

PORTISHEAD BRANCH LINE PRELIMINARY
ENVIRONMENTAL INFORMATION REPORT
VOLUME 2

CHAPTER 17

Water Resources, Drainage and Flood Risk



Table of Contents

Section	Page
17	Water Resources, Drainage and Flood Risk 17-1
17.1	Introduction 17-1
17.2	Legislation and Policy Framework 17-2
17.3	Methodology..... 17-7
17.4	Baseline, Future Conditions, and Value of Resource 17-21
17.5	Measures Adopted as Part of the DCO Scheme 17-33
17.6	Assessment of Effects 17-34
17.7	Mitigation and Residual Effects 17-39
17.8	Cumulative Effects 17-40
17.9	Limitations Encountered in Compiling the PEI Report..... 17-41
17.10	Summary 17-41
17.11	References 17-47
17.12	Abbreviations..... 17-47

Tables

Table 17-1: Summary of relevant NPSNN advice regarding flood risk and water resources
Table 17-2: Summary of local policy relevant to the water environment
Table 17-3: Summary of water environment related consultation responses provided in the Secretary of State's Scoping Opinion and how/where these have been addressed within the PEI Report
Table 17-4: Estimating the importance of water environment attributes
Table 17.5: Estimating the magnitude of an impact on an attribute
Table 17-6: Significance of effects
Table 17-7: WFD classification data on Cycle 1 surface waterbodies within the study area
Table 17-8: Discharge consents within the study area between Portishead and Ashton Junction
Table 17-9: WFD classification data for groundwater bodies within the study area
Table 17-10: Potential impacts, mitigation and residual impacts of the DCO Scheme on the water environment

Figures

See Volume 3 Book of Figures

Figure 17-1: Water Features

Appendices

See Volume 4 Appendices

Appendix 17.1: Flood risk Assessment (N/A, under development)
Appendix 17.2: Water Framework Directive Assessment (N/A, under development)
Appendix 17.3: Water Receptors
Appendix 17.4: Discharge Consents

CHAPTER 17

Water Resources, Drainage and Flood Risk

17.1 Introduction

17.1.1 The Portishead Branch Line (MetroWest Phase 1) Development Consent Order Scheme ("the DCO Scheme") has the potential to give rise to significant effects on water resources, drainage and flood risk. This Chapter of the preliminary environmental information report ("PEI Report"):

- describes the relevant legal and policy framework which informs the undertaking of the assessment;
- describes the methodology used for the identification and assessment of likely significance effects on water resources, drainage and flood risk;
- describes the water resources, drainage and flood risk baseline having regard to existing information;
- describes the measures that have been adopted as part of the DCO Scheme;
- identifies and assesses the likely significant effects that could result from the DCO Scheme during the construction, operation and decommissioning phases;
- considers mitigation of likely significant effects and assesses those residual effects that will result;
- considers the cumulative effects of other developments in combination with the DCO Scheme on water;
- identifies the limitations encountered in compiling the PEI Report; and
- provides a summary of the residual effects for the mitigated DCO Scheme.

17.1.2 This topic covers water quality and water quantity relating to surface water features such as rivers, streams, ponds, lakes, estuaries and coastal waters, and to groundwater bodies. Groundwater is also considered with respect to its interaction with surface water resources, whilst impacts upon hydrogeology are considered in Chapter 10 Geology, Hydrogeology, Ground Conditions and Contaminated Land. Water quantity considers water as a resource (e.g. availability for consumption and dilution of discharges). The physical impacts upon surface water features (e.g. river morphology) have also been considered. All of these aspects are referred to in this assessment as the "water environment".

17.1.3 The assessment is supported by a Flood Risk Assessment ("FRA") which is being developed and will be presented in the Environmental Statement. The FRA will summarise the existing flood risk relevant to the DCO Scheme and constraints arising from flood risk considerations for the DCO Scheme. The FRA is being developed in consultation with the Environment Agency ("EA"), the North Somerset Levels Internal Drainage Board ("NSLIDB"), North Somerset District Council ("NSDC") and Bristol City Council ("BCC") and other stakeholders to establish design constraints relating to flood risk, appropriate risk assessment methods and assessment criteria, and information available to support the FRA (e.g. Environment Agency flood maps and hydraulic model results). The FRA will also draw from other readily available information such as the National Planning Policy

Framework (“NPPF”) (CLG, 2012) (section 17.2), Strategic Flood Risk Assessments (“SFRA”), and Shoreline Management Plans (“SMP”).

- 17.1.4 A Water Framework Directive (“WFD”) Assessment (WFD compliance screening assessment) (see paragraph 17.2.2) is being undertaken and will be presented in the Environmental Statement.
- 17.1.5 This assessment on the water environment focuses on the DCO Scheme comprising the nationally significant infrastructure project (“NSIP”) and associated development. This chapter should be read in conjunction with Chapter 4 Description of the Proposed Works.
- 17.1.6 The assessment of the DCO Scheme in combination with other developments within 0.5 km and the effects of the other works required for the MetroWest Phase 1 programme, namely the Parson Street Junction improvements (including Liberty Sidings) and Parson Street Station modifications, Bedminster Down Relief Line, Severn Beach / Avonmouth Signalling, and Bathampton Turnback, are considered as part of the cumulative effects assessment in Section 17.7 and in Chapter 18 In-combination and Cumulative Effects Assessment.

17.2 Legislation and Policy Framework

European Union and National Legislation

- 17.2.1 Water resources are managed and protected under UK legislation and regulations consistent with European Community Directives. Where relevant, the assessment takes into account the legislative protection afforded to water resources. The main legal and policy framework is set by the following legislation.

Water Framework Directive (2000/60/EC) and Water Environment (Water Framework Directive) (England and Wales) Regulations 2003

- 17.2.2 The Water Framework Directive has been transposed into English law by the Water Environment (Water Framework Directive) (England and Wales) Regulations 2003. The WFD introduced a new system for monitoring and classifying the quality of surface and groundwaters which involves establishing the existing ecological and chemical status of each water body, setting environmental objectives and devising programmes of measures to meet those objectives. The Directive requires that Environmental Objectives are set for all surface waters and groundwater so that management measures are put in place to achieve Good Ecological Potential (“GEP”) / Good Ecological Status (“GES”) by a defined date and also requires that ecological status or potential does not decline over time. The WFD sets out a number of key objectives which are detailed in River Basin Management Plans (“RBMP”) (Environment Agency, 2009). It will be necessary to ensure that the DCO Scheme does not lead to a deterioration in the current status of any waterbody or hinder achievement of target status of the waterbodies in the Severn RBMP by the required date. A separate WFD Assessment (WFD compliance screening assessment) has been requested by the Environment Agency (their letter reference WX/2014/125769/01-L01 of 28 July 2014) and is being undertaken.

The Floods Directive (2007/60/EC) and the Flood Risk Regulations 2009

- 17.2.3 The Floods Directive is implemented in England by the Flood Risk Regulations 2009, which aim to provide a consistent approach to managing flood risk across Europe. The approach

is based on a six year cycle of planning (to be consistent with the WFD). The Regulations outline the duties of the Environment Agency and Lead Local Flood Authorities (“LLFA”) in relation to flood risk management activities and planning.

Water Resources Act 1991

- 17.2.4 The Water Resources Act (as amended) governs the quality and quantity of water. It sets out the functions of the Environment Agency. Part II of the Act provides the general structure for the management of water resources. Part III then explains the standards expected for controlled waters and what is considered as water pollution. Part IV provides information on mitigation through flood defence. Controlled waters are defined in section 104 of the Act and Main Rivers in Section 113.

Land Drainage Act 1991

- 17.2.5 The Land Drainage Act 1991 (as amended 1994) requires that a watercourse be maintained by its owner in such a condition that the free flow of water is not impeded. The Act also sets out the restrictions and consents required for development, within, over, under or adjacent to watercourses.

Water Act 2003

- 17.2.6 The Water Act 2003 amends the Water Resources Act 1991 and the Water Industry Act 1991 to make provision in connection with land drainage and flood defence and amends the Reservoirs Act 1975 to make provision about contaminated land in so far as it relates to the pollution of controlled waters. The Water Act sets out the framework for abstraction licensing, regulates impoundments, increases competition in water supply and includes measures for drought management and flood defence works in England and Wales.

Flood and Water Management Act 2010

- 17.2.7 Part 1 of the Act gives the Environment Agency a strategic overview of the management of flood and coastal erosion risk in England. It also gives upper tier local authorities in England responsibility for preparing and putting in place strategies for managing flood risk from groundwater, surface water and ordinary watercourses in their areas. The Environment Agency, local authorities and other bodies are given duties and powers that relate to these responsibilities directly by this Act, and by way of amendments made by of this Act to the Water Resources Act 1991 and the Land Drainage Act 1991. Part 2 includes provisions on sustainable drainage, reservoirs, special administration, provision of infrastructure, temporary bans on non-essential uses of water, civil sanctions, and incidental flooding of land, flood resistant repairs to property, compulsory works orders and agreements on new drainage systems.

Environmental Permitting (England and Wales) Regulations 2016

- 17.2.8 The Environmental Permitting (England and Wales) Regulations 2016 (as amended) provide for the regulation of specified installations and controls over emissions to the environment. The Regulations replace those parts of the Water Resources Act 1991 that relate to the regulation of discharges to controlled waters (including groundwater). Under the Regulations, groundwater activities relate to inputs of pollutants to groundwater. The

Regulations also replace the Groundwater Regulations 2009 and provide for controls over flood risk activities (see 17.2.10 below).

Nitrates Directive (91/676/EEC)

- 17.2.9 The Nitrates Directive (91/676/EEC) requires areas of land that drain into water polluted by nitrates to be designated as a Nitrate Vulnerable Zone ("NVZ") in an attempt to reduce the level of nitrates in drinking water.

Consents For Works To Watercourses

- 17.2.10 The Environmental Permitting (England and Wales) (as amended) extend the requirement for an environmental permit to flood risk activities for works or activities in, on or within 8 m of a main river, within 16 m of a tidal river or on the floodplain. The Regulations identify exempt and excluded activities.
- 17.2.11 Since April 2012, the LLFA became the consenting authority for works within or near to an Ordinary Watercourse, in this case NSDC and BCC. The Environment Agency remains the Consenting Authority for Main Rivers.
- 17.2.12 The Portbury Ditch, Drove Rhyne, Markham Brook, Colliter's Brook and the River Avon are Main Rivers and therefore an environmental permit may be required from the Environment Agency for works affecting these watercourses.
- 17.2.13 The remaining watercourses are Ordinary Watercourses and works to these watercourses will require a Land Drainage consent from the relevant LFFAs. Within the area managed by the NSLIDB, Land Drainage Act Consents are required for works within 9 m of an Ordinary Watercourse.
- 17.2.14 Consent is required for both temporary crossings and works to watercourses during construction, as well as for the design of the permanent structures and works.

Environmental Permits and Licences

- 17.2.15 Discharges into surface waters and groundwater are controlled by the Environmental Permitting Regulations (England and Wales) 2016 and granted by the Environment Agency. Environmental permits can combine several activities into one permit. There are standard permits supported by 'rules' for straightforward situations and bespoke permits for complex situations.
- 17.2.16 Under the Water Resources Act 1991 (as amended), anyone who wishes to abstract more than 20 m³/day of water from a surface source such as a river or stream or an underground source, such as an aquifer, will normally require an abstraction licence from the Environment Agency. Some low risk abstractions are exempt from abstraction licensing requirements. DEFRA has proposed to bring abstraction licensing within the scope of the Environmental Permitting (England and Wales) Regulations 2016. However, these proposals are not expected to progress in the near future.

National Policy

National Policy Statement for National Networks

- 17.2.17 The National Policy Statement for National Networks (2014) ("NPSNN") advises on flood risk assessment and water resources in the context of NSIPs. Table 17-1 below identifies

those policies of direct relevance to this assessment and the location where they are considered in this PEI Report.

Table 17-1: Summary of relevant NPSNN advice regarding flood risk and water resources

Summary of NPSNN Provision	Consideration within the PEI Report
Paragraph 5.92. Applications for projects in flood zones should be accompanied by a FRA.	A FRA is being prepared and will be presented in the Environmental Statement.
Paragraph 5.93. The FRA should assess the risks from all forms of flooding, and demonstrate how these flood risks will be managed taking climate change into account.	The FRA considers flood risk from all sources. Modelling undertaken for the FRA includes climate change scenarios through the design life (for 120 years to 2135) of the DCO Scheme.
Paragraph 5.94. Advises on the approach to the FRA.	This is being taken into account in the FRA.
Paragraph 5.95. Further guidance in the Government's planning guidance supporting the NPPF.	This is being taken into account in the FRA.
Paragraph 5.96. Applicants are advised to liaise early pre-application discussions with relevant stakeholders.	Early discussions have been held with the EA, NSDC, BCC and the NSILDB as part of the FRA (see Table 17-2).
Paragraph 5.97. Local flood risk management strategies and surface water management plans provide useful sources of information for FRAs.	Information from these documents has been used to inform the FRA.
Paragraph 5.221. Applicants to liaise with the relevant regulators, including the Environment Agency and utility companies and to undertake an assessment of the impact of the project on water quality, water resources and physical characteristics.	Consultation is presented in Section 17.4. The assessment of the impact upon water quality, water resources and upon physical characteristics of watercourses is presented in Section 17.6.
Paragraph 5.222. For projects that are improvements to existing infrastructure, opportunities should be taken to improve the quality of existing discharges where these contribute towards Water Framework Directive commitments.	The WFD Assessment is being prepared and will be presented in the Environmental Statement.
Paragraph 5.223. Advises on the content of the Environmental Statement ("ES") in terms of the Water Environment chapter.	Section 17.4 describes the existing quality of waters, water resources and physical characteristics. Section 17.6 describes the impacts of the proposed DCO Scheme on water resources, physical modifications, upon water bodies or protected areas under the WFD and around potable groundwater abstractions. Cumulative effects are described in Section 17.7.

National Planning Policy Framework

- 17.2.18 Section 10 of the NPPF on *Meeting the challenge of climate change, flooding and coastal change* advises that new developments should be planned to avoid increased vulnerability to a range of impacts related to climate change.
- 17.2.19 In the context of the Portishead Branch Line, the main issue is vulnerability to flooding. Inappropriate development in flood risk areas should be avoided, and where it is

- necessary, measures should be taken to make the DCO Scheme safe without directing the flood risk elsewhere.
- 17.2.20 The NPPF is accompanied by planning practice guidance documents of which two are relevant to the water environment in relation to the DCO Scheme, the *Flood Risk and Coastal Change Planning Practice Guidance* (CLG, 2014a) and the *Water Supply, Wastewater and Water Quality Planning Practice Guidance* (CLG, 2014b).
- 17.2.21 *Flood Risk and Coastal Change Planning Practice Guidance* provides advice to planning authorities in relation to flood risk and development. The guidance outlines the considerations for developments in relation to flood risk by ensuring that inappropriate development in areas at risk of flooding is avoided. This is achieved by undertaking a sequential test which directs development away from areas at highest risk and aims to locate new development in Flood Zone 1 (low probability). A site specific flood risk assessment is carried out which documents the sequential test and demonstrates how flood risk from all sources of flooding to the development itself and flood risk to others will be managed now, and taking future climate change into account.
- 17.2.22 *Water Supply, Wastewater and Water Quality Guidance* recognises that adequate water and wastewater infrastructure is needed to support sustainable development. It also identifies that a healthy water environment has the capacity to deliver multiple benefits and encourages the wider adoption of an integrated catchment-based approach to improving the quality of the water environment. The guidance also acknowledges that local planning authorities must have regard to the river basin management plans that implement the WFD.
- 17.2.23 The planning policy guidance in relation to water supply identifies that this would normally be addressed through the Local Plan, except when large developments that are likely to require a large amount of water have not been identified in Local Plans, or where enhanced water efficiency is required as part of a strategy to manage water demand locally and help deliver new development.
- 17.2.24 Water quality is only likely to be a significant planning concern when a proposal would involve physical modifications to a water body and/or would indirectly affect water bodies. Where there is the potential for significant impacts a proposal needs to demonstrate how the development would affect a relevant water body and how it is proposed to mitigate the impacts. Sufficient information should be provided in an application for the local planning authority to identify the likely impacts on water quality, which should be proportionate to the nature and scale of development proposed. Where significant impacts may occur, a more detailed assessment is required which should form part of the ES.
- 17.2.25 In relation to wastewater the guidance identifies that development plans should align with the investment plans of water and sewerage companies and that applications will need to provide information to demonstrate how the proposed development will be drained and wastewater dealt with.
- 17.2.26 The Environment Agency is the statutory body responsible for the protection and management of groundwater resources in England. *Groundwater Protection: Principles and Practice* (commonly referred to as "GP3") (Environment Agency 2013) sets out the aims and objectives for groundwater, technical approaches to its management and protection, and outlines the approach to the application of relevant legislation.

Local Policy

- 17.2.27 A summary of relevant regional and local planning policies is presented in Chapter 6 Planning Framework. The policies in Table 17-2 are relevant to the water environment for NSDC and BCC.

Table 17-2: Summary of local policy relevant to the water environment

Policy No.	Title	Description
NSDC's Core Strategy, adopted, January 2017)		
CS3	Flood Risk	An overarching policy aimed at directing developments away from flood plains.
NSDC's Sites and Policies Plan Part 1: Development Management Policies, adopted July 2016		
DM1	Flood Risk and Drainage	This policy aims to discourage inappropriate development in flood risk areas and to ensure that the impact of new development on flooding is fully taken into account. SuDs are expected for all major developments; alternatives will only be permitted where SuDs are impractical or would compromise the scheme viability and the alternative does not conflict with national planning policy.
BCC's Core Strategy, adopted June 2011		
BCS16	Flood Risk and Water Management	This policy sets out the Council's approach to minimising the risk and impact of flooding in the context of new development. All development will be expected to incorporate measures to reduce surface water runoff, including the use of SuDs, to ensure flood risk is not increased elsewhere.

17.3 Methodology

Guidance and Best Practice

- 17.3.1 The assessment of impacts of the DCO Scheme on the water environment is based on the guidance provided in the Department of Transport's *Design Manual for Roads and Bridges* ("DMRB") Volume 11 Section 3 Part 10, *Road Drainage and the Water Environment* ("HD45/09") and web-based Transport Appraisal Guidance ("WebTAG").
- 17.3.2 The identification of the nature of the DCO Scheme, potential impacts and appropriate mitigation measures are based upon the following guidance and best practice:
- Environment Agency Pollution Prevention Guidance Notes¹ ("PPG");
 - CIRIA guidance (e.g. *The potential for water pollution from Railways C643*, *Control of Water Pollution from Construction Sites (C532)* and *Control of water pollution from linear construction projects - Technical guidance (C648)* and *Site Guide (C649)*);

¹ All pollution prevention guidances ("PPG") that were previously maintained by the Environment Agency were withdrawn from use on the 17th December 2015. The Environment Agency no longer provides 'good practice' guidance. Archived versions of the documents are available from the National Archives and have been referred to within this assessment as they are still considered to provide good guidance. (<http://webarchive.nationalarchives.gov.uk/20140328084622/http://www.environment-agency.gov.uk/business/topics/pollution/39083.aspx>)

- Network Rail's *Railway Drainage Systems Manual Part 1: Purpose, scope and general management requirements* (NR/L3/CIV/005/1) (Network Rail 2010).

Consultations

- 17.3.3 Consultation relating to the water environment was undertaken as part of the environmental scoping process. The environmental Scoping Report (CH2M, June 2015) and supporting Baseline Report (CH2M, June 2015) have been the subject of a Scoping Opinion provided by the Secretary of State, dated August 2015. The Scoping Report, Baseline Report and the Scoping Opinion are available on the Planning Inspectorate's website at the following address <https://infrastructure.planninginspectorate.gov.uk/projects/south-west/portishead-branch-line-metrowest-phase-1/>.
- 17.3.4 Subsequently, consultation has been undertaken with various parties, including the Environment Agency and NSLIDB.
- 17.3.5 A summary of consultations is presented in Table 17-3 below along with a description of where and how the comments have been considered within this PEI Report.
- 17.3.6 Further information on the consultation process is presented in Chapter 5 Approach to the Environmental Statement. The Consultation Report on the informal stakeholder consultations undertaken in 2015 is available at <http://travelwest.info/project/metrowest>.

Table 17-3: Summary of water environment related consultation responses provided in the Secretary of State's Scoping Opinion and how/where these have been addressed within the PEI Report

Organisation	Summary of Response	Consideration within the PEI Report
Scoping Opinion Responses (August 2015)		
Planning Inspectorate	Paragraph 3.29. The Secretary of State considers that insufficient information was provided in the Scoping Report to scope out impacts of the project on the water quality changes to the River Avon and the cumulative effects of other works for MetroWest Phase 1 on water resources.	Water quality changes to the River Avon are assessed in paragraph 17.6. Cumulative effects on water resources are assessed in section 17.7.
	Paragraph 3.101. Pathways for discharges to surface and coastal waters via groundwater should be assessed.	Assessed in Section 17.6.
	Paragraph 3.102. The assessment should address the potential mobilisation/runoff of contaminants during construction and operation on ecological sites or the public water supply.	Assessed in Section 17.6.
	Paragraph 3.103. A FRA should form an appendix to the ES and should address the comments from the Environment Agency.	The FRA is being prepared and will be presented in the Environmental Statement.
	Paragraph 3.104. The ES should describe the water-related infrastructure which could be affected by the Project. The Applicant should consult with the relevant statutory undertakers.	Information on water related infrastructure has been obtained from the relevant utilities and is discussed in Chapter 15 Soils, Agricultural, Land Use and Assets.
	Paragraph 3.105. The scope of the assessment should be agreed with the Environment Agency and North Somerset Levels Internal Drainage Board.	Pre-application consultation has been undertaken with the Environment Agency and North Somerset Inland Drainage Board ("IDB") to agree the scope of the FRA. See Table 17-3 below.
	Paragraph 3.106. The Scoping Report does not explain how the requirements of the Water Framework Directive will be assessed. The EA identified five waterbodies which could be affected by the proposed development.	The WFD assessment is being undertaken and will be presented in the Environmental Statement. It should be noted that of the five waterbodies identified by the EA at the scoping stage, only 2 have been taken forward to Cycle 2 of the RBMPs. These are the Severn estuary and Portbury Ditch. In addition, although not identified by the EA in their list of five waterbodies, the River (Bristol) Avon has been considered in the WFD assessment.

Table 17-3: Summary of water environment related consultation responses provided in the Secretary of State's Scoping Opinion and how/where these have been addressed within the PEI Report

Organisation	Summary of Response	Consideration within the PEI Report
	Paragraph 3.107. Provide a WFD assessment in the appendix to the ES, and summarise the results in the ES.	The WFD assessment is being prepared and will be provided in the Environmental Statement and the results of the assessment to date are summarised in Section 17.6.
	Paragraph 3.108. Review the relevant River Basin Management Plan to determine how the project can contribute to WFD objectives.	The WFD assessment is being prepared and will be provided in the Environmental Statement.
	Paragraph 3.109. The FRA should form an appendix to the ES and be cross-referenced in the relevant ES chapters.	The FRA is being prepared and will be provided in the Environmental Statement.
	Paragraph 3.110. Given the inter-relationship between some of the environmental impact assessment ("EIA") topics in respect of water resources (due to impacts on soils, ecology and hydrogeology), make appropriate cross-referencing in the Water Chapter.	Cross-referencing to other parts of the PEI Report is made where appropriate.
	Paragraph 3.111. Mitigation measures are being considered through the project design and will be reported on more fully in the ES. Those relevant to the PEI Report assessment are described in Section 17.5 and in Section 17.7.	Drainage design is described in Chapter 4 Description of the Proposed Works. No further mitigation has been confirmed at this stage.
	Paragraph 4.34. It is the applicants' responsibility to identify the requirements for any environmental permits and/or water resource licences.	The need for any consents and environmental permits will be identified by the applicant.

Table 17-3: Summary of water environment related consultation responses provided in the Secretary of State’s Scoping Opinion and how/where these have been addressed within the PEI Report

Organisation	Summary of Response	Consideration within the PEI Report
Environment Agency	<p>Flood Risk Management: The EA requires a robust FRA that quantifies the current and future flood risk, which incorporates appropriate allowance for the predicted impact of climate change, within the catchments over the lifetime of the development. Any part of the development in the functional floodplain Flood Zone 3b should be identified as “Essential infrastructure” in accordance with the NPPF, as only water compatible development and essential infrastructure are compatible with flood zone 3b, subject to the Exception Test being successfully applied. A key element of the FRA will be the status of the Portishead Tidal flood defences due to their current condition. Appropriate means to resolve the matters relevant to the coastal defences or additional mitigation measures to provide the necessary level of protection should be considered. The proposed development is seen as an opportunity to improve the condition of the existing culverts on the Drove Rhyne south of the M5.</p>	<p>The FRA assesses current and future (2135) flood risk including climate change. Between Portishead and Pill the future scenario with climate change would lead to coastal flooding events above rail level approximately once every 25 to 50 years. There is an expectation that there would be significant changes in strategic flood risk management interventions during this period. The FRA is being prepared and will be presented in the Environmental Statement.</p>
	<p>Groundwater/Contaminated Land: There is potential for contamination of controlled waters due to the mobilisation of historical contamination. Dealing with contamination on an ad hoc basis during construction may result in the unexpected disturbance of contaminants and the subsequent contamination of controlled waters. Prior site investigation and the preparation of an appropriate strategy for the management of contaminated land would reduce any potential impacts on controlled waters.</p>	<p>This topic is dealt with in Chapter 10 Geology, Hydrogeology, Ground Conditions and Contaminated Land.</p>
	<p>Water Quality/Pollution Prevention: new and altered track drainage from the railway may result in unacceptable levels of silt in receiving waters. For example, there is an ongoing problem of siltation in the Ham Green fishing lakes due to high levels of silt in drainage water from Pill Tunnel. Other locations such as Charlton Tunnel Drainage improvements are also causing pollution problems. The discharges are not a significant risk to all watercourses, but it is critical to consider the sensitivity of the receiving water.</p>	<p>The proposed drainage is described in Chapter 4 Description of the Proposed Works. Further details will be available once the GRIP 3 design for the DCO Scheme has been completed. Network Rail has improved silt removal for drainage from Pill Tunnel to Ham Green Lakes and no further mitigation is proposed for the DCO Scheme. Charlton Tunnel is not on the DCO Scheme. The sensitivity of receiving waters has been considered in Appendix 17.3 of the PEI Report Volume 4 Appendices.</p>

Table 17-3: Summary of water environment related consultation responses provided in the Secretary of State's Scoping Opinion and how/where these have been addressed within the PEI Report

Organisation	Summary of Response	Consideration within the PEI Report
Highways England	No new connections are permitted to the Highways England drainage network. The existing "permitted" connection can only be retained if there is no change in land use.	The proposed drainage is described in Chapter 4 Description of the Proposed Works.
	Development must not lead to any surface water flooding on the Strategic Road Network carriageway.	Surface water flooding will be discussed in the FRA which will be presented in the Environmental Statement.
North Somerset Levels Internal Drainage Board	<p>The principle interest of the IDB is to ensure that the watercourse network can be operated and maintained for appropriate drainage, water level management and environmental standards and that the proposed works will not adversely affect any Board activity. During previous consultation key principles have been established, including:</p> <ul style="list-style-type: none"> - Any new or modified infrastructure, compound areas or other construction is sited at least 9 m away from the banks of any watercourses. Land Drainage Byelaw Consent will be required for works within 9 m of the top of bank - Any works will not adversely impact on the ability of the watercourse to function properly, be maintained efficiently, or be improved in the future. Land Drainage Consent will be required from the Board for works in, under, or over any watercourse. - Any new construction will not increase surface water runoff rate or volume of water entering the drainage network or detrimentally affect surface water distribution in the catchment. Land Drainage Consent will be required for any new connections or modifications to existing watercourse connections. 	Noted.
Public Health England	Receptors: The ES should consider the impact of the scheme on environmental receptors, including watercourses, surface and groundwater, and drinking water supplies.	This chapter of the PEI Report considers the impact on surface waters, groundwaters, and drinking water supply in Section 7.6.

Table 17-3: Summary of water environment related consultation responses provided in the Secretary of State's Scoping Opinion and how/where these have been addressed within the PEI Report

Organisation	Summary of Response	Consideration within the PEI Report
	PHE sets out issues to be considered in developing the baseline, the assessment and future monitoring for emissions to water. Emissions to water should consider potential impacts on human health. The assessment should consider all routes by which emissions to water may lead to population exposure. The off-site effects of emissions to groundwater and surface waters should be considered in terms of potential for population exposure. Recreational users should be considered alongside assessment of exposure via drinking water.	Section 17.6 identifies the potential impacts upon humans through public water supplies. Chapter 10 Geology, Hydrogeology, Ground Conditions and Contaminated Land presents the risk to humans from Controlled Waters.
Stakeholder Consultation		
Environment Agency	Pre-application consultation has been undertaken with the Environment Agency. Meetings were held on 2 May 2014, 10 December 2014, 18 May 2016 and 19 October 2016. The meetings in 2014 were mostly focussed on the historic flood risk and agreeing the approach to the flood risk assessment. The EA also advised (response dated 28 July 2014) no issues regarding water resources availability and identified the requirement for a separate WFD compliance assessment. The meetings in 2016 were to discuss the findings of the FRA and agree on further work required to complete the FRA to the Environment Agency's satisfaction.	The meetings with the Environment Agency have informed the methodology and development of the FRA and WFD Assessment which will be presented in the Environmental Statement.
North Somerset Levels IDB	A meeting was held with NSLIDB on 8 May 2014. They advised land drainage consent would be required for works around NSLIDB managed watercourses and that enlargement of culverts beneath the railway would be considered an improvement.	The response from NSLIDB will be covered in the FRA.
Bristol Water	Various meetings and discussions have been held by NSDC and their consultants with Bristol Water regarding the location of their assets and potential issues associated with the DCO Scheme	A review of the potential effect of the DCO Scheme on utilities is discussed in Chapter 15 Soils, Agriculture, Land Use and Assets. Sources of water for construction need to be agreed with Bristol Water and the Environment Agency, refer to paragraph 17.6.12.

Table 17-3: Summary of water environment related consultation responses provided in the Secretary of State's Scoping Opinion and how/where these have been addressed within the PEI Report

Organisation	Summary of Response	Consideration within the PEI Report
Wessex Water	Discussions and exchange of correspondence (10 November 2015 - 14 December 2015) with reference to sewer diversions at (i) Parsons Street Junction (further investigations of surface water sewer proposed as manholes/ drainage unclear, will either be diverted or decommissioned), and (ii) Possible redundant sewer at Ashton Gate (further survey proposed to retrieve sufficient information). No formal consultations carried out to date with respect to discharges to Wessex Water sewer network.	Sewer diversions may no longer be relevant with revised options at both Parsons Street Junction and Ashton Gate. Paragraph 17.6.19 covers need for consents to discharge to Wessex Water surface water sewers.

Definition of the Study Area

- 17.3.7 For the purposes of the water environment assessment the study area for the DCO Scheme is considered to comprise any surface water features within 250 m of the centreline of the railway between Portishead and Ashton Junction. For groundwater the study area extends to 500 m either side of the centreline of the railway. The FRA considers a wider study area defined by the Environment Agency's flood zones to incorporate areas representative of flood risk potentially impacted by the DCO Scheme.

Key Receptors

- 17.3.8 The key receptors for the water assessment are:
- surface water, including ponds, ditches, streams and estuaries;
 - groundwater, comprising aquifers that provide regional and local drinking water supply, and base flow to rivers;
 - drainage, including surface and foul drainage; and
 - flood risk.

Defining the Baseline

- 17.3.9 The baseline information for the study area has been established primarily from a desk-based review of the following sources:
- Environment Agency, December 2009. River Basin Management Plan, Severn River Basin District.
 - Environment Agency, February 2016. Severn River Basin District Management Plan.
 - www.environment-agency.gov.uk "what's in your backyard"
<https://www.gov.uk/check-local-environmental-data> (accessed April 2014, checked February 2015, October 2015 and November 2015).
 - <http://environment.data.gov.uk/catchment-planning/> (accessed October and November 2015)
 - <http://www.magic.gov.uk/>
 - <https://maps.google.co.uk/maps?hl=en&tab=wl>
 - <http://gridreferencefinder.com/#>
 - Ordnance Survey mapping.
 - Landmark Envirocheck report (for the Portishead area).
 - British Geological Survey online mapping tool.
 - Data provided by NSDC
 - Site walkover of the disused railway between Portishead and Pill undertaken to identify the watercourses and to inform the FRA.
 - North Somerset Levels Internal Drainage Board: <http://www.nslidb.org.uk/>
 - Emerging/ developing track design.

- 17.3.10 Data collected for the purposes of the determining flood risk will be reported in the FRA which will be presented in the Environmental Statement.
- 17.3.11 A site walkover along the disused section of the railway line between Portishead and Pill was undertaken in March 2014.

Assessment of Construction Impacts

- 17.3.12 The assessment criteria adopted are largely derived from the environmental assessment approach presented in Highways England's DMRB. Although the guidance applies to appraisal of road transport schemes, the concepts adopted are applicable for other large linear transport developments. DMRB covers environmental assessment for *Road Drainage and the Water Environment* in Volume 11 Section 3, Part 10: HD45/09 (referred to herein as HD45/09).

Assessment of Operational Impacts

- 17.3.13 The assessment of operational impacts will also be undertaken adopting the criteria derived from HD45/09 and WebTAG which specifically covers water environment appraisal under Unit A3.10. The criteria provided in the guidance to undertake a qualitative assessment will be applied to the DCO Scheme, as the quantitative assessment criteria provided in this guidance is only relevant to road schemes.
- 17.3.14 The assessment takes into account the nature and management of the railway operations and Network Rail's best practice and requirements.

Assessment of Decommissioning Impacts

- 17.3.15 No specific plans have been formulated for the decommissioning phase of the Portishead Branch Line. It is expected that the services will continue for as long as there is a business case for doing so. Closure of railways is a regulated process, overseen by the Office of Rail and Road. Disposal of railway assets is also regulated by the Office of Rail and Road under the terms of Network Rail's licence.
- 17.3.16 Railways are not designed to be decommissioned, although in accordance with paragraph 5.85 of the NPSNN, development plan policies [and Network Rail's Sustainable Development Strategy], consideration will be given to the sustainability of materials used in construction, including their embodied carbon content, where choice is available and some information on this is provided in Chapter 12 Materials and Waste. For the NSIP, in the event that the train operating company decides to cease services on the Portishead Branch Line, it is likely that the railway assets will remain in place, as occurred after traffic ceased in the 1980s. Previous practice following railway closures suggests that the railway formation will remain available either for re-development over time or finding an alternative transport use such as a guided busway or a cycle path. Such proposals would be subject to their own assessment including consideration of environmental effects. As such proposals are not reasonably foreseeable, the likely impacts cannot be assessed.
- 17.3.17 For any abandoned part of the railway track bed, vegetation would gradually encroach upon the railway line, with herbaceous plants, shrubs and trees gradually recolonising the railway corridor. The assets comprising the trackbed would gradually fall into disrepair due to the action of erosion and corrosion from rain, plants and animals. As the railway to be authorised by the DCO is largely laid at surface level between Portishead and Pill it is not

anticipated that there would be significant need for ongoing maintenance work for embankments or cuttings. Ongoing maintenance of the cuttings and embankments would still be required along the operational railway from the Port to the main line. Network Rail would probably recover (and ideally re-use) items of values such as wiring, signalling equipment and principal supply points ("PSP").

- 17.3.18 Remaining assets such as fencing would continue to be maintained. The bridges carrying highways over the DCO Scheme and public rights of way would continue to be maintained to standards appropriate for the public use, as a result of the obligations of North Somerset District Council as local highway authority.
- 17.3.19 It is anticipated the line between Royal Portbury Dock and Parson Street would remain open for services to the Port. The currently operational railway would remain open for freight traffic even if passenger services ceased and any decision regarding the cessation of freight services would be one for the Freight Operating Companies and Bristol Port Company, so decommissioning the operational railway is not considered relevant or foreseeable for assessing the DCO Scheme. Were any decommissioning of all or part of the operational railway to be proposed in the future, a separate project would be developed, which would be accompanied by a specific assessment of the implications for the SAC.
- 17.3.20 It is not anticipated that the associated development comprising highway works or car parks at Portishead would be altered as a result of the cessation of rail passenger services between Portishead and Bristol. Similarly it is anticipated the car parks at Pill would remain as car parks albeit for all of the car parks development proposals might come forward over time and would be assessed for their planning impacts and any environmental effects at such time as such schemes came forward for the local planning authority to consider. Changes to the UK's use of fuel for transport mean that the nature of emissions from vehicles undertaking any removal of items could only be a matter of speculation.

Assessment of Cumulative Effects

- 17.3.21 The potential impacts related to the construction and operation of the DCO Scheme may have a cumulative effect when considered in combination with other developments in the vicinity of the DCO Scheme and the other works associated with the MetroWest Phase 1 programme. The cumulative assessment, presented in Section 17.7 assesses the scale and significance of these impacts.

Water Framework Directive Assessment

- 17.3.22 It is a legal requirement to ensure that the DCO Scheme complies with the WFD. At present there is no prescribed methodology for demonstrating this.
- 17.3.23 Based on the *Water Supply, Wastewater and Water Quality Planning Practice Guidance* (CLG, 2014b), water quality is only likely to be a significant planning concern where a development involves physical modifications to a water body and, or would indirectly affect water bodies.
- 17.3.24 The WFD Assessment Report is being prepared and will be included in the Environmental Statement. WFD data from Cycle 1 of the *River Basin Management Plans* (Environment Agency, 2009) have also been presented in Section 17.4 where it assists in determining the value of receptors for assessment purposes.

Use of Significance Criteria

- 17.3.25 The determination of significance follows the approach presented in HD45/09. This is a three step process which involves identifying the value or sensitivity (to change) of the receptor, evaluating the magnitude of the impact of the DCO Scheme on the receptor, and combining these to determine the significance of the effect of the DCO Scheme on the receptor.

Value of the Receptor

- 17.3.26 The water environment receptors are identified through the baseline study and are assigned a value based on the criteria in Table A4.3 in HD45/09 which is reproduced below in Table 17-4.

Table 17-4: Estimating the importance of water environment attributes

Importance	Criteria	Typical Examples
Very High	Attribute has a high quality and rarity on regional or national scale	<p>Surface Water:</p> <ul style="list-style-type: none"> European Council ("EC") Designated Salmonid/Cyprinid fishery* WFD Class 'High' Site protected/designated under EC or UK habitat legislation (Special Area of Conservation ("SAC"), Special Protection Area ("SPA"), Site of Special Scientific Interest ("SSSI"), Water Protection Zone ("WPZ"), Ramsar site, or salmonid water) Species protected by EC legislation <p>Groundwater:</p> <ul style="list-style-type: none"> Principal aquifer providing a regionally important resource or supporting site protected under EC and UK habitat legislation Source Protection Zone ("SPZ") 1 <p>Flood Risk+:</p> <ul style="list-style-type: none"> Floodplain or defence protecting more than 100 residential properties from flooding
High	Amenity has a high quality and rarity on a local scale	<p>Surface Water:</p> <ul style="list-style-type: none"> WFD Class 'Good' Major Cyprinid Fishery* Species protected under EC or UK habitat legislation <p>Groundwater:</p> <ul style="list-style-type: none"> Principal aquifer providing locally important resource or supporting river ecosystem SP22 <p>Flood Risk+:</p> <ul style="list-style-type: none"> Floodplain or defence protecting between 1 and 100 residential properties or industrial premises from flooding

Table 17-4: Estimating the importance of water environment attributes

Importance	Criteria	Typical Examples
Medium	Attribute has a medium quality and rarity on local scale	<p>Surface Water:</p> <ul style="list-style-type: none"> WFD Class 'Moderate' <p>Groundwater:</p> <ul style="list-style-type: none"> Aquifer providing water for agricultural or industrial use with limited connection to surface water SPZ3 <p>Flood Risk+:</p> <ul style="list-style-type: none"> Floodplain or defence protecting 10 or fewer industrial properties from flooding
Low	Attribute has a low quality and rarity on local scale	<p>Surface Water:</p> <ul style="list-style-type: none"> WFD Class 'Poor' <p>Groundwater:</p> <ul style="list-style-type: none"> Unproductive strata <p>Flood Risk+:</p> <ul style="list-style-type: none"> Floodplain with limited constraints and a low probability of flooding of residential and industrial properties

* Fishery designated under the Surface Waters (Fishlife) (Classification) Regulations 1997 (amended 2003), which transposes the EC Freshwater Fish Directive 78/659/EEC. This has now been superseded by the WFD.

+ As noted above flood risk is covered by a separate FRA, but is retained herein as a reflection of the importance criteria highlighted in HD45/09.

Source: Department for Transport's Design Manual for Roads and Bridges, HD45/09 Road Drainage and the Water Environment, reproduced from Table A4.3.

- 17.3.27 The key water environment receptors within the study area, which could potentially be affected by the DCO Scheme either during construction or operation have been identified. The tables in Appendix 17.3 in the PEI Report Volume 4 Appendices provide a summary of the identified water receptors to be assessed and the value ascribed to them based on the criteria presented in Table 17-4. The table also identifies those receptors that can be scoped out at this stage and the justification for doing so. Impacts pertaining to flood risk (floodplain extent and flood conveyance) are dealt with separately in the FRA and are cross referenced herein as appropriate.

Magnitude of Impact

- 17.3.28 The magnitude of potential impacts (the degree of change) may be beneficial or adverse. The criteria for estimating the magnitude of impacts is presented in Table 17-5 below. This is taken from the criteria provided in DMRB HD45/09 Table A4.4.

Table 17.5: Estimating the magnitude of an impact on an attribute

Magnitude of effect	Criteria
Major Adverse	Results in loss of the attribute and/or quality and integrity of the attribute
Moderate Adverse	Results in an effect on the integrity of the attribute, or loss of part of the attribute
Minor Adverse	Results in some measurable changes in the quality or vulnerability of the attribute
Negligible	Results in an effect on the attribute, but of insufficient magnitude to affect the use or integrity of that attribute
Minor Beneficial	Results in some beneficial effect on the attribute or a reduced risk of a negative effect occurring
Moderate Beneficial	Results in a moderate improvement of attribute quality
Major Beneficial	Results in a major improvement of attribute quality

Source: Department for Transport's Design Manual for Roads and Bridges, HD45/09 Road Drainage and the Water Environment, adapted from Table A4.4.

- 17.3.29 The magnitude of flooding and runoff effects have been investigated and will be reported separately within the FRA to be presented in the Environmental Statement.

Significance of Effect

- 17.3.30 The significance of effects is based on the combination of the value (or importance) of the receptor (and its attributes) and the magnitude of impact using the matrix in Table 17-6 below reproduced from Table A4.5 in HD45/09. Potential effects can be either beneficial or adverse. The level of significance is assigned after consideration of any proposed mitigation.

Table 17-6: Significance of effects

Importance of attribute	Very High	Neutral	Moderate/Large	Large/Very Large	Very Large
	High	Neutral	Slight/Moderate	Moderate/Large	Large/Very Large
	Medium	Neutral	Slight	Moderate	Large
	Low	Neutral	Neutral	Slight	Slight/Moderate
		Negligible	Minor	Moderate	Major
	Magnitude of impact				

Source: Department for Transport's Design Manual for Roads and Bridges, HD45/09 Road Drainage and the Water Environment, Table A4.5.

- 17.3.31 Those residual effects described as having a Moderate, Large or Very Large effect upon a receptor are usually considered to be significant in terms of the EIA Regulations and thus are material considerations when determining planning applications. The use of the terms 'neutral' or 'slight' are used to acknowledge that there will be some change from the baseline conditions but that these effects are not significant.

17.4 Baseline, Future Conditions and Value of Resource

Regional Overview

- 17.4.1 The programme of works required for MetroWest Phase 1 lies within the catchment of the River Avon, a tributary of the River Severn. The River Avon has a large catchment area of approximately 2,220 km² encompassing the major cities of Bristol and Bath. The primary river flows from its source upstream of Malmesbury south then west for approximately 134 km through gentle rural landscapes and towns such as Bradford-on-Avon, Bath, and Bristol, before flowing through the Avon Gorge to Avonmouth, and into the Severn Estuary.
- 17.4.2 The Portishead Branch Line (MetroWest Phase 1) DCO Scheme primarily runs along the coastal plain of the North Somerset coast and the left² (south) bank of the River Avon. The River Avon is tidal throughout the study area.

Surface Water Features and Drainage

- 17.4.3 The main features of the surface water environment for the DCO Scheme comprise the River Avon, which is tidal throughout the study area and several watercourses and drains which form tributaries of the river. There is an extensive network of small drains and ditches, with a number of culverts under the existing railway track, particularly through the section between Portishead and Pill. From on site observations, the culverts, mostly brick lined, are in moderate to poor condition, with flow restricted by siltation. Many of the ditches in this area are also heavily overgrown and with the flat topography, the direction of the drainage may be unclear.
- 17.4.4 There are no coastal waters within the study area. The Severn Estuary (identified as the Severn Lower transitional water body under WFD) is located over 1 km from the proposed centreline of the railway and is not considered a material consideration with respect to surface water quality. However flood risk pertaining to the estuarine and coastal waters has been evaluated as part of the FRA and the Severn Lower was scoped into the WFD assessment as a downstream waterbody.
- 17.4.5 A lot of the watercourses and ponds are un-named and for the purposes of assessment have been assigned a unique number or name. The surface water features within the study area are presented, from west to east, in Appendix 17.3 and are shown on Figure 17-1 (Sheets 1 to 5) in Volume 3. The table in Appendix 17.3 should be read in conjunction with these figures.

Geomorphology

- 17.4.6 The surface watercourses in the study area are either artificial or heavily modified water bodies. Few watercourses have natural morphological features, such as the channel form and profile, bed substrate, and bank materials.
- 17.4.7 The flow regime and patterns in these watercourses are also dictated by bank vegetation and siltation from field drains and other sources. With flat gradients dominant, flow rates

² The left and right hand banks of a river assume the respondent is facing in the downstream direction.

do not appear to be sufficient to move in-channel sediment and the environment is dominantly depositional.

17.4.8 Where ditches and drains pass beneath existing culverts (e.g. through the Portbury to Pill section) they are in places partly blocked and often heavily silted.

17.4.9 Overall the surface watercourses have little geomorphological interest.

Surface Water Quality

17.4.10 Under the WFD water quality comprises ecological and chemical components. Ecological status is measured on the scale: high, good, moderate, poor and bad. Chemical status is recorded as good, fail or, where priority pollutants are not discharged, as "*does not require assessment*". Whilst good ecological status is defined as a slight variation from undisturbed natural conditions in natural water bodies, artificial water bodies ("AWB") and heavily modified water bodies ("HMWB") are unable to achieve natural conditions. Instead, they have a target to achieve good ecological potential, which recognises their important uses whilst making sure ecology is protected as far as possible. For a surface water body to be in overall good status or potential, both its ecological and chemical status must be at least good. Hydromorphology and hydrology are also used to assess the high status water bodies. Further details on the classification of waterbodies will be provided in the WFD assessment to be included in the Environmental Statement.

17.4.11 Surface waterbodies classified under the WFD have been identified using the Environment Agency's online mapping tool ("what's in your backyard"). WFD data from Annex B of the Severn RBMP, 2009 are presented in Table 17-7 for all Cycle 1 WFD surface waterbodies within the study area.

17.4.12 Cycle 2 data (2015-2021) were released in February 2016 and have been used in developing the WFD assessment. Where available on the Environment Agency's Catchment Data Explorer website, Cycle 2 data have been included in Table 17-7 below. Further information is available from <https://www.gov.uk/check-local-environmental-data> and <http://environment.data.gov.uk/catchment-planning/>.

17.4.13 The River Severn (GB530905415401) Transitional waterbody has not been included as a receptor within the assessment as it is located more than 250 m from the railway centreline (i.e. is located outside of the study area). The waterbody has been considered in the WFD assessment which requires that downstream waterbodies are considered in terms of the WFD Objectives.

Table 17-7: WFD classification data on Cycle 1 surface waterbodies within the study area

Waterbody Name	Bristol Avon	Portbury Ditch - source to confluence with Severn Estuary	Easton in Gordano stream (see Note 1)	Markham Brook – source to confluence with River Avon (Bristol) (see Note 1)	Chapel Pill (see Note 1)	Colliter's Brook source to confluence with River Avon (Bristol New Cut) (see Note 1)
Waterbody ID	GB530905415405	GB109052027330	GB109053027470	GB109053027420	GB109053027430	GB109053027360
Waterbody category	Transitional	River	River	River	River	River
Typology Description	Mixed, macro, extensive intertidal [Transitional water] (see Note 2)	Low, Small, Calcareous [River]	Low, Extra Small, Calcareous	Low, Extra Small, Calcareous	Low, Extra Small, Calcareous	Low, Small, Calcareous
Hydro-morphological Status	Heavily Modified (flood protection, navigation and quay line)	Artificial (land drainage) [Heavily modified]	Artificial (flood protection and land drainage)	Not Designated A/HMWB	Not Designated A/HMWB	Heavily Modified (flood protection, land drainage, urbanisation, water regulation (impoundment release))
Protected Area Designation	Freshwater Fish Directive, Natura 2000 (Habitats Directive and/or Birds Directive)	Freshwater Fish Directive, Natura 2000 (Habitats Directive and/or Birds Directive)	Natura 2000 (Habitats Directive and/or Birds Directive)	Not Designated		Not Designated
Current Ecological Quality (2009)	Good Potential	Moderate Potential (Dissolved oxygen - poor)	Good Potential	Moderate Status	Moderate Status	Moderate Potential
Current Ecological Quality (2015)	[Moderate Potential]	[Moderate Potential]	NA	NA	NA	NA

Table 17-7: WFD classification data on Cycle 1 surface waterbodies within the study area

Waterbody Name	Bristol Avon	Portbury Ditch - source to confluence with Severn Estuary	Easton in Gordano stream (see Note 1)	Markham Brook – source to confluence with River Avon (Bristol) (see Note 1)	Chapel Pill (see Note 1)	Colliter's Brook source to confluence with River Avon (Bristol New Cut) (see Note 1)
Current Chemical Quality (2009)	Does Not Require Assessment (see Note 3)	Does Not Require Assessment	Does Not Require Assessment	Does not Require Assessment	Does not Require Assessment	Does not Require Assessment
Current Chemical Quality (2015)	[Good]	[Good]	NA	NA	NA	NA
2015 Predicted Ecological Quality (2009)	Good Potential	Moderate Potential	Good Potential	Moderate Status	Moderate Status	Moderate Potential
2015 Predicted Chemical Quality (2009)	Does Not Require Assessment	Does Not Require Assessment	Does Not Require Assessment	Does Not Require Assessment	Does Not Require Assessment	Does Not Require Assessment
Status Objectives	Good Ecological Potential by 2015 [2021]	Good Ecological Potential by 2027	Good Ecological potential by 2015	Good Ecological Status by 2027	Good Ecological Status by 2027	Good Ecological potential by 2027
Ecological (2014 Cycle 2)*	Good	Moderate	Waterbody not listed	Waterbody not listed	Waterbody not listed	Waterbody not listed
Chemical (2014 Cycle 2)*	Good	Good	Waterbody not listed	Waterbody not listed	Waterbody not listed	Waterbody not listed

* Data taken from <http://environment.data.gov.uk/catchment-planning/> for those waterbodies where data are available.

- Notes:
1. These water bodies are defined as WFD water bodies in the 2009 RBMP but are absent from the revised 2015 RBMP
 2. Data in square brackets taken from revised 2015 RBMP
 3. Refer to paragraph 17.4.10 for the explanation for “does not require assessment”

NA – Not applicable

Pollution Incidents

- 17.4.14 The Environment Agency's online "What's in your backyard" mapping tool records one significant pollution incident within the study area located adjacent to the River Avon near Ashton Gate (National Grid Reference ST567721). The pollution incident occurred in June 2009 (Incident Number 685142) and had a significant impact upon water and a minor impact upon land. The data provided on the Environment Agency's website do not specify the source of the pollution incident. However the location recorded is 170 m east of the railway line and is unlikely to be associated with railway operations.
- 17.4.15 Pollution of the ditch (water receptor D12 in Appendix 17.3 in the PEI Report Volume 4 Appendices) located beneath the Royal Portbury Dock Road which flows under the disused Portishead Branch railway and discharges into the Drove Rhyne, has been reported to the Environment Agency on two occasions (May 2015 and August 2015) during site visits associated with the DCO Scheme. The incidents, considered to be Category 3 (minimal effect on water quality) by the Environment Agency, are assumed to be associated with the Gordano Motorway Service Area at Junction 19 of the M5 or from upstream farm activity.
- 17.4.16 Consultation with the Environment Agency (meeting held 10 December 2014) highlighted historical water quality and drainage issues associated with Pill Tunnel. Network Rail has confirmed that although there is a functioning track drainage system in Pill Tunnel, this includes discharge to an outfall into Ham Green Lakes via a series of silt interceptor settlement units and clarification tanks. A third silt interceptor was added during 2016 which has improved the capacity of the system.

Environmental / Water Designations

- 17.4.17 The study area does not lie within a surface water or ground water NVZ.
- 17.4.18 The Severn RBMP Annex D (Protected Area Objectives) (Environment Agency, 2009) provides a list of designated freshwater fish protected areas within the river basin. Portbury Ditch is classed as a cyprinid fishery with a compliance status of passing the imperative quality standards but failing the more stringent guideline standards.
- 17.4.19 WPZs are being developed under the WFD to strengthen the Environment Agency's powers to address diffuse water pollution and hydro-morphological degradation that could lead to failure of WFD objectives. A WPZ will be a defined geographical area within which the Environment Agency will have additional powers to protect water by using measures to manage or prohibit activities which cause or could cause damage or pollution of water. WPZs are currently being trialled in several locations in England, none of which is located within the study area.

Water Dependent Ecological Designations

- 17.4.20 Tables 9-8 and 9-9 in Chapter 9 Ecology and Biodiversity identify the internationally and nationally designated sites for nature conservation within the study area of the DCO Scheme between Portishead and Pill. The locations are shown on Figures 9-1 and 9-2 in Volume 3 Book of Figures. Downstream of Pill, the River Avon forms part of the Severn Estuary SAC, SPA, Ramsar site and SSSI. No other internationally and nationally designated sites are located within the water environment study area. Further discussion on the

nature conservation characteristics of these designations is provided in Chapter 9, Section 9.4. These international and national designations for the River Avon represent additional sensitivity to water quality conditions.

17.4.21 Table 9-10 in Chapter 9 identifies a number of Wildlife Sites ("WS") (non-statutory designated sites within North Somerset) and Sites of Nature Conservation Importance ("SNCI") (non-statutory designated sites within the City of Bristol) within the DCO Scheme study area. These are shown on Figure 9-3. Those sites within the water environment study area and that contain water-dependent features include the following:

- Portbury Wharf Nature Reserve North Somerset Wildlife Site ("NSWS"), now managed by NSDC (includes marshy grassland and open water)
- Drove Rhyne and adjacent fields NSWS (includes swamp and standing water)
- Fields between railway line and A369, Portbury NSWS (includes marshy grassland)
- Priory Farm (Avon Wildlife Trust Nature Reserve) (wetland with reed beds)
- Field east of M5 Motorway, Lodway NSWS (includes marshy grassland)
- Land adjacent to Severn Estuary SSSI (Portbury) NSWS (includes marshy grassland)
- Fields between A369 and M5 Motorway, Portbury NSWS (includes marshy grassland)
- Fields on Caswell Moor NSWS (includes swamp and standing water).

17.4.22 There are no nationally designated sites for nature conservation within the study area of the DCO Scheme along the operational freight line (the Portbury Freight Line) that are within the water environment study area and that have water dependent features, other than the Severn Estuary SSSI mentioned above.

17.4.23 Table 9-7 in Chapter 9 lists the wildlife sites and nature reserves within the Portbury Freight Line study area. Those within the water environment study area with water-dependent features include the following:

- River Avon (part of) NSWS (saltmarsh and saltmarsh influenced grassland)
- River Avon (part of) SNCI (saltmarsh)
- Lamplighter's Marsh SNCI (brackish marshland and saltmarsh)
- Cumberland Basin Lock BWNS (canal)
- Cumberland Basin BWNS (canal).

Water Environment Permitting

17.4.24 Abstraction licence data published on the Environment Agency website show that there are no surface water abstraction licences within the study area. There is one groundwater abstraction licence within the study area, licensed to Welcome Break Group Ltd located at the Gordano Motorway Service Area at Junction 19 of the M5, approximately 450 m south of the disused section of the railway line.

17.4.25 Environment Agency data have been obtained (January 2015) for discharge consents located within the study area. Further enquiries will be made prior to the completion of the ES. Table 17-8 presents information on those discharge consents located within the study area and the locations are shown on the maps presented in Appendix 17.4 in the PEI Report Volume 4 Appendices.

Table 17-8: Discharge consents within the study area between Portishead and Ashton Junction

Licensed holder	Grid reference (approximate)	Discharge type	Receiving watercourse	Distance and direction from railway line/ development
Wessex Water	ST 47194 76473	Sewage discharge from Portishead Town Pumping Station (storm sewer overflow)	Portbury Ditch	Located within the study area, west of the proposed station. Portbury Ditch to receive discharge from the proposed station car park
		Harbour Road combined / storm sewer overflow	Portbury Ditch	See above
Mustad Manufacturing	ST 47110 76352	Sewage - final and treated	Portbury Ditch (left bank)	C 150 m upstream of where Portbury Ditch to receive car park drainage
Wessex Water	ST 47616 76398	Sewage discharge from Portishead Town Pumping Station (storm sewer overflow)	Tributary of Portbury Ditch (The Cut – IDB controlled drain)	~65 m downstream of where the tributary passes beneath the railway line; the Pumping station is located on the left bank
Unknown	ST 500 759	Trade	Drove Rhyne	Located 170 m north of the railway line.
Unknown	ST 502 759	Trade	Drove Rhyne	Located 90 m north of railway line
Unknown	ST 503 759	Trade	Drove Rhyne	Located 98 m north of railway line.
Unknown	ST 504 761	Trade	Culverted tributary of Drove Rhyne	Located 205 m north of railway line
Wessex Water	ST 522 764	Sewage Outlet	River Avon	Located 220 m north east of railway line near Pill.

Groundwater

- 17.4.26 The geology and soils underlying the DCO Scheme are described in Chapter 10 Geology, Hydrogeology, Ground Conditions and Contaminated Land, Section 10.2. As groundwater within the underlying strata may represent an important water resource and impact upon surface waters, it is also covered in this chapter in relation to groundwater quality and quantity and the WFD assessment.
- 17.4.27 The Mercia Mudstone is classified as a Secondary B aquifer characterised by predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers.
- 17.4.28 The Carboniferous sediments are classified as a Principal aquifer; these are layers of rock having high intergranular and/or fracture permeability and can provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale.

- 17.4.29 The Devonian sandstones (Portishead Formation and Black Nore Sandstone Formation) are classified as Secondary A aquifers; permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.
- 17.4.30 Where they occur, the superficial deposits are classified as Secondary A and Secondary undifferentiated. Secondary A aquifers are permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.
- 17.4.31 There are no groundwater SPZs within the study area to protect groundwater abstraction points.
- 17.4.32 The Severn RBMP (Environment Agency, 2009) classifies groundwater bodies within the Severn River Basin District ("RBD"). Each groundwater body has quantitative and chemical components representing its overall status. The study area lies within three groundwater bodies, the WFD status of which are presented in Table 17-9. These data have been supplemented, where available, by updated RBMP Cycle 2 data published on the Environment Agency Catchment Data Explorer website.

Table 17-9: WFD classification data for groundwater bodies within the study area

Water Body Name	Portishead Mercia Mudstone (See note 1)	Carboniferous Limestone (Bristol)	Bristol Triassic
Water Body ID	GB40902G805300	GB40901G806800	GB40902G804800
Current Quantitative Quality	Good	Good	Good
Current Chemical Quality	Good	Good	Poor
Upward Chemical Trend	No	No	Yes
2015 Predicted Quantitative Quality	Good	Good	Good
2015 Predicted Chemical Quality	Good	Good	Poor
Overall Risk	Probably At Risk	Probably At Risk	At Risk
Protected Area	Yes - Drinking Water Protected Area	Yes - Drinking Water Protected Area	Yes - Drinking Water Protected Area
Quantitative Status (2015 Cycle 2)	Good	Good	Good
Chemical Status (2015 Cycle 2)	Good	Good	Poor

Note 1: These descriptions are taken directly from the 2016 Severn RBMP

Water Resources Availability

- 17.4.33 The *Bristol Avon and North Somerset Streams WFD Management Area Abstraction Licensing Strategy* (Environment Agency, 2012) supersedes the Catchment Abstraction

Management Strategies ("CAMS") for these areas and provides information on where water is available and the reliability of the resource. The Environment Agency has confirmed (letter reference WX/2014/125769/01-L01, dated 28 July 2014 and appended to the Scoping Report and available from the Planning Inspectorate's website) that following an assessment of local water resources, there are no issues regarding water resources availability along the proposed route.

Water Supply and Foul Drainage Assets

- 17.4.34 Wessex Water is the sewerage undertaker and Bristol Water plc provides public water supplies within the study area. There are pumping stations at Quays Avenue (Portishead) and adjacent to the railway at The Drove (Portbury) operated by Wessex Water Authority.

Flood Risk

- 17.4.35 Flood risk management in the area is undertaken by the Environment Agency, NSLIDB, NSDC and BCC. A full description and analysis of flood risk relating to the DCO Scheme will be presented in the FRA in the Environmental Statement. The location of flood risk zones and defences are shown on Figure 17-1 Sheets 1 to 5 in the PEI Report Volume 3 Book of Figures.
- 17.4.36 The FRA describes the main potential sources of flooding that may impact the vicinity of the DCO Scheme.
- Tidal flooding from the Severn Estuary (Flood Zones 2 and 3³). This area benefits from existing flood defences.
 - Tidal flooding from the Bristol Avon backing up along the Easton-in-Gordano Stream. This part may potentially also suffer from fluvial flooding, particularly when the Easton-in-Gordano stream cannot discharge due to tidal locking.
 - Fluvial flooding where the existing railway crosses significant watercourses i.e. Portbury Ditch, The Cut, Drove Rhyne, Easton-in-Gordano Stream, Longmoor and Colliter's Brooks. These watercourses may also be subject to an increase in flood risk due to tidal locking.
 - There appear to be some local issues with surface water flooding but there have been no recorded instances of sewer flooding.
 - Although some areas are located in areas of medium susceptibility to groundwater flooding the Environment Agency has indicated there are no specific groundwater flooding problems in the DCO Scheme area.
 - The risk of flooding from breached canals or reservoirs is understood to be very low.
 - Tidally dominated flooding from the Bristol Avon – this potentially impacts only a small section as mostly the existing Portbury Freight Line is significantly above the Avon floodplain. The area around Bower Ashton lies in Environment Agency Flood Zone 3.
 - In the vicinity of Colliter's Brook the Portbury Freight Line is in Flood Zone 2, but elsewhere (e.g. crossings of Markham Brook and Chapel Pill) the railway is significantly

³ EA Flood Zone 3 is an area that could be flooded: from the sea by a flood that has a 0.5 per cent (1 in 200) or greater chance of happening each year; or from a river by a flood that has a 1 per cent (1 in 100) or greater chance of happening each year. Flood Zone 2 represents areas likely to be affected by a major flood, with up to a 0.1 per cent (1 in 1000) chance of occurring each year.

higher (by several metres) than the watercourse it crosses and hence potential fluvial flood risk is discounted at these locations.

17.4.37 The FRA will provide details of DCO Scheme specific modelling that was undertaken to establish the baseline (and future, post development) flood risk with a greater degree of accuracy. This included updates to the Environment Agency coastal flood model (covering flooding from the Severn Estuary), the Bristol City Council Central Area Flood Risk Assessment ("CAFRA") model (covering tidal and flooding from the Bristol Avon and its tributaries) and fluvial modelling on Drove Rhyne and Easton-in-Gordano Stream.

17.4.38 The model baseline data suggest that:

- The Portishead to Pill (disused section) would not be flooded (by coastal flooding) for the present day scenario (2015) for all return periods simulated (up to a 1000 year return period). For these simulations the Portishead to Pill (disused section) is defended from coastal flooding by the existing coastal flood defences: the Sea Commissioner's Bank and inland bund defence. Coastal flood risk is projected to increase in the future in response to projected sea level rise, with coastal flooding rising to once every 20 to 50 years on average by 2135 (and less frequently for shorter future projections).
- The Portbury Freight Line currently floods approximately once every 5 to 10 years on average near Bower Ashton, and is projected to flood more often than once every 2 years on average by 2135.
- Fluvial flood levels in the Easton-in-Gordano Stream floodplain remain below the railway level up to the 1000 year return period for the present day (2015) and future (2135) scenarios.
- Tidal flood levels in the Easton-in-Gordano Stream floodplain remain below the railway level up to the 1000 year return period for the present day (2015) scenario and 200 year return period for the future (2135) scenario.
- Modelled flows in Drove Rhyne and its tributaries remain in-bank up to the 1000 year return period for the present day (2015) and 100 year return period for the future scenario (2135).

Drainage

17.4.39 Along the disused railway line from Portishead to Portbury Junction near Pill there are no piped track drains throughout the route. There are formation drainage (ditches) at the following locations:

- Down side, adjacent to Harbour Crescent;
- Down and Up sides, partially between Moor Lane and Sheepway Road;
- Down side past Sheepway Gate Farm;
- Down side from Royal Portbury Dock Road to Portbury Station

17.4.40 Many of these ditches are overgrown with vegetation and in some places it is not possible to see the alignment of the ditches. Three culverts under the existing railway line were observed between the old Portbury Station and the overbridge carrying the Royal Portbury Dock Road.

17.4.41 The operating Freight Line between Portbury Dock Junction and Parson Street Junction was refurbished by Railtrack in 2000 to meet a basic requirement of 20 freight trains in

each direction per day. No drainage or formation works were undertaken as this was deemed unnecessary.

- 17.4.42 Historically Pill Tunnel has suffered from inadequate drainage and track formation. As a result Network Rail undertook full track renewal during 2012/2013 with the associated provision of enhanced track drainage. The drainage through Clifton Tunnel No. 2 was also considered inadequate. Also during 2012/13 ballast placement and drainage works were carried out through Ashton Gate and the Pill Station site. Further track works, including drainage works, are scheduled for Parson Street Junction.
- 17.4.43 Assessment of the existing condition of track drainage (where it occurs) is being undertaken as part of the ongoing design process.
- 17.4.44 The existing highway at Portishead drains into the adjacent network.

Future Conditions

- 17.4.45 Flood risk is projected to increase in the future as a result of climate change and sea level rise. The dominant increase in flood risk for the DCO Scheme is considered to be tidal flood risk resulting from increased sea levels. However, the Draft Severn Estuary SMP considers tide defences in the vicinity of the DCO Scheme will be improved in the future to keep pace with increased tidal flood risk. Fluvial and surface water flood risk are expected to increase as a result of increased extreme rainfall depths, with increased fluvial and surface water flooding extents. Increased sea levels will increase the risk of tide locking of inland watercourses and drainage systems.
- 17.4.46 Apart from the effects of climate change upon flood risk, it has been assumed that the conditions identified now will still be representative of the water environment at the time of construction and throughout the operation of the DCO Scheme unless otherwise stated within the relevant section. This is based upon the assumption that existing environmental legislation currently in place to protect and prevent deterioration in environmental standards will remain in place (or be tightened). Based upon this it is anticipated that the general quality of the water environment will improve over the longer term, although different attributes of the water environment will improve at different rates. It also assumes that any future development impacting upon the water environment will be subject to the same environmental permits, controls and legislation as currently exists and that this will be enforced appropriately.

17.5 Measures Adopted as Part of the DCO Scheme

- 17.5.1 A number of measures have been included as part of the project design in order to minimise certain environmental effects. This includes:
- the drainage design for the highway and railway works which is described in Chapter 4 Description of the Proposed Works;
 - careful designing of the project to ensure key receptors are avoided where possible;
 - construction adopting best practices techniques, which will be set out in Code of Construction Practice ("COCP") - this document is still being finalised and will be submitted with the DCO application; and
 - Compliance with regulatory and legislative regimes as required by law.

- 17.5.2 The final ES will fully set out and detail those embedded mitigation measures within the description of the proposed development and within each of the topic chapters.

17.6 Assessment of Effects

Water Framework Directive Assessment

- 17.6.1 A WFD compliance screening assessment is being carried out for the DCO Scheme and will be presented in the Environmental Statement. The assessment is being undertaken with respect to three surface water bodies (Portbury Ditch, the Bristol Avon and the downstream Severn Lower transitional water body) and three groundwater bodies (Carboniferous Limestone, Bristol Triassic, and Portishead Mercia Mudstone).
- 17.6.2 The design of the scheme and measures to be adopted during construction and operation are such that impacts on any (defining) water quality, hydromorphological and ecological elements are likely to be either negligible or short lived.
- 17.6.3 The assessment to date concludes that no deterioration to the identified water bodies will occur as a result of the proposed works. Therefore, the DCO Scheme complies with the WFD and no further assessment is required.

Construction Phase

Water Quality

- 17.6.4 The water quality of surface water features could be affected through runoff of contaminants, including silt in surface waters and accidental spillages of contaminating substances such as fuel and cement. Impacts are likely to be temporary and localised. The potential for impacts to water quality will be mitigated through adhering to the mitigation measures that will be outlined in the Code of Construction Practice ("CoCP").
- 17.6.5 The following water features (Figure 17-1 Sheets 1 to 5) have been scoped into the assessment and are considered to be low value receptors; PDT1, PDRDN1, PDRDS1, The Cut, RDN2, RDS2, SG1, D3, D4, D5, D7, D8, Pond 5, Drove Rhyne, D9, D10, D11, D12, D13, D15 and WC 1. For these receptors, with the proposed mitigation in place, the magnitude of the impact upon water quality during construction is anticipated to be negligible resulting in a **neutral** significance of effect.
- 17.6.6 Portbury Ditch, Markham Brook, Chapel Pill, Ashton/Longmoor Brook and Colliter's Brook (Figure 17-1) are medium value receptors. For these receptors, with the proposed mitigation in place, the magnitude of the impact upon water quality during construction is anticipated to be negligible resulting in a **neutral** significance of effect.
- 17.6.7 Easton-in-Gordano Stream and the River Avon (Figure 17-1) are high value receptors. For these receptors, with the proposed mitigation the magnitude of the impact upon water quality during construction is anticipated to be negligible resulting in a **neutral** significance of effect.
- 17.6.8 The migration of pollutants through surface runoff, use of polluting substances and risk of accidental spillages during construction poses a temporary risk to groundwater quality during construction. Contamination of the aquifer through the migration of contaminants will be reduced through the implementation of mitigation incorporated into the CoCP. Furthermore, where they occur along the railway (mostly between Portishead and Pill

Junction and the vicinity of Ashton Gate), superficial deposits appear to be dominated by silts and clays which being relatively impermeable, will limit infiltration to underlying groundwater. With these ground conditions and the applied mitigation the magnitude of the impact is considered to be negligible upon groundwater quality. Incorporated measures will also address any potential migration through groundwater to possible surface water receptors. The Portishead Mercia Mudstone and Bristol Triassic groundwater bodies are considered to be of Medium value and therefore the significance of the effect upon these receptors is **neutral**. The Carboniferous Limestone (Bristol) groundwater body is of high value and the resulting significance of effect upon this receptor is also **neutral**.

- 17.6.9 As part of the construction works, existing contaminated ballast material and wooden sleepers will be removed for appropriate treatment. The removal of this potential source of contaminants at various locations throughout the DCO Scheme will result in a long term beneficial impact of minor magnitude. The residual significance of effect is **negligible** for those receptors of low value and **slight beneficial** for those receptors of medium and high value.
- 17.6.10 To summarise impacts upon water quality during the construction phase are anticipated to be of neutral effect and thus are **not significant** in regards to the EIA Regulations.

Water Quantity and Flood Risk

- 17.6.11 During construction the adoption of an appropriate Surface Water Management Plan will address issues related to discharges from works sites leading to increased downstream flood risk. Siting of compounds and other works areas off the floodplain will minimise any impacts related to the temporary loss of floodplain storage during construction. The Clanage Road temporary construction site does lie in the flood plain. This site was chosen as a construction compound as it was the only reasonable site close to the southern end of the scheme, despite being in the flood plain. The activities to be undertaken at this site include delivery and on-tracking road rail vehicles, minor material storage, construction are for switches and crossings ("S&C"), vehicle parking for the workforce and pedestrian access for the workforce. A flood plan will be prepared that sets out how these construction activities will be managed around the risk of flooding and agreed with the Environment Agency. Impacts on flood risk during construction are considered to be neutral and there will be overall **neutral** significance on flood risk during construction.

Use of Water Resources

- 17.6.12 Water may be required for construction processes such as for concrete batching, wheel washing and drinking water supplies and welfare facilities. Water is likely to be sourced from the public water supply which will need to be agreed with Bristol Water plc. On the assumption that water will be made available from Bristol Water plc, the use of water during construction is not anticipated to have a material effect upon any water features within the study area and the residual effect is **neutral**.
- 17.6.13 To summarise impacts upon water resources during the construction phase are anticipated to be of neutral effect and thus are **not significant** in regard to the EIA Regulations.

Physical Impacts

- 17.6.14 Construction activities may require works within the channels of watercourses such as for culverting, new outfalls, temporary diversions etc. Such activities can result in changes to the physical characteristics of a water features. Culverts beneath the Portishead to Pill disused section will, where necessary, be refurbished or replaced with culverts of the same dimension except for the Easton-in-Gordano stream which will have a larger culvert. These construction activities are likely to include de-silting and may temporarily impact on the flow of water through these culverts. Silt generated and, or removed under these operations will be subject to the CoCP and terms set out by the consenting process (see below). In the longer term, these activities are likely to be beneficial to the physical processes in the watercourses by increasing conveyance, improving flows and removing accumulated sediment.
- 17.6.15 Where works will be required within 8 m of the top of the bank of a watercourses (9 m for watercourses managed by the NSILDB) these will be subject to the consenting process and best practice for works near watercourses. Provided that these measures are in place, it is assumed that all impacts will be reduced to ensure that the residual effect is **neutral**.
- 17.6.16 To summarise physical impacts upon water features during the construction phase are anticipated to be of neutral effect and thus are **not significant** under the EIA Regulations.

Operation Phase

Water Quantity - Drainage

- 17.6.17 Runoff rates from the railway line would be no higher than from the existing footprint of the DCO Scheme, as there would be no increase in impermeable area. Therefore no impacts are anticipated for any of the receptors.
- 17.6.18 Runoff rates from the site of Portishead station and Pill station will increase as a result of the increase in impermeable areas for the new stations and car parks. It has been agreed with NSLIDB that potential effects on The Cut from surface water drainage from Portishead station and platforms are such that no attenuation is required before discharge. Measures to manage drainage discharges from the car park at Portishead station will be incorporated into the design. The drainage from Pill Station and car parks is still subject to development, but its design will include measures to minimise any potential increase in discharge. With these measures in place this is likely to result in no material effect on runoff as a result and the residual effect is **neutral**.
- 17.6.19 The design of drainage and the attenuation and management of runoff from highway modifications on Winterstoke Road has not yet been finalised. Appropriate measures will be incorporated in the design such that drainage discharges from the modified highway is unlikely to have a material effect on the receiving water environment and the residual effect is **neutral**.
- 17.6.20 To summarise impacts upon water quantity through drainage during the operational phase, where they can be assessed are anticipated to be of neutral effect and thus are not significant in regards to the EIA Regulation.

Water Quantity – Flood Risk

- 17.6.21 The most significant residual risk relates to the adoption of appropriate maintenance practices to ensure the culverts beneath the railway remain free from blockage. Similarly any SuDS drainage measures that are adopted by the DCO Scheme must be maintained in a sound operational condition. For future flood scenarios, agreements and flood plans will be required (with the Environment Agency, NSDC and BCC) to manage the residual threat of flood to the railway. This may include strategic planning to address wider flood risk (irrespective of the railway development) for example the management of future coastal flood risk between Portishead and Pill. Overall the completed railway is not expected to increase significantly impacts on flood risk during its operation. These impacts are considered to be neutral and there will be overall **neutral** significance of effect on flood risk.

Water Quality

- 17.6.22 Given the proposals for ballast renewal, track and station drainage, and the appropriate management of wastewater from trains the impacts associated with the potential for pollutants to enter the surface water environment will be mitigated to acceptable levels resulting in a negligible magnitude of impact upon water quality during operation and a **neutral** significance effect on the low, medium and high value receptors (see Appendix 17.3 and Figure 17-1).
- 17.6.23 The renewal of existing track drainage and incorporation of an improved track drainage system in some locations will provide long term benefits for water quality, although these are considered to be negligible magnitude for all receptors of the water environment. Where no formal drainage system is to be installed the potential for pollution associated with the routine operation of trains along the line is anticipated to be of **neutral** significance.
- 17.6.24 The potential incorporation of SuDS into the drainage design for the car park at Portishead Station will provide some mitigation for any water quality impacts. As a worst case, based upon the current proposed options runoff from the car parks will pass through swales before being discharged to combined sewers. Information on utilities has been obtained and is being checked to establish if the combined sewer would overflow to a watercourse. However with the proposed SuDS the impact upon water quality is anticipated to be negligible. Therefore, whether the combined sewer overflows to a receptor of low, medium or high value the significance of the effect will be **neutral**.
- 17.6.25 The proposed drainage from the highways at Portishead station will be to the existing highway drainage. The impact upon groundwater and surface water quality will be negligible with this mitigation and the significance of the effect will be **neutral**.
- 17.6.26 The drainage of the new car park at Pill station is likely to discharge into the adjacent highway or sewer network. This design is subject to further development but it is currently assumed that impacts to groundwater will be negligible and the significance of the effect will be **neutral**.
- 17.6.27 There are no source protection zones or abstraction licences within the area for public water supplies, therefore there is no risk of any contamination from the operation of the railway affecting the public drinking water supply.

- 17.6.28 Impacts upon groundwater quality during operation of the railway line are considered to be negligible due to the small quantities of pollutants produced, the localised nature of any contaminants and the presence of the ballast which will aid in the removal of contaminants. As near surface (superficial) deposits are primarily silts and clays these are relatively impermeable and provide a very limited (if any) connection with surface waters. Hence the potential for groundwater to act as a pollutant pathway to surface water receptors is also considered to be negligible. Where a drainage system to a surface watercourse exists this will also reduce the potential for inputs of contaminants to groundwater. The groundwater receptors are of medium and high value therefore the impact upon groundwater quality from track drainage is anticipated to be of **neutral** significance of effect.
- 17.6.29 To summarise impacts upon water quality to surface and groundwaters through drainage from both the track, stations, car parks and highways during the operational phase are anticipated to be of neutral effect and thus are **not significant** under the EIA Regulations.

Physical Impacts

- 17.6.30 Some track drainage catchments require the potential diversion of existing Wessex Water surface water sewers. No new outfalls are proposed associated with the diversions and therefore no impact upon the water environment is anticipated.
- 17.6.31 The status of the proposed track and station drainage from Pill Station remains unknown subject to further surveys. It is intended to use the existing outfall although full details of this have yet to be determined. If this proves to be an outfall to Markham Brook, further consultation will be undertaken with the Environment Agency.
- 17.6.32 To accommodate the additional runoff from Portishead Station roof and platform a new drainage system will be installed for this catchment. The system will discharge to an outfall to The Cut, a watercourse maintained by NSLIDB. The outfall is located circa 25 m north and downstream of the railway where the watercourse is concrete lined and the discharge is likely to have very little impact due to the existing hard engineered nature of the channel. The magnitude of the impact is considered to be negligible. The Cut is a low value receptor and therefore the significance of the effect is **neutral**.
- 17.6.33 It is assumed that no new outfalls will be required from the drainage catchments where new track drainage systems are to be installed or repaired and that existing outfalls can be used. The outfall structures may require minor repair work and this will be determined during the next stage. As these structures already exist there is likely to be no additional impact.
- 17.6.34 The repair or replacement works for the existing culverts will maintain existing flow capacity, with the exception of the culvert for the Easton-in-Gordano stream which will be enlarged to compensate for the infilling of the Cattle Creep underbridge. The underbridge currently acts as an informal by-pass channel during floods. Modelling suggests that there may be small changes in flood levels up or downstream of the enlarged culvert, but these are not considered to be significant.
- 17.6.35 At present it is understood that no new culverting will be required for the medium (Portbury Ditch, Markham Brook, Chapel Pill, Ashton Brook and Colliter's Brook) and high value (Easton-in-Gordano Stream and the River Avon) receptors. Any culverting works on

the low value receptors is unlikely to be significant, however this will be considered during the detailed design stage.

- 17.6.36 For the drainage from Portishead Station car parks in relation to physical impacts the worst case will be the option to discharge to Portbury Ditch, a Main River. Any outfall structure would require consent from the Environment Agency and it is assumed that compliance with any consent would reduce residual impacts to an acceptable level, thus there would be a **neutral** significance of effect upon Portbury Ditch.
- 17.6.37 Pill station car park and road drainage will be undertaken adopting SuDS and is unlikely to have any physical impact on receiving watercourses resulting in a **neutral** significance of effect.
- 17.6.38 To summarise, physical impacts upon water features through drainage from the track, stations, car parks and highways during the operational phase based on designs and understanding at this stage, are anticipated to be of either slight adverse or neutral effect and thus are **not significant** under the EIA Regulations.

Maintenance Activities

- 17.6.39 Maintenance activities will be undertaken in accordance with National Rail standards (NR/L3/CIV/005/1). Therefore any maintenance activities are anticipated to have an impact of negligible magnitude on all aspects of the water environment, resulting in a **neutral** significance of effect for all potential receptors.

Decommissioning Phase

- 17.6.40 For the reasons set out at 17.3.15 – 17.3.20 it is not possible to identify realistic options for decommissioning for assessment and no basis on which to consider that there would be reasonably foreseeable significant environmental impacts on water resource, drainage, and flood risk resulting from decommissioning.

17.7 Mitigation and Residual Effects

- 17.7.1 With the measures to be built into the scheme design and its construction, at this stage of the assessment, no residual significant environmental effects have been identified for the water environment.
- 17.7.2 Once the GRIP 3 design has been completed, further consideration will be given to the need to provide compensatory flood storage.
- 17.7.3 During the operation phase, if there is a risk of flooding along the DCO Scheme Network Rail will implement its procedures to safeguard services and passengers.
- 17.7.4 Other mitigation measures are being considered where adverse (but not significant effects) are identified. Proposals are currently being finalised to assess whether they are feasible to include as part of the project. This will be fully documented as part of the Environmental Statement and there will be ongoing discussions with key stakeholders to consider this further between now and the submission of the DCO application.

17.8 Cumulative Effects

Other Projects along the Portishead Branch Line

- 17.8.1 Developments to be considered in the cumulative assessment have been identified and are discussed in Chapter 18 In-combination and Cumulative Effects Assessment. Appendix 18.1 presents a long list of projects considered for the cumulative effects assessment and Appendix 18.2 summarises the potential cumulative effects for a short list of other projects.
- 17.8.2 Where planning applications have identified potential impacts in relation to the water environment, the majority relate to flood risk.
- 17.8.3 Assuming these developments are subject to the same planning and environmental protection policies and principles as detailed in national and local policy, which require for example the incorporation of SuDS into drainage designs, the DCO Scheme in combination with these developments is not anticipated to lead to significant cumulative effects upon the water environment.
- 17.8.4 In addition all developments and associated activities (whether subject to planning permission of some kind or not) are required to comply with the requirements of environmental legislation. Legislation provides protection of the water environment through requiring discharges to watercourses and ground and abstractions of water to be permitted. Legislation also affords protection to hydromorphological aspects and flood risk of watercourses through the requirement to obtain consents for works to watercourses. Any permits and consents would include mitigation as deemed appropriate by the permitting authority in order that impacts upon the environment are acceptable. Based upon the assumption that the developments will comply with the requirements of policy and legislation there is anticipated to be no cumulative impacts upon the water environment.

Other Works for MetroWest Phase 1

- 17.8.5 Other elements of MetroWest Phase 1, namely modifications to Parson Street Junction (including Liberty Sidings) and Parson Street Station, the Bedminster Down Relief Line, Severn Beach / Avonmouth Signalling, and Bathampton Turnback comprise small scale works, confined within the existing railway land. These works are to be undertaken by Network Rail under their permitted development rights and do not form part of the DCO Application.
- 17.8.6 Network Rail is undertaking an environmental appraisal, environmental risk register and environmental action plan of the works required for the Parson Street Junction, Bedminster Down Relief Line, and Bathampton Turnback as part of the reporting for Network Rail's Governance for Railway investment Projects ("GRIP") process. This process will identify the potential impacts and capture the need for mitigation during design and construction. The results will be carried forward from the present GRIP 3 / 4 phase, into the detailed design phase (GRIP 5) and construction (GRIP 6).
- 17.8.7 As discussed in paragraph 17.7.4 these works will be subject to environmental legislation requiring consents and permits for works that pose a risk to the water environment. Given the small scale nature of these works and the distances between these projects and the

Portishead Branch Line, it is considered that there are no significant cumulative effects during the construction and operation of these projects on the water environment.

17.9 Limitations Encountered in Compiling the PEI Report

- 17.9.1 All data presented in this PEI Report have been obtained from third party sources. It is assumed that the data provided by third parties are accurate.
- 17.9.2 The RBMPs are subject to a 6-yearly cycle. The first cycle of river basin planning, ran from the publication of RBMPs in 2009 until 2015. The second cycle of river basin planning runs from 2015 until 2021. WFD data from the 2009 Severn RBMP have been presented in the baseline section of this PEI Report in order to assist in establishing the value of receptors. This has been supplemented by 2014 (draft) Cycle 2 WFD data from the Environment Agency's Catchment Data Explorer website. The Cycle 2 RBMPs were published on 18 February 2016 and have been used to inform the WFD Assessment. However as the number of WFD classified waterbodies within the study area has decreased in Cycle 2, compared to those in Cycle 1, the Cycle 1 data have been retained in this report and were used to assist in establishing the value of these receptors (in the absence of Cycle 2 data). Further data from the Cycle 2 RBMPs will be used for the production of the ES where appropriate. The changes between the Cycle 1 and Cycle 2 RBMPs are not considered to be significant for the purposes of this assessment.
- 17.9.3 The drainage design for the station buildings, car parks and the railway track is ongoing and certain aspects have not been finalised. Further assessment of the drainage design will be undertaken following completion of the design for the hourly plus scheme. Where required, the Environment Agency and utility companies will be consulted on the proposals and consents sought. Consequently, through this permitting process, it is envisaged that there will be no significant effect of scheme drainage on the environment.
- 17.9.4 Options are still being explored for the management of runoff from the car parks and highway alterations associated with Portishead Station and Pill Station. Further consultation is required with the Environment Agency, Wessex Water and NSDC to determine a preferred option which can then be fully assessed.
- 17.9.5 The works required for the existing and new culverts has not yet been fully identified therefore impacts cannot be determined. This will be undertaken and confirmed at the detailed design stage.
- 17.9.6 Impacts associated with construction compounds and access have been considered based upon information provided during the drafting of the PEI Report. The contractor(s) may wish to select other locations and enter into separate agreements with the landowners.
- 17.9.7 A number of mitigation measures are still being considered as part of the environmental impact assessment. As the PEI Report only demonstrates those environmental effects at a certain point in time pre-application, these will be further refined as the Environmental Statement to be submitted with the DCO application is finalised.

17.10 Summary

- 17.10.1 A summary of the potential impacts of the DCO Scheme on the water environment, committed mitigation and the residual effects is presented in Table 17-10.

Table 17.10: Potential impacts, mitigation and residual impacts of the DCO Scheme on the water environment

Aspect	Impact	Receptors	Mitigation	Residual Impact
Construction activities				
Pollution from site works runoff / sediment / spillage.	Pollution of water resources.	Watercourses and other surface water features. Groundwater. Value/Sensitivity: Low, Medium and High	To be covered by the CoCP and the contractors' CEMP. Site management to prevent spills etc. Adherence to best practice for minimising risk of water pollution.	Magnitude: Negligible Significance of Effect: Neutral Significance for EIA legislation: Not significant
Water resources use during construction (e.g. for concrete batching).	None anticipated as water will be supplied by Bristol Water plc.	Watercourses Groundwater Value/Sensitivity: Low, Medium and High	Early consultation with water supply companies and EA as required. Water use minimisation to be adopted during construction.	Magnitude: No impact anticipated Significance of Effect: Neutral Significance for EIA legislation: Not significant
Works on, in or nearby watercourses.	Risk of reduction of flow capacity and increase in flood risk.	Watercourses Value/Sensitivity: Low, Medium and High	Identify appropriate measures for work in, over, nearby watercourses. Obtain appropriate Land Drainage and Flood Defence consents. Refurbish, repair or replace culverts as required maintaining existing flow capacity.	Magnitude: Negligible Significance of Effect: Neutral Significance for EIA legislation: Not significant
Works within a water channel.	Changes to the physical characteristics of water features, such as through culverting, new outfalls, temporary diversions etc.	Watercourses Value/Sensitivity: Low, Medium and High	Obtain appropriate Land Drainage and Flood Defence consents. Consideration of access route locations for construction to avoid the need for culverting of watercourses and minimise length of culverting where required.	Magnitude: Negligible Significance of Effect: Neutral Significance for EIA legislation: Not significant

Table 17.10: Potential impacts, mitigation and residual impacts of the DCO Scheme on the water environment

Aspect	Impact	Receptors	Mitigation	Residual Impact
Operation activities				
Drainage from rail network, stations or associated development activities (e.g. car parks).	Pollution of surface and groundwaters.	Watercourses and other surface water features. Groundwater (including public water supplies). Value/Sensitivity: Low, Medium and High	Incorporation of appropriate drainage system and SuDS where possible. Removal of existing sources of pollutants such as contaminated ballast and wooden sleepers.	Magnitude: Negligible Significance of Effect: Neutral Significance for EIA legislation: Not significant
Presence of structures within the floodplain.	Changes to conveyance of flows, including flood waters.	Watercourses. Value/Sensitivity: Low, Medium and High	Mitigation to be detailed in the Flood Risk Assessment. Agree necessary changes with the Environment Agency and IDB. Obtain appropriate Land Drainage Consents.	Magnitude: Negligible Significance of Effect: Neutral Significance for EIA legislation: Not significant
If required, new outfall structure to discharge runoff from Pill station drainage catchment.	Presence of new hard engineered structure within natural river (tidal) bank.	Markham Brook Value/Sensitivity: Medium	Agree necessary mitigation with the Environment Agency as part of Flood Defence Consent at detailed design stage. Minimise footprint of structure.	Magnitude: Minor adverse Significance of Effect: Slight adverse Significance for EIA legislation: Not significant
New outfall structure to discharge runoff from Portishead station drainage catchment.	Presence of new hard engineered structure within watercourse.	The Cut Value/Sensitivity: Low	Agree necessary mitigation with the NSLIDB as part of Land Drainage Consent at detailed design stage.	Magnitude: Negligible Significance of Effect: Neutral Significance for EIA legislation: Not significant

Table 17.10: Potential impacts, mitigation and residual impacts of the DCO Scheme on the water environment

Aspect	Impact	Receptors	Mitigation	Residual Impact
Presence of physical structures: culverts (including extensions), outfalls, and realignments (if required) within the channel of a watercourse.	Physical changes to surface water features through introduction of hard engineered structures, affecting bed and banks of channel.	Watercourses and other surface water features. Value/Sensitivity: Low	Agree necessary changes with the Environment Agency and IDB. Obtain appropriate Land Drainage Consents. Minimise the footprint of any structures. Refurbish, repair or replace culverts as required maintaining existing flow capacity.	Magnitude: Negligible Significance of Effect: Neutral Significance for EIA legislation: Not significant
Potential impacts from rail / station / other asset maintenance activities.	Risk of pollution of water resources	Watercourses and other surface water features. Groundwater. Value/Sensitivity: Low, Medium and High	Develop and apply appropriate maintenance management tools.	Magnitude: Negligible Significance of Effect: Neutral Significance for EIA legislation: Not significant.
Coastal flood risk to the proposed railway between Portishead and Pill.	Flooding of railway line during coastal flooding events. The risk of coastal flooding is insignificant for the present day scenario (2015) and increases in the future due future sea level rise.	The DCO Scheme within the coastal floodplain between Portishead and Pill. Value/Sensitivity: Low	Develop flood plan in consultation with Network Rail, NSDC and BCC. This will specify operational responses and triggers to cease operation during flooding and evacuation procedures. Sign up to receive EA coastal flood warnings. Significant warning time is expected for coastal flooding.	Magnitude: Negligible Significance of Effect: Neutral Significance for EIA legislation: Not significant

Table 17.10: Potential impacts, mitigation and residual impacts of the DCO Scheme on the water environment

Aspect	Impact	Receptors	Mitigation	Residual Impact
Coastal flood risk to proposed Portishead station and car park.	Insignificant for present day (2015) scenario. For the future (2135) scenario, there is simulated flooding on the proposed Portishead station car park for events with return periods 100 years and higher and at the pedestrian crossing of Portbury ditch for events with return periods 75 years and higher.	Proposed Portishead station car park and access route. Value/Sensitivity: Low	Develop outline flood plan in consultation with Network Rail, NSDC and BCC. (Outline as not relevant for present day scenario but will be required in future).	Magnitude: Negligible Significance of Effect: Neutral Significance for EIA legislation: Not significant
Tidal River Avon flood risk to the DCO Scheme proposed railway near Bower Ashton.	Tidal River Avon flooding of the DCO Scheme would occur approximately once every 5 to 10 years for the present day and more frequently in the future due to future sea level rise.	The DCO Scheme within the River Avon floodplain near Bower Ashton. Value/Sensitivity: Low	Develop flood plan in consultation with Network Rail, NSDC and BCC. This will specify operational responses and triggers to cease operation during flooding and evacuation procedures. Sign up to receive EA tidal flood warnings. Significant warning time is expected for tidal flooding.	Magnitude: Negligible Significance of Effect: Neutral Significance for EIA legislation: Not significant
Enlarge Easton-in-Gordano Stream flood culvert to mitigate infilling of Cattle Creep underbridge and loss of informal flood route.	Very small changes in flood levels up and downstream of culvert compared with existing.	Areas immediately up and downstream of the culvert. Value/Sensitivity: Low	Retain flood flow conveyance through the DCO Scheme with replacement culvert.	Magnitude: Negligible Significance of Effect: Neutral Significance for EIA legislation: Not significant.

Table 17.10: Potential impacts, mitigation and residual impacts of the DCO Scheme on the water environment

Aspect	Impact	Receptors	Mitigation	Residual Impact
Numerous existing culverts conveying watercourses crossed by the DCO Scheme.	Potential increase in flood risk upstream of the DCO Scheme if conveyance is reduced.	Areas upstream of watercourses crossed by the DCO Scheme. Value/Sensitivity: Low	All existing culverts crossed by the DCO Scheme will be assessed and refurbished or replaced if required with culverts of the same dimensions (i.e. same flow capacity). There will therefore be no change in flood risk due to culvert works. Maintenance of culverts to reduce likelihood of culvert blockage by Network Rail, NSLIDB, EA as appropriate.	Magnitude: Negligible Significance of Effect: Neutral Significance for EIA legislation: Not significant.
Maintain access to EA, NSDC, BCC and NSLIDB maintained watercourses and structures	Potential additional flood risk if maintenance of watercourses and culverts (e.g. clearing culvert blockages, clearing channels) is not undertaken.	Areas upstream of watercourses crossed by the DCO Scheme Value/Sensitivity: Low	The DCO Scheme has been designed in consultation with the EA, NSDC, BCC and NSLIDB to ensure required maintenance access is retained or improved.	Magnitude: Negligible Significance of Effect: Neutral Significance for EIA legislation: Not significant.

17.11 References

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17.12 Abbreviations

AWB	Artificial Water Body
BCC	Bristol City Council
BWNS	Bristol Wildlife Network Site
CAFRA	Central Area Flood Risk Assessment (Bristol City Council's flood model)
CAMS	Catchment Abstraction Management Strategies
CEMP	Construction Environmental Management Plan
CoCP	Code of Construction Practice
DCO	Development Consent Order
DMRB	Design Manual for Roads and Bridges
EA	Environment Agency
EC	European Council
EIA	Environmental Impact Assessment
ES	Environmental Statement
FRA	Flood Risk Assessment
GEP	Good Ecological Potential
GES	Good Ecological Status
GRIP	Governance of Railway Improvement Projects
HMWB	Heavily Modified Water Body
IDB	Internal Drainage Board
LLFA	Lead Local Flood Authority

NPPF	National Planning Policy Framework
NPSNN	National Policy Statement on National Networks
NSDC	North Somerset District Council
NSIP	Nationally Significant Infrastructure Project
NSLIDB	North Somerset Levels Internal Drainage Board
NSWS	North Somerset Wildlife Site
NVZ	Nitrate Vulnerable Zone
PPG	Pollution Prevention Guidance
PSP	Principal supply point
RBD	River Basin District
RBMP	River Basin Management Plan
SAC	Special Area of Conservation
SFRA	Strategic Flood Risk Assessment
SMP	Shoreline Management Plan
SNCI	Sites of Nature Conservation Importance
SPA	Special Protection Area
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage Systems
WebTAG	Web-based Transport Appraisal Guidance
WFD	Water Framework Directive
WPZ	Water Protection Zone
WS	Wildlife Sites