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# M4 Corridor around Newport

## December 2016 Environmental Statement Supplement

Welsh Government

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## December 2016 Environmental Statement Supplement

At Issue | December 2016

**CVJV/AAR**
3rd Floor
Longcross Court,
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Cardiff
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# Contents

Welsh Government

# M4 Corridor around Newport

## December 2016 Environmental Statement Supplement Main Text

M4CaN-DJV-EGN-ZG_GEN-RP-EN-0043

At Issue | December 2016

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# Contents

# Glossary

| | |
|---|---|
| ALC: | Agricultural Land Classification |
| ARN: | Affected Road Network |
| AQMA: | Air Quality Management Area |
| BoCC: | Birds of Conservation Concern |
| CL: | Contaminated Land |
| DfT: | Department for Transport |
| DMRB: | Design Manual for Roads and Bridges |
| EIA: | Environmental Impact Assessment |
| ES: | Environmental Statement |
| ESS: | Environmental Statement Supplement |
| FCA: | Flood Consequence Assessment |
| IEMA: | Institute of Environmental Management and Assessment |
| M4CaN: | M4 Corridor around Newport |
| NRW: | Natural Resources Wales |
| NTEM: | National Trip End Model |
| OYDM: | Opening Year Do Minimum |
| OYDS: | Opening Year Do Something |
| Pre-CEMP: | Pre-Construction Environmental Management Plan |
| SAC: | Special Area of Conservation |
| SPA: | Special Protection Area |
| SSSI: | Site of Special Scientific Interest |
| TEMPRO: | Trip End Model Presentation Program |
| WelTAG: | Welsh Transport Planning and Appraisal Guidance |
| WTA: | Water Treatment Area |

# Non-Technical Summary

1. Draft Orders for the proposed M4 Corridor around Newport (M4CaN) were published by Welsh Government in March 2016, together with an Environmental Statement (ES) and associated reports.

2. M4CaN (referred to in this document as 'the Scheme') includes a proposed new section of three lane motorway between Castleton (Junction 29 of the existing M4) and Magor (Junction 23 of the existing M4) to the south of Newport in South Wales, together with a number of Complementary Measures on the existing M4 between the same junctions.

3. In September 2016 a supplement to the ES was published (the September 2016 ESS) which provided errata; clarified some aspects of the cultural heritage assessment, and impacts during construction; provided the results of some of the 2016 ecological surveys; and provided updated or additional information to a number of appendices, including the Register of Environmental Commitments.

4. None of the additional data provided in the September 2016 ESS materially altered the assessment and conclusions of the March 2016 ES.

5. The final part of the September 2016 ESS described and assessed a number of modifications to the Scheme design since the publication of the draft Orders and consequential modifications to the Environmental Management Plans. The more significant design modifications were at the Magor Interchange where Bencroft Lane was realigned and at Docks Way junction.

6. Since September 2016, further information pertinent to the Scheme has become available and two further modifications to the design have been made. These, together with further errata and clarifications are reported in a second Environmental Statement Supplement (the December 2016 ESS) which should be read alongside the published March 2016 ES and the September 2016 ESS.

7. Part A of the December 2016 ESS is concerned with errata and sets out factual errors, inconsistencies and omissions.

8. Part B provides clarification and more detail to the Buildability Report (March 2016 ES Appendix 3.1) and the pre-CEMP (March 2016 ES Appendix 3.2). Clarification in the Buildability Report is provided predominantly in the form of plans, drawings, sketches and figures, including a set of detailed construction sequence plans for a section of the Caldicot Levels.

9. Part C provides updated and/or additional information that has become available since the publication of the September 2016 ESS. It includes the reports of the 2016 Dormouse Survey, two 2016 Bat Surveys (in respect of buildings and structures, and trees) together with a report on the Common crane.

10. Part C also includes mitigation strategies in respect of dormice, bats, great crested newts and water voles. These will be used to inform the protected species licence applications to Natural Resources Wales (NRW) which would be applied for prior to construction. The SSSI Mitigation Strategy (March 2016 ES Appendix 10.35) is also updated following comments from NRW together with Appendix R18.1 (Register of Environmental Commitments) which was first updated in the September 2016 ESS.

11. A Navigation Risk Assessment has been undertaken with stakeholders in respect of navigation on the Rivers Ebbw and Usk and within Newport Docks. The results of that assessment which will be used to inform the Marine Licence application are reported also in Part C.

12. Since the publication of the draft Orders NRW has stated its intention to issue guidance on water quality standards for the Gwent Levels. As a consequence, in Part C the DMRB risk assessments for the proposed water treatment areas (ES Appendix 16.3) have been updated in line with the new guidance. Part C also provides, as an appendix, an assessment for all consented and licensed sites regulated under health and safety regulation that could be affected by the Scheme.

13. Part D is concerned with two design changes that require modifications to the published draft Statutory Orders, with the implications of the changes in guidance relating to traffic growth forecasts published by the Department of Transport in July 2016, changes in guidance relating to the "Values of Time" and the 2016 budget announcement on the future of the Severn Crossing Tolls. For further information please see section 1.2 of the Revised Traffic Forecasting Report dated December 2016.

14. The first design modification is that the elevation of the bridges across Newport Docks and the River Usk has been raised together by a maximum of approximately 1.54 metres to take into account future changes in retained water level within the docks due to climate change and a reconsideration of the navigation safety zone. The maximum increase relates to the height of the two towers and the centre part of the bridge deck carrying the proposed new section of motorway. The east and west viaduct approaches between the area of maximum raising and the embankments at each end, the elevations and locations of which remain the same, are not raised as much and have a steeper gradient than previously. Part D provides an update to the visual impact assessment of raising the bridge which concludes that there would be no change to the overall assessment, nor any significant change at specific locations with a view of the bridge.

15. The second design modification relates to the removal of one retaining wall, and the creation of another, on the Docks Way Link Road between the Docks Way Junction and the A48 Southern Distributor Road. These changes do not materially alter the assessment and conclusions of the March 2016 ES.

16. The new TEMPRO values, changes in the value of the time and the half toll charges for the Severn Crossings have affected the predicted future year (2022 and 2037) traffic flows with consequential potential effects on changes in noise levels, air quality and carbon emissions. These, together with an explanation of the TEMPRO and traffic changes, are reported in Part D. In some locations the new traffic forecasts have resulted in increases in predicted traffic flows, primarily on the M48 and M4 near to the Severn Crossing tolls and in others, particularly those further west, to a decrease in traffic flows. However, in respect of noise, air quality and carbon these changes do not significantly affect the overall conclusions set out in the March 2016 ES.

17. Copies of the modified Orders, this ES Supplement and Summary, and supporting information are available to view during normal office hours at the locations below.

    - Orders Branch, Transport, Department of Economy Science and Transport, Welsh Government, Cathays Park, Cardiff, CF10 3NQ.

- Newport City Council, Civic Centre, Godfrey Road, Newport, NP20 4UR.
- Monmouthshire County Council, County Hall, Rhadyr, Usk, NP15 1GA.
- Monmouthshire County Council, Innovation House, Wales 1 Business Park, Magor, Monmouthshire, NP26 3DG.
- Newport Central Library, John Frost Square, Newport, NP20 1PA.

18. Further copies of the ES Supplement Summary can be obtained free of charge from the Welsh Government in Cardiff at the following address.

    Orders Branch
    Transport
    Department of Economy, Science and Transport
    Welsh Government
    Cathays Park, Cardiff
    CF10 3NQ.

19. The ES Supplement and Summary (together with the full March 2016 ES and the September 2016 ESS) are available to view and download from the Welsh Government website:

    http://www.wales.gov.uk/m4newport

20. Electronic copies of the March 2016 ES and two ES Supplements (on DVD) can be purchased from the above Welsh Government address at a cost of £20 (including postage and packaging).

21. Paper copies of the March 2016 ES and two ES Supplements are also available from the above address, although an administrative charge will be made to cover the cost of copying (price on application).

# 1 Introduction

## 1.1 Introduction

**1.1.1** M4CaN (referred to in this document as 'the Scheme') includes a proposed new section of three lane motorway between Castleton (Junction 29 of the existing M4) and Magor (Junction 23 of the existing M4) to the south of Newport in South Wales.

**1.1.2** The Scheme would also include a range of Complementary Measures. These are measures that would assist in alleviating travel related problems on the existing M4. The measures include reclassification of the existing M4 as a trunk road between Castleton and Magor, relief to Junction 23A with a new M4/M48/B4245 connection and provision of cycle and walking friendly infrastructure. These measures are complementary to the provision of the new section of motorway but would not by themselves alleviate the travel related problems on the existing M4.

**1.1.3** Draft Orders for the proposed M4 Corridor around Newport (M4CaN) were published by Welsh Government in March 2016, together with an Environmental Statement (ES) and associated reports.

**1.1.4** In September 2016 a supplement to the ES was published (the September 2016 ESS) which in Part A corrected a number of factual errors, inconsistencies and omissions primarily related to baseline information. Part B clarified aspects of the cultural heritage survey work and proposed mitigation, the marine historic environment, aspects of the landscape and visual assessment during construction, the impact on Barecroft Fields which is part of the Magor Marsh nature reserve, and the impact during construction on the Cardiff to Newport cycleway (NR88). Part C provided updated or additional information in the form of an updated Drainage Strategy, an updated Reen Mitigation Strategy, additional information on the Pye Corner WWII Barrage Balloon Tethers site, the results of the 2015 – 2016 Wintering Bird Survey, the 2016 Breeding Bird Survey, the 2016 Great Crested Newt Survey and the 2016 Bat Hibernation Roost Survey. Interim statements with regard to the Dormouse Survey 2016 and the Bat Emergence Survey 2016 were also included.

**1.1.5** Part C also updated Appendix 11.1 of the March 2016 ES and its supporting Contaminated Land (CL) annexes. It also provided the results from further rounds of quarterly surface water monitoring and provided an update to the Flood Consequences Assessment (FCA, ES Appendix 16.1). Appendix 17.2 (Planning Applications (for cumulative assessment)) and Appendix 18.1 (Register of Environmental Commitments) were also updated.

**1.1.6** None of the additional data provided in the September 2016 ESS materially altered the assessment and conclusions of the March 2016 ES.

**1.1.7** Part D of the September 2016 ESS described and assessed a number of modifications to the Scheme design since the publication of the draft Orders and consequential modifications to the Environmental Management Plans. The design modifications were at the Magor Interchange where Bencroft Lane was realigned and at Docks Way junction. Minor modifications were made to the Glan Llyn Junction and between M4 J23 and J23a.

**1.1.8** Since September 2016, further information pertinent to the Scheme has become available, including changes in guidance relating to traffic growth forecsts and further modifications to the design have been made. These, together with further errata and clarifications are reported here in a second Environmental Statement Supplement (the December 2016 ESS) which should be read alongside the published March 2016 ES and the September 2016 ESS.

**1.1.9** This December 2016 ESS is provided voluntarily to give greater clarity to environmental aspects of the Scheme by correcting minor factual errors and by providing new information and/or data.

## 1.2 Scope and Content of the ES Supplement

**1.2.1** This ES Supplement is divided into four parts, Part A to Part D. Part A identifies and corrects, by ES chapter, a number of minor factual errors, inconsistencies and omissions. Part B provides points of clarification in relation to the text provided within the March 2016 ES and September 2016 ESS. None of these corrections or clarifications alter the conclusions or the significance of effects set out in the ES.

**1.2.2** Part C introduces new supplementary information that has become available since the publication of the September 2016 ESS, including the findings of additional survey work. Part D is concerned with two design changes that require modifications to the published draft Statutory Orders, and with the implications of the changes in guidance relating to traffic growth forecasts, published by the Department of Transport in July 2016, changes in guidance relating to the "Values of Time" and the 2016 budget announcement on the future of the Severn Crossing Tolls. For further information please see section 1.2 of the Revised Traffic Forecasting Report dated December 2016.

**1.2.3** A non-technical summary of this ES Supplement is provided at the beginning of this document and is also available as a separate bilingual document.

**1.2.4** Table 1.1 sets out the structure of this ES Supplement. Figures and appendices within this ES Supplement have been referenced as follows.

- New figures or appendices (not previously forming part of the March 2016 ES or September 2016 ESS) are numbered according to their March 2016 ES chapter number and then in numerical order e.g. 10.1, 10.2 etc. To distinguish such new documents from the figures and appendices published in the March 2016 ES or September 2016 ESS, these new figures and appendices are pre-fixed with an 'SS'.
- Figures or appendices that formed part of the March 2016 ES or September 2016 ESS but have been updated or replaced retain their previous ES or ESS figure/appendix number but are pre-fixed with an 'SR' to distinguish them from the previous version.

**ES Supplement Table 1.1: Structure of the December 2016 ES Supplement**

| Structure of ES Supplement | |
|---|---|
| **Main Text** | Glossary |
| | Non- Technical Summary |
| Part A | Errata: Sets out factual errors, inconsistencies and omissions. |
| Part B | Clarifications: Sets out clarifications in relation to the text |

| Structure of ES Supplement | |
|---|---|
| | provided in the March 2016 ES and September 2016 ESS. |
| Part C | Additional information: New supplementary information that has become available since the publication of the September 2016 ESS, including the findings of additional survey work. |
| Part D | Design modifications: Details of changes to the Scheme since publication of the September 2016 ESS. |
| **Figures** | |
| Updated figures and drawings to accompany the text. | |
| **Appendices** | |
| Updated and new specialist reports forming technical appendices to the text. | |

## 1.3 The Assessment Team

**1.3.1** The Welsh Government awarded a Professional Services Contract for the Scheme development and environmental surveys, including publication of the March 2016 ES and up to and including any Public Local Inquiry. The contract was awarded to a Joint Venture of Costain, Vinci and Taylor Woodrow with a consultant joint venture of Arup and Atkins, supported by environmental sub-consultant RPS.

**1.3.2** The Environmental Impact Assessment (EIA) process has been managed by RPS, taking into account information provided by the Welsh Government, design and consultant team. RPS is a registrant of the Institute of Environmental Management and Assessment (IEMA) Quality Mark. Details of the EIA project team are provided in Table 1.2.

### ES Supplement Table 1.2: EIA Topic Specialists

| Topic | Main Author/Contributor |
|---|---|
| EIA project management | RPS |
| Air Quality | Arup (part of Arup Atkins Joint Venture) |
| Cultural Heritage | RPS |
| Landscape and Visual Effects | Atkins (part of Arup Atkins Joint Venture) |
| Ecology and Nature Conservation | RPS |
| Geology and Soils | RPS |
| Materials | RPS |
| Noise and Vibration | RPS |
| All Travellers | RPS |
| Community and Private Assets | RPS |
| Road Drainage and the Water Environment | RPS |
| Assessment of Cumulative Effects and Inter-relationships | RPS |
| Environmental Management | RPS |

## 1.4 Publication of the ES Supplement

**1.4.1** This ES Supplement is submitted to accompany the publication of Supplementary Orders for the Scheme.

**1.4.2** Copies of the Supplementary Orders, this ES Supplement and supporting information are available to view during normal office hours at the locations below.

- Orders Branch, Transport, Department of Economy Science and Transport, Welsh Government, Cathays Park, Cardiff, CF10 3NQ.
- Newport City Council, Civic Centre, Godfrey Road, Newport, NP20 4UR.
- Monmouthshire County Council, County Hall, Rhadyr, Usk, NP15 1GA.
- Monmouthshire County Council, Innovation House, Wales 1 Business Park, Magor, Monmouthshire, NP26 3DG.
- Newport Central Library, John Frost Square, Newport, NP20 1PA.

**1.4.3** In addition, copies of the draft Orders, the March 2016 ES and associated reporting published in March 2016 and the September 2016 ESS are available in the same locations.

**1.4.4** Further copies of the Non-Technical Summary (which is available as a separate bilingual document) can be obtained free of charge from the Welsh Government in Cardiff at the following address.

Orders Branch
Transport
Department of Economy, Science and Transport
Welsh Government
Cathays Park, Cardiff
CF10 3NQ.

**1.4.5** The full March 2016 ES, September 2016 ESS and December 2016 ESS are available to view and download from the Welsh Government website.

http://www.wales.gov.uk/m4newport

**1.4.6** Electronic copies of the March 2016 ES and ES Supplements (on DVD) can be purchased from the above Welsh Government address at a cost of £20 (including postage and packaging).

**1.4.7** Paper copies of the March 2016 ES and ES Supplements are also available from the above address, although an administrative charge will be made to cover the cost of copying (price on application).

## 1.5 Next Steps

**1.5.1** Welsh Government plan to hold a Public Local Inquiry commencing in spring 2017. Such Inquiries are held before an independent Inspector who would hear and consider the evidence both for and against the published Scheme and subsequently report their findings and recommendations to the Welsh Ministers. The Welsh Ministers would consider all issues, including any new information arising, before deciding whether to proceed with the Scheme and, if so, make the Orders with or without modification.

**1.5.2** Subject to the above process, the approximate key dates for progressing the M4 Corridor around Newport are as follows.

- Start of Public Local Inquiry: Spring 2017.
- Start of construction: Spring/Summer 2018.

- Completion of construction of new section of motorway: by the end of 2021.
- Completion of work associated with reclassification of existing motorway: by the end of 2022.

# 2 Part A: Errata

**2.1.1** The following errata have been identified in relation to the March 2016 ES.

## Chapter 2: Scheme Description

### September 2016 ESS Figure 2.4

**2.1.2** General Arrangement Drawing Sheet 3 of 16: label for Imperial Park site compound was erroneously moved in Revision 02 (September 2016 ESS) from its location which was correct in revision 01 (March 2016 ES).

**2.1.3** General Arrangement Drawing Sheet 9 of 16: Monk's Ditch Tata Access Culvert was erroneously referenced SBR-1470 in Revision 02 (September 2016 ESS). The reference to this culvert should be corrected to SBR-1485.

## Chapter 9: Landscape and Visual Effects

### March 2016 ES Figure 9.21

**2.1.4** Some errors were identified within these figures. These figures have been re-presented in this ESS at Figure SR9.21.

## Chapter 10: Ecology and Nature Conservation

### September 2016 ESS Omitted Text

*Air Quality*

**2.1.5** The ES Supplement published in September 2016 included additional information on Air Quality and Noise, some of which needs to be considered with respect to the potential for changes in the assessment of the effects on ecology and nature conservation.

**2.1.6** Para 4.3.6 of the September 2016 ESS explained that the construction traffic assessment had been updated to account for HGV movements along the temporary haul road for the proposed new section of motorway and to include construction staff vehicles movements across the network.

**2.1.7** The September 2016 ESS explains that the impact of additional traffic associated with the construction phase on annual mean NOx concentrations would be negligible to minor adverse (para 4.3.11). As the Severn Estuary is designated as a marine habitat, the annual mean NOx objective for the protection of vegetation does not apply.

**2.1.8** Other than the Severn Estuary, exceedances of the annual mean NOx objective are only predicted at Langstone – Llanmartin Meadows Site of Special Scientific Interest (SSSI) and this is the case in both the 'with' and 'without construction' scenarios in 2018 (para 4.3.10).

**2.1.9** The increase in annual mean NOx concentrations, at the closest point of Langstone-Llanmartin Meadows SSSI to the existing M4 corridor, is 0.9µg/$m^3$. This results in a minor adverse impact at the SSSI as a result of construction traffic.

**2.1.10** The September 2016 ESS explains that at the majority of ecological receptors assessed, additional traffic associated with the construction phase would not result in any change in total nitrogen deposition. The maximum increase in total nitrogen deposition associated with additional traffic movements during construction is 0.1 kgN/ha/yr and is predicted at locations within the River Usk Special Area of Conservation (SAC)/SSSI, Redwick and Llandevenny SSSI, Nedern Brook Wetlands SSSI, Severn Estuary Special Protection Area (SPA)/SAC and River Wye SAC/SSSI up to 20 metres from the nearest road (para 4.3.12).

**2.1.11** 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 NOx concentrations and nitrogen deposition at the designated sites assessed, no exceedences of the critical loads are predicted and exceedances of the precautionary annual mean NOx 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. 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 NOx concentrations.

**2.1.12** With respect to nitrogen deposition, the critical loads of the habitats present along the corridor of the new section of motorway would not be exceeded and there would be no significant effects.

**2.1.13** 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 ESS.

*Noise*

**2.1.14** With respect to operational noise from the motorway, there is no significant difference in the predicted sound levels for the revised scheme compared to the scheme originally assessed in the March 2016 ES. Consequently, impacts on ecology as a result of the operational phase of the scheme remain unchanged.

**2.1.15** With respect to construction noise, the only difference is the changes proposed near Magor. However, as noted in the September 2016 ESS, the changes have a minor effect on noise emission levels and it is therefore considered highly unlikely that the effect on ecology will differ significantly from that presented in the March 2016 ES.

## Chapter 11: Geology and Soils

September 2016 ESS Appendix R11.1 Table 3.1

**2.1.16** Table 3.1 Title: Scoped Out Areas of Potential Land Contamination Identified within the PSSR (2014) should read “Table 3.1: Scoped Out Areas of Potential Land Contamination Identified within the PSSR (2014) and Additional Sites Identified During the Review Process”

**2.1.17** The following rows should be added to Table 3.1:

| CL Site | PSSR Description | Site Scoped out of Further Assessment | Comments |
|---|---|---|---|
| CL-44 – A48 Petrol Station | Leaks and spills from former petrol station | Yes | Located off the route alignment and no significant works in the vicinity were considered likely to be affected by the site. |
| CL-45 – Berryhill Farm | Flytipping near Berryhill Farm | Yes | CL-45 relates to land which was the subject of legal investigation in relation to a breach of planning control (Planning Committee Enforcement Report: Unauthorised Works at Berryhill Cottage, Coedkernew-E03/0068). This included tipping of materials excavated from the yard area and elsewhere on site. An intrusive investigation at the site undertaken by NRW (EA Wales at the time) did not identify contamination at the site and no further action was taken in this regard (e-mail dated 10 September 2015 from Clive Walker (NRW). |

September 2016 ESS Appendix R11.1 Figures 3e, and 3p

**2.1.18** Some Ground Investigation sites were omitted. These figures have been re-presented at Figure SR3e and SR3p in Appendix SS11.2.

September 2016 ESS Appendix R11.1 Annex E and Appendix R11.2 Table 2.2

**2.1.19** The Summary Risk Matrix was incorrect. The amended Summary Risk Matrix presented in Appendix SS11.1 replaces the matrix presented in Annex E of Appendix R11.1 and Table 2.2 of Annex R11.2 of the September 2016 ESS.

September 2016 ESS Appendix R11.1, para 1.1.2

**2.1.20** Should read “Specifically, 17 of the previously identified potentially contaminated sites have been re-evaluated and this is set out in the following 15 Annex D reports, which have been updated together with the risk matrix presented in Annex E.”

**2.1.21** Delete 14th bullet “CL-29 – Spoil Heaps and Old Quarry, Llanwern Approach Road.”

September 2016 ESS Appendix R11.1, Annex D3, D4, D5, D6, D7, D8, D9, D10, D11, D12, D13, D14, D15, D16, D17, D18, D19, D20, D21, D22, D23, D24, D25 and D26.

**2.1.22** The Human Health Risk Assessment Screening undertaken within all CL report annexes utilises an incorrect S4UL for nickel. The LQM/CIEH Aug 2015 Update for Nickel S4UL provides revised criteria. The selected criterion (being the lower of POS park and the commercial end use) should be 800 mg/kg as opposed to 980 mg/kg. The assessment conclusions of the CL reports contained within Annex D and overall within the ES in this regard remain unchanged as a result.

September 2016 ESS Appendix R11.1, Annex D6 CL-6 Radiator Manufacturers and Adjacent Land

**2.1.23** Incorrect units in the screening of chloride, phenols and ammoniacal nitrogen within groundwaters. The assessment compared results in µg/l to screening criteria in mg/l.

**2.1.24** Table 18 to be replaced with

| Determinant | Units | Range | EQS | DWS | No. exceeded EQS (Total number of results) | Location of Exceedances | No. exceeded DWS (Total number of results) | Location of Exceedances |
|---|---|---|---|---|---|---|---|---|
| **Perched Groundwater (Tidal Flat Deposits)** | | | | | | | | |
| Arsenic | ug/l | 2.4 - 17 | 50 | 10 | 0 (3) | - | 3 (3) | BH325C |
| Boron | ug/l | 370 - 41,000 | 2000 | 1000 | 1 (3) | BH352C | 1 (3) | BH352C |
| Chromium | ug/l | <1 - 110 | - | 50 | - | - | 1 (3) | BH352C |
| Nickel | µg/l | 12 - 32 | 4 | 20 | 3 (3) | BH325C | 1 (3) | BH325C |
| Selenium | ug/l | 4.1 - 48 | - | 10 | - | - | 1 (3) | BH325C |
| Ammoniacal Nitrogen | mg/l | 4.4 – 5.4 | 0.6 | - | 3 (3) | BH325C | - | - |
| Copper | ug/l | <1 - 25 | 10 | 2000 | 1 (3) | BH325C | 0 (3) | - |
| Phenols[1] | mg/l | <0.03 – 0.04 | 0.0077 | - | 1 (3) | BH325C | - | - |
| **Perched Groundwater (Made Ground)** | | | | | | | | |
| Copper | ug/l | <1 - 11 | 10 | 2000 | 1 (3) | BH324 | 0 (3) | - |

Note: [1] based on phenol criteria

**2.1.25** As such, fewer exceedances have been identified within the perched groundwater in the Tidal Flat Deposits and perched groundwater in the Made Ground. There were no exceedances identified within the aquifer. The risks to controlled waters remain low.

**2.1.26** Para 10.1.3 should read “Gross contamination beneath the proposed new section of motorway crossing the Site or the construction compound has not been identified. The risk assessment has identified low risks to human health and controlled waters albeit control measures will be required to facilitate the construction and ongoing operation of the Scheme.”

March 2016 ES Appendix 11.1, Annex D23 CL-38 Knollbury Cesspits, Table 10

**2.1.27** The inhalation of ground gas/vapours associated with maintenance workers is omitted from the operational risk. A very low risk is attributed to this potential pollutant linkage.

September 2016 ESS Appendix R11.1, Annex D21 CL-33 B4245 Quarry, Table 13

**2.1.28** The inhalation of ground gas/vapours associated with maintenance workers was reported as moderate to low risk. This should read low risk.

September 2016 ESS Appendix R11.1, Annex D14 CL-18 River Usk Pier Location, Table 17

**2.1.29** The risk for perched water in the Made Ground (off site CL-15) contaminating the River Usk for the operational risk should read very low instead of low.

September 2016 ESS Appendix R11.1, Table 5.10

**2.1.30** The risk range relating to CL-10 Made Ground should read very low instead of very low - low.

## Chapter 16: Road Drainage and the Water Environment

March 2016 ES Appendix 2.2 Paragraph 4.1.5

**2.1.31** First sentence should read “The grassed channels will follow the gradient of the new section of motorway, with longitudinal gradients as low as 0.05% through the Levels.”

September 2016 ESS Appendix S2.2 Figure 2

**2.1.32** Drawing A1, a note which is arrowed to reed bed cross section (bottom left of Section A-A): Amend “Pea gravel (450mm thick) covered with 150mm topsoil” with “Pea gravel (600mm thick)”.

March 2016 ES Appendix 16.3

**2.1.33** Table 3.5a second column: Heavy metals – dissolved should read 85%.

**2.1.34** Paragraph 3.6.8 first sentence: Should read “The overall cumulative efficiency figures in red of 95.6% and 94.8%...”

**2.1.35** Table 3.6a last column: Heavy metals – dissolved should read 94.8%.

# 3 Part B: Clarifications

## 3.1 Buildability Report

**3.1.1** The Buildability Report provided at Appendix 3.1 of the March 2016 ES has been revised to provide further detail and clarification. The revised Report is provided at Appendix SR3.1 of this December 2016 ESS and replaces the report presented in the March 2016 ES.

**3.1.2** The revisions are shown as blue text (to delineate where new text has been added) and striked through text (to delineate where text has been deleted).

**3.1.3** The replacement report does not change the assessment made within the March 2016 ES. Therefore the assessment presented for all topics included within the March 2016 ES remains valid.

### Chapter 3: Scheme Construction

**3.1.4** The date when the main construction activities are anticipated to begin has been changed to spring/summer 2018 (rather than early 2018 as reported in the March 2016 ES). The new section of motorway would be completed by the end of 2021 (rather than within four years with a completion date of autumn 2021).

**3.1.5** Works associated with the reclassification of the existing M4 between Castleton and Magor are now expected to be completed within 12 months from completion of the new motorway (rather than within two years as previously reported).

**3.1.6** Table 3.1 which illustrates the overall construction programme has been amended to show a programme of 42 months duration rather than 44 months.

**3.1.7** The list of general construction activities should be updated to include: fencing of construction site installations (as part of the enabling works); remediation of contaminated land or groundwater where required; and construction of haul roads.

**3.1.8** The list of construction activities at Castleton and Magor Interchanges should be updated to include pre-earthworks drainage.

**3.1.9** Table 3.2 Construction Phasing of the March 2016 ES has been replaced with the table below.

## Table SR3.2: General / Site Wide Activities

| Sequence | Activity | Start | Finish |
|---|---|---|---|
| 1 | Maerdy Farm mitigation area – reversion to arable land, reinstatement of historic drainage and ditches | Preparatory works: Q4 2018 | Q1 2019 |
| | | Arable reversion: Q2 2019 | Q3 2019 |
| 2 | Tatton Farm mitigation area – grassland enhancements and seeding | Q2 2019 | Q3 2019 |
| 3 | Caldicot Moor mitigation area – grassland enhancement, formation of lagoons and ponds. Creation of new habitats. | Preparatory works: Q4 2018 | Q4 2018 |
| | | Arable reversion: Q2 2019 | Q2 2019 |
| **Note –** ongoing establishment of grassland and vegetation in above areas will be a continuous activity throughout the construction and aftercare period | | | |
| 4 | Clearance of vegetation suitable for nesting birds outside of the bird breeding season | September 2018 | March 2019 |
| 5 | Cultural heritage – undertake archaeological evaluation and detailed excavations | Q3 2018 | Q3 2018 |
| 6 | Cultural heritage – carry out detailed historic building survey and recording | Q3 2018 | Q3 2018 |

## Section 1 – Castleton Interchange

| Sequence | Activity | Start | Finish |
|---|---|---|---|
| 1 | Enabling work; advanced service diversion & protection measures, initial site clearance, boundary fencing and site preparation. | Q3 2018 | Q2 2019 |
| 1a | Capture and translocation of dormouse (includes the phased coppicing of vegetation to suit bird nesting period) | July 2018 | October 2018 |
| 1b | Capture and translocation of reptiles | July 2018 | October 2018 |
| 1c | Removal of maternity bat roost and demolition of buildings (Berry Hill Farm) | October 2018 | October 2018 |
| 1d | Removal of trees containing bat roosts | September 2018 | October 2018 |
| 1e | Closure of badger sett [includes the construction of new artificial sett prior to closure] | July 2018 | November 2018 |
| 2 | Bulk Excavation of new eastbound M4 link and Pound hill borrow pit. | Q4 2018 | Q2 2020 |
| 3 | Eastbound M4 link road construction | Q1 2020 | Q3 2020 |
| 4 | Construct Key A48 Under bridges and M4 Westbound viaduct. | Q4 2018 | Q3 2020 |
| 5 | Bulk Fill to new westbound embankments’ | Q1 2020 | Q2 2020 |
| 6 | Westbound M4 Link and westbound link to A48M road construction | Q3 2020 | Q4 2020 |
| 7 | Main traffic management switch, M4 running on new east and west bound link roads | Q4 2020 | Q4 2020 |
| 8 | Construct new ‘Link A Overbridge’ and the Eastbound A48M to M4 link | Q3 2020 | Q2 2021 |
| 9 | Bulk excavation of existing M4 and construct new M4 tie-in including commissioning. | Q1 2021 | Q4 2021 |

## Section 2 – Wentlooge Levels

| Sequence | Activity | Start | Finish |
|---|---|---|---|
| 1 | Enabling work; reen protection works on the Gwent Levels, advanced service diversion & protection measures, initial site clearance and boundary fencing | Q3 2018 | Q2 2019 |
| 1a | Capture and translocation of reptiles | July 2018 | October 2018 |
| 1b | Capture and translocation of water vole | September 2018 | October 2018 |
| | | February 2019 | March 2019 |
| 1c | Demolition of buildings containing bat roosts | July 2018 | October 2018 |
| 1d | Removal of trees containing bat roosts | September 2018 | October 2018 |
| 2 | Construct working platforms band drains and surcharged stage 1 bulk fill to embankments between Church Lane and Duffryn Railway Overbridge. | Q1 2019 | Q2 2019 |
| 3 | Settlement Period Church Lane to Duffryn Railway | Q3 2019 | Q3 2020 |
| 4 | Excavate surcharge material, and fill to piled embankment West of Duffryn railway | Q3 2020 | Q4 2020 |
| 5 | Construct temporary Bailey Bridge over Duffryn Railway | Q4 2018 | Q2 2019 |
| 6 | Construct permanent Duffryn Rail bridge | Q2 2019 | Q3 2020 |
| 7 | Construct working platforms band drains and surcharged stage 1 bulk fill to embankments between Duffryn railway and River Ebbw. | Q2 2019 | Q4 2019 |
| 8 | Construct working platforms and install driven concrete piles throughout. | Q2 2019 | Q2 2020 |
| 9 | Settlement Period Duffryn Railway to Ebbw Bridge | Q2 2019 | Q2 2020 |
| 10 | Excavate Surcharge material and fill piled embankment East of Duffryn railway and West of Ebbw | Q4 2020 | Q1 2021 |

| Sequence | Activity | Start | Finish |
|---|---|---|---|
| 11 | Construct Side Roads at Church Lane and Lighthouse Road. | Q4 2019 | Q2 2021 |
| 12 | Mainline Road construction including commissioning | Q4 2020 | Q3 2021 |

## Section 3 – River Ebbw to River Usk

| Sequence | Activity | Start | Finish |
|---|---|---|---|
| 1a | Capture and translocation of reptiles | July 2018 | October 2018 |
| 1b | Demolition of buildings containing bat roosts | July 2018 | October 2018 |
| 1c | Removal of trees containing bat roosts | September 2018 | October 2018 |
| **River Ebbw Underbridge** | | | |
| 1 | All statutory diversions, box culvert and temporary access from both sides of the bridge must be constructed before starting the piling activity. | Q3 2018 | Q4 2018 |
| 2 | Piling activity, foundation and abutment construction | Q1 2019 | Q1 2020 |
| 3 | Launch steel works, deck construction and finishes. [This requires completion of the western spans of the Docks Junction Viaduct which forms the launching platform] | Q3 2019 | Q1 2021 |
| **Docks Link Road** | | | |
| 1 | At access date, an access would be built from the SDR along the Dock Link Road. This enables the working platforms for the driven concrete piles to commence. | Q3 2018 | Q4 2018 |
| 2 | Construct the surcharged embankment, no ground treatments would be installed due to risk of watercourse contamination. | Q1 2019 | Q3 2019 |
| 3 | A settlement period (18month) is required to allow the surcharge material to then be excavated. | Q2 2019 | Q4 2020 |
| 4 | The road pavement can be done when the embankments and the Dock Junction structures are completed. | Q1 2021 | Q4 2021 |

| Sequence | Activity | Start | Finish |
|---|---|---|---|
| **Docks Junction and Docks Junction Viaduct** | | | |
| 1 | From obtaining access, working platforms and ground treatment / driven concrete piles would be installed below the interchange earthworks footprint. | Q4 2018 | Q2 2019 |
| 2 | Installation of bored concrete piles to the Docks Junction viaduct would follow | Q4 2018 | Q4 2019 |
| 3 | Construction of the substructure and superstructure to Docks Junction viaduct | Q1 2019 | Q3 2021 |
| **River Usk Crossing** | | | |
| 1 | All statutory diversions, haul road, temporary access, enabling works (demolition) and piling tests to be complete before commencing piling. | Q3 2018 | Q4 2018 |
| 2 | Sheetpiling and bored concrete piling to the main towers of the cable stayed bridge must be complete outside of the fish migratory period.<br>Piling to the back spans can continue after this period. | Q4 2018 | Q1 2019 |
| | | Q1 2019 | Q2 2019 |
| 3 | The eastern spans of the Docks Junction Viaduct forming the launch platform must be complete. This enables the structural steelwork to be launched from west abutment to the 6th piers from the west W3. | Q4 2018 | Q3 2019 |
| 4 | The fill behind the east abutment must be sufficiently built, to install the launching platform at the east side of abutment East Abutment (Ea). This enables the structural steelwork to be launched from Ea to E9. | Q4 2018 | Q3 2019 |
| 5 | E7 pier head must be complete as soon as possible in order to install a launching platform between E7 to E8. | Q1 2019 | Q2 2019 |
| 6 | The transverse beam on both of the Pylons must be completed before launching W1 to Western Tower (WT) and E1 to Eastern Tower (ET) structural steelwork. | Q1 2020 | Q4 2020 |
| 7 | The installation of the structural steelwork for the Cable Stayed Bridge main span can start only:<br>When W3 to W2 and E3 to E2 structural steelwork is completed.<br>When the first lift of the pylon head is completed | Q4 2020 | Q3 2021 |

## Section 4 – Caldicot Levels

| Sequence | Activity | Start | Finish |
|---|---|---|---|
| 1 | Enabling work; reen protection works on the Gwent Levels, advanced service diversion & protection measures, initial site clearance and boundary fencing | Q3 2018 | Q2 2019 |
| 1a | Capture and translocation of dormouse in the North Row area (includes the phased coppicing of vegetation to suit bird nesting period) | July 2018 | October 2018 |
| 1b | Capture and translocation of reptiles | July 2018 | October 2018 |
| 1c | Capture and translocation of water vole | September 2018 | October 2018 |
| | | February 2019 | March 2019 |
| 1d | Establish receptor site for great crested newt (WTA10) | Q3 2018 | Q3 2018 |
| 1e | Capture and translocation of great crested newt. During year 1 will require local displacement to key construction areas, year 2 will involve translocation to permanent receptor site. | July 2018 | September 2018 |
| | | March 2019 | September 2019 |
| 1f | Demolition of buildings containing bat roosts | July 2018 | October 2018 |
| 1g | Removal of trees containing bat roosts | September 2018 | October 2018 |
| 2 | Construct Llandevenny temporary Bailey Bridge. | Q4 2018 | Q2 2019 |
| 3 | Construct working platforms band drains and surcharged stage 1 bulk fill to embankments between Usk East and Glan Llyn junction. | Q1 2019 | Q1 2020 |
| 4 | Settlement period Usk to Glan Llyn junction | Q1 2020 | Q1 2021 |
| 5 | Excavate surcharge material, road formation and fill to piled embankment west of Llandevenny railway | Q1 2021 | Q2 2021 |
| 6 | Construct working platforms band drains and surcharged stage 1 bulk fill to embankments between Glan Llyn junction and Llandevenny railway. | Q2 2019 | Q2 2020 |

| Sequence | Activity | Start | Finish |
|---|---|---|---|
| 7 | Settlement period Glan Llyn junction to Llandevenny Railway | Q2 2020 | Q2 2021 |
| 8 | Excavate surcharge material, road box material and fill D2AP and Magor East junction embankments | Q2 2021 | Q3 2021 |
| 9 | Construct key side roads at Nash Road, Glan Llyn and North Row. (Bridge Piers after 12 months of settlement) | Q1 2020 | Q3 2021 |
| 10 | Mainline road construction. | Q1 2021 | Q4 2021 |

## Section 5 – Magor Interchange

| Sequence | Activity | Start | Finish |
|---|---|---|---|
| 1 | Enabling work; advanced service diversion & protection measures, initial site clearance, boundary fencing and site preparation. | Q3 2018 | Q2 2019 |
| 1a | Capture and translocation of dormouse (includes the phased coppicing of vegetation to suit bird nesting period) | July 2018 | October 2018 |
| 1b | Capture and translocation of reptiles | July 2018 | October 2018 |
| 1c | Demolition of buildings containing bat roosts | July 2018 | October 2018 |
| 1d | Removal of trees containing bat roosts | September 2018 | October 2018 |
| 1e | Closure of badger sett (disused) | July 2018 | November 2018 |
| 2 | Construct new Windmill Hill bridge and divert Bencroft Lane to new alignment | Q4 2018 | Q2 2019 |
| 3 | Carriageway refurbishment to existing M4 between Knollbury Lane to Eastern tie-in | Q1 2019 | Q3 2019 |
| 4 | Construct new Magor East B4245 structures, embankments, gyratory and open to traffic | Q1 2019 | Q2 2020 |
| 5 | Bulk excavation of new D2AP Link Road north of existing M4/M48 and deposit along the Caldicot Levels | Q1 2019 | Q4 2019 |

| Sequence | Activity | Start | Finish |
|---|---|---|---|
| 6 | Bulk excavate embankment North of Llandavenny railway to St Brides underpass and deposit along the Caldicot Levels | Q3 2019 | Q1 2020 |
| 7 | Construct New Newport Road B4245 Side Road and Bridge | Q2 2019 | Q1 2020 |
| 8 | Construct permanent Llandevenny Rail Bridge | Q2 2019 | Q2 2020 |
| 9 | Extend existing structures along existing M4/M48 in advance of works to the new D2AP | Q4 2019 | Q1 2021 |
| 10 | Construct new Magor Interchange bridge and westbound link retaining walls | Q1 2019 | Q1 2021 |
| 11 | Bulk excavation of surcharged material from Caldicot Levels and fill piled embankments to Llandavenny railway, and the new D2AP | Q1 2021 | Q3 2021 |
| 12 | Roadworks to new D2AP Magor east complete gyratory through link and tie in existing M4 to new M4 CAN | Q2 2021 | Q4 2021 |

**3.1.10** The principal earthwork quantities and areas of cut and fill are shown on Annex 18 of revised Buildability Report (Appendix SR3.1).

**3.1.11** The duration of the surcharging process has been clarified whereby the surcharged material would be removed when the required consolidation of the embankment has been achieved.

**3.1.12** Piled embankments would be used on the approaches to structures as well in areas where higher embankments are required (i.e. above 5 metres). This is minimise differential rates of settlement.

**3.1.13** Where piles are to be installed within potentially contaminated areas, piling risk assessments would be undertaken and, if necessary, the piling installation would be modified to prevent the spread of any contamination.

**3.1.14** Annex 19 of the revised Buildability Report (Appendix SR3.1) illustrates the different ground treatment methods that will be installed across the Levels.

**3.1.15** The section office compound at Magor Interchange should be referred to as the Caldicott compound to be consistent with the Buildability Report (Appendix SR3.1). The temporary works access for HGVs and construction plant will be from the M48 slip roads until the new M4 Junction 23 is fully operational.

**3.1.16** The material from the unsuitable material storage areas will only be used to restore the borrow pits where suitability requirements (in terms of potential contamination) have been satisfied.

**3.1.17** The location of the haul roads along the length of the new section of motorway are shown in Annex 11 of the revised Buildability report (Appendix SR3.1).

**3.1.18** The route for abnormal loads travelling from the abnormal load holding area at Wilcrick (Magor) would be along the A4810 to access the works areas at the River Usk Crossing, Nash/Meadows Road and Glan Llyn. For Magor sites, abnormal loads will directly access the sites from the M48/M4 slip roads and then using haul roads within the site boundaries.

**3.1.19** The temporary road diversions are shown in Annex 5 of the revised Buildability Report (Appendix SR3.1).

**3.1.20** The bullet points for following paragraph 3.3.62 are replaced by the points below:

- St Brides Road would be shut for the duration of the construction phase. This is to accommodate utility protection works within St Brides Road, existing structure extension works north and south of the existing underbridge and to provide construction traffic routes to and from Ifton Quarry beneath the existing M4. Prior to temporarily shutting St Brides Road, a temporary link would be constructed from the J23a roundabout to the lane that passes at the rear of the services. This lane would require widening to accommodate the temporary traffic flows expected when St Brides is shut.
- Whilst St Brides Road is closed, other existing traffic routes north - south of the existing M4 between Junction 23 and 23A would require temporary closure for durations between 12 months to a number of weeks. Windmill Hill Overbridge spanning the M48 would be constructed early to provide access north - south of the M48 to provide continuous access to Green Farm throughout construction.

- A 12 month road closure would be required for the construction the new Knollbury Lane Overbridge to the new M48 Roundabout.
- A shorter duration of road closure would be required for the installation of the bridge beams to the new Rockfield Lane Underbridge. It is expected that these could be constructed before there is a need to construct the new Knollbury Lane Overbridge so as to avoid further disruption to the local travelling public. The local north – south side road routes may require localised upgrading with the provision of temporary passing places in the lanes.
- Church Lane Overbridge would be built offline. Its northern approach embankment obstructs the current junction of Church Lane with the adjacent roundabout. Traffic would need to be diverted along Church Lane, with localised realignment, and back onto the existing network via the new roundabout and link road. The new roundabout would be constructed in phases to maintain vehicular access to Quinn Radiators commercial premises. A Stop/Go controlled plant crossing of the existing Church Lane would be operated to control site / public traffic interface until the new road alignment is brought into operation. The redundant carriageway across the new section of motorway would then be removed to enable earthworks to be infilled.

**3.1.21** Bullet point 2 under paragraph 3.3.70 is replaced with the text below:

- The permanent culverts would either be a pre-cast concrete box (founded on driven pre-cast concrete piles) or constructed in-situ with permanent sheet piled walls and in-situ concrete base slabs and roofs. In areas where band drains and surcharged embankment would be used, the permanent culverts would be installed prior to the surcharging process.

**3.1.22** During construction, runoff from the sides of the embankments would be captured in an impermeable bunded area located along the corridor of construction between the main line embankment and the permanent parallel field ditch/replacement reen. These bunds would form temporary lateral lagoons. The impermeable bund would be approximately 1.2 metres above ground level and would contain runoff until controlled discharge points.

**3.1.23** A typical cross section of the road embankment over the Levels with the protective bunds is shown in Annex 10 of the revised Buildability Report (Appendix SR3.1).

**3.1.24** As discussed in the March 2016 ES, it is intended to use the location of the permanent water treatment areas as temporary lagoons for water management during construction. The temporary lagoons would be formed by perimeter bunds approximately 1.2 metre high on top of the existing ground surface.

## 3.2 Pre-Construction Environmental Management Plan

**3.2.1** The Pre-Construction Environmental Management Plan (Pre-CEMP) provided as Appendix 3.2 of the March 2016 ES has been revised to provide further detail and clarification. The revised Plan is provided at Appendix SR3.2 of this December 2016 ESS and replaces the report presented in the March 2016 ES.

**3.2.2** The replacement report does not change the assessment made within the March 2016 ES. Therefore the assessment presented for all topics included within the March 2016 ES remains valid.

# 4 Part C: Additional Information

## 4.1 Navigation Risk Assessment

**4.1.1** In November 2016 a navigation risk assessment workshop was convened and meetings held with the main navigation stakeholders and users of the rivers Ebbw, Usk and Newport Docks.

**4.1.2** The risk assessment used a HAZID (Hazard Identification) methodology in line with the recommendations of the Port Marine Safety Code (PMSC) and associated guidance, together with Global Maritime's Risk Management Tool to identify the areas of risk, assess the consequences of an event occurring as a result of the risk and to ensure that mitigations or actions are developed in order to reduce the risk in accordance with the ALARP principle.

**4.1.3** During the construction of the bridge, the main navigation risks identified were as follows:

1) Vessel collision with the bridge
2) Collapse of bridge deck and/or dropped deck section
3) Other dropped objects (such as tools)
4) Pollution caused by construction activities or floating debris
5) Congested navigation
6) Conflict with radio communications
7) Presence of background light from construction activities and road lighting
8) Congested Newport South dock during periods of restricted access to the North Dock

**4.1.4** During the operational phase of the Scheme, the navigation risks were summarised as follows:

1) Vessel collision with the bridge
2) Dropped objects (such as tools) during maintenance activities
3) Pollution caused by pollution and/or floating debris
4) Falling objects from the bridge
5) Congested Newport South Dock during periods of restricted vessel access to the North dock

**4.1.5** Broad mitigation measures recommended for both the construction phase and the operational phase of the Scheme included the provision of warnings and signs including point of best passage lighting, active river traffic management, managing the risk of dropped objects, the preparation of a marine safety management plan, pollution control, and the elimination of potential disruptions to communication.

**4.1.6** The Welsh Government is presently considering the potential consequences of a vessel collision with the bridge within the docks and the findings of this assessment will be reported in the future.

## 4.2 Hazardous Installations Affected by the Scheme

**4.2.1** An assessment of the hazardous installations affected by the Scheme has been undertaken and is presented in Appendix SS2.2. The report identifies industrial installations which are currently consented under the Planning (Hazardous Substances) (Wales) Regulations 2015 ('the 2015 Regulations') and under the Dangerous Goods in Harbour Areas Regulations 2016 ('the 2016 Regulations') that handle, manage store or process hazardous substances within the proximity of the Scheme. The document focusses on those industrial installations whose consents and licences are affected by the Scheme and which may require amendments or revocation.

**4.2.2** The objective of this report is to provide an assessment for all consented and licenced sites regulated under health and safety regulation that could be affected by the Scheme.

## 4.3 Air Quality

**4.3.1** Following the response to the March 2016 ES provided by NRW, discussions have been ongoing regarding the points raised and to agree common ground regarding the air quality assessment. NRW noted the sensitivity analysis of choosing an appropriate meteorological station to be used, however requested clarification of inter-annual variability sensitivity testing had been carried out for the chosen meteorological station, Rhoose Airport. No inter-annual variability testing was undertaken for the March 2016 ES, however further modelling has been undertaken to satisfy this requirement for NRW.

**4.3.2** The meteorological data used in the main assessment is for 2014 from Rhoose Airport. To assess inter-annual variability, further modelling has been undertaken for the Do Something scenario, using meteorological data from the same station for 2013 and 2015. As in the March 2016 ES, sensitivity testing of the meteorological data used has been undertaken for the Do Something scenario to compare pollutant concentrations with the Scheme in place. The inter-annual variability sensitivity testing has been undertaken using the new traffic forecasts for the Scheme. This is discussed further in Part D below.

**4.3.3** Detailed results are outlined in Appendix SS7.1, this shows that inter-annual variability between the years assessed is low. The difference between predicted pollutant concentrations using 2013 and 2015 data compared with 2014 data is less than 4% for annual mean $NO_2$ concentrations. For all meteorological years assessed, pollutant concentrations remain well below the relevant air quality standards.

## 4.4 Ecology and Nature Conservation

**4.4.1** The following information has become available since publication of the March 2016 ES and September 2016 ESS.

- Additional environmental information arising from new surveys.
- Provision of protected species mitigation strategies and updates to the SSSI mitigation strategy following further consultation with NRW.

# Additional Survey Work

## Hazel Dormouse Surveys 2016

**4.4.2** The report of the additional survey is provided at Appendix SS10.1.

**4.4.3** The 2016 dormouse surveys were conducted to augment surveys conducted during 2014 and 2015 and to assess sites for their potential to be used as receptor sites. Surveys were also conducted in land within the eastern parts of the Tata Steel landholding in order to complete the survey effort in this area.

**4.4.4** During 2016 dormouse presence was found at three locations which were not surveyed in 2015; within the M4/M48 Motorway island (South), Woodview woodland (within the grounds of Woodview House north of the existing M4 north of Undy) and within young regenerating woodland within Coed Mawr woodland complex (a prospective dormouse translocation site).

**4.4.5** No dormice were found in any nest tubes within the Tata Steel landholding during the 2016 survey.

**4.4.6** No dormice were found in any nest tubes within the other additional area surveyed in 2016, the M4/M48 Motorway island (North).

## Bat Surveys 2016

### Tree Surveys

**4.4.7** Thomson Ecology undertook additional bat tree surveys between June and September 2016 of 14 of the 16 trees and the one building (previously referenced as a tree) that were surveyed in 2015. An additional three new trees which were identified as having high potential for bats were also surveyed. The full survey report is provided at Appendix SS10.2.

**4.4.8** During the 2016 surveys one tree was confirmed as a roost for common pipistrelle and a disused lime kiln building was confirmed as a roost for long eared bats. The two other trees identified as having high potential for bats were identified as probable bat roosts..

**4.4.9** Over the two years of bat tree surveys, in total three trees and one building were confirmed as bat roosts and two trees were probable bat roosts.

### Building and Structure Surveys

**4.4.10** In addition to the tree surveys, preliminary bat roost assessments and further emergence and re-entry surveys were undertaken of eleven buildings within the construction footprint of the new section of motorway which were not surveyed in 2015. Fair Orchard Farm which is just outside the Scheme footprint was also surveyed as the farmer had indicated the potential presence of a bat roost. Three bridges along the Scheme were also surveyed. The survey report is presented at Appendix SS10.3

**4.4.11** Six of the buildings surveyed within the Scheme footprint were confirmed as bat roosts. The presence of a bat roost was also confirmed at Fair Orchard Farm. None of the bridges surveyed was identified as a bat roost.

## Breeding Crane Survey 2016

**4.4.12** A breeding crane survey was undertaken in 2016. The details of this survey are confidential but the conclusion was that there is suitable habitat for breeding cranes in the study area and a single pair of cranes successfully bred and the fledging of one chick was confirmed in 2016.

**4.4.13** The main impact of the land take for the M4CaN Scheme on common crane would be the loss of a suitable nesting site.

**4.4.14** Part of an area of grassland to the southwest of the nest site which appears to have been used for chick rearing in 2016, would also be lost as suitable habitat for cranes.

**4.4.15** Visual and noise disturbance effects would extend beyond the Scheme boundary onto habitat which may have otherwise been suitable for breeding common crane, and also for chick rearing. Noise modelling data suggests that current background noise levels in the vicinity of the Scheme, including the location of where common crane breeding took place in 2016, is currently approximately 50 L10(18h) dB(A). The noise levels expected during construction are estimated to be 68-74 dB LAeq and during operation they are likely to be in the region of 65-70 L10(18h) dB(A).

**4.4.16** The construction phase would also see an increase in human activity in the area. This is a different disturbance type and source than the operational motorway, which will cause disturbance by moving vehicles and associated noise.

**4.4.17** Cranes have re-established as a nesting species in Wales after an absence of circa 400 years, and are therefore treated as a nationally important bird, and thus of High value. It is considered that the magnitude of impact of land take is Major adverse, due to the predicted damage to key characteristics, features or elements, resulting in detriment to the conservation status of this species. As a result, the significance of effect for common crane due to the land take of the Scheme is considered to be Large or Very Large adverse. Taking into account the proposed mitigation for loss of the nest site which would be provided in the north of the Caldicot Moor Mitigation Area where lagoons with suitable nesting islands would be provided, the magnitude of the impact is assessed as Moderate adverse and the significance of the effect as Moderate or Large adverse. This is significant in EIA terms.

**4.4.18** The magnitude of the impacts of the construction and operation of the Scheme on Common Crane, accepting that the nest site used in 2016 would have been lost through the land take of the scheme, is assessed as Minor adverse and the significance of the effects as Slight or Moderate. This is significant in EIA terms.

## Conclusion

**4.4.19** These additional surveys have provided further confirmation of the ecological features in the vicinity of the proposed new section of motorway and the assessment of significance of effects for dormice and bats remains as set out in the March 2016 ES.

## Draft Mitigation Strategies

### Dormouse Mitigation Strategy

**4.4.20** The mitigation strategy is provided at Appendix SS10.4.

**4.4.21** The mitigation measures proposed would be carried out under a hazel dormouse European Protected Species licence issued by NRW. All licenced works would be carried out under the supervision of an NRW dormouse licenced ecologist and all works would be undertaken in accordance with the licence method statement. This method statement will be based upon the principles set out in the strategy, and will be developed in detail in consultation with NRW.

**4.4.22** As part of the mitigation for the Scheme, due to the amount of habitat of known or potential value to dormice (that would be lost to construction), hazel dormice would be captured and translocated to an appropriate off-site receptor site prior to the commencement of construction.

**4.4.23** The methodology for trapping, handling and translocation, and post-translocation monitoring and reporting, would be undertaken in accordance with the European Protected Species Licence method statement.

**4.4.24** The mitigation proposed was taken into consideration in the March 2016 ES and therefore the assessment of the significance of effect remains valid.

### Bat Mitigation Strategy

**4.4.25** The mitigation strategy is provided at Appendix SS10.5.

**4.4.26** A number of the mitigation measures proposed would be carried out under a bat European Protected Species licence issued by NRW. All licensed works would be carried out under the supervision of an NRW bat licensed ecologist and all works will be undertaken in accordance with the licence method statement. This method statement will be based upon the principles set out in the strategy, and will be developed in detail in consultation with NRW.

**4.4.27** The mitigation proposed was taken into consideration in the March 2016 ES and therefore the assessment of the significance of effect remains valid.

### Great Crested Newt Mitigation Strategy

**4.4.28** The mitigation strategy is provided at Appendix SS10.6.

**4.4.29** The mitigation measures proposed would be carried out under a great crested newt European Protected Species licence issued by NRW. All licensed works would be carried out under the supervision of an NRW great crested newt licenced ecologist and all works will be undertaken in accordance with the licence method statement. This method statement will be based upon the principles set out in the strategy, and will be developed in detail in consultation with NRW.

**4.4.30** The mitigation proposed was taken into consideration in the March 2016 ES and therefore the assessment of the significance of effect remains valid.

### Water Vole Mitigation Strategy

**4.4.31** The mitigation strategy is provided at Appendix SS10.7.

**4.4.32** The mitigation strategy sets out the proposals for the mitigation of the likely effects on water vole during construction. It forms the basis of the water vole method statement that would be prepared and agreed with NRW in advance of construction. This method statement will be based upon the principles set out in the strategy, and will be developed in detail in consultation with NRW.

**4.4.33** The mitigation proposed was taken into consideration in the March 2016 ES and therefore the assessment of the significance of effect remains valid.

## 4.5 Geology and Soils

**4.5.1** Following consultation and agreement with NRW, Appendix 11.3 of the March 2016 ES has been updated to reflect the agreement of continued consultation with NRW. The updated report is presented in Appendix SR11.3 of this ESS.

## 4.6 Road Drainage and the Water Environment

**4.6.1** An assessment of the potential impact of the proposed Water Treatment Area (WTA) discharges on surface water quality was undertaken and reported in the Water Treatment Area Design Manual for Roads and Bridges (DMRB) Risk Assessments (Appendix 16.3 of the March 2016 ES).

**4.6.2** Following comments from NRW on the March 2016 ES and a subsequent meeting held with their water quality and conservation experts, it was agreed to reassess the proposed Water Treatment Area water environment risk assessments. This was principally in light of updated NRW water quality trigger levels for the Gwent Levels SSSI but also to take account of any limitations of the Highways Agency Water Risk Assessment Tool (HAWRAT) methodology due to very low or non-flow within reens proposed to receive Water Treatment Area discharges.

**4.6.3** It was agreed that the risk assessment would be reappraised to increase the conservatism of the original work by identifying areas where the dependence on reen flow in the prediction of worst case impacts on water quality could be further constrained.

**4.6.4** NRW stated given the very high sensitivity of the Gwent Levels SSSI, high confidence was required that reen water quality would be preserved following discharge of the proposed treated motorway drainage.

**4.6.5** The updated assessment is presented within Appendix SS16.1 which should be read in conjunction with Appendix 16.3 of the March 2016 ES.

## 4.7 Environmental Management

**4.7.1** The Register of Environmental Commitments provided at Appendix 18.1 of the March 2016 ES and Appendix R18.1 of the September 2016 ESS has been updated and is provided in Appendix SR18.1 of this ESS. The Register is in draft and will remain so up to and throughout the Public Local Inquiry during which it is anticipated that further commitments will be added and others amended and closed out.

# 5 Part D: Design Modifications

## 5.1 Changes Since Submission of the September 2016 ESS

**5.1.1** Since the publication of the draft Orders, the March 2016 ES and the September 2016 ESS, the following design changes have been incorporated as part of this ESS. The key parameters of the Scheme remain unchanged from those reported in the March 2016 ES and the September 2016 ESS.

- Changes to Future Year Road Traffic Forecasts as set out in paragraphs 5.2.3 to 5.2.16.
- Usk Crossing: Increased vertical height of the crossing by 1.54 m.
- Changes to the retaining structures of the Docks Way Link Road between the Docks Way Junction and the Existing A48 Newport Southern Distributor Road.
- Additional borrow bit at Magor located to the south of the B4245 road and opposite Reed Bed 12a.

**5.1.2** The effects of the above modifications are considered within this section of the ESS. In addition, a number of minor modifications are included on the General Arrangement Plans on Figure SR2.4 (Sheets 5 and 16).

### Changes to Plans Supporting Chapter 2 of the March 2016 ES

**5.1.3** Updated General Arrangement Plans for the proposed new section of motorway are provided at Figure SR2.4 and Environmental Management Plans provided at Figure SR2.6. In addition, the following updated drawings are provided.

- Figure SR2.7e – updated as a result of the raising of the Usk Crossing
- Figure SR9.11 – Selected Photomontages have been updated as a result of the raising of the Usk Crossing.
- Figure SR9.21.

### Changes to Chapter 2 Since Submission of the September 2016 ESS

**5.1.4** A number of structures listed in Table 2.2 have been revised as set out below:

- SBR-0580 Percoed NMU Bridge: the length of the approach spans vary between 21 metres and 36 metres. Overall length of structure is 192.6 metres.
- SBR-0650 Duffryn Railway Bridge: the structure span is 29.9 metres and the length is 208 metres.
- SBR-2295 Magor Interchange Bridge: structure span details should be deleted.

**5.1.5** The following new structure would be required:

- SBR-0910 Extension to existing SDR Bridge: extension required to the southern elevation of the existing SDR West Way Road. The structure will

consist of piled abutment walls adjacent to the existing structure supporting an in-situ concrete deck. Abutment extensions will be 12.5 metres with the deck span to match the existing. The bridge will carry the left hand turn traffic that will use the Docks Link to connect with the new section of motorway and Docks Way Junction.

## 5.2 Changes in Future Year Road Traffic Forecasts

**5.2.1** A number of the assessment topics reported in the March 2016 ES relate to, or are informed by, forecasts for the future level of traffic on the M4 around Newport. The production of traffic forecasts is governed by guidance published by the UK Department for Transport (DfT), namely WelTAG (Welsh Transport Planning and Appraisal Guidance).

**5.2.2** Following the publication of the March 2016 Traffic Forecasting Report, a number of changes to the guidance governing traffic forecasting have been introduced which are material to the future year traffic forecasts. In view of this, the forecasting of the effects of the M4CaN Scheme has been updated and the reports which rely on these forecasts have consequently been revised.

### Changes in Guidance Relating to Traffic Forecasts

**5.2.3** The M4CaN transport model is used to understand and predict current and future traffic conditions in a situation with and without the proposed M4CaN Scheme. The outputs of the transport model are used to inform the design of the Scheme and are applied in various aspects of the economic, social and environmental assessment of the Scheme.

**5.2.4** In accordance with WebTAG, future year traffic forecasts are derived from a set of growth factors taken from the National Trip End Model (NTEM) which is published by DfT through an interface called the Trip End Model Presentation Program (TEMPRO). At the time of the publication of Draft Orders, the M4CaN transport model and the various assessments of the Scheme were based on the current version of NTEM at that time, namely NTEM6.2 (as published in TEMPRO 6.2).

**5.2.5** In July 2016, DfT published an updated version of TEMPRO (TEMPRO 7.0) which is in turn based on NTEM 7.0. NTEM 7.0 replaces and supersedes NTEM 6.2 and the Welsh Government took the view that it needed to update the M4CaN transport model such that it is based on the up to date forecasts.

**5.2.6** The published NTEM 7.0 was reviewed by the Welsh Government. As part of this review, a number of discrepancies were identified between the forecast number of dwellings in Wales contained within NTEM 7.0 and the future housing requirements contained within the latest available Local Development Plans (LDPs) which are produced by the various local authorities in Wales. These discrepancies were brought to the attention of DfT who accepted that the Local Development Plans held by the Welsh Government provides a more up to date and accurate basis upon which to base future traffic forecasts particularly given the material differences observed for some Local Authorities. Independently, DfT also found a further issue relating to the employment inputs to the NTEM.

**5.2.7** Subsequently, DfT announced that it intends to undertake further quality assurance checks on the planning data underlying NTEM 7.0 and intends to

issue revised trip end forecasts that correct for issues that have occurred in the processing of input data in respect of employment and dwellings in January 2017. This was the subject of a notice published by DfT on 14 November 2016[1].

**5.2.8** As an interim measure, the Welsh Government have been provided with corrected NTEM forecasts that contain the up to date Wales LDP housing projections, together with the employment correction. It is these forecasts that have been adopted in the revised model, now termed M4CaN transport model (TEMPRO 7 Wales). Therefore, the planning data in the M4CaN transport model is consistent with the data used in LDPs in Wales which are used to support planning decisions. Earlier reports which were based on NTEM/TEMPRO 6.2 are therefore now superseded.

**5.2.9** Subject to the completion of their quality assurance checks, DfT has advised that the nationwide update of NTEM and TEMPRO to be released in January 2017 will include the revised Welsh planning data and will address other issues identified in NTEM 7.0. It is expected that the updated versions of NTEM/TEMPRO will be generally consistent with TEMPRO 7 Wales. If there are any differences, it is anticipated that they will marginal and these will be reported in evidence presented at the Public Local Inquiry.

## Other Changes in Guidance

**5.2.10** As part of the updates to WebTAG introduced in July 2016, the DfT has introduced new guidance on the value of travel time savings (or 'values of time'). The new values replace the previous values of time which were used to inform the reports published in March 2016.

**5.2.11** Values of time determine the value that travellers place on changes in journey time. Values of time are used in the M4CaN transport model to predict the way travellers will behave in response to changes in travel times or the financial costs of transport. Both the M4CaN transport model and the economic appraisal of the Scheme have been updated such that they are based on the newly published values of time.

## The Future of the Severn Crossing Tolls

**5.2.12** The M4CaN transport model has also been updated to reflect the UK Government's announcement, contained within the Budget 2016, on the future of the Severn Crossing tolls following the end of the current concession arrangement.

**5.2.13** The concession period is expected to come to an end either late in 2017 or early 2018, at which point the Severn Crossings will return to public ownership and the level of the toll will no longer be determined by the concession agreement. In accordance with the Severn Bridges Act 1992, the March 2016 EAR assumed there would be no tolls on the Severn Crossings when the new section of motorway south of Newport was due to be opened during 2021.

**5.2.14** In the March 2016 Budget, the Government announced its intention to retain tolls on the Severn Crossings at half their current levels. On this basis, the updated M4CaN transport model assumes, under the 'Core Scenario', a 'half toll' scenario. It is further assumed that, once in public ownership, VAT will no longer

[1] http://assets.dft.gov.uk/tempro/version7/ntem-notice/ntem7-status.pdf

be charged and, in line with previous Government announcements, that Light Goods Vehicles (Category 2 vehicles) will, in the future, pay the same toll price as for cars.

## Additional Changes to the Transport Model

**5.2.15** In addition to the above, a number of other associated changes have been adopted in the transport model. These are as follows:

- An update of goods vehicle growth in line with Road Traffic Forecasts 2015;
- Modified bespoke speed-flow curves to better reflect congested travel speeds on the M4 corridor around Newport;

**5.2.16** The updated traffic forecasts show lower volumes on both the existing M4 and proposed new section of motorway in the design year of 2037. However, changes in traffic volumes are relatively small. Forecast traffic volumes using the proposed new section of motorway in the design year of 2037 are within 5% of previous forecasts given in the March 2016 Traffic Forecasting Report. An extract from the Traffic Forecasting Report December 2016 is presented in Appendix SR2.1 showing traffic flow figures for future growth years using both TEMPRO 6.2 and 7 Wales.

## Chapter 2: Scheme Description

**5.2.17** As a result of the updated traffic forecasting modelling, Table 2.9 of Chapter 2 of the March 2016 ES is replaced with the table below.

## Table SR2.9: Forecast Annual Average Daily Traffic (AADT) Flows with New Section of Motorway open (All Vehicles)

| Location | Direction | Base Year: 2014 | Opening Year: 2022 | | Difference from Do Minimum | Design Year: 2037 | | Difference from Do Minimum |
|---|---|---|---|---|---|---|---|---|
| | | | Do Minimum | Do Something | | Do Minimum | Do Something | |
| Junction 29-28 | Eastbound | 52,900 | 59,700 | 36,100 | -40% | 68,600 | 41,500 | -40% |
| | Westbound | 51,900 | 58,500 | 33,600 | -43% | 67,500 | 39,900 | -41% |
| Junction 28-27 | Eastbound | 50,700 | 55,900 | 35,900 | -36% | 64,300 | 44,900 | -30% |
| | Westbound | 52,400 | 55,300 | 34,700 | -37% | 63,800 | 41,600 | -35% |
| Junction 27-26 | Eastbound | 50,200 | 55,800 | 36,100 | -35% | 64,900 | 46,100 | -29% |
| | Westbound | 52,500 | 57,100 | 37,500 | -34% | 65,200 | 44,600 | -32% |
| Junction 26-25A | Eastbound | 33,800 | 38,200 | 24,000 | -37% | 44,800 | 32,100 | -28% |
| | Westbound | 34,600 | 38,100 | 23,000 | -40% | 44,400 | 28,700 | -35% |
| Junction 25A-25 | Eastbound | 43,200 | 49,200 | 17,200 | -65% | 58,100 | 24,400 | -58% |
| | Westbound | 43,700 | 49,300 | 17,700 | -64% | 56,500 | 22,400 | -60% |
| Junction 25-24 | Eastbound | 46,700 | 53,900 | 29,200 | -46% | 63,800 | 38,400 | -40% |
| | Westbound | 46,700 | 53,000 | 30,400 | -43% | 61,000 | 36,500 | -40% |
| Junction 24-23A | Eastbound | 36,600 | 44,400 | 17,900 | -60% | 52,200 | 23,600 | -55% |
| | Westbound | 36,600 | 44,800 | 21,300 | -52% | 52,900 | 25,600 | -52% |
| Junction 23A-23 | Eastbound | 34,600 | 42,800 | 15,400 | -64% | 54,100 | 20,800 | -62% |
| | Westbound | 34,200 | 43,100 | 20,300 | -53% | 53,000 | 24,700 | -53% |
| New section of motorway (Junction 29 to Docks Way Junction | Eastbound | N/A | N/A | 25,600 | N/A | N/A | 32,400 | N/A |
| | Westbound | N/A | N/A | 26,600 | N/A | N/A | 32,400 | N/A |
| New section of motorway (Docks Way Junction to Glan Llyn Junction) | Eastbound | N/A | N/A | 27,500 | N/A | N/A | 35,300 | N/A |
| | Westbound | N/A | N/A | 27,000 | N/A | N/A | 34,400 | N/A |
| New section of motorway (Glan Llyn Junction to Junction 23A) | Eastbound | N/A | N/A | 28,700 | N/A | N/A | 37,000 | N/A |
| | Westbound | N/A | N/A | 25,300 | N/A | N/A | | N/A |

Note: Figures rounded up or down to nearest 100 vehicles

| Location | Direction | Base Year: 2014 | Opening Year: 2051 | | Difference from Do Minimum |
|---|---|---|---|---|---|
| | | | Do Minimum | Do Something | |
| Junction 29-28 | Eastbound | 52,900 | 73,700 | 45,500 | -38% |
| | Westbound | 51,900 | 71,600 | 43,800 | -39% |
| Junction 28-27 | Eastbound | 50,700 | 67,800 | 50,100 | -26% |
| | Westbound | 52,400 | 67,200 | 45,400 | -32% |
| Junction 27-26 | Eastbound | 50,200 | 68,000 | 51,600 | -24% |
| | Westbound | 52,500 | 67,700 | 48,600 | -28% |
| Junction 26-25A | Eastbound | 33,800 | 47,400 | 37,100 | -22% |
| | Westbound | 34,600 | 46,600 | 32,500 | -30% |
| Junction 25A-25 | Eastbound | 43,200 | 62,200 | 29,200 | -53% |
| | Westbound | 43,700 | 59,100 | 24,900 | -58% |
| Junction 25-24 | Eastbound | 46,700 | 67,400 | 44,300 | -34% |
| | Westbound | 46,700 | 64,100 | 39,500 | -38% |
| Junction 24-23A | Eastbound | 36,600 | 55,500 | 27,300 | -51% |
| | Westbound | 36,600 | 56,300 | 27,400 | -51% |
| Junction 23A-23 | Eastbound | 34,600 | 58,700 | 23,900 | -59% |
| | Westbound | 34,200 | 56,000 | 26,300 | -53% |
| New section of motorway (Junction 29 to Docks Way Junction | Eastbound | N/A | N/A | 35,800 | N/A |
| | Westbound | N/A | N/A | 35,400 | N/A |
| New section of motorway (Docks Way Junction to Glan Llyn Junction) | Eastbound | N/A | N/A | 38,400 | N/A |
| | Westbound | N/A | N/A | 37,700 | N/A |
| New section of motorway (Glan Llyn Junction to Junction 23A) | Eastbound | N/A | N/A | 40,100 | N/A |
| | Westbound | N/A | N/A | 34,800 | N/A |

Note: Figures rounded up or down to nearest 100 vehicles

## Air Quality

**5.2.18** The new set of traffic forecasts have been reviewed with regard to the study area of the air quality assessment. The Affected Road Network (ARN) discussed in Chapter 7 of the March 2016 ES and shown in Figure 7.1 of the March 2016 ES remains the same as assessed previously. However the new set of traffic forecasts does result in changes in traffic flows from those assessed in the Do Minimum and Do Something scenarios for the opening (2022) and future (2037) years. In some locations, primarily to the east of the Scheme on the M48, traffic flows increase due to changes in the Severn toll assumptions, however further west within the study area traffic flows decrease from what has been assessed previously. As these changes were greater than the change criteria included in DMRB HA207/07, it was considered appropriate to re-model operational air quality impacts to ensure the change in traffic forecasts did not result in significant effects.

**5.2.19** Since submission of the March 2016 ES, the ADMS-Roads dispersion model used to assess operational impacts has been updated. Therefore the remodelling has been undertaken using ADMS-Roads v4.0.1, which is the latest version of the model available. Background pollutant concentrations used to process model outputs were also updated by Defra in July 2016. For consistency, and as the revised background pollutant concentrations include improvements in forecast background pollutant concentrations, the same Background pollutant concentrations as those applied in the March 2016 ES assessment have been used in the re-modelling of operational air quality impacts. The following sections summarise the revised assessment (based on the new modelling) and is not a comparison with the previous assessment.

**5.2.20** It should be noted that the change to the traffic data affects forecast year therefore this does not change the baseline assessment presented in the March 2016 ES or the model verification exercise. This remains as set out in the March 2016 ES.

### Human Health

**5.2.21** This section describes the predicted changes at human receptor locations as a result of the Scheme in the opening year (2022) and future year (2037), for comparison with that presented in the March 2016 ES.

**5.2.22** It remains the case that the modelled results for the opening year of the Scheme (2022) do not predict any exceedences of the air quality objectives for $NO_2$ and $PM_{10}$. The main improvements would be located along the existing M4 corridor predominantly as a result of a large proportion of traffic moving to the proposed new section of motorway but also due to reduced congestion at key links along the existing M4 corridor, such as the entrance to the Brynglas Tunnels. It should be noted that these improvements are in the more populated parts of the study area and result in significantly reduced population exposure to air pollutants. The largest decrease in annual mean $NO_2$ and $PM_{10}$ concentrations (-5.1 µg/m$^3$ and -0.6 µg/m$^3$ respectively) is predicted at Receptor HH32 (Buckland Cottage), which is located within the Royal Oak Hill Air Quality Management Area (AQMA). The predicted improvement at this location as a result of the Scheme is slightly lower than predicted in the March 2016 ES as a result of the new set of traffic forecasts.

**5.2.23** An improvement in local air quality is predicted in all AQMAs within the study area. Although modelled pollutant concentrations are below the annual mean $NO_2$ objective in the Do Minimum scenario, without the Scheme in place, the urban areas surrounding the existing M4 corridor would benefit from the Scheme, reducing pollutant concentrations and residential exposure further. The modelling predicts that AQMAs along the existing M4 corridor could be revoked.

**5.2.24** $NO_2$ concentrations are predicted to increase at some locations, particularly around the proposed new section of motorway. The largest increase in pollutant concentrations at receptors within 200 metres of the proposed new section of motorway would occur at Fair Orchard Farm off Lighthouse Road, where an increase of 1.5 µg/m$^3$ annual mean $NO_2$ is predicted. Due to the very low background pollutant concentrations in this area, annual mean $NO_2$ concentrations are predicted to remain well below the annual mean $NO_2$ objective.

**5.2.25** $PM_{10}$ concentrations follow a similar trend as $NO_2$ across the study area. There are no predicted exceedences of the annual mean or daily mean $PM_{10}$ objective in either 2022 or 2037 anywhere in the study area.

**5.2.26** Modelled results at receptors assessed are presented in Table 7.3.4 and Table 7.3.5 of Appendix SR7.3. The magnitude of impact is also shown in Appendix SR7.3.

### AQMA Results

**5.2.27** The assessment identifies improvements in local air quality in all AQMAs across the study area. Modelled concentrations in all AQMAs are below the air quality objectives and limit values in both 2022 and 2037. It should be noted that in 2022, without the Scheme in place, annual mean $NO_2$ concentrations along the existing M4 corridor would remain elevated and as such are at risk of exceeding the annual mean $NO_2$ objective, given the uncertainty in modelling. With the Scheme in place, a significant improvement in pollutant concentrations along the existing M4 corridor is predicted due to the decrease in vehicle flow along the reclassified route. Improvements at St Julians AQMA are smaller than across the rest of the existing M4 corridor as Junction 25 will be reopened to all traffic as part of the complementary measures and therefore locally this will result in an increase in traffic. A slight improvement is also predicted in the AQMAs elsewhere in Newport, as a result of traffic using the M4 travelling into Newport city centre from the south rather than the north.

### Table 5.1: Summary of AQMA Modelled Results

| AQMA Name | Modelled Results |
|---|---|
| **AQMA adjacent to Existing M4** | |
| Glasllwch AQMA | Concentrations of $NO_2$ and $PM_{10}$ are predicted to improve within this AQMA. A decrease in annual mean $NO_2$ concentrations of 3.8µg/m$^3$ and 3.3µg/m$^3$ are predicted at the closest properties to the east and west of the motorway corridor, respectively. Annual mean $NO_2$ and $PM_{10}$ concentrations are predicted to be below the annual mean $NO_2$ and $PM_{10}$ objectives in the opening and future year of the Scheme. |

| AQMA Name | Modelled Results |
|---|---|
| Shaftesbury/ Crindau AQMA | Concentrations of $NO_2$ and $PM_{10}$ are predicted to improve within this AQMA. A decrease in annual mean $NO_2$ concentrations of 0.9µg/m$^3$ and 2.0µg/m$^3$ is predicted at the closest properties to the north and south of the motorway corridor, respectively. Annual mean $NO_2$ and $PM_{10}$ concentrations are predicted to be below the annual mean $NO_2$ and $PM_{10}$ objectives in the opening and future year of the Scheme. |
| St. Julians AQMA | Concentrations of $NO_2$ and $PM_{10}$ are predicted to improve within this AQMA. A decrease in annual mean $NO_2$ concentrations of 0.9µg/m$^3$ is predicted at those properties closest to the motorway corridor. Annual mean $NO_2$ and $PM_{10}$ concentrations are predicted to be below the annual mean $NO_2$ and $PM_{10}$ objectives in the opening and future year of the Scheme. |
| Royal Oak Hill AQMA | Concentrations of $NO_2$ and $PM_{10}$ are predicted to improve within this AQMA. A decrease in annual mean $NO_2$ concentrations of 5.1µg/m$^3$ are predicted at the property within the Royal Oak Hill AQMA. Annual mean $NO_2$ and $PM_{10}$ concentrations are predicted to be below the annual mean $NO_2$ and $PM_{10}$ objectives in the opening and future year of the Scheme. It should be noted that the verification process indicated that modelled concentrations were under predicting at this location by 12%. However, accounting for this, annual mean $NO_2$ concentrations would still remain within the annual mean $NO_2$ objective in the opening and future year of the Scheme. |
| **AQMA elsewhere in Newport** | |
| Malpas Road South AQMA | Concentrations of $NO_2$ are predicted to improve within this AQMA. A decrease in annual mean $NO_2$ concentrations of 1.1µg/m$^3$ is predicted within this AQMA. There is a decrease of 0.1µg/m$^3$ in annual mean $PM_{10}$ concentrations at this location as a result of the Scheme. |
| Caerleon Road AQMA | Concentrations of $NO_2$ are predicted to improve slightly within this AQMA. A small decrease in annual mean $NO_2$ concentrations of 0.1µg/m$^3$ is predicted within this AQMA. There is no change in annual mean $PM_{10}$ concentrations at this location as a result of the Scheme. |
| Chepstow Road AQMA | Concentrations of $NO_2$ and $PM_{10}$ are predicted to improve within this AQMA. A decrease in annual mean $NO_2$ concentrations of 1.4µg/m$^3$ is predicted at the northern end of the AQMA along Church Road. Annual mean $NO_2$ and $PM_{10}$ concentrations are predicted to be below the annual mean $NO_2$ and $PM_{10}$ objectives in the opening and future year of the Scheme. |

## Designated Sites

**5.2.28** This section describes the predicted changes at ecologically designated sites as a result of the Scheme in the opening year (2022) and future year (2037).

### Annual Mean $NO_x$ Concentrations

**5.2.29** At the majority of designated sites across the study area, the annual mean $NO_x$ limit value (30 µg/m$^3$) for the protection of vegetation would be met in the opening year (2022) and future year (2037) of the Scheme. It should be noted that the annual mean $NO_x$ limit value has been applied to all designated sites on a precautionary basis only as all are within 20 km of a town with more than 250,000

inhabitants and therefore the limit value does not apply in these locations (see Section 7.2 of the March 2016 ES). Modelled concentrations within 20 metres of a road are greater than 30 µg/m$^3$ at two designated sites, Langstone - Llanmartin Meadows SSSI and Severn Estuary SAC/SSSI/SPA/Ramsar site in the opening year and future year without the Scheme in place.

**5.2.30** The largest improvement in annual mean $NO_x$ concentrations (8.0 µg/m$^3$) is predicted at Langstone-Llanmartin Meadows as a result of the Scheme due to the removal of a large proportion of traffic from the existing M4 corridor and modelled concentrations are predicted to improve to below 30 µg/m$^3$. The Scheme would result in an increase in annual mean $NO_x$ concentrations (0.5 µg/m$^3$) at the Severn Estuary SSSI/SAC/SPA/Ramsar site where $NO_x$ concentrations are already greater than 30 µg/m$^3$ without the Scheme in place. However, it should be noted that this is a marine habitat and therefore does not have any vegetation sensitive to changes in gaseous concentrations of $NO_x$.

**5.2.31** The largest increase in annual mean $NO_x$ concentrations is predicted at the Gwent Levels - Redwick and Llandevenny SSSI with an increase of 9.8 µg/m$^3$ at the closest point to the proposed new section of motorway. Increases of a similar magnitude of annual mean $NO_x$ concentrations are also predicted at Gwent Levels - Nash & Goldcliff SSSI, Gwent Levels - St Brides SSSI and Gwent Levels - Whitson SSSI as a result of the Scheme. In the Do minimum and Do Something scenarios, annual mean $NO_x$ concentrations at these locations are predicted to be below 30 µg/m$^3$.

**5.2.32** Annual mean $NO_x$ concentrations at each of designated sites are presented in Table 7.3.6 of Appendix SR7.3.

Nitrogen Deposition

**5.2.33** Table 7.3.7 and Table 7.3.8 of Appendix SR7.3 show the predicted total nitrogen deposition rates and change in total deposition as a result of the Scheme at each of the designated sites for the opening year (2022) and future year (2037).

**5.2.34** The Scheme would result in an increase in nitrogen deposition rates at all designated sites assessed, with the exception of Langstone - Llanmartin Meadows SSSI. However, the modelled results for both the opening year (2022) and the future year (2037) of the Scheme indicate that the critical loads applied to the designated sites would not be exceeded.

**5.2.35** The largest increase in nitrogen deposition (0.5 kg N/ha/yr, 5% of the minimum critical load) is predicted at the Gwent Levels - St Brides SSSI, Nash & Goldcliff SSSI, Whitson SSSI and Redwick and Llandevenny SSSI at the closest point to the proposed new section of motorway. The largest decrease in nitrogen deposition (0.3 kg N/ha/yr, 3% of the minimum critical load) occurs at Langstone - Llanmartin Meadows SSSI. As discussed above this is as a result of a large proportion of traffic moving from the existing M4 to the proposed new section of motorway.

## Regional Air Quality Assessment

**5.2.36** This section describes the effect of the Scheme on regional air quality across the regional ARN, which remains as set out in the March 2016 ES. Total $CO_2$, $NO_x$ and $PM_{10}$ emissions for all assessed scenarios are presented in Table 5.2. The change in emissions as a result of the Scheme is presented in Table 5.3.

**Table 5.2: Total Emissions for All Assessed Scenarios across the Regional ARN**

| Pollutant | Baseline 2014 | Do Minimum 2022 | Do Something 2022 | Do Minimum 2037 | Do Something 2037 |
|---|---|---|---|---|---|
| | Units - tonnes/year | | | | |
| $CO_2$ | 410,247 | 405,930 | 402,606 | 464,367 | 455,052 |
| NOx | 1,183 | 597 | 392 | 516 | 331 |
| $PM_{10}$ | 82 | 65 | 45 | 78 | 55 |

**Table 5.3: Change in Emissions as a Result of the Scheme**

| Pollutant | Changes in emissions (tonnes/year) | |
|---|---|---|
| | Opening Year (2022) | Future Year (2037) |
| $CO_2$ | -3,324 | -9,315 |
| NOx | -206 | -185 |
| $PM_{10}$ | -20 | -24 |

**5.2.37** As shown in Table 5.3 the Scheme would result in a decrease in emissions, including greenhouse gas emissions represented by assessed $CO_2$ emissions, on a regional scale.

**5.2.38** The decrease in emissions is a function of the proposed new section of motorway being 2.8 km shorter than the existing M4 and the emission rates used to determine the total emissions account for congestion and elevated vehicle emissions associated with this. The change in emissions has been compared with national emissions associated with the transport sector to determine the significance of the change. As shown in Table 5.4, the change in emission as a result of the Scheme is small compared with national emissions. Therefore the effect of the Scheme on regional emissions is not considered to be significant.

**Table 5.4: Comparison of Change with National Emissions**

| Pollutant | National Emissions from the Transport Sector | Changes in emissions (tonnes/year) | | Percentage Change of National Emissions | |
|---|---|---|---|---|---|
| | | Opening Year (2022) | Future Year (2037) | Opening Year (2022) | Future Year (2037) |
| $CO_2$ | 5,700,000 | -3,324 | -9,315 | -0.06% | -0.16% |
| NOx | 22,300 | -206 | -185 | -0.9% | -0.8% |
| $PM_{10}$ | 1,380 | -20 | -24 | -1.4% | -1.7% |

## Carbon

**5.2.39** The new traffic forecasts have also been reviewed having regard to the user carbon assessment presented in Appendix 2.4 of the March 2016 ES. Table 5.5 shows the revised user carbon assessment and replaces Table 3 of Appendix 2.4 of the March 2016 ES. The revised assessment using the new traffic forecasts does not change the conclusions of the user carbon assessment included in Appendix 2.4 of the March 2016 ES.

**Table 5.5: Annual User Carbon Predicted – Expressed as $tCO_{2e}$/yr**

| Year | Do Minimum | | | | Do Something | | | |
|---|---|---|---|---|---|---|---|---|
| | Bus/ Coach | Car + LGV | HGV | Total | Bus/ Coach | Car + LGV | HGV | Total |
| Baseline 2014 | 7,388 | 1,645,268 | 698,972 | 2,351,628 | - | - | - | - |
| Opening Year 2022 | 7,388 | 1,546,537 | 734,578 | 2,288,503 | 7,355 | 1,547,558 | 730,939 | 2,285,852 |
| Forecast Year (2037) | 7,457 | 1,693,316 | 819,435 | 2,520,208 | 7,409 | 1,694,536 | 809,489 | 2,511,434 |

## Noise and Vibration

**5.2.40** The new set of traffic forecasts have been reviewed to determine the implications of the traffic flow changes on the noise assessment reported in the March 2016 ES and the September 2015 ES Supplement. This has confirmed that the correction factors and hourly profile used previously do not change.

**5.2.41** The difference in predicted noise levels between the Opening Year Do Minimum scenario (OYDM) and the Opening Year Do Something scenario (OYDS) at a selection of the significant model links demonstrate a maximum increase as a result of the traffic flow changes of +0.5 dB on the existing M4 and a maximum decrease of -0.8 dB on the M48.

**5.2.42** For the new section of motorway to the south of Newport, the difference between the two sets of traffic forecasts would result in a decrease of 0.1 dB to 0.2 dB in the opening year. Therefore, the effects of the new traffic forecasts, as affecting the Scheme, are minimal and overall the Scheme, including the complementary measures on the existing M4, would still result in a benefit to more people in terms of noise reduction than would result in a disbenefit to people due to noise increases. Hence, the changes due to new traffic forecasts do not affect the overall conclusions set out in the March 2016 ES and the September 2016 ES Supplement.

**5.2.43** Overall the scheme, including the complementary measures on the existing M4 would be quieter, albeit negligibly. Based upon the conclusions from the above, and the overall uncertainty within noise predictions and assessment, the traffic noise model has not been rerun as the previous results are still considered representative and robust.

## Other Topic Areas

**5.2.44** The Change in traffic forecasting data would not result in any changes to the assessment of construction and operational effects for the following topics.

- Cultural Heritage.
- Landscape and Visual.
- Ecology and Nature Conservation.
- Geology and Soils.
- Materials.
- All Travellers.

- Community and Private Assets.
- Road Drainage and the Water Environment

## 5.3 Raising the Usk Crossing

**5.3.1** The alignment has been raised by 1.54m for two reasons:

- 0.7m to increase the safety clearance from 0.3m to 1m;
- 0.84m to take into account the proposed higher impounded dock water level due to climate change predictions and Associated British Port's confirmed proposal to replace the outer gates to the Sea Lock.

**5.3.2** This has required a lift of the mainline vertical alignment by 1.54m over the area of the junction cut and as a consequence, the main span of the River Usk, slip roads, Docks Way Junction Gyratory. The increase in level extends to the west bank of the River Ebbw and to the eastern end of the River Usk bridge approach viaducts.

### Air Quality

**5.3.3** Changes to the height of the Usk Crossing have been included in the remodelling of air quality impacts using the new traffic forecasts.

### Landscape and Visual

**5.3.4** As a result of the raising of the Usk Crossing the Zone of Theoretical Visibility (ZTV) for visual receptors has changed. The updated ZTV figures have been re-issued at Figure SR9.1 to SR9.8. The changes to ZTV are minimal and therefore it does not result in any changes to the number of receptors or the assessment made within the March 2016 ES and the September 2016 ESS.

### Other Topic Areas

**5.3.5** The design modifications at the Usk Crossing would not result in any changes to the assessment of land take, construction and operational effects for the following topics.

- Cultural Heritage.
- Ecology and Nature Conservation.
- Geology and Soils
- Materials.
- Noise and Vibration
- All Travellers.
- Community and Private Assets.
- Road Drainage and the Water Environment

## 5.4 Changes to Docks Way Link Road

**5.4.1** A retaining wall has been added on the east side of Docks Way Link Road in order to reduce land required from an adjacent business.

**5.4.2** Retaining Wall SBW-0895 has been removed from the Scheme following a realignment of Docks Way Link.

**5.4.3** The design modifications at the Usk Crossing would not result in any changes to the assessment of land take, construction and operational effects for all topics included within the ES.

## 5.5 Additional Borrow Pit at Magor

**5.5.1** An additional area of land has been identified to be used for borrow which was previously identified as temporary storage. The area of land is located to the south of the B4245 road and opposite Reed Bed 12a. The effects of this additional borrow land on the topics covered within the ES is provided within this section.

### Cultural Heritage

**5.5.2** Paragraphs 8.7.15 and 8.7.16 of the March 2016 ES describe the works that would be undertaken during construction in the vicinity of the Scheduled Monument known as the Devil's Quoit – a standing stone of probable Bronze Age date located to the east of Undy, north of the B4245 road. To this list of works should now be added the proposed borrow pit that would be located to the south of the B4245 road.

**5.5.3** The magnitude of impact on this Scheduled Monument during construction would remain as major, as reported in paragraph 8.7.17 of the March 2016 ES, and the consequent assessed significance of effect would remain as large.

**5.5.4** The land containing this additional borrow pit area would be reinstated at the end of construction. Therefore the magnitude of impact on the Scheduled Monument during operation and the consequent significance of effect would remain as reported in paragraph 8.8.67 of the March 2016 ES.

**5.5.5** Paragraph 8.9.4 of the March 2016 ES describes how archaeological evaluation would be undertaken at a number of prescribed locations within the permanent and temporary land take required for the construction of the Scheme. The location of this additional borrow pit would also require archaeological evaluation ahead of the commencement of construction activity in this area.

### Community and Private Assets

**5.5.6** The additional area of potential borrow (previously identified as an area for soil storage) would affect an area of approximately 1.5 ha of Grade 2 and 1.1 ha of Grade 3a land. Within the borrow pit areas, where the soils are stripped and restored, the land may not be returned to its pre-working physical characteristics. Whilst it may be possible for these areas to be reclaimed to an agricultural land use, a precautionary approach has been taken to the likely potential quality of the restoration and it has been assessed that the agricultural quality of the restored land is unlikely to comprise the best and most versatile Grades 1, 2 or 3a land. The nature of the soil profiles in these areas is naturally free draining and when the borrow material is removed, it is likely to be replaced by slowly permeable clayey soils from the Newchurch association, intermixed with some peaty and lighter soil materials. It is considered that the change in the nature of the underlying substrate material could create a slowly permeable layer below

restored topsoil and subsoil materials and may change the drainage characteristics of formerly free draining materials. Hence the quality of the restoration and potential for best and most versatile land to be re-established is considered uncertain. The area of the borrow pits that would be restored to agricultural land including this additional area would be approximately 15.22 ha.

**5.5.7** The temporary loss of this area of land from the land holding at Old Court was assessed in the March 2016 Environmental Statement on the basis that this area was to be used for temporary storage. The use of this land as an additional potential area of borrow would lead to a residual reduction in the quality of this area of agricultural land. Whilst the borrow area may be reinstated to a grassland use within the overall wider holding, it is assessed that the potential quality of this grassland and flexibility of use would be significantly reduced.

**5.5.8** There would be no significant differences in the assessment of land take, construction or operational effects on 'Community and Private Assets' as a result of this additional potential area of borrow.

## Other Topic Areas

**5.5.9** The additional borrow pit would not result in any significant changes to the assessment of land take, construction and operational effects for the following topics.

- Air Quality
- Landscape and Visual
- Ecology and Nature Conservation
- Geology and Soils
- Materials
- Noise and Vibration
- All Travelers
- Road Drainage and Water Environment