

Welsh Government
M4 Corridor around Newport
Environmental Statement Volume 1

Chapter 19: Conclusions

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19 Conclusions

19.1 General

- 19.1.1** This ES has reported on the EIA undertaken for the Scheme and has been carried out in accordance with current legislation and guidance, whilst due regard has also been had to emerging legislation. It has highlighted adverse and beneficial impacts and residual effects associated with the Scheme under a number of environmental topic headings and also described how any adverse effects would be mitigated.
- 19.1.2** A summary of the significant environmental effects of the Scheme associated with each environmental topic is provided within the 'Summary of Effects' section of each environmental topic chapter (Chapters 7 to 16). Those texts are brought together here in this chapter.
- 19.1.3** Any limitations in the assessment process have been identified within the individual environmental topic chapters.

19.2 Alternatives

- 19.2.1** Chapter 4 outlines the main alternatives considered during the evolution of the Scheme and sets out the main reasons for the selection of the key elements of the Scheme, taking into account environmental effects.
- 19.2.2** The process has considered a 'Do-Nothing'/'Do -Minimum' scenario, alternatives to a motorway solution, alternative route options and alternative design solutions. Consideration of 'Do -Nothing' or 'Do-Minimum' options confirmed that there is a strong need to do something to address identified problems for the M4 Corridor around Newport. Doing nothing, other than initiatives already planned or committed, was not considered to offer a reasonable alternative.
- 19.2.3** Taking into account the previous assessment work, Welsh Government identified a new section of motorway to the south of Newport (known at that time as the Black Route), together with Complementary Measures, as its draft Plan in 2013. The draft Plan identified two reasonable alternatives to this option: the Red Route and the Purple Route. Other routes were suggested in consultation, but none of these were considered to be reasonable alternatives.
- 19.2.4** The Red Route was a non-motorway (dual carriageway) option. Assessment identified that this option did not perform as strongly as the two motorway options, with significantly reduced capacity and would attract less traffic from the M4. The conclusion was that, provided funding could be made available to deliver it as a single project, a motorway solution would offer greater value for money and better meet the objectives for the M4 Corridor around Newport.
- 19.2.5** The Purple Route offered an alternative route for a new section of motorway. However, assessments concluded that the Black Route performed more strongly than the Purple Route. A range of factors were considered, including distance travelled, journey times, proximity to the residential area of Duffryn and impacts on Newport Docks and the River Usk. Taking into account the constraints identified, consultation responses and the likely effects of the options considered, the Black Route was selected as the preferred route corridor.

19.2.6 Following adoption of the Plan and modification of the protected Preferred Route (TR111) in 2014, work has continued in relation to design options for the Scheme. A range of factors has been taken into account in order to identify the Scheme that forms the subject of the draft Statutory Orders and is described in Chapter 2 of this ES.

19.2.7 In particular, the key factors affecting the development of the design have included the following.

- The special features of the Gwent Levels Sites of Special Scientific Interest, to minimise the effects of the new section of motorway on them and the desire to minimise land take from these designated sites as far as possible.
- Consultation with stakeholders, such as Natural Resources Wales (for example, in relation to the reed mitigation strategy).
- Existing features, such as existing infrastructure (such as overhead lines and gas mains) and contaminated land.
- Existing land uses, including for example Newport Docks.
- Connectivity, alignment and drainage of the existing local highway network.
- Maintenance of existing routes used by motorised and non-motorised users, where practicable and the desire to reduce the length of route diversions.
- Maintenance of access to property and land.
- Reduction of disruption, including route closures, during the construction phase.

19.2.8 Overall, it is considered that the Scheme represents the most appropriate option to address the existing problems on the M4 Corridor around Newport in terms of environmental, infrastructure, engineering and land based constraints.

19.3 Scheme Design

19.3.1 Chapter 2 and its accompanying figures describe in detail the design and key features of the Scheme. Under Section 28G of the Wildlife and Countryside Act 1981 (as amended) Welsh Government has a duty 'to *take reasonable steps, consistent with the proper exercise of the authority's functions, to further the conservation and enhancement of the flora, fauna or geological or physiographical features by reason of which the site is of special scientific interest*'. Welsh Government also has duties under Section 40 of the Natural Environment and Rural Communities Act 2006 in exercising its functions, to have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity. Environmental concerns and environmental protection therefore have been the cornerstone of the Scheme design.

19.3.2 As noted above, previous studies undertaken by Welsh Government have demonstrated that a route to the south of Newport is the most appropriate to meet the Government's objectives for alleviating the problems and difficulties of the existing M4 to the north of Newport and the Preferred Route was chosen after consideration of a number of alternatives. The horizontal alignment strikes a balance between keeping as close to the southern parts of Newport without significantly affecting communities there and encroaching any further than necessary into the Sites of Special Scientific Interest (SSSIs), whilst also

negotiating a large number of surface and subsurface utilities, rail and road infrastructure, and conforming to modern highway design standards.

19.3.3 Nevertheless, the new section of motorway would cross the Gwent Levels, an area of flat reclaimed marshes dissected by numerous reens and ditches that support a range of invertebrates for which the area is designated as SSSIs.

19.3.4 The drainage design for the Scheme and its interaction with the existing reen system, which forms a key feature of the SSSI, has therefore been paramount. Extensive consultation has been held with Natural Resources Wales (NRW) which is responsible for the maintenance of the main rivers and reens across the Gwent Levels. NRW are in agreement with the proposed drainage strategy for the Scheme and the strategy to replace reens and ditches that would be lost.

19.3.5 In summary, the specification for the proposed drainage considerably exceeds that required by the standards normally adopted for trunk roads and motorways. The pollution control functions have been designed to operate during a 100 year return period storm including a 30% increase in precipitation to take account of climate change.

19.3.6 Water quality at the outfalls from the water treatment areas would be of a suitable quality and quantity to enable the reen system to continue to support the features for which the Gwent Levels are designated as SSSI.

19.4 Embedded and Additional Mitigation

19.4.1 As noted above, Welsh Government have duties under Section 28G of the Wildlife and Countryside Act 1981 and the Natural Environment and Rural Communities Act 2006. To comply with those duties many elements of the Scheme that could be deemed as mitigation have been integrated from the outset into the highway and engineering design of the Scheme.

19.4.2 As set out in Chapter 2, the environmental design principles for the Scheme reflect the environmental context and key requirements of the environmental drivers for integration and include the following.

- Providing appropriate visual, landscape, ecological and environmental mitigation whilst minimising land take and impact on the areas of Sites of Special Scientific Interest and Special Area of Conservation.
- Retain as much existing mature and maturing vegetation as possible.
- Establish new planting to screen and integrate the Scheme into the surrounding landscape whilst retaining cohesion with retained landscape and ecological features.
- Maintain the quality of views to and from surrounding receptors.
- Create cohesive connectivity north and south of the Scheme for ecology and landscape character through design and planting methods.
- Introduce innovative landscape planting to conserve and enhance areas with specific landscape/ecological importance providing a sustainable and future focussed solution.

- Use new planting to integrate the scale, layout, form and massing of the Scheme, to reduce the scale of earthworks and filter views of the Scheme, and to reinforce existing planting.
- Use locally indigenous local plants and species rich grass on embankments and in landscape areas to reflect the distinct local character and to link the Scheme design to existing features – providing physical e.g. habitat and wildlife corridors and visual continuity.
- Use habitat creation to offset habitat loss and to add nature conservation value – including integrating the Scheme into the distinct landscape, enhancing the appearance and ecology of new drainage ditches and reens with marginal planting and planting reed beds in balancing ponds and attenuation areas.
- Use lighting with low spillage and careful consideration given to design and siting of road signs, traffic signals, environmental barriers and other street furniture.
- Improve cycle and pedestrian approaches along the Scheme as well as the interface at junctions and crossings providing opportunity to create potential ‘gateways’ to Newport.

19.4.3 Numerous measures are therefore embedded in the overall Scheme design to minimise the impact of the Scheme on the local environment, both natural and built. Where appropriate, additional measures have been introduced to mitigate predicted environmental impacts in both the construction and operation phases of the Scheme. Embedded mitigation measures and additional proposed mitigation measures are described in the relevant assessment topic chapters and are summarised in Tables 19.1 and 19.2 respectively below.

Table 19.1: Embedded Mitigation Measures

| Mitigation Measures Integral to, or Embedded in, the Scheme | |
|---|--|
| No construction in the wetted channels of the Rivers Usk and Ebbw | Avoidance of lighting other than at junctions and the river crossings |
| Minimise land take within the Gwent Levels SSSIs and where practical avoiding land take to the south of the line of the new section of motorway | Replacement of reens at a ratio of slightly greater than 1:1. |
| Provision of water treatment areas to control the volume and quality of water discharged to the reen system | Replacement of field ditches at a ratio of slightly greater than 1:1 |
| Maintaining all existing reen connections across the line of the new road | Landscape/habitat provision shown on the Environmental Masterplan (EMP) (Figure 2.6) |
| Provision of permanent mammal fencing along the new road | Replacement of saltmarsh |
| Incorporation of culverts and reen bridges together with replacement reens and ditches to maintain connectivity of the reen system | Incorporation of pollution control measures in highway drainage design |
| Maintenance of the connectivity of the Wales Coast Path | Creation of five new lengths of public bridleways and cycleway |
| Highway lighting confined to new interchanges and highway junctions | LED lighting |
| Thin surface course system on the new section of motorway to provide up to 3.5 dB(A) noise attenuation | |

Table 19.2: Additional Mitigation Measures

| Additional Proposed Mitigation | |
|--|---|
| Design of lighting of the River Usk and River Ebbw crossings to avoid lighting of the river channels and banks | Ecological enhancement of land (e.g. recutting of former ditches, removal of hedgerows, reseeding grassland) at Maerdy Farm, Tatton Farm and Caldicot Moor. |
| Minimise light spill through lighting design | Provision of replacement badger setts |
| Provision of mammal crossings at suitable locations across the line of the road | Provision of bat barn north of Magor |
| Provision of mammal tunnels adjacent to all reen culverts | Use of woodland soils and rootstocks in new planting areas. |
| Design of planting to guide bats to culverts | Provision of bat boxes. |
| Provision of eel passes on all new sluices | Investigate the potential for translocation of waxcap turf. |
| Use of plant material from existing reens and ditches to encourage colonisation of new reens and ditches by aquatic macrophytes. | Installation of approximately 4km of 2 metre high acoustic fencing |

19.4.4 Where possible, the above measures are shown on the Environmental Master Plans (see Figure 2.6). Chapter 18 describes how each of the measures shown on the Environmental Masterplan has an environmental 'Function' and a landscape or environmental 'Element'.

19.4.5 It is important that all of the environmental mitigation and enhancement measures which form the basis for the final assessment of effects within each of the environmental topic chapters are taken forward and properly implemented. For ease of reference, mitigation measures described in the environmental assessment topic chapters have been incorporated into a draft Register of Commitments (see Appendix 18.1).

19.5 Air Quality – Summary of Effects

19.5.1 The assessment has examined the potential effects of the Scheme on air quality during both its construction and operational phases.

19.5.2 A review of the current air quality legislation and planning policies relevant to the Scheme has been undertaken.

19.5.3 The baseline assessment demonstrates that there are existing air quality issues within the study area, with exceedences of the nitrogen dioxide (NO₂) annual mean objective being observed along the existing M4 corridor and in Newport City Centre. No exceedences of fine particles (PM₁₀) were recorded in the baseline assessment.

19.5.4 Assessment of the construction phase of the Scheme showed that mitigation is required to reduce potential nuisance dust issues at local residential properties and designated sites. This is a common finding from dust impact assessments and the mitigation measures applied are well tested and acknowledged as being effective. With these in place, the effect of the Scheme during the construction phase is not predicted to be significant. The assessment of effects associated with additional HGV movements during the construction phase has also shown

that no significant effects arising from traffic emissions are predicted across the study area.

- 19.5.5** The regional assessment showed that once operational the Scheme would result in a decrease in emissions on a regional scale in the opening year. The decrease in emissions in the opening year is likely to be 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. In comparison with national emissions from the transport sector, the change in emissions as a result of the Scheme are small and are not considered to be significant.
- 19.5.6** Assessment of the opening and design years showed predicted concentrations of both NO₂ and PM₁₀ would be below objective levels in all scenarios. As no exceedances of air quality objectives were observed across the study area at human or ecological receptors, no mitigation was required for the operational phase.
- 19.5.7** A number of areas were shown to experience a large improvement in air quality concentrations across the study area, most notably in urban areas adjacent to the existing M4 corridor. All AQMAs in the study area are predicted to experience improvements in concentrations as a result of the Scheme. Increases in pollutant concentrations have been predicted at locations within 200 metres of the proposed new section of motorway. However, given the existing low level of pollutant concentrations in this area, pollutant concentrations remain well within the relevant air quality objectives.
- 19.5.8** The Scheme would result in an increase in annual mean oxides of nitrogen (NO_x) concentrations and nitrogen deposition at a number of designated sites. However, habitat specific critical loads would be met at all designated sites. As the critical loads are met, it is considered that the increase in nitrogen deposition would not be significant.
- 19.5.9** Based upon the professional judgement of suitably qualified and experienced specialists, it has been shown that overall the Scheme would provide greater benefits to the region with respect to air quality pollutant concentrations, than the do minimum scenario. With the proposed mitigation implemented during the construction phase, the Scheme would result in no significant adverse effects on air quality.

19.6 Cultural Heritage – Summary of Effects

- 19.6.1** The assessment has identified that the implementation of the Scheme would result in a long term large adverse effect on the Gwent Levels Landscape of Outstanding Historic Interest. This would result from loss of land within the registered historic landscape and the consequent severance of several identified historic landscape character areas, along with visual and aural impacts on parts of the registered historic landscape that are not physically affected.
- 19.6.2** There would also be a permanent large adverse effect resulting from the demolition of the Grade II listed Magor Vicarage and a long term large adverse effect on one Scheduled Monument (a standing stone east of Undy) and on a Grade II listed farmhouse (Tatton Farm) due to the changes within their settings.

- 19.6.3** There would be permanent moderate adverse effects resulting from the demolition of three historic buildings or groups of historic buildings within Newport Docks, also from works within the Conservation Area at Llanfihangel. There would be a long term moderate adverse effect on the Grade I listed Newport Transporter Bridge and on the Grade II* listed Whitson Court as a result of change within their settings. There would be a short to medium term moderate adverse effect during construction on a second Scheduled Monument (a medieval moated site at Undy) as a result of changes within its setting, although this would reduce to a slight adverse effect during operation.
- 19.6.4** With regard to buried archaeological remains, there would be a long term moderate effect on a site just to the west of Magor comprising settlement enclosures of later Iron Age and Roman date. There would also be a long term moderate effect on the shrunken medieval settlement at Llanfihangel, on a small moated site of post-medieval or medieval date at the junction of Rush Wall and North Row, and on a complex of earthworks adjacent to Pont-y-Cwch Reen.
- 19.6.5** There is the potential for long term effects of moderate, large or even very large significance on undiscovered archaeological sites within the Gwent Levels. The level of effect would depend on the nature of the remains (i.e. the value of the archaeological site), their extent within the Scheme boundary and beyond and the type and scope of any impact resulting from the construction of the Scheme.
- 19.6.6** In addition to the significant adverse effects described above, the assessment has identified a number of slight adverse effects. These are in relation to the demolition of a small number of (non-listed) historic buildings, along with impacts on historic landscape character areas within and also outside the Gwent Levels Landscape of Outstanding Historic Interest, and changes within the settings of designated heritage assets including Scheduled Monuments and listed buildings. Slight adverse effects have also been identified with regard to impacts on a small number of known archaeological sites. Further effects of this level of significance can be anticipated following the implementation of the programme of archaeological investigation described in the Cultural Heritage Mitigation Plan (Appendix 8.10) and an archaeological watching brief will be kept at all times.
- 19.6.7** A slight beneficial effect has been identified with regard to changes within the setting of the Grade II* listed George Street Bridge in Newport.

19.7 Landscape and Visual – Summary of Effects

Landscape

- 19.7.1** The landscape assessment identified 11 local landscape character areas (LCAs), the boundaries of which have been established through a combination of desk study, review of LANDMAP data and site visits. The LCAs capture the varying character of the study area which includes the Levels, the urban area of Newport, more undulating agricultural land to the north and the River Severn Estuary. The effects of the new section of motorway on each of the LCAs have been assessed for the construction phase, year 1 of operation and year 15 of operation.
- 19.7.2** During construction, the new section of motorway would result in a very large adverse significance of effect on LCA2 (Wentlooge Levels), a large adverse significance of effect on LCA1, LCA5 and LCA7 (Michaelston-y-Fedw, Chepstow Woods Southwest and Caldicot Levels), a moderate adverse significance of

effect on LCA3 and LCA9 (Newport Docks and Uskmouth and Magor and Undy) and aslight adverse significance of effect on LCA6 and LCA11 (Llanwern Steelworks and Severn Estuary). These effects would arise primarily as a result of the change of land use, loss of vegetation, decrease in tranquillity and extensive topsoil, unsuitable material and hard stockpile areas.

19.7.3 During the first year of operation (year 1), the significance of effect associated with the new section of motorway would reduce for LCA2, LCA5 and LCA11 to large adverse, moderate adverse and neutral respectively. This reduction in the significance of effect when compared to the construction phase would be as a result of a reduced physical land take, the restoration of temporary land use areas and establishment of landscape planting. The main landscape impacts arising during year 1 of operation would be those associated with the physical presence of a new section of motorway within a landscape which does not already include infrastructure of this type and scale, particularly across the Levels (LCA2 and LCA7). The River Usk Crossing would form the dominant feature of LCA3 and would be visible from within surrounding LCAs.

19.7.4 During year 15 of operation, the significance of effect associated with the new section of motorway would reduce to moderate adverse for LCA1, slight adverse for LCA3 and LCA5 and neutral for LCA6. This reduction in the significance of effect when compared to those in year 1 of operation would be as a result of maturing landscape planting, which would mitigate the loss of vegetation removed during construction and integrate the new section of motorway into the wider network of woodlands, hedgerows and other soft landscape features. The main landscape impacts arising during year 15 of operation would be similar to those during year 1 associated with the physical presence of a new section of motorway within a landscape which does not already include infrastructure of this type and scale, particularly across the Levels (LCA2 and LCA7). The River Usk Crossing would form the dominant feature of LCA3 and would be visible from within surrounding LCAs.

19.7.5 LCA7 and LCA9 (Caldicot Levels, and Magor and Undy) would experience a consistent significance of effect (large adverse and moderate adverse respectively) throughout construction, year 1 and year 15. However, LCA4, LCA8 and LCA10 (Newport, Caldicot Moor and Caldicot) would experience a neutral significance of effect throughout construction, year 1 and year 15.

Visual

Construction Effects

19.7.6 The number of visual receptors from which views would be significantly adversely affected by the Scheme would be at its greatest during the construction phase. The construction area for a new section of motorway would be, by its very nature, a substantial and highly noticeable element within any context. For a major new road project of this scale and complexity, and given the inherent sensitivity of many of the visual receptors, it is considered that significant adverse effects upon visual amenity for a sizeable number of receptors could not be completely avoided. Adverse effects of the greatest significance are predicted for the following types of receptors.

- Receptors that lie in relatively close proximity to the road, with a limited area of intervening elements in the foreground to help with screening, resulting in construction elements and operations being highly noticeable.
- Receptors that have an open, elevated viewpoint within undeveloped rural areas, where a large proportion of the Scheme is visible within expansive and far reaching views. This applies to receptors on the Castleton Ridge and across the rising ground to the north of Magor and Undy.
- Receptors in rural, undeveloped areas where there are relatively few existing urban intrusions. This applies to many receptors across the Wentlooge and Caldicot Levels areas.

Operational Effects - Year 1 Winter

Residential Receptors

19.7.7 Twenty one residential receptors/receptor groups would experience a moderate adverse significance of effect, twenty two would experience a large adverse significance of effect and six would experience a very large adverse significance of effect in the winter of year 1. Of these receptors, those that are located in the western parts of the study area would experience significant adverse effects mainly due to the Castleton Interchange element of the new section of motorway. This part of the Scheme is elevated above the expansive low lying Wentlooge Levels area to the south. This means that, even with many intervening foreground elements and with some receptors at some distance from the Scheme, views of the traffic and associated highway infrastructure and bridges and flyovers would be available for many receptors to the south of the Castleton Interchange. These elements would often be highly noticeable and perceived as detracting urban features beyond the largely rural foreground. Receptors across other parts of the study area that would experience significant adverse effects are generally located within close proximity to the Scheme, often in locations where proposed overbridges would add to the quantity and visibility of detracting features.

Non-residential Receptors

19.7.8 This receptor group includes schools, leisure facilities, places of worship and commercial and industrial premises. Four non-residential receptors would experience a moderate significance of effect and five would experience a large adverse significance of effect in the winter of year 1. Non-residential receptors that would experience significant adverse effects in the winter of operational year 1 are located within close proximity to the Scheme, often in locations where proposed overbridges would add to the quantity and visibility of detracting features. Despite the often low sensitivity of these receptors the Scheme would adversely impact on their visual amenity due to the dominance of traffic and infrastructure on the views available.

Public Rights of Way and Land with Public Access

19.7.9 Fifteen receptor groups would experience a moderate significance of effect (fourteen adverse and one beneficial), fifteen would experience a large adverse significance of effect and four would experience a very large adverse significance of effect in the winter of year 1. Walkers using Public Rights of Way and other public access areas in the western parts of the study area would experience

significance adverse effects mainly due to the Castleton Interchange. This part of the Scheme is elevated above the expansive low lying Wentlooge Levels area to the south. This means that, even with many intervening foreground elements and with some receptors at some distance from the Scheme, views of the traffic and associated highway infrastructure and bridges and flyovers would be available for many receptors to the south of the Castleton Interchange. These elements would often be highly noticeable and perceived as detracting urban features beyond the largely rural foreground. Receptors across other parts of the study area that would experience significant adverse effects are generally located within close proximity to the Scheme (within approximately 600 metres), often in locations where proposed overbridges would add to the quantity and visibility of detracting features. moderate beneficial effects are anticipated for visitors to Belle View Park in Newport. These receptors would have intermittent views of the River Usk Crossing as they move around the park. This element would often be framed by foreground trees and would be seen in the context of views of other existing bridges across the River Usk. It is considered that it would appear as a positive point of interest.

Roads and Transport Routes

19.7.10 Motorists would only experience significant adverse effects from a very limited proportion of the roads within the study area. This is due to the low or moderate sensitivity of these receptors and the fleeting nature of views at normal traffic speeds. Five receptor groups using roads are predicted to experience a moderate adverse significance of effect on their visual amenity during the winter of year 1. Adversely affected stretches of road would be located in very close proximity to the new section of motorway and/or have some more open stretches that afford views up to the Castleton Interchange (Hawse lane and Ty Mawr Lane) or down across the Magor Interchange (lanes to the north of Magor). There are no significant effects predicted for users of the railways in the study area.

19.7.11 Passengers on boats on the River Usk and River Ebbw would experience significant effects. These are graded as large adverse for the River Ebbw due to the elevated sections of motorway spanning this river and moderate beneficial for the River Usk due to the River Usk Crossing being considered as a positive addition to visual amenity.

Operational Effects - Year 15 Summer

Residential Receptors

19.7.12 Seventeen residential receptors/receptor groups would experience a moderate significance of effect, six would experience a large significance of effect and one would experience a very large significance of effect in the summer of year 15. All of these receptors are located within approximately 300 metres of the new section of motorway. It is this proximity that would result in them continuing to experience a residual significant adverse effect on their visual amenity as traffic and infrastructure associated with the Scheme would remain highly perceptible at these closer distances.

Non-residential Receptors

- 19.7.13** Five non-residential receptors would experience a moderate significance of effect in the summer of year 15. All of these receptors who would continue to experience a residual significant adverse effect are located within approximately 300 metres of the new section of motorway. It is this proximity and a lack of intervening elements that would result in them continuing to experience a residual significant adverse effect on their visual amenity as traffic and infrastructure associated with the new section of motorway would remain highly perceptible at these closer distances.

Public Rights of Way and Land with Public Access

- 19.7.14** Twelve receptor groups would experience a moderate significance of effect (eleven adverse and one beneficial), five would experience a large adverse significance of effect and two would experience a very large adverse significance of effect by the summer of year 15. The significance of adverse effects due to the Castleton Interchange would diminish as the landscape mitigation planting matures, but views, albeit in part mitigated, of the traffic and associated highway infrastructure and bridges and flyovers would still be available for many receptors to the south of the Castleton Interchange area. Those receptors located within close proximity to the Scheme across other parts of the study area would experience a similar diminution of impact, but users of some paths that run closest to the Scheme would continue to experience a significant effect on their visual amenity. For receptors using Belle Vue Park these impacts are considered to be beneficial. For all other receptors that would be significantly adversely affected, the continuing intrusion of traffic, motorway structures and highway infrastructure into the views that are available to them is considered to adversely affect their visual amenity.

Roads and Transport Routes

- 19.7.15** There are no significant residual effects for roads or railways in the study area.
- 19.7.16** Passengers on boats on the River Usk and River Ebbw would experience significant residual effects. These are graded as large adverse for the River Ebbw due to the elevated sections of motorway spanning this river and moderate beneficial for the River Usk due to the River Usk Crossing being considered as a positive addition to visual amenity.

19.8 Ecology and Nature Conservation – Summary of Effects

- 19.8.1** The proposed new section of motorway would pass through European, nationally and locally designated sites, and would affect habitats that support protected and notable species, such as bats, otter, dormouse, water vole, badger, hedgehog, reptiles, great crested newts and other amphibians, birds, fish, invertebrates and plant species.
- 19.8.2** Effects on European Sites have been assessed separately in a process known as Assessment of Implications (of highways and/or road projects) on European Sites, and the results of the assessment have been provided in the form of a Statement to Inform an Appropriate Assessment.

- 19.8.3** As explained in section 10.5 of Chapter 10 (Ecology and Nature Conservation), the impacts of the scheme have been assessed, firstly with the mitigation which is an integral part of the scheme, and then taking into account proposed additional mitigation.
- 19.8.4** The mitigation which is considered to be integral to the scheme design and construction includes standard measures to control pollution during construction and these would be set out in a Construction Environmental Management Plan (CEMP) following the principles set out in the Pre-CEMP (Appendix 3.2).
- 19.8.5** As explained in the Pre-CEMP, an Environmental Co-ordinator (ECO) would be responsible for the interface between the environmental specialists and engineers. The ECO would have primary responsibility for managing environmental issues through the construction and post-construction monitoring phases and for obtaining relevant licences and consents.
- 19.8.6** The Environmental Clerk of Works (ECOW) would support the ECO during construction and aftercare. The ECOW would be the site representative for the ECO and would be responsible for overseeing construction activities to ensure all environmental commitments are met and compliance with the conditions of all licences and permits. The ECOW would be based on site full time and would have the authority to direct members of the contractor's site staff on environmental issues.
- 19.8.7** Table 19.1 sets out those mitigation measures which are integral to the Scheme design and those that are additional, but which would be implemented and therefore have been included in the residual assessment of likely significant effects.
- 19.8.8** Measures which would be implemented during construction, over and above standard measures to control pollution would include the following.
- Biosecurity method statement for site works, including ecology surveys.
 - Capture and translocation of dormouse.
 - Capture and translocation of reptiles.
 - Capture and translocation of water vole.
 - Capture and translocation of great crested newt.
 - Removal of bat roosts at the appropriate season.
 - Closure of badger setts at the appropriate season.
 - Pre-construction surveys for bats, badger, water vole, otter, great crested newt and features of importance to grass snake to confirm measures required during construction.
 - Clearance of vegetation suitable for nesting birds outside the bird breeding season.
 - Management of surface water and groundwater during construction including maintenance of water levels in reens and field ditches, de-watering of borrow pits and provision of temporary water treatment areas.
 - Construction lighting would be designed and managed to minimise light spill outside the working area.

- Installation of piles for the East Pier of the River Usk crossing outside the main fish migration period.
- Provision of mammal fencing during construction if and where required.
- Provision of means of escape from excavations.
- Provision of barn owl nest boxes.
- Construction sites at Great Pencarn, Newport Docks and Tata Steel would be restored on completion of construction.

19.8.9 Protected species licenses would be required for works affecting badgers, dormice, bats and great crested newts and these licences would be obtained from NRW prior to the commencement of works.

19.8.10 Having considered both the mitigation which is integral to the Scheme, and also the proposed additional mitigation, the residual effects are summarised below.

European Statutory Designated Sites

Land Take

19.8.11 The only European designated site which would be affected by the land take for the Scheme would be the River Usk SAC where the east pylon of the River Usk crossing would be located within an area of salt marsh. The salt marsh would be replaced notwithstanding that saltmarsh is not one of the features for which the SAC is designated and there would thus be no loss of a key feature of the SAC. The effect would be slight at all timescales. In EIA terms the effect would not be significant. .

Construction

19.8.12 The effect of the temporary land take for construction purposes is assessed as slight at all timescales. In EIA terms, the effects would not be significant.

Operation

19.8.13 Since there would be no further physical incursions into the sites, there would be no operational effects on the designated sites *per se*. The effect would therefore be Neutral. This would not be significant in EIA terms.

National Designated Sites

Land Take

19.8.14 The east pier of the new crossing of the River Usk would be located within an area of saltmarsh on the east bank of the river. The mitigation included in the Scheme for this loss of saltmarsh is the creation of new saltmarsh in an area to be used for construction of the River Usk Crossing once the construction works are complete.

19.8.15 The new section of motorway would cross the Gwent Levels St Bride's SSSI, the Nash and Goldcliff SSSI, the Whitson SSSI and the Redwick and Llandevenny SSSI. The land take for the Scheme would have significant effects on the SSSIs. The new section of motorway would cross the River Usk (Lower Usk) SSSI which is also designated as an SAC as referred to above.

19.8.16 The maintenance of reed connections by culverting across the road and the replacement of infilled and culverted reeds and infilled field ditches at a ratio of a little over 1:1 is integral to the design of the Scheme. The proposals for mitigation for the loss of grazing marsh within the SSSIs are set out in the SSSI Mitigation Strategy at Appendix 10.35.

19.8.17 Taking into account that this additional mitigation and enhancement would commence in advance of construction, and that improvements in the ecological interest of grasslands would be expected to be manifest within a few years, the land take effects on the SSSIs (National (High) value) are assessed as moderate or large in the short term, and slight or moderate in the medium/long term. Taking a precautionary approach the short, medium and long term effects on the Gwent Levels SSSIs would be significant in EIA terms.

Construction

The assessment takes into account the replacement of saltmarsh within the River Usk (Lower Usk) SSSI, which would be affected by the construction of the new River Usk Crossing, and which forms part of the Scheme design, construction land take within the Gwent Levels SSSIs which would be restored to grassland, together with the additional mitigation set out in the SSSI Mitigation Strategy (Appendix 10.35). The land take effects would be of slight or moderate significance in the medium term. In the long term the effects would be slight. In EIA terms, taking a precautionary approach, the effects would be significant in the short and medium term and would not be significant in the long term.

Operation

19.8.18 Some sections of Gwent Levels SSSIs to the north of the new section of motorway would be severed from the major parts of the designated sites to the south. All of the grazing marsh areas could continue to be managed alongside the operation of the Scheme. The effects on nationally designated sites (National (High) value) are assessed as slight. This is not significant in EIA terms.

Non-statutory Designated Sites

Land Take

19.8.19 The land take for the new section of motorway would affect nine Sites of Importance for Nature Conservation (SINCs) and two areas of ancient woodland. Overall the effects on the SINCs would be moderate or large in the short term, and moderate in the medium and long term. In EIA terms the effects would be significant in the short, medium and long term.

Construction

19.8.20 There would be additional land take for construction within the Marshall's SINC (salt marsh as described above for European and National Designated Sites and areas of industrial land of minimal ecological value) and areas of scrub within the Spencer Works 3 SINC. These effects would not be significant in EIA terms.

Operation

19.8.21 The operation of the new section of motorway would have little ongoing severance effect on SINCs and there would be no effects of highway drainage on

the sites other than the drainage discharges to the River Ebbw SINC and to the St Bride's Brook within the Grange Road SINC. The proposals for mitigation for the loss of grazing marsh set out in the draft SSSI Mitigation Strategy at Appendix 10.35 would result in creation of new grassland areas and improved management of existing grasslands and would also serve to mitigate for the operational impacts on SINC. Taking into account this additional mitigation, the operational effects on SINC are assessed as slight. In EIA terms this would not be significant.

Nature Reserves

Land Take

19.8.22 Nature reserves in the vicinity of the Scheme are the Newport Wetlands National Nature Reserve and RSPB Nature Reserve, and the Magor Marsh and Great Traston Meadows Gwent Wildlife Trust Nature Reserves. The Scheme would not result in land take from any of these nature reserves and there would be no significant land take effects.

Construction

19.8.23 Given their distance from the Scheme, adverse effects on the ecology of either Magor Marsh Nature Reserve or Newport Wetlands Nature Reserve as a result of construction activities are unlikely (No change). There could be some disturbance from construction in the north western part of Great Traston Meadows Nature Reserve. This is likely to be of slight significance. These effects would not be significant in EIA terms.

Operation

19.8.24 Given their distance from the Scheme, adverse effects on the ecology of either Magor Marsh Nature Reserve or Newport Wetlands Nature Reserve as a result of the operation of the new section of motorway are unlikely. There could be some disturbance from traffic in the north western part of Great Traston Meadows Nature Reserve. This is likely to be a slight effect. This would not be significant in EIA terms.

Rivers (Usk and Ebbw) Ecological Unit

19.8.25 The Rivers (Usk and Ebbw) Ecological Unit includes the following Valued Ecological Receptors (VERs).

- Rivers.
- Sub-tidal benthic habitat.
- Intertidal mudflats.
- Coastal saltmarsh.
- Migratory fish.
- Estuarine fish assemblage.

19.8.26 The Newport Local Biodiversity Action Plan (BAP) includes a Freshwater Habitat Action Plan, which in turn includes Rivers and Streams. The Trunk Road Estate BAP includes a Rivers and Streams Habitat Action Plan.

- 19.8.27** The major watercourses within the Scheme corridor are the Rivers Usk and Ebbw, both of which would be crossed by the new motorway. The river crossings have been designed to avoid any construction within the wetted channels of the rivers (which has been defined as within the limits of Mean High Water) in order to avoid any adverse effects on the river habitat.
- 19.8.28** The Newport Local BAP includes a Marine and Coastal Habitat Action Plan. This includes a section on Coastal Saltmarsh. The Trunk Roads Estate BAP includes a Habitat Action Plan for Coastal and Estuarine Habitats which includes saltmarshes. The Scheme would result in the permanent loss of 0.2 ha of saltmarsh on the east bank of the River Usk through the land take for the east pylon of the River Usk crossing. There would also be permanent loss of some 0.74 ha of saltmarsh on the banks of the River Ebbw through a combination of land take for the bridge supports and shading by the new bridge which would be much lower than the River Usk Crossing. Saltmarsh on the east bank of the River Usk temporarily used for construction purposes would be reinstated on completion of construction. In order to mitigate for the permanent loss of the total of 0.94 ha of saltmarsh, a new area of saltmarsh would be established on the site of the construction compound to the south of the proposed River Usk Crossing on the east bank of the Usk. This would cover some 2 ha, giving a ratio of new saltmarsh to that which would be permanently lost of 2.1:1.
- 19.8.29** The Trunk Roads Estate BAP Habitat Action Plan for Coastal and Estuarine Habitats also includes Mudflats. As explained above the crossing of the Rivers Usk and Ebbw would avoid the wetted channels of the rivers, which includes the intertidal mud.

Land Take

- 19.8.30** In EIA terms the residual effects of land take on all these VERs would not be significant other than for coastal saltmarsh, the effects on which, as explained under International Designated Sites above, taking a precautionary approach, in the medium term would be significant, and in the long term not significant.

Construction

- 19.8.31** In EIA terms the residual effects of construction on sub-tidal benthic habitats, intertidal mudflats, migratory fish and estuarine fish would not be significant.
- 19.8.32** For the rivers habitat, taking into account the mitigation measures which are incorporated into the Scheme to minimise the risk of accidental pollution events and particulate pollution during construction (i.e. avoidance of construction in the wetted channel of the rivers, the CEMP following the principles set out in the pre-CEMP (Appendix 3.2 and associated annexes) and adherence to standard best practice guidance and Environment Agency PPGs) the effects are assessed as slight or moderate for the River Usk and slight for the River Ebbw. Taking a precautionary approach, the effect on the River Usk in EIA terms would be a medium term significant effect and the effect on the River Ebbw would not be significant.
- 19.8.33** The effect of construction on coastal saltmarsh habitats has been described above under International and National Designated Sites. It would be slight in the medium term for saltmarsh at the River Ebbw and slight or moderate for saltmarsh at the River Usk. In the long term the effects would be Neutral or slight

for the River Ebbw saltmarsh and slight for the River Usk saltmarsh. In EIA terms the medium term effect on the River Usk saltmarsh would be significant. The other effects would not be significant.

Operation

19.8.34 The incorporation of the drainage strategy as a key aspect of the Scheme design is considered to provide a comprehensive means by which to protect the Rivers Usk and Ebbw and associated habitats and species from contaminants associated with the routine highway runoff and pollution events. Measures to avoid the bridge lighting illuminating the rivers are also proposed to avoid adverse effects of lighting on fish.

19.8.35 In EIA terms the residual effects of the operation of the new section of motorway on the habitats and species included in the Rivers Ecological Unit would not be significant.

Reens, Ditches, Reedbeds and Ponds Ecological Unit

19.8.36 The Reens, ditches, reedbeds and ponds Ecological Unit includes the following VERs.

- Eutrophic standing waters.
- Ponds.
- Reedbeds.
- Aquatic macrophytes.
- Otter.
- Water vole.
- Grass snake.
- Great crested newt and other amphibians.
- Freshwater fish assemblage.
- Freshwater invertebrates.

19.8.37 The Newport Local BAP includes a Wetland Habitat Action Plan which in turn includes Coastal and Floodplain Grazing Marsh with the associated reens and ditches, and Reedbeds. The Trunk Road Estate BAP also includes a Waterbodies Habitat Action Plan, which includes Ponds.

19.8.38 The Scheme would result in the infilling or culverting of 2568 m of reens and 9136 m of field ditches. To mitigate for this, the proposals include the provision of 2657 m of new reens and 9771 m of new field ditches.

19.8.39 No ponds would be lost under the footprint of the new motorway itself but a pond would be lost at the Duffryn construction compound site. A total of 6.59 ha of reedbed would be affected during the construction of the new motorway of which 3.19 ha would be taken for the permanent works and 3.35ha would be temporarily used during the construction period and then returned to reedbed.

19.8.40 New water treatment areas including ponds and reedbeds would be constructed along the length of the scheme, 9.4 ha of which would comprise ponds and 8.06 ha of which would comprise reedbeds).

- 19.8.41** Otter is included in the Newport Local BAP. The Trunk Road Estate BAP includes a species action plan for Otter. The Newport Local BAP species action plan for water vole states that a major objective is to enhance and create suitable habitat to re-establish links within its range along the coastal floodplains and restore water vole populations to these areas. The Trunk Road Estate BAP includes a species action plan for water vole. The Trunk Road BAP includes a species action plan for amphibians.
- 19.8.42** Design of the Scheme has taken into account the need to ensure that these wetland species are protected during the construction of the new motorway, and once completed can continue to occupy suitable habitats in the vicinity of the road, and in particular are able to cross the line of the road so as to avoid isolation of populations.

Land Take

- 19.8.43** In EIA terms the residual effects of land take on all these VERs would not be significant other than for reedbeds and freshwater invertebrates. The effect from land take on reedbeds is assessed as moderate in the short term. In the medium term as the new reedbeds established the effect would be Neutral or slight. In EIA terms the effects in the short term would be significant, and in the medium term would not be significant.
- 19.8.44** For freshwater invertebrates the effects of land take would be slight or moderate in the short term reducing to slight in the medium and long term. In EIA terms the effects in the short term would be significant, and in the medium term would not be significant.

Construction

- 19.8.45** In EIA terms the residual effects of construction on ponds, water vole, grass snake, great crested newt and other amphibians and freshwater fish would not be significant.
- 19.8.46** The effect of construction works on eutrophic standing waters taking account of the pollution control and other water management measures included in the Scheme is assessed as slight or moderate. In EIA terms, and taking a precautionary approach, this is a significant medium term effect.
- 19.8.47** For reedbeds, the residual effect of the construction works, taking into account that the reedbeds affected during the construction period would be restored on completion, is assessed as moderate in the medium term. In the long term as the new reedbeds established the effect would be Neutral or slight. In EIA terms there would be a medium term significant effect.
- 19.8.48** The residual effect of the construction works on aquatic macrophyte assemblages, taking account of the pollution control measures which would be implemented as part of the Scheme and additional measures to ensure that there were no more than short duration changes in reed and ditch water levels during construction is assessed as slight or moderate. Taking a precautionary approach, in EIA terms this is a significant medium term effect.
- 19.8.49** For otter, taking into account the measures to limit the potential for and likely impact of pollutants, the commitment to culvert retained reens, and the planting and creation of replacement and new habitats of value to otters (including

woodland, scrub, hedgerows and reedbeds) and additional mitigation measures, in particular pre-construction surveys, the installation of mammal exclusion fencing around boundaries of the work sites, provision of mammal crossings, and species-sensitive design of culverts, the effect of construction on otters is assessed as slight or moderate. Taking a precautionary approach, in EIA terms this is a medium term significant effect.

- 19.8.50** For freshwater invertebrates, the mitigation measures that would be implemented to protect water quality would reduce the risk to aquatic invertebrates from pollution. Additional mitigation measures would manage water levels during construction. The residual effects would be slight or moderate. Taking a precautionary approach, this would be a medium term significant effect.

Operation

- 19.8.51** In EIA terms the residual effects of the operation of the new section of motorway would not be significant on all habitats and species included in the Reens, Ditches, Reedbeds and Ponds Ecological Unit, other than for otter.

- 19.8.52** The operational effect of the new section of motorway on otter, taking into account the installation of mammal exclusion fencing around the boundaries of the new road and measures to limit the potential for and likely impact of operational pollutants included in the scheme, and additional mitigation measures, in particular the provision of mammal crossings, and mammal tunnels at all culverted reens is assessed as slight or moderate. Taking a precautionary approach, in EIA terms the effect would be significant.

Grazing Marsh Ecological Unit

- 19.8.53** The Grazing marsh Ecological Unit includes the following VERS.

- Coastal and floodplain grazing marsh.
- Shrill carder bee.
- Wet grassland plants.

- 19.8.54** The Newport BAP includes a Wetland Habitat Action Plan which includes Coastal and Floodplain Grazing Marsh. The Monmouthshire BAP includes a Habitat Action Plan for Species-rich grasslands and Floodplain Pastures including Seasonally Flooded Pastures. The Trunk Roads Estate BAP includes a Habitat Action Plan for Coastal and Estuarine Habitats which in turn includes Coastal and floodplain grazing marsh. The Scheme would result in the unavoidable loss of some 86.4 ha of grazing marsh within the Gwent Levels SSSIs (of which 77.6 ha would be permanently lost and 8.85 ha would be within the temporary construction areas). In order to mitigate for this loss the SSSI Mitigation Strategy (Appendix 10.35) provides for a range of habitat improvements across up to 155 ha of land at Maerdy Farm, Tatton Farm and Caldicot Moor.

- 19.8.55** The shrill carder bee is also a Newport BAP species recognising that one of the remaining populations of this species is on the flower-rich grasslands of the Gwent Levels SSSIs. Loss of habitat for shrill carder bee would arise from the loss of the vegetation bordering reens and ditches, and the loss of vegetated brownfield land at Great Pencarn, land within Newport Docks and the Tata Steel site. Mitigation for the loss of reens and ditches is described under the Reens, ditches, reedbeds and ponds Ecological Unit above. Other habitat for shrill

carder bee would be provided on south facing embankments and cuttings of the new section of motorway which would include areas to be sown to species-rich grassland. Extensive areas of species-rich grassland would be established on south facing cutting slopes at the Castleton Interchange in the west of the new section of motorway and on the embankments of water treatment areas. Additional mitigation would be provided by the SSSI Mitigation Strategy (Appendix 10.35) which would include measures to improve the species diversity of existing grasslands, to create new species-rich grassland on areas which are currently arable land, to enhance the biodiversity of existing reed and ditch banks, and to create new ditches, with associated bank vegetation, all of which would be of benefit to shrill carder bee. The construction sites at Great Pencarn, within Newport Docks and at Tata Steel, would be restored so far as practicable, to provide a mosaic of habitats including areas with food plant species of value to shrill carder bee.

Land Take

- 19.8.56** In EIA terms there would be significant effects of land take on these VERs as follows.
- 19.8.57** Taking into account the extent of the loss of coastal and floodplain grazing marsh habitat, and the strategy to mitigate the effects of loss of grazing marsh described in the draft SSSI Mitigation Strategy (Appendix 10.35), the effects on the habitat in the short term are assessed as being of moderate or large significance, and in the medium to long term, slight or moderate significance. In EIA terms, taking a precautionary approach, the effects would be significant in the short, medium and long term.
- 19.8.58** The effects on shrill carder bee taking into account the mitigation comprising the habitat improvements included in the SSSI Mitigation Strategy (Appendix 10.35) and the sympathetic restoration of the construction sites at Great Pencarn, Newport Docks and Tata Steel would be moderate or large in the medium term. In the long term as the new and replacement habitats develop, the effect would be slight or moderate. In EIA terms, taking a precautionary approach, effects would be significant in the medium and long term.
- 19.8.59** For wet grassland plants, taking into account the extensive creation of suitable habitat which would result from implementation of the SSSI Mitigation Strategy (Appendix 10.35), the effect would be of moderate significance in the short term. In the medium term, as the habitat improvements take effect, the effects are assessed as being of slight significance. In EIA terms the effects would be significant in the short term, becoming not significant in the medium term.

Construction

- 19.8.60** The residual effects of construction on coastal and floodplain grazing marsh and wet grassland plants would not be significant in EIA terms.
- 19.8.61** For shrill carder bee, the effects of the construction works resulting in additional habitat loss, taking into account the sympathetic restoration of the construction areas in Newport Docks and Tata Steel on completion of the works, are assessed as being of moderate or large significance in the medium term and slight or moderate in the long term. Taking a precautionary approach these effects are significant in EIA terms.

Operation

19.8.62 The residual effects of the operational motorway on the habitat and species included in the Grazing Marsh Ecological Unit, taking into account habitat severance, and that provisions would be made for NRW to manage the drainage future drainage, the mitigation measures included in the Scheme, ongoing management of the new species-rich grasslands and the implementation of the SSSI Mitigation Strategy (Appendix 10.35) would not be significant in EIA terms.

Farmland Ecological Unit

19.8.63 The Farmland Ecological Unit includes the following VERS.

- Lowland mixed deciduous woodland (including Wet woodland).
- Hedgerows.
- Lowland meadow.
- Dormouse.
- Badger.
- Hedgehog.

19.8.64 The Newport, Monmouthshire and Trunk Road Estate Biodiversity Action Plans (BAP) all include Woodland Habitat Action Plans. The total loss of woodland habitat as a result of the land take for the new section of motorway (including that within temporary construction areas) would be 49.8 ha (of which 7.15 ha is semi-natural woodland and 42.65 ha plantation). Acknowledging that the Scheme would result in unavoidable losses of woodland (much of which is plantation woodland associated with the existing M4, particularly in the Castleton area), the Scheme includes extensive woodland planting. The new planting comprises 103 ha of 'Woodland' and 'Linear Belts of Trees and Shrubs' similar to those associated with the existing M4. Unlike the existing woodland, there would be extensive new woodland blocks at Berryhill Farm in the west, and east of Rockfield Farm at Undy in the east. The overall ratio of new planting to that which would be lost would be 2.1:1. The long term management of these woodlands would be the responsibility of the South Wales Trunk Road Agent and would follow the principles set out in the Trunk Roads Estate BAP, including that of maximising biodiversity within woodlands.

19.8.65 The Newport Local BAP includes a Farmland Habitat Action Plan, which includes hedgerows. The Monmouthshire Local BAP includes a Boundary and Linear Features Habitat Action Plan. This includes hedgerows. The Trunk Road Estate BAP includes a Habitat Action Plan for Boundary Features, which includes hedgerows. The Scheme would result in the loss of some 35.8 km of hedgerows. The proposals include the planting of some 3.6 km of hedgerows. Much of the route of the new section of motorway would be through the Gwent Levels. Whilst the hedgerows within the Levels, typically along the reens and ditches which form the field boundaries, are of biodiversity value, NRW also consider them to be detrimental to the ecology of the reens and ditches which support the important aquatic plant and animal communities which are key features of the Gwent Levels SSSIs as they cause shading and interfere with management of the watercourses. NRW have thus indicated that hedgerow planting would not be appropriate within the Gwent Levels SSSIs. At either end of the Scheme, the

extensive woodland and other landscape planting proposed at the Castleton and Magor Interchanges means that there would be little opportunity for hedgerow planting in these areas.

19.8.66 The Newport Local BAP includes a Lowland Grassland and Heathland Action Plan. This in turn includes Lowland Meadows. The Newport Local BAP also includes a Fungi Action Plan. This is primarily concerned with waxcaps and other grassland fungi. As referred to above under Coastal and Floodplain Grazing Marsh, the Monmouthshire Local BAP includes a Habitat Action Plan for Species-rich Grasslands and Floodplain Pastures. This includes Lowland Neutral Grassland. The Trunk Roads Estate BAP includes a Lowland Meadows Habitat Action Plan. Whilst the Scheme would result in the loss of some 164 ha of grassland in addition to that included under grazing marsh considered above, the majority of this is semi-improved or improved grassland of little intrinsic nature conservation value. Overall, the Scheme would result in the loss of some 7.01 ha of unimproved grassland. Some small areas of species-rich grassland including wax caps at Pound Hill and Pwll Diwaelod would be lost. The Scheme includes the establishment of some 26.1 ha of species-rich grassland, predominantly on the south facing embankments of the new motorway, and on the south facing slopes of cuttings, and on the banks enclosing the water treatment areas. The total area of all grassland (excluding amenity grassland) included in the Scheme is some 117 ha.

19.8.67 Dormouse is included in the Newport Biodiversity Action Plan. The Trunk Road Estate BAP includes a species action plan for dormouse. The main area for dormouse within the Scheme corridor is around the Castleton Interchange at the west of the Scheme with a smaller population north of Magor at the east. Two dormouse nests were found within the Gwent Levels south of the Tata Steel area. In the long term, replacement woodland planting would result in an increase in habitat of potential value to dormice throughout the Scheme (103 ha of woodland and linear belt planting to replace 49.8 ha of loss). However, hazel dormice would require replacement habitat with immediate effect. Therefore, the mitigation for the Scheme would include dormouse trapping and translocation to a favourable off-site location in accordance with a European Protected Species licence and associated method statement. Investigations of potential receptor sites are progressing in consultation with NRW. Should no favourable off-site receptor site be located prior to the commencement of construction, with NRW approval and licencing, dormice would be trapped and translocated prior to construction to a temporary holding site in order to be cared for in captivity until an off-site receptor site has been enhanced to favourable condition or replacement planting associated with the Scheme has established and developed sufficiently to support the dormouse population in the long term. In principle agreement has been reached with Bristol Zoo regarding accommodation of a captive population of dormouse until such time as they can be released, if such a facility is required.

Land Take

19.8.68 The residual effects of land take on dormouse, badger and hedgehog would not be significant in EIA terms.

19.8.69 In EIA terms there would be significant effects of land take on other VERs as follows.

19.8.70 Within the lowland mixed deciduous woodland habitat, the effects on plantation woodland in EIA terms in the short to medium term would not be significant and in the long term would be potentially beneficial. The effects on semi-natural woodland would be of moderate or large significance in the short and medium terms, but in the longer term of moderate significance. In EIA terms the effects would be significant in the short, medium and long term.

19.8.71 The effect of the loss of hedgerows as a result of the land take for the new section of motorway would be moderate in the short, medium and long term. In EIA terms this would be a significant impact. However, it must be appreciated that the woodland and linear planting at Castleton and Magor at either end of the Scheme would provide habitats of greater biodiversity value and would provide wildlife corridors, and that NRW do not favour hedgerow planting by way of mitigation within the Gwent Levels SSSIs due to their potential to overshadow and impact upon the reens.

19.8.72 For lowland meadows, excluding coastal grazing marsh considered under the Grazing Marsh Ecological Unit above, the land take effects on all grasslands, other than species-rich grasslands, would not be significant in EIA terms. For species-rich grasslands the effects would be of moderate significance in the short term becoming slight in the medium term as the new grassland develops. In EIA terms the effects would be significant in the short term becoming not significant in the medium term.

Construction

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

Operation

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

Industrial Land Ecological Unit

19.8.75 The Industrial Land Ecological Unit includes the following VERs.

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

19.8.76 The Newport Local BAP includes a Brownfield and Urban Action Plan, which in turn includes open mosaic habitats on previously developed land. The Monmouthshire Local BAP includes a Built Environment and Associated Green

Spaces Habitat Action Plan, which in turn includes Wasteground', 'Brownfield' and Industrial Sites. There are areas of 'brownfield' land at Great Pencarn – Duffryn, south of the Solutia works, in Newport Docks, south of the Tata Steelworks at Llanwern and at Green Moor. Vegetation regenerating on the brownfield land typically comprises a mosaic of grassland and scrub often formed on man-modified substrata.

- 19.8.77** The brownfield site at Great Pencarn – Duffryn would be almost entirely taken up by the main construction compound for the Scheme. In the section of Newport Docks between the River Ebbw and the River Usk, much of the vegetated brownfield land would be taken up by the embankment for the new motorway from the River Ebbw eastwards to the start of the viaduct section, by the link to Docks Way and its junction with the new section of motorway, or by temporary construction areas south of the embankment and east of the Docks Way link.
- 19.8.78** East of the River Usk there would be losses of areas of vegetated brownfield land adjacent to the saltmarsh on the east bank of the river, either side of the Uskmouth railway line, south of the Solutia works, and an area between the Uskmouth railway line and the River Usk in order to provide construction areas for the viaduct and Usk crossing.
- 19.8.79** The section of motorway along the south of the Tata Steel land and across Green Moor, and the associated construction areas, would pass through of brownfield land including sludge lagoons and their embankments.
- 19.8.80** In restoring the construction sites at Great Pencarn, within Newport Docks and Tata Steel, so far as practicable a mosaic of habitat types providing some of the characteristics of brownfield land would be provided. Such habitats include areas of unvegetated, loose bare substrate and pools and early successional communities consisting mainly of stress-tolerant species (e.g. indicative of low nutrient status or drought) which may be composed of annuals, mosses and liverworts, lichens, ruderals, inundation species, and open and flower-rich grassland. Hibernacula for reptiles, potentially using suitable surplus materials derived from construction would be provided.
- 19.8.81** The Trunk Road Estate BAP includes a species action plan for reptiles. Single common lizards were recorded at the eastern edge of Magor Services and the former laboratory site at Pye Corner in 2014 indicating low populations in these areas. In 2015 single common lizard and slow worm were recorded within Newport Docks indicating low populations. Prior to commencement of construction in areas where common lizard and slow worm populations have been identified, reptile fencing would be installed and reptiles would be captured and transferred to suitable habitat on the margin of the Scheme, or to suitable habitat within the SSSI mitigation areas (Appendix 10.35) or elsewhere by agreement.
- 19.8.82** The small ranunculus moth, recorded within the Tata Steel land, is the subject of a Species Action Plan in the Newport Biodiversity Action Plan. Brownfield sites are important for the recovery of this and other invertebrate species. Surveys of the land within Newport Docks identified 329 invertebrate species. Of these 32 (9.7%) were considered to be 'Key Species', seven of them of Red Data Book or equivalent status. This represents a good diversity for such an open site. One species, a fly *Liriomyza intonsa*, is new for Britain. The survey showed that the saltmarsh beside the River Ebbw is of particular conservation importance.

19.8.83 Surveys of the land at and Tata Steel recorded 378 invertebrate species. Of these 31 (8.2%) were considered to be 'Key Species', nine of them of Red Data Book or equivalent status (2.4%). This is a good diversity for the habitat types present. The proportion of Key Species was good, indicating an area of significant invertebrate conservation value. Of particular interest were a fly *Hydrophorus viridis* and a hoverfly *Sphaerophoria loewi*, both very rare nationally. Reens and ephemeral pools were particularly important for the rarest species found. Reedbeds and sedge beds were also important for a number of scarce species and general biodiversity. Old poplar trees were also of interest. Sympathetic restoration of the construction sites would partially mitigate for the loss of habitat for invertebrates characteristic of brownfield sites.

Land Take

19.8.84 The residual effects of land take on reptiles would not be significant in EIA terms.

19.8.85 For the open mosaic habitats on previously developed land habitat the land take effects, taking into account the sympathetic restoration of the land at Great Pencarn, Newport Docks and Tata Steel, are assessed as moderate or large in the medium term, and moderate in the long term. These effects are significant in EIA terms.

19.8.86 The effects on the terrestrial invertebrate assemblage associated with brownfield land, taking into account the sympathetic restoration of the land at Great Pencarn, Newport Docks and Tata Steel, are assessed as moderate or large in the medium term. In the long term as the habitats recovered the effects would be moderate. These effects would be significant in EIA terms.

Construction

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

Operation

19.8.88 The residual effects of the operation of the new section of motorway on the habitat and species included in the Industrial Land Ecological Unit, taking into account the sympathetic restoration of the construction areas at Great Pencarn, Newport Docks and Tata Steel, and the extent of habitat (particularly species-rich grassland) included in the Scheme would not be significant in EIA terms.

Bats

19.8.89 There is a species action plan for bats in the Newport Local BAP. The Trunk Road Estate BAP includes a species action plan for bats. Recognising that all bats are European Protected Species and taking the results of the 2014 and 2015 reports together, the corridor of the proposed new section of motorway is of at least district level importance for lesser horseshoe bats and brown long-eared bats and between district and county level importance for pipistrelles. For all other bat species, results of the surveys indicate that the route is of regional value with regard to foraging and commuting behaviour. Overall the route corridor is thus assessed as being of regional value for bats.

19.8.90 Construction of the Scheme would require the felling of trees and demolition of buildings of known or probable value to roosting bats. This work would require a European Protected Species licence which would be obtained prior to the commencement of the licenceable works. A bat barn would be provided north of Magor and another, if required, at Berryhill Farm. Artificial bat roost boxes to replace roosts which would be removed for the Scheme would be installed in suitable trees in field boundaries on the edges of the Scheme such as on the margins of construction sites and borrow pits, and elsewhere by agreement.

19.8.91 Habitats of value to bats which would be lost would include woodland, reens and their rough grassland banks, and hedgerows. The Scheme includes woodland and linear belt planting, and scrub planting. Reens and ditches would be constructed to replace the lost watercourses. There would be some hedgerow planting. Culverts and mammal tunnels, underpasses and overbridges, would provide routes which bats could use to cross the new motorway. However, evidence for the effectiveness of the proposed culverts and mammal tunnels is limited and the probability that bats will use the culverts and/or mammal crossings is not possible to predict exactly.

Land Take

19.8.92 Taking into account the provision of a bat barn at Magor, the provision of bat boxes, minimising of light spill from the highway lighting where provided, provision of mammal crossings which could be used by some bat species, and design of planting to guide bats to culverts the effect on bats is assessed as moderate in the short and medium terms. In the longer term the effects would be of slight significance. In EIA terms the short and medium term effects would be significant, but the long term effects not significant.

Construction

19.8.93 There would likely be some change in bat activity while crossing points are constructed and until bats locate these, but measures would be carried out in order to help bats locate these features, including locating them at or close to sites of high and very high bat activity, and the installation of mammal fencing and bat corridors. However, the evidence for the effectiveness of the proposed culverts and mammal tunnels is limited and the probability that bats will use the culverts and/or mammal crossings is not possible to predict exactly. Other mitigation measures would include the use of sympathetic lighting and monitoring surveys. It is also the case that there is alternative habitat in the immediately surrounding area. The residual effect of construction on bats is assessed as being of moderate significance. In EIA terms this is a significant medium term effect.

Operation

19.8.94 Taking into account the potential risk of vehicle collision for some species which may cross the new road, and the long term disruption to the movement of all bat species but in particular those species unlikely to cross the new road, and the additional mitigation measures, in particular the provision of mammal tunnels adjacent to all reen culverts, the construction of mammal crossings along the route to include locations associated with high bat activity, the detailed alignment of fencing and the location of planting to lead bats to safe crossing points, on a

precautionary basis the residual effect on bats is assessed as moderate. In EIA terms this would be significant.

Breeding Birds

19.8.95 The Trunk Road Estate BAP includes a species action plan for barn owl, the objectives of which are to gather more information about the presence of barn owls on the trunk road network, and to reduce the level and incidence of mortality on roads whilst managing the soft estate for barn owls where it is safe to do so, and where the risk of road-related casualties is low.

19.8.96 Barn owl is known to be susceptible to collision with moving vehicles due to its horizontal hunting techniques. Because barn owls remain relatively safe when confining their activities to road verges themselves it is recommended that these linear stretches of rough grassland should be continuous and not interrupted by the planting of long impenetrable blocks of dense trees or shrubs which extend the full width of the verge. The landscape provisions for the Scheme provide linear grassland habitat along the proposed motorway verges through the Gwent Levels. The vegetated verges on a motorway are separated from the carriageways by the hard shoulder which provides a buffer between the potential barn owl feeding habitat and the traffic on the road. There would also be an area of marshy grassland south of the road at chainage 17900 to chainage 19100 in the vicinity of the existing potential barn owl nest, and nest boxes which would be provided during the construction phase, which would be an attractive hunting area for barn owl.

Land Take

19.8.97 The mitigation and other measures included in the Scheme which would be of benefit to breeding birds include replacement of reens and ditches (as set out in the Reen Mitigation Strategy at Appendix 2.2), the extensive woodland planting included in the scheme (Figure 2.6) and the provision of water treatment areas incorporating ponds and reedbeds. Additional mitigation would be provided as set out in the SSSI Mitigation Strategy at Appendix 10.35 which would comprise the ecological enhancement of land at Maerdy Farm, Tatton Farm and Caldicot Moor.

19.8.98 The effects on the breeding bird components of the Severn Estuary SPA or Ramsar site would not be significant in EIA terms, as would be the effects on other breeding birds apart from Cetti's Warbler.

19.8.99 For barn owl the short term effects of land take would be moderate, but in the medium term, as the improvements to the SSSI mitigation areas became effective, the land take effects would be Neutral or slight. The short term effects would be significant in EIA terms, becoming not significant in the medium term.

19.8.100 The predicted effect for Cetti's warbler with respect to land take would be moderate or large significance in the short term, but slight or moderate in the medium and long term. Taking a precautionary approach, these effects would be significant in EIA terms.

Construction

19.8.101 In EIA terms the effects on the breeding bird components of the Severn Estuary SPA or Ramsar sites, and for other breeding birds (including barn owl) other than

Cetti's Warbler, would not be significant. For Cetti's warbler, the effects would be moderate or large. In EIA terms this would be a significant medium term effect.

Operation

19.8.102 In EIA terms the operation of the new section of motorway would have no significant effect on the breeding bird components of the Severn Estuary SPA or Ramsar site.

19.8.103 Taking into account the ongoing management of the new reens and water treatment areas which would develop as suitable habitat for Cetti's warbler and other wetland breeding birds, the management of the extensive woodland and other planting included in the Scheme which would provide extensive habitat for woodland birds, and the habitat which would be provided by the SSSI mitigation areas, the residual effects of the operation of the new section of motorway on Cetti's warbler would be moderate or large. This would be a significant effect in EIA terms.

19.8.104 For other breeding bird species identified in the study area the residual effects of the operation of the new section of motorway would not be significant in EIA terms.

Wintering Birds

Land Take

19.8.105 The residual effects of land take on wintering birds would not be significant in EIA terms.

Construction

19.8.106 Taking account of the potential disturbance effects at the river crossings, the effect on wintering birds that are part of the Severn Estuary SPA/Ramsar site would be slight or moderate (redshank, gadwall and pintail), slight (teal, pochard and shoveler), Neutral or slight (shelduck, wigeon, tufted duck, curlew, lapwing and mallard), and Neutral or slight for the other species that make up part of the Severn Estuary SPA/Ramsar assemblage.

19.8.107 In EIA terms, and on a precautionary basis, the effect on wintering birds that are part of the Severn Estuary SPA/Ramsar site would be significant in the medium term. The other effects would not be significant.

19.8.108 For other species recorded within the study area the effects would not be significant in EIA terms.

Operation

19.8.109 The residual effects of the operation of the new section of motorway, taking into account disturbance (visual and noise), the risk of vehicle collisions, and the availability of alternative habitat would not be significant.

19.9 Geology and Soils – Summary of Effects

- 19.9.1** The route of the proposed new section of motorway has been subject to a number of detailed ground investigations that have provided data on the ground conditions to provide a detailed understanding of the geological and hydrogeological baseline conditions. The data generated during ground investigations have also allowed assessments to be undertaken on the level of risk to humans and the environment associated with land contamination based on the Scheme both during construction and its operation.
- 19.9.2** The Scheme would not affect any designated geological sites and some new rock exposures would be created providing a beneficial effect.
- 19.9.3** The potential impacts on topsoil and subsoil during construction would be mitigated through the adoption of a Soils Handling Strategy. This would be used to control the way that topsoils and subsoils are managed and stored during construction to allow reuse as part of the Scheme whilst maintaining soil quality, as far as possible. The effect on topsoils from pollutants in traffic spray during operation would be of neutral significance.
- 19.9.4** In total, 27 areas potentially affected by land contamination along the proposed route of the new section of motorway have been identified, each of which has been subject to an individual assessment to determine the need for remediation to protect the environment and human health. For some of the potentially contaminated sites, potential risks have been identified that require remediation to ensure human health and the environment (including the sensitive reens of the Gwent Levels) are mitigated. Exposure by construction workers, the general public and future maintenance workers to potentially contaminated soils, waters and ground gases have been assessed along with the risk of contaminants migrating into surface waters and ground waters.
- 19.9.5** A remediation strategy has been developed in line with UK guidance to mitigate risks from known potential areas of land contamination and this is set out in the Outline Remediation Strategy Report (Appendix 11.2). Contaminated soil arisings from excavations would be subject to compliance testing against suitability for reuse criteria. Suitable materials would then be reused within the Scheme typically as general embankment fill. Some contaminated soils would need treatment particularly in the Tata lagoons area. The Outline Remediation Strategy also provides procedures to deal with the unlikely event of unexpected or previously unidentified land contamination being encountered during construction. The final remediation strategy would also ensure the handling, treatment, movement and reuse of contaminated soils is controlled in line with a Material Management Plan that would be prepared using the Definition of Waste Code of Practice. Upon completion of construction of the Scheme, a Remediation Verification Report would be prepared to prove 'Lines of Evidence' to NRW, Monmouthshire County Council and Newport City Council that the remediation has been completed in line with the agreed remediation strategy.
- 19.9.6** The potential effects of potentially contaminated surface water runoff and prevention of potentially contaminated groundwaters entering surface waters during construction would be mitigated through the implementation of a Groundwater and Surface Water Management Plan. Surface water and groundwater monitoring would be undertaken during construction and for up to 5 years following construction. With these measures in place effects on water

quality would be of neutral or slight adverse significance. The exception to this is during the construction phase in the area of the sludge lagoons (CL-26), where a minor adverse impact, whilst unlikely, could occur and thus the potential effect could be of moderate adverse significance.

19.9.7 Potential effects from ground gases impacting on human health during construction would be mitigated using good practice guidance and adoption of strict safe working procedures resulting in slight adverse effects. The effects from any ground gases during the operational stage would be mitigated through the incorporation of gas protective mitigation measures and the significance of effects would be limited to slight adverse.

19.9.8 Risks to human health from any contamination during the operational phase would be minimal. This is because the construction of the Scheme would result in a barrier being created in the form of the motorway embankment itself or clean topsoils and subsoils being placed as part of Scheme landscaping. The hardstanding and landscaped areas would effectively break any potential contaminant linkages between contaminated soils and human receptors. The effects to human health during operation would generally be of slight beneficial significance as a result of the Scheme as the likelihood for humans coming into contact with contamination is reduced compared to the baseline.

19.9.9 The effects of potential contamination on surface waters during operation would be mitigated through the remediation strategy and modifying construction methods in known and potentially contaminated areas, such as not installing band drains in contaminated soils and careful selection of piling techniques. The Scheme would result in slight adverse effects to the water environment.

19.9.10 The potential risks during construction in the unlikely event of buried unexploded ordnance (UXO) being encountered would be mitigated through the implementation of a UXO Mitigation Strategy which would follow good practice guidance. The risks from buried UXO being encountered during construction are assessed to be of slight adverse significance.

19.9.11 With the mitigation measures proposed, the only potentially significant effect could be on the sensitive surface waters of the Gwent Levels where a potentially significant effect is predicted during construction associated with the handling and management of lagoon wastes.

19.10 Materials – Summary of Effects

19.10.1 The likely significance of environmental effects from the use of material resources, and the generation and management of waste, resulting from the construction and operation of the Scheme are summarised below.

19.10.2 The strategy for construction is to reuse as much of the material won (excavated) during construction as possible. This would maximise the sustainability of the Scheme by minimising both the amount of material that would otherwise be transported for disposal and the amount of imported primary raw materials, thereby preserving mineral resources.

19.10.3 The resultant effect on mineral sterilisation and depletion of resources is assessed as slight adverse, which would not be significant in EIA terms.

- 19.10.4** The reuse of site won materials would be undertaken in accordance with the approach set out in the Definition of Waste: Development Industry Code of Practice (CL:AIRE, 2011). This would require the preparation of a Materials Management Plan that would control and document the reuse of materials. The reuse of site won materials would furthermore be subject to their compliance with relevant assessment criteria to ensure suitability and protection of environmental receptors. These requirements are provided in an Outline Remedial Strategy (Appendix 11.2). An Outline Materials Management Plan is provided as part of Appendix 3.2 of this ES.
- 19.10.5** Where materials are initially unable to meet the assessment criteria they would either be treated to make them suitable for use or, as a last resort, disposed of off-site as waste. Effective treatment would offset the need for imported material resources and minimise the requirements for disposal.
- 19.10.6** During the construction phase, standard best construction practice would be adopted. A Construction Environmental Management Plan (CEMP) will set out the controls for material storage. A Pre-CEMP is provided at Appendix 3.2 of this ES.
- 19.10.7** This approach for managing materials is consistent with the waste hierarchy defined in the Waste Framework Directive (Directive 2008/98/EC). Adopting the waste hierarchy would significantly reduce the amount of material requiring off-site disposal and hence minimise potential impacts relating to movement of materials both on to and off the site.
- 19.10.8** The assessment demonstrates that the significance of adverse environmental effects with mitigation in place is generally slight. The resultant effect relating to the use of site won rock and imported materials is assessed as slight adverse, which would not be significant in EIA terms. The effects relating to the disposal of materials are assessed as slight adverse, which would not be significant in EIA terms. During construction the importation of materials and associated traffic movements could potentially result in short term, localised, moderate adverse effects particularly relating to increased heavy goods vehicle movements. Detailed traffic management would be required to mitigate the movement of materials during construction.
- 19.10.9** During the operational phase there would be no significant effects anticipated associated with material resources.

19.11 Noise and Vibration– Summary of Effects

- 19.11.1** Legislation and policy promote sustainable economic growth, whilst ensuring that quality of life is not unreasonably affected. It is considered that the Scheme appropriately reflects these aims with regard to the noise and vibration effects associated with the construction and subsequent operation of the Scheme.
- 19.11.2** During the construction phase, standard best construction practice would be adopted. In addition, where necessary, additional mitigation would be put in place, including temporary hoardings or noise barriers around worksites or particularly noisy activity and sound insulation where appropriate.

- 19.11.3** Specific monitoring measures would include noise monitoring and vibration monitoring at residential premises at key locations during construction to check compliance with noise and vibration limits.
- 19.11.4** A Construction Environmental Management Plan (CEMP) will set out the controls for noise and vibration levels during construction. A Pre-CEMP is provided at Appendix 3.2 of this ES.
- 19.11.5** With the generic mitigation measures discussed and temporary noise barriers where appropriate, it is estimated that 213 residential NVSRs may experience a effects of moderate or large significance. An estimated 140 properties fall within 45 to 71 metres of a construction site and would experience a slight adverse significance of effect.
- 19.11.6** During operation, both beneficial and adverse noise effects are predicted to occur. The proposed new section of motorway would reduce congestion on the existing M4 potentially resulting in higher road-speeds and increased vehicle noise. Measures have been incorporated into the design of the Scheme to reduce noise for receptors in proximity to the proposed new section of motorway, including the provision of a thin road surface system which is relatively low noise and screening in the form of planting, bunding and retaining walls. Noise barriers of 2 metres in height area proposed at four areas along the new section of motorway, although these are subject to detailed design.
- 19.11.7** Based on the predicted noise change, the level of significance is considered to range between major beneficial and major adverse in the short term. In the long term, the range decreases to levels of significance between moderate beneficial and major adverse. Considering the difference between the situations in 2022 without the Scheme compared to the same year with the Scheme (without noise barriers), 1,203 receptors would experience a significant adverse effect and 4,026 would experience a significant benefit. With noise barriers in place, it is predicted that 1,117 receptors would experience a significant adverse effect and 4,101, a significant beneficial effect.
- 19.11.8** When considered as a whole, the Scheme has a net benefit, with an average noise level difference of -1.4 dB per property across the 20,654 properties assessed for the opening year, when comparing the Do-Minimum scenario against the Do-Something scenario. This equates to approximately a 66,700 'dB·people' improvement because of the Scheme.
- 19.11.9** It is considered, on balance that the Scheme would not result in unacceptable risk or harm due to noise pollution. Moreover, the Scheme would result in a positive improvement in the noise environment surrounding the existing M4 though Newport.

19.12 All Travellers – Summary of Effects

- 19.12.1** In addition to the road network linking Newport, Magor and Castleton with the settlements to the north of the M4 and the outlying small settlements of the Gwent Levels to the south, pedestrians, cyclists and equestrians have access to a network of public rights of way. The proposed new section of motorway would affect a number of these routes, predominantly used for informal recreation by pedestrians and cyclists.

- 19.12.2** One national route, the Wales Coast Path, together with the length of the Newport Coast Path that runs along the same alignment, would be affected by the new section of motorway to the west of the River Ebbw and to the east of the River Usk. The proposed new section of motorway would also cross the National Cycle Network Route 4, a long distance route between London and Fishguard, which forms the main option of the Celtic Trail East cycle route passing through Newport, parts of which are traffic-free.
- 19.12.3** Consultation has been undertaken with Newport City Council, Monmouthshire County Council, Natural Resources Wales and Sustrans in relation to these resources and measures that have been incorporated into the Scheme to minimise the impacts on them.
- 19.12.4** A number of site visits together with user surveys were undertaken to establish the baseline conditions for this range of resources used by pedestrians, cyclists and equestrians.
- 19.12.5** Some routes used by pedestrians, cyclists and equestrians would require stopping up on a temporary basis during construction or on a permanent basis where they fall within the permanent land take for the Scheme. During both phases diversions would be established for most routes to enable users to access other parts of the local network and to maintain connectivity between routes.
- 19.12.6** Taking into account the measures incorporated into the Scheme for the diversion of permanently affected routes and the mitigation measures proposed to provide temporary diversions for those public rights of way and cycle paths affected during construction, including the Wales Coast Path and Newport Coast Path, no significant effects on public rights of way, cycle paths or other routes are predicted.
- 19.12.7** During construction, the existing M4, M48 and A4810, together with most local roads crossing the Scheme or linking to it, would remain open under traffic management, where required, except for some overnight weekend road and lane closures during the installation of the new bridge structures and other works such as utility diversions. However, several local highways would be temporarily stopped up to enable extension works to be undertaken to existing overbridge and underbridge crossings and for construction access. Although temporary diversion routes would be put in place there is likely to be a significant adverse effect on users of local roads due to disruption to north-south journeys in the Magor area and the potential increase in the length of some journeys. This, together with the temporary impacts on public rights of way and cycle routes used by pedestrians, would result in a construction effect on community severance i.e. some residents may be dissuaded from making trips and some trips would be made longer or less attractive. However, this effect would be temporary and for the duration of construction only.
- 19.12.8** Following the completion of the construction works, the connectivity of the public rights of way network would be maintained. Those routes that were partly or fully stopped up on a permanent basis would have been diverted, except for public footpath 399/29, which runs from the A48 and does not link to any other highway i.e. it is a dead-end. Those that were partly or fully stopped up temporarily during the construction phase would have been reinstated along their original alignment. In addition, five new public bridleways and one new public footpath are created

as part of the Scheme and these would be operational, including a new bridleway running eastwards along Rush Wall from North Row to the south of the new carriageway, linking to the existing alignment of Barecroft Common which would provide an off-road link between National Cycle Network Route 4 at North Row and Magor.

19.12.9 The strategic and local highway network in the area, together with the existing overbridge and underpass crossings of the existing M4 provide important links for the settlements located on either side of the road. Where possible, these would remain open during the construction period and operational, under traffic management where required until the new temporary and permanent structures forming part of the Scheme are completed, following which traffic management would be withdrawn. In addition to the new section of motorway, the following two new public highways would be provided as part of the Scheme, together with several new overbridges or underbridges.

- Docks Link Road running north from the Docks Way Junction to meet the A48, providing access to Newport Docks and the central southern area of Newport from the strategic highway network.
- Glan Llyn Link Road running from the new Glan Llyn Junction to meet the A48, providing access to existing and new residential and commercial areas in south Newport from the strategic highway network.

19.12.10 Public transport services, including rail services, and bus stops would continue to function as they do presently and therefore there would be no effects arising from the operation of the Scheme. However, there would be some disruption to rail services along the main line during the construction period, including travel by replacement bus services, but these are likely to be restricted to off-peak overnight or Bank Holiday closures.

19.13 Community and Private Assets – Summary of Effects

19.13.1 The proposed new section of motorway runs through a variety of urban and rural land uses, including agricultural land (including grazing land on the Gwent Levels) and industrial areas around Newport.

19.13.2 The majority of community facilities in the vicinity of the new section of motorway are located within the settlements of Newport, Magor/Undy and Castleton. Visitor attractions in the vicinity of the new section of motorway include the Newport Transporter Bridge, Great Traston Meadows and Magor Marsh Nature Reserves, the Newport Wetlands Centre and Dewstow Gardens and Grottoes.

19.13.3 Within the footprint of the new section of motorway, there are residential and commercial properties and agricultural land and farm holdings.

Community Facilities

19.13.4 There would be no loss of community facilities or tourist attractions currently in use during construction and effects from the operation would be limited to changes in traffic flows on routes that serve local communities and facilities and some changes in amenity.

Private Assets

19.13.5 Twelve residential properties (including one listed building) and a number of commercial properties would require demolition to accommodate the new section of motorway. The owners and occupiers of these properties would be financially compensated for their loss.

19.13.6 Operational effects on private assets would generally be limited to the permanent change in visual and acoustic amenity at residential properties due to the presence of the new section of motorway and predicted changes in operational traffic flows.

Effects on Businesses

19.13.7 There would be land take effects on the following commercial properties from west to east along the proposed new section of motorway.

- A section of nine hole golf facility at Parc Golf Club.
- Part of a grass track used for banger racing at Fair Orchard Farm.
- Land and buildings owned by Associated British Ports (ABP) including parts of a number of leasehold premises and a restriction on the heights of vessels accessing the North Dock.
- Land and buildings in the eastern docks area owned by Marshalls Mono Ltd.
- Land owned by Carlsberg that would be required for the Nash Road/Nash Mead re-alignment.
- Access to A R Jones and Sons Ltd premises.
- Part of the rear yard, loading and parking area at the Industrial Automation & Control Ltd (IAC) site at Delta House, Meadows Road.
- Land on Tata's Llanwern Steelworks site.
- Tarmac Ltd business premises on land owned by Tata.
- Part of the existing Wilcrick highway depot, which would be demolished and replaced by a new facility at Glan Llyn.
- Small amounts on non-operational land within the service station operated by Moto Hospitality Limited.

19.13.8 There would be temporary impacts on commercial resources during the construction phase. Approximately 15 hectares of land within the western area of Newport Docks would be impacted during the construction period, which would be returned to the owner on completion of the bridge construction works.

Land Used by the Community

19.13.9 Within the footprint of the new section of motorway, some 'Land used by the Community' (e.g. common land, town and village greens, fuel and field garden allotments and public open space) would be affected. This includes the following.

- An area of the site to the north of the existing plots on the Castleton Grow Your Own site.

- A small section of a strip of common land that runs alongside the River Ebbw that would be within the permanent and temporary land take areas for the new River Ebbw Underbridge.
- The northern part of the Green Moor Lane registered allotments site.

19.13.10 Mitigation measures in relation to the temporary or permanent loss of common land and registered allotments would take the form of exchange land that would be offered as a permanent replacement for both resources.

Effects on Agricultural Land and Farm Holdings

19.13.11 Better quality agricultural land, including areas of the 'best and most versatile' Grades 2 and 3a land, is located on the higher areas at the western and eastern ends of the route, whilst the central part of the route, crossing the Gwent Levels, is of lower quality, predominantly Grade 4 land.

19.13.12 During construction, a detailed soil handling methodology would be produced which would identify best practice methods for the stripping, storage and replacement of soils on areas of temporary land take during construction to reduce effects on agricultural land. This would be implemented through the Pre-Construction Environmental Management Plan (Appendix 3.2 of this ES). To mitigate the effects on farm holdings the following measures are proposed.

- Reinstate land following construction to reduce permanent land take.
- Adjust construction programme to accommodate harvesting of crops wherever possible.
- Maintain farm access points wherever possible or re provision as soon as possible within the construction process.
- Maintain essential services throughout construction period.
- Implement best practice construction procedures to ensure that no cross-contamination between holdings occurs.
- Apply best practice construction procedures to minimise impacts of dust and noise on crops and livestock.
- Reintegrate restored land into appropriate government schemes following consultation with Natural Resources Wales.

19.13.13 The land take for the new section of motorway would lead to the permanent loss of approximately 60.2 hectares of 'best and most versatile' agricultural land.

19.13.14 It would also not only lead to the physical loss of land from farm holdings located between Castleton and Magor, but would also lead to other permanent effects on the holdings, including the severance of fields and access routes within the farm holding and changes to the network of reens, which may have implications for the location of water supply to grazing livestock. A total of nine farm holdings would be particularly affected by permanent land take, with one additional holding lost in its entirety. These holdings include two large arable enterprises, three dairy based enterprises and two large livestock based enterprises together with two holdings which are not farmed in hand, but where large proportions of the holdings are affected and the land is let out for use by local farmers.

19.13.15 There would be construction effects on agricultural land and soils required for compounds, borrow pits and haul roads. However, these would be restored and available to be returned to the owners. Where high quality agricultural land is temporarily affected by borrow pits in particular, the quality of the land would be reduced following restoration and this may lead to additional losses of the best and most versatile land, which could comprise an additional 12.62 ha of land.

19.13.16 There would also be some temporary effects on land holdings arising from construction works, where the disruption would affect a number of arable and livestock based enterprises. When considered together with the permanent land take, there would be significant effects on agricultural land and farm holdings.

19.14 Water Environment – Summary of Effects

19.14.1 The assessment of likely effects on the water environment, including drainage, has identified potential impacts on surface water, groundwater and flood risk, both during the construction and operational phases of the proposed new section of motorway. Surface water comprising River Usk and the Gwent Levels and specifically the Special Area of Conservation and SSSIs therein, are recognised as highly sensitive owing to the important biodiversity supported, specifically in the case of the SSSIs, by the presence of high water quality and the general absence of pollutants.

19.14.2 By contrast, groundwater is not as sensitive owing to the general concealment of aquifers by low permeability, clay rich soils. Additionally, within the Caldicot Levels, elevated chloride concentrations reduce the value of groundwater as a drinking water resource. Some spring fed potable or agricultural water supplies are present near the Castleton Interchange, a small number of which are recognised as being at risk of interruption or denigration principally during the construction period. Mitigation would be provided in the form of monitoring and the temporary or long term replacement of affected supplies.

19.14.3 During construction the appropriate control, storage, treatment and discharge of runoff and dewatered groundwater has been recognised as the principal mitigation of both surface water and groundwater impacts. Such measures have been delineated following regulator guidance and best practices and key measures are contained within the Pre-CEMP (Appendix 3.2), supported by an Outline Pollution Control and Prevention Plan and an Outline Groundwater and Surface Water Management Plan. The construction period would also be subject to extensive performance and aftercare monitoring to demonstrate no detriment to existing long term water quality indicators.

19.14.4 The construction of the embankment through the Gwent Levels would require the redirection of reens and ditches severed and infilled by the route. This would be achieved by the construction of new reens, connecting the severed watercourses and passing through the embankment via large box culverts. A greater length of reens and ditches is proposed to be provided than would be lost to construction, as described in Chapter 2.

19.14.5 Site won soils as well as stabilised lagoon material from the Tata steelworks is proposed to be re-used within the Scheme, principally as a fill within embankments. The potential for lateral flow of contaminated leachate out of the embankments and into to the surrounding reen system has been considered. Re-use Target Concentrations have been developed that ensure no

unacceptable impact to surface water quality would occur. The Re-use Target Concentrations for soils developed for the new section of motorway would be presented in the Remediation Strategy for the Scheme. This would ensure that infiltrating water through the permanent works would have a negligible impact on water quality of the surface water within the Gwent Levels.

- 19.14.6** During operation, the principal effects are from routine highways drainage and the effect of the permanent works on flood risk. Routine drainage has been assessed utilising an approved risk assessment tool for the evaluation of pollution of watercourses. Given the high sensitivity of the Gwent Levels, the Scheme design has incorporated the use of roadside grass lined channels capturing and transferring runoff to water treatment areas as described in Chapter 2 (Scheme Description). Both the grass lined channels and the water treatment areas are capable of removing the potential pollutants emanating from the carriageway to allow water to return to the reen network to both prevent flooding (to a 1 in 100 year plus climate change standard) and to preserve long term water quality conditions of the Gwent Levels.
- 19.14.7** A Flood Consequences Assessment has been produced based on a flood model for both the Wentlooge and Caldicot Levels to assess the effect on flood risk on the region with the Scheme in place. Both the 1 in 100 year and 1 in 1,000 year plus climate change scenarios have been assessed. The Flood Consequences Assessment has concluded that no property would experience an increased risk of fluvial or pluvial flooding and those areas of predicted detriment down stream of some of the main reen culverts through the embankment can be mitigated through control sluices present on the culverts.
- 19.14.8** With currently proposed improvements to the Gwent Levels sea defences, the proposed new section of motorway would not be at risk of tidal flooding up to the year 2030 notwithstanding sea level rises due to climate change. Continued improvements to sea defences beyond 2030, in line with Welsh Government policy to 'Hold the Line' would ensure that the proposed new section of motorway would remain flood free into the future, notwithstanding sea level rises due to climate change.
- 19.14.9** Effects on private abstractions are not assessed for significance of impact as no criteria for sensitivity of receptor or magnitude of effect are prescribed by the DMRB methodology. The risk of private supply denigration has however been assessed on all identified private supplies on a relative risk basis. Mitigation of possible short and long term effects on continuity or quality of supply is provided in the text and comprises the provision of either temporary or permanent alternative water supplies.

19.15 Cumulative Assessment – Summary of Effects

- 19.15.1** Cumulative effects result from multiple actions on receptors or resources occurring in combination over time. This chapter analyses two types of cumulative effect.
- 19.15.2** The first type is the assessment of effects on receptors or receptor groups, such as local residents, users of local rights of way or services, which may be affected by different environmental effects generated by the Scheme simultaneously or concurrently. This is sometimes referred to as the 'inter-relationships' between different environmental effects. This assessment includes consideration of

particular locations where several effects, for example noise, air quality and visual change, may all occur.

- 19.15.3** The second type is the assessment of effects of the Scheme together with other proposed (but not yet built) developments, where there is the potential for impacts to overlap spatially or temporally.

Inter-relationships

- 19.15.4** People living locally to the Scheme may be affected adversely or beneficially. The new section of motorway would enable traffic related effects to move from a highly populated residential area to a less populated area. Those people living near the existing motorway would see beneficial changes in relation to noise levels and air quality but a limited visual change. The cumulative beneficial effects have the potential to be more significant than the individual effects of the Scheme.

- 19.15.5** Despite the lower density of dwellings near the new section of motorway, there are new receptors that would experience an increase in noise as a result of the new section of motorway. Although air quality changes would not breach environmental standards, there would be a change in air quality near the new section of motorway. Changes in views from dwellings nearby would also result from the introduction of the new section of motorway and would also be a new effect for these receptors. The cumulative adverse effects have the potential to be more significant than the individual effects of the Scheme and would be new significant effects for those living near the new section of motorway.

- 19.15.6** Users of public rights of way and other routes near the Scheme during construction may be simultaneously affected by the dust and noise generated during construction activities as well as the visual effects (change in views). Users could also experience a temporary diversion or closure of a route. Such effects would only combine where users of public rights of way are in close proximity to the Scheme's construction activities. The receptors are transient through the landscape along the paths or routes and would not experience a long term effect unless out of choice. Nevertheless, the cumulative adverse effects have the potential to be more significant than the individual effects of the Scheme.

- 19.15.7** During operation users of public rights of way and other routes may be simultaneously affected by changes in the amount of traffic noise and air quality from the new section of motorway as well as the visual effects (change in views). Users could also experience a permanent diversion or closure of a route. Such effects would only combine where users of public rights of way are in close proximity to the Scheme. The receptors are transient through the landscape along the paths or routes and would not experience a long term effect unless out of choice. Effects are more likely to be felt intermittently. Nevertheless, the cumulative adverse effects have the potential to be more significant than the individual effects of the Scheme.

Cumulative Effects

- 19.15.8** There are a number of types of cumulative effects likely to occur during the lifetime of the Scheme. With respect to cumulative effects with other developments these include potential cumulative effects due to loss of land in

respect of the Gwent Levels SSSIs, best and most versatile agricultural land and various farm holdings; and the loss of terrestrial habitat for otters, dormice and other protected species. The majority of potential cumulative impacts would arise as a result of proposed housing or solar farm developments in the vicinity of the Scheme.

- 19.15.9** In terms of landscape effects, other proposed development would add further urbanisation to certain landscape character areas and, in other areas, would be in keeping with landscape character (for example, further built development in an already urbanised area) and would not result in a significant cumulative effect on landscape. Similarly for views, the introduction of more development and vertical elements (such as wind turbines) in some areas would not present a noticeable cumulative visual effect, while in other locations, where development represents a more noticeable change from the baseline, there may be an increase in adverse visual effects on residential receptors, users of public rights of way and road users.
- 19.15.10** Cumulative effects between the Scheme and other planned or proposed developments may occur in respect of the historic landscape of the Gwent Levels and the setting of several cultural heritage assets.
- 19.15.11** Some of the closest residential properties to the Scheme, together with several public rights of way (including the Wales Coast Path and the Newport Coast Path) would experience cumulative effects both during construction and the operation of the Scheme, particularly in respect of visual impact, noise and potentially air quality. This would occur with other programmed developments set out in the Local Development Plans of Newport City Council and Monmouthshire County Council as well as with private developments including solar farms.
- 19.15.12** Wintering birds may experience a cumulative effect between the loss of suitable foraging areas within or close to the Scheme and intertidal and subtidal areas that could be impacted upon by the proposed Cardiff and Newport Tidal Lagoon developments. Bird and bat populations may also be affected by injury or mortality from both collision with vehicles on the Scheme and collision with the moving blades of wind turbines.