rivers Ecological Unit would not be significant.

6.5 Reens, Ditches, Reedbeds and Ponds Ecological Unit

- 6.5.1 The Reens, Ditches, Reedbeds and Ponds Ecological Unit includes the following VERS.

Eutrophic standing waters.

Ponds.

Reedbeds.

Aquatic macrophytes.

Otter.

Water vole.

Grass snake.

Great crested newt and other amphibians.

Freshwater fish assemblage.

Freshwater invertebrates.

Land Take

- 6.5.2 As set out in the Supplementary File note on the Reen Mitigation Strategy (September 2016 ES Supplement (Document 2.4.4), Appendix 2.1) the Scheme would result in the infilling or culverting of 2755 m of reens and 9373 m of field ditches. To mitigate for this, the proposals include the provision of 2826 m of new reens and 10594 m of new field ditches.
- 6.5.3 No ponds would be lost under the footprint of the new section of motorway itself but a pond would be lost at the Duffryn construction compound site. A total of 6.59 ha of reedbed would be affected during the construction of the new section of motorway of which 3.19 ha would be taken for the permanent works and 3.35 ha would be temporarily used during the construction period and then returned to reedbed.
- 6.5.4 New water treatment areas including ponds and reedbeds would be constructed along the length of the Scheme, 9.4 ha of which would comprise ponds. The revised EMP (September 2016 ES Supplement (Document 2.4.4) Figure R2.6) includes some 9.9 ha of reedbeds.
- 6.5.5 Otter is included in the Newport Local BAP (Document 11.2.30). The Trunk Road Estate BAP (Document 6.1.1) includes a species action plan for Otter. The Newport Local BAP includes an action plan for water vole. The Trunk Road Estate BAP includes a species action plan for water vole. The Trunk Road BAP includes a species action plan for amphibians.

- 6.5.6 Design of the Scheme has taken into account the need to ensure that aquatic species are protected during the construction of the new section of motorway, and once completed can continue to occupy suitable habitats in the vicinity, and in particular are able to cross the line of the new section of motorway so as to avoid isolation of populations.
- 6.5.7 In EIA terms the residual effects of land take on all these VERs would not be significant other than for reedbeds and freshwater invertebrates. The magnitude of impacts from land take on reedbeds is assessed as Moderate Adverse and the significance of effects as Moderate in the short term. In the medium term as the new reedbeds established the magnitude of impacts would be Negligible Adverse and the significance of effects Neutral or Slight. In EIA terms the effects in the short term would be significant, and in the medium term would not be significant.
- 6.5.8 For freshwater invertebrates the magnitude of the impacts of land take would be Minor Adverse and the significance of effects Slight or Moderate in the short term, and in the medium/long term, the impacts would be Negligible Adverse and the significance of effects Slight. In EIA terms the effects in the short term would be significant, and in the medium term would not be significant.

Construction

- 6.5.9 In EIA terms the residual effects of construction on ponds, water vole (described by Jon Davies (WG 1.19.1)), grass snake, great crested newt and other amphibians, and freshwater fish would not be significant.
- 6.5.10 The magnitude of the impact of construction works on eutrophic standing waters taking account of the pollution control and other water management measures included in the Scheme and described in the Pre-CEMP (December 2016 ES Supplement (Document 2.4.14) Appendix SR3.2), the Outline Pollution Control and

Prevention Plan (Annex E to the pre-CEMP), and the Outline Surface and Groundwater Plan (Annex G to the pre-CEMP) is assessed as Minor Adverse and the significance of effects as Slight or Moderate. In EIA terms, and taking a precautionary approach, this is a significant medium term effect.

- 6.5.11 For reedbeds, the magnitude of the residual impact of the construction works on reedbeds is assessed as Moderate Adverse and the significance of effects as Moderate in the medium term. In the long term as the new reedbeds established the magnitude of impacts would be Negligible Adverse and the significance of effects Neutral or Slight. In EIA terms there would be a medium term significant effect.
- 6.5.12 The magnitude of the residual impact of the construction works on aquatic macrophyte assemblages, taking account of the pollution control measures which would be implemented as part of the Scheme as referred to above, and additional measures to limit changes in reed and ditch water levels during construction is assessed as Minor Adverse and the significance of effects as Slight or Moderate. Taking a precautionary approach, in EIA terms this is a significant medium term effect.
- 6.5.13 For otter, taking into account the measures to limit the potential for and likely impact of pollutants, the commitment to culvert retained reeds, and the planting and creation of replacement and new habitats of value to otters (including woodland, scrub, hedgerows and reedbeds) as shown on the revised Environmental Masterplan (September 2016 ES Supplement (Document 2.4.4) Figure R2.6), and additional mitigation measures, in particular pre-construction surveys, the installation of mammal exclusion fencing around boundaries of the work sites, and the provision of mammal crossings, the magnitude of the likely impact of construction on otters is assessed as Minor Adverse and the significance of effects as Slight

or Moderate. Taking a precautionary approach, in EIA terms this is a medium term significant effect.

- 6.5.14 For freshwater invertebrates, the mitigation measures that would be implemented to protect water quality would reduce the risk from pollution. Additional mitigation measures would manage water levels during construction. The magnitude of the residual impacts would be Minor Adverse and the significance of effects Slight or Moderate. Taking a precautionary approach, this would be a medium term significant effect.

Operation

- 6.5.15 In EIA terms the residual effects of the operation of the new section of motorway would not be significant on all habitats and species included in the Reens, Ditches, Reedbeds and Ponds Ecological Unit, other than for otter.
- 6.5.16 The magnitude of the operational impact of the new motorway on otter, taking into account the installation of mammal exclusion fencing around the boundaries of the new road and measures to limit the potential for and likely impact of operational pollutants included in the Scheme, and additional mitigation measures, in particular the provision of mammal crossings, and mammal tunnels at all culverted reens, is assessed as Minor Adverse and the significance of effects Slight or Moderate. Taking a precautionary approach, in EIA terms the effect would be significant.

6.6 Grazing Marsh Ecological Unit

- 6.6.1 The Grazing Marsh Ecological Unit includes the following VERS.

Coastal and floodplain grazing marsh.

Shrill carder bee.

Wet grassland plants.

Land Take

- 6.6.2 The Scheme would result in the unavoidable loss of some 86.4 ha of grazing marsh within the Gwent Levels SSSIs (of which 77.58 ha would be permanently lost and 8.85 ha would be within the temporary construction areas). In order to mitigate for this loss the revised SSSI Mitigation Strategy (Appendix SR10.35 of the December 2016 ES Supplement (Document 2.4.14)) provides for habitat improvements to mitigate for the loss of grazing marsh across some 107 ha of land at Maerdy Farm, Tatton Farm and Caldicot Moor.
- 6.6.3 Loss of habitat for shrill carder bee would arise from the loss of the vegetation bordering reens and ditches, and the loss of vegetated brownfield land at Great Pencarn, land within Newport Docks and the Tata Steel site. Mitigation for the loss of reens and ditches is described under the Reens, Ditches, Reedbeds and Ponds Ecological Unit above. Other habitat for shrill carder bee would be provided on south facing embankments and cuttings of the new section of motorway which would include areas to be sown to species-rich grassland. Extensive areas of species-rich grassland would be established on south facing cutting slopes at the Castleton Interchange in the west of the new section of motorway, on the embankment of the new section of motorway across the Gwent Levels and the embankments of the water treatment areas. Additional mitigation would be provided by the revised SSSI Mitigation Strategy (Appendix SR10.35 of the December 2016 ES Supplement (Document 2.4.14)) which would include measures to improve the species diversity of existing grasslands, to create new species-rich grassland on areas which are currently arable land, to enhance the biodiversity of existing reen and ditch banks, and to create new ditches, with associated bank vegetation, all of which would be of benefit to shrill carder bee. The construction sites at Great Pencarn, within Newport Docks and at Tata Steel, would be restored so far as practicable, to provide a mosaic of habitats

including areas with plant species of value in providing food for shrill carder bee.

- 6.6.4 Taking into account the extent of the loss of coastal and floodplain grazing marsh habitat, and the strategy to mitigate the effects of loss of grazing marsh described in the revised SSSI Mitigation Strategy (Appendix SR10.35 of the December 2016 ES Supplement (Document 2.4.14)), the magnitude of the impacts on the habitat in the short term is assessed as Moderate Adverse and the significance as Moderate or Large, and in the medium to long term, the magnitude of impacts would be Minor Adverse and the effects of Slight or Moderate significance. In EIA terms, taking a precautionary approach, the effects would be significant in the short, medium and long term.
- 6.6.5 The magnitude of the land take impacts on shrill carder bee, taking into account the mitigation comprising the habitat creation included in the revised Environmental Masterplan (September 2016 ES Supplement Document 2.4.4) Figure R2.6) (, the improvements included in the revised SSSI Mitigation Strategy (Appendix SR10.35 of the December 2016 ES Supplement (Document 2.4.14)) and the sympathetic restoration of the construction sites at Great Pencarn, Newport Docks and Tata Steel would be Moderate Adverse and the significance Moderate or Large in the medium term. In the long term as the new and replacement habitats develop, the magnitude of impacts would be Minor Adverse and the significance of effects Slight or Moderate. In EIA terms, taking a precautionary approach, the effects would be significant in the medium and long term.
- 6.6.6 For wet grassland plants, taking into account the extensive creation of suitable habitat which would result from implementation of the revised SSSI Mitigation Strategy (Appendix SR10.35 of the December 2016 ES Supplement (Document 2.4.14)), the magnitude of impact would be Moderate Adverse and the effects of Moderate significance in the short term. In the medium term, as the habitat

improvements take effect, the magnitude of impacts is assessed as Minor Adverse and the effects of Slight significance. In EIA terms the effects would be significant in the short term, becoming not significant in the medium term.

Construction

- 6.6.7 The residual effects of construction on coastal and floodplain grazing marsh and wet grassland plants would not be significant in EIA terms.
- 6.6.8 For shrill carder bee, the magnitude of impacts of the construction works resulting in additional habitat loss, taking into account the sympathetic restoration of the construction areas in Newport Docks and Tata Steel on completion of the works, is assessed as Moderate Adverse and the significance of effects Moderate or Large in the medium term and the magnitude of impacts Minor Adverse and the significance of effects Slight or Moderate in the long term. Taking a precautionary approach these effects are significant in EIA terms.

Operation

- 6.6.9 The residual effects of the operational motorway on the habitat and species included in the Grazing Marsh Ecological Unit, taking into account habitat severance, and that provisions would be made for NRW to manage the future drainage, the mitigation measures included in the Scheme and shown on the revised Environmental Masterplan (September 2016 ES Supplement (Document 2.4.4) Figure R2.6), ongoing management of the new species-rich grasslands included in the Scheme, and the implementation of the revised SSSI Mitigation Strategy (Appendix SR10.35 of the December 2016 ES Supplement (Document 2.4.14)) which would provide ecological enhancement of existing areas of grazing marsh and conversion of arable land to grazing marsh, would not be significant in EIA terms.

6.7 Farmland Ecological Unit

6.7.1 The Farmland Ecological Unit includes the following VERS.

Lowland mixed deciduous woodland (including) wet woodland).

Hedgerows.

Lowland meadow.

Dormouse.

Badger.

Hedgehog.

Land Take

6.7.2 The total loss of woodland habitat as a result of the land take for the new section of motorway (including that within temporary construction areas) would be 49.8 ha (of which 7.15 ha is semi-natural woodland and 42.65 ha plantation). Acknowledging that the Scheme would result in unavoidable losses of woodland (much of which is plantation woodland associated with the existing M4, particularly in the Castleton area), the Scheme includes extensive woodland planting. The new planting shown on the revised EMP (September 2016 ES Supplement (Document 2.4.4) Figure R2.6) comprises 104.4 ha of 'Woodland' and 'Linear Belts of Trees and Shrubs' similar to those associated with the existing M4. Unlike the existing woodland, there would be extensive new woodland blocks at Berryhill Farm in the west, and east of Rockfield Farm at Undy in the east. The overall ratio of new planting to that which would be lost would be 2.1:1. After the initial Aftercare Period, the long term management of these woodlands would be the responsibility of Welsh Government and would follow the principles set out in the Trunk Roads Estate BAP (Document 6.1.1), including that of maximising biodiversity within woodlands.

6.7.3 The Scheme would result in the loss of some 35.8 km of hedgerows. The proposals shown on the revised EMP (September 2016 ES

Supplement (Document 2.4.4) Figure R2.6) include the planting of some 4.1 km of hedgerows. Much of the route of the new section of motorway would be through the Gwent Levels. Whilst the hedgerows within the Levels, typically along the reens and ditches which form the field boundaries, are of biodiversity value, NRW also consider them to be detrimental to the ecology of the reens and ditches which support the important aquatic plant and animal communities which are key features of the Gwent Levels SSSIs, as they cause shading and interfere with management of the watercourses. NRW have thus indicated that hedgerow planting would not be appropriate within the Gwent Levels SSSIs. At either end of the Scheme, the extensive woodland and other landscape planting proposed at the Castleton and Magor Interchanges means that there would be little opportunity for hedgerow planting in these areas.

6.7.4 Whilst the Scheme would result in the loss of some 164 ha of grassland in addition to that included under grazing marsh considered above, the majority of this is semi-improved or improved grassland of little intrinsic nature conservation value. Overall, the Scheme would result in the loss of some 7.01 ha of unimproved grassland. Some small areas of species-rich grassland including wax caps at Pound Hill and Pwll Diwaelod would be lost. The Scheme shown on the revised EMP (September 2016 ES Supplement (Document 2.4.4) Figure R2.6) includes the establishment of some 38.1 ha of species-rich grassland, predominantly on the south facing embankments of the new motorway, and on the south facing slopes of cuttings, and on the banks enclosing the water treatment areas. The total area of all grassland (excluding amenity grassland) included in the Scheme is some 105 ha.

6.7.5 The residual effects of land take on dormouse (described by Jon Davies (WG 1.19.1)), badger and hedgehog would not be significant in EIA terms.

- 6.7.6 Within the lowland mixed deciduous woodland habitat, the effects on plantation woodland in EIA terms would not be significant and in the long term would be potentially beneficial. The magnitude of the impacts on semi-natural woodland would be Major Adverse leading to effects of Moderate or Large significance in the short and medium terms, but in the longer term the magnitude of impacts would be Moderate Adverse and the effects of Moderate significance. In EIA terms the effects would be significant in the short, medium and long term.
- 6.7.7 The magnitude of the loss of hedgerows as a result of the land take for the new section of motorway would be Moderate Adverse and the significance of effects Moderate in the short, medium and long term. In EIA terms this would be a significant impact. However, it must be appreciated that the woodland and linear planting at Castleton and Magor at either end of the Scheme would provide habitats of greater biodiversity value and would provide wildlife corridors, and that NRW do not favour hedgerow planting by way of mitigation within the Gwent Levels SSSIs due to their potential to overshadow and impact upon the reens.
- 6.7.8 For lowland meadows, excluding coastal grazing marsh considered under the Grazing Marsh Ecological Unit above, the effects on all grasslands, other than species-rich grasslands, would not be significant in EIA terms. For species-rich grasslands the magnitude of impacts would be Moderate Adverse and the effects of Moderate significance in the short term. In the medium term as the new grassland develops the magnitude of impacts would be Minor Adverse and the effects of Slight significance. In EIA terms the effects would be significant in the short term becoming not significant in the medium term.

Construction

- 6.7.9 The residual effects of construction on all VERs within the Farmland Ecological Unit would not be significant in EIA terms.

Operation

- 6.7.10 Taking into account the severance already caused by existing roads, the planting included in the Scheme which is shown on the revised EMP (September 2016 ES Supplement (Document 2.4.4) Figure R2.6), future management of land within the highway boundary in accordance with the objectives of the Trunk Road Estate BAP (Document 6.1.1), measures to limit the potential for and likely impact of light spill, the long term management and maintenance of habitats of potential value to dormice or the dormice receptor site(s), the long-term monitoring of dormice populations, the maintenance of box culverts and mammal crossings, the provision of mammal exclusion fencing around the operational boundary of the new road and the use of fencing to help guide wildlife into box culverts and dry mammal crossings, the residual effects of the operation of the new section of motorway on the habitats and species included in the Farmland Ecological Unit would not be significant in EIA terms.

6.8 Industrial Land Ecological Unit

- 6.8.1 The Industrial Land Ecological Unit includes the following VERS.

Open mosaic habitats on previously developed land.

Reptiles (common lizard, slow worm).

Terrestrial invertebrates.

Land take

- 6.8.2 Areas of 'brownfield' land which would be affected by the Scheme are at Great Pencarn, south of the Solutia works, in Newport Docks, south of the Tata Steelworks at Llanwern, and at Green Moor.

Vegetation on the brownfield land typically comprises a mosaic of grassland and scrub often formed on man-modified substrata.

- 6.8.3 The brownfield site at Great Pencarn would be almost entirely taken up by the main construction compound for the Scheme. In the section of Newport Docks between the River Ebbw and the River Usk, much of the vegetated brownfield land would be taken up by the embankment for the new section of motorway from the River Ebbw eastwards to the start of the viaduct section, by the link to Docks Way and its junction with the new section of motorway, or by temporary construction areas south of the embankment and east of the Docks Way link.
- 6.8.4 East of the River Usk there would be losses of areas of vegetated brownfield land adjacent to the saltmarsh on the east bank of the river, either side of the Uskmouth railway line, south of the Solutia works, and an area between the Uskmouth railway line and the River Usk in order to provide construction areas for the viaduct and Usk crossing.
- 6.8.5 The section of new motorway along the south of the Tata Steel land and across Green Moor, and the associated construction areas, would pass through brownfield land including sludge lagoons and their embankments.
- 6.8.6 In restoring the construction sites at Great Pencarn, within Newport Docks and Tata Steel, so far as practicable a mosaic of habitat types providing some of the characteristics of brownfield land would be provided. Such habitats include areas of unvegetated, loose bare substrate and pools and early successional communities consisting mainly of stress-tolerant species (e.g. indicative of low nutrient status or drought) which may be composed of annuals, mosses and liverworts, lichens, ruderals, inundation species, and open and flower-rich grassland. Hibernacula for reptiles, potentially using suitable surplus materials derived from construction would be provided.

- 6.8.7 Single common lizards were recorded at the eastern edge of Magor Services and the former laboratory site at Pye Corner in 2014 indicating low populations in these areas. In 2015 single common lizard and slow worm were recorded within Newport Docks indicating low populations. Prior to commencement of construction in areas where common lizard and slow worm populations have been identified, reptile fencing would be installed and reptiles would be captured and transferred to suitable habitat on the margin of the Scheme, or to suitable habitat within the SSSI mitigation areas (revised SSSI Mitigation Strategy at Appendix SR10.35 of the December 2016 ES Supplement (Document 2.4.14)).
- 6.8.8 Brownfield sites are important for invertebrate species. Surveys of the land within Newport Docks identified 329 invertebrate species. Of these, 32 (9.7%) were considered to be 'Key Species', seven of them of Red Data Book or equivalent status. This represents a good diversity for such an open site. One species, a fly *Liriomyza intonsa*, was new for Britain. The survey showed that the saltmarsh beside the River Ebbw is of particular conservation importance.
- 6.8.9 Surveys of the land at Tata Steel recorded 378 invertebrate species. Of these, 31 (8.2%) were considered to be 'Key Species', nine of them of Red Data Book or equivalent status (2.4%). This is a good diversity for the habitat types present. The proportion of Key Species was good, indicating an area of significant invertebrate conservation value. Of particular interest were a fly *Hydrophorus viridis* and a hoverfly *Sphaerophoria loewi*, both very rare nationally. Reens and ephemeral pools were particularly important for the rarest species found. Reedbeds and sedge beds were also important for a number of scarce species and general biodiversity. Old poplar trees were also of interest. Sympathetic restoration of the construction sites would partially mitigate for the loss of habitat for invertebrates characteristic of brownfield sites.

- 6.8.10 The residual effects of land take on reptiles would not be significant in EIA terms.
- 6.8.11 For the open mosaic habitats on previously developed land habitat the magnitude of the land take impacts, taking into account the sympathetic restoration of the land at Great Pencarn, Newport Docks and Tata Steel, is assessed as Major Adverse and the significance of effects Moderate or Large in the medium term, and the magnitude of impacts Moderate Adverse and the significance of effects Moderate in the long term. These effects are significant in EIA terms.
- 6.8.12 The magnitude of the impacts on the terrestrial invertebrate assemblage associated with brownfield land, taking into account the sympathetic restoration of the land at Great Pencarn, Newport Docks and Tata Steel, is assessed as Major Adverse and the significance of effects Moderate or Large in the medium term. In the long term as the habitats recovered the magnitude of impacts would be Moderate and the significance of effects Moderate. These effects would be significant in EIA terms.

Construction

- 6.8.13 The land take for construction has been assessed above. The residual effects of construction on all VERs within the Industrial Land Ecological Unit would not be significant in EIA terms.

Operation

- 6.8.14 The residual effects of the operation of the new section of motorway on the habitat and species included in the Industrial Land Ecological Unit, taking into account the sympathetic restoration of the construction areas at Great Pencarn, Newport Docks and Tata Steel, and the extent of habitat (particularly species-rich grassland) included in the Scheme and shown on the revised EMP (September 2016 ES Supplement (Document 2.4.4) Figure R2.6), would not be significant in EIA terms.

6.9 Summary

- 6.9.1 In this section I have summarised the effects of the land take, construction and operation of the M4CaN Scheme on ecology and nature conservation as reported in Chapter 10 Ecology and Nature Conservation of the March 2016 ES (Document 2.3.2), and updated in the September 2016 ES Supplement (Document 2.4.4) and the December 2016 ES Supplement (Document 2.4.14), focussing on those effects which are assessed as significant in EIA terms.
- 6.9.2 For the purposes of the assessment the designated sites and nature reserves were considered in their own right, and the other Valued Ecological Receptors (VERs) were grouped together under Ecological Units based on the habitats and species present that would be affected in similar ways.
- 6.9.3 The Ecological Units and their component VERs are as follows.

Rivers (Usk and Ebbw)

- a) Rivers
- b) Sub-tidal benthic habitat
- c) Intertidal mudflats
- d) Coastal saltmarsh
- e) Migratory fish
- f) Estuarine migratory fish assemblage

Reens, ditches, reedbeds and ponds

- a) Eutrophic standing waters
- b) Ponds
- c) Reedbeds
- d) Aquatic macrophytes
- e) Otter
- f) Water vole
- g) Grass snake

- h) Great crested newt and other amphibians
- i) Freshwater fish assemblage
- j) Freshwater invertebrates

Grazing Marsh

- a) Coastal and floodplain grazing marsh
- b) Shrill Carder bee
- c) Wet grassland plants

Farmland

- a) Lowland mixed deciduous woodland
- b) Wet woodland
- c) Hedgerows
- d) Lowland meadow
- e) Dormouse
- f) Badger
- g) Hedgehog

Industrial land

- a) Open mosaic habitats on previously developed land
- b) Reptiles (Common lizard, slow worm)
- c) Terrestrial invertebrates

Bats

- a) Breeding Birds
- b) Wintering Birds

6.9.4 Effects on dormouse and water vole are described by Mr Jon Davies (WG 1.19.1), on bats by Richard Green (WG 1.20.1), and on birds by Dr Simon Zisman (WG 1.21.1).

Changes in Air Quality

- 6.9.5 The March 2016 ES (Document 2.3.2, section 10.6) concluded with respect to the air quality effects of the operation of the new section of motorway that whilst there would be increases in annual mean NO_x concentrations and nitrogen deposition at the designated sites assessed, no exceedences of the critical loads are predicted and exceedences of the precautionary annual mean NO_x objective are limited to only two of the eleven designated sites assessed, and then only within 20 m of the centre line of each carriageway and thus only a very small proportion of the designated site would be affected. One of these sites is the Severn Estuary SAC, SPA and Ramsar Site. In the vicinity of the Scheme the habitats for which the Severn Estuary is designated are marine and intertidal habitats, and rocky shores which are not considered to be sensitive to changes in oxides of nitrogen. Overall, the effect of the Scheme was assessed as being not significant for designated sites. Similarly for the habitats present along the corridor of the road, there would be no significant effects as a result of NO_x concentrations.
- 6.9.6 With respect to nitrogen deposition, the critical loads of none of the habitats present along the corridor of the new section of motorway would be exceeded and there would be no significant effects.
- 6.9.7 The same conclusions are drawn with respect to the effects of construction of the new section of motorway based on the air quality information provided in the September 2016 ES Supplement (Document 2.4.4) as set out in the December 2016 ES Supplement (Document 2.4.14) at para 2.1.13.

Designated Sites

- 6.9.8 The only European designated site which would be affected by the land take for the Scheme would be the River Usk SAC where the east pylon of the River Usk crossing would be located within an area of saltmarsh. The saltmarsh would be replaced by creation of new

saltmarsh in an area to be used for construction of the River Usk Crossing once the construction works are complete, and saltmarsh is not one of the features for which the SAC is designated. Thus there would be no loss or adverse effect on a key feature of the SAC as a result of land take. There would be no significant effects on the SAC as a result of land take, during construction, or during the operation of the Scheme.

- 6.9.9 The site for the east pylon of the new crossing of the River Usk is also within the River Usk (Lower Usk) SSSI and the loss would be mitigated by the creation of a new area of saltmarsh once the construction works are complete.
- 6.9.10 As well as the River Usk (Lower Usk) SSSI, the new section of motorway would cross the Gwent Levels St Bride's SSSI, the Nash and Goldcliff SSSI, the Whitson SSSI, and the Redwick and Llandeenny SSSI. The land take for the Scheme would have significant effects on the SSSIs.
- 6.9.11 The maintenance of reed connections by culverting across the road and the replacement of infilled and culverted reeds and infilled field ditches are integral to the design of the Scheme. The proposals for mitigation for the loss of grazing marsh within the SSSIs are set out in the revised SSSI Mitigation Strategy (Appendix SR10.35 of the December 2016 ES Supplement (Document 2.4.14)).
- 6.9.12 Taking into account that this additional mitigation and enhancement would commence in advance of construction, and that improvements in the ecological interest of grasslands would be expected to be manifest within a few years, the magnitude of the land take impacts on the Gwent Levels SSSIs (National (High) value) is assessed as Moderate Adverse and the significance of effects as Moderate or Large in the short term. The magnitude of impacts would be Minor Adverse and the Significance of effects Slight or Moderate in the medium/long term. Taking a precautionary approach the short,

medium and long term effects on the Gwent Levels SSSIs would be significant in EIA terms.

6.9.13 During construction, the assessment takes into account the replacement of saltmarsh within the River Usk (Lower Usk) SSSI, which would be affected by the construction of the new River Usk Crossing, and which forms part of the Scheme design; construction land take within the Gwent Levels SSSIs which would be restored to grassland; together with the additional mitigation set out in the revised SSSI Mitigation Strategy (Appendix SR10.35 of the December 2016 ES Supplement (Document 2.4.14)). The magnitude of the land take impacts would be Minor Adverse leading to effects of Slight or Moderate significance in the medium term. In the long term the magnitude of impacts would be Negligible Adverse and the significance of effects Slight. In EIA terms, taking a precautionary approach, the effects would be significant in the short and medium terms and not significant in the long term.

6.9.14 During operation of the Scheme some sections of the Gwent Levels SSSIs to the north of the new section of motorway would be severed from the major parts of the designated sites to the south. All of the grazing marsh areas could continue to be managed alongside the operation of the Scheme and the effects would not be significant.

Other significant ecological effects

6.9.15 I have summarised the significant effects of the Scheme on non-statutory designated sites and nature reserves, and on the habitats and species of the Rivers (Usk and Ebbw); Reens, Ditches, Reedbeds and Ponds; Grazing Marsh; Farmland; and Industrial Land Ecological Units in the table at Appendix A to this evidence.

7. CONSULTTEES' RESPONSES AND OBJECTIONS TO THE M4CAN SCHEME

7.1 Introduction

7.1.1 In this section I address matters raised in consultation responses and objections to the draft Orders for the M4CaN Scheme which are relevant to ecology and nature conservation.

7.1.2 Consultation responses have been submitted by:

Newport City Council (SUP0192)

Monmouthshire County Council (ISU0002)

7.1.3 Objections have been submitted by the following organisations:

Natural Resources Wales (OBJ0268)

Royal Society for the Protection of Birds (OBJ0245)

Gwent Wildlife Trust (OBJ0270)

Wildlife Trusts Wales (OBJ0260)

Woodland Trust (OBJ0271)

Bat Conservation Trust (OBJ0298)

Buglife (OBJ0267)

Gwent Ornithological Society (OBJ0297)

Friends of the Earth Cymru (OBJ0125)

7.1.4 The matters relating to ecology and nature conservation raised in these submissions can be grouped under the following headings:

- a) Incomplete or inadequate surveys;
- b) Inadequate, incorrect or missing information;
- c) Incorrect or inadequate assessment;
- d) Additional recommendations;

- e) Inadequate or uncertain mitigation and monitoring;
- f) Criticism of the Scheme; and
- g) Matters of policy/guidance.

7.1.5 Where appropriate, consultees' responses and objections are also addressed by Jon Davies (dormouse and water vole) (WG 1.19.1), Richard Green (bats) (WG 1.20.1) and Simon Zisman (birds) (WG 1.21.1).

7.1.6 In addition to the responses and objections from the organisations I have referred to above, individuals have also objected to the Scheme on the basis of effects on ecology and nature conservation. The matters raised are covered in the more detailed responses and objections made by the organisations to which I respond in this section.

7.2 Incomplete or inadequate surveys

Great Crested Newt

7.2.1 NRW (OBJ 0268) commented in their letter of 4 May 2016 to Welsh Government that further GCN surveys were required for waterbodies within 250m of positive eDNA results. The survey should also include all waterbodies which would be directly impacted by the Scheme (particularly those assessed as having a high HSI score but not covered within the seven eDNA zones).

7.2.2 NRW's letter of 4 May 2016 also referred to the need for information on the proposed strategy for great crested newt subject to survey findings. NRW's letter of 18 October also refers to concerns with respect to great crested newt.

7.2.3 Newport City Council (SUP0192), in a report dated April 2016, referred to the great crested newt surveys carried out in 2014 and

2015 and to the further surveys being carried out in 2016. The stated that the mitigation proposed should be based on these surveys.

- 7.2.4 As explained in the September 2016 ES Supplement (Document 2.4.4) further great crested newt surveys were carried out in spring 2016 and the survey report was provided in Appendix S10.6 of the September 2016 ES Supplement. The report of the survey was provided to NRW on 2 August 2016.
- 7.2.5 The 2016 surveys included further survey using the eDNA technique for great crested newt presence/absence and population size class estimate surveys and presence / absence surveys using trapping and observation methods.
- 7.2.6 The 2016 surveys fell into two categories as follows:
- a) Land generally within 250 metres of the proposed new section of motorway that was not surveyed during 2015.
 - b) All watercourses within 250 metres of the location of positive eDNA results identified during the 2015 eDNA sampling.
- 7.2.7 Four areas not covered in 2015 were surveyed:
- a) Tata Steel Land.
 - b) Adjacent to the eastbound carriageway of the existing M4 north of Undy.
 - c) Adjacent to the westbound carriageway of the existing M4 north of Undy.
 - d) Within Marshall Land on the east bank of the River Usk.
- 7.2.8 Positive eDNA results were identified during the 2015 eDNA at three locations comprising:
- a) The Bareland Street area south of Llandeenny;
 - b) To the east of Tonew Kennels; and

- c) South of Tatton Farm.

7.2.9 Watercourses within 250 metres of the locations of the positive 2015 eDNA were identified. A total of 210 watercourses were assessed and of these:

- a) 105 watercourses were identified for survey;
- b) 94 watercourses were found to not provide suitable habitat for great crested newts; and
- c) A further 11 watercourses were not suitable for survey because they were inaccessible, either due to barriers preventing access or due to health and safety reasons.

7.2.10 No great crested newts were found using traditional trapping and observational survey methods. It should be noted that the survey was constrained by site conditions including dense emergent and bank vegetation, dense floating vegetation, hedge preventing access, high turbidity, high water level, steep banks and the presence of water shrew.

7.2.11 Great crested newt DNA was detected at the same locations as in 2015 (March 2016 ES (Document 2.3.2) Appendix 10.22). In addition, great crested newt DNA was detected at one location where not previously detected. This was in a watercourse adjacent to the location where three individual great crested newts were found underneath reptile survey mats during the 2015 Reptile Survey (March 2016 ES Appendix 10.27).

7.2.12 Based upon the traditional survey data and the eDNA data results, it is considered that a small population of great crested newt is present within the Scheme corridor, and that where they are present the great crested newts are in small, potentially isolated pockets. The presence of populations of predatory fish, and lack of extensive 'fish-free' areas within which a significant and sustainable metapopulation of great crested newt could exist, is likely to be a significant constraint on the

population in the vicinity of the Scheme and more widely within the Gwent Levels.

- 7.2.13 The report of the further great crested newt survey carried out in spring 2016, using both 'conventional' and eDNA techniques, has further informed the mitigation strategy for the species. The draft strategy was Appendix SS10.6 of the December 2016 ES Supplement (Document 2.4.14). The draft strategy takes account of NRW comments on a previous informal draft.

Badger

- 7.2.14 In their letter of 4 May 2016 to Welsh Government, NRW (OBJ0268) commented that pre-construction surveys for badger were not complete and detailed mitigation measures and methods of working not submitted. NRW's letter also referred to the need for further information on the proposed strategy for badger.
- 7.2.15 Detailed mitigation measures and methods of working will be covered in the badger method statement. NRW have agreed that this is not required at this stage but should be prepared prior to commencement of construction.
- 7.2.16 The pre-construction badger survey would be carried out in the season prior to construction to identify any changes in the distribution of badgers and to further inform the mitigation requirements.

Aquatic macrophytes

- 7.2.17 In their letter of 4 May 2016 to Welsh Government NRW (OBJ0268) expressed concerns with the quality of the 2014 aquatic macrophytes survey (March 2016 ES (Document 2.3.2) Appendix 10.14).
- 7.2.18 A further aquatic macrophyte survey had been carried out in 2015 (March 2016 ES (Document 2.3.2) Appendix 10.30) and the River Corridor Survey (March 2016 ES Appendix 10.32) also provided information on aquatic macrophytes.

- 7.2.19 In their letter of 4 May 2016 NRW (OBJ0268) commented that they had far greater confidence in the 2015 survey compared to that prepared in 2014. The survey was undertaken at the optimum time of year (June to August) and results accorded with those obtained by CCW during their surveys undertaken during 2010-12, with similar species present. The findings concurred with their local knowledge and experience of the Gwent Levels, i.e. that greater species diversity will be found in reens compared to field ditches, and the importance of management in maintaining diversity.

Invertebrates

- 7.2.20 In their letter of 4 May 2016 to Welsh Government NRW (OBJ0268) expressed concerns with the March 2016 ES (Document 2.3.2) Appendix 10.15 Terrestrial and Aquatic Invertebrate Survey 2014 due to poor weather, lack of access and short survey times.
- 7.2.21 Further terrestrial invertebrate surveys were carried out in 2015 (March 2016 ES (Document 2.3.2) Appendix 10.31) at Newport Docks and Tata Steel. NRW commented in their letter that the 3-day surveys at each of these sites have highlighted that both sites support rich invertebrate faunas of at least regional importance and that further work would undoubtedly add other significant species. They agreed with the recommendations made, that mitigation should aim to retain as much of the key habitats as possible and that these should not be lost to subsequent development.
- 7.2.22 In addition to the March 2016 ES (Document 2.3.2) Appendix 10.15 Terrestrial and Aquatic Invertebrate Survey 2014, previous NRW aquatic invertebrate surveys were also referred to in the March 2016 ES Chapter 10 Ecology and Nature Conservation. As agreed with NRW further aquatic invertebrate survey was considered unnecessary and all reens and ditches within the various SSSI boundaries were considered capable of supporting the individually qualifying invertebrate assemblage of each SSSI.

Aquatic Desk Study

- 7.2.23 In their letter of 4 May 2016 to Welsh Government NRW (OBJ0268) expressed concerns with the March 2016 ES (Document 2.3.2) Appendix 10.18 Aquatic Desk Study in that previous CCW surveys were not referred to although provided.
- 7.2.24 The CCW surveys were referred to in some detail in the March 2016 ES Chapter 10 Ecology and Nature Conservation.
- 7.2.25 NRW noted that eels are present throughout the Gwent Levels drainage system.
- 7.2.26 The March 2016 ES (Document 2.3.2) Chapter 10 Ecology and Nature Conservation recognises at para 10.4.437 that the eels which occur in the reens and ditches of the Gwent Levels are part of the population that is one of the reasons for notification of the Severn Estuary Ramsar site, and that this population should be considered to be of International (Very high) value.

Other Surveys

- 7.2.27 Gwent Wildlife Trust (OBJ0270) in their letter of 4 May 2016 referred to the lack of surveys for harvest mouse and polecat.
- 7.2.28 There is no recognised survey methodology for polecat. The most recent assessment of the status of the species in the UK is provided in The Distribution and Status of the Polecat (*Mustela putorius*) in Britain 2014-2015 (Croose, E, 2016) (Document 11.3.24). The overall conclusion was that:

“The polecat population in Britain is continuing to recover and re-colonise parts of its former range following a severe historical decline during the 19th century. Since the previous two distribution surveys, the polecat’s range has expanded considerably into parts of southern and eastern England and the polecat is now more widespread than at any time in over 100 years. Whilst it seems likely that the population

will continue to expand, the potential impact of anthropogenic threats on the continuing recovery is unknown and warrants further investigation.”

- 7.2.29 As reported in the March 2016 ES (Document 2.3.2) Appendix 10.17 Desk Study polecat was recorded in two locations at the western end of the search area for the new section of motorway along the route of the existing M4 motorway. In the overlapping search area based on the existing M4, polecat was recorded in three locations at the western end of the search area and in the centre/east of it. The records included roadkill on the existing M4. Given the improving status of the species in the UK it is likely that polecats will become more common in the area. I do not consider that the new section of motorway would constrain this locally. As for other mammals, the mammal tunnels proposed would enable polecats to cross the new section of motorway.
- 7.2.30 As reported in the March 2016 ES (Document 2.3.2) Appendix 10.17 Desk Study, in the search area for the new section of motorway, harvest mouse was recorded at Magor Marsh. In the overlapping search area based on the existing M4, harvest mouse records were all located at the eastern end of the search area south of the existing M4 motorway.
- 7.2.31 The typical habitats of harvest mice include long tussocky grassland, reedbeds, hedgerows and around woodland edges. The mitigation measures for the Scheme, including the SSSI mitigation areas and the protected species mitigation area proposed in the north of Caldicot Moor (revised SSSI Mitigation Strategy at Appendix SR10.35 of the December 2016 ES Supplement (Document 2.4.14)) will provide extensive suitable habitat for this species.
- 7.2.32 Gwent Wildlife Trust (OBJ0270) in their letter of 4 May 2016 requested that a review of surveys be undertaken with NRW and other key organisations, and that further survey work be undertaken.

- 7.2.33 NRW was consulted on the scope of the ecological surveys carried out in both 2014 and 2015, and has been consulted on the further surveys carried out in 2016 and which, where complete, were reported in the September 2016 ES Supplement (Document 2.4.4). The position regarding the further bat and dormouse surveys which have continued through 2016 was set out in the September 2016 ES Supplement and the reports of these surveys were appended to the December 2016 ES Supplement (Document 2.4.14).
- 7.2.34 The Gwent Wildlife Trust (OBJ0270) in their letter of 4 May 2016 stated that otter surveys should have extended 2 km either side of the proposed route, not 500 m.
- 7.2.35 The 500 m zone for the 2014 survey was agreed with NRW. For the 2015 survey the 100 m zone was also agreed with NRW. The aim was to locate any holts or resting places. Otters are assumed to be present throughout the Usk, the Ebbw and the Gwent Levels and are considered to be of National (High) value for EIA purposes.
- 7.2.36 The Gwent Wildlife Trust also stated that since the otter population in the vicinity of the road is of National (High) value, further surveys should be undertaken.
- 7.2.37 Since otter has been assumed to be present throughout the Scheme and no holts or resting places have been identified which would be affected by the Scheme, and since pre-construction surveys would be carried out to confirm whether any holts or resting places are present at that time, no further survey is required at this stage.
- 7.2.38 Buglife (OBJ0267) in an email dated 4 May 2016 stated that the terrestrial invertebrate survey was based on only a few days of survey and missed the spring and early summer periods.
- 7.2.39 The March 2016 ES (Document 2.3.2) acknowledges (para 10.3.184) that:

“The late start (July) of the surveys of land within Newport Docks and Tata Steel due to delays in obtaining access meant that potentially important invertebrates with flight periods between April and June will have been missed. Weather conditions were unreliable and somewhat variable and to some degree affected these and the bee survey of the Gwent Levels. The data collected are sufficient to establish the value of the sites surveyed for invertebrates for the purposes of the EIA.”

- 7.2.40 The purpose of the surveys was to provide an evaluation of the terrestrial invertebrate communities present for the purposes of the EIA. The population of shrill carder bee was considered to be of national importance and the invertebrate community of the industrial sites as of regional importance. Whilst further surveys would undoubtedly have identified additional species, the opinion of the surveyor was that, even with much more survey work, this was unlikely to change the evaluation.
- 7.2.41 Newport City Council’s (SUP0192) report dated April 2016 noted that the Council’s scoping response in 2015 recommended that a moth trap be set up in several locations to ascertain the level of moth activity along the proposed route and that this has not been addressed and surveys not undertaken. The Council also noted that the Newport Biodiversity Partnership has not been consulted with regards to survey effort/methodology and recommended that they are consulted with regards to species specific surveys as well as specific taxonomic group surveys.
- 7.2.42 As explained at para 16.4.7 of the Scope of Ecological Surveys Report (Appendix 9.1 of the EIA Scoping Report (March 2016 ES (Document 2.3.2) Appendix 5.1)) deployment of moth traps was proposed in the southern part of the former Llanwern Steelworks owned by Tata Steel. Chapter 10 para 10.3.115 of the March 2016 ES explains that this proved impractical for health and safety reasons.

This was due to the presence of hazards on site which made night working potentially dangerous.

- 7.2.43 It is the case that there have been no discussions with the Newport Biodiversity Partnership. Other than statutory consultees, who have been consulted directly, all consultations on the EIA have followed the statutory process for public consultations.

7.3 Inadequate, incorrect or missing information

Protected species mitigation

- 7.3.1 NRW's letter of 4 May 2016 (OBJ0268) stated that further information was required on the proposed strategy for otter to include specific locations of fencing, planting and mammal crossings and referred to the need for ledges within culverts for times of high water.

- 7.3.2 Details of mammal fencing, planting and mammal crossings were shown on the Environmental Masterplan (March 2016 ES (Document 2.3.2) Figure 2.6) and are also shown on the revised Environmental Masterplan (September 2016 ES Supplement (Document 2.4.4) Figure R2.6). As explained in the March 2016 ES, the provision of otter ledges in culverts was considered but they were not thought practical for health and safety reasons related to the potential for causing blockages and the need to remove obstructions. As an appropriate alternative, 900 mm diameter tunnels would be provided above the summer penning levels, adjacent to each culvert so as to allow for the passage of otters at times when water levels may be high. The locations of the proposed culverts with adjacent mammal tunnels are shown on the revised Environmental Masterplan. The matter of mammal ledges in the culverts has been reviewed as part of the development of the draft Water Vole Mitigation Strategy. This is described in more detail by Mr Jon Davies in his Proof of Evidence (WG 1.19.1) but in summary, where practicable and where there are no health and safety constraints (i.e. those greater than 1800 mm in

diameter), mammal ledges would be installed in culverts. It is expected that these culverts would include:

- a) Middle Road Reen Diversion;
- b) Monk's Ditch Reen;
- c) Mill Reen culvert; and
- d) Percoed Reen culvert.

7.3.3 Mill Reen culvert would be extended to a length of 135 m. However, this would have a span of 6 m and height of 4 m above the right of way that would pass beneath it. A mammal ledge would be provided along the culvert.

7.3.4 Where practicable, mammal ledges may also be installed along culverts on Tatton Farm.

7.3.5 The Gwent Wildlife Trust (OBJ0270) in their letter of 4 May 2016 stated that the Trunk Road Estate BAP (Document 6.1.1) action plan for otter is inadequate as it does not refer to lighting.

7.3.6 The reference is to the baseline section of Chapter 10 of the March 2016 ES (Document 2.3.2) which simply quotes the Trunk Road Estate BAP. Measures to limit the effects of lighting are set out in section 10.5 Ecological Mitigation and Monitoring of the March 2016 ES (Document 2.3.2) and for the operational road comprise:

- a) Avoidance of lighting other than at junctions and river crossings.
- b) Design of lighting of the River Usk and River Ebbw Crossings to avoid lighting of the river channels and banks.
- c) Minimise light spill through lighting design.

7.3.7 During construction, construction lighting would be designed and managed to minimise light spill outside the working area. These measures would effectively limit the potential effects of light on otter.

It should be noted that the existing bridges over the Usk; the Transporter Bridge, the Southern Distributor Road Bridge and the existing M4 bridge upstream of the proposed River Usk Crossing are all lit.

- 7.3.8 The potential effects of light on otter and the mitigation proposed to ensure that there would be no significant effects are also set out at paras 5.2.116 – 5.2.122, and 5.2.129 of the SIAA report (Document 2.3.4).
- 7.3.9 NRW's letter of 4 May 2016 (OBJ0268) requested confirmation that SSSI mitigation at Caldicot Moor would be suitable for translocated water vole, GCN and reptiles. If not then an alternative approach may be required which may require land outside the current Scheme boundary.
- 7.3.10 A revised SSSI Mitigation Strategy has been published (Appendix SR10.35 of the December 2016 ES Supplement (Document 2.4.14)). Additional measures have been included at Caldicot Moor to accommodate water vole, and grass snake as well as Cetti's Warbler and common crane. An area of land at the south of Tatton Farm would be used to provide habitat for great crested newt.
- 7.3.11 In the letter of 4 May 2016 NRW (OBJ0268) stated that there was no acknowledgement of the potential for direct mortality on species through land take and/or construction operations.
- 7.3.12 It is inevitable that there would be direct mortality of species as a result of the land take and construction of the Scheme. To the extent that there is the potential for such effects on protected species, one of the purposes of the mitigation strategies, which include measures such as translocation, exclusion, displacement etc (and licences where applicable), is to ensure that direct mortality is avoided so far as practicable. Whilst any mortality of individual animals is regrettable, the important consideration in terms of the populations is that adverse impacts on the conservation status of the species in the

area should be avoided. The mitigation measures proposed would ensure that this was achieved.

- 7.3.13 In the letter of 4 May 2016 NRW (OBJ0268) requested a barn owl mitigation strategy.
- 7.3.14 NRW have subsequently agreed that this can be prepared prior to the commencement of construction. Commitment 121 in the Register of Environmental Commitments (Appendix SR18.1 of the December 2016 ES Supplement (Document 2.4.14)) confirms that further survey will be carried out pre-construction to confirm the status of any potential barn owl nest sites. Subject to the findings of the survey barn owl nest boxes would be provided in trees around the boundaries of the mitigation land at Green Moor (chainage 17900 to 19100) in the same area as the potential barn owl nest but further from the construction area, and also within the SSSI mitigation areas.

SSSI mitigation

- 7.3.15 In the letter of 4 May 2016 NRW (OBJ0268) requested confirmation that the proposed construction methodologies, combined with the Drainage strategy, Reen Mitigation Strategy and SSSI Mitigation Strategy will fully mitigate for the loss of SSSI area and disruption to drainage network on the Gwent Levels SSSIs which would be affected. They requested further detailed discussions on these strategies.
- 7.3.16 A Supplementary File note on the Reen Mitigation Strategy and a revised Drainage Strategy were appended to the September 2016 ES Supplement (Document 2.4.4) as Appendices S2.1 and S2.2 respectively.
- 7.3.17 A meeting was held with NRW on 6 September 2016 to discuss the updated Drainage and Reen Mitigation Strategies and revisions to the SSSI Mitigation Strategy (March 2016 ES (Document 2.3.2) Appendix 10.35). Following this meeting the SSSI Mitigation Strategy was

revised and the revised version was published as Appendix SR10.35 of the December 2016 ES Supplement (Document 2.4.14). A revised Pre-CEMP was published as Appendix SR3.2 of the December 2016 ES Supplement.

Monitoring during construction

- 7.3.18 In the letter of 4 May 2016 NRW (OBJ0268) referred to insufficient detail of monitoring proposals in the pre-CEMP. They stated that it was important that monitoring should trigger timely action where problems were identified.
- 7.3.19 As I have explained in section 6 of this evidence, the Register of Environmental Commitments would be annexed to the CEMP. This includes a number of commitments related to monitoring during construction of the new section of motorway. An updated draft of the register formed Appendix SR18.1 of the December 2016 ES Supplement (Document 2.4.14), and this will continue to be updated during the course of the Public Inquiry. Each of the protected species mitigation strategies for dormouse, bats, great crested newt and water vole includes requirements for monitoring which would also be incorporated into the CEMP.

Welsh Government's statutory duties

- 7.3.20 In the letter of 4 May 2016 NRW (OBJ0268) requested an explanation as to how the project would meet the statutory duty on Welsh Government to maintain and enhance biodiversity, particularly in the context of loss and severance of the Gwent Levels SSSI area and impacts on protected species, including dormouse.
- 7.3.21 The statutory duty under the Environment (Wales) Act 2016 Section 6(1) (Document 3.1.16) is that :

“A public authority must seek to maintain and enhance biodiversity in the exercise of functions in relation to Wales, and in so doing promote

the resilience of ecosystems, so far as consistent with the proper exercise of those functions.”

7.3.22 There is a specific duty regarding SSSIs in Section 28G of the Wildlife and Countryside Act 1981 (Document 3.1.7) which is that an authority to which this section applies has the duty “...*to take reasonable steps, consistent with the proper exercise of the authority’s functions, to further the conservation and enhancement of the flora, fauna or geological or physiographical features by reason of which the site is of special scientific interest.*”

7.3.23 In his Proof of Evidence (WG 1.23.1), Mr John Davies explains in relation to these duties, and to the duty relating to conserving biodiversity under Section 40(1) of the Natural Environment and Rural Communities (NERC) Act 2006 (Document 3.1.13), that in testing options using WelTAG; selecting a route and making highway design choices that would minimise the effect on the SSSIs; and developing a comprehensive SSSI mitigation strategy, the Welsh Government has sought to maintain and enhance biodiversity insofar as that is consistent with the proper exercise of its functions regarding the motorway network.

7.3.24 Specific habitat improvements which would result in ecological enhancement within the overall framework of mitigation measures, would include:

- a) Arable conversion to species diverse grassland using an appropriate grass seed mix.
- b) Enhancing species diversity of existing grassland.
- c) Recutting ditches at Maerdy Farm and Caldicot Moor increasing the amount of ditch habitat.

Planting of native species

- 7.3.25 In the letter of 4 May 2016 NRW (OBJ0268) asked how does the intention to only use native species for planting accord with the Environmental Masterplan?
- 7.3.26 As explained in the March 2016 ES (Document 2.3.2) Chapter 9: Landscape and Visual Effects (para 9.5.3), one of the requirements that guided the development of mitigation measures shown on the Environmental Masterplan (March 2016 ES Figure 2.6) was to use native species of local provenance wherever possible. This carries through the chapter where there are numerous references to establishment of species rich grassland using seed mix of local provenance and use of native trees and shrubs in woodlands and other areas of planting. The landscape provisions of the EMP are described in more detail in the Proof of Evidence of Mr Nick Rowson (WG 1.8.1).

Impact Assessment

- 7.3.27 In the letter of 4 May 2016 NRW (OBJ0268) noted that Table 10.19 of the March 2016 ES (Document 2.3.2) does not include a comprehensive list of the possible impacts upon each VER and how these may differ in the short, medium and long term.
- 7.3.28 A revised version of Table 10.19 addressing NRW's comment was included in the September 2016 ES Supplement (Document 2.4.4) at Appendix S10.8.
- 7.3.29 The Gwent Wildlife Trust (OBJ0270) in their letter of 4 May 2016 referred to significant under-recording of reën and ditch loss. They included an example of a section of the Reën Mitigation Strategy Plans (March 2016 ES Appendix 2.3) (Document 2.3.2) at Bareland Street and indicated a number of ditches not shown as lost on the plan.
- 7.3.30 The plans were reviewed and the following errors identified:

Chainage	Error
7960-7980	Two field ditches not shown
19610-19640	Field ditch marked should be re-en
19700-19800	Field ditches not shown
19800-20200	Field ditch not shown

7.3.31 The Supplementary File note on the Reen Mitigation Strategy at Appendix S2.1 of the September 2016 ES Supplement (Document 2.4.4) corrects these errors and the lengths of reens and ditches which would be infilled or culverted has been re-measured. The changes, which are minor and do not affect the assessment, are set out in Table 2.

Table 2: Loss of Reens and Ditches

	Original	Revised
Reen	2568 m	2755 m
Field Ditch	9136 m	9373 m

Effects on SSSIs

7.3.32 In the letter of 4 May 2016 NRW (OBJ0268) requested clarification of the extent of loss of Gwent Levels SSSIs and a breakdown of the percentages of reens and field ditches lost between the four Gwent Levels SSSIs affected.

7.3.33 A table setting out the losses of key habitats within the four Gwent Levels affected has been provided in Table 4.1: Land Take of the September 2016 ES Supplement (Document 2.4.4). This includes percentage losses of reens and ditches. In their letter of 18 October 2016, NRW welcome the presentation of this information.

7.3.34 In the letter of 4 May 2016 NRW (OBJ0268) referred to March 2016 ES (Document 2.3.2) Appendix 10.30 Aquatic Macrophytes Report and stated that this confirms a high impact to designated sites given

the species present and abundance. They indicated that this was not reflected in Chapter 10 of the March 2016 ES which reports no long-term impacts. NRW referred to the key issue being whether species diversity can be replicated over such a large area of the Gwent Levels, and uncertainty over the quality of replacement reens and ditches. In the letter of 18 October 2016 NRW express concerns regarding the rate of colonisation of the new reens and ditches by vegetation, the uniform design of the replacement reens and ditches and the methods to be employed in infilling the sections of existing watercourses which would be lost, and creation of the replacement reens and ditches.

7.3.35 The March 2016 ES (Document 2.3.2) Appendix 10.30 does not make any reference to impacts. It purely sets out base-line information on the aquatic macrophytes recorded in the reens and ditches surveyed. The ES chapter does reflect the findings of the survey and affords the aquatic macrophytes assemblage High (National) value. The Reen Mitigation Strategy (March 2016 ES Appendix 2.3), together with the Supplementary File Note on the Reen Mitigation Strategy at September 2016 ES Supplement (Document 2.4.4) Appendix 2.1, sets out the measures that would be implemented to replace the watercourses that would be lost as a result of the Scheme.

7.3.36 The assessment of the impacts of habitat loss through land take on the aquatic macrophyte assemblage presented in the March 2016 (Document 2.3.2) ES Chapter 10 Ecology and Nature Conservation takes into account the overall availability of habitat across the Gwent Levels, and the extent of replacement of reens and ditches that is integral to the Scheme and which would be implemented in the early stages of the construction. The magnitude of impact is assessed as Minor Adverse and the significance of effect as Slight or Moderate in the short term. In the medium term the magnitude of impact is assessed as Negligible Adverse and the significance of effect as Slight.

- 7.3.37 Where practicable and subject to NRW approval, plant material from existing reens and ditches which would be lost, and also material arising from NRW dredging of watercourses would be used to encourage colonisation of new reens and ditches by aquatic macrophytes. Taking into account this additional mitigation the magnitude of the impact of the loss of habitat on the aquatic macrophyte assemblage is assessed as Negligible Adverse and the significance of effect as Slight.
- 7.3.38 During construction the magnitude of the impact on the aquatic macrophyte assemblages in the absence of mitigation, other than the pollution control measures which would be implemented as part of the Scheme, and which are described in the Pre-CEMP (December 2016 ES Supplement (Document 2.4.14) Appendix SR3.2), and other measures integral to the Scheme, is assessed as Moderate Adverse and the significance of effects as Moderate or Large. Additional measures would be implemented to ensure that there were no more than short duration changes in reen and ditch water levels during construction through, for example, installation of temporary stop-boards and over-pumping as required. The magnitude of the impact of the construction works on aquatic macrophyte assemblages following the implementation of this additional mitigation is assessed as Minor Adverse and the significance of effects as Slight or Moderate.
- 7.3.39 The magnitude of the operational impact of the new section of motorway on the assemblage of aquatic macrophytes in the absence of mitigation (other than measures included in the Scheme) taking into account habitat severance, changes to reen and field ditch levels, highway drainage, potential pollution events and use of de-icing salt is assessed as Minor Adverse and the significance of effects as Slight or Moderate.
- 7.3.40 Taking into account additional mitigation comprising introduction of plant material from existing reens and field ditches into the new reens

and field ditches, and the measures included in the revised SSSI Mitigation Strategy (Appendix SR10.35 of the December 2016 ES Supplement (Document 2.4.14)), the magnitude of the operational impact of the new section of motorway on the assemblage of aquatic macrophytes is assessed as Negligible Adverse and the significance of effects as Slight.

- 7.3.41 Given that all of the watercourses on the Gwent Levels are artificial and that they are subject to regular dredging, I see no reason why aquatic macrophytes will not colonise the new watercourses, with the introduction of dredgings if necessary. The effects of the Scheme on aquatic macrophytes must also be seen in the context of the proportion of watercourses within the Gwent Levels SSSIs that would be affected. Across the four SSSIs affected by the Scheme, only approximately 2% of all reens and ditches would be affected by the land take for the Scheme. There would be no effects on the Gwent Levels – Rumney and Peterstone SSSI or Magor and Undy SSSI
- 7.3.42 Annex 7 of the revised Buildability Report (Appendix SR3.1 of the December ES Supplement (Document 2.4.14) contains a series of sketches that show the typical construction sequence to be adopted on the Gwent Levels. This was discussed with NRW at a workshop meeting on 28 November 2016.
- 7.3.43 In the letter of 4 May 2016 NRW (OBJ0268) made extensive comments on the SSSI Mitigation Strategy (March 2016 ES (Document 2.3.2) Appendix 10.35).
- 7.3.44 The strategy was revised in the light of these comments and was discussed with NRW at a meeting on 6th September 2016. A revised SSSI Mitigation Strategy was published as Appendix SR10.35 of the December 2016 ES Supplement (Document 2.4.14).
- 7.3.45 In the letter of 4 May 2016 NRW (OBJ0268) requested that full details of statutory designations be provided and advised that SSSI features

should be based on the SSSI Features Sheet not citations or Site Management Statements.

7.3.46 In NRW's response to the EIA Scoping Report (March 2016 ES Appendix 5.1) (Document 2.3.2) they recommended that reference be made to the relevant Site Management Statements (SMS) as there is some variation in qualifying features for each Gwent Levels SSSI. The description of the SSSI features in Chapter 10 Ecology and Nature Conservation of the March 2016 ES followed this advice. NRW subsequently provided the relevant SSSI Features Sheets. These were attached at Appendix S10.2 of the September 2016 ES Supplement (Document 2.4.4) and the important features of those SSSIs that would be crossed by the proposed new section of motorway were summarised in Table 1 of Appendix S10.2 of the September 2016 ES Supplement alongside the features previously referred to in the March 2016 ES Chapter 10 (Document 2.3.2) for comparison.

7.3.47 The key features of the Gwent Levels SSSIs as set out in the March 2016 ES Chapter 10 (Document 2.3.2) were based on the Site Management Statements and citations available at that time. Although there are differences in the lists of key plant and invertebrate species between the individual SSSIs as set out in the SSSI Features Sheets, the key features (comprising reed and ditch habitat, and a range of aquatic and marginal plant species, aquatic invertebrates and shrill carder bee) are essentially the same, and these features form the basis for the assessment of the effects of the Scheme on the SSSIs through the EIA.

Magor Marsh

7.3.48 In their letter of 4 May 2016, Wildlife Trusts Wales (OBJ0260) stated that the SSSIs which would be directly affected include Magor Marsh SSSI.

- 7.3.49 This is not the case. Magor Marsh SSSI is some 700 m to the east of the new section of motorway and would not be directly affected by the Scheme.
- 7.3.50 In their letter of 4 May 2016 the Gwent Wildlife Trust (OBJ0270) stated that Barecroft is part of their Magor Marsh Nature Reserve and that this loss of a section of nature reserve has not been considered in mitigation/compensation proposals. They consider this to be a significant omission reflecting a failure to discuss land take plans with the Trust and that all sections of the ES which refer to nature reserves will need to be corrected.
- 7.3.51 Newport City Council (SUP0192), in their report dated April 2016, referring to the March 2016 ES Table 10.16 (Document 2.3.2), also referred to potential land take within Magor Marsh Nature Reserve which, if affected, should be assessed.
- 7.3.52 As explained in the September 2016 ES Supplement (Document 2.4.4), the information on the extent of Magor Marsh Nature Reserve which formed the basis for the boundary of the reserve shown on the March 2016 ES (Document 2.3.2) Figure 10.3d was obtained from the South East Wales Biological Records Centre (SEWBRC). Plans of the Magor Marsh Nature Reserve are available on the board at the nature reserve and on the Trust's website. Neither the SEWBRC nor the Trust's plan indicated that any land at Barecroft was part of the Magor Marsh Nature Reserve.
- 7.3.53 Regardless of ownership, the effects of the Scheme on the Barecroft Fields SINC were assessed as part of the assessment of the effects on non-statutory designated sites and this identifies that there would be a loss of a small area of land at the north west corner of the SINC (March 2016 ES (Document 2.3.2) paragraph 10.7.33). As I have explained above, the total loss of land from the SINC would be 0.1ha out of a total area of 4.74 ha, or 2.11%. There would also be some disturbance during construction and operation of the new section of

motorway as this would be adjacent to the site. The Barecroft Fields SINC is also part of the Redwick and Llandeenny SSSI and the effects are included in the assessment of effects on SSSIs.

- 7.3.54 Accepting that the Gwent Wildlife Trust considers Barecroft Fields to be part of Magor Marsh Nature Reserve, a receptor of Regional/County (Medium) value, then the magnitude of the impacts on the reserve would be Minor Adverse as a result of land take, and construction and operation of the new section of motorway. These would be effects of Slight Adverse significance and would not be significant in EIA terms.

Sites of Importance for Nature Conservation (SINCs)

- 7.3.55 In their letter of 4 May 2016 the Gwent Wildlife Trust (OBJ0270) stated that a total of nine SINCs would be damaged permanently by the proposed motorway and that the area damaged is not quantified apart from the Solutia SINC.
- 7.3.56 The area of the Solutia SINC was quantified as this would be the SINC where the greatest area of land would be affected. The relevant areas of the other SINCs which would be directly affected are set out in the September 2016 ES Supplement (Document 2.4.4) and in Table 3 below.

Table 3: Loss of SINCs

SINC	Area outside Scheme (ha)	Area inside Scheme (ha)	Total area (ha)	% affected
Afon Ebbw River	16.66	0.60	17.26	0.03%
Marshall's	7.90	2.40	10.30	23.3%
Solutia Site	51.7	12.7	64.40	19.7%
Spencer Works 3	1.14	1.71	2.86	59.8%
Bowkett Field, Barecroft	1.61	0.53	2.13	24.9%
Barecroft Fields	4.64	0.10	4.74	2.11%
Land at Barecroft Common	6.32	0.01	6.34	0.16%
Grange Road	1.53	0.82	2.36	34.8%
Upper Grange Farm Field		0.45	0.45	100.0%

7.3.57 The March 2016 ES (Doc 2.3.2) stated that the Upper Grange Farm Field SINC would be subject to some loss as a result of the construction of the new section of motorway and works to the St Bride's Underbridge. As indicated in the table above, the new section of motorway and associated construction works would remove all of this SINC. This loss of a very small area does not change the overall assessment of the effects of land take on non-statutory designated sites which, as I explain in section 6.3 of this evidence was that the magnitude of the impacts on these sites would be Major Adverse and the significance of effects Moderate or Large in the short term. The magnitude of impacts would be Moderate Adverse and the effects of Moderate significance in the medium and long term. In EIA terms the effects would be significant in the short, medium and long term.

7.3.58 Newport City Council (SUP0192), in their report dated April 2016, stated that the proposed route would have direct impacts on the River Ebbw, Marshalls, Solutia, and Spencer Works 3 SINC's within Newport. They requested confirmation as to the rate of 'provision' for loss of SINC. The Council advised that in their response to the EIA Scoping Report dated 13 October 2015 it was stated that

‘compensation’ should be at a rate of 1:1.5. The Council refers to the March 2016 ES Table 10.2 (Document 2.3.2) which states that this has been addressed and that “*The target is to replace BAP habitats lost at a ratio of 1.5:1, not just those habitats within SINC*s”. The Council sought clarification if this is the case.

7.3.59 The Gwent Wildlife Trust (OBJ0270) (in its letter of 4 May 2016) commented that there is no like for like mitigation for SINC loss and that SINC

s have not been given any clear mitigation/compensation of their own.

7.3.60 By way of clarification I here provide details of the replacement ratios for the various BAP habitats which would be affected by the Scheme. It should be noted that the SINC

s are generally designated on the basis of the BAP habitats present.

7.3.61 Coastal saltmarsh: The total permanent loss of saltmarsh at the Rivers Usk and Ebbw would be 0.94 ha. The area of new saltmarsh on completion would extend to approximately 2 ha. The ratio of replacement habitat to the area permanently lost would thus be approximately 2.1:1 (March 2016 ES (Document 2.3.2) para 10.7.50).

7.3.62 Eutrophic standing waters: The March 2016 ES (Document 2.3.2) para 10.7.55 states that “*A total of 2568 m of reens and 9136 m of field ditches would be infilled or culverted during the construction of the new section of motorway.*” The revised figures in the Supplementary File note on the Reen Mitigation Strategy (September 2016 ES Supplement (Document 2.4.4) Appendix S2.1) are 2,755 m of reens and 9,373 m of ditches. The March 2016 ES para 10.7.56 states that the lost reens and field ditches would be replaced with 2,657 m of reens and 9,771 m of field ditches. The figures in the Supplementary File note on the Reen Mitigation Strategy are 2,826 m of reens and 10,594 m of ditches.

7.3.63 This gives a replacement ratio of loss to replacement for reens of 1:1.06 and for ditches of 1:1.08 (so effectively 1:1). The reason that

the ratio of new to existing is not greater is because NRW were concerned that the original proposals (7,610 m of new reens and 11,800 m of new ditches) could have had adverse effects on the hydrology of the levels.

7.3.64 In addition to the reen mitigation strategy the current proposals for SSSI mitigation (revised SSSI Mitigation Strategy (Appendix SR10.35 of the December 2016 ES Supplement (Document 2.4.14))) include re-cutting of 5,865 m of former ditches at Maerdy Farm and Caldicot Moor. The total length of new ditch which would be provided through the Reen Mitigation Strategy and SSSI Mitigation Strategy would thus be 16,459 m. The ratio of ditch replacement on this basis would be 1:1.76.

7.3.65 Reedbeds: Para 10.7.63 of the March 2016 ES (Document 2.3.2) explains that a total of 6.59 ha of reedbed would be affected during the construction of the new section of motorway of which 3.19 ha would be taken for the permanent works and 3.35 ha would be temporarily used during the construction period and then returned to reedbed. The revised EMP (September 2016 ES Supplement (Document 2.4.4) Figure R2.6) includes 9.9 ha of reedbeds, thus the ratio of lost to replacement reedbeds would be 1:1.5.

7.3.66 Coastal and floodplain grazing marsh: As explained in the March 2016 ES (Document 2.3.2)para 10.7.126, the strategy to mitigate the effects of loss of grazing marsh is described in the SSSI Mitigation Strategy (March 2016 ES Appendix 10.35). This strategy has been revised through discussion with NRW and a revised SSSI Mitigation Strategy (Appendix SR10.35 of the December 2016 ES Supplement (Document 2.4.14)). A total of some 86.4 ha of grazing marsh would be affected as a result of the permanent and temporary land take within the Gwent Levels SSSIs of which some 77.58 ha would be permanently lost and 8.85 ha would be within the temporary construction areas.

7.3.67 In determining the area of land required to provide sufficient mitigation, in addition to physical and ecological characteristics, and the aim of providing some mitigation land to both the west and east of the River Usk, land ownership has also been an important consideration in identifying land which would be suitable for ecological enhancement so as to provide the essential mitigation for the loss of grazing marsh. In the first instance land already owned by Welsh Government has been considered in order to avoid the need to acquire privately owned land. The land at Tatton Farm is owned by the Welsh Government. Consideration was next given to land within agricultural holdings which would be significantly affected by the proposed new section of motorway and where there is the potential for reversion of arable land to grassland. Maerdy Farm was identified as a suitable site where the land is severed by the proposed new section of motorway and comprises arable land. Finally, consideration was given to land close to but outside the existing SSSIs, which is otherwise of similar character and would be capable of ecological enhancement. Caldicot Moor is the only such area identified.

7.3.68 Two types of mitigation have been considered; firstly reversion of arable land to permanent grassland; and secondly, enhancement of the biodiversity value of existing grasslands. The relevant areas are shown on the plans at Figure 2 of the revised SSSI Mitigation Strategy (Appendix SR10.35 of the December 2016 ES Supplement (Document 2.4.14)) and are summarised in Table 4 below.

Table 4: Summary of Mitigation Areas

Mitigation Area	Arable reversion	Grassland enhancement	Protected species mitigation	Total
Tatton Farm	N/A	37.0 ha	3.5 ha	40.5 ha
Maerdy Farm	33.9 ha	N/A	N/A	33.9 ha
Caldicot Moor	12.2 ha	24.0 ha	19.0 ha	55.2 ha
Total	46.1 ha	61.0 ha	22.5 ha	129.6 ha

7.3.69 As I have explained in section 5.3 of this evidence, the requirements for grazing marsh mitigation have been discussed with NRW and it has been agreed that, for arable reversion, a mitigation ratio of 1:1 has been used since the arable land is not considered to contribute in any material way to SSSI purposes. For grassland enhancement, recognising that the land already has biodiversity value, a mitigation ratio of 1.5:1 has been used, so for every hectare of grassland lost, 1.5 ha would be enhanced. The land identified at Tatton Farm, Maerdy Farm and Caldicot Moor is sufficient, based on the ratios agreed with NRW, to satisfy the requirement for mitigation of the loss of grazing marsh.

7.3.70 An area of 19.0 ha at the north of Caldicot Moor is proposed to provide wetland habitat as essential mitigation for the effects on a range of protected species including Cetti's warbler and common crane. An area at the south of Tatton Farm is proposed as essential mitigation for the effects on great crested newt.

7.3.71 Lowland Mixed Deciduous Woodland (including Wet Woodland):
Para 10.7.149 of the March 2016 ES (Document 2.3.2) explains that taking the proposed new section of motorway between the Castleton Interchange and the River Usk, 23.8 ha of plantation woodland would be lost. In the same section of the route 2.60 ha of semi-natural woodland would be lost (total woodland lost - 26.4 ha). Para 10.7.150 of the March 2016 ES (Document 2.3.2) explains that in the section of the route east of the River Usk some 18.8 ha of plantation woodland and 4.55 ha of semi-natural woodland would be lost (total woodland

lost – 23.35 ha). The total loss of woodland across the Scheme would thus be some 49.8 ha.

7.3.72 As I have explained in section 6 of this evidence the new planting shown on the revised EMP (September 2016 ES Supplement (Document 2.4.4) Figure R2.6) comprises 104.4 ha of ‘Woodland’ and ‘Linear Belts of Trees and Shrubs’ similar to those associated with the existing M4. Unlike the existing woodland, there would be extensive new woodland blocks at Berryhill Farm in the west, and east of Rockfield Farm at Undy in the east. The overall ratio of woodland that would be lost to new planting along the full length of the Scheme would be 1:2.1.

7.3.73 Hedgerows: The March 2016 ES (Document 2.3.2) para 10.7.160 explains that the new section of motorway would result in the loss of a total of some 35.8 km of hedgerows of which some 8.2 km are species-rich intact hedgerows. The remaining 27.6 km are species-poor and/or defunct hedgerows. The revised EMP (September 2016 ES Supplement (Document 2.4.4) Figure R2.6) shows some 4.1 km of hedgerow planting.

7.3.74 The March 2016 ES (Document 2.3.2) para 10.7.161 also explains that NRW have indicated that hedgerow planting would not be appropriate within the Gwent Levels SSSIs. This is because hedgerows along the field boundaries can result in overgrowth/shading of the reens and field ditches with adverse effects on aquatic macrophytes and invertebrates which are the important features of the SSSIs.

7.3.75 The March 2016 ES (Document 2.3.2) para 10.7.162 explains that at either end of the new section of motorway, the extensive woodland and other landscape planting proposed at the Castleton and Magor Interchanges means that there would be little opportunity for hedgerow planting in these areas. The woodland and linear planting at Castleton and Magor at either end of the route would provide

habitats of greater biodiversity value and would provide wildlife corridors.

7.3.76 Lowland Meadow: As explained at para 10.7.169 of the March 2016 ES (Document 2.3.2), based on the Phase 1 Habitat Survey mapping, the Scheme would result in the loss of some 7.01 ha of unimproved grassland. The landscape proposals shown on the revised EMP (September 2016 ES Supplement (Document 2.4.4) Figure R2.6) includes some 38.1 ha of species-rich grassland. This is primarily on south facing road embankments and on the banks enclosing the water treatment areas.

7.3.77 Para 10.7.171 of the March 2016 ES (Document 2.3.2) explains that the total loss of all grasslands as a result of the new section of motorway would amount to some 250 ha. Some 86.4 ha of this land is grassland within the Gwent Levels SSSIs and has been classed as grazing marsh. The remaining total grassland loss outside the SSSIs would be some 164 ha, the majority of which is improved or semi-improved grassland of little intrinsic ecological interest. The total area of all grassland (excluding amenity grassland) included in the revised EMP (September 2016 ES Supplement (Document 2.4.4) Figure R2.6) is some 106 ha. As explained earlier in the section relating to coastal grazing marsh, the SSSI mitigation proposals would also result in the conversion of some 46 ha of arable land to grassland and improvement in the biodiversity value of some 61 ha of existing grassland.

7.3.78 Open Mosaic Habitats on Previously Developed Land: The March 2016 ES (Document 2.3.2) para 10.7.204 explains that there are areas of 'brownfield' land at Great Pencarn, south of the Solutia works, in Newport Docks, south of the Tata Steelworks at Llanwern and at Green Moor. Vegetation regenerating on the brownfield land typically comprises a mosaic of grassland and scrub often formed on man-modified substrata, such as concrete rubble at Solutia and

steelworks slag at Tata Steel and Green Moor, and includes a number of locally notable species.

7.3.79 The March 2016 ES (Document 2.3.2) paras 10.7.214 to 217 explains that the brownfield site at Great Pencarn would be almost entirely taken up by the main construction compound for the new section of motorway. In the section of Newport Docks between the River Ebbw and the River Usk, much of the vegetated brownfield land would be taken up by the embankment for the new section of motorway from the River Ebbw eastwards to the start of the viaduct section; the link to Docks Way and its junction with the new section of motorway; and by temporary construction areas south of the embankment and east of the Docks Way link. East of the River Usk there would be losses of areas of vegetated brownfield land adjacent to the saltmarsh on the east bank of the river; either side of the Uskmouth railway line; south of the Solutia works; and an area between the Uskmouth railway line and the River Usk in order to provide construction areas for the viaduct and Usk crossing. The new section of motorway along the south of the Tata Steel land and across Green Moor, and the associated construction areas, would pass through brownfield land including sludge lagoons and their embankments.

7.3.80 The March 2016 ES (Document 2.3.2) para 10.7.218 explains that following completion of the works all temporary construction work sites would be removed and the land affected would be restored. In restoring the construction sites at Great Pencarn, within Newport Docks and at Tata Steel, so far as practicable a mosaic of habitat types providing some of the characteristics of brownfield land would be provided. Such habitats include areas of unvegetated loose bare substrate and pools and early successional communities consisting mainly of stress-tolerant species (e.g. indicative of low nutrient status or drought) which may be composed of annuals, mosses and liverworts, lichens, ruderals, inundation species, and open and flower-

rich grassland. Hibernacula for reptiles, potentially using suitable surplus materials derived from construction would be provided.

- 7.3.81 In their letter of 4 May 2016 the Gwent Wildlife Trust (OBJ0270) stated that the River Ebbw SINC and the wider area of countryside and grazing marsh to the south is acting as a key wildlife corridor linking the River Usk SAC corridor to the Severn Estuary SAC and SPA.

I find it difficult to see from the geography of the area how the River Ebbw and adjoining land can act as a wildlife corridor between the Usk and the Severn Estuary as it is separated from the River Usk by the developed areas of Newport Dock. The River Usk corridor in any event links directly to the Severn Estuary.

Shrill Carder Bee

- 7.3.82 In the letter of 4 May 2016 NRW (OBJ0268) stated that the March 2016 ES (Document 2.3.2) Appendix 10.31 Bumblebee Survey makes no reference to NRW contracted reports for bumblebees on the Gwent Levels.

- 7.3.83 NRW had not previously provided these reports. They were subsequently requested and provided to RPS on 19 May 2016. As explained in the September 2016 ES Supplement (Document 2.4.4), NRW provided the following survey reports:

- a) The Status of the Shrill Carder Bee *Bombus sylvarum* on the Gwent Levels. CCW Contract Science Report No. 623 (Pavett, P. M., 2004) (Document 11.3.33).
- b) The Status and Distribution of the Shrill Carder Bee *Bombus sylvarum* on the Eastern Gwent Levels and within the Caerwent and Caldicot areas of Gwent in 2010. CCW Contract Science No 972 (Smith, M. N., 2011) (Document 11.3.34).
- c) The distribution of the shrill carder bee *Bombus sylvarum* on the Gwent Levels, 1998 to 2010 (Appendix S10.3 of the September 2016 ES Supplement (Document 2.4.4)).

- 7.3.84 As explained in the September 2016 ES Supplement (Document 2.4.4), Howe (Appendix S10.3 of the September 2016 ES Supplement) summarises the findings of Pavett (2004) (Document 11.3.33) and Smith (2011) (Document 11.3.34) and other surveys of the Gwent Levels and adjoining areas for shrill carder bee following the first record in 1998. These surveys have shown that the shrill carder bee is widespread across the Levels, with particularly strong populations on the Newport Wetlands Reserve. Numbers are much reduced towards the eastern end of the Levels (from Magor to Chepstow). The species is mostly associated with the reens, road verges, field margins and sea wall where there are abundant pollen sources.
- 7.3.85 Howe (Appendix S10.3 of the September 2016 ES Supplement (Document 2.4.4)) recommends that the conservation efforts for the shrill carder bee within the Gwent Levels should be focussed on promoting sympathetic management of the reens, road verges, field margins and sea wall. This management should ensure an abundant supply of forage plants such as common knapweed *Centaurea nigra*, creeping thistle *Cirsium arvense*, narrow-leaved everlasting-pea *Lathyrus sylvestris*, common bird's-foot trefoil *Lotus corniculatus*, red clover *Trifolium pratense*, and tufted vetch *Vicia cracca* from April to September. Attempts should also be made to restore species-rich swards to the many agriculturally-improved pastures on the Levels, initially in areas supporting strong populations of the bee.
- 7.3.86 The March 2016 ES (Document 2.3.2) explains at paras 10.7.129 to 10.7.133 that loss of habitat for shrill carder bee would arise from the loss of the vegetation bordering reens and ditches, and the loss of vegetated brownfield land at Great Pencarn, land within Newport Docks and the Tata Steel site. Mitigation for the loss of reens and ditches is described in the Reen Mitigation Strategy (March 2016 ES Appendix 2.3 and subsequently in the Supplementary File Note on the

Reen Mitigation Strategy at Appendix S2.1 of the September 2016 ES Supplement (Document 2.4.4).

- 7.3.87 The revised EMP (September 2016 ES Supplement (Document 2.4.4) Figure R2.6) shows that the south facing embankments and cuttings of the new section of motorway would include areas to be sown to species-rich grassland. Extensive areas of species-rich grassland would be established on south facing cutting slopes at the Castleton Interchange in the west of the route, on the embankments of the new section of motorway across the Gwent Levels, and on the embankments of water treatment areas. In all, some 38.1 ha of species rich grassland would be established as part of the landscape proposals included in the Scheme. The seed mix for this grassland would take into account the specific needs of shrill carder bee and would include a range of food plants used by the species such as common knapweed, scabious, red clover, bird's-foot trefoil, meadow vetchling and vetches.
- 7.3.88 The additional mitigation which would be provided by the SSSI Mitigation Strategy (revised SSSI Mitigation Strategy (Appendix SR10.35 of the December 2016 ES Supplement (Document 2.4.14)) would also include measures to improve the species diversity of existing grasslands, to create new species-rich grassland on areas which are currently arable land, to enhance the biodiversity of existing ditch banks, and to create new ditches with associated bank vegetation, all of which would be of benefit to shrill carder bee.
- 7.3.89 Additional mitigation as part of construction would comprise restoring the construction sites at Great Pencarn, within Newport Docks, and at Tata Steel, so far as practicable, to provide a mosaic of habitats including areas with food plant species of value to shrill carder bee.

Other matters

- 7.3.90 In the letter of 4 May 2016 NRW (OBJ0268) stated that SIAA Appendices A1 and A2 were missing.

- 7.3.91 We have checked the website version of the SIAA report and both Appendices are there.
- 7.3.92 In the letter of 4 May 2016 NRW (OBJ0268) stated that Tan 5 Nature Conservation and Planning should be referred to in Chapter 6 Legislative and Policy Context of the ES.
- 7.3.93 Tan 5 is referred to at paras 10.2.19 and 10.3.1 of the March 2016 ES (Document 2.3.2).
- 7.3.94 Newport City Council (SUP0192), in a report dated April 2016, stated that they were unable to locate March 2016 ES (Document 2.3.2) Confidential Appendices 10.37 and 10.38. These are the reports of the 2014 and 2015 badger surveys and since they contain sensitive information relating to the locations of badger setts are treated as confidential.

7.4 Incorrect or inadequate assessment

Statutory designated sites

- 7.4.1 RSPB (OBJ0245) in a letter dated 4 May 2016 stated that the harm to sites of national, European and international importance is greater than predicted. They state that there would be a range of direct and indirect effects on parts of the Gwent Levels SSSIs and the important features, including permanent destruction, temporary loss, severance and fragmentation, impacts on water quality and quantity, and impacts on drainage.
- 7.4.2 All of these matters are addressed in the March 2016 Environmental Statement (Document 2.3.2) and in so far as there is the potential for effects on European Sites, in the Statement to inform an Appropriate Assessment (SIAA) (Document 2.3.4). I have summarised the key findings in this evidence. I consider that the assessment of effects on these designated sites has been carried out in a robust and thorough manner and does not understate the magnitude of impacts or significance of effects.

Mitigation measures

- 7.4.3 RSPB (OBJ0245) in the letter dated 4 May 2016 asserted that the March 2016 ES (Document 2.3.2) fails to treat the proposed “mitigation” measures in the appropriate way and underestimates the residual impacts, and that there was a flawed approach to the avoid-mitigate-compensate-hierarchy.
- 7.4.4 Newport City Council (SUP0192), in their report dated April 2016 also requested clarification as to what is deemed to be mitigation and compensation.
- 7.4.5 The hierarchical system for seeking to avoid, reduce and if necessary offset the potential impacts is set out in para 10.5.2 of the March 2016 ES (Document 2.3.2). Mr Peter Ireland describes this in his Proof of Evidence (WG 1.7.1).
- 7.4.6 In my opinion, all of these measures should be considered to constitute the mitigation measures for the Scheme. In the March 2016 ES paragraphs 10.5.10 – 10.5.13 the various mitigation measures proposed are classified according to this hierarchy. However, as explained in section 10.5.3, some measures are considered to be integral to the Scheme and are therefore assumed to be in place as intrinsic elements of the Scheme. These include mitigation measures falling under the headings of avoidance, reduction and offsetting. The assessment is first carried out with these mitigation measures in place. Other measures are not integral to the Scheme and are considered to be additional mitigation (and which again include both measures to reduce and offset the effects). The Scheme is then again assessed with these measures in place. The approach thus provides first an assessment of the Scheme with the integral mitigation in place and then an assessment with the additional mitigation. It should be noted that the CIEEM Guidelines for Ecological Impact Assessment in the UK and Ireland (Document 11.2.32) state at paragraph 6.23 that:

“It is helpful to set out how a project has evolved in response to ecological considerations and to indicate how mitigation that has been incorporated into the Scheme design has avoided or minimised adverse impacts. Presenting the results of the assessment ‘with’ and ‘without’ mitigation allows the need for mitigation and/or compensation to be clearly identified. Where mitigation is fully integrated into the Scheme and there is high confidence that it will be implemented, it may be appropriate simply to assess the significance of effects of the mitigated project, with this assessment reflecting the likelihood of the incorporated measures being successful. Where there is any uncertainty, then the with/without mitigation approach to assessment described above should be used to ensure transparency.”

- 7.4.7 I acknowledge that there are alternative approaches, but I consider that this approach based on differentiating between embedded and additional mitigation is valid and accords with guidance. There would be mechanisms in place to ensure delivery of mitigation through the Register of Environmental Commitments (updated as December 2016 ES Supplement (Document 2.4.14) Appendix SR18.1) and the conditions which would be attached to any protected species licences.

SSSI condition

- 7.4.8 RSPB (OBJ0245) in the letter dated 4 May 2016 stated that two of the three SSSI mitigation areas are located within SSSIs that appear to be in unfavourable condition for their reed and ditch features. There is thus an obligation on NRW to work with owners and occupiers to secure restoration. They also state that the ES provides no information on the baseline condition of the various SSSIs and their interest features and fails to acknowledge the apparent unfavourable condition of the various Gwent Levels SSSIs.
- 7.4.9 As explained in the September 2016 ES Supplement (Document 2.4.4), NRW have advised that condition assessments for the Gwent

Levels SSSIs are still being finalised on the basis of their own survey information collected over the last few years. However, they have advised that preliminary draft analysis indicates that most features are likely to be classified as 'unfavourable'. The main causes of unfavourable condition are the combination of a lack of in-channel submerged vegetation, an over-dominance of terrestrial vegetation and the lack of bare ground/poaching across the SSSIs.

- 7.4.10 As the data form a baseline survey, NRW are not able at this stage to assess whether the features should be classified as 'Unfavourable Declining' or 'Unfavourable Improving'.
- 7.4.11 Extensive ecological surveys have been carried out for the Scheme over the period since 2014 and some are continuing. These have established the baseline conditions for the Scheme regardless of any condition assessment of the wider SSSIs.
- 7.4.12 Regardless of the current condition and responsibilities, a number of the measures which are proposed within the SSSIs as part of the Scheme, in particular arable reversion at Maerdy Farm, recutting of former ditches at Maerdy Farm, and improvements to the diversity of grasslands at Tatton Farm would be unlikely to take place in the absence of the Scheme. Maerdy Farm is an arable farm in private ownership and any such radical change in farming practice is unlikely. Tatton Farm is owned by Welsh Government. In accordance with the Welsh Government's duties under section 28G of the Wildlife and Countryside Act, there is an intention to carry out works to improve the field ditches within the farm as these support the aquatic vegetation and invertebrate communities which are the main features of the SSSI. The grasslands at Tatton Farm are typical of the Gwent Levels SSSIs and it is unlikely that changes in grassland management could be justified in the absence of the Scheme.

European eel

- 7.4.13 RSPB (OBJ0245) in the letter dated 4 May 2016 stated that eels are a listed feature of the Severn Estuary Ramsar Site. RSPB do not agree with the assessment of potential effects on eel as being slight or moderate at all timescales (March 2016 ES (Document 2.3.2) paragraph 10.7.109). They consider it is not possible to conclude that there would be no adverse effect on the integrity of the Severn Estuary Ramsar site in respect of the eels feature.
- 7.4.14 As stated in the SIAA (Document 2.3.4) report at paragraph 5.5.4 European eel is listed as a feature of the Severn Estuary Ramsar site, and is known to migrate through the Severn Estuary to the River Ebbw and River Usk, and is also known to occur throughout the Gwent Levels. The Screening Assessment identified the following likely significant effects on eel:
- a) Land take leading to habitat loss/fragmentation of European eel habitat across the Gwent Levels, outside of the Ramsar site (construction and operation).
 - b) Physical presence of the M4CaN may represent a barrier to the movement of European eels across the Gwent Levels (operation).
 - c) Release of pollutants into water courses leading to water quality changes and potential physiological/behavioural/barrier effects during migration through the River Ebbw and River Usk and across the Gwent Levels (construction and operation).
 - d) Noise and vibration leading to disturbance/barrier effects during migration through the River Ebbw and River Usk and across the Gwent Levels (construction); and
 - e) Lighting for the M4CaN causing behavioural/barrier effect on migration through the River Ebbw and River Usk and across the Gwent Levels (construction and operation).

- 7.4.15 No site-specific surveys were undertaken for migratory fish, and therefore the baseline was based on desk study information. This was considered to be appropriate due to the availability of information and data on fish migration (particularly timing of migrations) from a range of sources around the Severn Estuary and River Usk, including long term monitoring at the Hinkley Power Station and the information presented within Severn Tidal Power reports.
- 7.4.16 Potential effects on the relevant conservation objectives of the Severn Estuary Ramsar Site are discussed in turn in the SIAA report (Document 2.3.4). Significant adverse effects (including barrier effects) on the qualifying migratory fish species of the Severn Estuary Ramsar site (including eel) are not predicted to occur as a result of the M4CaN Scheme during construction or operation.

Saltmarsh

- 7.4.17 RSPB (OBJ0245) in the letter dated 4 May 2016 stated that the permanent loss of 0.2 ha of saltmarsh within the SAC/SSSI should be formally acknowledged.
- 7.4.18 As stated at para 10.7.3 of the March 2016 ES (Document 2.3.2) relating to effects on the River Usk SAC, the land take during construction of the east pylon of the River Usk Crossing would result in loss of a total area of 0.69 ha of saltmarsh vegetation. Following construction, much of the affected area would return to saltmarsh and the permanent land take would be 0.20 ha. The loss of this area of saltmarsh within the SSSI is set out in para 10.7.11 of the March 2016 ES.
- 7.4.19 The mitigation included in the Scheme for this loss of saltmarsh is for the creation of new saltmarsh in an area to be used for construction of the River Usk Crossing, once the construction works are complete. Once the site had been finished to the correct levels, it would be allowed to revegetate naturally. This could take up to 10 years. The area of new saltmarsh on completion would extend to approximately 2

ha. The ratio of replacement habitat to the area permanently and temporarily lost within the designated site would thus be approximately 3:1. Considering only the area which would be permanently lost, the ratio of new saltmarsh to that lost within the designated site would be 10:1.

7.4.20 The loss of 0.2 ha of saltmarsh within the River Usk SAC/SSSI is thus fully acknowledged in the March 2016 ES (Document 2.3.2) and appropriate mitigation provided.

7.4.21 In their letter of 4 May 2016 the Gwent Wildlife Trust (OBJ0270) stated that the March 2016 ES (Document 2.3.2) implies that the River Usk saltmarsh and other bank habitats are less important than the wetted channel as they have not been avoided. They also state that the loss of saltmarsh habitat will damage the integrity of the River Usk SAC.

7.4.22 Whilst the saltmarsh adjacent to the east bank of the River Usk is within the boundary of the River Usk SAC, it is the case that saltmarsh and other bank habitats are not features for which the River Usk SAC is designated. The populations of migratory fish which are a feature of the SAC designation are found in the river channel, and since the entire River Usk populations of those fish must pass through the section of river which the bridge would cross in order to breed, the bridge has been designed to avoid any structures or construction works within the river to avoid effects on those fish, the populations of which are considered to be of international importance. Whilst it is the case that otter (also a feature of the SAC designation) will move through the area of the proposed bridge both in the river channel and also on land, there is no evidence that the land in the vicinity of the bridge is of particular value to otter. For the purposes of assessment the River Usk itself, the mudflats and the saltmarsh in the area of the proposed crossing (which are features of the River Usk (Lower Usk) SSSI), together with otter, are considered to be of national importance.

7.4.23 As set out in HD44/09 Assessment of Implications (of Highways and/or Road Projects) on European Sites (including Appropriate Assessment) (Highways Agency, 2009) (included in Document 6.1.8) integrity of a European Site is defined as the coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was classified. As explained in para 10.4.5 of the March 2016 ES (Document 2.3.2) the habitats and species for which the River Usk SAC is designated are:

- a) Running water supporting *Ranunculion* vegetation.
- b) Otter.
- c) Fish species.
- d) A group of rare craneflies.

7.4.24 Saltmarsh is not one of the features for designation of the site and thus the effects on saltmarsh do not constitute an effect on the integrity of the SAC. The effects on saltmarsh as a component of the River Usk (Lower Usk) SSSI and as a UKBAP/Section 42 list habitat have been assessed. In so far as the location and construction of the east pylon of the River Usk Crossing on the saltmarsh may affect otter as a feature of the SAC this is addressed in detail in the SIAA (Document 2.3.4). The SIAA concluded that mitigation measures would prevent any significant adverse effect on the long term viability of the otter population of the SAC.

7.4.25 In their letter of 4 May 2016 the Gwent Wildlife Trust (OBJ0270) stated that the wrong terminology has been used for the saltmarsh 'mitigation'. Mitigation applies to minimising damage in situ. The created saltmarsh would therefore be compensation.

7.4.26 As explained in the March 2016 ES para 10.5.2 (Document 2.3.2), the mitigation proposals for the Scheme include measures to avoid, reduce or remediate/offset the effects. Replacement of saltmarsh is

included in the measures to offset the effects which are integral to the Scheme (March 2016 ES para 10.5.12).

Effects on SSSIs

- 7.4.27 In their letter of 4 May 2016 the Gwent Wildlife Trust (OBJ0270) stated that a number of areas of SSSI land are affected to the north of the motorway and that no quantification of these areas is provided.
- 7.4.28 As with the land south of the motorway, all of these areas are included in the measurement of the land take for the Scheme. The water treatment areas are included in the permanent land take and the construction compounds in the temporary land take.
- 7.4.29 In their letter of 4 May 2016 the Gwent Wildlife Trust (OBJ0270) referred to the March 2016 ES (Document 2.3.2) para 10.7.13 which indicates that 105 ha of SSSI would be permanently lost and a further 20 ha would be damaged during construction. They state that it is highly likely that these additional 20 ha would no longer qualify as SSSI, making a total of 125 hectares of SSSI lost. The letter states that the Trust undertook a quick assessment of loss and came to a significantly higher figure of 146 ha in total. They request that the figure be rechecked and a clear list of exactly which structural elements of the road Scheme are included, for example overbridge / underbridge cuttings and embankments or water treatment areas.
- 7.4.30 The figures referred to in the March 2016 ES (Document 2.3.2) para 10.7.13 are, as stated, the land take within the Gwent Levels SSSIs (the figures are rounded and are more accurately 104.99 ha permanently lost and 19.99 ha for construction use giving a total of 124.98 ha). The land take within the River Usk (Lower Usk) SSSI is set out in the preceding paragraph (March 2016 ES para 10.7.11) and is 0.20 ha permanently lost and a further 0.49 ha temporarily affected. Adding these figures to the total for the Gwent Levels SSSIs, the total SSSI loss is 105.19 ha permanently lost and 20.48 ha temporarily affected.

- 7.4.31 The figures include the entire land take for the Scheme including cuttings, embankments, water treatment areas, land for landscape mitigation planting and temporary construction areas.
- 7.4.32 With respect to whether the temporary construction land would qualify as SSSI once restored, it should be noted that the SSSIs include a wide range of habitat types including arable land, temporary grass leys, improved and semi-improved grassland, as well as some unimproved grassland. The temporary land take for the Scheme would affect the full range of habitats. It is perfectly reasonable to assume that the restored land would still be suitable for inclusion in the SSSI.

Operational effects

- 7.4.33 In their letter of 4 May 2016 the Gwent Wildlife Trust (OBJ0270) stated that there is overwhelming peer-reviewed scientific evidence exists that the proximity of traffic to habitats has a deleterious effect on wildlife. Many wildlife species are less common or absent near roads and these road-avoidance zones can extend to more than 1,000 m effectively resulting in the loss of a population. The documents should not discount noise as impacting on sites and species.
- 7.4.34 The March 2016 ES (Document 2.3.2) does not discount the effects of noise on species. There are detailed considerations of the potential effects of noise on the species considered to be most sensitive. Thus there are detailed considerations of the potential effects of construction noise on migratory, estuarine and freshwater fish, breeding birds and wintering birds. Similarly for operational noise from the road there is detailed consideration of the potential effects on breeding and wintering birds.
- 7.4.35 There can be no effects of noise on sites per se, only on the species using the site.

- 7.4.36 In their letter of 4 May 2016 the Gwent Wildlife Trust (OBJ0270) referred to Table 17.10 of the March 2016 ES (Document 2.3.2) and states that this does not take into account increased human physical presence and activities close to the highway, increase in litter and other debris, risk of pollution, injury and entrapment to wildlife in water treatment areas, or of getting trapped inside the mammal fencing have not been considered.
- 7.4.37 I find it difficult to see why the presence of the motorway would result in an increase in human presence and activity outside the corridor of the road itself. The only activities that would be required in these areas would be periodic management of the new reens and ditches, and the water treatment areas, which would be similar to the management of the existing reens and ditches already undertaken. Similarly there is no reason why the use of the road would give rise to a significant increase in litter and debris outside the corridor of the road. There is detailed consideration of the potential for changes in air quality in Chapter 7 of the March 2016 ES (Document 2.3.2), and water quality in Chapter 16. Wildlife would be allowed free access to the water treatment areas so there is no risk of entrapment. There is a risk that wildlife may find a way through the mammal fencing along the road and become trapped. This is hazardous both to the animal and to road users. It is thus important that the wildlife fences are maintained as for any major road. The main risk along the new section of motorway would be for badgers and otters. Unlike some other major roads, there is no evidence of large numbers of deer in the area which can be a particular risk.

Cumulative impacts

- 7.4.38 In their letter of 4 May 2016 the Gwent Wildlife Trust (OBJ0270) stated that referring to zones of influence for the assessment of cumulative effects relating to severance, fragmentation and barrier impacts being receptor specific avoids stating what the zones of influence will be, and to inadequate detail in the cumulative impact

assessment set out in March 2016 ES (Document 2.3.2) Tables 17.11 and 17.12.

- 7.4.39 The zone of influence for the purpose of cumulative impacts assessment varies with the ecological receptor and the nature of the impact. For example, for land take impacts all the ecological features within the boundary of a site would be subject to cumulative impacts with other projects affecting the same resources. For most purposes the zone of influence would extend to a few hundred metres. For more mobile species, for example birds and bats, and wide ranging species such as otter, and those likely to be affected by construction and operational noise, the effects of which will extend beyond the site boundary, wider zones of influence are appropriate and would extend to a few kilometres from the site.
- 7.4.40 The level of detail provided in March 2016 ES (Document 2.3.2) Tables 17.11 and 17.12 is appropriate to a cumulative impact assessment and follows Planning Inspectorate guidance (Document 18.1.2). The cumulative impact assessment is not intended to provide a detailed assessment of likely cumulative impacts, but to identify where there are potential issues.
- 7.4.41 In their letter of 4 May 2016 the Gwent Wildlife Trust (OBJ0270) referred to the Statement to inform an appropriate assessment under the Habitats and Species Regulations 2010 (Document 2.3.4) and state that this gives inadequate consideration to cumulative impacts along the full length of the River Usk within Newport.
- 7.4.42 In so far as the River Usk SAC is concerned the Scheme would have no effect on the integrity of the site. Even if there are other developments elsewhere that do impact on the Usk the cumulative effect of those and the Scheme would be the same as without the Scheme, so no purpose would be served by more detailed consideration.

7.5 Additional recommendations

Piling

7.5.1 In their letter of 4 May 2016 NRW (OBJ0268) stated that any piling within 30 m of the River Usk and River Ebbw during the shad migration period (April –June inclusive) should only be undertaken on the falling tide (from high tide plus one hour to low tide minus one hour), and that vibro-piling in the vicinity of the River Usk and River Ebbw should be soft start so that fish can adapt to the initial noise.

7.5.2 Commitment No. 63 in the Register of Environmental Commitments Update (December 2016 ES Supplement (Document 2.4.14) Appendix SR18.1) states that:

“Subject to further discussion piling to install the cofferdam and pylon piles for the east pylon of the River Usk Crossing would be scheduled to avoid the period of highest sensitivity for underwater noise related impacts on migratory fish in the River Usk (March to June inclusive). Piling activities would not take place one hour either side of high water.”

7.5.3 As stated in the commitment, the timing of the piling works in relation to the state of the tide is still under discussion with NRW. NRW have since confirmed that the period of highest sensitivity is April to June. As part of the further consultation with NRW the matter of soft start for vibro-piling would be considered.

Aftercare

7.5.4 In their letter of 4 May 2016, NRW (OBJ0268) stated that the initial aftercare of replacement reens and ditches and also the landscape aftercare period should be extended from five to ten years.

7.5.5 Commitment No. 161 in the Register of Environmental Commitments update (December 2016 ES Supplement (Document 2.4.4) Appendix SR18.1) states that:

“The aftercare period for the first 5 years (Month of opening + 5yrs) would be the responsibility of the contractor and is covered by the Environmental, Landscape and Ecology Aftercare Plan (ELEAP). Thereafter responsibility for the ongoing long term maintenance would shift to Welsh Government’s highway maintenance contractor (currently SWTRA). The Handover Environmental Management Plan (HEMP) would set out the proposed strategy for the future maintenance and management of the environmental mitigation measures for the following 10 year period (Month of opening + 15yrs). NRW would be consulted on both the ELEAP and the HEMP.”

Pre-CEMP

- 7.5.6 In their letter of 4 May 2016 NRW (OBJ0268) stated that tree and hedgerow protection should be included in the CEMP.
- 7.5.7 There are references in the pre-CEMP (December 2016 ES Supplement (Document 2.4.14) Appendix SR3.2) to retention of existing vegetation where possible, avoidance of damage to hedgerows and veteran trees, protection of trees and scrub of value to dormice and avoidance of the root or crown spread of trees when positioning soil stockpiles.
- 7.5.8 In their letter of 4 May 2016, NRW (OBJ0268) stated that the section on Disease in Annex D-Invasive Species of the pre-CEMP (March 2016 ES (Document 2.3.2) Appendix 3.2) should be included in Annex C-Biosecurity Safe Systems of Work.
- 7.5.9 In the revised pre-CEMP at Appendix SR3.2 of the December 2016 ES Supplement (Document 2.4.14) a reference to the section on disease in Annex D has been added to Annex C.

Severed land

- 7.5.10 In their letter of 4 May 2016, NRW (OBJ0268) referred to further opportunities for areas of wet grassland and other habitats in areas cut off by the road and which would thus be difficult to manage as part

of farm holdings. They also stated that the SSSI mitigation requirement must include land severed and rendered uneconomical to farm.

7.5.11 Where corners of fields would be cut off by the new section of motorway, these would be retained as wet grassland as shown on the revised Environmental Master Plan (September 2016 ES Supplement (Document 2.4.4) Figure R2.6). Although they would remain as grassland, recognising that they would be difficult to manage, they are included in the draft Orders and in the figures for grazing marsh loss and are taken into account in the calculation of areas required for mitigation.

7.5.12 All such areas of cut off field corners and other difficult to manage areas are included in the draft Orders

Habitat mitigation

7.5.13 In their letter of 4 May 2016, NRW (OBJ0268) requested the provision of further areas of species-rich grassland along the road embankment though the Gwent Levels.

7.5.14 The revised Environmental Master Plan (September 2016 ES Supplement (Document 2.4.4) Figure R2.6) includes additional areas of species rich grassland, particularly along the south facing embankment of the new section of motorway across the Gwent Levels. As I explained in section 5 of this evidence, the area of such grassland has increased from 26.1 ha in the March 2016 version of the Environmental Master Plan to 38.1 ha in the September 2016 revised version.

7.5.15 In their letter of 4 May 2016, NRW (OBJ0268) requested that open areas be included within the areas of woodland at Berryhill Farm and east of Undy.

- 7.5.16 Clearings and rides are integral components of woodland habitat and increase woodland biodiversity and would be included in the detailed designs of these areas.
- 7.5.17 In their letter of 4 May 2016, NRW (OBJ0268) stated that whilst it is important for the M4CaN Scheme to keep abreast of the Living Levels Project, this project cannot be used to seek to provide mitigation for, or offset damage caused by the Scheme.
- 7.5.18 The mitigation measures proposed for the Scheme are independent of any proposals which may emerge through the Living Levels Project.
- 7.5.19 In their letter of 4 May 2016, NRW (OBJ0268) recommended natural regeneration as opposed to the use of seed mixes on the Gwent Levels.
- 7.5.20 Whilst natural regeneration may be appropriate where relatively small areas are disturbed, for extensive areas, such as the new road embankments and areas of arable reversion in the SSSI mitigation areas, seeding will be required to ensure quick establishment, not least to stabilise the soil surface to avoid erosion under heavy rainfall.
- 7.5.21 In their letter of 4 May 2016, NRW (OBJ0268) stated that water treatment area reedbeds should not be counted as mitigation for habitat loss as their purpose is to treat road run-off.
- 7.5.22 It should be noted that the main loss of reedbeds as a result of the Scheme would be from the Tata Steel water treatment lagoons. These are used to treat water which is more polluted than that which the Water Treatment Areas within the Scheme will receive. It is therefore entirely reasonable for the Scheme Water Treatment Areas to be considered in the calculation of areas for mitigation for loss of reedbed.

Method Statements

- 7.5.23 In their letter of 4 May 2016, NRW (OBJ0268) stated that a reptile method statement was required.
- 7.5.24 In subsequent discussions, NRW have stated that they will be satisfied provided this is prepared prior to the start of construction. Commitment 127 in the Register of Environmental Commitments (Appendix SR18.1 of the December 2016 ES Supplement (Document 2.4.14)) states that:
- “Prior to commencement of construction in areas where common lizard and slow worm populations have been identified, reptile fencing would be installed and reptiles would be captured and transferred to suitable habitat on the margin of the Scheme, or to suitable habitat within the SSSI mitigation areas (Appendix 10.35) or elsewhere by agreement. The detailed method statement for the capture and translocation would be agreed with NRW in advance.”*
- 7.5.25 In their letter of 4 May 2016, NRW (OBJ0268) stated that ‘Ghost Licences’ for European Protected Species and water vole must be submitted prior to determination.
- 7.5.26 Mitigation strategies for these species have been discussed with NRW and drafts have been published as Appendices SS10.4 to SS10.7 of the December 2016 ES Supplement (Document 2.4.14). It is intended that these mitigation strategies would form the basis for method statements to support applications for European Protected Species Licences in due course.

7.6 Inadequate or uncertain mitigation and monitoring**Watercourses**

- 7.6.1 In their letter of 4 May 2016, RSPB (OBJ0245) expressed concerns regarding the effectiveness of mitigation and compensation measures. In particular they considered that measures to manage existing SSSI watercourses should properly be considered

compensation and only come into play once the SSSI features have been restored to favourable condition; and that the successful creation of new reens and ditches is questionable.

- 7.6.2 The Scheme proposals do not include any changes to management of existing SSSI watercourses. The creation of new reens and ditches is essential to ensure the continuation of effective water management in the Levels. The intention in creating the new reens and ditches is to replicate the general form of the existing reens and ditches with the addition of a berm providing additional marginal habitat in the reens. Opportunities would be taken to vary the profile and width of the features during construction and this was discussed further with NRW in a meeting on 6th September 2016. It should be recognised that all of the new reens and ditches would be connected to existing watercourses, and that these existing reens and ditches are themselves artificial water courses which have been excavated in the past, and in the case of the reens are subject to a programme of regular clearing out as part of the NRW management regime. I see no reason why the new features would not become established and colonised by vegetation and fauna of the neighbouring connecting watercourses within a few years at most, potentially facilitated with introduction of dredged material from suitable nearby watercourses.
- 7.6.3 In their letter of 4 May 2016 the Gwent Wildlife Trust (OBJ0270) referred to the March 2016 ES Appendix 2.3 Reen Mitigation Strategy (Document 2.3.2) and stated that the ratio of lost to replacement reen is considered inadequate and that it should be 1:2.
- 7.6.4 The locations and lengths of the replacement reens were discussed and agreed with NRW. A significantly longer length of replacement reens was originally proposed but as I have explained earlier in this section, NRW were concerned that this could have adverse effects on the hydrology of the levels.

- 7.6.5 In their letter of 4 May 2016 the Gwent Wildlife Trust (OBJ0270) stated that the new reens and ditches won't colonise effectively. They referred to some specific concerns which they considered were constraints on effective establishment of biodiversity in the new reens which I address in turn. Buglife (OBJ0267) also expressed concern over connectivity of the aquatic system in their letter of 4 May 2016.
- 7.6.6 *"New reens and ditches won't colonise effectively."* Mitigation described in the March 2016 ES chapter 10 (Document 2.3.2) has been designed to aid recolonisation, for example by the maintenance of all existing reen connections across the line of the new section of motorway, including temporary connection during construction and the translocation of aquatic plant material and sediment from existing to new reens/ditches. Many of the existing ditches do not hold water all year round, and therefore are inhabited by a community of aquatic invertebrates that is tolerant of fluctuating water levels and occasional drying, and therefore is able to recolonise such areas naturally.
- 7.6.7 *"Tilting sluices restrict movement of wildlife"*. Sluices are an integral component of the existing reen system controlling water levels in line with summer and winter penning levels. Tilting sluices are NRW's preferred method of water level control and are already installed at many locations in the levels. Eel passes would be provided on all new sluices. Aquatic invertebrates generally are well able to colonise newly created habitats. Many species of interest within the reen network are very mobile with the ability to disperse by flight in the case of water beetles, and the adult life stages of Odonata and other winged insects.
- 7.6.8 *"No consideration to replicating the diversity of lost reens e.g. orientation, proximity to areas of good habitat, nature of the ground (peat, clay, slope, flow rate etc)."* Replacement reens and ditches would be cut in close proximity to the locations where the existing features would be lost and so are likely to be in similar ground and would be connected to the retained reens and ditches in the same

area. It would not be possible to replicate the orientation of the existing features. During construction, measures would be implemented to vary the profile and width of the channels, and this was discussed with NRW at a meeting on 6th September 2016.

- 7.6.9 *“Connectivity across the carriageway will be very limited with culverts rather than bridges in most cases.”* It is accepted that culverts would restrict the growth of aquatic macrophytes within the enclosed section of the watercourse. However fish and aquatic invertebrates would be able to move through them.
- 7.6.10 *“Many drainage structures will be physical barriers to wildlife, e.g concrete headwalls, grass lined ditch in box culvert, carrier pipe, concrete channel.”* Whilst there would be drainage structures associated with the highway drainage system, these would not affect the connectivity of the reën and ditch system of the levels which would be separate from the highway drainage, other than at the points of discharge from the Water Treatment Areas. Although the highway drainage would not be specifically designed to provide additional aquatic habitat it is the case that the Water Treatment Area ponds and reedbeds would be habitats for wildlife.
- 7.6.11 *“Transfer of dredgings from existing ditch to new ditch will not replicate the biodiversity of the lost habitat.”* The transfer of dredgings would form part of a strategy to facilitate natural recolonisation with both aquatic plants and animals. Transfer of dredgings would speed up the establishment of newly created watercourses and contribute to the translocation of benthic flora and fauna.
- 7.6.12 *“Risk of transfer of invasive plant species between watercourses.”* The presence and locations of invasive species has been identified through macrophyte surveys. Any translocation of dredgings etc. would be informed by details of the known presence of invasive species, and further survey prior to any translocation, and where

practicable would be accompanied by an invasive species eradication regime.

- 7.6.13 *“Reen/ditch replacement is compensation not mitigation.”* As stated in the March 2016 ES (Document 2.3.2) at para 10.5.12, as I have explained in section 5 of this evidence, the reen/ditch replacement is considered to be offsetting and is part of the mitigation integral to the Scheme.

SSSI Mitigation

- 7.6.14 In their letter of 4 May 2016 the Gwent Wildlife Trust (OBJ0270) stated that mitigation should be provided on a large site *“..... in a strategically valuable location adjacent to significant existing wildlife corridors which cater for a wide range of species likely to be impacted by the Scheme , especially those at risk from disturbance, lighting and noise. The area would need to include land away from major ecological barriers (the proposed M4 included) providing a safe area for wildlife.”*
- 7.6.15 The Scheme includes specific measures to mitigate for the effects on key species. A single mitigation area would not be suitable for all species. The requirements of the species associated with the higher land at the east and west of the Scheme, e.g. dormouse and badger, are very different from the largely wetland species found in the Gwent Levels, e.g. water vole and great crested newt. However, as I have explained, recognising the extent of the loss of grazing marsh habitat, three substantial mitigation areas are proposed at Maerdy Farm, Tatton Farm and Caldicot Moor. As explained in the revised SSSI Mitigation Strategy (Appendix SR10.35 of the December 2016 ES Supplement (Document 2.4.14)), in addition to physical and ecological characteristics, and the aim of providing some mitigation land to both the west and east of the River Usk, land ownership was an important consideration. In the first instance land already owned by Welsh Government was considered in order to avoid the need to acquire

privately owned land. The land at Tatton Farm is owned by the Welsh Government. Consideration was next given to land within agricultural holdings which would be significantly affected by the proposed new section of motorway and where there is the potential for reversion of arable land to grassland. Maerdy Farm was identified as a suitable site where the land is severed by the proposed new section of motorway and comprises arable land. Finally, consideration was given to land close to but outside the existing SSSIs, which is otherwise of similar character and would be capable of ecological enhancement. Caldicot Moor was the only such area identified. This is immediately adjacent to the eastern boundary of the Gwent Levels – Magor and Undy SSSI and is within the Caldicot and Wentlooge Levels Internal Drainage District.

- 7.6.16 This is an appropriate and proportional approach to mitigation for the loss of grazing marsh. In addition the land at Caldicot Moor provides an area for essential mitigation for protected species associated with the Gwent Levels.
- 7.6.17 In their letter of 4 May 2016 the Gwent Wildlife Trust (OBJ0270) stated that 20.7ha of grazing marsh which would be temporarily affected would be completely destroyed followed by habitat restoration.
- 7.6.18 This is the figure given in the March 2016 ES (Document 2.3.2) at Figure 10.5.4. The figures have been revised based on changes in the design and the revised figures are provided in Table 4.1: Land Take within the Gwent Levels SSSIs of the September 2016 ES Supplement (Document 2.4.4). This shows that a total of some 125 ha of land within the Gwent Levels SSSIs would be affected by the proposed new section of motorway. Of this, the temporary and permanent loss of grazing marsh would amount to some 86.4 ha (of which 8.85 ha would be affected by temporary use for construction) and this is the area which has been used in considering the requirements for land to mitigate for this loss.

- 7.6.19 Whilst the construction areas have been included in the calculation of the requirements for mitigation areas, it is the case that the grazing marsh land within the construction areas would be restored to grassland when the compounds were no longer required.
- 7.6.20 It must also be appreciated that the extent of grazing marsh which would be lost has been measured on the basis of all grassland within the Gwent Levels SSSIs. Much of this grassland is improved or semi-improved grassland of little intrinsic nature conservation interest. The measurement of loss also includes severed field corners which would not be directly affected, but would be difficult to manage once the new section of motorway was constructed.
- 7.6.21 In the letter of 4 May 2016 the Gwent Wildlife Trust (OBJ0270) referred to the Caldicot Moor mitigation area as the very driest area of the levels. They stated that it is very difficult to see how water can be retained in the area without substantial water retaining structures. Nutrient enrichment resulting from its arable land use will result in an uphill battle to return it to any type of species rich grassland (as grazing marsh is unlikely to be achieved due to it being too dry). They consider that it could take hundreds of years to achieve habitat approaching unimproved grassland. They stated that in combination with 3 lines of pylons, this site is not also suitable for the wind turbines and the SSSI mitigation.
- 7.6.22 The revised SSSI Mitigation Strategy (Appendix SR10.35 of the December 2016 ES Supplement (Document 2.4.14)) shows revised proposals whereby only the northern section of the area previously identified would be used, the very northernmost lowest lying area being used for protected species mitigation. The southern, driest section is not required. Electricity pylons are a feature of the Gwent Levels SSSIs generally so are not a significant constraint here. I am aware of the planning application for two wind turbines. I understand that Monmouthshire County Council had granted planning permission for two turbines to be erected on the land in August 2014, but the

application was subsequently called in by the Welsh Government in December 2014 and no further planning Document umentation has been submitted since that time. The applicant (RES) has raised no objection to the draft Orders and it has since been confirmed by them that the land is in the ownership of Great House Farm, Undy. There is thus no indication that the planning application is likely to be pursued.

- 7.6.23 Whilst it is the intention to seek to achieve a species-rich grass sward, it should be noted that there is very little unimproved grassland within the Gwent Levels. Much of the grassland is semi-improved or improved. Reversion of arable land to grassland managed with low nutrient inputs will be beneficial regardless of the quality of the resulting grassland.
- 7.6.24 The Gwent Wildlife Trust (OBJ0270) in its letter of 4 May 2016 stated that the documentation gives no information about any alternative areas to Maerdy Farm for mitigation that have been considered.
- 7.6.25 No other mitigation areas have been identified. NRW required that some of the mitigation for the loss of SSSI grazing marsh should be located outside the existing SSSIs. We did not identify other land outside the existing SSSIs within the Gwent Levels which is suitable.
- 7.6.26 The Gwent Wildlife Trust, in its letter of 4 May 2016 (OBJ0270), referred to Plan 2a of the SSSI Mitigation Strategy (March 2016 ES Appendix 10.35) (Document 2.3.2) as showing ditches adjacent to the railway affected by pollution joined to the proposed new system.
- 7.6.27 The revised proposals for Maerdy Farm are shown on Plan 2a of the revised SSSI Mitigation Strategy (Appendix SR10.35 of the December 2016 ES Supplement (Document 2.4.14)). The new ditches would not connect to the drains along the railway. However, it is accepted that, at the scale of these drawings this may not be clear. Detailed design will ensure that this is not the case.

- 7.6.28 The Gwent Wildlife Trust in its letter of 4 May 2016 (OBJ0270) stated that nutrient enrichment resulting from arable land use at Maerdy Farm will mean that it could take hundreds of years to achieve habitat approaching unimproved grassland.
- 7.6.29 As I have explained for Caldicot Moor above, it should be noted that there is very little unimproved grassland within the Gwent Levels. Much of the grassland is semi-improved or improved. Reversion of arable land to grassland managed with low nutrient inputs will be beneficial regardless of the quality of the resulting grassland.
- 7.6.30 The Gwent Wildlife Trust (OBJ0270) in its letter of 4 May 2016 stated that the invasive non-native species least duckweed and Nuttall's duckweed were found in the reën to the northern edge of Caldicot Moor. This presents a high risk of spreading these species which are listed on schedule 9 of the Wildlife and Countryside Act 1981. The Trust made a similar point regarding Tatton Farm.
- 7.6.31 The pre-CEMP (December 2016 ES Supplement (Document 2.4.14) Appendix SR3.2) includes Annex C Biosecurity Safe System of Works and Annex D Invasive Species which set out the measures to be implemented to prevent spread of invasive species.
- 7.6.32 The Gwent Wildlife Trust (OBJ0270) in its letter of 4 May 2016 stated that the Tatton Farm mitigation area is conveniently owned by Welsh Government and that ownership should not have dictated mitigation choices.
- 7.6.33 Before compulsorily acquiring 3rd party land for mitigation it is important to demonstrate that any suitable land already owned by Welsh Government, or which may otherwise be available, has been identified and is to be used where practicable.
- 7.6.34 The Gwent Wildlife Trust in its letter of 4 May 2016 (OBJ0270) stated that the management of Tatton Farm with grazing may be very difficult as this area would be completely surrounded by urban development

and the M4 if this proposal goes ahead. Finding graziers into the future is likely to be difficult.

- 7.6.35 There is currently a single access point to this land from Pye Corner. A new single access would be provided to the north of the proposed new section of motorway. There would be no material change in the ease of access to the land.
- 7.6.36 In their letter of 4 May 2016, Wildlife Trust Wales (OBJ0260) referred to the mitigation strategy set out in the March 2016 ES (Document 2.3.2) and stated that it is significantly flawed.
- 7.6.37 This section of the letter makes a number of points regarding the likely success of the proposed mitigation by replacement of reens and ditches which would be lost to the Scheme. It ignores the fact that the Scheme would affect less than 2% of the area of the Gwent Levels SSSIs and all of the new reens and ditches would be connected to existing neighbouring reens and ditches, and that it is proposed that plant material and sediment from watercourses which would be lost would be transferred to the new watercourses. The new reens would also incorporate berms to provide areas for marginal plant species to establish. It should also be noted that the existing reens and ditches are periodically disturbed by dredging and this is important in providing a range of water conditions necessary to maintain the diversity of aquatic flora and fauna.
- 7.6.38 To respond to a number of specific points raised by Wildlife Trust Wales:
- 7.6.39 *“Where would replacement reens be located?”* The replacement reens and ditches would be located adjacent to the new section of motorway and are shown on the Highway Drainage and Reen Mitigation plans at Appendix A of the Reen Mitigation Strategy (March 2016 ES (Document 2.3.2) Appendix 2.3) and the Supplementary Note on the Reen Mitigation Strategy (September 2016 ES Supplement (Document 2.4.4) Appendix S2.1).

- 7.6.40 *“Why was a ratio of 1:1 chosen?”* Initial designs had greater lengths of new reens and ditches, but as I have explained, in discussion with NRW the lengths were reduced as they were concerned that there would be insufficient water to maintain levels in summer if a significantly greater length was provided and thus the hydrology of the Levels could be adversely affected.
- 7.6.41 *“The Gwent Levels cannot be recreated elsewhere and if lost to development would be lost forever.”* The Scheme would not result in the loss of the Gwent Levels. Overall, less than 2% of the total area of the Gwent Levels SSSIs would be lost as a result of the Scheme, and mitigation is proposed for the loss of reens and ditches and grazing marsh grassland.
- 7.6.42 *The provision of new reens and ditches is not “a significant positive impact on biodiversity.”* It is the case that the Reen Mitigation Strategy at March 2016 ES (Document 2.3.2) Appendix 2.3 stated that *“...a significant amount of additional reen length will be added to the levels which will have a significant positive impact both on the biodiversity and the water management along the levels.”* This is an incorrect statement and referred to previous proposals which included greater lengths of new reens and ditches. This has been corrected in the Supplementary File note on the Reen Mitigation Strategy at Appendix S2.1 of the September 2016 ES Supplement (Document 2.4.4). As I have explained above NRW were concerned that longer lengths of reens and ditches would affect the hydrology of the Levels.
- 7.6.43 Wildlife Trusts Wales (OBJ0260), in its letter of 4 May 2016 stated that the nationally important nature conservation value of the SSSIs cannot be adequately safeguarded through mitigation or compensation strategies, and that far too many variables exist in semi-natural environments for all eventualities to be foreseen and adequately mitigated against. Reference is made to previous developments on the Gwent Levels where there have been ecological problems. One of these involved high levels of sulphate in discharges

and this is known to have resulted from the use of pulverised fuel ash as fill to raise site levels.

- 7.6.44 As explained in March 2016 ES (Document 2.3.2) Chapter 12 Materials, an Outline Materials Management Plan (MMP) is provided as part of the pre-CEMP (updated at December 2016 ES Supplement Appendix SR3.2). The reuse of site won materials would be subject to their compliance with relevant specifications and assessment criteria to ensure engineering suitability and protection of environmental receptors. The assessment criteria would be agreed with NRW and Newport and Monmouthshire local planning authorities prior to construction and details would be provided within the MMP. Thus materials to be used in construction of the new section of motorway would be carefully assessed prior to use to ensure that there is no risk of similar problems arising. However, it is accepted, in spite of the comprehensive mitigation measures proposed, that it is not possible to entirely mitigate for the loss of complexity of the habitats of the SSSIs. Thus Chapter 10 Ecology and Nature Conservation of the March 2016 ES (Document 2.3.2) recognises that there would be a significant adverse long term impact on the Gwent Levels SSSIs as a result of the land take for the Scheme.
- 7.6.45 Monmouthshire County Council (ISU0002), in a letter dated 29th April 2016, sought further clarification of the amount of replacement reed and ditch habitat. Based on the Reed Mitigation Strategy (March 2016 ES Appendix 2.3) (Document 2.3.2) the ratio for infilled reed : new reed is 1:1.03 and the ratio for destroyed ditch : new ditch is 1:1.07. They consider this to be a low level of compensation considering the high quality habitat that will be lost. The Council states that compensation for reeds is heavily based on 'metre for metre' compensation with replacement reeds being provided at a set 0.7 m x 2 m x 5.7 m whilst the reality of the existing reed network is a range of different sized reeds on different aspects with close relationships to surrounding semi-natural habitat to create different

functions. The compensation will need to allow those functions to continue or improve those functions to compensate for the system lost.

7.6.46 The Supplementary File note on the Reen Mitigation Strategy (September 2016 ES Supplement (Document 2.4.4) Appendix S2.1) has slightly different lengths of lost and replacement reens and ditches from the Reen Mitigation Strategy (March 2016 ES Appendix 2.3) (Document 2.3.2), but the ratios of lost to new reens and ditches are similar at essentially 1:1. The lengths of replacement reens and ditches are based on discussions with NRW. The original intention was to provide a higher ratio but NRW were concerned that this could result in adverse effects on the hydrology of the Levels. The orientation of the replacement reens and ditches is largely governed by the horizontal alignment of the new section of motorway. As stated in the Reen Mitigation Strategy (March 2016 ES (Document 2.3.2) Appendix 2.3), the dimensions of the replacement reens referred to are the general proposals but continuing advice would be sought from NRW on the specification for reen design. This would include varying the cross sections of the reens and creation of shallow areas to increase habitat diversity. In addition to the new watercourses to be provided through the Reen Mitigation Strategy, the proposals set out in the revised SSSI Mitigation Strategy (Appendix SR10.35 of the December 2016 ES Supplement (Document 2.4.14)) includes recutting of some 5.9 km of former field ditches.

7.6.47 Monmouthshire County Council (ISU0002), in a letter dated 29th April 2016 stated that it would be helpful if the options considered for mitigation and compensation that have been discounted were available to demonstrate the iterative process that has resulted in the current proposals.

7.6.48 The iterative process is covered at the level required by the EIA Regulations in Chapter 4 of the March 2016 ES (Document 2.3.2). Chapter 4 includes consideration of alternatives going back to 1989.

It also includes (at paragraphs 4.4.24 to 4.4.77) a description of the iterative design process undertaken by the ECI contractor since March 2015.

Noise

- 7.6.49 The Gwent Wildlife Trust in its letter of 4 May 2016 (OBJ0270) stated that no mitigation for noise effects on wildlife is proposed with respect to the operation of the Scheme. This shows no regard for the avoidance-mitigate-compensate hierarchy.
- 7.6.50 This is not correct. The proposals for installation of piles for the River Usk crossing take full account of the need to avoid the sensitive period for fish migration (April to June). The Scheme includes a low noise surface throughout which could provide noise attenuation of up to 3.5 dB.

Saltmarsh

- 7.6.51 The Gwent Wildlife Trust (OBJ0270) (letter of 4 May 2016) stated that the area of new saltmarsh to be created would not be 2 ha as indicated since the banks needed around the edge to protect adjoining industry from inundation would have quite a large land take. They also stated that this area is unsuitable for saltmarsh mitigation and that another suitable area must be found in a better location.
- 7.6.52 The total area of this site between the proposed lagoon and the river channel is some 2.2 ha. Allowing for new banks around the edge should enable an area of some 2 ha of new saltmarsh to be achieved. This area is suitable for saltmarsh mitigation. It is adjacent to the tidal section of the River Usk, is currently not used and is capable, with some adjustment of levels following cessation of its use for construction of the River Usk Crossing, and provision of a flood bank to protect neighbouring land, of developing saltmarsh vegetation. We are not aware of any more suitable area which should preferably be within or close to the River Usk.

- 7.6.53 The Gwent Wildlife Trust (OBJ0270) (letter of 4 May 2016) refer to the lagoon that is planned for this site to attenuate the flows of the bridge drainage before discharge to the River Usk. They state that this could result in pollutants building up on this area of land making it unsuitable as a mitigation area.
- 7.6.54 Discharge would be via a ditch through the saltmarsh to the river and the area would be regularly flushed by high spring tides. As explained by Mr Richard Graham in his Proof of Evidence (WG 1.15.1), NRW are satisfied that discharges to the Rivers Usk and Ebbw have lesser requirements for attenuation and treatment and they have advised that the proposals for discharges into these tidal waters are adequate.
- 7.6.55 The Gwent Wildlife Trust (OBJ0270) (letter of 4 May 2016) stated that the lagoon would be a very polluted compound and creation of saltmarsh may attract otters to the area and these may be harmed by contact with pollutants. The Trust express similar concerns regarding pollution of the Water Treatment Areas generally
- 7.6.56 The Water Treatment Area lagoons would receive water following every rainfall event generating run-off. Potential pollutants are typically concentrated within the road run-off generated by rainfall following periods of dry weather and this initial runoff is referred to know as the 'first flush'. Run-off following a first flush, either during the same rainfall event or a subsequent one would be relatively unpolluted. The majority of water flowing through the lagoon would not comprise first flush run-off and will not therefore be significantly polluted. Historically, otter population decline has been linked to the presence in water of persistent organic pesticides and health impacts more recently associated with endocrine disrupting chemicals. None of these chemicals are contained within road run-off. It is not intended to exclude wildlife from these areas.

Invertebrates

7.6.57 In an email dated 4 May 2016, Buglife (OBJ0267) stated that effective mitigation for terrestrial invertebrates requires fine scale detail of habitats to be lost to be replicated in replacement habitat. Any habitat lost should be replaced at a ratio significantly greater than 1:1.

7.6.58 The March 2016 ES (Document 2.3.2) outlines at paras 10.5.52-10.5.62 the proposals for ecological enhancement of land at Maerdy Farm, Tatton Farm and Caldicot Moor, and further information on the proposals was set out in ES Appendix 10.35 SSSI Mitigation Strategy and then in the revised SSSI Mitigation Strategy (Appendix SR10.35 of the December 2016 ES Supplement (Document 2.4.14)). At this stage this is a strategy and the detail will be developed further prior to commencement of the works but among the measures proposed which would benefit terrestrial invertebrates are:

- a) Arable conversion to species diverse grassland using an appropriate grass seed mix.
- b) Increase the area of species diverse grassland.
- c) Enhance species diversity of existing grassland.
- d) Increase the amount of ditch habitat.
- e) Manage grassland to encourage ground nesting birds and invertebrates.

7.6.59 Based on the Phase 1 Habitat Survey (ES Figure 10.4), the Scheme would result in the loss of some 7.01 ha of unimproved grassland. The landscape/habitat provision shown on the Environmental Masterplan (March 2016 ES (Document 2.3.2) Figure 2.6), as referred to at ES para 10.5.48, included some 26.1 ha of species rich grassland to be provided along the embankments and cuttings of the new section of motorway. This has subsequently been increased to 38.1 ha in the revised Environmental Masterplan at Figure R2.6 of the September 2016 ES Supplement (Document 2.4.4).

- 7.6.60 The March 2016 ES (Document 2.3.2) para 10.5.120 refers to Chapter 3: Scheme Construction and explains that following completion of the works in restoring the construction sites at Great Pencarn, within Newport Docks and Tata Steel, elements of the open mosaic habitat on previously developed land habitat would be incorporated and the habitat requirements of shrill carder bee (and terrestrial invertebrates generally) and reptiles would be taken into account. In particular the seed mixes used in restoring these areas would include food plant species of value to shrill carder bee.
- 7.6.61 In their email dated 4 May 2016, Buglife (OBJ0267) stated that ditches should not be uniform along their whole length but should include a range of profiles. They state that even steep-sided profiles should incorporate gentle slopes at the ditch edges and a sloping shelf above the water level that is beneficial for wetland species.
- 7.6.62 As explained in the Reen Mitigation Strategy (March 2016 ES (Document 2.3.2) Appendix 2.3) continuing advice would be sought from NRW on the specification for reen design and whilst in general the proposals are that the reens would be excavated to a depth of 2.0 m with 1 in 1 side slopes, a 0.7 m wide berm and will be approximately 5.7 m wide at the surface, opportunities to vary the profile and channel width would be taken during construction. This was discussed with NRW at a meeting on 6th September 2016.
- 7.6.63 Newport City Council (SUP0192), in its report dated April 2016 referred to the invertebrate surveys carried out for the Scheme (March 2016 ES (Document 2.3.2) Appendices 10.15 and 10.31) and in particular the high quality of land at Newport Docks and Tata Steel for invertebrates and the need for mitigation of the effects.
- 7.6.64 The footprint of the new section of motorway, together with the land required for temporary construction uses would result in the loss of brownfield land at Great Pencarn – Duffryn; the section of Newport Docks between the River Ebbw and the River Usk; east of the River

Usk adjacent to the saltmarsh on the east bank of the river; either side of the Uskmouth railway line; south of the Solutia works; an area between the Uskmouth railway line and the River Usk; along the south of the Tata Steel land; and across Green Moor. As explained in the March 2016 ES Chapter 3: Scheme Construction (Document 2.3.2) following completion of the works all temporary construction work sites would be removed and the land affected would be restored. In restoring the construction sites at Duffryn, within Newport Docks and Tata Steel, so far as practicable a mosaic of habitat types providing some of the characteristics of brownfield land which make them valuable for invertebrates would be provided. However, there would be loss of brownfield site habitat and after mitigation the magnitude of the residual impacts on the terrestrial invertebrate assemblage associated with brownfield land (Regional (Medium) value) is assessed as Major Adverse and the significance of effects as Moderate or Large in the medium term. In the long term, as the habitats recovered, the magnitude of impacts would be Moderate Adverse and the significance of effects Moderate.

7.6.65 Newport City Council (SUP0192), in its report dated April 2016, also referred to the bumblebee survey carried out for the Scheme (March 2016 ES Appendix 10.31) (Document 2.3.2) which recorded twelve species of bumblebee and state that compensation will be paramount to minimise impact on bumblebees.

7.6.66 Bumblebees in general are included in the assessment of effects on terrestrial invertebrates. However, because of the particular conservation importance of shrill carder bee, and the significance of the Gwent Levels population for the species in the UK, the March 2016 ES (Document 2.3.2) considers the effects on this species specifically.

7.6.67 Loss of habitat for shrill carder bee would arise particularly from the loss of the vegetation bordering reens and ditches, and the loss of

vegetated brownfield land at Great Pencarn, land within Newport Docks and the Tata Steel site.

- 7.6.68 The revised Environmental Masterplan (September 2016 ES Supplement (Document 2.4.4) Figure R2.6) shows that the south facing embankments and cuttings of the new section of motorway would include areas to be sown to species-rich grassland. Extensive areas of species-rich grassland would be established on south facing cutting slopes at the Castleton Interchange in the west of the route and on the embankments of the new section of motorway across the Gwent Levels and the water treatment areas. In all some 38.1 ha of species rich grassland would be established as part of the revised landscape proposals included in the Scheme. The seed mix for this grassland would take into account the specific needs of shrill carder bee and would include a range of food plants used by the species such as common knapweed, scabious, red clover, bird's-foot trefoil, meadow vetchling and vetches. These would also be of benefit to other bee species.
- 7.6.69 The additional mitigation which would be provided by the revised SSSI Mitigation Strategy (Appendix SR10.35 of the December 2016 ES Supplement (Document 2.4.14)) would also include measures to improve the species diversity of existing grasslands, to create new species-rich grassland on areas which are currently arable land, to enhance the biodiversity of existing ditch banks, and to create new ditches, with associated bank vegetation, all of which would be of benefit to shrill carder bee.
- 7.6.70 Additional mitigation as part of construction would comprise restoring the construction sites at Great Pencarn, within Newport Docks and at Tata Steel, so far as practicable, to provide a mosaic of habitats including areas with food plant species of value to shrill carder bee and other bees.

Invasive Species

- 7.6.71 Newport City Council (SUP0192), in its report dated April 2016 stated that an action plan to prevent spread of invasive species should be submitted which should contribute to the Newport Generic Action Plan (GAP) for invasive species as well as the work that NRW undertake along the Gwent Levels.
- 7.6.72 We understand from Newport City Council that the GAP for invasive species has not yet been prepared. In so far as the ecological surveys carried out for the Scheme have identified the locations of invasive species within the areas surveyed (and as shown on March 2016 ES (Document 2.3.2) Figure 10.9) this will contribute to the knowledge base which will inform the GAP in due course.
- 7.6.73 As explained at para 6.5.1 of March 2016 ES Appendix 3.2 the Pre-Construction Environmental Management Plan (the Pre-CEMP, updated as December 2016 ES Supplement Appendix SR3.2), works (including surveys and monitoring visits) would be undertaken in accordance with a biosecurity risk assessment and safe system of work (which are included in Annexes C and D of Appendix 3.2). The risk assessment and safe system of work would take into account species-specific guidelines for management and control of non-native invasive species produced by the Non-Native Species Secretariat and NRW.
- 7.6.74 Paras 1.3.3 & 1.3.4 of the Pre-CEMP (Appendix SR3.2 of the December 2016 ES Supplement (Document 2.4.14) explain that prior to construction, the Pre-CEMP would become the CEMP and would include updates from pre-construction surveys, or modifications as a result of commitments made at the Public Local Inquiry. The CEMP would be agreed with key stakeholders, including NRW and the local planning authorities, and would be in place before construction begins. The CEMP would be incorporated into the Health and Safety Environmental Management Plan (HASEMP).

Mammal Crossings

- 7.6.75 Newport City Council (SUP0192), in their report dated April 2016, referred to apparent conflicts between mammal crossings and the highway boundary fencing on the Environmental Masterplans (March 2016 ES (Document 2.3.2) Figure 2.6) and requested clarification.
- 7.6.76 In general the mammal crossings would emerge outside the highway boundary fence. There are exceptions at the west of the Scheme where the crossings are primarily for dormouse where the entrances at either end would be within areas of planting inside the highway boundary fence.

Translocation of coppice stools and fungi

- 7.6.77 Newport City Council (SUP0192), in their report dated April 2016 requested information on the success rates of 'lifting and replanting' coppice stools of hazel.
- 7.6.78 Anderson (2003) (Document 11.2.33) provides guidance on translocation of trees and shrubs. She reports that the benefits of translocating native trees and shrubs are:
- a) They should consist of the locally native genetic stock;
 - b) They re-grow much more quickly than horticultural stock, especially when competing with the flush of vegetation that appears with the ground flora;
 - c) At least some of the invertebrates, fungi and microflora associated with the root balls are also transferred.
- 7.6.79 The advice is that trees and shrubs should be transferred as coppice stumps and coppicing should be conducted immediately prior to translocation in the autumn. The process is equivalent to coppicing in a wood after which a vigorous and often non-woodland ground flora joins the normal woodland species until the canopy is re-established.

Re-growth from the coppiced stumps may be slower than in an in situ wood, but a complete canopy can be expected within about 10-12 years.

- 7.6.80 Recent successful examples of translocation of coppice material in Wales include the transplanting of coppiced stools of mature scrub species (in particular hazel, although other species also work) on a number of road schemes in Wales, including the A40 Penblewin to Slebech Park scheme in Pembrokeshire and the A477 St Clears to Red Roses Improvement. Not only is this method a sustainable approach to site clearance (as it 're-uses' plant material that would otherwise be chipped) but it also leads to a much more rapid establishment of planting areas. This can be particularly important where the proposed function of the planting is as visual screening. In addition, other species associated with the coppiced stools, including ground flora species such as bluebells and wood anemone, are often translocated at the same time, thus 'seeding' the receptor site. Ideally, each shrub to be translocated should be coppiced (to varying heights, in order to encourage a variety of structure) and moved only once directly into the location where it will remain. Double-handling does still work, but has an increased risk of failure. By the end of construction of the A40 Penblewin to Slebech Park scheme, over 600 coppiced stools had been moved, with a success rate of over 95%. In some parts of the UK, watering of the translocated material will be important; however, in Wales this is less likely to be a concern (although they should be well watered at the time of translocation). The translocation process works especially well for hazel, and is therefore likely to be a valuable component of dormouse mitigation.
- 7.6.81 Newport City Council (SUP0192), in their report dated April 2016, requested information on the success rates of translocating waxcap turf, and if this is not viable what are the other options.
- 7.6.82 There is no proven method of translocating waxcap fungi and no record of previous success. As stated at para 10.7.174 of the March

2016 ES (Document 2.3.2) since the effectiveness of such methods has yet to be demonstrated, no account was taken of this in the assessment of the significance of the impact on species-rich grasslands on this account. Griffith et al (2004) (Document 11.3.21) report experimenting with translocating turves containing waxcap mycelium but state that it may be many years before survival of the fungal community can be confirmed. Wright (2015) (Document 11.3.22) reports a method for translocating waxcaps based on transfer of fruiting bodies to suitable receptor sites. This work was carried out in autumn 2014 and success cannot yet be judged. The receptor sites will be monitored for twenty years.

Monitoring

7.6.83 Newport City Council (SUP0192), in their report dated April 2016, stated that monitoring should be undertaken on the measures employed to mitigate for loss of habitat etc. For example the mammal passes will need to be monitored not only for otters and badgers but hedgehogs as well. Nesting birds should also be monitored post construction to ascertain; a) whether the road itself has impacted upon their behaviour; and b) whether the 'mitigation' habitats are proving to be effective for bird species. Monmouthshire County Council, in their letter of 29 April 2016 also stated that monitoring of mitigation and compensation will be vital and must extend beyond the commitments in any European Protected Species Licences.

7.6.84 As I have explained in section 5 of this evidence, a comprehensive programme of monitoring and reporting would be carried out by the Contractor during the Aftercare Period extending to five years beyond the completion of construction. Subsequent responsibility would rest with the Welsh Government.

Reptiles

7.6.85 Newport City Council (SUP0192), in their report dated April 2016, referred to the assumed presence of grass snakes throughout the

Gwent Levels and the targeted surveys of certain areas found slow worms, common lizard and grass snake. They refer to the need for a mitigation strategy and details of compensation.

- 7.6.86 As agreed with NRW a mitigation strategy for reptiles will be agreed in advance of commencement of construction.

7.7 Criticism of the Scheme

Effects on SSSIs

- 7.7.1 Gwent Wildlife Trust (OBJ0270), in their letter of 4 May 2016, referred to damage to SSSI land south of the line of the new section of motorway which has not been avoided in spite of NRW requesting that water treatment areas should be located to the north. They stated that it is not clear why these areas are located to the south and no quantification of the areas affected to the south is provided.
- 7.7.2 The Water Treatment Areas located south of the line of the new section of motorway within the Gwent Levels SSSIs are WTAs 4a, 8 and 10. Mr Ben Sibert explains in his Proof of Evidence (WG 1.5.1) that these have to be located south of the line of the new road for hydrological reasons. All of these areas are included in the measurement of the land take for the Scheme. The water treatment areas are included in the permanent land take and the construction compounds in the temporary land take.
- 7.7.3 Gwent Wildlife Trust (OBJ0270), in their letter of 4 May 2016, stated that water treatment areas should not be considered as mitigation as they damage more SSSI land under their footprint. They should not have been sited on the SSSIs if they were considered to be mitigation.
- 7.7.4 The water treatment areas are integral to the Scheme and are essential in mitigating the rate and quality of water discharged to the reed system so that it does not result in adverse effects. The land take for these is included in the measurement of the permanent land

take of the Scheme. Given that the water treatment areas have to be at the lowest points of the highway drainage system it is inevitable that those receiving run-off from the new section of motorway within the Gwent Levels are located in the SSSIs.

- 7.7.5 In their letter of 4 May 2016, Wildlife Trusts Wales (OBJ0260) stated that there would be direct loss of 8 km and 125 ha of SSSIs despite them being legally protected.
- 7.7.6 Direct loss of SSSI has been minimised through the design of the Scheme and the location of construction compounds so far as practicable outside the SSSIs. In so far as there would be loss of reens and ditches, the key features of the SSSIs, these would be replaced as set out in the Supplementary File Note to the Reen Mitigation Strategy (September 2016 ES Supplement (Document 2.4.4) Appendix S2.1). Loss of 'grazing marsh' grassland would be mitigated by measures set out in the revised SSSI Mitigation Strategy (Appendix SR10.35 of the December 2016 ES Supplement (Document 2.4.14)).
- 7.7.7 The duty imposed on all public bodies by Section 28G of the Wildlife and Countryside Act 1981 is to take reasonable steps, consistent with the proper exercise of their functions, to further the conservation and enhancement of the features that make a SSSI of special interest. In his Proof of Evidence (WG 1.23.1), Mr John Davies explains in relation to this duty, and to the broader duties under the Natural Environment and Rural Communities Act 2006 (Document 3.1.13) updated in respect of public bodies in Wales by the Environment (Wales) Act 2016 (Document 3.1.16), that in testing options using WeITAG (Document 6.1.4); selecting a route and making highway design choices that would minimise the effect on the SSSIs; and developing a comprehensive SSSI mitigation strategy, the Welsh Government has sought to maintain and enhance biodiversity insofar as that is consistent with the proper exercise of its functions regarding the motorway network.

Effects on SINC

- 7.7.8 In their letter of 4 May 2016 the Gwent Wildlife Trust (OBJ0270) stated that the Scheme should have been trying to avoid SINC damage as it was in theory guided by the principle of the hierarchical system ‘where avoidance is always the first mitigation measure to be considered’.
- 7.7.9 In designing the Scheme the priority has quite properly been on avoidance of unnecessary construction within international and national designated sites. The avoidance is necessarily at a relatively coarse scale given the nature of the Scheme and it would not be possible to align the new section of motorway in such a way as to avoid SINC (as indeed it has not been possible to entirely avoid SSSIs or the River Usk SAC).
- 7.7.10 The Gwent Wildlife Trust (OBJ0270) (letter of 4 May 2016) stated that the whole of the Solutia SINC (a total of 43 ha) is due to be lost under the combined impact of the M4CaN Scheme and an employment allocation.
- 7.7.11 The 2016 ES (Document 2.3.2) explains at para 10.7.27 that the new section of motorway from chainage 11550 to 12350 would cut through the southern part of the Solutia SINC and Water Treatment Area 6 would be located in the south eastern part of this SINC. The total area lost from the SINC would be some 12.7 ha out of a total area of 64.4 ha and a further 6.03 ha would be severed from the remainder to the south of the new section of motorway. It should be noted that almost all of the area of the Solutia SINC which would be affected by the Scheme (shown on Figure 10.3b of the March 2016 ES (Document 2.3.2)) is within the employment allocation Em1(iv) in the Newport Local Development Plan 2011-2026 Proposals Map-East (Document 5.3.1). The only additional area which would be affected by the Scheme is a small area in the south west corner of the SINC.

Habitat loss and severance

- 7.7.12 In their letter of 4 May 2016, Wildlife Trusts Wales (OBJ0260) referred to the effects of habitat fragmentation as a result of the Scheme.
- 7.7.13 The Scheme seeks to minimise the effects of habitat fragmentation by maintaining reen connections across the line of the road, providing mammal crossings in the form of tunnels, and installing wildlife fencing to prevent mortality (particularly of otter and badger).
- 7.7.14 In their letter of 4 May 2016, Wildlife Trusts Wales (OBJ0260) referred to habitat degradation particularly arising from changes in hydrology and water quality in the reen and ditch system of the Gwent Levels. Similar concerns are expressed by Buglife (OBJ0267) in their email of 4 May 2016.
- 7.7.15 The replacement reens and ditches set out in the Supplementary File Note to the Reen Mitigation Strategy (September 2016 ES Supplement (Document 2.4.4) Appendix 2.1) are designed to ensure that the hydrology of the Gwent Levels is not adversely affected by the Scheme. The Scheme recognises the national importance of the aquatic habitats of the reens and ditches of the Gwent Levels and incorporates a high level of treatment of the run-off from the road via grass ditches, petrol and silt traps, attenuation lagoons and reedbeds before discharging to reens.
- 7.7.16 Mr Richard Graham explains in his Proof of Evidence (WG 1.15.1) that that the drainage system is capable of preserving ambient reen water quality in the long term and that short term impacts would be within acceptable criteria.

European Eel

- 7.7.17 In their letter of 4 May 2016, Wildlife Trusts Wales (OBJ0260) referred to the effects of the Scheme on the European eel.

- 7.7.18 The importance of the Severn Estuary for European eel has been reflected in the valuation of this receptor in the Environmental Statement as of International (very high) importance. The potential or adverse effects on this species, as a key feature of the Severn Estuary Ramsar site, have been fully considered in the March 2016 ES (Document 2.3.2) and in the SIAA (Document 2.3.4). The assessment takes into account both the effects of the construction (particularly piling noise to which detailed consideration was given) and operation of the new section of motorway on freshwater fish, including European eel.
- 7.7.19 Throughout the construction phase it is proposed to maintain the connectivity of reens and ditches within the network, through the creation of new reens and ditches to replace those which would be lost and provision of culverts where reens cross the line of the road. Eel passes would be provided on all new sluices installed as part of the Scheme.

Ancient Woodland

- 7.7.20 The Woodland Trust (OBJ0271), in a letter dated 4 May 2016, referred to damage and loss of ancient woodland as follows: two areas of ancient woodland at Pwll Diwaelod; one area of ancient woodland at Berryhill Farm; one area of ancient woodland at Pye Corner; and ancient woodland at Roggiett Brake.
- 7.7.21 The March 2016 ES (Document 2.3.2) at paragraph 10.4.64 explains that the woodlands at Pwll Diwaelod, Berryhill Farm, Pye Corner, Roggiett Brake and Rogiet Rectory Wood are included in the Forestry Commission Ancient Woodland Inventory. Detailed National Vegetation Classification (NVC) surveys of these woodlands confirmed that the woodlands at Pwll Diwaelod, part of the woodland at Berryhill Farm, and the woodlands at Roggiett Brake and Rogiet Rectory Wood were ancient woodland. However at Pye Corner a small scrubby plantation includes a small part of an area that is shown

as ancient semi-natural woodland in the ancient woodland inventory. However, with the exception of a narrow strip of mature trees beside Picked Lane there does not appear to be any evidence of old woodland. As I have explained in section 4 of this evidence, an aerial photograph from 1945 (Appendix B Figure 1 of this evidence) clearly shows that the site was a field at that time. An aerial photograph from 1979 (Appendix B Figure 2 of this evidence) again shows the site as a field through which a pipeline had recently been installed. It is evident that most of the current wooded area has been established relatively recently.

7.7.22 Thus Chapter 10 of the March 2016 ES (Document 2.3.2) identifies that areas of ancient woodland at Pwll Diwaelod, Berryhill Farm, and Roggiett Brake would fall within the limit for temporary and permanent works for the Scheme.

7.7.23 Pwll Diwaelod is located at the extreme western end of the Scheme. There are three main areas of woodland at Pwll Diwaelod which are classified as semi-natural ancient woodland. Easements for access are required at three locations within those ancient woodlands and, taking a precautionary approach, the environmental assessment stated that there would be small losses of the edge of a small ancient woodland at Pwll Diwaelod. During detailed design and the development of the detailed Construction Environmental Management Plan (CEMP), further work would be undertaken to minimise the effects on the ancient woodland at Pwll Diwaelod.

7.7.24 At Berryhill Farm 1.04 ha was identified as ancient woodland comprising a mature oak and ash woodland including old coppice stools. Part of the original woodland has been replanted with conifers and part of this area of the wood is infested with Himalayan balsam, a non-native invasive species. All of the wood would need to be removed in order to construct the Scheme. To the extent practicable, and avoiding areas affected by Himalayan balsam, during clearance of the wood, coppice stools of hazel and other shrub species would

be lifted and replanted in areas of new planting. Woodland topsoil would also be stripped and placed in new planting areas to encourage the establishment of the woodland ground flora.

- 7.7.25 Roggiett Brake is located at the extreme eastern end of the Scheme at the end of the proposed haul road to Ifton Quarry. The proposed haul road would pass through the southern end of the ancient woodland at Roggiett Brake. However the haul road would use an existing track which was used as a haul road when stone was transported from the quarry for construction of the Second Severn Crossing. Some clearance of scrub which has colonised the former track at the south of Roggiett Brake would be required, as would trimming of vegetation on either side of the haul road, but there would be no significant loss of woodland.

7.8 Matters of policy/guidance

- 7.8.1 RSPB (OBJ0245), in its letter of 4 May 2016 stated that the proposal does not comply with policies in Planning Policy Wales (Document 5.1.12) and Technical Advice Note 5 on Nature Conservation (Document 11.2.14) to protect and conserve the best wildlife sites in Wales i.e. European Sites and Sites of Special Scientific Interest. They identify specific areas of concern to which I respond below.
- 7.8.2 *Failure to avoid damage and deterioration; inappropriate or ineffective mitigation or compensation measures.* The damage to international sites is limited to the construction and long term presence of the east pylon of the Usk Crossing as explained in Chapter 10 of the March 2016 ES (Document 2.3.2) and the SIAA report (Document 2.3.4). This pylon would be located within an area of saltmarsh which is not one of the reasons for designation of the River Usk SAC. It is one of the features of the River Usk (Lower Usk) SSSI. Following construction the construction site would be restored to saltmarsh. To mitigate (see below) for the permanent loss of saltmarsh (0.20 ha), replacement habitat would be provided on land which would be

temporarily used for bridge construction to the south of the crossing.

This would provide some 2 ha of saltmarsh.

- 7.8.3 The new section of motorway would pass through four of the six Gwent Levels SSSIs. The impacts of the Scheme on the features of the SSSIs (reens and ditches; aquatic invertebrates; and shrill carder bee) are recognised in Chapter 10 of the March 2016 ES (Document 2.3.2) and mitigation provided by way of replacement reens and ditches (which will provide aquatic invertebrate habitat) and species rich grassland (habitat for shrill carder bee).
- 7.8.4 Mitigation for the loss of grazing marsh is provided through the revised SSSI Mitigation Strategy (Appendix SR10.35 of the December 2016 ES Supplement (Document 2.4.14)).
- 7.8.5 *Failure to identify impacts on individual sites.* A schedule of losses of key habitats within each of the four Gwent Levels SSSIs affected is provided in Table 4.1 of the September 2016 ES Supplement (Document 2.4.4) which is reproduced below as Table 5.

Table 5: Land Take within the Gwent Levels SSSIs

	St Brides	Nash and Goldcliff	Whitson	Redwick and Llandeveyney	Total (all affected Gwent Levels SSSIs)
Permanent Loss					
Grassland (grazing marsh)	25.30 ha	15.43 ha	1.92 ha	34.93 ha	77.58 ha
Other land	9.74 ha	12.23 ha	3.16 ha	2.27 ha	27.4 ha
SSSI Area	35.04 ha	27.66 ha	5.08 ha	37.20 ha	104.98 ha
Temporary Loss					
Grassland (grazing marsh)	5.04 ha	1.66 ha	0.32 ha	1.83 ha	8.85 ha
Other land	1.04 ha	9.09 ha	1.11 ha	0.39 ha	11.63 ha
SSSI Area	5.58 ha	10.75 ha	1.43 ha	2.23 ha	19.99 ha
Temporary and Permanent Loss					
Grassland (grazing marsh)	30.34 ha	17.09 ha	2.24 ha	36.76 ha	86.43 ha
Other land	10.78 ha	21.32 ha	4.27 ha	2.66 ha	39.03 ha
SSSI Area	40.62 ha	38.41 ha	6.51 ha	39.43 ha	124.97 ha
Loss of Reens and Ditches					
Total Reens within SSSI	41,523 m	26,455 m	28,388 m	33,674 m	130,040 m
Total Ditches within SSSI	137,160 m	78,301 m	91,998 m	91,794 m	399,253 m
Reens Lost	1,067 m	775 m	65 m	795 m	2,702 m
Ditches Lost	3,762 m	1,464 m	659 m	1,791 m	7,676 m
Loss of Reens %	2.6 %	2.9 %	0.2 %	2.4 %	2.1 %
Loss of Ditches %	2.7 %	1.9 %	0.7 %	2.0 %	1.9 %

Note: An additional 53 metres of reen and 1,697 metres of ditch would be lost outside the SSSIs.

7.8.6 Lack of legal certainty and security for delivery of mitigation and compensation. In order to provide legal certainty and security, land required for mitigation is included in the draft Orders. In some cases there is ongoing work (for example dormouse) which means that the mitigation requirements (and any land requirements) are not fully resolved. However, it is likely that any additional land required for dormouse will be woodland in Welsh Government ownership. Welsh Government fully appreciates that it will be necessary to demonstrate that all essential mitigation is deliverable before the Scheme can be permitted.

7.8.7 Both Newport City Council (SUP0192) in its report dated April 2016 and Monmouthshire County Council (ISU0002) in its letter of 29 April 2016 referred to the Welsh Government's lack of consultation with local organisations such as the Newport Biodiversity Partnership, and other local specialists and academics.

7.8.8 It is the case that there have been no direct discussions with the Newport Biodiversity Partnership. Mr Matthew Jones describes in detail in his Proof of Evidence (WG 1.1.1) the process of consultation for the Scheme. Other than statutory consultees, who have been consulted directly, all consultations on the EIA have followed the statutory process for public consultations.

7.9 Summary

7.9.1 In this section I have addressed the matters raised in consultation responses and objections to the draft Orders for the M4CaN Scheme which are relevant to ecology and nature conservation.

7.9.2 Consultation responses have been submitted by:

Newport City Council (SUP0192)

Monmouthshire County Council (ISU0002)

7.9.3 Objections have been submitted by the following organisations:

Natural Resources Wales (OBJ0268)

Royal Society for the Protection of Birds (OBJ0245)

Gwent Wildlife Trust (OBJ0270)

Wildlife Trusts Wales (OBJ0260)

Woodland Trust (OBJ0271)

Bat Conservation Trust (OBJ0298)

Buglife (OBJ0267)

Gwent Ornithological Society (OBJ0297)

Friends of the Earth Cymru (OBJ0125)

- 7.9.4 Where appropriate, consultees' responses and objections are also addressed by Jon Davies (dormouse and water vole) (WG 1.19.1), Richard Green (bats) (WG 1.20.1) and Simon Zisman (birds) (WG 1.21.1).
- 7.9.5 In addition to the responses and objections from the organisations I have referred to above, individuals have also objected to the Scheme on the basis of effects on ecology and nature conservation. The matters raised are covered in the more detailed responses and objections made by the organisations to which I have responded in this section.
- 7.9.6 Where comments relate to incomplete or inadequate surveys, further surveys were carried out subsequent to the March 2016 ES (Document 2.3.2) and were appended to the September 2016 ES Supplement (Document 2.4.4) and to the December 2016 ES Supplement (Document 2.4.14). These include surveys for great crested newt, dormouse, bats, wintering and breeding birds.
- 7.9.7 Where NRW (OBJ0268) have requested mitigation strategies for protected species these have been prepared in consultation with NRW (dormouse, great crested newt, bats and water vole) and drafts were published as appendices to the December 2016 ES Supplement (Document 2.4.14), or NRW have subsequently advised that these are not required at this stage and can be prepared and agreed in advance of commencement of construction (badger, reptiles, otter and barn owl).
- 7.9.8 I have responded to all of the relevant points in this section of my evidence. In this summary I refer to some of the specific matters raised.
- 7.9.9 NRW (OBJ0268) stated that further detailed discussions were required on the Drainage Strategy, Reen Mitigation Strategy, pre-

CEMP and SSSI Mitigation Strategy. Revised versions of the Drainage Strategy and SSSI Mitigation Strategy and a Supplementary File Note on the Reen Mitigation Strategy were provided to NRW and discussed at a meeting on 6th September 2016. The Supplementary File note on the Reen Mitigation Strategy and the revised Drainage Strategy were appended to the September 2016 ES Supplement (Document 2.4.4) as Appendices S2.1 and S2.2 respectively. The revised Pre-CEMP was Appendix SR3.2 of the December 2016 ES Supplement (Document 2.4.14). The revised SSSI Mitigation Strategy was Appendix SR10.35 of the December 2016 ES Supplement.

7.9.10 The Gwent Wildlife Trust (OBJ0270) stated that Barecroft is part of their Magor Marsh Nature Reserve and that this loss of a section of nature reserve has not been considered in mitigation/compensation proposals.

7.9.11 As explained in the September 2016 ES Supplement (Document 2.4.4), the information on the extent of Magor Marsh Nature Reserve which formed the basis for the boundary of the reserve shown on the March 2016 ES (Document 2.3.2) Figure 10.3d did not include Barecroft Fields. Regardless of ownership, the effects of the Scheme on the Barecroft Fields SINC were assessed as part of the assessment of the effects on non-statutory designated sites and this identifies that there would be a loss of a small area of land at the north west corner of the SINC (March 2016 ES (Document 2.3.2) paragraph 10.7.33). There would also be some disturbance during construction and operation of the new section of motorway as this would be adjacent to the site. The Barecroft Fields SINC is also part of the Gwent Levels - Redwick and Llandeenny SSSI and the effects were included in the assessment of effects on SSSIs.

7.9.12 Accepting that the Gwent Wildlife Trust consider Barecroft Fields to be part of Magor Marsh Nature Reserve, a receptor of Regional/County (Medium) value, then the magnitude of the impacts

on the reserve would be Minor Adverse as a result of land take, and construction and operation of the new section of motorway. These would be effects of Slight Adverse significance and would not be significant in EIA terms.

- 7.9.13 Newport City Council (SUP0192) requested confirmation as to the rate of 'provision' for loss of SINC. The Council refers to the March 2016 ES (Document 2.3.2) Table 10.2 which states that "*The target is to replace BAP habitats lost at a ratio of 1.5:1, not just those habitats within SINC's*".
- 7.9.14 By way of clarification I here provide a summary of the replacement ratios for the various BAP habitats which would be affected by the Scheme. It should be noted that the SINC's are generally designated on the basis of the BAP habitats present.
- 7.9.15 Coastal saltmarsh: The ratio of replacement habitat to the area permanently lost would be approximately 2.1:1.
- 7.9.16 Eutrophic standing waters: The replacement ratio for replacement of reens would be 1.06:1 and for ditches 1.08:1 (so effectively 1:1). The reason that the ratio of new to existing is not greater is because NRW were concerned that the original proposals could have had adverse effects on the hydrology of the levels. In addition to the reen mitigation strategy the current proposals for SSSI mitigation (revised SSSI Mitigation Strategy (Appendix SR10.35 of the December 2016 ES Supplement (Document 2.4.14)) include re-cutting of 5,865 m of former ditches at Maerdy Farm and Caldicot Moor. Including these additional ditches, the ratio of ditch replacement on this basis would be 1.76:1.
- 7.9.17 Reedbeds: The ratio for replacement of reedbeds would be 1.5:1.
- 7.9.18 Coastal and floodplain grazing marsh: The strategy to mitigate the effects of loss of grazing marsh was described in the SSSI Mitigation Strategy (March 2016 ES Appendix 10.35). This strategy has been

revised through discussion with NRW and a revised SSSI Mitigation Strategy was published as Appendix SR10.35 of the December 2016 ES Supplement (Document 2.4.14). Two types of mitigation have been considered; firstly reversion of arable land to permanent grassland; and secondly, enhancement of the biodiversity value of existing grasslands. The requirements for grazing marsh mitigation have been discussed with NRW and it has been agreed that, for arable reversion, a mitigation ratio of 1:1 has been used since the arable land is not considered to contribute in any material way to SSSI purposes. For grassland enhancement, recognising that the land already has biodiversity value, a mitigation ratio of 1.5:1 has been used, so for every hectare of grassland lost, 1.5 ha would be enhanced.

7.9.19 Lowland Mixed Deciduous Woodland (including Wet Woodland): The overall replacement ratio of woodland along the full length of the Scheme would be 2.1:1.

7.9.20 Hedgerows: The new section of motorway would result in the loss of a total of some 35.8 km of hedgerows of which some 8.2 km are species-rich intact hedgerows. The revised EMP (September 2016 ES Supplement (Document 2.4.4) Figure R2.6) shows some 4.1 km of hedgerow planting. NRW have indicated that hedgerow planting would not be appropriate within the Gwent Levels SSSIs. This is because hedgerows along the field boundaries can result in overgrowth/shading of the reens and field ditches with adverse effects on aquatic macrophytes and invertebrates which are the important features of the SSSIs. The extensive woodland and other landscape planting proposed at the Castleton and Magor Interchanges means that there would be little opportunity for hedgerow planting in these areas. The woodland and linear planting at Castleton and Magor at either end of the route would provide habitats of greater biodiversity value and would provide wildlife corridors.

- 7.9.21 Lowland Meadow: Based on the Phase 1 Habitat Survey mapping, the Scheme would result in the loss of some 7.01 ha of unimproved grassland. The landscape proposals shown on the revised EMP (September 2016 ES Supplement (Document 2.4.4) Figure R2.6) includes some 38.1 ha of species-rich grassland. This is primarily on south facing road embankments and on the banks enclosing the water treatment areas.
- 7.9.22 Open Mosaic Habitats on Previously Developed Land: The March 2016 ES (Document 2.3.2) para 10.7.204 explains that there are areas of ‘brownfield’ land at Great Pencarn; south of the Solutia works; in Newport Docks; south of the Tata Steelworks at Llanwern; and at Green Moor. Following completion of the works all temporary construction work sites would be removed and the land affected would be restored. In restoring the construction sites at Great Pencarn, within Newport Docks and Tata Steel, so far as practicable a mosaic of habitat types providing some of the characteristics of brownfield land would be provided.
- 7.9.23 The Woodland Trust referred to damage and loss of ancient woodland. The March 2016 ES (Document 2.3.2) cat paragraph 10.4.64 explains that the woodlands at Pwll Diwaelod, Berryhill Farm, Pye Corner, Roggiett Brake and Rogiet Rectory Wood are included in the Forestry Commission Ancient Woodland Inventory. Detailed National Vegetation Classification (NVC) surveys of these woodlands confirmed that the woodlands at Pwll Diwaelod, part of the woodland at Berryhill Farm, and the woodlands at Roggiett Brake and Rogiet Rectory Wood were ancient woodland. However at Pye Corner aerial photographs from 1945 and 1979 (Appendix B of this evidence) show that the site was a field at that time. It is evident that most of the current wooded area has been planted relatively recently.
- 7.9.24 Thus Chapter 10 of the March 2016 ES (Document 2.3.2) identifies that areas of ancient woodland at Pwll Diwaelod, Berryhill Farm, and

Roggiett Brake would fall within the limit for temporary and permanent works for the Scheme.

- 7.9.25 Pwll Diwaelod is located at the extreme western end of the Scheme. During detailed design and the development of the detailed Construction Environmental Management Plan further work would be undertaken to minimise the effects on the ancient woodland at Pwll Diwaelod.
- 7.9.26 At Berryhill Farm 1.04 ha was identified as ancient woodland comprising a mature oak and ash woodland including old coppice stools. All of the wood would need to be removed in order to construct the Scheme. To the extent practicable, and avoiding areas affected by Himalayan balsam, during clearance of the wood, coppice stools of hazel and other shrub species would be lifted and replanted in areas of new planting. Woodland topsoil would also be stripped and placed in new planting areas to encourage the establishment of the woodland ground flora.
- 7.9.27 Roggiett Brake is located at the extreme eastern end of the Scheme at the end of the proposed haul road to Ifton Quarry. The proposed haul road would pass through the southern end of the ancient woodland using an existing track which was used as a haul road when stone was transported from the quarry for construction of the Second Severn Crossing. Some clearance of scrub would be required, as would trimming of vegetation on either side of the haul road, but there would be no significant loss of woodland.
- 7.9.28 NRW (OBJ0268) requested an explanation as to how the project would meet the statutory duty on Welsh Government to maintain and enhance biodiversity, particularly in the context of loss and severance of the Gwent Levels SSSI area and impacts on protected species, including dormouse. The statutory duty under the Environment (Wales) Act 2016 Section 6(1) (Document 3.1.16) is that:

“A public authority must seek to maintain and enhance biodiversity in the exercise of functions in relation to Wales, and in so doing promote the resilience of ecosystems, so far as consistent with the proper exercise of those functions.”

7.9.29 In his Proof of Evidence (WG 1.23.1), Mr John Davies explains in relation to this duty, and to the duties relating to furthering the conservation and enhancement of the features of SSSIs under Section 28G of the Wildlife and Countryside Act 1981 (Document 3.1.7), and conserving biodiversity under Section 40(1) of the Natural Environment and Rural Communities (NERC) Act 2006 (Document 3.1.13), that in testing options using WelTAG (Document 6.1.4); selecting a route and making highway design choices that would minimise the effect on the SSSIs; and developing a comprehensive SSSI mitigation strategy, the Welsh Government has sought to maintain and enhance biodiversity insofar as that is consistent with the proper exercise of its functions regarding the motorway network.

8. CONCLUSIONS

- 8.1.1 The proposed new section of motorway would pass through European, nationally and locally designated sites, and would affect habitats that support protected and notable species, such as bats, otter, dormouse, water vole, badger, hedgehog, reptiles, great crested newts and other amphibians, birds, fish, invertebrates and plant species. A comprehensive suite of ecological surveys has been carried out, commencing in 2014, continuing through 2015 with some further surveys being undertaken in 2016.
- 8.1.2 I have described the mitigation measures which are proposed and have taken these into account in assessing the impacts of the Scheme as set out in Chapter 10 of the March 2016 ES (Document 2.3.2), the September 2016 ES Supplement (Document 2.4.4) and the December 2016 ES Supplement (Document 2.4.14).
- 8.1.3 The new section of motorway would cross the River Usk/Afon Wysg Special Area of Conservation (SAC), a European designated site. The features of the SAC in the Newport area are six fish species, four of which are migratory, and otter. The section of the river through Newport also forms part of a nationally designated site, the River Usk (Lower Usk) Site of Special Scientific Interest (SSSI).
- 8.1.4 The east pylon of the River Usk crossing would be located within an area of saltmarsh within the SAC and SSSI. The qualifying features of the SAC (fish and otters) would not be significantly affected. Saltmarsh is not a feature of the SAC but is a feature of the SSSI and would be replaced.
- 8.1.5 Effects on European Sites have been assessed separately in a process known as Assessment of Implications (of highways and/or road projects) on European Sites, and the results of the assessment have been provided in the form of a Statement to Inform an Appropriate Assessment (Document 2.3.4). The conclusion of the SIAA report was that there would be no adverse effect on the integrity

of the European sites considered either alone or in-combination with other plans and projects.

- 8.1.6 The new section of motorway would cross the Gwent Levels St Bride's SSSI, the Nash and Goldcliff SSSI, the Whitson SSSI and the Redwick and Llandevenny SSSI. The special features of these sites are the reen and ditch habitats, supporting aquatic plants and invertebrates, and the shrill carder bee. The reens and ditches support diverse aquatic plant communities, which in turn support a wide range of other wildlife. Otter, water vole, grass snake and amphibians are also present. The land take for the Scheme would have significant effects on these SSSIs.
- 8.1.7 As explained in the Supplementary File note on the Reen Mitigation Strategy (September 2016 ES Supplement (Document 2.4.4) Appendix S2.1), 2,755 m of reen and 9,373 m of field ditches would be infilled or culverted during the construction of the new section of motorway. These would be replaced by a total of 2,826 m of new main reen and 10,594 m of new field ditch. The new reens would connect reens cut off by the new section of motorway, with sluices to allow management of water levels. The new ditches would connect to the nearest reens to provide connectivity. In addition to the new watercourses to be provided through the Reen Mitigation Strategy, the revised proposals for SSSI Mitigation (revised SSSI Mitigation Strategy (Appendix SR10.35 of the December 2016 ES Supplement (Document 2.4.14)) include recutting of some 5.9 km of former field ditches in the SSSI Mitigation areas at Maerdy Farm and Caldicot Moor.
- 8.1.8 This would ensure that there was no reduction in the extent of the freshwater ecosystem which is the basis of much of the interest of the Gwent Levels SSSIs. In addition the provision of berms within the replacement reens, and the lack of shading hedgerows, would provide good opportunities for growth of aquatic macrophytes.

- 8.1.9 In addition to the replacement of watercourses mitigation for the loss of grazing marsh is proposed through the SSSI Mitigation Strategy. This was attached to the March 2016 ES (Document 2.3.2) as Appendix 10.35 and a revised version was published as Appendix SR10.35 of the December 2016 ES Supplement (Document 2.4.14). The aim of the strategy is to provide mitigation for the loss of coastal grazing marsh habitat as a result of the Scheme and, where practicable, to ecologically enhance land within the Gwent Levels SSSIs. As explained in the revised SSSI Mitigation Strategy (Appendix SR10.35 of the December ES Supplement (Document 2.4.14)), the temporary and permanent loss of grazing marsh would amount to some 86.4 ha.
- 8.1.10 Three mitigation areas have been identified, these being Maerdy Farm, Tatton Farm and Caldicot Moor. The total area of the land identified in the revised proposals within these three areas is 129.6 ha, of which 107.1 ha would be available for mitigation for loss of grazing marsh through arable reversion and enhancement of existing grassland.
- 8.1.11 The requirements for grazing marsh mitigation have been discussed with NRW and it has been agreed that, for arable reversion, a mitigation ratio of 1:1 has been used since the arable land is not considered to contribute in any material way to SSSI purposes. For grassland enhancement, recognising that the land already has biodiversity value, a mitigation ratio of 1.5:1 has been used, so for every hectare of grassland lost, 1.5 ha would be enhanced. The land identified in the revised proposals at Tatton Farm, Maerdy Farm and Caldicot Moor is sufficient, based on the ratios agreed with NRW, to satisfy the requirement for mitigation of the loss of grazing marsh.
- 8.1.12 Operation of the new section of motorway (including changes in air quality) would have no significant effect on the internationally and nationally and designated sites.

- 8.1.13 Nature reserves in the vicinity of the new section of motorway are the Newport Wetlands National Nature Reserve and RSPB Nature Reserve, and the Great Traston Meadows and Magor Marsh Gwent Wildlife Trust Nature Reserves. The Scheme would not result in land take from the Newport Wetlands or Great Traston Meadows nature reserves. Similarly there would be no effects on the main part of Magor Marsh Nature Reserve which is open to the public. The Gwent Wildlife Trust also owns land at Barecroft Fields designated as a SINC, the north west corner of which is within the footprint of the new section of motorway, and the remainder of which would be subject to increased noise. Accepting that the Gwent Wildlife Trust consider Barecroft Fields to be part of Magor Marsh Nature Reserve then there would be impacts on the reserve as a result of land take, and construction and operation of the new section of motorway. These effects would not be significant in EIA terms.
- 8.1.14 The proposed new section of motorway would cross a number of non-statutory designated sites including nine Sites of Importance for Nature Conservation (SINCs), which include mostly river, grassland and industrial habitats, and three areas of ancient woodland. In addition, there would be temporary land take during construction within three SINCs. Overall the effects on the SINCs would be significant.
- 8.1.15 Significant long term effects of land take on habitats would be those on grazing marsh, lowland mixed deciduous woodland, hedgerows and open mosaic habitats on previously developed land. There would also be significant land take effects in the short or medium term or significant effects during construction on rivers, coastal saltmarsh, lowland meadow (species-rich), eutrophic standing waters and reedbeds. Operation of the proposed new section of motorway would not have significant effects on habitats.

- 8.1.16 The target in designing the Scheme has been to replace BAP habitats at a ratio of 1.5:1. This has been achieved for coastal saltmarsh, reedbeds, woodland, and lowland meadow.
- 8.1.17 For eutrophic standing waters, taken here to be reens and ditches, the replacement ratio of replacement for reens would be 1.06:1 and for ditches 1.08:1 (so effectively 1:1). The reason that the ratio of new to existing is not greater is because NRW were concerned that the original proposals could have had adverse effects on the hydrology of the levels. In addition to the reen mitigation strategy, the current proposals for SSSI mitigation set out in the revised SSSI Mitigation Strategy (Appendix SR10.35 of the December 2016 ES Supplement (Document 2.4.14)) include re-cutting of 5,865 m of former ditches at Maerdy Farm and Caldicot Moor. Including these additional ditches, the ratio of ditch replacement would be 1.76:1.
- 8.1.18 The strategy to mitigate the effects of loss of coastal grazing marsh is described in the revised SSSI Mitigation Strategy (Appendix SR10.35 of the December 2016 ES Supplement (Document 2.4.14)). As I have explained earlier in these conclusions, the requirements for grazing marsh mitigation have been discussed with NRW and it has been agreed that, for arable reversion, a mitigation ratio of 1:1 has been used, and for grassland enhancement a mitigation ratio of 1.5:1 has been used.
- 8.1.19 The new section of motorway would result in the loss of a total of some 35.8 km of hedgerows of which some 8.2 km are species-rich intact hedgerows. The revised EMP (September 2016 ES Supplement Figure R2.6 (Document 2.4.4)) shows some 4.1 km of hedgerow planting. NRW have indicated that hedgerow planting would not be appropriate within the Gwent Levels SSSIs. This is because hedgerows along the field boundaries can result in overgrowth/shading of the reens and field ditches with adverse effects on aquatic macrophytes and invertebrates which are the important features of the SSSIs. The extensive woodland and other landscape

planting proposed at the Castleton and Magor Interchanges means that there would be little opportunity for hedgerow planting in these areas. The woodland and linear planting at Castleton and Magor at either end of the route would provide habitats of greater biodiversity value and would provide wildlife corridors.

- 8.1.20 For Open Mosaic Habitats on Previously Developed Land, the March 2016 ES (Document 2.3.2) para 10.7.204 explains that there are areas of ‘brownfield’ land at Great Pencarn, south of the Solutia works, in Newport Docks, south of the Tata Steelworks at Llanwern and at Green Moor. Following completion of the works all temporary construction work sites would be removed and the land affected would be restored. In restoring the construction sites at Great Pencarn, within Newport Docks and Tata Steel, so far as practicable a mosaic of habitat types providing some of the characteristics of brownfield land would be provided.
- 8.1.21 Protected species licenses would be required for works affecting badger, dormouse, bats and great crested newt and these licences would be obtained from NRW prior to the commencement of works. Mitigation strategies for these species have been developed in consultation with NRW and drafts were appended to the December 2016 ES Supplement (Document 2.4.14).
- 8.1.22 Significant long term effects of land take on species would be those on shrill carder bee, other terrestrial invertebrates, common crane and Cetti’s warbler. There would also be significant land take effects in the short or medium term, or significant effects during construction on wet grassland plants, aquatic plants, otter, freshwater invertebrates, shrill carder bee, other terrestrial invertebrates, bats, common crane, Cetti’s warbler, barn owl, and wintering birds (redshank, gadwall and pintail). Operation of the new section of motorway would have significant long term effects on otter, bats, common crane and Cetti’s warbler.

- 8.1.23 Welsh Government has a statutory duty to maintain and enhance biodiversity, particularly in the context of loss and severance of the Gwent Levels SSSIs and impacts on protected species. The statutory duty under the Environment (Wales) Act 2016 Section 6(1) (Document 31.7) is that :

“A public authority must seek to maintain and enhance biodiversity in the exercise of functions in relation to Wales, and in so doing promote the resilience of ecosystems, so far as consistent with the proper exercise of those functions.”

- 8.1.24 In relation to this duty, and to the duties under Section 28G of the Wildlife and Countryside Act 1981 (relating to furthering the conservation and enhancement of the features of SSSIs) and conserving biodiversity under Section 40(1) of the Natural Environment and Rural Communities Act 2006 (Document 3.1.13), Mr John Davies explains in his Proof of Evidence (WG1.23.1) that in testing options using WelTAG (Document 6.1.4); selecting a route and making highway design choices that would minimise the effect on the SSSIs; and developing a comprehensive SSSI mitigation strategy, the Welsh Government has sought to maintain and enhance biodiversity insofar as that is consistent with the proper exercise of its functions regarding the motorway network.

- 8.1.25 My Proof of Evidence includes all the 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.

- 8.1.26 I believe the facts which I have stated in this Proof of Evidence are true and that the opinions expressed are correct.

- 8.1.27 I understand my duty to the Inquiry to assist it with matters within my expertise and I believe that I have complied with that duty.

References

The following sections of the Design Manual for Roads and Bridges do not have individual Document numbers but are included in Document 6.1.8 Design Manual for Roads and Bridges (2014).

Highways Agency (1993). Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 4: Ecology and Nature Conservation.

Highways Agency (1999). DMRB Volume 10, Section 4, Part 4: Nature Conservation advice in relation to Otters (HA 81/99).

Highways Agency (2001) DMRB Volume 10, Section 4, Part 2 (HA 59/92): Mitigating against Effects on Badgers.

Highways Agency (2008). Design Manual for Roads and Bridges HA 201/08 Volume 11, Section 2, Part 1. General Principles and Guidance of Environmental Impact Assessment.

Highways Agency (2009). DMRB Volume 11, Section 4, Part 1 (HD44/09). Assessment of Implications (of Highways and Roads Projects) on European Sites (Including Appropriate Assessment).

Appendix A

Summary of Likely Significant Effects on Ecology and Nature Conservation

Activity/ Receptor	Value of receptor	Description of impact	Short / medium / long term	Magnitude of impact (without mitigation)	Significance of effect (without mitigation)	Magnitude of impact (with mitigation)	Significance of effect (with mitigation)	Significant / Not significant In EIA terms
Land take								
National Statutory Designated Sites	High	Habitat loss including grazing marsh	Short term	Moderate Adverse	Moderate/ Large	Moderate Adverse	Moderate/ Large	Significant
			Medium/ Long term	Moderate Adverse	Moderate/ Large	Minor Adverse	Slight/ Moderate	Significant
Non-statutory Designated Sites	Medium	Habitat loss including grassland, ancient woodland	Short term	Major Adverse	Moderate/ Large	Major Adverse	Moderate/ Large	Significant
			Medium/ Long term	Major Adverse	Moderate/ Large	Moderate Adverse	Moderate	Significant
Rivers (Usk and Ebbw)								
Coastal saltmarsh	Medium (Ebbw)/ High (Usk)	Loss of saltmarsh	Short/ Medium term	Minor Adverse	Slight/ Moderate (River Usk) Slight (river Ebbw)	Minor Adverse	Slight/ Moderate (River Usk) Slight (River Ebbw)	Significant
Reens, ditches, reedbeds and ponds								
Reedbeds	Medium	Habitat loss	Short term	Moderate Adverse	Moderate	Moderate Adverse	Moderate	Significant
Freshwater invertebrates	High	Habitat loss	Short term	Minor Adverse	Slight/ Moderate	Minor Adverse	Slight/ Moderate	Significant
Grazing Marsh								
Coastal and floodplain grazing marsh	High	Habitat loss	Short term	Moderate Adverse	Moderate/ Large	Moderate Adverse	Moderate/ Large	Significant
			Medium/ Long term	Moderate	Moderate/ Large	Minor Adverse	Slight/ Moderate	Significant

Activity/ Receptor	Value of receptor	Description of impact	Short / medium / long term	Magnitude of impact (without mitigation)	Significance of effect (without mitigation)	Magnitude of impact (with mitigation)	Significance of effect (with mitigation)	Significant / Not significant In EIA terms
			Long term	Adverse	Large		Moderate	
Shrill carder bee	High	Habitat loss	Short/ Medium term	Moderate Adverse	Moderate/ Large	Moderate Adverse	Moderate/ Large	Significant
			Long term	Moderate Adverse	Moderate/ Large	Minor Adverse	Slight/ Moderate	Significant
Wet grassland plants	Medium	Habitat loss	Short term	Moderate Adverse	Moderate	Moderate Adverse	Moderate	Significant
Farmland								
Lowland mixed deciduous woodland (Semi-natural)	Medium	Habitat loss	Short/ Medium term	Major Adverse	Moderate/ Large	Major Adverse	Moderate/ Large	Significant
			Long term	Major Adverse	Moderate/ Large	Moderate Adverse	Moderate	Significant
Hedgerows	Medium	Habitat loss	Short/ Medium/ Long term	Moderate	Moderate	Moderate Adverse	Moderate	Significant
Lowland meadow (Species-rich)	Medium	Habitat loss	Short term	Moderate Adverse	Moderate	Moderate Adverse	Moderate	Significant
Industrial land								
Open mosaic habitats on previously developed land	Medium	Habitat loss	Short/ Medium term	Major Adverse	Moderate/ Large	Major Adverse	Moderate/ Large	Significant
			Long term	Major Adverse	Moderate/ Large	Moderate Adverse	Moderate	Significant
Terrestrial invertebrates	Medium	Habitat loss	Short/ Medium term	Major Adverse	Moderate/ Large	Major Adverse	Moderate/ Large	Significant
			Long term	Major Adverse	Moderate/ Large	Moderate Adverse	Moderate	Significant
Bats								
Bats	Medium	Habitat loss	Short/	Major Adverse	Moderate/	Moderate	Moderate	Significant

Activity/ Receptor	Value of receptor	Description of impact	Short / medium / long term	Magnitude of impact (without mitigation)	Significance of effect (without mitigation)	Magnitude of impact (with mitigation)	Significance of effect (with mitigation)	Significant / Not significant In EIA terms
			Medium term		Large	Adverse		
Breeding Birds								
Cetti's warbler	High	Habitat loss	Short term	Moderate Adverse	Moderate/ Large	Moderate Adverse	Moderate/ Large	Significant
			Medium term	Moderate Adverse	Moderate/ Large	Minor Adverse	Slight/ Moderate	Significant
			Long term	Minor Adverse	Slight/ Moderate	Minor Adverse	Slight/ Moderate	Significant
Barn owl	Medium	Habitat loss	Short term	Moderate Adverse	Moderate	Moderate Adverse	Moderate	Significant
Common Crane	High	Habitat Loss	Short term	Major Adverse	Large/ Very Large	Major Adverse	Large/ Very Large	Significant
			Medium/ Long term	Major Adverse	Large/ Very Large	Moderate Adverse	Moderate/ Large	Significant
Construction phase								
National Statutory Designated Sites	High	Disturbance, habitat loss	Short/ Medium term	Minor Adverse	Slight/ Moderate	Minor Adverse	Slight/ Moderate	Significant
Rivers (Usk and Ebbw)								
Rivers	Medium (Ebbw)/ High (Usk)	Pollution	Short/ Medium term	Minor Adverse	Slight/ Moderate (River Usk) Slight (River Ebbw)	Minor Adverse	Slight/ Moderate (River Usk) Slight (River Ebbw)	Significant
Coastal saltmarsh	Medium (Ebbw)/ High (Usk)	Habitat loss	Short/ Medium term	Minor Adverse	Slight (River Ebbw) Slight/ Moderate (River Usk)	Minor Adverse	Slight (River Ebbw) Slight/ Moderate (River Usk)	Significant

Activity/ Receptor	Value of receptor	Description of impact	Short / medium / long term	Magnitude of impact (without mitigation)	Significance of effect (without mitigation)	Magnitude of impact (with mitigation)	Significance of effect (with mitigation)	Significant / Not significant In EIA terms
Reens, ditches, reedbeds and ponds								
Eutrophic standing waters	High	Pollution	Short/ Medium term	Minor Adverse	Slight/ Moderate	Minor Adverse	Slight/ Moderate	Significant
Reedbeds	Medium	Habitat loss	Short/ Medium term	Moderate Adverse	Moderate	Moderate Adverse	Moderate	Significant
Aquatic macrophytes	High	Loss of species diversity	Short/ Medium term	Moderate Adverse	Moderate/ Large	Minor Adverse	Slight/ Moderate	Significant
Otter	High	Habitat loss, fatality, pollution, disturbance	Short/ Medium term	Moderate Adverse	Moderate/ Large	Minor Adverse	Slight/ Moderate	Significant
Freshwater invertebrates	High	Loss of species diversity	Short/ Medium term	Moderate Adverse	Moderate/ Large	Minor Adverse	Slight/ Moderate	Significant
Grazing Marsh								
Shrill carder bee	High	Habitat loss	Short/ Medium term	Moderate Adverse	Moderate/ Large	Moderate Adverse	Moderate/ Large	Significant
			Long term	Moderate Adverse	Moderate/ Large	Minor Adverse	Slight/ Moderate	Significant
Bats								
Bats	Medium	Habitat loss	Short/ Medium term	Moderate Adverse	Moderate	Moderate Adverse	Moderate	Significant
Breeding Birds								
Cetti's warbler	High	Habitat loss, disturbance	Short/ Medium term	Moderate Adverse	Moderate/ Large	Moderate Adverse	Moderate/ Large	Significant
Common Crane	High	Disturbance	Short/ Medium term	Minor Adverse	Slight/ Moderate	Minor Adverse	Slight/ Moderate	Significant
Wintering Birds								

Activity/ Receptor	Value of receptor	Description of impact	Short / medium / long term	Magnitude of impact (without mitigation)	Significance of effect (without mitigation)	Magnitude of impact (with mitigation)	Significance of effect (with mitigation)	Significant / Not significant In EIA terms
Redshank, Gadwall, Pintail	High	Habitat loss, disturbance	Short/ Medium term	Minor Adverse	Slight/ Moderate	Minor Adverse	Slight/ Moderate	Significant
Operational Phase								
Reens, ditches, reedbeds and ponds								
Otter	High	Severance, pollution	Long term	Major Adverse	Large/Very Large	Minor Adverse	Slight/ Moderate	Significant
Bats								
Bats	Medium	Severance	Long term	Moderate Adverse	Moderate	Moderate Adverse	Moderate	Significant
Breeding Birds								
Cetti's warbler	High	Severance, disturbance	Long term	Moderate Adverse	Moderate /large	Moderate Adverse	Moderate/ large	Significant
Common Crane	High	Disturbance	Long term	Minor Adverse	Slight/ Moderate	Minor Adverse	Slight/ Moderate	Significant

Appendix B

Aerial photographs of location of woodland at Pye Corner (1945 and 1979)



