Welsh Government

M4 Corridor around Newport

Environmental Statement Volume 3: Appendix 16.4

Water Framework Directive Compliance Assessment

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CVJV/AAR
3rd Floor
Longross Court,
47 Newport Road,
Cardiff
CF24 0AD

List of Acronyms

Abbreviation	Definition
AOD	Above Ordnance Datum
BOD	Biological Oxygen Demand
CEA	Cumulative Effects Assessment
CEMP	Construction and Environmental Management Plan
CL	Contaminated Land
DDT	Dichlorodiphenyltrichloroethane
DMRB	Design Manual for Roads and Bridges
DO	Dissolved Oxygen
EA	Environment Agency
EIA	Environmental Impact Assessment
EMC	Event Mean Concentration
EMSC	Event Mean Sediment Concentration
EQS	Environmental Quality Standards
ES	Environmental Statement
EU	European Union
FCS	Favourable Conservation Status
FDC	Flood Defence Consent
GCS	Good Chemical Status
GEP	Good Ecological Potential
GES	Good Ecological Status
GSWMP	Ground and Surface Water Management Plan
GOS	Good Overall Status
GQS	Good Quantitative Status
HA	Highways Agency
HAWRAT	Highways Agency Water Risk Assessment Tool
HGV	Heavy Goods Vehicles
HRA	Habitats Regulations Assessment
HMWB	Heavily Modified Water Body
LLFA	Lead Local Flood Authority
LMS	Land Management Scheme
M4CaN	M4 Corridor around Newport
MCAA	Marine and Coastal Access Act
MHWS	Mean High Water Springs
NRW	Natural Resources Wales
NRW-MLT	Natural Resources Wales - Marine Licensing Team
OO	Overseeing Organisation
OWC	Ordinary Watercourse Consent
PAH	Polycyclic Aromatic Hydrocarbons
Pre-CEMP	Pre-Construction and Environmental Management Plan
RBD	River Basin District
RBMP	River Basin Management Plan
RTC	Remedial Target Concentration
SAC	Special Area of Conservation

Abbreviation	Definition
SIAA	Statement to Inform Appropriate Assessment
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
SWMI	Significant Water Management Issue
TEN-T	Trans-European Transport Network
TFD	Tidal Flat Deposits
TSS	Total Suspended Solids
UWWTD	Urban Waste Water Treatment Directive
WFD	Water Framework Directive
WIYBY	‘What’s In Your Back Yard’
WTA	Water Treatment Areas

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1 Introduction

1.1 Assessment Context

1.1.1 The Welsh Government proposes to construct the M4 Corridor around Newport (M4CaN). This involves a new section of three lane motorway to the south of Newport between Magor and Castleton and associated Complementary Measures (hereafter referred to as the 'Scheme').

1.1.2 The Scheme is subject to the legislative requirements of the EIA Directive (European Directive 2011/92/EU, as amended) and has been developed in accordance with the requirements of the Highways Act 1980 (as amended). It has been developed in accordance with the guidance the Design Manual for Roads and Bridges (DMRB), as well as in close consultation with environmental consultees and the relevant Overseeing Organisation (OO) (i.e. Natural Resources Wales (NRW)). This is to ensure that any possible environmental issues are fully addressed and integrated into the design and construction techniques utilised, aiming to minimise the risk of the resultant impacts on the local environment.

1.1.3 The DMRB aims to provide guidance on the assessment and management of the impacts that construction, improvement, technology and maintenance projects for roads and bridges may have on the environment. The relevant Standard for the assessment of highways projects on the water environment is found within Volume 11, Section 3, Part 10 of Standard HD 45/09 – Road Drainage and the Water Environment (Highways Agency *et al*, 2009).

1.1.4 The guidance set out within Standard HD 45/09 of the DMRB (Highways Agency *et al*, 2009) needs to be taken into account in assessing the potential effects of the proposed construction and operational activities on the water environment. The DMRB guidance lists the European (EU) Water Framework Directive (WFD) (2000/60/EC) as one of the key pieces of environmental legislation regarding water resource management and all discharges to water from roads projects must comply with the standards and classifications of the WFD.

The WFD aims to protect and enhance water quality through the protection of designated water bodies within the EU. Developers must ensure that new highways projects or improvement projects which will cause discharges to receiving water bodies do not lead to deterioration in its classification status. The new section of motorway will be located within and in close proximity to a number of WFD water bodies. A WFD Compliance Assessment is therefore required by the Statutory Authorities (i.e. NRW) to assess whether the proposed new section of motorway is compliant with WFD legislation.

1.2 Assessment Background

Environmental Permitting and Marine Licensing

1.2.1 NRW regulates all works in, under, over or near to designated Environment Agency (EA) Main Rivers, including ordinary watercourses[1] found within river basin drainage districts within Wales. Ordinary watercourses outside of drainage districts are regulated by the Lead Local Flood Authority (LLFA), which is normally the Local Authority for the region concerned.

1.2.2 The NRW Marine Licensing Team (NRW-MLT) also regulates marine licensable activities under the Marine and Coastal Access Act (MCAA) 2009. NRW-MLT's responsibility covers proposed works located from Mean High Water Springs (MHWS) and out to 12 nautical miles (i.e. within Welsh territorial waters).

1.2.3 In determining consent applications for all works in, under, over and near main, ordinary and coastal waters, NRW must give regard to the requirements of the WFD. Development consent applications must be supported by a WFD Compliance Assessment and developers must ensure that development consent proposals keep within the aims of the WFD.

1.2.4 Construction works carried out over, under or near a main river, or in a flood plain or flood defence (including a sea defence) will require a Flood Defence Consent (FDC) (this will be covered by Environmental Permitting (Amendments) Regulations 2015 as of 1 April 2016). The new section of motorway will notably cross both the River Ebbw and the River Usk. The works will therefore require an FDC from NRW and this consent also requires consideration of the impacts on the WFD status of associated water bodies. The Project will also require a number of Ordinary Watercourse Consents (OWC) which will be obtained from the LLFA (see above).

1.2.5 NRW-MLT will require consideration of WFD and any potential impacts to WFD water bodies which could occur as a result of granting a Marine Licence (as described in paragraph 1.2.1 to 1.2.2 above). Proposed construction works include activities below MHWS (but outside the wetted channel[2]) of the River Usk and River Ebbw and therefore constitute licensable marine activities.

1.2.6 A Marine Licence will therefore be sought to construct the foundations to support the River Usk Crossing below MHWS in both the River Usk and the River Ebbw, and a Marine Licence will also be required for the installation of two new outfalls in the River Ebbw for the discharge of highway drainage from the River Usk Crossing. No other works below MHWS are currently anticipated.

1.2.7 The relevant environmental permits and marine licensable activities for the new section of motorway are discussed further within the Environmental Permitting Strategy (ES Appendix 11.5).

[1] Ordinary Watercourse – an ordinary watercourse is defined as '*a watercourse that does not form part of a main river*' (Flood and Water Management Act 2010, Chapter 29).
[2] Wetted Channel - the wetted channel has been agreed with NRW to be delineated by the MHWS elevation of 4.79 mAOD (metres Above Ordnance Datum) (see ES Chapter 2 - Scheme Description (Volume 1)).

Consultation

1.2.8 A consultation meeting took place on 14 December 2014 with NRW in order to discuss the approach taken to date to the WFD Compliance Assessment. A summary of the outcomes of this meeting are as follows:

- NRW agreed that the approach to the assessment undertaken to date was fit for purpose and agreed that the EA internal guidance document entitled *Assessing New Modifications for Compliance with WFD: Detailed Supplementary Guidance* (Environment Agency, 2010) should be used to inform the remaining methodological requirements where necessary; and
- The assessment is to be undertaken based on the updated 2015 River Basin Management Plan (RBMP) (data links provided by NRW at the meeting) and not the 2009 RBMP. It should be noted that where 2015 data is not available, 2009 data has been used in place. Where this has occurred, it will be highlighted further within this report, so that any further data provision under the 2015 RBMP, should this be forthcoming, can be readily used instead.

1.3 Scheme Description

1.3.1 Briefly, the Scheme will comprise the construction of a length of three-lane motorway extending over a distance of approximately 23 km. This will involve the construction of the main highway and associated features such as bridges, culverts, retaining walls, piled embankments and drainage ditches.

1.3.2 A detailed description for the Scheme is provided in Chapter 2 - Scheme Description (ES Volume 1), with an overview of the approach to the construction in Chapter 3 - Scheme Construction.

1.4 Assessment Area

Scheme Location

1.4.1 The existing M4 motorway runs between London and South Wales, crossing the River Severn and using the Brynglas Tunnels at Newport. The Scheme would provide a new three-lane motorway to the south of Newport between Junctions 29 (Castleton) and 23A (Magor) of the M4 and associated Complementary Measures.

1.4.2 From Junction 29 at Castleton, the new section of motorway would pass to the south and east of Newport and Duffryn, crossing the north eastern part of the Wentlooge Levels and the South Wales to London Mainline. The route of the proposed new section of motorway crosses high ground in the east and west and crosses the River Ebbw and River Usk in its mid-section. The new section of motorway also crosses the Alexandra Docks, between the Usk and the Ebbw. Collectively, this central section of the new motorway is referred to as the 'new bridged section of motorway'.

1.4.3 To the east of the River Usk, the route would pass to the south of the Tata Llanwern steel works, passing through the northern parts of the Caldicot Levels. The route would cross the South Wales to London Mainline on the approach to Magor, re-joining the existing M4 at Junction 23A.

1.4.4 The existing M4 and the proposed route for the new section of motorway are shown on Figures 1a to 1d.

WFD Study Area

Stage 1 - Initial WFD Assessment

1.4.5 A corridor of 1 km radial width from the footprint of the new section of motorway has been used in order to identify all the relevant water bodies required for assessment. Any water bodies which lie within or intersect this corridor have automatically been screened in. This study area is shown on Figures 1a to 1d. Justification for the inclusion of any other water bodies outside of this immediate study area during screening has been provided in paragraphs 0 and Section 4.1 where relevant.

Stage 2 – Detailed WFD Assessment

1.4.6 For the purposes of the detailed assessment stage, the study area has been reduced to a nominal corridor of 250 m radial width from the footprint for the new section of motorway, in line with the assessment study area used within Chapter 16 - Road Drainage and the Water Environment. This study area is also shown on Figures 1a to 1d.

1.5 Report Structure

Context within Environmental Statement

1.5.1 This WFD Compliance Assessment constitutes one of three Technical Appendices to ES Chapter 16 - Road Drainage and the Water Environment (ES Volume 1). This WFD Compliance Assessment should therefore be read in conjunction with the full ES chapter and also Appendix 16.3 – DMRB Risk Assessment, which sets out the results of the Highways Agency Water Risk Assessment Tool Modelling (HAWRAT). An assessment of the proposed new section of motorway using the HAWRAT model is required under the DMRB and is described further in Section 5 of HD 45/09 Environmental Assessment Techniques for Road Drainage and the Water Environment (Highways Agency *et al.*, 2009).

1.5.2 The HAWRAT model is a predictive modelling tool used to make an assessment of the potential ecological impacts of routine highways run-off on surface waters. The outcome of the model is used to determine the likely environmental risk and/or clarify if specific mitigation measures should be implemented in certain circumstances.

1.5.3 The model uses toxicity thresholds against which to assess the predicted concentrations of certain pollutants. The thresholds have been designed in order to prevent adverse ecological effects in receiving water courses and therefore to be compliant with the requirements of the WFD.

1.5.4 This report does not aim to repeat information provided elsewhere within the ES. Therefore, where information is discussed in more robust detail elsewhere, a summary of the relevant information will be provided here along with the reference to the appropriate sections of the relevant draft ES chapters and/or Technical Reports.

Document Structure

1.5.5 This WFD Compliance Assessment Report is structured as follows:

- **Section Two** – Provides an introduction to and overview of the WFD and its requirements and an explanation of the relationship between the WFD and the requirements under the DMRB;
- **Section Three** – Provides an overview of the methodology used during this WFD Compliance Assessment for both the Stage 1 Screening Assessment and the Stage 2 Detailed Assessment, including details on the relevant guidance documents and other data sources;
- **Section Four** – Provides the Stage 1 Screening Assessment;
- **Section Five** – Provides the Stage 2 Detailed Assessment;
- **Section Six** – Provides a brief discussion on the results of the WFD Compliance Assessment and provides recommendations for mitigation and/or design requirements; and
- **Section Seven** – Provides a full reference list for this study.

2 The Water Framework Directive

2.1 Legislative Background

Legal Framework

2.1.1 The requirements of the WFD are set out under Council Directive 2000/60/EC on Establishing a Framework for Community Action in the Field of Water Policy (i.e. the Water Framework Directive). The overall aim of the WFD is to protect and enhance water quality through the protection of water bodies within Europe. It covers all coastal and transitional (i.e. estuarine) water out to one nautical mile, as well as all terrestrial water bodies.

2.1.2 The objectives of the WFD are carried forward through the implementation of each RBMP in order to:

- Prevent deterioration, enhance and restore bodies of surface water, achieve good chemical and ecological status of such water and reduce pollution from discharges and emissions of hazardous substances;
- Protect, enhance and restore all bodies of groundwater, achieve good chemical and quantitative status of groundwater, prevent the pollution and deterioration of groundwater, and ensure a balance between groundwater abstraction and replenishment; and
- Preserve Protected Areas.

2.1.3 Under the WFD, coasts, estuaries, rivers, lakes and groundwaters are all divided into a series of water bodies. For each of these water bodies, excluding groundwater bodies (see paragraph 2.1.8), the WFD sets overall, ecological and chemical objectives.

2.1.4 The overall objective for all water bodies is to attain a current status of ‘Good Overall Status’ (GOS), which can only be achieved by attaining both 'Good Ecological Status' (GES) and 'Good Chemical Status' (GCS) by 2015 or later, unless alternative arrangements (e.g. exemptions due to costs or feasibility) can be justified (EA, 2012a; 2012b). Water body status can include Bad, Poor, Moderate, Good or High for Ecological Status, Good or Fail for Chemical Status, and Fail for Protected Area Status (see paragraph 2.1.10) where the relevant objectives have not been met.

2.1.5 The WFD cycle of assessment takes six years (i.e. 2009 to 2015, 2015 to 2021 and 2021 to 2027), and so objectives which are not met by 2015 may roll on to the 2015 to 2021 cycle, or to the 2021 to 2027 cycle.

2.1.6 Overall ecological and chemical status are both supported by a number of quality elements, for example, overall ecological quality is comprised of a series of ‘biological elements’, ‘physico-chemical/supporting elements’ and ‘supporting conditions’ (i.e. hydromorphology). Chemical status is based on ‘other’, ‘priority’ and ‘priority hazardous’ pollutants. These are discussed further in paragraph 3.1.3.

2.1.7 For the purposes of this report, the relevant water body types are defined as:

- A riverine water body is a body of inland water flowing, for the most part, on the surface of the land but which may flow underground for part of its course (FWR, 2015);
- A transitional water body is any surface water which is substantially influenced by freshwater flows (i.e. the water body is partly saline) due to its location either at a river mouth or in close vicinity to the coast (FWR, 2015); and
- A groundwater body is defined as all water which is below the surface of the ground in the saturation zone and in direct contact with the ground or subsoil (FWR, 2015).

Groundwater Bodies

2.1.8 Groundwater bodies are subject to a separate classification system under the WFD, where Quantitative Status (in place of Ecological Status) and Chemical Status are assessed alongside Protected Areas. Quantitative Status and Chemical Status are established by undertaking four quantitative and five chemical tests independently and the results of these tests are assessed in combination to provide the characterisation of the overall status.

2.1.9 Quantitative status is defined as the ability of the groundwater resource to provide for the receiving ecosystem through the quantity of groundwater within the aquifer. To achieve Good Quantitative Status (GQS), the overall groundwater resource less the annual flow rate to surface water bodies must remain greater than the amount abstracted and must not cause deterioration in surface water body status either.

Protected Area Designations

2.1.10 As well as defined overall, ecological/quantitative and chemical status, water bodies may also include Protected Area designations which incorporate adherence to other EU Directives. These Protected Area designations also require consideration within any WFD Assessment (EA, 2012a; 2012b) and include:

- Habitats Directive - Council Directive 1992/43/EC on the conservation of natural habitats and of wild fauna and flora;
- Birds Directive – Council Directive 2009/147/EEC on the conservation of wild birds (codified version);
- Bathing Water Directive – Council Directive 2006/7/EC on the management of bathing water quality;
- Shellfish Waters Directive – Council Directive 2006/113/EC on the quality required of shellfish waters (codified version);
  - This Directive has since been repealed under the WFD (December 2013).
- Freshwater Fish Directive – Council Directive 2006/44/EC on the quality of fresh waters needing protection or improvement in order to support fish life (codified version);
  - This Directive has since been repealed under the WFD (December 2013).

- Groundwater Directive – Council Directive 2000/60/EEC (as amended) on the protection of groundwater against pollution caused by certain dangerous substances;
    - This Directive has since been repealed under the WFD (December 2013) and has been replaced by the Groundwater Daughter Directive.
- Groundwater Daughter Directive – Council Directive 2006/118/EC on the protection of groundwater against pollution and deterioration;
- Drinking Water Directive – Council Directive 98/83/EC (as amended) on the quality of water intended for human consumption;
- Urban Waste Water Treatment Directive (UWWTD) – Council Directive 1991/271/EEC on urban waste water treatment; and
- Nitrates Directive – Council Directive 1991/676/EEC on the protection of waters against pollution caused by nitrates from agricultural sources.

Artificial and Heavily Modified Water Bodies

2.1.11 Water bodies may be assigned a hydromorphological designation of either Artificial or as a Heavily Modified Water Body (HMWB). This designation may be due to anthropogenic channel modifications on a natural water body (i.e. HMWB) or the water body may be an artificially constructed road drainage ditch (i.e. Artificial). In these cases, the water body must aim to achieve 'Good Ecological Potential' (GEP) as opposed to GES, usually by 2027.

2.1.12 For HMWBs, specific mitigation measures will have been assigned to the water body to enable it to achieve or continue to maintain GEP. These specific mitigation measures, and whether or not these are currently being implemented (i.e. 'in place' or 'not in place'), are contained within the relevant RBMPs. Water bodies which are not classified as HMWBs have general mitigation measures which are relevant for all the water bodies within a River Basin District (RBD).

2.1.13 The current status of the mitigation measures which have been identified for each water body based on the 2009 Severn RBMP have not been updated within the currently available updated RBMP published in December 2015. Therefore, where mitigation measures are assessed in Section 5.3, this has been based on the 2009 mitigation measure status.

2.2 Current WFD Status

Severn Estuary River Basin Management Plan

2.2.1 River Basin Management Plans (RBMP) provide the mechanism by which every water body within the RBD is assessed under the WFD. In Wales, NRW currently manage the Western Wales RBD and jointly manage the cross-border Dee RBD with the EA. The Severn RBD also sits across the English and Welsh border, spanning an area of 21,590 km^2 and is technically managed by the EA (supported by NRW).

2.2.2 Although the management of the Severn RBD is overseen by the EA, NRW have been the key Authority consulted during the development of the new section of motorway. This is due to the large majority of the project being situated within South Wales. The only area of potential overlap is with parts of the Lower

Severn water body and, as agreed during a consultation meeting with NRW on 14 December 2015, NRW will consult directly with the EA on this matter as appropriate.

2.2.3 The Severn RBD encompasses a variety of water body types, specifically the River Severn and Severn Estuary and the Rivers Wye, Usk, Ebbw and Taff in South Wales. An illustration of the extent of the Severn RBD, taken from the Severn RBMP (EA, 2015a) is shown in Inset 1**Error! Reference source not ound.** below.

2.2.4 There are a total of 749 surface water bodies (i.e. rivers, canals, lakes and reservoirs) of which 54 are considered Artificial and 121 are considered HMWBs. There are also six estuarine water bodies, one natural and five HMWBs, and 42 groundwater bodies all of which are natural (EA, 2015a).

2.2.5 The specific key issues for the Severn RBD, as defined in the Severn RBMP include:

- Pollution from rural areas (40% of water bodies affected);
- Pollution from waste water (29% of water bodies affected);
- Physical modifications (27% of water bodies affected); and
- Pollution from towns and transport (12% of water bodies affected).

Inset 1 Overview of the Severn RBD as set out in the Severn RBMP (EA, 2015a)

3 Methodology

3.1 Assessment Overview

WFD Compliance

3.1.1 This WFD Compliance Assessment for the proposed new section of motorway assesses the potential for construction elements to have an impact on WFD water bodies. Operational impacts will not be assessed within this report (see paragraph 4.2.7 *et seq.*). The new section of motorway is therefore assessed against the following objectives (as set out in Articles 4.1, 4.8 and 4.9 of the WFD):

- **Objective 1** – The new section of motorway will not cause deterioration in any element of water body classification;
- **Objective 2** - The new section of motorway will not prevent the WFD status objectives from being reached within the water body or other downstream water bodies; and
- **Objective 3** - The new section of motorway will positively contribute to the delivery of the relevant WFD objectives.

3.1.2 These three objectives are generally concerned with the overall quality of the water body and the water environment, and need to be met in order for any development to be compliant with WFD legislation.

WFD Quality Components

3.1.3 As previously discussed in Section 2.1, there are two WFD quality components for surface waters; GES/GEP and GCS. The status of each of these components is determined by a series of elements and sub-elements, against which construction elements should be assessed. The key elements pertaining to GES/GEP and GCS are broken down as follows:

- **Ecological Status**
  - Biological Quality Component
    - Elements include angiosperms (e.g. sub-elements seagrass and saltmarsh), fish, invertebrates, macrophytes, phytoplankton etc.
  - Hydromorphological Supporting Elements
    - Elements include hydromorphological regime and morphology.
  - Physico-Chemical Quality Elements
    - Elements include pH, temperature, salinity, Biological Oxygen Demand (BOD) etc.
  - Supporting Elements
    - Elements may include a Mitigation Measures Assessment and/or an Expert Judgement Assessment where data may not be available.
- **Chemical Status**
  - Priority Hazardous Substances

- Elements include anthracene, cadmium and its compounds, mercury and its compounds etc.

- Priority Substances
  - Elements include benzene, lead and its compounds, naphthalene, nickel and its compounds etc.
- Other Pollutants
  - Elements include total dichlorodiphenyltrichloroethane (DDT), Isodrin, Endrin, Aldrin, etc.

3.2 Assessment Methodology

Stage 1 and Stage 2 Assessments

3.2.1 In order to carry out the WFD Compliance Assessment, the methodology described in Stage 1 and 2 below has been followed. Inset 2 below provides an overview of this methodology in the form of a flow chart listing the key activities which have been undertaken at each phase.

- **Stage 1 – WFD Screening Assessment;**

  A. Identification of relevant water bodies which have the potential to be impacted by the new section of motorway.

  B. Identification of high-level relevant construction elements which are likely to have the potential to cause impacts to the water bodies identified in Stage A.

  C. Collation of background summary data for each water body identified in Stage A, including the current status designations assigned under the WFD and set out in the Severn RBMP (see paragraph 2.2.1 *et seq.* above).

  D. Screening Assessment of the impacts from the relevant construction elements identified in Step B on the water bodies identified in Step A.

- **Stage 2 – WFD Detailed Assessment;**

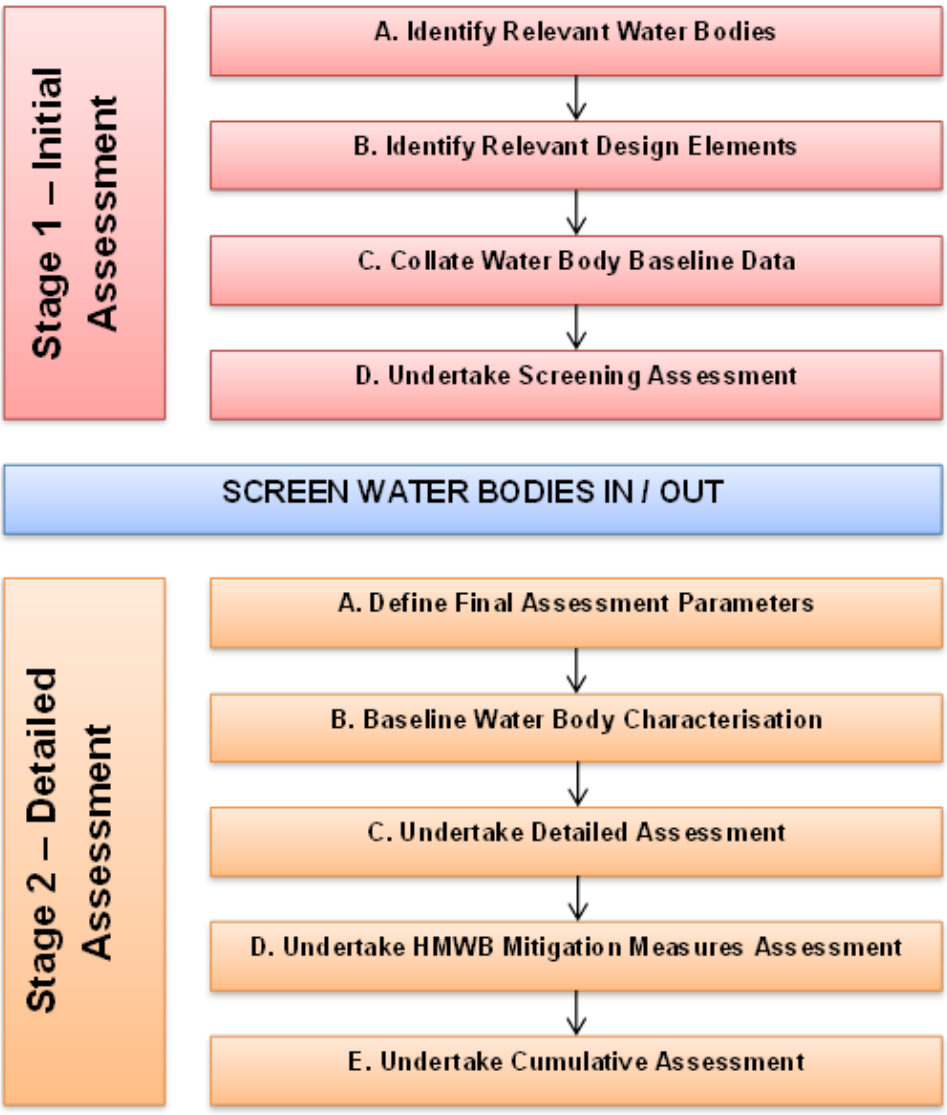
  A. Definition of the final Detailed Assessment parameters based on the results of the Screening Assessment in Stage 1 Step D, including clarification on and justification of any assumptions and/or exclusions to be considered (Part 1), as well as clarification on the construction methodology to be assessed (Part 2).

  B. Production of an environmental baseline characterisation overview of all water bodies screened in for assessment based on the results of Stage 1 Step D, to include current water body status, protected area objectives and any HMWB mitigation measures.

  C. Assessment of the potential direct and indirect impacts of the construction elements of the new section of motorway on the status of the identified water bodies.

  D. Assessment of the potential impacts of the construction elements of the new section of motorway against the status and achievement potential of the Mitigation Measures set out for HMWBs within the Severn RBMP.

E. Assessment of any potential cumulative effects on the identified water bodies, taking into account the assessment results of Stage 2 Step C and Step D (above) and any potential spatial and temporal impacts of other planned developments within the vicinity of the new section of motorway.



Inset 2. Flow Diagram Depicting Outline Assessment Methodology.

Guidance Documents

3.2.2 The EA has previously produced standard guidance documents for the process of completing the various stages of a WFD assessment. However, this EA guidance documentation is principally designed to consider the effects of dredging and disposal activities on the water environment (EA, 2012a, 2012b and 2012c). In the absence of any other guidance, these general principles have been applied to other activities, including construction works and discharges that could affect a WFD water body.

3.2.3 The EA has also produced detailed supplementary internal guidance for assessing new modifications for compliance with WFD for river, lake, estuary and coastal water bodies (EA, 2010).

3.2.4 This WFD Compliance Assessment methodology therefore draws on a number of sources of data and guidance in order to provide the most scientifically robust assessment:

- Supplementary Guidance 488_10_SD01 - Assessing New Modifications for Compliance with WFD: Detailed Supplementary Guidance (EA, 2010);
- DMRB Volume 11, Section 3, Part 10 – HD 45/09 Road Drainage and the Water Environment (Highways Agency *et al.*, 2009);
- DMRB Volume 11 Section 2, Part 5 - HA 205/08 Environmental Impact Assessment (Highways Agency *et al.*, 2008);
- Clearing the waters - Marine dredging and the Water Framework Directive. Stage one: the screening stage (EA, 2012a);
- Clearing the waters - Marine dredging and the Water Framework Directive. Stage two: the scoping process (EA, 2012b);
- Clearing the waters - Marine dredging and the Water Framework Directive. Stage three: assessment (EA, 2012c); and
- H1 Environmental Risk Assessment Framework: Annex D1 Assessment of Hazardous Pollutants within Surface Water Discharges, Issue 2.0 (EA, 2014).

Data Sources

3.2.5 Site-specific surveys have been undertaken to inform the overall characterisation of the water environment. These surveys are not discussed further within this report, however detailed information can be found in the following documents:

- Chapter 16 – Road Drainage and the Water Environment (ES Volume 1);
- Appendix 16.2 - Baseline Water Environment Report (ES Volume 3); and
- Annex L of Appendix 16.2: Water Monitoring Strategy Report (ES Volume 3).

3.2.6 No site-specific data has been collected exclusively for the purposes of this WFD Compliance Assessment, but all recent site-specific surveys for water quality have been undertaken with WFD requirements in mind (see Appendix 5.1 - ES Scoping Report).

3.2.7 This assessment has been informed by the following ES documents:

- Chapter 2 - Scheme Description (ES Volume 1);
- Chapter 3 - Scheme Construction (ES Volume 1);
- Chapter 7 – Air Quality (ES Volume 1);
- Chapter 10 – Ecology and Nature Conservation (ES Volume 1);
- Chapter 16 - Road Drainage and the Water Environment (ES Volume 1);
- Appendix 16.1 - Flood Consequences Assessment (ES Volume 3);
- Appendix 16.2 – Baseline Water Environment Report (ES Volume 3); and
- Appendix 16.3 – DMRB Risk Assessment (ES Volume 3).

3.2.8 The following reports have also been utilised:

- Statement to Inform Appropriate Assessment (SIAA);
- Appendix 11.5: Environmental Permitting Strategy (ES Volume 3);
- Appendix 3.1: Buildability Report (ES Volume 3); and
- Appendix 2.2: Drainage Strategy Report (ES Volume 3).

3.2.9 Mirroring the six year cycle of WFD assessment, the EA/NRW managed RBMPs have recently reached the end of the most recent six year cycle, from 2009 to 2015. The updated RBMPs were published on the UK Government website on 30 October 2015, with the fully updated plans being published in early 2016 following ministerial consideration and approval. The 2015 Cycle 2 water body data [accessed on 2 November 2015] has therefore been downloaded from the UK Government RBMP website in the form of raw data spreadsheets and interactive maps in GeoPDF format.

3.2.10 Where 2015 data has not been collected for certain elements, 2009 data has been used where this is available. All 2009 data has been taken from either the 2009 Severn RBMP Annexes, the EA's 'What's In Your Back Yard' (WIYBY) online data mapping portal and/or the EA's 'Catchment Data Explorer' online water catchment data tool.

3.3 Commitments Register

Impacts to Groundwater

3.3.1 A detailed description of the baseline groundwater environment within the study area is provided in the Appendix 16.2 - Baseline Water Environment Report (ES Volume 3) and Chapter 16 - Road Drainage and the Water Environment (ES Volume 1).

3.3.2 The assessment of the potential impacts to groundwater arising from both the construction and operational phases of the new section of motorway has also been undertaken in Chapter 16 - Road Drainage and the Water Environment. A range of design measures, mitigation measures and monitoring are proposed for the construction and operational phases to further mitigate the potential effects on groundwater and these are also discussed in the ES chapter.

3.3.3 The results of the construction and operational phase impacts to groundwater are summarised as follows:

- No direct discharges to groundwater are proposed as all drainage channels would be sealed or lined and discharged to surface watercourses principally through designated Water Treatment Areas (WTA). Therefore no tests for groundwaters following Method C of the DMRB guidance have been undertaken;
- The low permeability of the road surface and use of a granular sub-base with lateral fin drains would ensures that any water that passes through the highway surface would be collected and drained to the WTAs; and
- To ensure that any water that does infiltrate through the highway embankment sides does not have an unacceptable effect on groundwater

quality, Remedial Target Concentrations (RTCs)[3] for the WTAs have been developed and are provided in the Remediation Strategy Report.

Ground and Surface Water Management Plan

3.3.4 A Ground and Surface Water Management Plan (GSWMP) is also proposed for the construction phase of the new section of motorway. A summary of the scope of this management plan is provided below. All management plans will be implemented through the Construction Environmental Management Plan (CEMP). The CEMP shall provide targeted guidance throughout the construction period, presenting all commitments made to mitigate potential environmental effects. A Pre-Construction Environmental Management Plan (Pre-CEMP) is provided at Appendix 3.2 (Volume 3).

3.3.5 The GWSMP shall consider all drainage required during the construction phase and will reference all industry and regulatory pollution prevention guidelines. The GSWMP shall describe the design of each element of surface water management system required to manage surface water runoff during construction and potential risks to surface waters. This shall include consideration of temporary storage and settlement requirements to manage sediment load of waters. The GSWMP shall define the water quality criteria to ensure any discharge to receiving watercourses meets regulatory requirement.

3.3.6 The GSWMP considers all activities to be undertaken during the construction phase that may require control of groundwater sources (i.e. through pumping etc.). Its overarching aim is to define the approach for groundwater management, including any monitoring required to determine the acceptability of chemical and physical quality with respect to discharge to surface watercourses. In particular, the GSWMP will consider:

- Excavations within borrow pits;
- Structures required for managing groundwater in cuttings areas;
- Excavations required for bridge tower and viaduct pier foundations (particularly those requiring cofferdam construction); and
- Excavations required for subsurface structures/utilities that may encounter shallow groundwater.

3.3.7 Based on the information provided above regarding the assessment of impacts to groundwaters, as well as clarification and agreement with NRW during a water quality consultation meeting on 14 December 2015, no assessment of groundwaters has been included in this WFD Compliance Assessment.

[3] Remedial Target Concentrations (RTCs) – specified target concentrations of various substances for both soils (mg/kg) and surface waters (µg/L) have been set where Scheme-won excavated material is proposed to be used within embankment construction. The preferred approach for construction remediation works is through the reuse of excavated materials and materials acceptability criteria have therefore been set out within the Remediation Strategy Report.

Indirect Impacts

3.3.8 Water bodies outside of the Stage 1 Study Area which have the potential to be impacted indirectly based on the proposed construction methods will be highlighted within Stage 1 (see Section 3.2 for Stage 2 methodology).

3.3.9 These water bodies will only be assessed as part of the Stage 2 Detailed Assessment in terms of the potential for indirect and/or cumulative impacts on WFD water bodies resulting from the new section of motorway. Indirect impacts to upstream and/or downstream water bodies have the potential to impact the current WFD status of these water bodies. For example, the downstream migration of high levels of suspended sediments following piling activities has the potential to negatively impact the water quality of a downstream water body due to increased turbidity. Increased turbidity could also indirectly affect biological quality elements of the receiving watercourse, such as a change in the invertebrate species assemblage due to increased sediment smothering.

4 Stage 1 – WFD Screening Assessment

4.1 Step A – Identification of Relevant Water Bodies

4.1.1 Based on the extent of the Stage 1 Study Area as set out in Section 1.4, all water bodies within or dissecting the 1 km boundary around the proposed route corridor have been identified. A total of five riverine water bodies, one transitional water body and three groundwater bodies are located within or dissecting the Stage 1 Study Area. No coastal water bodies were identified.

4.1.2 The following three groundwater bodies have immediately been scoped out of further assessment following the justification provided in paragraphs 3.3.8 and 3.3.9:

- **Usk and Wye Southern Carboniferous Limestone** (GB40901G206300), located beneath and at the eastern end of the new section of motorway;
- **Usk Devonian Old Red Sandstone** (GB40902G201700), located beneath and along the entirety of the corridor of the new section of motorway; and
- **SE Valleys Southern Devonian Old Red Sandstone and Triassic Mercia Mudstone** (GB40902G201500), located beneath and along the entirety of the new section of motorway.

4.1.3 Three riverine water bodies and one transitional water body flow into the Severn Lower transitional water body (GB530905415401) downstream of the route corridor:

- **Severn Lower** (GB530905415401), located approximately 2 km from the proposed route corridor at the closest point south of Newport Docks and is the downstream receiving water body for the Usk, Mill Reen and two Monk's Ditch water bodies.

4.1.4 Despite being situated outside of the 1 km Stage 1 Study Area, the Severn Lower water body has been identified as having the potential to be indirectly affected by the new section of motorway. This is due to the hydrological continuity of this water body with the Monk's Ditch, Mill Reen and the River Usk water bodies, and the potential for any impacts from these water bodies to migrate downstream and affect the Severn Lower. The Severn Lower water body has therefore been included in the screening assessment and, following the justification provided in paragraphs 3.3.8 and 3.3.9, has been assessed in the Stage 2 Detailed Assessment in terms of identifying potential indirect and/or cumulative impacts of the new section of motorway (only) via the adjoining upstream water bodies.

4.1.5 Therefore, the WFD water bodies identified for Stage 1 Screening include the following and are shown in Figures 2a to 2d:

- **Broadway Reen - source to R Severn Estuary** (GB109056073370), located within the path of the new section of motorway, approximately 1.2 km south east of the A48 at Coedkernew and south west of Duffryn;
- **Usk** (GB530905415404), located within the pathway of the new section of motorway at two locations over the River Usk and the River Ebbw around Newport Docks.

- **Ebbw R – conf Ebbw Fach R to Maes-glas** (GB109056026910), located along the River Ebbw approximately 700 m north of the new section of motorway and adjoining the Usk transitional water body at the eastern boundary of Newport Docks.
    - Noting this water body is not directly intersected by the new section of motorway;
- **Monks Ditch - source to Wainbridge** (GB109056026850), located within the path of the new section of motorway 550 m south of the A4810 at Llandevenny Works and extending south and then west to join the Severn Lower transitional water body at Goldcliff;
- **Monks Ditch - Wainbridge to mouth** (GB109056026810), located within the path of the new section of motorway 415 m south of the A4810 at Llandevenny Works and extending south east to join the Severn Lower transitional water body;
- **Mill Reen - source to the R Severn Estuary** (GB109056026860), located within the path of the new section of motorway to the north of Magor 550 m east of Junction 23A of the existing M4 alignment and extending south east to join the Severn Lower transitional water body; and
- **Severn Lower** (GB530905415401), located approximately 2 km from the proposed route corridor at the closest point south of Newport Docks and is the downstream receiving water body for the Usk, Mill Reen and two Monk's Ditch water bodies.
    - Noting this water body is not directly intersected by the new section of motorway.

4.1.6 The new section of motorway is intersected at six locations by WFD water bodies, each of which has been labelled as Intersect A to Intersect F from the west end of the new section of motorway to the east. Table 1 lists the water bodies which directly intersect the corridor at each location and then any secondary water bodies which could potentially be indirectly affected by construction of the new section of motorway.

Table 1. Water Bodies Directly and Indirectly Affected at Each Intersect Location.

Intersect	Water Bodies Directly Intersecting the New Section of Motorway	Water Bodies Potentially Indirectly Affected
A	Broadway Reen - source to R Severn Estuary	N/A
B	Usk	Ebbw R – conf Ebbw Fach R to Maes-glas Severn Lower
C	Usk	Severn Lower
D	Monks Ditch – source to Wainbridge	Severn Lower
E	Monks Ditch - Wainbridge to mouth	Severn Lower

Intersect	Water Bodies Directly Intersecting the New Section of Motorway	Water Bodies Potentially Indirectly Affected
F	Mill Reen - source to R Severn Estuary	Severn Lower

4.2 Step B – Identification of Relevant Construction Elements

Effects on the Water Environment

4.2.1 This assessment has considered only those construction elements of the new section of motorway which are relevant to the water quality of the water bodies included for assessment at each Intersect location. The primary effects associated with the new section of motorway are considered to be those generated during construction (e.g. excavation leading to changes in hydromorphology and water quality) and operation (e.g. road run-off and discharges leading to changes in water quality) and, for this type of highways project, would be expected to be as follows:

- Effects on surface waters from run-off during highway construction, particularly in the vicinity of areas of contaminated land identified along the proposed new section of motorway;
- Effects on groundwaters and surface waters from the highway construction methodology and proposed material reuse within the highway design;
- Effects of construction on water quality and the current function of the reen system; and
- Effects on surface waters from routine run-off and accidental spillages as part of operational highway drainage.

Construction Elements

4.2.2 The actual construction elements identified are based on the potential effects identified and assessed within Section 16.6 of Chapter 16 - Road Drainage and the Water Environment (ES Volume 1). The physical works associated with the new section of motorway would start at Chainage[4] (Ch.) 1,520 with the physical works relevant to this WFD Compliance Assessment beginning at Ch. 5,500. A summary description of each construction element has been provided, however for further details on the specific construction methodology, Chapter 3 - Scheme Construction (ES Volume 1) should be consulted.

4.2.3 Potential effects associated with the construction phase of projects such as the new section of motorway are typically short to medium term in nature and of localised extent; although in some cases these effects can occur across the whole of the new section of motorway. The construction elements listed below have been identified in line with those elements assessed within the Section 16.6 of Chapter 16 - Road Drainage and the Water Environment (ES Volume 1).

[4] Chainage (Ch.) – this refers to the location of an element in relation to its distance from the western end of the new section of the motorway (i.e. Ch. 5,460 refers to a location 5,460 m / 5.46 km from the western end of the new section of motorway).

4.2.4 The works would include the construction of a number of new structures as described in

4.2.5 Table 2 below.

Table 2. Construction Elements with the Potential to Impact WFD Water Bodies.

Construction Activity	Works Element	Potential Effects
Borrow Pits	Excavation and run-off.	Generation of potentially contaminated, silt laden run-off during excavation.
Highway Embankments	Dewatering of Tidal Flat Deposits (TFD)[5] on Gwent Levels using band drains in embankments less than 5 m high.	Impacts on surface water courses.
	Re-use of excavated materials as general embankment fill in embankments that utilise band drains to facilitate settlement of TFD on the Gwent Levels.	Generation of potentially contaminated leachate by infiltration through general embankment fill during surcharging period, before highway surface completed. Lateral or vertical flows to surface water receptors.
	Re-use of excavated materials as general embankment fill in embankments that utilise piled foundations without the need for band drains to facilitate settlement of TFD on Gwent Levels.	Generation of potentially contaminated leachate by infiltration through general embankment fill during surcharging period, before highway surface completed. Lateral or vertical flows to surface water receptors.
	Surface run-off from embankments during construction and surcharging period.	Generation of potentially contaminated, silt laden run-off during construction phase.
Road Cuttings	Construction of road cuttings in the vicinity of the Castleton and Magor junctions. Generally extensions of exiting cuts rather than new cuts.	Interception of contaminated waters emanating from known areas of Contaminated Land (CL) Sites (see Chapter 11 - Geology and Soils (ES Volume 1)) for unknown sources of groundwater contamination. Potential impacts on receiving waters.
Mitigation Reens	Culverting, infilling and altering the physical characteristics of reens.	Direct impact on reen system, principally by sediment generated during culverting.

[5] Tidal Flat Deposits – the generic description for this geological formation commonly refers to silt and clay with sand and gravel layers deposited within the tidal zone (BGS, 2016). Much of the substrate of the Gwent Levels can be considered TFD (see ES Chapter 16 - Road and Drainage and the Water Environment).

Construction Activity	Works Element	Potential Effects
Bridge and Viaduct Structures	Construction of bridge piers that may involve construction of coffer dams and dewatering.	Generation, management and handling of contaminated sediments during construction.
Access Roads and Laydown Areas	Generation of potentially contaminated, silt laden run-off during excavation.	
Use and Storage of Construction Materials	Accidental spillage of hazardous substances to ground or direct to surface water	

4.2.6 Further detailed information on the construction elements listed above is provided within the Detailed Assessment in Section 5.2.

Operational Elements

4.2.7 The operational elements of the new section of motorway which have the potential to have an impact on WFD water bodies are centred on the potential impacts from pollution originating from surface run-off from the highway.

4.2.8 The DMRB Guidance (HD 45/09) specifies procedures for the assessment of pollution impacts from routine run-off on surface waters, groundwater and from accidental spills, known as Method A, Method C and Method D respectively (Highways Agency *et al*., 2009).

Only Methods A and D have been used for the new section of motorway as all proposed road drainage outfalls have been designed to discharge to surface waters, and therefore there will be no pollution impact on groundwater from routine run-off (see ES Appendix 16.3 - DMRB Risk Assessment, Volume 3).

4.2.9 The Method A assessment comprises two separate elements; the HAWRAT Model and the Environmental Quality Standards (EQS) assessments:

- HAWRAT is an application designed to assess the short-term risks related to the intermittent nature of road runoff. It assesses the acute and chronic pollution impacts on aquatic ecology associated with soluble and sediment bound pollutants respectively. It is used to help highways designers decide whether pollution mitigation measures are needed in specific circumstances; and
- EQS are the maximum permissible annual average concentrations of potentially harmful chemicals, as defined under the WFD. The long-term risks over the period of one year are assessed through comparison of the annual average concentration of pollutants discharged with the published EQS for those pollutants.

4.2.10 The Method D assessment is an empirical methodology utilising look-up tables of probabilities of accidents and risks from pollution. Mitigation can be considered in the form of risk reduction factors associated with up to two complementary drainage treatment types.

4.2.11 Possible impacts on the water environment resulting from construction of the new section of motorway and their monitoring and mitigation in accordance with the

obligations and requirements of environmental legislation policy are reported within the Chapter 16 - Road Drainage and the Water Environment (ES Volume 1) and the Pre-CEMP (Appendix 3.2, ES Volume 3). Any flood-related impacts arising from the new section of motorway are assessed and reported in Chapter 16 and separately within Appendix 16.1 - Flood Consequences Assessment (ES Volume 3).

Method A Assessment

4.2.12 The main pollutants present in highways run-off can be grouped in the following categories:

- Sediment – on its own or as a colloid site for metal and organic pollutants;
- Metals – vehicles and fuel combustion, metal corrosion;
- Hydrocarbons – lubricating oils, fuel, exhaust emissions and herbicides;
- Salts and nutrients – de-icing operations and fertilisers; and
- Microbial – decay of organic matter / litter in verges.

4.2.13 For the assessment of routine run-off, the following key contaminants have been modelled to represent the above pollutant groups (those marked with an asterisk (*****) have been modelled using HAWRAT):

- Total suspended solids (TSS);
- Copper (total* and filtered*);
- Zinc (total* and filtered*);
- Cadmium (total)*;
- Pyrene*;
- Fluoranthene*;
- Anthracene*;
- Phenanthrene*;
- Total Polycyclic Aromatic Hydrocarbons (PAH)*; and
- Chloride.

4.2.14 The HAWRAT assessment deals with soluble (acute) and sediment-related (chronic) pollutants associated with routine highway run-off. Acute pollution impacts are expressed as Event Mean Concentrations (EMC) (µg/L) for dissolved copper and zinc. Chronic pollution impacts are expressed as Event Mean Sediment Concentrations (EMSC) (mg/kg) for total copper, zinc, cadmium, and (µg/kg) for pyrene, fluoranthene, anthracene, phenanthrene and total PAH. It also uses traffic density, climatic region and event rainfall characteristics to predict run-off quality in terms of EMCs and EMSCs. Using long term rainfall event data it generates likely run-off quality distributions that could be observed in practice.

4.2.15 The results of the Method A HAWRAT Assessment are presented in Sections 4.6.5 *et seq*. of Appendix 16.3 – DMRB Risk Assessment, and show that all discharges to the affected surface water bodies are predicted to represent acceptable discharges under the DMRB Guidance. Therefore, no further

assessment of operational impacts resulting from the new section of motorway, in terms of routine highway run-off, on WFD water bodies is required.

Method D Assessment

4.2.16 The DMRB Guidance provides optimum risk reduction factors to be considered when determining whether pollution risk will be mitigated by the design features or by the drainage treatment stages proposed in Appendix 16.3 – DMRB Risk Assessment. The input parameters for the Method D assessment are:

- Road Length;
- Spillage Rates;
- Spillage Probability;
- Spillage Pollution Risk;
- Pollution Occurring Risk;
- Annual Average Daily Traffic; and
- Percentage of Heavy Goods Vehicles (HGV).

4.2.17 Based on the methodology and assessment set out in Appendix 16.3 – DMRB Risk Assessment (ES Volume 3), it has been concluded that the risk associated with pollution impacts from spillages can be considered to have negligible magnitude and neutral significance. Therefore, no further assessment of operational impacts resulting from the new section of motorway, in terms of the risk of pollution incidents, on WFD water bodies is required.

Based on the operational impacts modelling undertaken during Methods A (paragraph 4.2.12 to 4.2.15) and D described above, there are no predicted operational impacts on WFD water bodies and therefore operational elements have not be considered further within this WFD Compliance Assessment.

4.3 Step C – Water Body Background Summary Data

4.3.1 Table 3 below provides a summary of the WFD status for the water bodies identified in Step A, as listed above in paragraph 4.1.5. This summary data includes the overall, ecological and chemical status as well as any protected area designations associated with the water body as set out in the updated 2015 Severn RBMP.

Table 3. Stage 1 Step C – Water Body Summary Data for all Water Bodies Screened in for Initial Assessment (EA, 2015).

Water Body Name and ID	Water Body Length (km) / Area (km^2) and Hydro-morphological Designation	Current Overall Status / Potential	Current Ecological Status/Potential and Certainty	Current Chemical Status / Potential and Certainty	Protected Area Designations	Status Objective and Justification if not 'Good' by 2015
Broadway Reen - source to R Severn Estuary (GB109056073370)	Length 7.56 km Artificial	Moderate Potential	Moderate Potential Mitigation Measures *– Moderate or Less*	Good	None	GOS by 2021 GEP by 2021
Usk (GB530905415404)	Area N/A HMWB	Moderate Potential	Moderate Potential Mitigation Measures *– Moderate or Less*	Good	Habitats Directive Birds Directive	GOS by 2021 GEP by 2021
Ebbw R – conf Ebbw Fach R to Maes-glas (GB109056026910)	Length N/A HMWB	Moderate Potential	Moderate Potential Mitigation Measures *– Moderate or Less*	Fail	None	GOS by 2021 GEP 2021 GCS by 2021
Monks Ditch - source to Wainbridge (GB109056026850)	Length 14.8 km Artificial	Moderate Potential	Moderate Potential Mitigation Measures *– Moderate or Less*	Good	None	GOS by 2021 GEP by 2021
Monks Ditch - Wainbridge to mouth (GB109056026810)	Length 5.3 km Artificial	Moderate Potential	Moderate Potential Mitigation Measures *– Moderate or Less*	Good	None	GOS by 2021 GEP by 2021
Mill Reen - source to the R Severn Estuary (GB109056026860)	Length 6.7 km Artificial	Moderate Potential	Moderate Potential Mitigation Measures *– Moderate or Less*	Good	None	GOS by 2021 GEP by 2021
Severn Lower (GB530905415401)	Area N/A HMWB	Moderate Potential	Moderate Potential Mitigation Measures *– Moderate or Less*	Fail	Bathing Water Directive Habitats Directive Birds Directive	GOS by 2021 GEP by 2021 GCS by 2021

4.4 Step D – Screening Assessment

4.4.1 The following screening assessment has been carried out based on the potential for the relevant construction elements identified within Stage 1 Step B (see Section 4.2 and

4.4.2 Table 2) to directly affect a water body. Table 4 below provides an overview of the Stage 1 Screening Assessment for the new section of motorway, with the full Screening table presented in Annex A.

Table 4. Summary of Stage 1 Screening Results (grey = not applicable to the water body; green = screened out of detailed Stage 2 assessment; red = screened in for detailed Stage 2 assessment).

Construction Element		Water Body						
		Broadway Reen - source to R Severn Estuary	Ebbw R – conf Ebbw Fach R to Maes-glas[6]	Usk	Monks Ditch – source to Wainbridge	Monks Ditch - Wainbridge to mouth	Mill Reen - source to R Severn Estuary	Severn Lower[6]
Biological Quality Elements								
• Angiosperms • Chironomids • Fish • Invertebrates • Macrophytes • Macroalgae • Phytoplankton	Borrow Pit							
	Embankments							
	Road Cuttings							
	Mitigation Reens							
	Bridge Structures							
	Access and Roads							
	Materials Storage							
Hydromorphological Supporting Elements								
• Hydrological Regime • Morphology • Tidal Regime	Borrow Pit							
	Embankments							
	Road Cuttings							
	Mitigation Reens							
	Bridge Structures							
	Access and							

[6] The Ebbw R – conf Ebbw Fach R to Maes-glas and Severn Lower water bodies have been included here for completeness, however these water bodies will only be assessed within the Indirect Impacts Assessment in paragraph 5.3.24 *et seq*. See Section 4.1 for further information.

Construction Element		Water Body						
		Broadway Reen - source to R Severn Estuary	Ebbw R – conf Ebbw Fach R to Maes-glas[6]	Usk	Monks Ditch – source to Wainbridge	Monks Ditch - Wainbridge to mouth	Mill Reen - source to R Severn Estuary	Severn Lower[6]
	Roads							
	Materials Storage							
Protected Area Designations								
• Habitats Directive • Birds Directive	Borrow Pit							
	Embankments							
	Road Cuttings							
	Mitigation Reens							
	Bridge Structures							
	Access and Roads							
	Materials Storage							
Physico-Chemical Elements								
• Physical Characteristics • Priority Hazardous Substances • Priority Substances • Other Pollutants	Borrow Pit							
	Embankments							
	Road Cuttings							
	Mitigation Reens							
	Bridge Structures							
	Access and Roads							
	Materials Storage							

4.5 Screening Assessment Results

Conclusions

4.5.1 A summary of the conclusions of the screening assessment in terms of potential impacts on water quality are:

Biological Quality Elements

- All biological quality elements have been screened in for further assessment due to the variety of construction activities taking place and the scale of the project. The least likely biological elements to be impacted are groups such as phytoplankton, however due to the nature of the works, large increases in suspended sediments, turbidity or accidental contamination of the water environment could cause impacts and so it remains screened in; and
- Invertebrate fauna is the element that has the most potential to be impacted during the proposed works. This is due to the number of proposed morphological change to the river and reen channels, including culverting, infilling and replacement of reens. This could result in a relatively large amount of permanent habitat loss for invertebrates in the reen water bodies due to their relative size in relation to the total works areas.

4.5.2 Further information on the impacts of the project on the ecology of the study area is presented in Chapter 10 – Ecology and Nature Conservation (ES Volume 1).

Hydromorphological Quality Elements

4.5.3 A summary of the screening assessment in terms of potential impacts to hydromorphological quality elements are:

- The quality element with the greatest potential for impact is river morphology, including physical characteristics of the water channel such as river depth and/or width variation, the structure and/or substrate of the river bed and the structure of any intertidal/riparian zones. This is due to the planned culverting and infilling activities planned to maintain the Gwent Levels reen system throughout the construction period;
- Assessment of impacts on the tidal regime is not required for riverine water bodies, however assessment is required for transitional water bodies. The Usk water body will not be assessed for impacts to the tidal regime from bridge and/or viaduct structures as a commitment has been made that no construction will occur within the wetted channel of the River Usk due to its designation as a Special Area of Conservation (SAC). No other construction elements proposed for the Usk water body at Intersects B or C are likely to impact on the tidal regime, in terms of impacts to either freshwater flow dynamics and/or wave exposure, and therefore this element has been scoped out of further assessment.

Physico-Chemical Elements

4.5.4 A summary of the conclusions of the screening assessment in terms of potential impacts to physico-chemical quality elements are:

- All construction elements have the potential to negatively impact the physical characteristics of the respective water bodies in terms of salinity, nutrient concentrations, pH, etc. This is due to the use of introduced materials during construction and the potential release of pollutants associated with construction activities;
- Some construction elements such as the infilling of reens and the installation of mitigation reens have a greater potential to impact these physico-chemical

elements due to the changes in the reen/river structure and morphology which, in turn, can then indirectly impact water quality;

- Impacts from priority substances and priority hazardous substances have been scoped out of further assessment. It is considered unlikely that any discharge would contain these types of substances, however all discharges to existing surface water courses and water bodies during construction will be treated prior to discharge in line with WFD requirements as per a Ground and Surface Water Management Plan (GSWMP) within the CEMP; and
- Impacts from other polluting substances has been retained for further assessment due to the installation of discharge outfalls and the potential for accidental release of other contaminating substances to be present during construction. It should be noted that all planned discharges are to be treated prior to their release to any controlled surface water bodies.

5 Stage 2 – Detailed WFD Assessment

5.1 Step A – Part 1: Clarification of Assessment Scope

Water Bodies Screened Out

5.1.1 Based on the results of the Stage 1 Screening, the following water bodies have been screened out of the main Stage 2 Detailed Assessment:

- Ebbw R – conf Ebbw Fach R to Maes-glas (GB109056026910); and
- Severn Lower (GB530905415401).

5.1.2 Impacts on the Ebbw Fach to Maes Glas water body are unlikely, primarily due to the distance between the most southerly point of the water body boundary and the new section of motorway. It is very unlikely that there will be any impacts to water quality on this water body due to its position upstream of the proposed construction works and distance, which is beyond the 250 m Stage 2 assessment corridor at approximately 1 km upstream of the new section of motorway. This water body will therefore only be assessed for indirect impacts from construction (see paragraph 3.3.8 and paragraph 5.3.6)).

5.1.3 Impacts on the status of the Severn Lower water body are also unlikely as there are no construction elements occurring within this water body. However, due to the connectivity of the Severn Lower with both of the Monk's Ditch water bodies and the Mill Reen water body, as well as the Usk water body, the Severn Lower has been screened out of Stage 2 detailed assessment but will be considered for indirect impacts from construction (see paragraph 3.3.8 and paragraph 5.3.6).

WFD Elements Screened Out

5.1.4 Only those WFD quality elements included in Table 4 (see Annex A) will be assessed further for each water body:

- No biological quality elements have been scoped out of the Detailed Assessment;
- The hydromorphological element for tidal regime has been scoped out for all water bodies;
- The only protected area designations to be included for assessment are those designated under the Usk water body, including the Severn Estuary/Môr Hafren and River Usk/Afon Wysg SACs and the Severn Estuary/ Môr Hafren Special Protection Area (SPA). No other water bodies contain designated protected areas; and
- Impacts from priority substances and priority hazardous substances have been scoped out of further assessment. These substances are considered unlikely to be present within the current water environment, also if these substances were recorded, all discharges to existing surface water courses and water bodies during construction will be treated prior to discharge in line with WFD requirements.

Construction Elements Screened Out

5.1.5 Based on the Screening Assessment presented in Table 4, the following construction elements have been screened out for further assessment for all water bodies:

- Borrow pits; and
- Access and roads.

5.2 Step A – Part 2: Detailed Construction Element Description

5.2.1 A summary of the construction elements that have been screened in for this Detailed Assessment is provided in this Section. Table 5 to Table 9 describing the main components of each construction element along with any current mitigation measures. The most recent and up-to-date construction methods and plans have been used in the preparation of this Section, however where information is not yet available on the likely methods and/or scope of the proposed works, expert judgement has been used to assess any likely impacts.

5.2.2 A description of the generic impacts of each construction element is also provided in the tables below. The assessment of these potential impacts on WFD quality elements has been derived based on the assumption that the mitigation measures listed in the tables will be implemented and that any impacts to WFD water bodies will be classed as 'residual' impacts.

Mitigation Measures

5.2.3 The mitigation measures for the new section of motorway in terms of impacts to the water environment are discussed in full detail in Section 16.8 of Chapter 16 - Road Drainage and the Water Environment (ES Volume 1). Impacts on aquatic ecological quality are also relevant to the assessment of the biological quality elements under the WFD. A full description of these is therefore provided in Chapter 10 - Ecology and Nature Conservation (ES Volume 1) and Appendix 10.35 - Sites of Special Scientific Interest (SSSI) Mitigation Strategy (ES Volume 3).

5.2.4 A brief description of the key forms of mitigation relating to impacts on WFD quality elements is provided below.

Water Treatment Areas and the Water Environment

5.2.5 The creation of the WTAs is the primary method of mitigation for potential impacts on the water environment from highway run-off. These have been specifically designed to include multiple elements in order to remove pollutants. Within the Gwent Levels, road drainage would be provided through grass-lined roadside channels, which would convey run-off up to a 1 in 100 plus climate change rainfall event to twelve WTAs located along the route. The WTAs are designed to attenuate and treat the collected surface water prior to discharging it into existing surface watercourses. In addition to the grass-lined channels, which are highly effective at removing suspended and dissolved pollutants from routine highway drainage, each WTA includes a bypass oil separator/pollution control lagoon, wet balancing pond and area of reed bed. The design and specification

of the WTAs is described further in Chapter 16 – Road Drainage and the Water Environment (ES Volume 1).

5.2.6 RTCs have also been established to protect controlled waters (i.e. WFD surface water bodies) where site won materials are to be used as general embankment fill. The Outline Remediation Strategy Report (Appendix 11.2, ES Volume 3) identifies the nature and extent of any land remediation works required in advance of the construction phase and outline all agreed RTCs. The RTCs will be designed to ensure that the EQS agreed with NRW are achieved (see Chapter 16 – Road Drainage and the Water Environment, ES Volume 1).

Reen Mitigation Strategy and the Gwent Levels

5.2.7 The new section of motorway would cross the historic Gwent Levels, composed of the historic reen systems of the Caldicot and Wentlooge Levels. This network of interconnecting watercourses is composed of reens and field ditches in which the water levels are controlled by a series of sluice structures. Water levels are divided into winter penning levels and summer penning levels and are managed by NRW. As the water levels are controlled by sluices there is typically very little flow, and most of the reens have no recognisable catchment (see Appendix 2.3 - Reen Mitigation Strategy).

5.2.8 The new section of motorway crosses reens at a number of locations, specifically the reen water bodies identified within this assessment. In order to mitigate for the loss in length of reens, it is proposed that new reens are provided along the north of the new section of motorway in areas in which existing reens are being infilled. These engineered reens will connect reens that have been cut off by the highway, with tilting sluices to allow manipulation of the water levels in the reen and to provide hydrological continuity within the system. Culvert crossings or reen bridges will be provided for each main reen, in order to maintain connectivity within the reen system. Mammal crossings would be provided independently to the hydraulic culverts.

Table 5. Summary of Construction Details, Mitigation Measures and Generic Impacts for the Highways and Embankments Construction Element.

Element	Highways and Embankments
Description of Element	• Embankments would primarily be constructed using site won soils from cuttings and borrow pits as well imported quarry aggregate. Additionally, embankments would be constructed using a fill material which may be composed of reused materials and/or stabilised soils, derived from the former Llanwern Steelworks Site on the Caldicot Levels, subject to material testing. • The general embankment fill would be compacted to Highways Agency specifications and would therefore be characterised by low porosity and low permeability. • Embankments within the Gwent Levels would be constructed directly on the Tidal Flat Deposits and therefore no excavation works would be required during construction (with the exception of any areas of existing/discovered contamination requiring remediation; see ES Appendix 11.1 Contaminated Land Assessment Report. • Where higher embankments are required (i.e. above 5 m) ground treatment would comprise the installation of precast piles to

Element	Highways and Embankments
	support the embankment fill material. • Embankments of less than 5 m height may require band drains , compacting and surcharging. Porewater dewatered from the TFD during surcharging is likely to be brackish, within the Caldicot Levels, with elevated ammoniacal nitrogen concentrations and the presence of a variety of metals (see Appendix 2.2 - Drainage Design Report).
Mitigation Measures	• Embankment drainage would be provided through a bunded system along the construction corridor that acts as lateral settlement lagoons. These would collect run-off which would migrate to natural low areas within the bunded areas and would be pumped to the nearest WTA. • These WTAs would attenuate and treat the collected surface water via settlement prior to discharging it into agreed discharge locations. Discharges would be subject to continual water quality compliance monitoring. The design and specification of the construction period WTAs is described in ES Appendix 3.1 – Buildability Report. • Construction would be undertaken according to a NRW-agreed CEMP, incorporating a GSWMP and Pollution Control and Prevention Plan. • Silt fencing would be installed around the margins of topsoil mounds to minimise the risk of sediment-laden run-off reaching surface watercourses.
Water Bodies to be Assessed for Construction Element	• Broadway Reen - source to R Severn Estuary. • Usk. • Monks Ditch – source to Wainbridge. • Monks Ditch - Wainbridge to mouth. • Mill Reen - source to R Severn Estuary.
Generic Construction Element Impacts	
Biological Quality Elements	
Composition and Abundance of Aquatic Flora	• Loss of riparian zone and marginal aquatic habitat. • Loss of sediment continuity and/or build-up of in-channel sediment. • Loss of riparian vegetation.
Composition and Abundance of Invertebrate Fauna	• Loss of benthic habitats. • Loss of sediment continuity / build-up of in-channel sediment.
Composition, Abundance and Age Structure of Fish Fauna	*No direct residual impacts on fish fauna from the construction of embankments have been identified.*
Hydromorphological Supporting Elements	
Hydrological Regime	• Loss of sediment continuity / build-up of in-channel sediment. • Interruption to flow dynamics.
Morphology	• Loss of morphological diversity and habitat.
Physico-Chemical Quality Elements	
Water Quality: Thermal	• Decrease in water quality resulting from vertical leaching of porewater.

Element	Highways and Embankments
conditions Oxygenation conditions Salinity Acidification status Nutrient conditions	• Decrease in water quality resulting from surface run-off during construction. • Decrease in water quality resulting from infiltration of contaminated leachate during surcharging period.

Table 6. Summary of Construction Details, Mitigation Measures and Generic Impacts for the Road Cuttings Construction Element.

Element	Road Cuttings
Description of Element	• Cutting will be required at the elevated areas situated at the eastern and western ends of the proposed new section of motorway. • Dewatering may be required in some areas.
Mitigation Measures	• Filter drains will be installed along the north side of road cuts to intercept any groundwater. • Road drainage would be provided through piped carrier systems, which would subsequently discharge to the WTAs. The WTAs would attenuate and treat the collected surface water prior to discharging it into agreed discharge locations. • Construction would be undertaken according to a NRW agreed CEMP incorporating a GSWMP and Pollution Control and Prevention Plan. • Silt fencing would be installed around the margins of topsoil mounds to minimise the risk of sediment-laden run-off reaching surface watercourses.
Water Bodies to be Assessed for Construction Element	• Mill Reen - source to R Severn Estuary.
Generic Construction Element Impacts	
Biological Quality Elements	
Composition and Abundance of Aquatic Flora	• Loss of sediment continuity and/or build-up of in-channel sediment from discharge of groundwater to surface waters.
Composition and Abundance of Invertebrate Fauna	• Loss of sediment continuity and/or build-up of in-channel sediment from discharge of groundwater to surface waters.
Composition, Abundance and Age Structure of Fish Fauna	*No direct residual impacts on fish fauna from road cuttings have been identified.*

Hydromorphological Supporting Elements	
Hydrological Regime	• Loss of sediment continuity and/or build-up of in-channel sediment from discharge of groundwater to surface waters.
Morphology	*No direct residual impacts on morphology from road cuttings have been identified.*
Physico-Chemical Quality Elements	
Water Quality: Thermal conditions Oxygenation conditions Salinity Acidification status Nutrient conditions	• Decrease in water quality resulting from build-up of in-channel sediment from discharge of groundwater to surface waters.

Table 7. Summary of Construction Details, Mitigation Measures and Generic Impacts for the Mitigation, Culverting and Infilling Reens Construction Element.

Element	Mitigation, Culverting and Infilling Reens
Description of Element	• Infilling, culverting and replacement of several existing reens is planned. The construction of highway embankments, water treatment areas, road junctions and access roads also requires the provision of compensatory reens and field drains to replace those lost beneath the footprint of the development.
Mitigation Measures	• Construction of mitigation / compensation reens at a ratio of a little over 1:1. • Provision of mammal tunnels adjacent to all reen culverts. • Use of plant material from existing reens and ditches to encourage colonisation of new reens and ditches by aquatic macrophytes. • Provision of eel passes on all new sluices. These would be designed in accordance with the guidance provided in *Elver and eel passes - A guide to the design and implementation of passage solutions at weirs, tidal gates and sluices* (EA, Undated). • Construction would be undertaken according to a NRW agreed CEMP incorporating a GSWMP and Pollution Control and Prevention Plan.
Water Bodies to be Assessed for Construction Element	• Broadway Reen - source to R Severn Estuary. • Monks Ditch – source to Wainbridge.
Generic Construction Element Impacts	
Biological Quality Elements	
Composition and Abundance of Aquatic Flora	• Loss of riparian zone and marginal aquatic habitat. • Loss of riparian vegetation. • Loss of in-channel habitat.

Element	Mitigation, Culverting and Infilling Reens
Composition and Abundance of Invertebrate Fauna	• Loss of benthic habitats.
Composition, Abundance and Age Structure of Fish Fauna	• Loss of benthic habitat. • Loss of in-channel habitat. • In-channel barrier effects to migration and movement.
Hydromorphological Supporting Elements	
Hydrological Regime	• Loss of hydrological connectivity. • Interruption of flow dynamics.
Morphology	• Alteration in reen morphology. • Loss of morphological diversity and habitat.
Physico-Chemical Quality Elements	
Water Quality: Thermal conditions Oxygenation conditions Salinity Acidification status Nutrient conditions	*No direct residual impacts on water quality from reen alterations have been identified.*

Table 8. Summary of Construction Details, Mitigation Measures and Generic Impacts for the Bridge and Viaduct Structures Construction Element.

Element	Bridge and Viaduct Structures
Description of Element	• The River Usk Crossing is proposed to take the form of a 2.1 km long elevated structure, including a high level cable stayed bridge over the river. • New bridged section of motorway, which includes the River Ebbw and River Usk Crossing, would be supported by piled piers and piled towers. • The west pier of the River Usk Crossing would be located within the Newport Docks area. The east pier would be within an area of saltmarsh on the east bank of the Usk. • Some excavation works and dewatering activities may be required outside of the tidal channel. The construction of piled tower foundations may require the use of dewatered cofferdams to facilitate safe excavation in these areas.
Mitigation Measures	• There will be no construction in the wetted channels of the Rivers Usk and Ebbw. A commitment has been made to ensure that piers are kept outside of the wetted channel of the River Usk and that only the eastern tower of the River Usk bridged section would be situated on natural saltmarsh, but would remain outside of the wetted channel for that transitional water body. • A site-specific Piling Risk Assessment will ensure that the

Element	Bridge and Viaduct Structures
	approach to piling and foundation construction for bridge and viaduct structures, particularly the River Ebbw and River Usk Crossings which may impact the River Usk WFD water body, minimises the potential for the creation of new contamination pathways and hence the cross-contamination of WFD surface waters. • Installation of piles for the East Pier of the River Usk Crossing will be undertaken outside the main fish migration period. Piling to install the cofferdam and pylon piles for the east pylon of the River Usk Crossing would be scheduled to avoid the period of highest sensitivity for underwater noise related impacts on migratory fish in the River Usk (March to June (inclusive)). • In order to mitigate for the loss of saltmarsh habitat at the location of the River Usk Crossing East Pier, replacement habitat would be created at the location of the bridge construction compound to the south of the River Usk Crossing. This would involve creation of a new flood bank on the landward side of this area and reduction of the level of the site to that of the existing saltmarsh. The topography of the saltmarsh in the area affected by the River Usk Crossing construction compound would be reinstated and the restored area would be smoothed over to remove any deep depressions on completion of the works to encourage the recovery of saltmarsh vegetation. • Construction would be undertaken according to a NRW agreed CEMP incorporating a GSWMP and Pollution Control and Prevention Plan.
Water Bodies to be Assessed for Construction Element	• Broadway Reen - source to R Severn Estuary. • Usk.
Generic Construction Element Impacts	
Biological Quality Elements	
Composition and Abundance of Aquatic Flora	• Increased shading from structures leading to a reduction in habitat quality.
Composition and Abundance of Invertebrate Fauna	• Increased shading from structures leading to a reduction in habitat quality.
Composition, Abundance and Age Structure of Fish Fauna	*No direct residual impacts on fish fauna from bridge and viaduct structures have been identified.*
Hydromorphological Supporting Elements	
Hydrological Regime	*No direct residual impacts on hydrological regime from bridge and viaduct structures have been identified.*
Morphology	*No direct residual impacts on morphology from bridge and viaduct structures have been identified.*

Physico-Chemical Quality Elements	
Water Quality: Thermal conditions Oxygenation conditions Salinity Acidification status Nutrient conditions	• Decrease in water quality from influx of contaminated sediments/soils from the construction of the bridge tower foundations. • Decrease in water quality from influx of contaminated water from the uncontrolled run-off of surface waters during construction. • Decrease in water quality from management of run-off generated during dewatering outside of the tidal channel of the River Usk.

Table 9. Summary of Construction Details, Mitigation Measures and Generic Impacts for the Material Laydown, Storage and Use Construction Element.

Element	Materials Laydown, Storage and Use
Description of Element	• During the construction of the new section of motorway, storage, handling and transport of construction materials and plant machinery is required. • No sand blasting is proposed as part of the construction works, although controlled blasting may be needed to extract the rock from some areas of cut and the borrow pits, with rock being processed where it is blasted and then removed from the excavation and transported to where it is needed. Also some blasting may be required for demolition. • Topsoil stores would be generated very early in the construction programme and would be in place for the duration of the construction phase, reaching up to 3 m height for topsoil and up to 5 m for subsoil. • Unsuitable material stores would be created, predominantly comprising organic material generated during the initial works (e.g. piling arisings, culvert arisings). Other unsuitable material would be generated towards the end of the construction phase from the creation of the water treatment areas.
Mitigation Measures	• Silt fencing would be installed around the margins of topsoil mounds to minimise the risk of sediment-laden run-off reaching surface watercourses. Fencing would also be placed around laydown and storage areas for the same reason. • Construction would be undertaken according to a NRW agreed CEMP incorporating a GSWMP and Pollution Control and Prevention Plan.
Water Bodies to be Assessed for Construction Element	• Broadway Reen - source to R Severn Estuary. • Monks Ditch – source to Wainbridge. • Mill Reen - source to R Severn Estuary.
Generic Construction Element Impacts	
Biological Quality Elements	
Composition and Abundance of Aquatic Flora	• Smothering effects due to increased sediment load from surface run-off of stored materials. • Increased turbidity due to increased sediment load from surface run-off of stored materials. • Decreased biodiversity due to effects of accidental release of hazardous substances.

Element	Materials Laydown, Storage and Use
Composition and Abundance of Invertebrate Fauna	• Smothering effects due to increased sediment load from surface run-off of stored materials. • Increased turbidity due to increased sediment load from surface run-off of stored materials. • Decreased biodiversity due to effects of accidental release of hazardous substances.
Composition, Abundance and Age Structure of Fish Fauna	• Increased turbidity due to increased sediment load from surface run-off of stored materials. • Decreased biodiversity due to effects of accidental release of hazardous substances.
Hydromorphological Supporting Elements	
Hydrological Regime	*No direct residual impacts on hydrological regime from materials laydown areas, storage and use have been identified.*
Morphology	*No direct residual impacts on morphology from materials laydown areas, storage and use have been identified.*
Physico-Chemical Quality Elements	
Water Quality: Thermal conditions Oxygenation conditions Salinity Acidification status Nutrient conditions	• Decrease in water quality from the release of excavated dust, sediments and soils. The potential impacts from the creation of dust are assessed in ES Chapter 7 - Air Quality. • Decrease in water quality from dust generated during the use of heavy machinery during construction and material handling / transport. • Decrease in water quality from run-off containing excavated dust, sediments and soils. • Decrease in water quality from contaminated leachate from storage of large volumes of soil. • Decrease in water quality due to increase in sediment load within surface run-off. • Decrease in water quality due to the entrainment in run-off or accidental release of potentially hazardous substances.

5.3 Step B, C and D - WFD Compliance Assessment

5.3.1 Due to the scale of the assessment required for the new section of motorway, Steps B, C and D of the Stage 2 Detailed Assessment (as set out in paragraph 3.2.1) have been condensed into a single assessment table for each water body for ease of comparison and identification of impacts.

Overview

5.3.2 The following sections provide the detailed WFD compliance assessment for the new section of motorway. The assessment is set out in the form of tables which contain:

- Information on the current status of each water body taken forward for assessment. The current status of these water bodies has been sourced from the updated Severn RBMP data published online on 30 October 2015 (EA, 2015a); and

- The assessment of any residual direct impacts identified in Table 5 to Table 9 which could cause deterioration in the quality status of the respective elements and overall potential of the water body.

5.3.3 Quality elements which have a current status of 'high' are considered to be most sensitive to deterioration and are defined as 'having biological, chemical and morphological conditions associated with no or very low human pressure' (EA, 2010). Any development within a water body with high status elements is therefore at risk of causing deterioration.

5.3.4 In order to undertake the compliance assessment, any residual generic impacts identified in Table 5 to Table 9 for each of the construction elements have been assessed against the relevant WFD elements which were screened in during the Stage 1 Screening in Table 3. Where no potential for deterioration in WFD status is identified, the justification for this decision is provided including any the specific mitigation measures to be implemented in each case.

5.3.5 The potential for the proposed construction of the new section of motorway to provide positive improvements in WFD quality status is discussed in Section 6.4.

5.3.6 The two water bodies for which potential indirect impacts have been identified (i.e. Ebbw Fach to Maes Glas and the Severn Lower water bodies) have been assessed in paragraph 5.3.6 only and are not included within the following tables.

Mitigation Measures Assessment

5.3.7 Any water bodies designated as HMWBs have been previously assigned specific mitigation measures to enable the water body to maintain or achieve GEP. The EA and/or NRW are responsible for implementing these mitigation measures throughout the WFD process. This part of the assessment therefore identifies whether any components of the new section of motorway would help to achieve or conflict with these actions.

5.3.8 As previously stated, the current status of the mitigation measures which have been identified for each water body based on the 2009 Severn RBMP have not been updated within the currently available updated RBMP published in December 2015. Therefore, where mitigation measures are assessed in Section 5.3, this has been based on the 2009 mitigation measure status.

Intersect A - Broadway Reen - source to R Severn Estuary

5.3.9 A detailed description of the approach to construction proposed for the Gwent Levels West area (i.e. the Wentlooge Levels), is provided in Appendix 3.1 - Buildability Report.

5.3.10 A detailed plan of the key construction activities to occur at Intersect A within the Broadway Reen water body is shown in Figure 4a.

5.3.11 The ecological baseline for the Gwent Levels reen network is provided in Appendix 10.18 – Aquatic Environment Baseline Study, with a full ecological impact assessment for the new section of motorway being undertaken in Chapter 10 – Ecology and Nature Conservation (ES Volume 1).

Table 10. Stage 2 Detailed Assessment of Impacts to Water Bodies at Intersect A.

Intersect A - Broadway Reen - source to R Severn Estuary			
Current Overall Status	**Moderate**	Overall Status Objective	**Good by 2021**
Current Ecological Status	**Moderate Potential**	Overall Ecological Objective	**Good by 2021**
Current Chemical Status	**Good**	Overall Chemical Objective	**Good by 2015**
Hydromorphological Designation	**Artificial**	Reasons for Designation	**Land Drainage / Wider Environment**
Biological Quality Elements	**Not Assessed**		
Aquatic Flora	**Not Assessed**	Fish Fauna	**Not Assessed**
Invertebrates	**Not Assessed**		

Highway and Embankments

- The mitigation measures relevant to the construction of the highway and associated embankments are provided in Table 5.
- Any loss of marginal riparian habitat / vegetation and / or in-channel aquatic vegetation (i.e. phytoplankton, macrophytes etc.) will be localised and temporary and will be mitigated by the construction of replacement reens in order to maintain hydrological and biological connectivity. Any alterations to the Broadway Reen water body will be agreed with NRW in order to comply with the requirements of the WFD prior to these works occurring.
- Any potential for increased sedimentation / sediment loading and / or increased turbidity due to sediment-run-off during the construction of the highway and embankments will be mitigated by the use of silt fencing.

Alterations to and Replacement of Reens

- The mitigation measures relevant to the alteration of existing reens and construction of mitigation reens are provided in Table 7.
- Any loss of marginal riparian habitat / vegetation and/or in-channel aquatic vegetation and habitat will be localised and temporary and will be mitigated by the construction of replacement reens in order to maintain hydrological and biological connectivity. Any alterations to the Broadway Reen water body will be agreed with NRW in order to comply with the requirements of the WFD prior to these works occurring.
- The construction of mammal tunnels and eel passes as well as the use of existing plant material to encourage rapid recolonisation will further mitigate for the impacts of the new section of motorway construction on WFD biological quality elements.

Bridge and Viaduct Structures

- The mitigation measures relevant to the construction of bridge and viaduct structures are provided in Table 8.
- No works will be undertaken within the wetted channel of the Broadway Reen water body and therefore no residual impacts on WFD biological quality elements have been identified.

Materials Use and Storage

- The mitigation measures relevant to the construction of the highway and associated embankments are provided in Table 9.
- Any potential for increased sedimentation / sediment loading and / or increased turbidity due to sediment run-off / dust from materials' laydown and storage areas will be mitigated by the use of silt fencing.

Intersect A - Broadway Reen - source to R Severn Estuary	
• The adoption of RTCs for any waste construction waters being discharged to WFD surface waters from these areas will mitigate for any entrained contaminants which could impact biological quality elements. **Based on the information available, no potential for impacts on WFD biological quality elements, such that would cause deterioration in WFD quality status, have been identified.**	
Hydromorphological Supporting Elements	**Supports Good**
Hydrological Regime	**Supports Good** *(quantity and dynamics of flow - supports good)*
Morphology	**N/A**
Highway and Embankments • The mitigation measures relevant to the construction of the highway and associated embankments are provided in Table 5. • Any loss of sediment and / or flow continuity during the construction of the highway and embankments would be localised and temporary and would be mitigated by the construction of mitigation reens and the installation of carrier pipes to maintain flow levels throughout construction. • Any impacts on the morphology of the Broadway Reen water body would be negligible as the water body has a 'hydromorphological designation of 'artificial' due to the repeated maintenance dredging undertaken of the reen system. • Any alterations to the hydrological regime and/or morphology of the Broadway Reen water body will be agreed with NRW in order to comply with the requirements of the WFD prior to these works occurring. **Alterations to and Replacement of Reens** • The mitigation measures relevant to the alteration of existing reens and construction of mitigation reens are provided in Table 7. • Any loss of sediment and / or flow continuity during the infilling, diverting, culverting of reens and the construction of mitigation reens would be localised and temporary and would be mitigated by the installation of carrier pipes to maintain flow levels and some translocation of aquatic habitats throughout construction. • Any impacts on the morphology of the Broadway Reen water body would be negligible as the water body has a hydromorphological designation of 'artificial' due to the repeated maintenance dredging undertaken of the reen system. • Any alterations to the hydrological regime and/or morphology of the Broadway Reen water body will be agreed with NRW in order to comply with the requirements of the WFD prior to these works occurring. **Bridge and Viaduct Structures** • The mitigation measures relevant to the construction of bridge and viaduct structures are provided in Table 8. • No construction activities relating to bridge and viaduct structures are being undertaken within the wetted channel at this location and therefore the impacts on the Broadway Reen water body would be negligible. **Based on the information available, no potential for impacts on WFD hydromorphological supporting elements, such that would cause deterioration in WFD quality status, have been identified.**	
Physico-Chemical Quality Elements	**Moderate (Good by 2021)** *Dissolved Oxygen (DO) has been classified as 'bad' based on a Significant Water Management Issue (SWMI) of a confirmed 'Physical Modification' due to 'Land Drainage and Water Level Management' activities. The sector responsible for this SWMI is*

<table>
<tr><th colspan="4">Intersect A - Broadway Reen - source to R Severn Estuary</th></tr>
<tr><td></td><td colspan="3">given as Agriculture and Land Management.</td></tr>
<tr><td>Specific Pollutants</td><td colspan="3">Not Assessed
The current chemical status is listed as ‘good’, with an objective to maintain ‘good’ status. All Priority Hazardous Substances, Priority Substances and Other Pollutants[7] are listed as ‘does not require assessment’.</td></tr>
<tr><td>Ammonia</td><td>Moderate</td><td>pH</td><td>High</td></tr>
<tr><td>BOD</td><td>Good</td><td>Phosphate</td><td>Poor</td></tr>
<tr><td>DO</td><td>Bad</td><td>Temperature</td><td>High</td></tr>
<tr><td colspan="4"><u>Highway and Embankments</u>
• The mitigation measures relevant to the construction of the highway and associated embankments are provided in Table 5.
• Any potential impacts to water quality from increased sedimentation / sediment loading and / or increased turbidity due to sediment run-off / dust from construction of the highway and embankments will be mitigated by the use of silt fencing.
• The adoption of RTCs for any waste construction waters being discharged to WFD surface waters will mitigate for any entrained contaminants which could impact WFD physico-chemical quality elements.
• Construction practices have been designed in consultation with NRW, including the identification of RTCs, such that all potential impacts on WFD surface water bodies from construction have been assessed as negligible.
<u>Alterations to and Replacement of Reens</u>
• The mitigation measures relevant to the alteration of existing reens and construction of mitigation reens are provided in Table 7.
• Any potential impacts to water quality from increased sedimentation / sediment loading and / or increased turbidity due to sediment run-off / dust from the culverting and construction of mitigation reens will be mitigated by the use of silt fencing.
• The adoption of RTCs for any waste construction waters being discharged to WFD surface waters will mitigate for any entrained contaminants which could impact WFD physico-chemical quality elements.
• Construction practices have been designed in consultation with NRW, including the identification of RTCs, such that all potential impacts on WFD surface water bodies from construction are negligible.
<u>Materials Use and Storage</u>
• The mitigation measures relevant to the construction of the highway and associated embankments are provided in Table 9.
• Any potential for impacts to water quality from increased sedimentation / sediment loading due to sediment run-off / dust from materials’ laydown and storage areas will be mitigated by the use of silt fencing.
• The adoption of RTCs for any waste construction waters being discharged to WFD surface waters from these areas will mitigate for any entrained contaminants which could impact biological quality elements.
Based on the information available, no potential for impacts on WFD physico-chemical quality elements, such that would cause deterioration in WFD quality status, have been identified.</td></tr>
</table>

[7] Specific Pollutant – specific pollutants are defined as ‘*substances which can have a harmful effect on biological quality and which may be identified as being discharged to water in significant quantities’* (UKTAG, 2008).

Surface Water Supporting Elements	**Moderate (Good by 2021)** *This classification is due to a confirmed 'Physical Modification' SWMI from 'Land Drainage'.*
Mitigation Measures Assessment	The classification of 'moderate-or-less' means that at least one of the mitigation measures identified below is still not in place. The mitigation measures listed in Annex B of the 2009 Severn RBMP (EA, 2015a) include the following, however no further updates on the status of these measures is available from the 2015 Cycle 2 assessment: • Retain marginal aquatic and riparian habitats throughout channel alteration (in place); • Operational and structural changes to locks, sluices, weirs, beach control, etc. (not in place); • Structures or other mechanisms in place and managed to enable fish to access waters upstream and downstream of the impounding works (not in place); and • Increase in-channel morphological diversity (not in place). The hydromorphology of the Broadway Reen water body is currently designated as 'artificial'. The current status or 'moderate-or-less' means that, as described above, at least one of the mitigation measures listed above remains 'not-in-place' and therefore it is not currently possible for this water body to achieve 'high' status for the Surface Water Supporting Elements component. Mitigation for the new section of motorway includes structures to enable eels and mammals to move within newly created reens, and therefore may support the implementation of mitigation measures proposed by the EA for this water body. The potential for the new section of motorway to contribute to improvements in WFD status for all water bodies is discussed in Section 6.4. **Based on the assessment of the relevant construction impacts provided above, the new section of motorway will not prevent any of the mitigation measures listed above from being implemented and will not result in a status deterioration of the Surface Water Supporting Elements component.**
Protected Area Status	*There are no protected area designations within this water body.*

Intersect B and Intersect C - Usk

5.3.12 Details of the planned construction and phasing of the River Usk Crossing is presented in Chapter 3: Scheme Construction (ES Volume 1) and Appendix 3.1: Buildability Report, which should be consulted alongside this detailed assessment.

5.3.13 The Usk water body is intersected at two locations by the new section of motorway. A detailed plan of the key construction activities to occur at Intersect B and Intersect C are shown in Figure 4b and Figure 4c, respectively.

5.3.14 The full aquatic ecological baseline for the River Usk, and the adjoining River Ebbw, is provided in Appendix 10.18 and Chapter 10 – Ecology and Nature Conservation (ES Volume 1).

Table 11. Stage 2 Detailed Assessment of Impacts to Water Bodies at Intersects B / C.

Intersect B and Intersect C – Usk			
Current Overall Status	**Moderate**	Overall Status Objective	**Good by 2021**
Current Ecological Status	**Moderate**	Overall Ecological Objective	**Good by 2021**
Current Chemical Status	**Good**	Overall Chemical Objective	**Good by 2015**
Hydromorphological Designation	**Heavily Modified Water Body**	Reasons for Designation	**Flood Protection**
Biological Quality Elements	**Moderate (Good by 2021)** *Pressure from 'Chemicals' on invertebrates status has led to an unknown SWMI which is also currently pending investigation in terms of both the activities causing the SWMI and the sector to hold responsibility for its management.*		
Aquatic Flora	**High** *(macroalgae element, opportunistic macroalgae sub-element)*		
Invertebrate Fauna	**Moderate (Good by 2021)** *(infaunal quality index sub-element)*		
Fish Fauna	**N/A**		

Highway and Embankments

- The mitigation measures relevant to the construction of the highway and associated embankments are provided in Table 5.
- Any loss of marginal riparian habitat / vegetation and / or in-channel aquatic vegetation (i.e. phytoplankton, macrophytes etc.) will be localised and temporary. In order to mitigate for the loss of saltmarsh habitat at the location of the River Usk Crossing East Pier, replacement habitat will be created at the location of the bridge construction compound to the south of the River Usk Crossing.
- Any potential for increased sedimentation / sediment loading and / or increased turbidity due to sediment-run-off during the construction of the highway and embankments will be mitigated by the use of silt fencing.

Bridge and Viaduct Structures

- The mitigation measures relevant to the construction of bridge and viaduct structures are provided in Table 8.
- There will be no construction in the wetted channels of the River Usk water body. A commitment has been made to ensure that piers are kept outside of the wetted channel of the River Usk and that only the eastern tower of the River Usk bridged section would be situated on natural saltmarsh, but would remain outside of the wetted channel of this water body.
- A site-specific Piling Risk Assessment will ensure that the approach to piling and foundation construction for bridge and viaduct structures, particularly the River Ebbw and River Usk Crossings which may impact the River Usk WFD water body, minimises the potential for the creation of new contamination pathways and hence the cross-contamination of WFD surface waters.
- Installation of piles for the East Pier of the River Usk Crossing will be undertaken outside the main fish migration period (i.e. March to June (inclusive); see Chapter 10 – Ecology and Nature Conservation).

Based on the information available, no potential for impacts on WFD biological quality elements, such that would cause deterioration in WFD quality status, have been identified.

Hydromorphological Supporting Elements	**Supports Good**		
Hydrological Regime	**Supports Good**		
Morphology	*The Usk water body is classified as a HMWB and therefore impacts on morphology have not been assessed.*		
<u>Bridge and Viaduct Structures</u> • The mitigation measures relevant to the construction of bridge and viaduct structures are provided in Table 8. • No construction activities relating to bridge and viaduct structures are being undertaken within the wetted channel at this location and therefore the impacts on the hydrological regime of the Usk water body have been assessed as negligible. **Based on the information available, no potential for impacts on WFD hydromorphological supporting elements, such that would cause deterioration in WFD quality status, have been identified.**			
Physico-Chemical Quality Elements	**High** *Priority Hazardous Substances are currently assessed as 'good' overall with cadmium and its compounds assessed as 'good'. Priority substances are also assessed as 'good' with lead and its compounds and nickel and its compounds also both assessed as 'good'. Other pollutants are listed as 'does not require assessment'.*		
Dissolved Oxygen	**High**		
Specific Pollutants	**High**		
Arsenic	**High**	Iron	**High**
Copper	**High**	Zinc	**High**
<u>Highway and Embankments</u> • The mitigation measures relevant to the construction of the highway and associated embankments is provided in Table 5. • Any potential impacts to water quality from increased sedimentation / sediment loading and / or increased turbidity due to sediment run-off / dust from construction of the highway and embankments will be mitigated by the use of silt fencing. • The adoption of RTCs for any waste construction waters being discharged to WFD surface waters will mitigate for any entrained contaminants which could impact WFD physico-chemical quality elements. • Construction practices have been designed in consultation with NRW, including the identification of RTCs, such that all potential impacts on WFD surface water bodies from construction have been assessed as negligible. **<u>Bridge and Viaduct Structures</u>** • The mitigation measures relevant to the construction of bridge and viaduct structures are provided in Table 8. • Any potential impacts to water quality from increased sedimentation / sediment loading and / or increased turbidity due to sediment run-off / dust from construction of bridge and viaduct structures will be mitigated by the use of silt fencing. • The adoption of RTCs for any waste construction waters being discharged to WFD surface waters will mitigate for any entrained contaminants which could impact WFD physico-chemical quality elements. **Based on the information available, no potential for impacts on WFD physico-chemical quality elements, such that would cause deterioration in WFD quality status, have been identified.**			

Surface Water Supporting Elements	Moderate (Good by 2021)
Mitigation Measures Assessment	The mitigation measures assessment cites 'Physical Modification' as a confirmed SWMI based on pressures from 'Flood Protection Use'. The status of the mitigation measures assessment is 'moderate-or-less', due to at least one of the below mitigation measures not having been implemented. The mitigation measures listed in Annex B of the 2009 Severn RBMP (EA, 2015) include the following, however no further updates on the status of these measures is available following the 2015 Cycle 2 updates: • Bank rehabilitation/reprofiling (in place); • Indirect/offsite mitigation and offsetting measures (not in place); • Preserve and, where possible, enhance ecological value of marginal aquatic habitat, banks and riparian zone (not in place); and • Retain marginal aquatic and riparian habitats throughout channel alteration (not in place). The hydromorphology of the Usk water body is currently designated as a HMWB. The current status or 'moderate-or-less' means that, as described above, at least one of the mitigation measures listed above remains 'not-in-place' and therefore it is not currently possible for this water body to achieve 'high' status for the Surface Water Supporting Elements component. **Based on the assessment of the relevant construction impacts provided above, the new section of motorway will not prevent any of the mitigation measures listed above from being implemented and will not result in a status deterioration of the Surface Water Supporting Elements component.**
Protected Area Status	**It should be noted that the following protected areas and their features are fully discussed and assessed as part of the Habitats Regulations Assessment (HRA) process. The full HRA has been presented in the SIAA for the new section of motorway.** **Severn Estuary/Môr Hafren SAC** This water body includes a protected area designation for the Severn Estuary/Môr Hafren SAC, a Natura 2000 site designated under the Habitats Directive. The overall objective for this protected area is to achieve Favourable Conservation Status[8] (FCS). Based on the 2015 Cycle 2 data on protected area status, the extended deadline of 2021 has been removed and the site is now considered to be meeting its objectives. However, due to the lack of availability of sufficient measurement techniques in terms of non-native species management, this status could be subject to change in future WFD cycles should further investigations be made into the survey techniques and control mechanisms required for monitoring non-native species in this site. The interest features for which the protected area was designated includes the Annex I habitats Atlantic salt meadows, estuaries, intertidal mudflats and sandflats, subtidal sandbanks and reefs; and the Annex II species river lamprey *Lampetra fluviatilis*; sea lamprey

[8] Favourable Conservation Status (FCS) - to protect and, where necessary, improve the water or water-dependent environment to the extent necessary to maintain FCS or make improvements to water-dependent habitats and species such that FCS is attained for the features for which the protected area is designated.

Petromyzon marinus and twaite shad *Alosa fallax*.

As no impacts have been identified which could cause deterioration in any of the WFD quality elements, it is considered unlikely that the new section of motorway will negatively impact on the conservation status of the Severn Estuary/ Môr Hafren SAC and therefore prevent it from maintaining FCS.

River Usk/Afon Wysg SAC

This water body also includes a protected area designation for the River Usk/Afon Wysg SAC, a Natura 2000 site designated under the Habitats Directive. The overall objective for this protected area is to achieve FCS. The SAC is currently not meeting its environmental objectives as required by Article 4 (1c), with an extended date for achieving the environmental objectives of 2021.

The justification for the extended deadline for achieving protected area objectives to 2021 is due to the barrier effects of the historically significant Crickhowell Bridge, considered to be one of the highest priority management features for the River Usk/ Afon Wysg SAC. Measures to reduce the barrier effects of this bridge on fish species include an assessment of options to be carried out in conjunction with the other relevant competent authorities (EA, 2009b).

The water-dependant interest features for which the protected area was designated includes the Annex I habitat Rivers with floating vegetation often dominated by water-crowfoot and the Annex II species river lamprey, sea lamprey, brook lamprey *Lampetra planeri*, twaite shad, allis shad *Alosa alosa*, Atlantic salmon *Salmo salar*, bullhead *Cottus gobio* and the European otter *Lutra lutra*.

Reasons for the site not meeting its objectives and the measures proposed to action this, as set out in the 2009 RBMP, are summarised below as:

- Deterioration from consented impacts - with a requirement for undertaking a review of consents;
- Inappropriate weirs dams and other structures - development of fisheries enhancement projects and specific habitat works;
- Inland flood defence and erosion control - measures required involve enforcement and to undertake a review of consents;
- Erosion/disturbance from public access - requires input from other competent authority functions and an Land Management Scheme (LMS);
- Non-Native terrestrial Species – requires an LMS and specific habitat works;
- Tree felling and management - input required from other competent authority functions;
- Waste impacts from dumping spoil, sludge, etc. – requires enforcement with a review of relevant consents.

Reasons for the features not meeting quality objectives by 2015 include:

- Licences/consents/compliance - technically infeasible alongside practical constraints of a technical nature; and
- Natural conditions – long ecological recovery time needed for species such as the twaite shad and sea lamprey.

As no impacts have been identified which could cause deterioration in any WFD quality elements, it is considered unlikely that the new section of motorway will negatively impact on the conservation status of the River Usk/Afon Wysg

	SAC and prevent it from reaching and maintaining FCS. **Severn Estuary/ Môr Hafren SPA** This water body also includes a Natura 2000 protected area designation under the Birds Directive for the Severn Estuary/Môr Hafren SPA. Based on the 2015 Cycle 2 data on protected area status this site is now considered to be meeting its objectives and is currently at FCS. As previously discussed, this status could be subject to change in future WFD cycles should further investigations be made into the status of these conservation measures. The water-dependant interest features for which the protected area was designated includes the Annex II species Bewick's swan *Cygnus columbianus bewickii*, dunlin *Calidris alpina*, gadwall *Anas strepera*, redshank *Tringa totanus*, shelduck *Tadorna tadorna,* white-fronted goose *Anser albifrons* and the waterfowl assemblage. **As no impacts have been identified which could cause deterioration in any WFD quality elements, it is considered unlikely that the new section of motorway will negatively impact on the conservation status of the Severn Estuary/ Môr Hafren SPA and prevent it from maintaining FCS.**

Intersect D – Monks Ditch – source to Wainbridge

5.3.15 A description of the approach to construction to be taken on the Gwent Levels East area (i.e. the Caldicot Levels), is provided in Appendix 3.1: Buildability Report.

5.3.16 A detailed plan of the key construction activities to occur at Intersect D is shown in Figure 4d.

5.3.17 The ecological baseline for the Gwent Levels reen network is provided in ES Appendix 10.18, with a full ecological impact assessment for the new section of motorway being undertaken within Chapter 10 – Ecology and Nature Conservation (ES Volume 1).

Table 12. Stage 2 Detailed Assessment of Impacts to Water Bodies at Intersect D.

Intersect D – Monks Ditch – source to Wainbridge			
Current Overall Status	**Moderate**	Overall Status Objective	**Good by 2021**
Current Ecological Status	**Moderate**	Overall Ecological Objective	**Good by 2021**
Current Chemical Status	**Good**	Overall Chemical Objective	**Good**
Hydromorphological Designation	**Artificial**	Reasons for Designation	**Land Drainage / Wider Environment**
Biological Quality Elements	**High**		
Aquatic Flora	**N/A**	Fish Fauna	**N/A**
Invertebrate Fauna	**High**		

Highway and Embankments

- The mitigation measures relevant to the construction of the highway and associated embankments are provided in Table 5.
- Any loss of marginal riparian habitat / vegetation and / or in-channel aquatic vegetation (i.e. phytoplankton, macrophytes etc.) will be localised and temporary and will be mitigated by the construction of replacement reens in order to maintain hydrological and biological connectivity. Any alterations to the Monks Ditch – source to Wainbridge water body will be agreed with NRW in order to comply with the requirements of the WFD prior to these works occurring.
- Any potential for increased sedimentation / sediment loading and / or increased turbidity due to sediment-run-off during the construction of the highway and embankments will be mitigated by the use of silt fencing.
- No direct residual impacts on fish fauna from the construction of embankments have been identified.

Alterations to and Replacement of Reens

- The mitigation measures relevant to the alteration of existing reens and construction of mitigation reens are provided in Table 7.
- Any loss of marginal riparian habitat / vegetation and/or in-channel aquatic vegetation and habitat will be localised and temporary and will be mitigated by the construction of replacement reens in order to maintain hydrological and biological connectivity. Any alterations to the Monks Ditch – source to Wainbridge water body will be agreed with NRW in order to comply with the requirements of the WFD prior to these works occurring.
- The construction of mammal tunnels and eel passes as well as the use of existing plant material to encourage rapid recolonization will further mitigate for the impacts of the new section of motorway construction on WFD biological quality elements.

Materials Use and Storage

- The mitigation measures relevant to the construction of the highway and associated embankments are provided in Table 9.
- Any potential for increased sedimentation / sediment loading and / or increased turbidity due to sediment run-off / dust from materials laydown and storage areas will be mitigated by the use of silt fencing.
- The adoption of RTCs for any waste construction waters being discharged to WFD surface waters from these areas will mitigate for any entrained contaminants which could impact biological quality elements.

Based on the information available at the time of writing, no potential for impacts on WFD biological quality elements, such that would cause deterioration in WFD quality status, have been identified.

Hydromorphological Supporting Elements	**Supports Good**		
Hydrological Regime	**High**	Morphology	**N/A**

Highway and Embankments

- The mitigation measures relevant to the construction of the highway and associated embankments are provided in Table 5.
- Any loss of sediment and / or flow continuity during the construction of the highway and embankments would be localised and temporary and would be mitigated by the construction of mitigation reens and the installation of carrier pipes to maintain flow levels throughout construction.
- Any impacts on the morphology of the Monks Ditch – source to Wainbridge water body would be negligible as the water body has a hydromorphological designation of 'artificial' due to the repeated maintenance dredging undertaken of the reen system.
- Any alterations to the hydrological regime and/or morphology of the Monks Ditch – source to Wainbridge will be agreed with NRW in order to comply with the

requirements of the WFD prior to these works occurring.

Alterations to and Replacement of Reens

- The mitigation measures relevant to the alteration of existing reens and construction of mitigation reens are provided in Table 7.
- Any loss of sediment and / or flow continuity during the infilling, diverting, culverting of reens and the construction of mitigation reens would be localised and temporary and would be mitigated by the installation of carrier pipes to maintain flow levels and some translocation of aquatic habitats throughout construction.
- Any impacts on the morphology of the Broadway Reen water body would be negligible as the water body has a hydromorphological designation of 'artificial' due to the repeated maintenance dredging undertaken of the reen system.
- Any alterations to the hydrological regime and/or morphology of the Broadway Reen water body will be agreed with NRW in order to comply with the requirements of the WFD prior to these works occurring.

Based on the information available, no potential for impacts on WFD hydromorphological supporting elements, such that would cause deterioration in WFD quality status, have been identified.

Physico-Chemical Quality Elements	**Good** *Priority Hazardous Substances, Priority Substances and Other Pollutants are listed as 'does not require assessment'.*		
Specific Pollutants	**Not Assessed**		
Ammonia	**High**	pH	**High**
BOD	**Good**	Phosphates	**Good**
DO	**High**	Temperature	**High**

Highway and Embankments

- The mitigation measures relevant to the construction of the highway and associated embankments are provided in Table 5.
- Any potential impacts to water quality from increased sedimentation / sediment loading and / or increased turbidity due to sediment run-off / dust from construction of the highway and embankments will be mitigated by the use of silt fencing.
- The adoption of RTCs for any waste construction waters being discharged to WFD surface waters will mitigate for any entrained contaminants which could impact WFD physico-chemical quality elements.
- Construction practices have been designed in consultation with NRW, including the identification of RTCs, such that all potential impacts on WFD surface water bodies from construction are assessed as negligible.

Alterations to and Replacement of Reens

- The mitigation measures relevant to the alteration of existing reens and construction of mitigation reens are provided in Table 7.
- Any potential impacts to water quality from increased sedimentation / sediment loading and / or increased turbidity due to sediment run-off / dust from the culverting and construction of mitigation reens will be mitigated by the use of silt fencing.
- The adoption of RTCs for any waste construction waters being discharged to WFD surface waters will mitigate for any entrained contaminants which could impact WFD physico-chemical quality elements.
- Construction practices have been designed in consultation with NRW, including the identification of RTCs, such that all potential impacts on WFD surface water bodies from construction are negligible.

Materials Use and Storage

- The mitigation measures relevant to the construction of the highway and associated embankments are provided in Table 9.
- Any potential for impacts to water quality from increased sedimentation / sediment loading due to sediment run-off / dust from materials laydown and storage areas will be

mitigated by the use of silt fencing.

- The adoption of RTCs for any waste construction waters being discharged to WFD surface waters from these areas will mitigate for any entrained contaminants which could impact biological quality elements.

Based on the information available, no potential for impacts on WFD physico-chemical quality elements, such that would cause deterioration in WFD quality status, have been identified.

Surface Water Supporting Elements	**Moderate**
Mitigation Measures Assessment	The Mitigation Measures Assessment is classed as 'moderate-or-less' due to a confirmed 'Physical Modification' SWMI from 'Land Drainage'. The mitigation measures listed in Annex B of the 2009 Severn RBMP include the following, however no further updates on the status of these measures is available: • Appropriate techniques to align and attenuate flow to limit detrimental effects of drainage features (in place); • Develop and revise sediment management strategies (in place); • Retain marginal aquatic and riparian habitats throughout channel alteration (in place); • Use of flood bunds like earth banks in place of floodwalls (in place); • Operational and structural changes to locks, sluices, weirs, beach control, etc. (not in place); • Preserve and, where possible, enhance ecological value of marginal aquatic habitat, banks and riparian zone (not in place); • Structures or other mechanisms in place and managed to enable fish to access waters upstream and downstream of the impounding works (not in place); • Alteration of channel bed within culvert (not in place); • Re-opening existing culverts (not in place); • Increase in-channel morphological diversity (not in place); • Preserve and, where possible, restore historic aquatic habitats (not in place); and • Removal of hard bank reinforcement/revetment, or replacement with soft engineering solution (not in place). The hydromorphology of the Monks Ditch – source to Wainbridge water body is currently designated as 'artificial'. The current status or 'moderate-or-less' means that, as described above, at least one of the mitigation measures listed above remains 'not-in-place' and therefore it is not currently possible for this water body to achieve 'high' status for the Surface Water Supporting Elements component. **Based on the assessment of the relevant construction impacts provided above, the new section of motorway will not prevent any of the mitigation measures listed above from being implemented and will not result in a status deterioration of the Surface Water Supporting Elements component.**
Protected Area Status	*There are no protected area designations within this water body.*

Intersect E - Monks Ditch - Wainbridge to mouth

5.3.18 A description of the approach to construction to be taken on the Gwent Levels East area (i.e. the Caldicot Levels), is provided in Appendix 3.1: Buildability Report.

5.3.19 A detailed plan of the key construction activities to occur at Intersect E is shown in Figure 4e.

5.3.20 The ecological baseline for the Gwent Levels reen network is provided in ES Appendix 10.18, with a full ecological impact assessment for the new section of motorway being undertaken within Chapter 10 – Ecology and Nature Conservation (ES Volume 1).

Table 13. Stage 2 Detailed Assessment of Impacts to Water Bodies at Intersect E.

Intersect E - Monks Ditch - Wainbridge to mouth			
Current Overall Status	**Moderate**	Overall Status Objective	**Good by 2021**
Current Ecological Status	**Moderate**	Overall Ecological Objective	**Good by 2021**
Current Chemical Status	**Good**	Overall Chemical Objective	**Good**
Hydromorphological Designation	**Artificial**	Reasons for Designation	**Land Drainage / Wider Environment**
Biological Quality Elements	**Good**		
Aquatic Flora	**N/A**	Fish Fauna	**N/A**
Invertebrate Fauna	**Good**		
Highway and Embankments • The mitigation measures relevant to the construction of the highway and associated embankments are provided in Table 5. • Any loss of marginal riparian habitat / vegetation and / or in-channel aquatic vegetation (i.e. phytoplankton, macrophytes etc.) will be localised and temporary and will be mitigated by the construction of replacement reens in order to maintain hydrological and biological connectivity. Any alterations to the Monks Ditch – Wainbridge to mouth water body will be agreed with NRW in order to comply with the requirements of the WFD prior to these works occurring. • Any potential for increased sedimentation / sediment loading and / or increased turbidity due to sediment-run-off during the construction of the highway and embankments will be mitigated by the use of silt fencing. **Based on the information available at the time of writing, no potential for impacts on WFD biological quality elements, such that would cause deterioration in WFD quality status, have been identified.**			
Hydromorphological Supporting Elements	**Supports Good**		
Hydrological Regime	**High**	Morphology	**N/A**
Highway and Embankments • The mitigation measures relevant to the construction of the highway and associated			

Intersect E - Monks Ditch - Wainbridge to mouth

embankments are provided in Table 5.

- Any loss of sediment and / or flow continuity during the construction of the highway and embankments would be localised and temporary and would be mitigated by the construction of mitigation reens and the installation of carrier pipes to maintain flow levels throughout construction.
- Any impacts on the morphology of the Monks Ditch – Wainbridge to mouth water body would be negligible as the water body has a hydromorphological designation of 'artificial' due to the repeated maintenance dredging undertaken of the reen system.
- Any alterations to the hydrological regime and/or morphology of the Monks Ditch – Wainbridge to mouth water body will be agreed with NRW in order to comply with the requirements of the WFD prior to these works occurring.

Based on the information available, no potential for impacts on WFD hydromorphological supporting elements, such that would cause deterioration in WFD quality status, have been identified.

Physico-Chemical Quality Elements	**Moderate** *Phosphate is currently considered 'moderate', associated with a confirmed SWMI of a diffuse source of 'Pollution from Rural Areas' which has been attributed to Farm Infrastructure and Dairy/Beef Field activities.* *DO is classified as 'bad' due to SWMIs from diffuse sources of 'Pollution from Rural Areas' and 'Changes to the Natural Flow and Levels of Water' from 'Land Drainage'. Both of these SWMIs have been confirmed for this water body and with the Agricultural and Rural Land Management Sector having responsibility.* *Priority Hazardous Substances, Priority Substances and Other Pollutants are listed as 'does not require assessment'.*

Specific Pollutants	**Not Assessed**		
Ammonia	**High**	pH	**High**
BOD	**High**	Phosphates	**Moderate**
DO	**Bad**	Temperature	**High**

Highway and Embankments

- The mitigation measures relevant to the construction of the highway and associated embankments are provided in Table 5.
- Any potential impacts to water quality from increased sedimentation / sediment loading and / or increased turbidity due to sediment run-off / dust from construction of the highway and embankments will be mitigated by the use of silt fencing.
- The adoption of RTCs for any waste construction waters being discharged to WFD surface waters will mitigate for any entrained contaminants which could impact WFD physico-chemical quality elements.
- Construction practices have been designed in consultation with NRW, including the identification of RTCs, such that all potential impacts on WFD surface water bodies from construction are negligible.

Based on the information available, no potential for impacts on WFD physico-chemical quality elements, such that would cause deterioration in WFD quality status, have been identified.

Surface Water Supporting Elements	**Moderate or Less**
Mitigation Measures Assessment	The mitigation measures assessment is at 'moderate-or-less' status and cites 'Physical Modification' as a confirmed SWMI based pressures from 'Land Drainage' activities carried out within the

Intersect E - Monks Ditch - Wainbridge to mouth	
	water body (EA, 2015a). No specific sector has been identified as responsible for this SWMI. The mitigation measures listed in Annex B of the 2009 Severn RBMP include the following, however no further updates on the status of these measures is available: • Develop and revise sediment management strategies (in place); • Operational and structural changes to locks, sluices, weirs, beach control, etc. (not in place); • Preserve and, where possible, enhance ecological value of marginal aquatic habitat, banks and riparian zone (not in place); • Structures or other mechanisms in place and managed to enable fish to access waters upstream and downstream of the impounding works (not in place); • Preserve and, where possible, restore historic aquatic habitats (not in place); and • Removal of hard bank reinforcement / revetment, or replacement with soft engineering solution (not in place). The hydromorphology of the Monks Ditch – Wainbridge to mouth water body is currently designated as 'artificial'. The current status or 'moderate-or-less' means that, as described above, at least one of the mitigation measures listed above remains 'not-in-place' and therefore it is not currently possible for this water body to achieve 'high' status for the Surface Water Supporting Elements component. **Based on the assessment of the relevant construction impacts provided above, the new section of motorway will not prevent any of the mitigation measures listed above from being implemented and will not result in a status deterioration of the Surface Water Supporting Elements component.**
Protected Area Status	*There are no protected area designations within this water body.*

Intersect F – Mill Reen – source to R Severn Estuary

5.3.21 A description of the approach to construction to be taken on the Gwent Levels East area (i.e. the Caldicot Levels), is provided in Appendix 3.1: Buildability Report.

5.3.22 A detailed plan of the key construction activities to occur at Intersect F is shown in Figure 4f.

5.3.23 The ecological baseline for the Gwent Levels reen network is provided in ES Appendix 10.18, with a full ecological impact assessment for the new section of motorway being undertaken within Chapter 10 – Ecology and Nature Conservation (ES Volume 1).

Table 14. Stage 2 Detailed Assessment of Impacts to Water Bodies at Intersect F.

Intersect F – Mill Reen – source to R Severn Estaury			
Current Overall Status	**Moderate**	Overall Status Objective	**Good by 2021**
Current Ecological Status	**Moderate**	Overall Ecological Objective	**Good by 2027**
Current Chemical Status	**Good**	Overall Chemical Objective	**Good**
Hydromorphological Designation	**Artificial**	Reasons for Designation	**Land Drainage / Wider Environment**
Biological Quality Elements	**Moderate (Good by 2027)** *Biological quality elements are listed as 'moderate' overall, with an objective to achieve good status by 2027. The reason for not achieving this objective by 2021 is listed as being 'Technically Infeasible: Cause of Adverse Impact Unknown'.* *Pressure from 'Chemicals' on invertebrates status has led to an unknown SWMI which is currently pending investigation in terms of both the activities causing the SWMI and the sector to hold responsibility for its management.*		
Aquatic Flora	**N/A**	Invertebrate Fauna	**Moderate**
Fish Fauna	**N/A**		

Highway and Embankments

- The mitigation measures relevant to the construction of the highway and associated embankments are provided in Table 5.
- Any loss of marginal riparian habitat / vegetation and / or in-channel aquatic vegetation (i.e. phytoplankton, macrophytes etc.) will be localised and temporary and will be mitigated by the construction of replacement reens in order to maintain hydrological and biological connectivity. Any alterations to the Mill Reen water body will be agreed with NRW in order to comply with the requirements of the WFD prior to these works occurring.
- Any potential for increased sedimentation / sediment loading and / or increased turbidity due to sediment-run-off during the construction of the highway and embankments will be mitigated by the use of silt fencing.
- No direct residual impacts on fish fauna from the construction of embankments have been identified.

Road Cuttings

- The mitigation measures relevant to road cutting activities are provided in Table 6.
- Any potential for increased sedimentation / sediment loading and / or increased turbidity due to sediment run-off / dust from materials laydown and storage areas will be mitigated by the use of silt fencing.
- The adoption of RTCs for any waste construction waters being discharged to WFD surface waters from these areas will mitigate for any entrained contaminants which could impact biological quality elements.

Materials Use and Storage

- The mitigation measures relevant to the construction of the highway and associated embankments are provided in Table 9.
- Any potential for increased sedimentation / sediment loading and / or increased turbidity due to sediment run-off / dust from materials laydown and storage areas will be mitigated by the use of silt fencing.
- The adoption of RTCs for any waste construction waters being discharged to WFD

surface waters from these areas will mitigate for any entrained contaminants which could impact biological quality elements.

Based on the information available, no potential for impacts on WFD biological quality elements, such that would cause deterioration in WFD quality status, have been identified.

Hydromorphological Supporting Elements	**Supports Good**		
Hydrological Regime	**High**	Morphology	**N/A**

Highway and Embankments

- The mitigation measures relevant to the construction of the highway and associated embankments are provided in Table 5.
- Any loss of sediment and / or flow continuity during the construction of the highway and embankments would be localised and temporary and would be mitigated by the construction of mitigation reens and the installation of carrier pipes to maintain flow levels throughout construction.
- Any impacts on the morphology of the Mill Reen water body would be negligible as the water body has a hydromorphological designation of 'artificial' due to the repeated maintenance dredging undertaken of the reen system.
- Any alterations to the hydrological regime and/or morphology of the Mill Reen water body will be agreed with NRW in order to comply with the requirements of the WFD prior to these works occurring.

Based on the information available, no potential for impacts on WFD hydromorphological supporting elements, such that would cause deterioration in WFD quality status, have been identified.

Physico-Chemical Quality Elements	**Moderate** *There is a probable SWMI listed for DO for 'Flow', due to 'Changes in Natural Flow and Water Levels' and 'Land Drainage' activities. The sector with responsibility for this SWMI is Agriculture and Rural Land Management.*		
Specific Pollutants	**Not Assessed**		
Ammonia	**High**	Phosphates	**Good**
DO	**Moderate**	Temperature	**High**
pH	**High**		

Highway and Embankments

- The mitigation measures relevant to the construction of the highway and associated embankments are provided in Table 5.
- Any potential impacts to water quality from increased sedimentation / sediment loading and / or increased turbidity due to sediment run-off / dust from construction of the highway and embankments will be mitigated by the use of silt fencing.
- The adoption of RTCs for any waste construction waters being discharged to WFD surface waters will mitigate for any entrained contaminants which could impact WFD physico-chemical quality elements.
- Construction practices have been designed in consultation with NRW, including the identification of RTCs, such that all potential impacts on WFD surface water bodies from construction are negligible.

Road Cuttings

- The mitigation measures relevant to road cutting activities are provided in Table 6.
- Any potential impacts to water quality from increased sedimentation / sediment loading and / or increased turbidity due to sediment run-off / dust from road cutting activities will be mitigated by the use of silt fencing.
- The adoption of RTCs for any waste construction waters being discharged to WFD surface waters will mitigate for any entrained contaminants which could impact WFD

physico-chemical quality elements.

Materials Use and Storage

- The mitigation measures relevant to the construction of the highway and associated embankments are provided in Table 9.
- Any potential for impacts to water quality from increased sedimentation / sediment loading due to sediment run-off / dust from materials laydown and storage areas will be mitigated by the use of silt fencing.
- The adoption of RTCs for any waste construction waters being discharged to WFD surface waters from these areas will mitigate for any entrained contaminants which could impact biological quality elements.

Based on the information available, no potential for impacts on WFD physico-chemical quality elements, such that would cause deterioration in WFD quality status, have been identified.

Surface Water Supporting Elements	Moderate or Less
Mitigation Measures Assessment	The mitigation measures assessment cites 'Physical Modification' as a confirmed SWMI based on 'Land Drainage' pressures. The mitigation measures listed in Annex B of the 2009 Severn RBMP include the following, however no further updates on the status of these measures is available: • Develop and revise sediment management strategies (in place); • Retain marginal aquatic and riparian habitats during channel alteration (in place); • Operational and structural changes to locks, sluices, weirs, beach control, etc. (not in place); and • Structures or other mechanisms in place and managed to enable fish to access waters upstream and downstream of the impounding works (not in place). The hydromorphology of the Mill Reen water body is currently designated as 'artificial'. The current status or 'moderate-or-less' means that, as described above, at least one of the mitigation measures listed above remains 'not-in-place' and therefore it is not currently possible for this water body to achieve 'high' status for the Surface Water Supporting Elements component. **Based on the assessment of the relevant construction impacts provided above, the new section of motorway will not prevent any of the mitigation measures listed above from being implemented and will not result in a status deterioration of the Surface Water Supporting Elements component.**
Protected Area Status	**Severn Estuary/ Môr Hafren SAC** This water body includes a protected area designation for the Severn Estuary/Môr Hafren SAC; a Natura 2000 site designated under the Habitats Directive. Detailed information on the current status of this site is included in the assessment for the River Usk water body in Table 11. A full assessment of this site and its features has been undertaken during the HRA process which is presented in the SIAA. **As no impacts have been identified which could cause deterioration in any WFD quality elements, it is considered unlikely that the new section of motorway will negatively impact on the conservation status of the Severn Estuary/ Môr Hafren SAC and prevent it from maintaining FCS.**

Indirect Impact Assessment

Ebbw R – conf Ebbw Fach R to Maes-glas

5.3.24 The Ebbw R – conf Ebbw Fach R to Maes-glas water body is located north of the new section of motorway, approximately 1 km upstream from the location of Intersect B where the new section of motorway intercepts the River Usk water body.

5.3.25 No construction works are planned to take place within or in close proximity to the water body. In addition, it is considered unlikely that any impacts to water quality, such that could cause deterioration in WFD quality elements, could affect this upstream location, and so no indirect impacts have been identified.

Severn Lower Water Body

5.3.26 The Severn Estuary covers the extent of the tidal influence from the upstream limit between Frampton and Awre in Gloucestershire, seawards to a line drawn between Penarth Head in Wales and Hinkley Point in Somerset. The Severn Lower water body encompasses part of this area, from the northern boundary between Beachley and Aust and the southern boundary between Lavernock and Brean Down.

5.3.27 The results of the Stage 2 assessment has shown there to be no remaining impacts on WFD water bodies after the implementation of appropriate mitigation. Therefore, there will be no potential for indirect impacts to the Severn Lower water body and no adverse impacts on WFD quality.

5.4 Step E - Cumulative Effects Assessment (CEA)

5.4.1 Chapter 17 - Assessment of Cumulative Effects and Inter-relationships (ES Volume 1) provides information on the nature and location of other local plan allocations, planning applications and other proposed developments which have been considered in the CEA, and provides the basis for the summary of the potential cumulative effects.

Recent Developments

5.4.2 No information is currently available on any schemes within the vicinity of the new section of motorway which have recently undertaken a WFD assessment.

Planned Developments

5.4.3 Based on the list of major planning applications identified within Chapter 17 of the ES, only one development is within close proximity to a WFD water body.

5.4.4 A screening opinion for the development of a 7.5 MW solar farm was submitted to Newport City Council on 17 July 2014. The potential location of this development is situated within the 250 m Stage 2 Assessment study area adjacent to the River Usk water body at Intersect B.

5.4.5 There is currently no further information on this project regarding its status of development or the potential for impacts on the water environment under the WFD, although the Screening Opinion listed on the planning application website states that an EIA will be required.

5.4.6 Due to the nature of this development (i.e. installation of solar panels and associated electrical infrastructure), it is unlikely that major adverse impacts on WFD water bodies would be expected, both spatially and temporally, when assessing the cumulative impacts of the new section of motorway with this development.

6 Assessment Conclusions

6.1 Overview

6.1.1 This section contains a summary and brief discussion of the results of the WFD Compliance Assessment of the effects of the new section of motorway on WFD water bodies. Table 15 below provides the results of the assessment in relation to the three key questions posed by the scope of this report:

- Is this proposed development likely to cause deterioration in the current status of any WFD quality elements?
- Will the proposed development prevent attainment of GES or GEP in any of the water bodies identified?
- Is the proposed development likely to impact on any water bodies outside of those assessed within the report (i.e. through the CEA)?

6.1.2 This assessment has considered the effects of the new section of motorway on the relevant water bodies according to the requirements set out within the DMRB. All further information on the DMRB assessments for the new section of motorway in relation to water quality and the water environment are presented in Chapter 16 - Road Drainage and the Water Environment (ES Volume 1) and Appendix 16.3 – DMRB Risk Assessment.

Table 15. Summary of Results of WFD Compliance Assessment.

Water Body	Deterioration in Current Quality Status	Prevention of Attaining GES / GEP	Cumulative Effects on Other Water Bodies
Broadway Reen	No	No	No
River Usk	No	No	No
Monks Ditch – source to Wainbridge	No	No	No
Monks Ditch – Wainbridge to mouth	No	No	No
Mill Reen	No	No	No
Indirect Impact Assessment Water Bodies			
Ebbw R – conf Ebbw Fach R to Maes-glas	No	No	No
Severn Lower	No	No	No

6.2 Mitigation Measures

6.2.1 The assessment presented above has been undertaken based on the assumption that the mitigation measures listed below will be implemented. Table 16 provides an overview of the mitigation measures which have been identified as being relevant to this WFD Compliance Assessment.

6.2.2 Should any of the measures identified below be subject to change, it is recommended that this assessment is revisited to ensure that a change in the

mitigation strategy will not lead to higher magnitude impacts on WFD quality elements, such that a deterioration in overall WFD status could occur.

Table 16. Overview and Summary of Relevant Mitigation Measures.

Measure	Description of Measure
Mitigation Measures	
Provision of water treatment areas to control the volume and quality of water discharged to the reen system *(see Chapter 2 – Scheme Description)*	• Run-off from the new section of motorway would be intercepted into grassed channels in the road verge. These channels would transfer the run-off to construction period WTAs. The grassed channels would be lined with a geosynthetic clay liner (and topsoil) to contain pollutants. The use of grassed channels would reduce the flow rate and would allow for some sediment to be deposited and oily residues and organic matter to be retained and broken down. Where the use of grassed channels is not possible, concrete channels would be utilised. With the exception of discharges to the River Usk and the River Ebbw, drainage from the new motorway would be treated through the WTAs. These would typically include provision for capture of hydrocarbons and grit prior to run-off entering the main attenuation lagoons. • The drainage of the River Usk Crossing would consist of kerb drainage to an outfall pipe that would run along the central reservation. On the west side of the River Usk, drainage would discharge into the River Ebbw via an oil separator. On the east side, drainage would discharge to the River Usk via a storage lagoon and a field ditch.
Maintaining all existing reen connections across the line of the new road *(see Chapter 2 – Scheme Description, Appendix 2.3 – Reen Mitigation Strategy and Appendix 3.1 – Buildability Report)*	• Culvert crossings or reen bridges would be provided for each main reen in order to maintain connectivity within the reen system. • Constructing the culverts early in the construction programme would maintain connectivity of the reen network and reduce potential disruption to ecology and reduce the risk of flooding in the area. Ground treatment measures in the form of pre-cast driven piling would be required beneath these new culverts to prevent them settling and sinking into the soft organic layers below. Each culvert crossing would be installed on a half and half basis with a temporary piped crossing installed within the existing channel to one side of the works.
Provision of mammal tunnels adjacent to all reen culverts *(see Chapter 2: Scheme Description and Chapter 10- Ecology and Nature Conservation)*	• Based on the results of otter surveys, otter activity has been recorded at a number of the WFD water bodies within this assessment. Mammal tunnels will be provided adjacent to all reen culverts. • Otters are not an element which requires assessment under the WFD, however they are a listed feature of the River Usk/ Afon Wysg SAC which is a designated protected area of the River Usk water body. Should the new section of the motorway fail to provide these mitigation measures for otters, the River Usk/ Afon Wysg SAC could continue to fail to meet its conservation objectives and attain FCS. Therefore each mammal culvert will be designed and installed in accordance with guidelines published in DMRB Volume 10, Section 4, Part 4 (Highways Agency *et a*l., 1999).
Provision of eel passes on all new	• Eel passes would be provided on all new sluices which may be constructed as part of the new section of the motorway. These

Measure	Description of Measure
sluices *(see Chapter 10 – Ecology and Nature Conservation)*	would be designed in accordance with the guidance provided in 'Elver and Eel Passes - A Guide to the Design and Implementation of Passage Solutions at Weirs, Tidal Gates and Sluices (Environment Agency, Undated).
Use of plant material from existing reens and ditches to encourage colonisation of new reens by aquatic macrophytes *(see Chapter 10 – Ecology and Nature Conservation)*	• Where practicable and subject to NRW approval, plant material from existing reens and ditches which would be lost, and also, by agreement, material arising from NRW dredging of water courses would be used to encourage colonisation of new reens and ditches by aquatic macrophytes.

Measures to Offset Adverse Effects	
Replacement of reens at a ratio of greater than 1:1 *(see Chapter 10 – Ecology and Nature Conservation and Appendix 2.3 – Reen Mitigation Strategy)*	• A total of over 2500 m of reens are due to be infilled or culverted during the construction of the new motorway. These would be replaced by a total of 2657 m of new main reens. • New reens would be provided along the north of the new section of motorway in areas where existing reens would be cut off by the new motorway. The proposed reens would be 2 m deep with 1 in 1 side slopes (giving an approximate width of 5.7 m at the surface). These new reens would connect reens cut off by the new section of motorway, with sluices to allow management of water levels.
Replacement of saltmarsh *(see Chapter 10 – Ecology and Nature Conservation)*	• In order to mitigate for the permanent loss of saltmarsh habitat at the location of the River Usk Crossing East Pier, replacement habitat would be created at the location of the bridge construction compound to the south of the Rive Usk Crossing adjacent to the drainage attenuation lagoon. This would involve creation of a new flood bank on the landward side of this area and reduction of the level of the site to that of the existing saltmarsh. • The topography of the saltmarsh in the area affected by the River Usk Crossing construction compound would be reinstated to an elevation similar to that of the surrounding area. The restored area would be smoothed over to remove any deep depressions on completion of the works to encourage the recovery of saltmarsh vegetation.

6.3 WFD Status Objectives

6.3.1 The results of this assessment have shown that when all the relevant mitigation measures are considered (as above), the extent of the construction works proposed for the new section of motorway will have no adverse effects on WFD quality status of any of the water bodies assessed. However, due to the nature of the works, there is likely to be some small, temporary and localised impacts on the environment which will not cause an overall deterioration in status.

Biological Quality Elements

6.3.2 Based on the current design information available, it is likely that any remaining impacts on biological quality elements following the implementation of all mitigation measures would be temporary and localised in nature. The key issues are:

- Temporary and localised habitat loss and fragmentation of riparian and in-channel habitats during works to culvert, infill and replace reens;
- Temporary and localised disruption to in-channel hydrodynamic and sediment flows during all works, including potential impacts for sediment smothering and increased turbidity; and
- Localised accidental release of polluting substances to surface water bodies from materials storage areas or entrainment of polluting substances in surface water run-off during construction.

Hydromorphological Supporting Elements

6.3.3 As all the WFD water bodies included within this assessment are designated either as Artificial or as a HMWB, therefore impacts on hydromorphological supporting elements such as Morphology are predicted to be minor, and all changes to reen morphology will be agreed with NRW prior to construction in order to comply with the requirements of the WFD.

6.3.4 No works will be undertaken within the wetted channel of the River Usk water body. The River Usk Crossing is proposed to take the form of a 2.1 km long elevated structure, including a high level cable stayed bridge over the river. The bridge piers would be located outside the wetted channel which has been defined in discussion with NRW[2]. The west pier would be located within the Newport Docks area, whilst the east pier would be within the area of saltmarsh on the east bank of the Usk (see mitigation measures for saltmarsh recolonisation in Table 16).

Physico-Chemical Quality Elements

6.3.5 As assessed within Chapter 16 – Road Drainage and the Water Environment, potential impacts on water quality have been mitigated through a number of means (as agreed with NRW), primarily:

- The creation of the construction period WTAs that have been specifically designed to include multiple elements in order to remove pollutants; and
- Establishment of RTCs to protect controlled waters.

6.3.6 Taking these measures into account, there are no remaining impacts on water quality and/or WFD physico-chemical quality elements from the construction elements identified.

Protected Area Objectives

6.3.7 The only water body to contain protected area designations is the River Usk transitional water body. No potential for adverse effects on the following protected area designations within the River Usk water body were identified:

- Severn Estuary/ Môr Hafren SAC – currently at FCS;

- River Usk/Afon Wysg SAC – currently failing FCS; and
- Severn Estuary/ Môr Hafren SPA – currently at FCS.

6.3.8 As previously stated, full consideration of the impacts to these sites has been undertaken during the HRA process and is reported within the M4CaN SIAA.

6.4 Contributing to Improvements in WFD Status

6.4.1 A significant proportion of the mitigation measures for the new section of the motorway have been designed to mitigate the loss of aquatic habitats and, where practicable, to ecologically enhance the land within the Gwent Levels reen system as set out in Appendix 10.35 - SSSI Mitigation Strategy.

6.4.2 As explained in the SSSI Mitigation Strategy, the new section of motorway would result in the loss of reen and ditch habitat which would have subsequent effects on aquatic macrophytes, insects and other invertebrates associated with these habitats. Specific mitigation measures are included in the new section of motorway to mitigate these effects, principally through Appendix 2.3 - Reen Mitigation Strategy which includes replacement of the lost lengths of reens and field ditches with a greater length of each, and provision of suitable habitat for shrill carder bee, principally on the embankments of the new motorway.

6.4.3 The final detailed prescriptions for mitigation and management will be agreed in advance with NRW and will be included in the final SSSI Mitigation Strategy/Mitigation Area Management Plans. A range of ecology-focussed enhancement measures are proposed for these areas including:

- Maintain water level management;
- Enhance the biodiversity value of watercourses;
- Increase the amount of reen and ditch habitat; and
- Manage grassland to encourage ground nesting birds and invertebrates.

6.4.4 All of these measures are capable of directly contributing to improvements in the biological quality elements and hydromorphological supporting elements which, subsequently, may also lead to improvements in physico-chemical quality at some locations where this is currently at ‘bad’ status for WFD water bodies. Some of these measures are over and above those prescribed as best practice and therefore the new section of motorway has the potential to actively contribute to ecological enhancement measures of WFD water bodies along the length of the new section of motorway.

6.4.5 Measures to be implemented during construction, over and above standard measures specifically to control physical and chemical pollution to the water environment would include:

- Management of surface water and groundwater during construction including maintenance of water levels in reens and field ditches; and
- De-watering of borrow bits and provision of temporary water treatment areas including consideration of temporary storage and settlement requirements to manage the sediment load of waters.

6.5 Recommendations

6.5.1 It should be noted that this WFD Compliance Assessment has been carried out in parallel to the production of the ES. If the ES is approved, this WFD Compliance Assessment should be reviewed at the detailed design stage to ensure that any assumptions made at this stage of the design process are still valid with regards to the final design.

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Figures

Legend

- Limit of Permanent and Temporary Works for New Section of Motorway
- Proposed New Section of Motorway
- Existing M4
- Stage 1 Study Area
- Stage 2 Study Area

NOTE
Study area based on the motorway alignment that was proposed at the time of assessment

Llywodraeth Cymru
Welsh Government

Appendix 16.4

Site Location

Figure: 1a	Revision: -
Date: March 2016	Status: At Issue
Drawn: RJJ	Checked: AH

Scale: A3 @ 1:25,000
0 500 1,000 m

N

dwg ref: JER6591_Figure1_SiteLocation

Legend

- Limit of Permanent and Temporary Works for New Section of Motorway
- Proposed New Section of Motorway
- Existing M4
- Stage 1 Study Area
- Stage 2 Study Area

NOTE
Study area based on the motorway alignment that was proposed at the time of assessment

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Appendix 16.4

Site Location

Figure: 1b	Revision: -
Date: March 2016	Status: At Issue
Drawn: RJJ	Checked: AH

Scale: A3 @ 1:25,000
0 500 1,000 m

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dwg ref: JER6591_Figure1_SiteLocation

Legend

- Limit of Permanent and Temporary Works for New Section of Motorway
- Proposed New Section of Motorway
- Existing M4
- Stage 1 Study Area
- Stage 2 Study Area

NOTE
Study area based on the motorway alignment that was proposed at the time of assessment

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Appendix 16.4

Site Location

Figure: 1c	Revision: -
Date: March 2016	Status: At Issue
Drawn: RJJ	Checked: AH

Scale: A3 @ 1:25,000
0 500 1,000 m

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dwg ref: JER6591_Figure1_SiteLocation

Legend

- Limit of Permanent and Temporary Works for New Section of Motorway
- Proposed New Section of Motorway
- Existing M4
- Stage 1 Study Area
- Stage 2 Study Area

NOTE
Study area based on the motorway alignment that was proposed at the time of assessment

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Appendix 16.4

Site Location

Figure: 1d	Revision: -
Date: March 2016	Status: At Issue
Drawn: RJJ	Checked: AH

Scale: A3 @ 1:25,000
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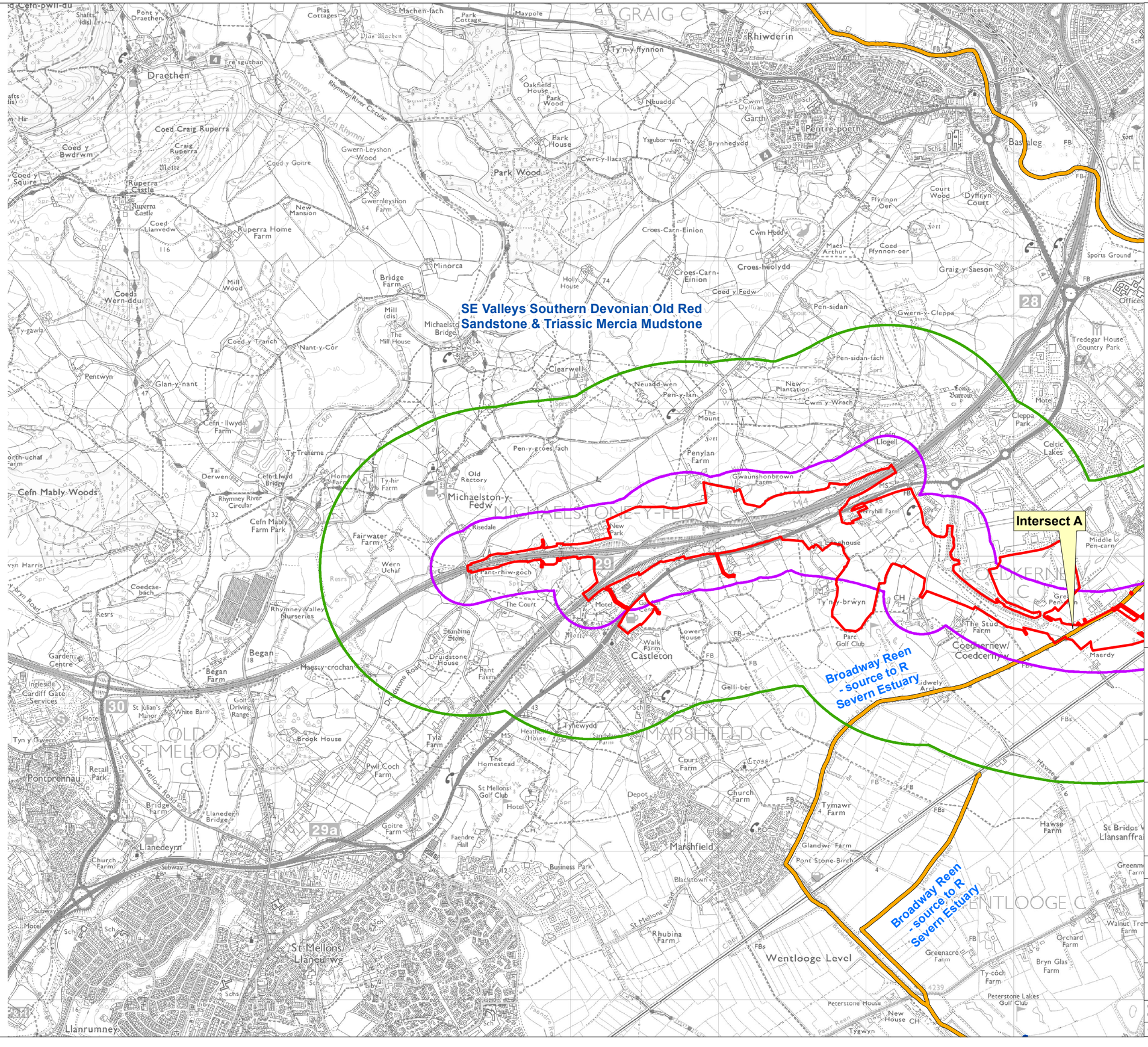

Legend

- Limit of Permanent and Temporary Works for New Section of Motorway
- Stage 1 Study Area
- Stage 2 Study Area
- Groundwater Waterbody - Good Potential
- River Waterbody - Moderate Potential
- Transitional Waterbody - Moderate Potential

NOTE
Study area based on the motorway alignment that was proposed at the time of assessment

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Welsh Government

Appendix 16.4

WFD Water Bodies

Figure: 2a	Revision: -
Date: March 2016	Status: At Issue
Drawn: RJJ	Checked: AH

Scale: A3 @ 1:25,000
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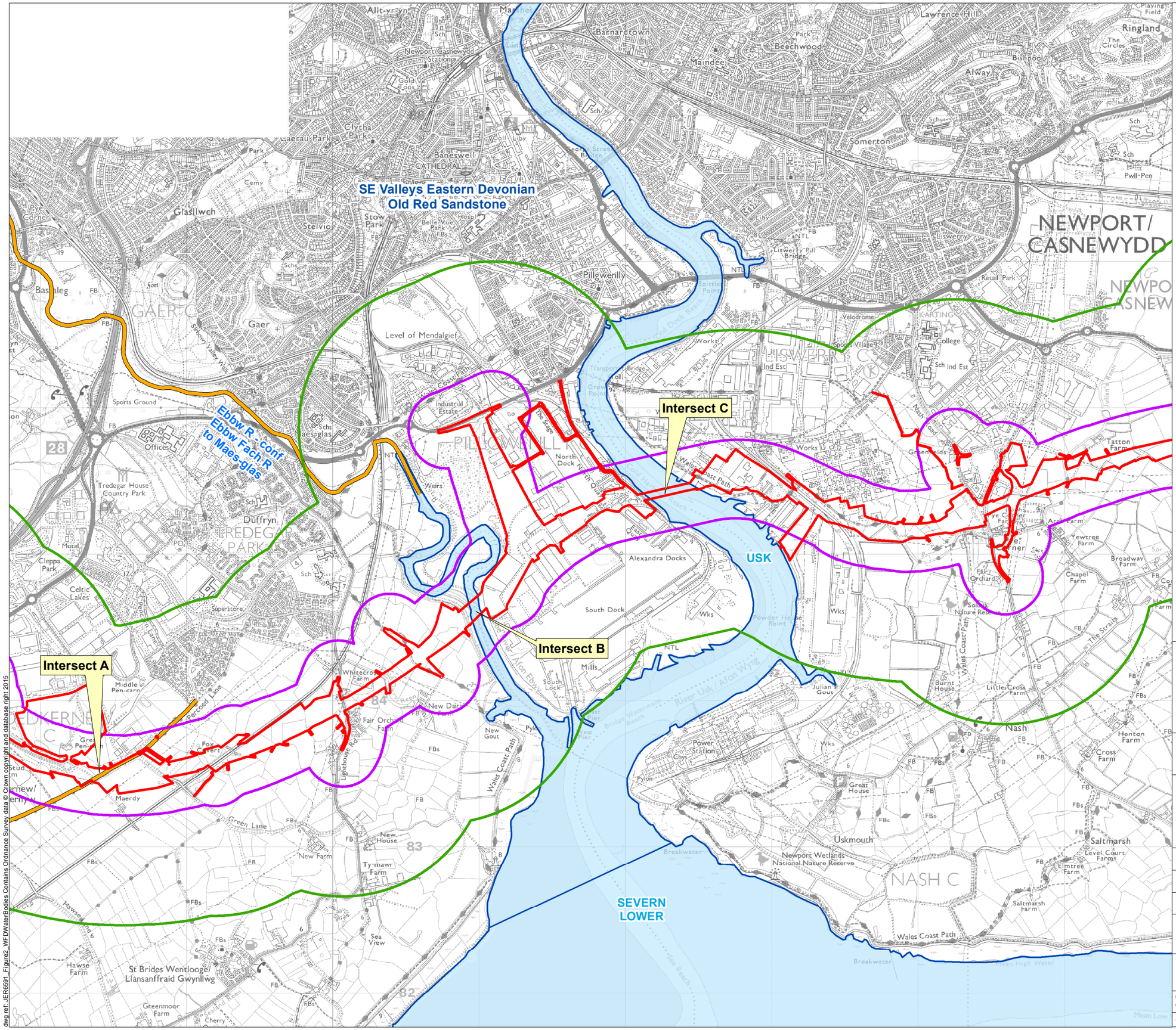

Legend

- Limit of Permanent and Temporary Works for New Section of Motorway
- Stage 1 Study Area
- Stage 2 Study Area
- Groundwater Waterbody - Good Potential
- River Waterbody - Moderate Potential
- Transitional Waterbody - Moderate Potential

NOTE
Study area based on the motorway alignment that was proposed at the time of assessment

Llywodraeth Cymru
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Appendix 16.4

WFD Water Bodies

Figure: 2b	Revision: -
Date: March 2016	Status: At Issue
Drawn: RJJ	Checked: AH

Scale: A3 @ 1:25,000
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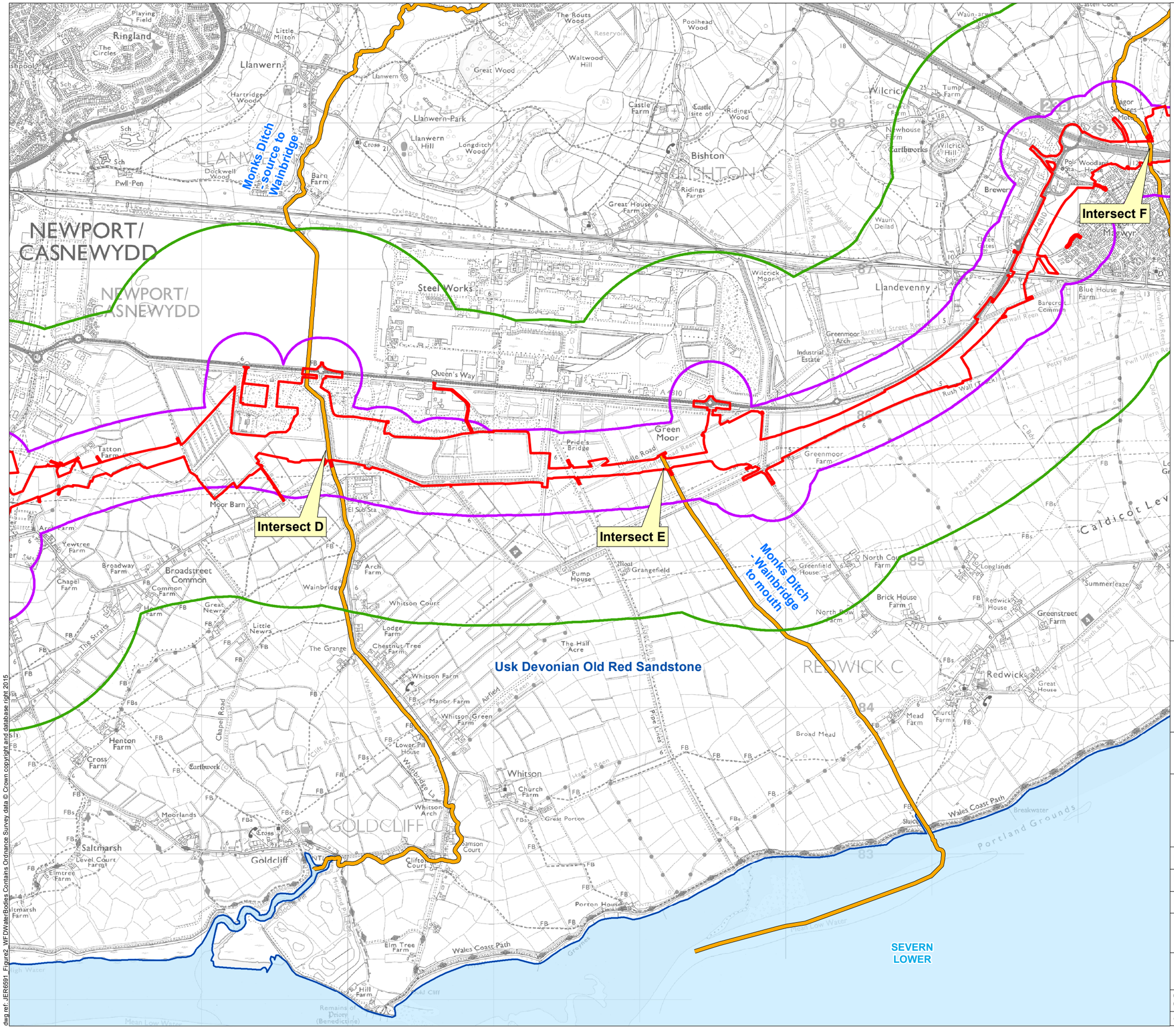

Legend

- Limit of Permanent and Temporary Works for New Section of Motorway
- Stage 1 Study Area
- Stage 2 Study Area
- Groundwater Waterbody - Good Potential
- River Waterbody - Moderate Potential
- Transitional Waterbody - Moderate Potential

NOTE
Study area based on the motorway alignment that was proposed at the time of assessment

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Appendix 16.4

WFD Water Bodies

Figure: 2c	Revision: -
Date: March 2016	Status: At Issue
Drawn: RJJ	Checked: AH

Scale: A3 @ 1:25,000
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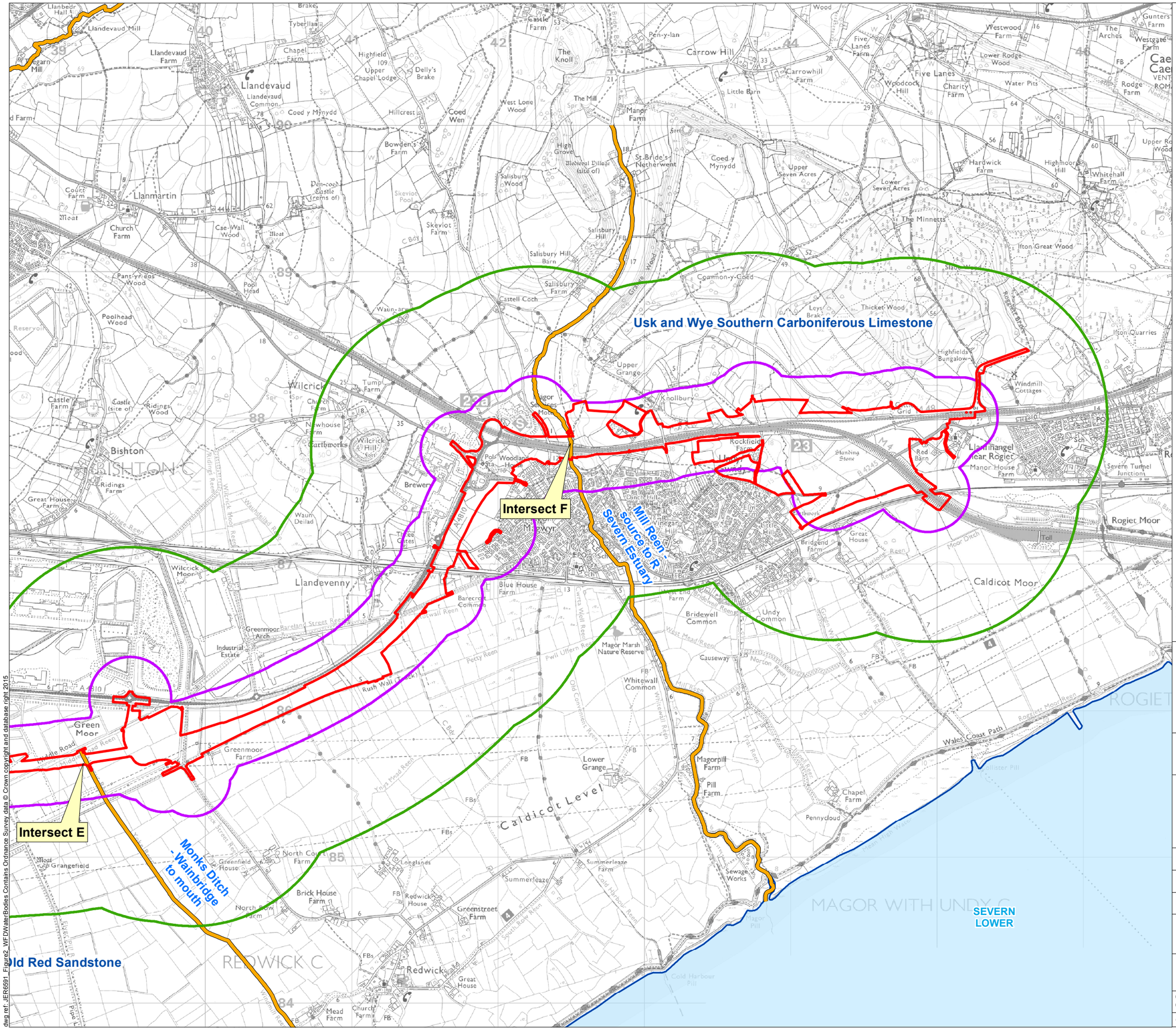

Legend

- Limit of Permanent and Temporary Works for New Section of Motorway
- Stage 1 Study Area
- Stage 2 Study Area
- Groundwater Waterbody - Good Potential
- River Waterbody - Moderate Potential
- Transitional Waterbody - Moderate Potential

NOTE
Study area based on the motorway alignment that was proposed at the time of assessment

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Appendix 16.4

WFD Water Bodies

Figure: 2d	Revision: -
Date: March 2016	Status: At Issue
Drawn: RJJ	Checked: AH

Scale: A3 @ 1:25,000
0 500 1,000 m

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dwg ref: JER6591_Figure2_WFDWaterBodies

SE Valleys Southern Devonian Old Red Sandstone & Triassic Mercia Mudstone

Broadway Reen - source to R Severn Estuary

Broadway Reen - source to R Severn Estuary

Intersect A

Legend

- Limit of Permanent and Temporary Works for New Section of Motorway
- Proposed New Section of Motorway
- Proposed Water Treatment Area
- Proposed Depot / Laydown Area
- Proposed Borrow Pit Area
- Proposed Stockpiled Material Storage
- Stage 1 Study Area
- Stage 2 Study Area
- Mitigation Reen
- Groundwater Waterbody - Good Potential
- River Waterbody - Moderate Potential
- Transitional Waterbody - Moderate Potential

NOTE
Study area based on the motorway alignment that was proposed at the time of assessment

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Appendix 16.4

Construction Elements for Assessment

Figure: 3a	Revision: -
Date: March 2016	Status: At Issue
Drawn: RJJ	Checked: AH

Scale: A3 @ 1:25,000
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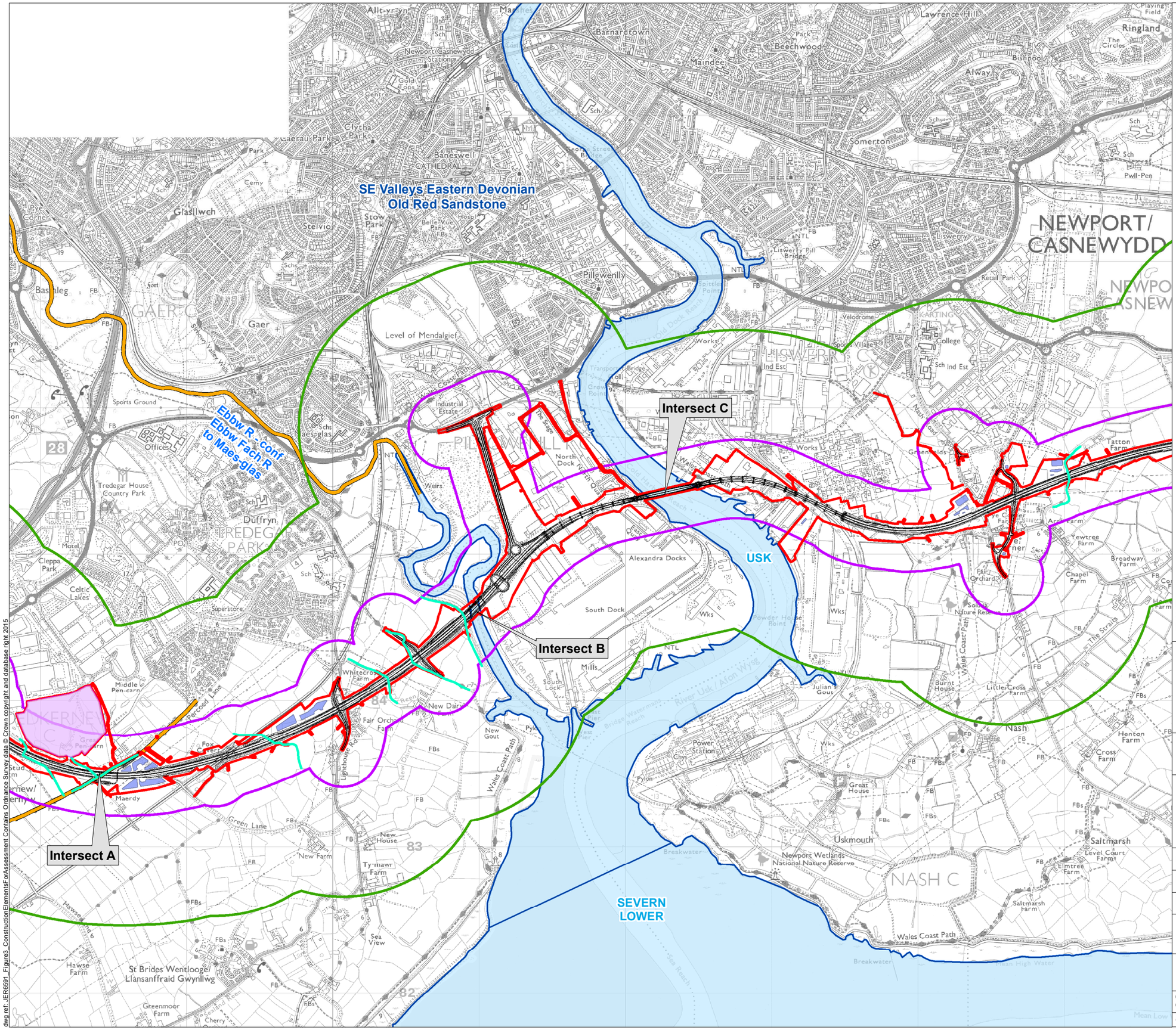

NOTE
Study area based on the motorway alignment that was proposed at the time of assessment

Llywodraeth Cymru
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Appendix 16.4

Construction Elements for Assessment

Figure: 3b	Revision: -
Date: March 2016	Status: At Issue
Drawn: RJJ	Checked: AH

Scale: A3 @ 1:25,000
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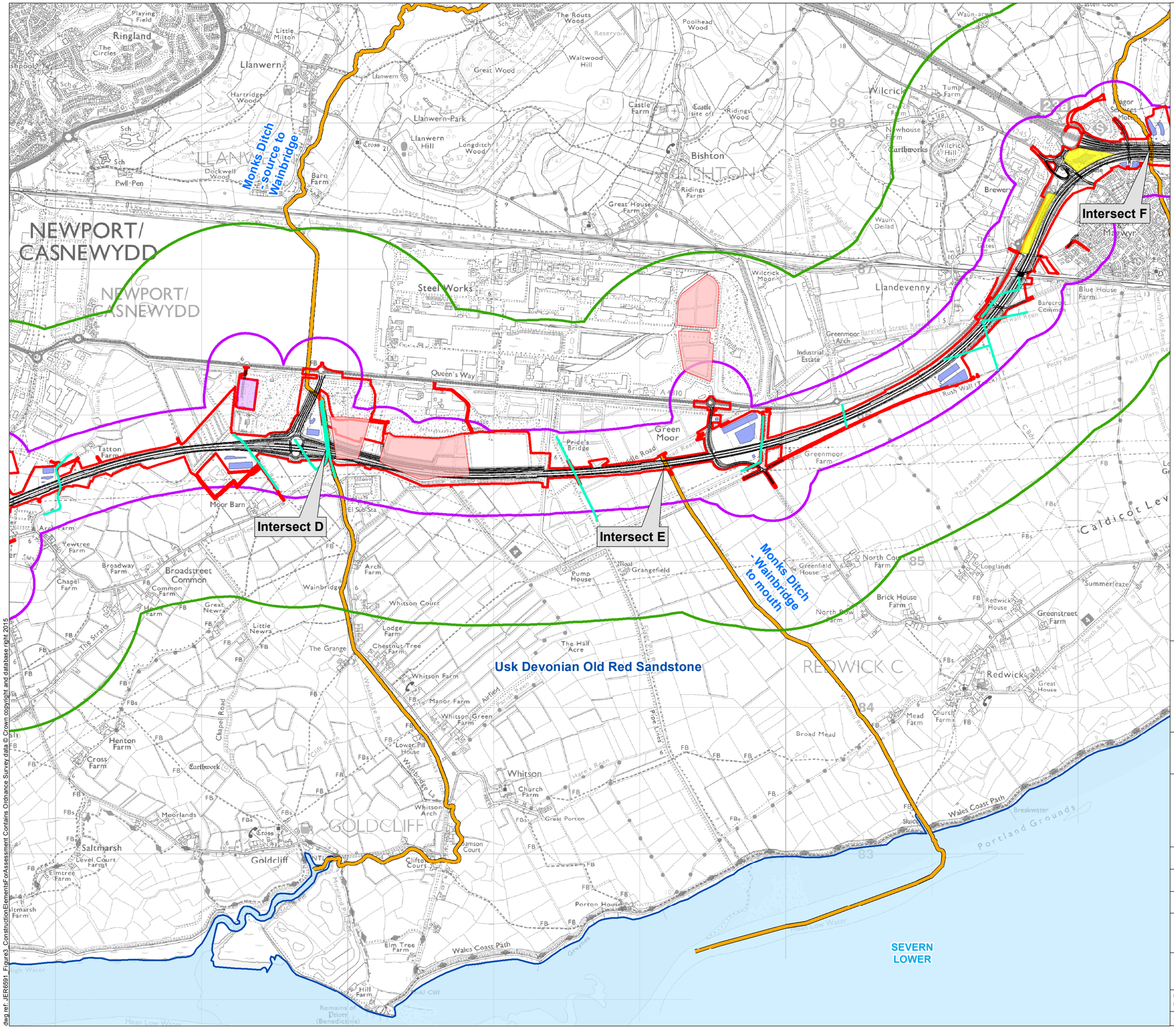


Legend

- Limit of Permanent and Temporary Works for New Section of Motorway
- Proposed New Section of Motorway
- Proposed Water Treatment Area
- Proposed Depot / Laydown Area
- Proposed Borrow Pit Area
- Proposed Lagoon Excavation & Remediation
- Stage 1 Study Area
- Stage 2 Study Area
- Mitigation Reen
- Groundwater Waterbody - Good Potential
- River Waterbody - Moderate Potential
- Transitional Waterbody - Moderate Potential

NOTE
Study area based on the motorway alignment that was proposed at the time of assessment

Llywodraeth Cymru
Welsh Government

Appendix 16.4

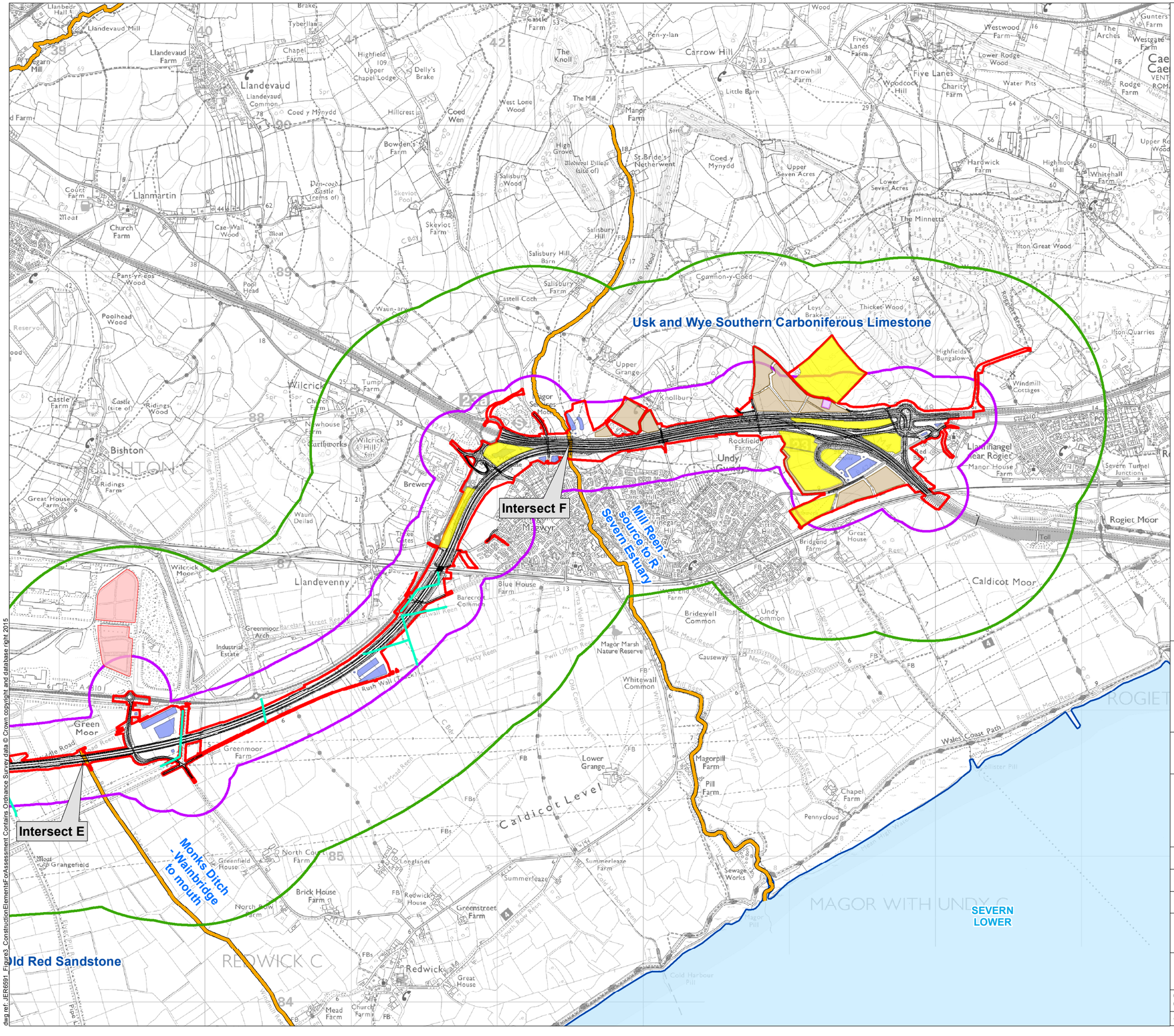
Construction Elements for Assessment

Figure: 3c	Revision: -
Date: March 2016	Status: At Issue
Drawn: RJJ	Checked: AH

Scale: A3 @ 1:25,000
0 500 1,000 m

N

dwg ref: JER6591_Figure3_ConstructionElementsForAssessment



Legend

- Limit of Permanent and Temporary Works for New Section of Motorway
- Proposed New Section of Motorway
- Proposed Water Treatment Area
- Proposed Depot / Laydown Area
- Proposed Borrow Pit Area
- Proposed Lagoon Excavation & Remediation
- Proposed Stockpiled Material Storage
- Stage 1 Study Area
- Stage 2 Study Area
- Mitigation Reen
- Groundwater Waterbody - Good Potential
- River Waterbody - Moderate Potential
- Transitional Waterbody - Moderate Potential

NOTE
Study area based on the motorway alignment that was proposed at the time of assessment

Llywodraeth Cymru
Welsh Government

Appendix 16.4

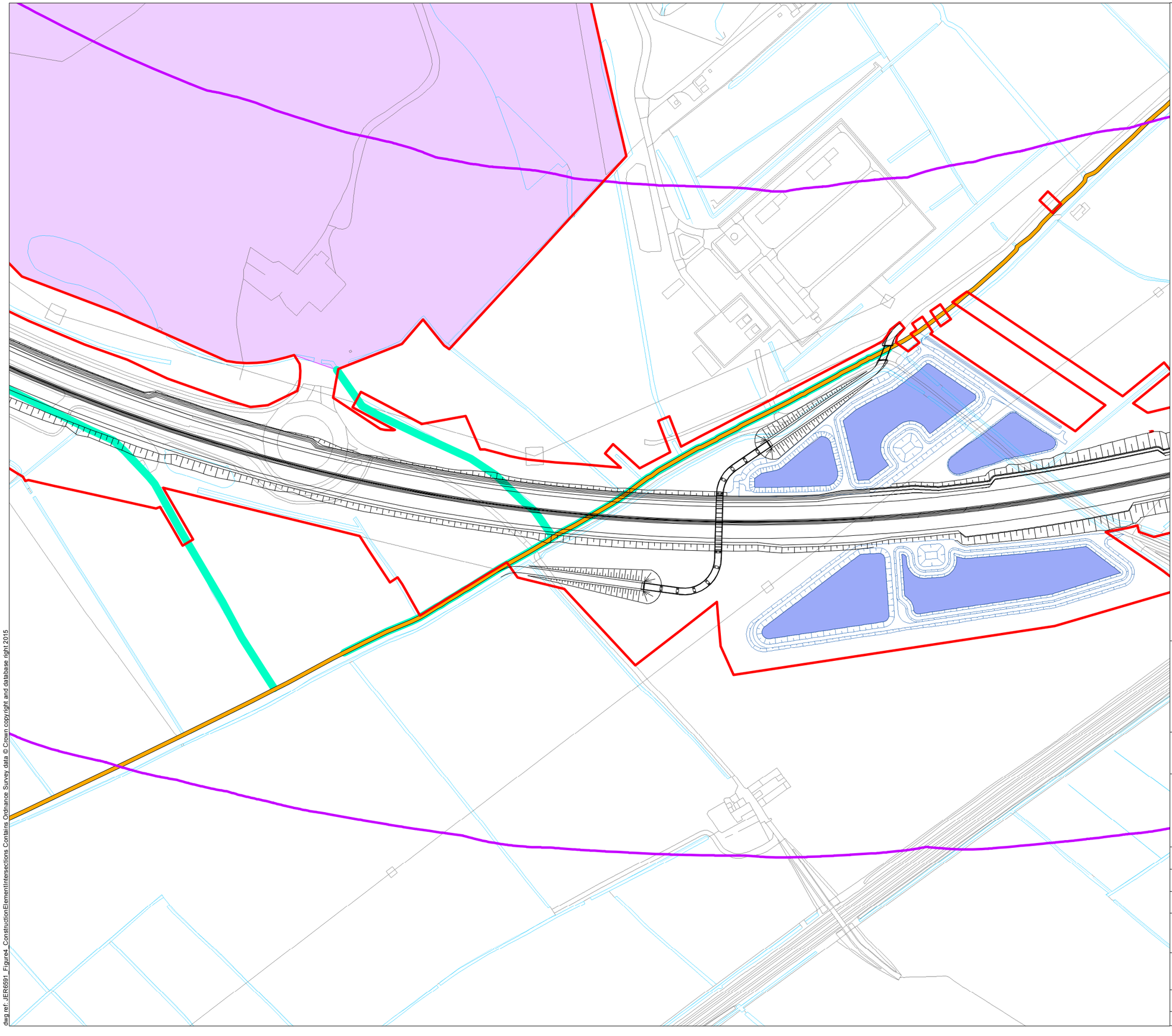
Construction Elements for Assessment

Figure: 3d	Revision: -
Date: March 2016	Status: At Issue
Drawn: RJJ	Checked: AH

Scale: A3 @ 1:25,000
0 500 1,000 m

N

dwg ref: JER6591_Figure3_ConstructionElementsForAssessment



Legend

- Limit of Permanent and Temporary Works for New Section of Motorway
- Proposed New Section of Motorway
- Proposed Water Treatment Area
- Proposed Depot / Laydown Area
- Stage 2 Study Area
- Mitigation Reen
- Groundwater Waterbody - Good Potential
- River Waterbody - Moderate Potential

NOTE
Study area based on the motorway alignment that was proposed at the time of assessment

Llywodraeth Cymru
Welsh Government

Appendix 16.4

Construction Element Intersections

Figure: 4a	Revision: -
Date: March 2016	Status: At Issue
Drawn: RJJ	Checked: AH

Scale: A3 @ 1:3,000
0 60 120 m

N

dwg ref: JER6591_Figure4_ConstructionElementIntersections

Legend

- Limit of Permanent and Temporary Works for New Section of Motorway
- Proposed New Section of Motorway
- Stage 2 Study Area
- Mitigation Reen
- Groundwater Waterbody - Good Potential
- Transitional Waterbody - Moderate Potential

NOTE
Study area based on the motorway alignment that was proposed at the time of assessment

Llywodraeth Cymru
Welsh Government

Appendix 16.4

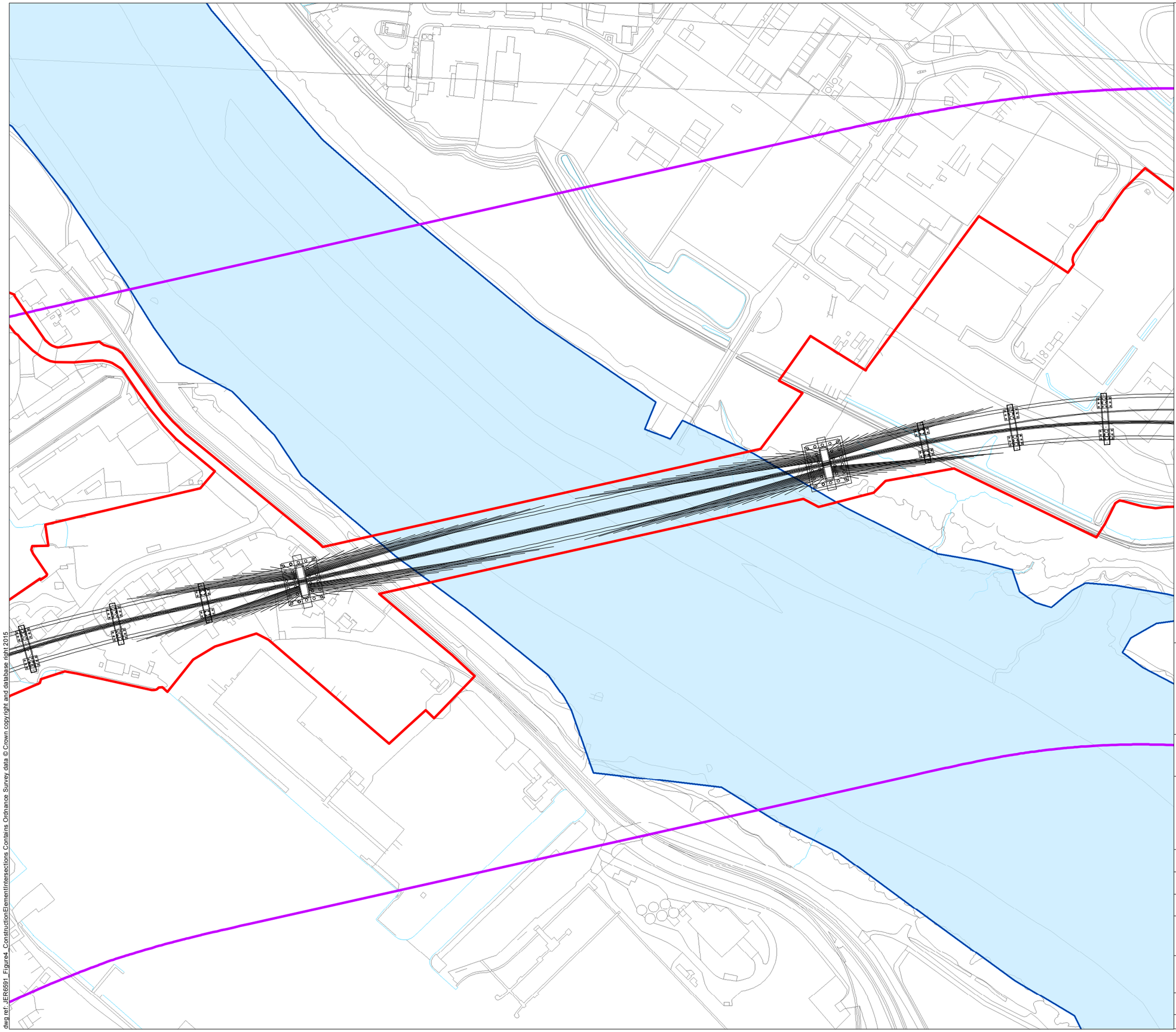
Construction Element Intersections

Figure: 4b	Revision: -
Date: March 2016	Status: At Issue
Drawn: RJJ	Checked: AH

Scale: A3 @ 1:3,000
0 60 120 m

N

dwg ref: JER6591_Figure4_ConstructionElementIntersections



Legend

- Limit of Permanent and Temporary Works for New Section of Motorway
- Proposed New Section of Motorway
- Stage 2 Study Area
- Groundwater Waterbody - Good Potential
- Transitional Waterbody - Moderate Potential

NOTE
Study area based on the motorway alignment that was proposed at the time of assessment

Llywodraeth Cymru
Welsh Government

Appendix 16.4

Construction Element Intersections

Figure: 4c	Revision: -
Date: March 2016	Status: At Issue
Drawn: RJJ	Checked: AH

Scale: A3 @ 1:3,000
0 60 120 m

N

dwg ref: JER6591_Figure4_ConstructionElementIntersections

Legend

- Limit of Permanent and Temporary Works for New Section of Motorway
- Proposed New Section of Motorway
- Proposed Water Treatment Area
- Proposed Depot / Laydown Area
- Proposed Lagoon Excavation & Remediation
- Stage 2 Study Area
- Mitigation Reen
- Groundwater Waterbody - Good Potential
- River Waterbody - Moderate Potential

NOTE
Study area based on the motorway alignment that was proposed at the time of assessment

Llywodraeth Cymru
Welsh Government

Appendix 16.4

Construction Element Intersections

Figure: 4d	Revision: -
Date: March 2016	Status: At Issue
Drawn: RJJ	Checked: AH

Scale: A3 @ 1:3,000
0 60 120 m

N

dwg ref: JER6591_Figure4_ConstructionElementIntersections

Legend

- Limit of Permanent and Temporary Works for New Section of Motorway
- Proposed New Section of Motorway
- Proposed Water Treatment Area
- Stage 2 Study Area
- Mitigation Reen
- Groundwater Waterbody - Good Potential
- River Waterbody - Moderate Potential

NOTE
Study area based on the motorway alignment that was proposed at the time of assessment

Llywodraeth Cymru
Welsh Government

Appendix 16.4

Construction Element Intersections

Figure: 4e	Revision: -
Date: March 2016	Status: At Issue
Drawn: RJJ	Checked: AH

Scale: A3 @ 1:3,000
0 60 120 m

N

dwg ref: JER6591_Figure4_ConstructionElementIntersections

Legend

- Limit of Permanent and Temporary Works for New Section of Motorway
- Proposed New Section of Motorway
- Proposed Water Treatment Area
- Proposed Stockpiled Material Storage
- Stage 2 Study Area
- Groundwater Waterbody - Good Potential
- River Waterbody - Moderate Potential

NOTE
Study area based on the motorway alignment that was proposed at the time of assessment

Llywodraeth Cymru
Welsh Government

Appendix 16.4

Construction Element Intersections

Figure: 4f	Revision: -
Date: March 2016	Status: At Issue
Drawn: RJJ	Checked: AH

Scale: A3 @ 1:3,000
0 60 120 m

N

dwg ref: JER6591_Figure4_ConstructionElementIntersections

Annexes

Annex A – Full Screening Table

WFD Quality Element	Broadway Reen - source to R Severn Estuary	Ebbw R – conf Ebbw Fach R to Maes-glas	Usk	Monks Ditch – source to Wainbridge	Monks Ditch - Wainbridge to mouth	Mill Reen - source to R Severn Estuary
	• Installation of highway embankment spanning the width of the water body. • Culverting of existing reen and installation of mitigation reen. • Construction of footbridge spanning from west to east side of the water body. • Creation of depot and laydown area north west of the water body.	Based on the current understanding of the construction activities, no physical works are envisioned to impact this water body.	• Construction of the River Ebbw and River Usk Cossings, both spanning the water body from west to east. • Installation of the associated support and viaduct structures for the River Ebbw and River Usk Crossings. • Construction of highway embankments adjacent to the water body at a number of locations to support bridge structures.	• Installation of highway embankment spanning the width of the water body at two locations. • Road cutting activity surrounding the water body. • Culverting of existing reen and installation of adjacent mitigation reen. • Creation of remediation lagoon via excavation adjacent to the water body.	• Installation of highway embankment spanning the width of the water body.	• Installation of highway embankment spanning the width of the water body. • Road cutting activity surrounding the water body. • Creation of materials storage area close to the water body.
Biological Quality Elements						
• Angiosperms • Chironomids • Fish • Invertebrates • Littoral Invertebrates • Macroalgae • Phytoplankton Blooms • Macrophytes and Phytobenthos Combined	✓ **Highway Embankments** The installation of a length of the highway spanning from west to east directly over water body and the construction of the required embankments has the potential to negatively impact biological water quality and has therefore been scoped in for further assessment. ✓ **Culverts and Mitigation Reens** The culverting of the existing reen underneath the proposed highway embankment and creation of two mitigation reens upstream of the water body has the potential to negatively impact biological water quality and has therefore been scoped in for further assessment. ✓ **Bridge and Viaduct Structures** The installation of a footbridge crossing the water body and the associated embankments required has the potential to negatively impact biological water quality and has	✗ No adverse impacts to this water body have been identified. No further assessment is required.	✓ **Highway Embankments** The installation of a length of the highway spanning from west to east directly over water body and the construction of the required embankments has the potential to negatively impact biological water quality and has therefore been scoped in for further assessment. ✓ **Bridge and Viaduct Structures** The installation of the River Usk Crossing within the boundary of the Usk water body has the potential to negatively impact biological water quality and has therefore been scoped in for further assessment.	✓ **Highway Embankments** The installation of a length of the highway spanning from west to east directly over a portion of the water body at two locations along the length of the water body has the potential to negatively impact biological water quality and has therefore been scoped in for further assessment. ✓ **Culverts and Mitigation Reens** The culverting of the existing reen underneath the proposed highway embankment and the creation of a mitigation reen adjacent to the water body has the potential to negatively impact biological water quality and has therefore been scoped in for further assessment. ✓ **Materials Use and Storage** The excavation of a lagoon remediation area and creation of WTAs adjacent to the water body has the potential to negatively impact biological water quality and has therefore been scoped in for further	✓ **Highway Embankments** The installation of a length of the highway spanning from west to east directly over the head of the water body boundary has the potential to negatively impact biological water quality and has therefore been scoped in for further assessment.	✓ **Highway Embankments** The installation of a length of the highway spanning from west to east directly over a portion of the water body has the potential to negatively impact biological water quality and has therefore been scoped in for further assessment. ✓ **Road Cuttings** Road cutting activities in close proximity to the water body have the potential to negatively impact biological water quality and have been scoped in for further assessment. ✓ **Materials Use and Storage** The creation of a materials storage area in relatively close proximity to the water body has the potential to negatively impact biological water quality and has been scoped in for further assessment.

WFD Quality Element	Broadway Reen - source to R Severn Estuary	Ebbw R – conf Ebbw Fach R to Maes-glas	Usk	Monks Ditch – source to Wainbridge	Monks Ditch - Wainbridge to mouth	Mill Reen - source to R Severn Estuary
	therefore been scoped in for further assessment. ✓ **Materials Use and Storage** The creation of a depot and laydown area in relatively close proximity to the water body has the potential to negatively impact biological water quality and has been scoped in for further assessment.			assessment.		
Hydromorphological Supporting Elements						
• Hydrological Regime • Morphology • Tidal Regime	✓ **Highway Embankments** The installation of a length of the highway spanning from west to east directly over water body and the construction of the required embankments could impact the hydrological regime and continuity and has therefore been scoped in for further assessment. ✓ **Culverts and Mitigation Reens** The culverting of the existing reen underneath the proposed highway embankment and creation of two mitigation reens upstream of the water body could impact the hydrological regime and continuity and has therefore been scoped in for further assessment. ✓ **Bridge and Viaduct Structures** The installation of a footbridge crossing the water body and the associated embankments required could impact the hydrological regime and continuity and has therefore been scoped in for further assessment. ✕ **Materials Use and Storage** The creation of a depot and laydown area in relatively	✕ No adverse impacts to this water body have been identified. No further assessment is required.	✕ **Highway Embankments** Due to the proposed free-spanning design of the bridge structures across the Usk water body, highway embankments will not be required and therefore this element has been scoped out of further assessment. ✓ **Bridge and Viaduct Structures** The installation of the River Ebbw and River Usk Crossings over the Usk water body are unlikely to present any impacts to the hydromorphology of the water body, however due to the possibility of construction occurring within the wetted channel, this has been scoped in for further assessment.	✓ **Highway Embankments** The installation of a length of the highway spanning from west to east directly over a portion of the water body at two locations along the length of the water body could impact the hydrological regime and continuity and has therefore been scoped in for further assessment. ✓ **Culverts and Mitigation Reens** The culverting of the existing reen underneath the proposed highway embankment and the creation of a mitigation reen adjacent to the water body could impact the hydrological regime and continuity and has therefore been scoped in for further assessment. ✕ **Materials Use and Storage** The excavation of a lagoon remediation area and creation of WTAs adjacent to the water body is unlikely to impact the hydrological regime or morphology of the water body and therefore this element has been scoped out of further assessment.	✓ **Highway Embankments** The installation of a length of the highway spanning from west to east directly over the head of the water body boundary could impact the hydrological regime and continuity and has therefore been scoped in for further assessment.	✓ **Highway Embankments** The installation of a length of the highway spanning from west to east directly over a portion of the water body could impact the hydrological regime and continuity and has therefore been scoped in for further assessment. ✕ **Road Cuttings** Road cutting activities in close proximity to the water body are unlikely to impact the hydrological regime or morphology of the water body at this location and therefore this element has been scoped out of further assessment. ✕ **Materials Use and Storage** The creation of a materials storage area in relatively close proximity to the water body is unlikely to impact the hydrological regime or morphology of the water body and therefore this element has been scoped out of further assessment.

WFD Quality Element	Broadway Reen - source to R Severn Estuary	Ebbw R – conf Ebbw Fach R to Maes-glas	Usk	Monks Ditch – source to Wainbridge	Monks Ditch - Wainbridge to mouth	Mill Reen - source to R Severn Estuary
	close proximity to the water body is unlikely to impact the hydrological regime or morphology of the water body and therefore this element has been scoped out of further assessment.					
Protected Areas Designations						
• Habitats Directive • Birds Directive	✗ There are no designated sites associated with this water body. No assessment is required.	✗ There are no designated sites associated with this water body. No assessment is required.	✓ **Bridge and Viaduct Structures** The installation of the River Usk Crossing within the boundary of the Usk water body has the potential to negatively impact water quality which could be detrimental to the interest features of the Severn Estuary and River Usk/Afon Wysg SACs and the Severn Estuary SPA and has therefore been scoped in for further assessment. ✗ **Highway Embankments** Due to the proposed free-spanning design of the bridge structures across the Usk water body, highway embankments will not be required and therefore this element has been scoped out of further assessment.	✗ There are no designated sites associated with this water body. No assessment is required.	✗ There are no designated sites associated with this water body. No assessment is required.	✗ There are no designated sites associated with this water body. No assessment is required.
Physico-Chemical Quality Elements						
• Physical Characteristics • Priority Hazardous Substances • Priority Substances • Other Pollutants	✓ **Highway Embankments** The installation of a length of the highway spanning from west to east directly over the water body and the construction of the required embankments could impact the physical characteristics of the water body and release contaminants to the water environment and has therefore been scoped in for further assessment. ✓ **Culverts and Mitigation Reens** The culverting of the existing reen underneath the	✗ No adverse impacts to this water body have been identified. No further assessment is required.	✓ **Highway Embankments** The installation of a length of the highway spanning from west to east directly over water body and the construction of the required embankments could impact the physical characteristics of the water body and release contaminants to the water environment and has therefore been scoped in for further assessment. ✓ **Bridge and Viaduct Structures** The installation of the River Usk Crossing within the	✓ **Highway Embankments** The installation of a length of the highway spanning from west to east directly over a portion of the water body at two locations along the length of the water body could impact the physical characteristics of the water body and release contaminants to the water environment and has therefore been scoped in for further assessment. ✓ **Culverts and Mitigation Reens** The culverting of the existing	✓ **Highway Embankments** The installation of a length of the highway spanning from west to east directly over the head of the water body boundary could impact the physical characteristics of the water body and release contaminants to the water environment and has therefore been scoped in for further assessment.	✓ **Highway Embankments** The installation of a length of the highway spanning from west to east directly over a portion of the water body could impact the physical characteristics of the water body and release contaminants to the water environment and has therefore been scoped in for further assessment. ✓ **Road Cuttings** Road cutting activities in close proximity to the water body have the potential to impact the physical

WFD Quality Element	Broadway Reen - source to R Severn Estuary	Ebbw R – conf Ebbw Fach R to Maes-glas	Usk	Monks Ditch – source to Wainbridge	Monks Ditch - Wainbridge to mouth	Mill Reen - source to R Severn Estuary
	proposed highway embankment and creation of two mitigation reens upstream of the water body could impact the physical characteristics of the water body and release contaminants to the water environment and has therefore been scoped in for further assessment. ✕ **Bridge and Viaduct Structures** The installation of a small footbridge crossing the water body is unlikely to impact the physical characteristics and contaminants within the water body and this element has therefore been scoped out of further assessment. ✓ **Materials Use and Storage** The creation of a depot and laydown area to use as materials storage in relatively close proximity to the water body could impact the physical characteristics and contamination of the water body through leaching. This element has therefore been scoped in for further assessment.		boundary of the Usk water body could impact the physical characteristics of the water body and release contaminants to the water environment and has therefore been scoped in for further assessment.	reen underneath the proposed highway embankment and the creation of a mitigation reen adjacent to the water body could impact the physical characteristics of the water body and release contaminants to the water environment and has therefore been scoped in for further assessment. ✓ **Materials Use and Storage** The excavation of a lagoon remediation area and creation of WTAs adjacent to the water body could impact the physical characteristics and contamination of the water body through leaching. This element has therefore been scoped in for further assessment.		characteristics of the water body and release contaminants to the water environment and have therefore been scoped in for further assessment. ✓ **Materials Use and Storage** The creation of a materials storage area in relatively close proximity to the water body has the potential to release contaminants to the water environment and has therefore been scoped in for further assessment.