



MetroWest+

Portishead Branch Line (MetroWest Phase 1)

Planning Inspectorate Reference: TR040011

Applicant: North Somerset District Council

9.3.3 ExA.SoCG-EA.D1.V1 – Statement of Common Ground

Between

- (1) North Somerset District Council;
- (2) Network Rail Infrastructure Limited; and
- (3) Environment Agency

Version: 1

Date: November 2020



Version history			
Date	Version	Status	Description/changes
2 November 2020	1	D1 Submission	Draft for submission to examination at Deadline 1

1. Introduction

- 1.1 This Statement of Common Ground ("SoCG") has been prepared by North Somerset District Council ("the Applicant"), Network Rail Infrastructure Limited ("NRIL"), and the Environment Agency ("EA") to set out the areas of agreement and disagreement between the parties in relation to the Development Consent Order ("DCO") application for the Portishead Branch Line (MetroWest Phase 1) ("the DCO Scheme") based on consultation to date.
- 1.2 This SoCG comprises an agreement log which has been structured to reflect topics of interest to the EA in relation to the application for the DCO Scheme. Topic specific matters agreed and not agreed between the EA and the Applicant are included.

2. Scheme overview

- 2.1 The Applicant has applied to the Planning Inspectorate ("PINS") for a DCO to construct the Portishead Branch Line under the Planning Act 2008 ("Application"). The Application was made on 15 November 2019 under reference TR040011 and was accepted for examination on 12 December 2019.
- 2.2 The DCO Scheme will provide an hourly (or hourly plus) railway service between Portishead and Bristol Temple Meads Railway Station, with stops at Portishead, Pill, Parson Street and Bedminster.
- 2.3 The DCO Scheme comprises the Nationally Significant Infrastructure Project ("NSIP") as defined by the Planning Act 2008 ("the 2008 Act") to construct a new railway 5.4 km long between Portishead and the village of Pill, and associated works including a new station and car park at Portishead, a refurbished station and new car park at Pill and various works along the existing operational railway line between Pill and Ashton Junction where the DCO Scheme will join the existing railway. Ashton Junction is located close to the railway junction with the Bristol to Exeter Mainline at Parson Street.¹
- 2.4 The Application has been accompanied by an Environmental Statement ("ES") because the DCO Scheme is classified as EIA development in the EIA Regulations 2017².

¹ Please refer to Schedule 1 of the DCO (Document Reference 3.1) for more detail.

² The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017

3. The Environment Agency's role in the DCO Scheme

- 3.1 The EA is a non-departmental public body established under the Environment Act 1995 and sponsored by the Department for Environment, Food and Rural Affairs ("DEFRA"). The EA's principal aim is to protect or enhance the environment and contribute towards attaining the objective of achieving sustainable development.
- 3.2 The EA's role in the DCO process derives from the 2008 Act and secondary legislation made under it. In addition to its overarching role under the sponsorship of DEFRA, it is a prescribed consultee under section 42 of the Act and a consenting body in respect of a wide range of environmental matters including waste operations/discharge, water abstraction and flood risk.

4. Overview of Engagement

4.1 Introduction

- 4.1.1 This section briefly summarises the consultation that the Applicant has had with the EA. For further information on the consultation process please see the Consultation Report (Document Reference 5.1).

4.2 Pre-application engagement

- 4.2.1 The Applicant has engaged with the EA on the DCO Scheme during the pre-application process, both in terms of informal non-statutory engagement and formal consultation carried out pursuant to Section 42 of the Planning Act 2008.
- 4.2.2 The Applicant has had regular and constructive engagement with the EA throughout the pre-application process on both a formal and an informal basis. The Applicant adopted a multi-stage approach to formal consultation which has allowed the DCO Scheme proposals to evolve iteratively through the Applicant's consideration and regard for the EA's input, in keeping with the (former) Department for Communities and Local Government (DCLG) Pre-Application Guidance (2015). This has meant that the EA was able to direct the scope of the studies and review interim findings, in particular with regard to the FRA modelling studies, such that the EA meaningfully contributed to the development of the proposals in the DCO Scheme.

The formal consultation was carried out in three main stages:

- i. "Stage 1 Consultation", from 22 June 2015 to 3 August 2015 (pursuant to Section 47 only);
- ii. "Stage 2 Consultation", from 23 October 2017 to 4 December 2017; and
- iii. "Additional Stage 2 Consultation" at several different points following Stage 2 Consultation.

A full account of the Applicant's pre-application engagement with the EA is contained in the Consultation Report (Document reference 5.1).

4.3 Post-application

- 4.3.1 Following the submission of the application on 15 November 2019, the Applicant has continued to engage with the EA to discuss the content of this document.
- 4.3.2 Following the s 56 process, the EA has submitted relevant representations which are attached as Annexure 1 to this statement.
- 4.3.2 This statement therefore addresses the relevant representations made by the EA in the first instance and then addresses other issues raised during consultation.

4.4 Overview of key issues raised in the Relevant Representations and at s42

- 4.4.1 The EA raised the following key issues:

[summary]

- 4.4.2 The following sections provide detail on the matters raised by the EA during the course of the DCO Scheme consultation, the actions taken by the Applicant in response, and whether the matter is agreed or remains to be agreed.

5. Flood risk

The following tables set out the detailed comments received by the Applicant and NRIL from the EA in respect of flood risk.

5.1 Flood Risk Assessment ("FRA") – relevant representations issues raised

Ref	Topic	Environment Agency position	Applicant position	Status (Issue Resolved/Issue Outstanding)
5.1.1	Climate Change Allowances in the December 2019 NPPF guidance and the Applicant's response dated 21 March 2020 ("the Response") to the Planning Inspectorate's letter of advice under s 51 of the Planning Act 2008 and dated 24 January 2020. (See Annexure 2)	Concerns with the climate change allowances adopted	The Response addresses both the Inspectorate's request for an explanation and in part the Agency's concerns. To address the kernel of the Agency's concerns the Applicant has broken down the details of the Response for the Agency to consider whether it is agreed or not agreed:	N/A
5.1.2	Climate Change Allowances	Peak River Flow concern	<p>Peak River Flow: For small catchments (< 5km²) which include Drove Rhyne and Easton-in-Gordano Stream and those only slightly larger, Longmoor and Collier's Brooks (Flood Estimation Handbook catchment areas 8.6km² and 5.4km² respectively) the December 2019 NPPF guidance states rainfall climate change allowances rather than peak river flow allowances should be applied.</p> <p>Note: Notwithstanding the reference to the small size of the Longmoor and</p>	

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			Colliter's Brooks catchments the Applicant has re-run the simulation with a 70% allowance using the December 2019 NPPF climate change guidance for fluvial flooding as an "upper limit" sensitivity test.	
5.1.3	Climate Change Allowances	Peak Rainfall Intensity concern	<p>Peak Rainfall Intensity: The climate change allowance from the December 2019 NPPF guidance is 40% upper end allowance.</p> <p>Drove Rhyne: For the railway crossings the simulated 1000 year return period peak flood levels (with a 30% climate change allowance used in the Applicant's FRA) are more than 0.4m below the railway level. The differences between simulated 1000 year peak flood levels with a 20% allowance and 30% allowance are only approximately 0.01m at the railway crossing. Increasing the climate change allowance to 40% is therefore not expected to significantly increase simulated peak flood levels, and therefore is not expected to impact the railway.</p> <p>Easton-in-Gordano Stream: We have now undertaken simulations applying the December 2019 NPPF Guidance upper end climate change allowance (applying 40% uplift for both the 2075 and 2115 simulated future years). Results of these simulations show that the proposed floodplain storage compensation within the Easton-in-Gordano Stream floodplain</p>	

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			<p>does provide mitigation when applying the current upper end climate change allowance of 40%, and the railway will not be flooded for the 100 year and 200 year return period Easton-in-Gordano Stream fluvial flood events in 2075 and 2115 (minimum rail level at Easton-in-Gordano Stream is 8.65mAOD, 200 year fluvial flood level in both 2075 and 2115 with +40% rainfall allowance is 8.33mAOD).</p> <p>Longmoor and Colliter's Brooks: The MetroWest Phase 1 modelling of Longmoor and Colliter's Brooks applies a 25% climate change allowance for both 2075 and 2115.</p> <p>The Applicant has now simulated flooding in the Longmoor and Colliter's Brooks applying the December 2019 NPPF Guidance climate change allowances (40% uplift in model inflows and current sea level rise allowances applied). Applying these climate change and sea level rise allowances has not resulted in a change in the simulated future frequency of closure of the railway at Longmoor and Colliter's Brooks in 2075 and 2115. This remains at once every 50 to 75 years (i.e. as assessed in the Applicant's FRA).</p> <p>For peak rainfall intensity the Applicant's FRA is a robust and acceptable assessment.</p>	

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			Note: As above, at reference 5.1.2 notwithstanding the reference to the small size of the Longmoor and Colliter's Brooks catchments the Applicant has re-run the simulation with a 70% allowance using the December 2019 NPPF climate change guidance for fluvial flooding as an "upper limit" sensitivity test. Applying the 70% allowance in 2075 and 2115 provides an "upper limit" of the frequency of flooding of the DCO Scheme at the crossing of Longmoor and Colliter's Brooks of approximately once every 50 to 75 years on average in 2075 and once every 25 to 50 years on average in 2115 (compared to once every 50 to 75 years on average in both 2075 and 2115 applying 40% allowance).	
5.1.4	Climate Change Allowances	Sea Level Rises concern	Sea Level: For sea level rises, paragraph 5.1.5 of the FRA denotes the increases in sea levels to 2075 and 2115 due to climate change (0.59m and 1.14m) used in the CAFRA model (Bristol City Council's (BCC) Central Area Flood Risk Assessment model as updated in Appendix N, DCO Document Reference 5.6). The December 2019 NPPF Guidance levels are generally higher but as the Inspectorate acknowledges, these figures were only updated in December 2019 after the DCO application was made. The Applicant also explains in paragraph 4.2.17 and table 4.4 of the FRA, the EA Coastal Flood Boundary (CFB) 2018 Extreme Water Levels (EWL) at Avonmouth	

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			<p>was compared with those of the CFB 2011 dataset (applied in the CAFRA modelling). This comparison shows the revised CFB 2018 EWLs are lower than equivalent CFB 2011 EWLs, by 0.09 m for the 20 year return period EWL. This indicates that whilst the CAFRA modelling uses the climate change allowances derived from the NPPF 2013 guidance it overstates “present day” tidal flood risk compared to the more recent 2018 CFB EWLs.</p> <p>In addition, the Applicant has prepared tables 3 and 4 in Appendix 1 to the Response which compares EWLs at Avonmouth applied in the Portishead Branch Line (MetroWest Phase 1) tidal River Avon modelling (as a downstream boundary condition) with those derived by applying the values of the current CFB2018 EWLs adjusted to future years with the current sea level rise allowances for flood risk assessments (as updated in the December 2019 NPPF Guidance.) The tables have been prepared for the whole of the Proposed Development.</p> <p>Section C of the Response also provides a graph which compares EWLs applied in the MetroWest modelling with those derived applying the current CFB dataset (CFB2018) adjusted to future years with the current upper end sea level rise allowances for flood risk assessments, for the 10 year and</p>	

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			<p>200 year return periods. This shows that up to approximately 2065 the EWLs applied in the MetroWest modelling are higher than those derived using the current CFB 2018 values and December 2019 NPPF Guidance climate change allowances.</p> <p>The MetroWest simulated 2075 River Avon tidal EWLs are consistently higher than the equivalent updated CFB2018 values with higher central allowance applied, and only 0.03m to 0.05m below the upper end allowances (for the 2 year to 200 year return periods). The 2115 EWLs applied in the MetroWest FRA tidal River Avon modelling are between the current CFB 2018 values with higher central and upper end allowances applied, and closer to the values with the higher central allowance applied.</p> <p>For sea level rises the Applicant's FRA is a robust and acceptable assessment.</p>	
5.1.5	Flooding Frequency	Potential high frequency of flooding of the proposed railway line.	<p>Based on revised climate change allowances, Table 4 in the Response details an assessment of the calculated future frequency of flooding to the proposed railway. The calculated frequency of future flooding of the proposed railway is approximately:</p> <p>- 1 to 2 times per year in 2075 applying the higher central sea level rise allowances,</p>	

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			<p>- 2 to 3 times per year in 2075 applying the upper end sea level rise allowances.</p> <p>- Once every 1 to 2 years in 2060 applying the higher central sea level rise allowances,</p> <p>- Once per year in 2060 applying the upper end sea level rise allowances</p> <p>The calculated frequency of future (2115) flooding is approximately 5 to 6 times per year applying the higher central sea level rise allowances, and approximately 8 times per year applying the upper end sea level rise allowances</p> <p>In Appendix 2 of the Response the Applicant has applied the impact of frequency of future flooding on the proposed train service timetable for 2075 and 2115 This shows less than 1% of train operating hours lost per year due to flooding in 2075, with the Upper end sea level rise allowances applied.</p>	
5.1.6	Flood Plain compensation	The provision of flood plain compensation i.e. is it adequate and is it provided on a hydraulically linked, level for level basis (Bower Ashton)	<p>Bower Ashton/Clanage Road Compound:</p> <p>It was not possible to specify the proposed floodplain compensation at Bower Ashton on a level for level basis. The Applicant has now undertaken further modelling to assess whether the proposed floodplain compensation at Bower Ashton (lowering ground levels within the Clanage Road compound site) provides the required</p>	

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			<p>compensation – applying the current tidal boundary conditions in the model (i.e. applying the current CFB 2018 dataset and the current climate change allowances as updated in December 2019 NPPF Guidance). This modelling demonstrates that the proposed floodplain compensation at Bower Ashton does fully compensate for the ramps to the main road and railway with no simulated increase in offsite flood risk up to the 200 year tidal River Avon flood in 2075 and 2115, applying the December 2019 NPPF Guidance Upper end sea level rise allowances.</p> <p>The EA is currently considering the Applicant's further modelling. In the meantime therefore, the FRA conclusions are considered robust in this regard</p> <p>For clarification:</p> <p>1)The proposed compensation area is within the Order limits</p> <p>2)The proposed compensation area involves lowering ground levels within the compound by approximately 0.1m on average. This detail of the design will not significantly impede use of the permanent compound as:</p> <p>- The access to the compound and ramp up to the track are designed to a specification that accommodates a range</p>	

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			<p>vehicular types (taking account of the vehicles that may use the compound).</p> <p>- Whilst the lowering of compound levels by approximately 0.1m may lead to slightly wetter ground conditions during periods of wet weather, the impact of this on use of the permanent compound will be insignificant as it is only expected to be used periodically for maintenance inspections and for occasional site works.</p>	
5.1.7	Flood Plain Compensation	The provision of flood plain compensation i.e. is it adequate and is it provided on a hydraulically linked, level for level basis (Easton-in-Gordano Stream)	<p>Easton-in-Gordano Stream: The Applicant has undertaken simulations applying the December 2019 NPPF Guidance upper end climate change allowance (applying 40% uplift for both the 2075 and 2115 simulated future years). Results of these simulations show that the proposed floodplain storage compensation within the Easton-in-Gordano Stream floodplain (to the west of Easton-in-Gordano Stream) does provide mitigation when applying the current upper end climate change allowance of 40%.</p> <p>The proposed floodplain storage compensation to the west of Easton-in-Gordano Stream provides compensation for fluvial flood events up to a peak level of 8.3mAOD. The simulated 100 year return period fluvial flood peak level with 40% climate change allowance is 8.28 mAOD in 2075 and 8.29 mAOD in 2115 i.e. no</p>	

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			<p>additional floodplain compensation is required beyond what is proposed in the DCO application.</p> <p>The Applicant has also undertaken hydraulic modelling to assess whether locating the floodplain storage compensation to the east of Easton-in-Gordano Stream, instead of to the west of Easton-in-Gordano Stream, would provide the required mitigation. This floodplain storage compensation option has been assessed by hydraulic modelling as it is not possible to provide compensation to the east of Easton in-Gordano Stream on a level-for-level basis.</p> <p>The hydraulic modelling undertaken demonstrates that the assessed floodplain storage compensation to the east of Easton- in-Gordano Stream, instead of to the west of Easton-in-Gordano Stream, does provide the required mitigation. Post-development peak flood levels in the vicinity of the railway crossing of Easton-in-Gordano Stream are generally slightly lower than the pre-development case by approximately 0mm to 2mm.</p> <p>The field to the east of the Easton-in-Gordano stream is the locally designated Field East of Court Farm Wildlife Site, valued for its unimproved neutral grassland. The scrape would lie in the wetter part of the site and could result in</p>	

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			an adverse effect on the site if the characteristic species are lost. However, with mitigation, such as translocation of species, creating a scrape with varying depths, and a mosaic of marshy grassland and open water, the impact of building the scrape could be mitigated.	
5.1.8	Third Party Land	The potential increase in flood risk to third parties, particularly in the vicinity of Portishead, Pill, Easton-in-Gordano and Clanage Road.	The DCO Scheme was adjusted to ensure that no third party land is to be affected by flooding impacts caused by the proposed works e.g. the track height in Bower Ashton remains at its current level. This is included in the FRA (ES Appendix 17.1, DCO Application Document Reference 5.6).	
5.1.9	Use of Designated Flood Zones	The use and understanding of the designated flood zones	<p>The FRA contains the precise definitions of designated flood zones which are well understood and applied consistently and accurately in the FRA (ES Appendix 17.1, DCO Application Document Reference 5.6).</p> <p>Note: A review of the recent peak tide level at Avonmouth (March 2020), photos of areas flooded (taken at 09:00 on 12 March 2020 see Annexure 3) and the MetroWest FRA flood maps indicates consistency between these photos and the MetroWest understanding of tidal flood risk in the area.</p>	

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5.1.10	Main River Culverts	Details of works proposed in the vicinity of, and/or over main river culverts i.e. a 'no additional loading approach' has not been clarified, as previously requested	See below section 8 issues raised during consultation regarding loading in the vicinity of and/or over main river culverts.	
5.1.11	Access Requirements	The lack of confirmation that Environment Agency access requirements can be provided (there are noted contradictions within the FRA).	See below section 8 issues raised during consultation regarding EA access requirements.	
5.1.12	Portishead associated development	Details regarding associated development in Portishead	See below section 5.2.4, 5.2.7 and 5.2.12 issues raised during consultation regarding associated development in Portishead.	
5.1.13	Permitting	The lack of confirmation the Environment Agency's Flood Risk Activity Permitting requirements are fully understood.	Details of permitting arrangements are set out in section 9 below	

5.2 Flood Risk Assessment ("FRA") – Consultation issues raised

Ref	Topic	Environment Agency position	Applicant position	Status (Agreed/ Not Agreed)
5.2.1	Essential Infrastructure	If Essential Infrastructure is in Flood Zone 3 or 3B then it needs to demonstrate that in a 1 in 20 year flood event it can stay operational.	<p>The FRA modelling indicates that the line would have to close in this flood event for the 60 year design life with climate change. However, the DCO Scheme is restricted by the historic alignment of the line.</p> <p>The modelling shows that the line is forecast to flood as referred to in section 5.1 above. The modelling has assumed no</p>	

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			<p>strategic flood defence solution for the River Avon.</p> <p>During the development of the FRA, modelling was undertaken to test a scenario where the track height is increased by approximately 150 mm to 250 mm at Bower Ashton. The model output however showed an increased flood risk to third party landowners which could not be mitigated. An Extreme Weather Plan to deal with operational flood risk is included as Appendix T of the FRA (ES Appendix 17.1, DCO Application Document Reference 5.6).</p>	
5.2.2	Essential Infrastructure	Any proposed development categorised as 'Essential Infrastructure', proposed within Flood Zone 3b, must be considered by the Authorising Authority to have passed the Sequential Test and Exception Test, in accordance with the requirements of national planning policy.	<p>The DCO Scheme utilises operational railway along a historic alignment, which could not be changed without prohibitive costs. There is no option to avoid Flood Zones 3 and 3B, though as an NSIP the DCO Scheme can operate within these zones provided it passes the Sequential Test and Exception Test.</p> <p>The DCO Scheme passes both the Sequential Test and the Exception Test, as required for Essential Infrastructure development within Flood Zones 3a and 3b. This is detailed in the FRA (ES Appendix 17.1, DCO Application Document Reference 5.6).</p>	
5.2.3	Essential Infrastructure	Accepted that any approved railway designated as 'Essential Infrastructure' (as	Since this comment was made by the EA, the modelling was updated and showed	

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		<p>this scheme is [because it is an NSIP]) will flood in an extreme flood event, subject to the adoption of an agreed flood management plan, including details of flood warnings and evacuation procedures.</p> <p>However, there will be a section of the line [in Bower Ashton] which will flood more frequently than the 1 in 2 year (50% annual exceedance probability - AEP) with a post development flood level of 0.93 m. The line should remain operational up to a 1 in 20 year (5% AEP) event, with the allowance for the predicted impact of climate change, without increasing flood risk elsewhere.</p>	<p>that in 2075 the line will have to close as referred to in section 5.1 above. This frequency is considered likely to have only a relatively minor impact on railway operation due to its short duration and a shallow depth above the lowest rail level. (See paragraph 5.1.5 above). During the development of the FRA, modelling was undertaken to test a scenario where the track height is increased by approximately 150 mm to 250 mm at Bower Ashton. The model output however showed an increased flood risk to third party landowners which could not be mitigated.</p> <p>An Operational Flood Plan included with the FRA (ES Appendix 17.1, DCO Application Document Reference 5.6) describes the response for reacting to flooding. This was presented to the EA.</p>	
5.2.4	Scheme design life	Query what the flooding impact is in Portishead with a lower than 120 years design life, as 100 years is the usual lifetime used for a more vulnerable development, with 60 years used for less vulnerable developments.	<p>A 60-year design life is used for the central case scenario and the Applicant has undertaken sensitivity tests based on a 100-year design life.</p> <p>The Applicant notes a 60-year design life was accepted by the EA for other West of England infrastructure projects such as the South Bristol Link and for MetroBus (M2 - Ashton Vale to Temple Meads route) in respect of environmental permits.</p>	
5.2.5	Third party land	More explanation is required on the flood difference plots and required commentary	The DCO Scheme was adjusted to ensure that no third party land is to be affected by	

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		on which properties are affected and the number.	flooding impacts e.g. the track height in Bower Ashton remains at its current level. This is included in the FRA (ES Appendix 17.1, DCO Application Document Reference 5.6). The revised flood difference plots show no increase to third party flood risk, as discussed in the submitted FRA.	
5.2.6	Third party land	More explanation is required in the flood difference plots to explain why the grey areas have no impact.	In response to the comments from the EA the Applicant has updated the difference plots to differentiate between positive and negative differences in areas shown in grey. In addition, the design has changed in the Bower Ashton / Ashton Vale area such that there are no offsite impacts. The EA has subsequently reviewed and approved the hydraulic modelling undertaken to derive these difference plots for the FRA. More detail is set out in the FRA (ES Appendix 17.1, DCO Application Document Reference 5.6). Additional hydraulic modelling has since been undertaken to assess the revised design in the Bower Ashton / Ashton Vale area. This additional modelling has been submitted to the EA to review (See section 5.1 above).	
5.2.7	Portishead	Requested more explanation in the FRA for the changes in flood levels at Portishead.	The FRA (ES Appendix 17.1, DCO Application Document Reference 5.6) was updated with further detail.	
5.2.8	Floodplain Compensation	Stated a need to explain detriments in flood risk and where compensation is unachievable e.g. Marsh Lane	Any flood risk from the DCO Scheme to third parties has been fully mitigated and	

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			included in the FRA (ES Appendix 17.1, DCO Application Document Reference 5.6).	
5.2.9	FRA modelling	Stated that in the CAFRA model, the tidal 1000 year event used different base model versions for the pre and post development scenarios; the same should be used for comparison of pre and post development scenarios.	This technical issue has now been resolved. The modelling was updated and shared with the EA who confirmed (letter dated 14 April 2019, EA reference WX/2016/129249/05-L01) they were satisfied that the models were “ <i>fit for purpose</i> ”.	
5.2.10	FRA modelling	Stated that the coastal model can be considered sufficient for this specific purpose, however preferred outstanding issues to be addressed.	The modelling was updated and shared with the EA who confirmed (letter dated 14 April 2019, EA reference WX/2016/129249/05-L01) they were satisfied that the models were “ <i>fit for purpose</i> ”.	
5.2.11	Floodplain compensation	Stated that the floodplain compensation in Bower Ashton be provided on a level for level basis and is hydraulically linked to the area of lost storage.	<p>This has been superseded by retaining the current track level.</p> <p>Compensation for loss of floodplain storage within the Clanage Road compound due to the ramp has been provided within the compound itself included in the FRA (ES Appendix 17.1, DCO Application Document Reference 5.6) and as updated as referred to in section 5.1 above. It was not possible to specify compensation on a level-for-level, and so hydraulic modelling was used to demonstrate that the proposed floodplain compensation does provide the required mitigation.</p>	

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5..2.12	Local flood impacts	Requested further information on the third party impacts resulting from the proposed scheme from increased flood levels to some areas around Portishead and Bower Ashton.	Any flood risk from the DCO Scheme to third parties has been fully mitigated and included in the FRA (ES Appendix 17.1, DCO Application Document Reference 5.6).	
5.2.13	Drove Rhine	Stated that the model report shows that for the Drove Rhine, the sensitivity test was only run with an increase of 150mm, not 200mm, therefore a run should be undertaken on a selection of return periods for a 200mm increase of the railway and a post-development difference plan shown.	<p>In response to the comment from the EA, the Applicant has undertaken sensitivity testing with an increase of 200mm and difference plots have been added to the Drove Rhyne modelling report.</p> <p>The EA has subsequently reviewed the hydraulic modelling undertaken to derive these difference plots for the FRA (ES Appendix 17.1, DCO Application Document Reference 5.6). Additional hydraulic modelling has since been undertaken to assess the revised design in the Bower Ashton / Ashton Vale area. This additional modelling has been submitted to the EA for review (See section 5.1 above)</p>	
5.2.14	Emergency plan	Requested further detail on the emergency plan at the 'permit stage'	<p>Noted. This will be provided as part of a permit application.</p> <p>An Operational Flood Plan included with the FRA (ES Appendix 17.1, DCO Application Document Reference 5.6) that describes the response for reacting to flooding has been presented to the EA.</p>	
5.2.15	Third party land	Stated that even where there is a very small increase to third party flood risks, the	The DCO Scheme was adjusted to ensure that no third party land would be affected by flooding impacts e.g. the track height in	

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		EA still need to flag it as it is contrary to the NPPF.	Bower Ashton remains at its current level. This is included in the FRA (ES Appendix 17.1, DCO Application Document Reference 5.6).	
5.2.16	Local flood impacts	Stated that the impact of the buildings and car park etc. should be assessed to the same extent as if they were the only development being undertaken.	Following this feedback, further information was provided in the FRA (ES Appendix 17.1, DCO Application Document Reference 5.6).	
5.2.17	Third party land	Very supportive of the focus on ensuring there is no increase in flood risk to third parties, by maintaining the line at existing levels.	Noted.	
5.2.18	Floodplain compensation	Stated that if the model review is satisfactory, they would accept the compensation V5 being provided for the ramp, on the grounds that it would appropriately mitigate the increase in flood risk.	The Applicant is awaiting confirmation from the EA that they are satisfied with the ramp modelling.	
5.2.19	Use of Designated Flood Zones	<p>Confirmed the following:</p> <ul style="list-style-type: none"> Clanage Road compound land should be considered as FZ3b. The Lodway Farm compound is located entirely in FZ1 however, it should be noted that a number of the access routes to the compound run through areas of higher flood risk. The Portbury Hundred compound is located in FZ3, protected by defences as 	<p>The Clanage Road compound has been included in the FRA (ES Appendix 17.1, DCO Application Document Reference 5.6) as Flood Zone 3b.</p> <p>Note: A review of the recent peak tide level at Avonmouth (March 2020), photos of areas flooded (Annexure 3) and the MetroWest FRA flood maps indicates consistency between these photos and the MetroWest understanding of tidal flood risk in the area.</p>	

Ref	Topic	Environment Agency position	Applicant position	Status (Agreed/ Not Agreed)
		<p>are the access routes. As this is a temporary compound, we would expect the defences to remain as existing, for the lifetime of the compound (assuming it will not continue to be used after the construction of the railway line). Flood risk should be considered when planning the use of this compound i.e. the storage of materials/waste must be avoided.</p> <p>Stated that any areas at risk of flooding must be subject to the requirements of any pertinent plans/reports/strategies determined through the DCO process i.e. the Flood Risk Assessment, Emergency Response Plan for Flood Events etc.</p>	<p>Access to Lodway Farm compound uses an existing route. The Portbury Hundred compound will not affect the existing flood defences. As defended flood plain, the risk to the compound is minimal and therefore the storage of material/waste should be acceptable. The contractor(s) will be required to produce a construction stage Flood Plan including any emergency response which takes into consideration the findings of the FRA (ES Appendix 17.1, DCO Application Document Reference 5.6) and the outline construction stage Flood Plan for Clanage Road construction compound, included with the FRA.</p>	

5.3 Other flooding-related issues raised during consultation for separate tables in this section

Ref	Topic	Environment Agency position	Applicant position	Status (Agreed/ Not Agreed)
5.3.1	Draft DCO	A Requirement should be included in the DCO necessitating a Flood Risk Management Plan.	Appendix T of the FRA (ES Appendix 17.1, DCO Application Document Reference 5.6) comprising the MetroWest Phase 1 Outline Flood Plan for the Operations Phase and the MetroWest Phase 1 Flood Plan during Construction for Proposed Infrastructure at Bower Ashton in Flood Zone 3b (Clanage Road Construction Compound) have been submitted with the DCO application. The Flood Plan for the operations phase will be superseded by Network Rail's own procedures for managing floods on their network. The contractor will be required to produce a construction stage flood plan which takes into consideration the findings of the FRA and the Flood Plan for Proposed Infrastructure.	
5.3.2	Strategic flood mitigation measures	Stated that it is not possible to rely on "significant changes in strategic flood risk management interventions" before 2135, and that the proposal should assume none.	The assessment has assumed no strategic flood solution. The design life for the DCO Scheme has been remodelled for 2075 (60-year design life) central case and a sensitivity test for 2115 (100-year design life).	
5.3.3	Strategic flood mitigation measures	Stated that despite the intentions of the draft Shoreline Management Plan ("SMP"), the Draft Severn Estuary SMP considers tide defences in the vicinity of the DCO Scheme, there is no certainty that improvements can or will be made.	The assessment has assumed no strategic flood solution. The design life for the DCO Scheme has been remodelled for 2075 (60-year design life) central case and a sensitivity test for 2115 (100-year design life).	

Ref	Topic	Environment Agency position	Applicant position	Status (Agreed/ Not Agreed)
5.3.4	Flood risk permits	Requested draft flood risk permits.	Environmental permits will be applied for pre-construction as included in Consents and Licences required under Other Legislation (DCO Document Reference 5.3).	
5.3.5	Strategic flood mitigation measures	Stated that it is not possible to rely on any future strategic flood risk scheme, as the delivery of any such scheme would depend on numerous factors outside the Agency's control. Accordingly, the proposals must have a robust contingency plan, and be included in the FRA.	Noted. The assessment has assumed no strategic flood solution. An Operational Flood Plan included with the FRA (ES Appendix 17.1, DCO Application Document Reference 5.6) describes the response for reacting to flooding. This was presented to the EA.	
5.3.6	FRA Local flood impacts	Noted that leaving the railway line at its current level will result in regular flooding, particularly when the predicted impact of climate change is considered. Stated they would continue to highlight the resulting low resilience to flooding, in accordance with their statutory duties.	See section 5.1 above	
5.3.7	Clanage Road Compound	A number of inaccuracies have been noted in the submitted Flood Plan for the proposed Clanage Road compound. It is stated the compound is situated in Flood Zone 3a and only at risk in a greater than 1 in 50yr event. This is contrary to the Project Team's latest flood risk modelling and therefore must be amended. Additionally, it is noted that the temporary storage of material is proposed, without a plan to remove the material if flooding is expected. This is unacceptable and contrary to previous advice that such	The Flood Plan has been updated to correct this and is included in the Flood Risk Assessment DCO Application document reference 5.6. As stated in the Master CEMP Appendix 4.2 of the ES Chapter 4 the contractor will monitor Environment Agency flood warnings and will react appropriately to the risk according to its Flood Plan and Staff Evacuation Plan. This may include the contractor and or Network Rail Maintenance/renewals teams securing	

Ref	Topic	Environment Agency position	Applicant position	Status (Agreed/ Not Agreed)
		material may increase flood risk to third parties. Accordingly, this must be amended.	materials/plant (and where appropriate moving materials/plant off site) that could be a risk during a flood.	

6. Ground investigation and contamination

6.1 The following table sets out the topics and issues which have arisen through EA's relevant representations and consultation with the EA. The table details the process whereby the topics have been scoped through dialogue between the Applicant and the EA, how issues have been resolved, or where matters remain outstanding.

	Sub-topic	Environment Agency position	Applicant position	Status (Agreed/ Not Agreed)
6.1.1	Contaminated Land (Relevant Representation)	The information submitted does not give the Environment Agency confidence that the applicant has adequately understood the potential risks associated with the development from potential historic contamination. Additionally, because the applicant does not appear to have undertaken a detailed and open-minded interpretation of the desk-based information available, the proposals to further investigate potential areas of concern may not, in our view, be comprehensive enough to determine the risk to the water environment. The wording of the documents submitted is such that potential risks appear to have been dismissed, prior to being properly assessed. All areas of potential concern should be subject to an appropriately detailed site investigation to allow for an assessment of risk, based on data and the context in which it is acquired.	The Applicant has adequately addressed the EA's concerns throughout during consultations. See below.	
	Contaminated Land (Consultation)	Stated a requirement for prior site investigation and preparation of an appropriate strategy for the management	The land-use history of the DCO Scheme has been documented and ground investigation undertaken to inform the design to allow for risks posed by land contamination. This	

	Sub-topic	Environment Agency position	Applicant position	Status (Agreed/ Not Agreed)
		of contaminated land to reduce any potential impacts on controlled waters.	is described in the Land Contamination Summary Report (ES Appendix 10.2, DCO Application Document Reference 6.25), and sections 10.4 and 10.6 of ES Chapter 10 - Geology, Hydrogeology, Ground Conditions and Contaminated Land (DCO Application Document Reference 6.25).	
6.1.2	Contaminated Land (Consultation)	Requested detail and methodology/ strategy regarding possible groundwater/land contamination, particularly historical rather than operational.	This has been assessed in the ES Chapter 10 - Geology, Hydrogeology, Ground Conditions and Contaminated Land (DCO Application Document Reference 6.13) and it was determined that construction will have no impacts on the underlying hydrogeology in terms of regional and local flows or groundwater quality. There were no likely significant effects from operation on groundwater and so this was scoped out at the Scoping Opinion (DCO Application Document Reference 6.1) stage by the Inspectorate.	
6.1.3	Contaminated Land (Consultation)	Stated that, following a review of the Trackbed, Geotechnical, and Ground Investigation reports, that the track and all of the ancillary land that will comprise the project have not been subject to an adequate level of site investigation and subsequent assessment of risks to the water environment. Stated that none of the information provided is deemed to be of any significant value in this regard, that there has been a significant oversight, and would again urge the project team to	Following this feedback, a further Land Contamination Summary Report was produced (ES Appendix 10.2, DCO Application Document Reference 6.25). The purpose of the report was to collate and summarise the information relating to land contamination, and it presented a risk assessment for the scheme, with a gap analysis to identify missing information and inform a likely timescale for obtaining this information. A draft of this report was shared with the EA and further comments received.	

	Sub-topic	Environment Agency position	Applicant position	Status (Agreed/ Not Agreed)
		address this matter, prior to submitting the application.		
6.1.4		Stated a need to see assurances over the safe transporting of contaminated material.	Further detail will be included in the contractor's CEMP, based on the Master CEMP (ES Appendix 4.2, DCO Application Document Reference 8.14).	
6.1.5	Contaminated Land (Consultation)	Queried why further investigation of land contamination at Avon Road Underbridge is not deemed necessary.	Further ground investigation is not planned as it is considered there is sufficient information available to inform the detailed design of measures included in the ES Chapter 10 - Geology, Hydrogeology, Ground Conditions and Contaminated Land (DCO Application Document Reference 6.13) and its appendices. However wider investigations are proposed at the Pill Station site to inform detailed design measures, and will include consideration of the Avon Road Bridge area within the Pill Ground Investigations.	
6.1.6	Contaminated Land (Consultation)	Disagree in respect of the weighting attributed to the potential, and as yet untested, risks associated with land contamination of parts of the scheme.	A meeting was offered to explain the risks and their assessments.	
	Contaminated Land (Consultation)	Stated uncertainty in relation to how detailed the additional site investigations will be, and whether this will be sufficient to address potential risks of land contamination	The Applicant has proposed a requirement for a DCO Requirement Report to be produced for the DCO Scheme post-DCO approval. This DCO Requirement Report requires approval by the LPA after consultation with the EA. It is proposed to approach this report in 2 stages – a desk study and GI scope which will be discussed	

	Sub-topic	Environment Agency position	Applicant position	Status (Agreed/ Not Agreed)
			with the EA prior to undertaking the GI and final DCO Requirement Discharge Report.	
6.1.7	Contaminated Land (Consultation)	Stated that they had not had the opportunity to discuss land contamination issues with [the consultant].	It was suggested that a meeting be held between the land quality specialists from the EA and the DCO Scheme's consultants.	
6.1.8	Contaminated Land (Consultation)	Stated that a dedicated desk study (or studies) is required to fully inform the proposed site investigation works to enable stakeholders to have sufficient confidence in [these works].	The Applicant has proposed a requirement for a DCO Requirement Report to be produced for the DCO Scheme post-DCO approval. This DCO Requirement Report requires approval by the LPA after consultation with the EA. It is proposed to approach this report in 2 stages – a desk study and GI scope which will be discussed with the EA prior to undertaking the GI and final DCO Requirement Discharge Report.	
6.1.9	Contaminated Land (Consultation)	Stated that the [land contamination] report does review the very limited site investigation data available however, any conclusions derived from the data reviewed and presented in this report should be treated with caution, due to its limited nature. Stated that further assessment of the existing data is needed, on the grounds that it is not clear what risk the concentrations (that have been measured) pose to controlled waters, beyond the comparison provided in the report.	The focus of the land contamination report at this stage is to provide the DCO process with information on likely significant environmental effects. The Applicant has had regard to the nature and extent of the proposed development and the receiving environment in both scoping the investigations undertaken to date and those that are most appropriate to being undertaken prior to commencement of development. Mitigation measures that are standard measures and known to be effective have been taken into account in determining the likelihood of significant effects. The Applicant has identified those works where further investigations should be undertaken prior to construction	

	Sub-topic	Environment Agency position	Applicant position	Status (Agreed/ Not Agreed)
			activities to ensure that appropriate mitigation measures will be undertaken to remove or minimise pollution linkages. A DCO Requirement Report will be produced for the DCO Scheme post-DCO approval. This DCO Requirement Report requires approval by the LPA after consultation with the EA. It is proposed to approach this report in 2 stages – a desk study and GI scope which will be discussed with the EA prior to undertaking the GI and final DCO Requirement Discharge Report.	
6.1.10	Contaminated Land (Consultation)	Stated that they did not agree with the assessment provided in Table 4.1 [of the land contamination report] because with each potential source area listed the likelihood of risk factor is invariably listed as 'n/a' or 'unlikely', with the risk then listed as 'n/a', 'no risk' or 'low'. Stated that given the lack of understanding in these areas, they questioned why the likelihood and risk appear to largely dismiss any/all issues.	The table does not dismiss all issues. "Unlikely" is defined as per CIRIA 552 and does not dismiss risk. The Applicant suggested a meeting to explain the table and the assessments. It was stated to the EA that "n/a" is used for risks not considered to exist (either through lack of source/pathway/receptor or simply that they don't exist under baseline (for example risks to site construction staff)).	
6.1.11	Contaminated Land (Consultation)	Stated that the scope of the ground investigation requirements assessment undertaken in Table 4.1 [of the land contamination report] are not clear and it would be of benefit to present site investigation proposals alongside an improved desk study. Stated that most areas are listed as needing further investigation however, Portishead Station and Avon Road Bridge do not appear to	The Applicant is recommending further GI at Portishead Station. The purposes of these investigations will be to inform detailed measures to be taken before and during the construction process in order to avoid or reduce risks to workers and the environment. At Avon Road further ground investigations are not planned as it is considered that there is sufficient information available to inform the detailed	

	Sub-topic	Environment Agency position	Applicant position	Status (Agreed/ Not Agreed)
		have been recommended for further investigation; it is not clear, based on the information provided, why this should be the case.	design of measures. Wider investigations are proposed at Pill Station site to inform detailed design measures, which will include consideration of the Avon Road Bridge area within the Pill Ground Investigations.	
6.1.12	Contaminated Land (Consultation)	Noted that, apart from the track ballast, which is a known potential source of organic and inorganic contamination, there are numerous other areas of potential concern that require further detailed investigation [section 2 of the Land Contamination Summary Report (ES Appendix 10.2, DCO Application Document Reference 6.25).]. Stated that it is essential that, as part of the assessment of risks following these further investigations, that the risks associated with mobilising contaminants are also taken into account, i.e. creation of new preferential pathways in the form of drainage features, services and engineering works in general etc.	The Applicant considers that sufficient information has been provided for the purposes of the DCO application and that the issues raised relating to pathways will be dealt with by the more detailed project design, following further investigations where identified as appropriate, in accordance with the requirements proposed for the DCO. Whilst a number of potential and confirmed sources of contamination exist along the route, the extent of works proposed for the existing freight railway are modest and the potential disturbance of ground is mainly limited to short sections of ballast renewal and works to bridges/structures. These works are not considered likely to have an impact upon existing contamination.	
6.1.13	Hazardous Waste	<p>Stated that hazardous waste would need to be removed from the site using hazardous waste consignment notes as waste code 170503* and sent for appropriately permitted disposal or remediation before any further use.</p> <p>The Non-hazardous waste would be coded as 17 05 04.</p>	The Applicant agrees with this statement from the EA.	

	Sub-topic	Environment Agency position	Applicant position	Status (Agreed/ Not Agreed)
6.1.14	Hazardous and non-hazardous Waste	Stated that there is an indication to sort the ballast at depots along the line, which implies both hazardous and non-hazardous sections of ballast would be bought together at the depots and then sorted. Stated that any mixing of hazardous and non-Hazardous waste is prohibited, unless undertaken as expressly stated under a Permit; if mixed, the resultant material would also be deemed hazardous waste.	It is more likely that waste will be sorted as it is dug, i.e. based on previous ground investigations, supplemented by additional investigation ahead of the excavation, so waste will not be mixed. The reuse of site-won materials will be facilitated through the application of the CL:AIRE The Definition of Waste: Development Industry Code of Practice, and which will be secured through the development and implementation of the Outline Materials Management Plan as part of the detailed CEMP based on the Master CEMP DCO Application Document Reference 8.12.	

7. Wildlife and habitat

7.1 The following table sets out the topics which have arisen through relevant representations and consultation with the EA. The table details the process whereby the topics have been scoped through dialogue between the Applicant and the EA, how issues have been resolved, or where matters remain outstanding.

	Sub-topic	Environment Agency position	Applicant position	Status (Agreed/ Not Agreed)
7.1.1	Risk to habitats (Relevant Representations)	Issues of particular relevance to the Environment Agency include the treatment of watercourses and wetlands, together with the species that are dependent on such habitats, in particular otter, water vole, eel and other fish species. It is acknowledged that extensive survey work has been undertaken to identify potential risks to these habitats and dependent species however, the Environment Agency must be satisfied in respect of the proposed mitigation measures, to ensure any impacts are minimal and short-term. Additionally, measures must be included for habitat re-creation and enhancement, which must result in a net gain in biodiversity from the proposal. Additionally, the Environment Agency will require full details of how it is proposed to treat and control invasive species. A commitment to long-term control of species, including Japanese knotweed, would therefore be required.	All issues that the EA raises are considered and addressed in the Master CEMP (ES Appendix 4.2, DCO Application Document Reference 8.14) and ES Chapter 9 – Ecology and Biodiversity (DCO Application Document Reference 6.12).	
7.1.2	Risk to Habitats (Consultation)	Include otter assessments / surveys particularly in respect of breeding sites and use of any areas near watercourses.	Otter survey and assessment completed for the DCO Scheme and included in Section 9.6 of ES Chapter 9 – Ecology and Biodiversity	

	Sub-topic	Environment Agency position	Applicant position	Status (Agreed/ Not Agreed)
		Appropriate mitigation will be required during construction, including covering work holes/trenches at night. Provision of otter passes must be considered.	(DCO Application Document Reference 6.12), and in the Otter Survey Report (ES Appendix 9.8, DCO Application Document Reference 6.25). Mitigation for otters has been considered in the Master CEMP (ES Appendix 4.2, DCO Application Document Reference 8.14). Otter passes are not considered necessary to mitigate the impact of the DCO Scheme.	
7.1.3	Risk to Habitats (Consultation)	Stated clarification needed in respect of habitat creation/enhancement proposals.	No new habitat or enhancements are required for the DCO Scheme which was explained to the EA.	

8. Main rivers and watercourses (excluding flooding) and groundwater

8.1 The following table sets out the topics which have arisen through EA's relevant representations and consultation with the EA. The table details the process whereby the topics have been scoped through dialogue between the Applicant and the EA, how issues have been resolved, or where matters remain outstanding.

	Sub-topic	Environment Agency position	Applicant position	Status (Agreed/ Not Agreed)
8.1.1	Pollution Prevention (Relevant Representation)	The Environment Agency has previously advised the Applicant regarding the measures required to prevent pollution of the water environment and the specific regulatory requirements pertinent to the proposal and associated works. Accordingly, the Agency must be satisfied in respect of all relevant proposals, particularly those concerning pollution prevention and incident control and waste management, including potentially hazard waste	The Applicant has adequately addressed the EA's concerns throughout during consultations. See below.	
8.1.2	Pollution Prevention (Consultation)	Stated that agreed measures will need to be implemented to minimise any disturbance with regard to adequate mitigation for impacts on watercourses and otters.	Mitigation measures detailed in the Master CEMP (ES Appendix 4.2, DCO Application Document Reference 8.14) to minimise disturbance on otters and impacts on watercourses.	
8.1.3	Pollution Prevention (Consultation)	Stated that the PEIR document indicates a good understanding of the hydrogeological sensitivities of the route and potential sources of contamination, both on the route and from surrounding land uses. The Agency would advise that detailed information will ultimately be	The Applicant has had regard to the nature and extent of the proposed development and the receiving environment in both scoping the investigations undertaken to date and those that are most appropriate to being undertaken prior to commencement of development. Mitigation measures that are standard measures and known to be	

	Sub-topic	Environment Agency position	Applicant position	Status (Agreed/ Not Agreed)
		required in the form of an appropriate desk study and site investigation proposal.	effective have been taken into account in determining the likelihood of significant effects. The Applicant has identified those works where further investigations should be undertaken prior to construction activities to ensure that appropriate mitigation measures will be undertaken to remove or minimise pollution linkages. A DCO Requirement Report will be produced for the DCO Scheme post-DCO approval. This DCO Requirement Report requires approval by the LPA after consultation with the EA. It is proposed to approach this report in 2 stages – a desk study and GI scope which will be discussed with the EA prior to undertaking the GI and final DCO Requirement Discharge Report.	
8.1.4		<p>Requested more information on the discharge rates of track / station drainage into Markham Brook to make sure it is acceptable.</p> <p>Also requested discharge rates for any track/ highway drainage that outfalls into any main river or watercourse that connects to a main river. Stated that without this the scheme could end up with a pre-commencement condition that gives the maximum outfall rate into these watercourses.</p>	The drainage design was revised, so that Pill Station and track drainage does not outfall into Markham Brook. The FRA (ES Appendix 17.1, DCO Application Document Reference 5.6). was shared with the EA, along with the Surface Water Drainage Strategy (DCO Application Document Reference 6.26).	
8.1.5	Pollution Prevention (Consultation)	Stated a need for evidence to show that ground water won't change.	This has been assessed in the ES Chapter 10 – Geology, Hydrogeology, Ground Conditions and Contaminated Land (DCO	

	Sub-topic	Environment Agency position	Applicant position	Status (Agreed/ Not Agreed)
			Application Document Reference 6.13) and it was determined that construction will have no impacts on the underlying hydrogeology in terms of regional and local flows or groundwater quality. There were no likely significant effects from operation on groundwater and so this was scoped out at the Scoping Opinion (DCO Application Document Reference 6.1) stage by the Inspectorate.	
8.1.6	Main river culverts (Consultation)	Stated a requirement to include any impacts to main river culverts in the FRA, together with a statement that there will be no additional loading onto or additional drainage into any of these. Stated that if any were to be considered for improvement or replacement, the FRA should show that the plans maximise opportunities for flood risk benefits.	Colliter's Brook and Longmoor Brook culverts' structural performance will be assessed in the context of the proposed development and the culverts will be improved if required to allow for any additional structural loading. Information on structural loading has been included in the FRA (ES Appendix 17.1, DCO Application Document Reference 5.6).	
8.1.7	FRA EA maintenance access (Consultation)	Stated that the FRA should include a 10m maintenance strip adjacent to all main rivers.	The DCO Scheme will have no adverse impact on access required to maintain Main River culverts and Main River watercourses, included in the FRA (ES Appendix 17.1, DCO Application Document Reference 5.6).	
8.1.8	Main River Culverts (Consultation)	Stated that any works which would involve excavating above or adding additional weight on top of the Longmoor Brook culvert near old Ashton Gate station would need close engagement with the EA, on top of any permit requirements.	Works to replace the ballast, rails and sleepers over Longmoor Brook culvert will be discussed with the EA in addition to any permit requirements.	

	Sub-topic	Environment Agency position	Applicant position	Status (Agreed/ Not Agreed)
			Information on structural loading has been included in the FRA (ES Appendix 17.1, DCO Application Document Reference 5.6).	
8.1.9	Permitting	Stated that permits will not be required for scaffolding within 16m of rivers if it is taken down at the end of each day and stored away from the river, and that each day the river conditions are checked before installation so that their use will not increase flood risk.	Noted.	
8.1.10		Stated that permits are required within 8m of a main river (or affecting the main river itself) or 16m of a tidal river or flood defence; further away and they can be covered by planning.	Noted.	

9. Site-specific and other matters

9.1 The following table sets out the topics which have arisen through consultation with the EA. The table details the process whereby the topics have been scoped through dialogue between the Applicant and the EA, how issues have been resolved, or where matters remain outstanding.

	Sub-topic	Environment Agency position	Applicant position	Status (Agreed/ Not Agreed)
9.1.1	Ham Green Fishing Lakes	<p>Stated that the Ham Green Fishing Lakes will need to be closely monitored during construction to ensure:</p> <ul style="list-style-type: none"> the collection of sediment is maintained effectively, due to the likely increase in loading; the management of any polluting substances stored on site, that may potentially impact on the lakes in the event of a discharge from the site. 	<p>NRIL has installed three “silt busters” to reduce the suspended sediment load of drainage from Pill Tunnel to the Ham Green Lakes. The historic issue of siltation in Ham Green lakes is now resolved and no further mitigation or monitoring is proposed for the DCO Scheme.</p> <p>The Surface Water Drainage Strategy (DCO Application Document Reference 6.26, also contained within ES Appendix 17.1) identifies additional sediment management measures during construction.</p>	
9.1.2	Bower Ashton and Marsh Lane (Easton-in-Gordano) – flood risk	<p>Stated a need to contact properties in any new yellow areas on the flood plots [in the Bower Ashton area and east of Marsh Lane near Easton-in-Gordano] as a result of an increase of the track height.</p>	<p>The height of track was revised to ensure it remains at its current level and flood compensation provided in the Clanage Road compound for flood water displacement by the ramp. This avoids flood risk to third parties, and therefore there is no need to contact properties in the Ashton/ Bower Ashton areas. See paragraphs 5.1.6 and 5.1.7 above.</p> <p>Flood compensation has been provided at Easton-in-Gordano to remove increased flood risk to third parties. Both areas have been assessed and mitigations included in</p>	

	Sub-topic	Environment Agency position	Applicant position	Status (Agreed/ Not Agreed)
			the FRA (ES Appendix 17.1, DCO Application Document Reference 5.6). See also 5.1.7 above.	
9.1.3	EA protective provisions	Stated a need for text on Protective Provisions to be included in the DCO application.	Text was provided and is included in the Draft Proposed DCO (DCO Application Document Reference 3.1). Further discussions are to take place regarding the protective provisions.	
9.1.4	Avon Gorge EA maintenance access	Stated a need for prior notification of tow path closures through the Avon Gorge, in case there is a clash with the Agency's maintenance programme.	The Applicant and NRIL will develop a community engagement strategy as set out in the Master CEMP (ES Appendix 4.2, DCO Application Document Reference 8.14) for the DCO Scheme during construction.	
9.1.5	Permitting	Stated that if a pedestrian ramp is being installed near Longmoor Brook in Ashton Vale, or levels raised within 8m of the watercourse a permit will most likely be needed.	Noted.	
9.1.6	Pill Viaduct	Stated that works to Pill Viaduct above the 0.1% AEP (1 in 1000 year) flood level with no impact on flood flows may not require a permit as the works are a statutory undertaking.	Noted.	
9.1.7	Permitting FRA Main rivers	Stated that regarding storing material, there may be a requirement to have permits issued by the EA; the basic position is that no material is to be stored in the flood plain. Explained that if this is absolutely necessary / unavoidable, the material should be stored more than 16	A flood plan was produced for the Clanage Road compound and issued to the EA within the FRA (ES Appendix 17.1, DCO Application Document Reference 5.6). The compound is well over 16 m away from the nearest main river, and if loose ballast needs to be stored	

	Sub-topic	Environment Agency position	Applicant position	Status (Agreed/ Not Agreed)
		metres away from any main river and will require a Flood Risk Activity Permit from the EA, and may additionally be subject to the requirements of a formal waste permit from the EA.	here a Flood Risk Activity Permit will be applied for.	
9.1.8	Waste storage	Queried the details regarding the proposed storage of ballast for the disused line and whether EA guidance on these issues was required. Stated that the volumes of materials would most likely exceed the exempt quantities, and the storage duration of over a year would be an issue too.	The old ballast is to be stored at the Portbury Hundred and Lodway compounds, and possibly along the rail corridor. Some will be contaminated and perhaps will be stored for over a year. These additional details and more were forwarded to the EA for a response.	
9.1.9	Waste storage	Stated that the use of the depots to store ballast using the Non Waste Framework Directive 2 exemption is proposed, and that this exemption is for the storage of waste at the site of production. Requested further information on the expected quantity of waste to be stored at any one time and the period any waste ballast would be stored at each collection point is needed, before determining the suitability of this exemption to store the waste ballast before collection.	Further discussions will take place and be considered for inclusion in a SoCG.	

10. Conclusions

10.1 This Statement of Common Ground records that, in summary:

10.1.1 [insert summary of topics agreed/ not agreed].

11. Agreement on this Statement of Common Ground

This Statement of Common Ground has been jointly prepared and agreed by:

Environment Agency
<i>Name:</i>
<i>Signature:</i>
<i>Position:</i>
<i>On behalf of:</i>
<i>Date:</i>

The Applicant
<i>Name:</i>
<i>Signature:</i>
<i>Position:</i>
<i>On behalf of:</i>
<i>Date:</i>

Network Rail Infrastructure Limited
<i>Name:</i>
<i>Signature:</i>
<i>Position:</i>
<i>On behalf of:</i>
<i>Date:</i>

ANNEXURE 1

Environment Agency Relevant Representations

The Planning Inspectorate National Infrastructure Planning Temple Quay House 2 The Square Bristol BS1 6PN
Our ref: WX/2019/133441/01-L02 Your ref: TR040011 Date: 26 February 2020 Dear Sir/Madam METROWEST
DEVELOPMENT CONSENT ORDER ENVIRONMENT AGENCY – RELEVANT REPRESENTATION

The Environment Agency remains fully supportive of the aims of the proposal, which is viewed as having considerable merit, as an integral element of a more extensive sustainable transport network.

Notwithstanding the above, please find hereunder an outline of issues pertinent to the Environment Agency's interests, which will require clarification and resolution, in the interests of the protection and enhancement of the water environment:

FLOOD RISK MANAGEMENT The Agency has, on numerous occasions, advised the Applicant in respect of its concerns regarding various aspects of flood risk management. The Agency's concerns have been compounded by the proposal's supporting Flood Risk Assessment (FRA), which is viewed as being deficient in a number of respects. The Agency has specifically advised in respect of the FRA's poor structure and lack of clarity, in addition to a number of noted repetitions and discrepancies/contradictions. Flood risk management Issues of particular concern to the Environment Agency include:

- The potential high frequency of flooding of the proposed railway line.
- The potential increase in flood risk to third parties, particularly in the vicinity of Portishead, Pill, Easton-in-Gordano and Clanage Road.
- The climate change allowances adopted.
- The provision of flood plain compensation i.e. is it adequate and is it provided on a hydraulically linked, level for level basis?
- The use and understanding of the designated flood zones.
- Details of works proposed in the vicinity of, and/or over main river culverts i.e. a 'no additional loading approach' has not been clarified, as previously requested.
- The lack of confirmation that Environment Agency access requirements can be provided (there are noted contradictions within the FRA).
- Details regarding associated development in Portishead.
- The lack of confirmation the Environment Agency's Flood Risk Activity Permitting requirements are fully understood. It is noted The Planning Inspectorate's letter dated 24 January 2020 (Ref: TR040011) raised a number of the above concerns for the Applicant's attention. The Environment Agency would advise that an additional flood risk modelling submission has been received for review, which is ongoing.

GROUNDWATER AND CONTAMINATED LAND With regard to the documents submitted in respect of the potential for historic contamination along the proposed route and at associated development sites that will support the rail infrastructure, the Environment Agency would advise as follows:

The Environment Agency has, throughout the pre-application consultation process, advised the Applicant of its concerns regarding the approach adopted in respect of the investigation of potentially contaminated land. The information submitted does not give the Environment Agency confidence that the applicant has adequately understood the potential risks associated with the development from potential historic contamination. Additionally, because the applicant does not appear to have undertaken a detailed and open-minded interpretation of the desk-based information available, the proposals to further investigate potential areas of concern may not, in our view, be comprehensive enough to determine the risk to the water environment. The wording of the documents submitted is such that potential risks appear to have been dismissed, prior to being properly assessed. All areas of potential concern should be subject to an appropriately detailed site investigation to allow for an assessment of risk, based on data and the context in which it is acquired.

ECOLOGY AND BIODIVERSITY Issues of particular relevance to the Environment Agency include the treatment of watercourses and wetlands, together with the species that are dependent on such habitats, in particular otter, water vole, eel and other fish species. It is acknowledged that extensive survey work has been undertaken to identify potential risks to these habitats and dependent species however, the Environment Agency must be satisfied in respect of the proposed mitigation measures, to ensure any impacts are minimal and short-term. Additionally, measures must be included for habitat re-creation and enhancement, which must result in a net gain in biodiversity from the proposal. Additionally, the Environment Agency will require full details of how it is proposed to treat and control invasive species. A commitment to long-term control of species, including Japanese knotweed, would therefore be required.

LAND INTERESTS With reference to the Environment Agency's leasehold land and other land interests in the vicinity of the proposed route, the following comments must be noted:

Full details are required in respect of how each of the parcels of land, where the Environment Agency is in occupation, or has an interest, will potentially be affected by the proposal and whether any impact will be on a temporary or permanent basis. Whether it is permanent or temporary, the Environment Agency will need to ensure suitable arrangements are in place, to enable it to continue to work operationally from the land in question. It is deemed essential to ensure that, if the proposal will affect any of the Agency's leaseholds or land interests, it does not put the Agency in breach of any of its obligations, under agreements associated with any land affected.

AND ENVIRONMENTAL MANAGEMENT The Environment Agency has previously advised the Applicant regarding the measures required to prevent pollution of the water environment and the specific regulatory requirements pertinent to the proposal and associated works. Accordingly, the Agency must be satisfied in

respect of all relevant proposals, particularly those concerning pollution prevention and incident control and waste management, including potentially hazard waste.

PROTECTIVE PROVISIONS The Environment Agency's legal representative is still awaiting contact from the Applicant's legal representatives regarding outstanding concerns in respect of the submitted Protective Provisions pertinent to the Environment Agency's interests.

STATEMENT OF COMMON GROUND A note from Womble Bond Dickinson dated 6 December 2019 (accessed through The Planning Inspectorate's meeting noted dated 14 January 2020) states the Applicant will continue to work with the Environment Agency on water related issues. The Agency would advise that it is currently awaiting a draft copy of the Statement of Common Ground, as previously requested. It is important to note that, following recent storm events, the Environment Agency is currently in 'Incident Mode', which necessitates the prioritisation and re-direction of resources to ensure the protection of people, property and infrastructure in the affected areas. Therefore, while staff are engaged in their respective incident management roles, normal workloads are likely to be subject to delays. Should you wish to discuss this matter further please contact the undersigned. Yours sincerely Dave Pring Planning Specialist Direct e-mail

nwx.sp@environment-agency.gov.uk

ANNEXURE 2

Jacobs' Response to MetroWest S51 Letter



MetroWest+

Portishead Branch Line (MetroWest Phase 1)

TR040011

Applicant: North Somerset District Council

Response to the Planning Inspectorate's letter of advice under s 51 of the Planning Act 2008 and dated 24 January 2020
Planning Act 2008

Author: Jacobs

Date: March 2020



Response to the Planning Inspectorate's letter of advice under s 51 of the Planning Act 2008 and dated 24 January 2020 ("s 51 Letter")

This document sets out North Somerset District Council's ("the Applicant's") response to the Planning Inspectorate's request for information contained in the s 51 Letter.

Planning Inspectorate’s comment	The Applicant’s response																											
<p>The Planning Inspectorate has undertaken an initial review of the Flood Risk Assessment ("FRA") submitted as part of the Portishead Branch Line (MetroWest Phase 1) Development Consent Order (DCO) application. See APP-076 to APP-092, duplicated in APP-173 to APP-189. Some concerns were identified during the acceptance stage relating to the FRA and the Inspectorate has raised the following issues and has requested a response from the Applicant:</p> <p>Flood Risk Assessment Currency</p> <p>The Inspectorate has identified apparent inconsistencies within the FRA relating to the climate change allowances used in modelled scenarios. The inconsistencies relate to allowances for rainfall intensity, peak river flow and sea level rise. Section 5 of the Applicant’s FRA Report states that projected climate change allowances were derived following the NPPF 2013 guidance (which is based on DEFRA 2006 climate change guidance). The Inspectorate notes that the NPPF was updated in February 2019, and revised in line with UK Climate Projections 2018, prior to the DCO application being made in November 2019</p> <p>The inconsistencies are broadly as highlighted in the tables below.</p> <table><tr><th colspan="2">Rainfall intensity: Applicant’s Assessment</th><th colspan="2">NPPF Guidance recommendation</th></tr><tr><th>Year</th><th></th><th>2040 to 2069 (2050s)</th><th>2070 to 2115 (2080s)</th></tr><tr><td>Allowance</td><td>20% 30%</td><td>UE = 20% C = 10%</td><td>UE = 40% C = 20%</td></tr></table> <p>The guidance states that central and upper end allowances should be used in flood risk assessments to understand the range of impact.</p> <table><tr><th colspan="3">Peak river flow (Severn): Applicant’s Assessment</th><th colspan="2">NPPF Guidance recommendation</th></tr><tr><th>Year</th><th>2075</th><th>2115</th><th>2040 to 2069 (2050s)</th><th>2070 to 2115 (2080s)</th></tr><tr><td>Allowance</td><td>20%</td><td>20%</td><td>UE = 40% HC = 25% C = 20%</td><td>UE = 70% HC = 35% C = 25%</td></tr></table> <p>The guidance states that upper end allowances should be used for essential infrastructure in flood zones 2 or 3a.</p> <p>NPPF Guidance recommendation</p>	Rainfall intensity: Applicant’s Assessment		NPPF Guidance recommendation		Year		2040 to 2069 (2050s)	2070 to 2115 (2080s)	Allowance	20% 30%	UE = 20% C = 10%	UE = 40% C = 20%	Peak river flow (Severn): Applicant’s Assessment			NPPF Guidance recommendation		Year	2075	2115	2040 to 2069 (2050s)	2070 to 2115 (2080s)	Allowance	20%	20%	UE = 40% HC = 25% C = 20%	UE = 70% HC = 35% C = 25%	<p>Section A</p> <p>It is clear that the climate change allowances in the Inspectorate's tables have been taken from paragraph 5.1.5 of the FRA which states:</p> <p>"The following climate change allowances have been applied in the modelling undertaken for this FRA:</p> <ul style="list-style-type: none">• Extreme rainfall depths: +20% for 2075; +30% for 2115• Extreme river flows: +20% for 2075 and 2115• Sea level rise: +0.59 m between 1990 and 2075; +1.14 m between 1990 and 2115• Extreme wind speed: +10%• Extreme wave height: +10%. " <p>Whilst the Inspectorate has used the correct allowances in the tables provided in the s 51 letter, the Applicant wishes to explain that these were not the climate change allowances applied in the modelling for all the catchments and for all parts of the Proposed Development:</p> <ol style="list-style-type: none">1. The allowances for rainfall intensity (or extreme rainfall depths) for small catchments (< 5km²) fluvial models (Drove Rhyne and Easton-in-Gordano Stream) are 20% for 2075 and 30% for 2115 as referred to above. However, for Longmoor and Colliter’s Brooks (catchment areas 8.6km² and 5.4km² respectively) a 25% allowance was applied for both 2075 and 2115. This is because the FRA uses Bristol City Council’s (BCC) Central Area Flood Risk Assessment (CAFRA) model to assess fluvial flood risk in Longmoor and Colliter’s Brooks (as well as River Avon tidal flood risk). The CAFRA model fluvial climate change allowances specified in the model boundary conditions were retained (+25%) as this was consistent with BCC’s CAFRA modelling. Also, the climate change allowances applied in the drainage design for the permanent development sites at Portishead and Pill Station car parks, haul roads and compounds was 40% (see document APP 192 - 6.26 Surface Water Drainage Strategy for Portishead and Pill Stations, Haul Roads and Compounds) which is the Upper End for 2070 to 2115 in the updated NFFP guidance (December 2019 NPPF Guidance – see - https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances). Also, the Applicant's climate change allowance was 30% for the stations and platforms and 20% for the track (see section 8.3 FRA). This was because Network Rail's GRIP 3 design uses a 30% allowance for station buildings and platforms and 20% for track. However, the Applicant formally acknowledges that at detailed design at GRIP 5 it will need to consider a design capacity reflecting an allowance of 40% for climate change which may be enforced through Requirement 11 of the draft DCO.2. For the peak river flow the allowance of 20% referred to in paragraph 5.1.5 of the FRA is not correct. As described in the FRA, the only element of the Applicant’s modelling that applied river flow allowances was the fluvial simulations undertaken with CAFRA hydraulic model. This modelling applied a 25% allowance for both 2075 and 2115 (to be consistent with the CAFRA modelling). The Applicant has however explained the implications of using the December 2019 NPPF Guidance climate change allowances in Tables 1 and 2 in Appendix 1. The tables show that the Applicant has run further models using the December 2019 NPPF. Guidance for sea level rises (tidal River Avon flooding), and increased rainfall allowances (applied in the Longmoor and Colliter’s Brooks and Easton-in-Gordan Stream fluvial models). Furthermore, notwithstanding the reference to the small size of the catchments (see table 1) the Applicant will also re-run the simulation with a 70% allowance for fluvial flooding as an “upper limit” sensitivity test.
Rainfall intensity: Applicant’s Assessment		NPPF Guidance recommendation																										
Year		2040 to 2069 (2050s)	2070 to 2115 (2080s)																									
Allowance	20% 30%	UE = 20% C = 10%	UE = 40% C = 20%																									
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Allowance	20%	20%	UE = 40% HC = 25% C = 20%	UE = 70% HC = 35% C = 25%																								

Planning Inspectorate’s comment								The Applicant’s response																
<p>Sea level (South west): Applicant’s Assessment</p> <table><tr><th>Year</th><th>1990 to 2075</th><th>1990 to 2115</th><th>2000 to 2035 (mm)</th><th>2036 to 2065 (mm)</th><th>2066 to 2095 (mm)</th><th>2096 to 2125 (mm)</th><th>Cumulative 2000 to 2125 (m)</th></tr><tr><td>Allowance</td><td>0.59m</td><td>1.14m</td><td>HC = 5.8 UE = 7</td><td>HC = 8.8 UE = 11.4</td><td>HC = 11.7 UE = 16</td><td>HC = 13.1 UE = 18.4</td><td>HC = 1.21 UE = 1.62</td></tr></table> <p>The Inspectorate understands that rainfall intensity and peak river flow allowances have not been amended in the NPPF guidance since February 2019, but notes that further guidance on their use was added in the December 2019 update. The Inspectorate also understands that updates to NPPF guidance for sea level were made in December 2019, after the DCO application was made.</p>								Year	1990 to 2075	1990 to 2115	2000 to 2035 (mm)	2036 to 2065 (mm)	2066 to 2095 (mm)	2096 to 2125 (mm)	Cumulative 2000 to 2125 (m)	Allowance	0.59m	1.14m	HC = 5.8 UE = 7	HC = 8.8 UE = 11.4	HC = 11.7 UE = 16	HC = 13.1 UE = 18.4	HC = 1.21 UE = 1.62	<p>3. Rainfall intensity and peak river flow have some but not a significant impact on flood risk (see implications in Tables 1 and 2 in Appendix 1). The most significant impact of future projected climate change on flood risk will be an increase in tidal (River Avon) flood risk due to the projected sea level rise. (see paragraph 2.4.12 of the FRA). For sea level rises, paragraph 5.1.5 of the FRA denotes the increases in sea levels to 2075 and 2115 due to climate change (0.59m and 1.14m) used in the CAFRA model. The December 2019 NPPF Guidance levels are generally higher but as the Inspectorate acknowledges, these figures were only updated in December 2019 after the DCO application was made. A copy of the sea level rise guidance adopted at the time of the study (pre-December 2019 guidance) is provided in Appendix 3. These were the sea level rise allowances that were current at the time of submitting the DCO application and it was therefore a pragmatic and reasonable approach to have taken. The Applicant also explains in paragraph 4.2.17 and table 4.4 of the FRA, the Environment Agency (EA) Coastal Flood Boundary (CFB) 2018 Extreme Water Levels (EWL) at Avonmouth was compared with those of the CFB 2011 dataset (applied in the CAFRA modelling). This comparison shows the revised CFB 2018 EWLs are lower than equivalent CFB 2011 EWLs, by 0.09 m for the 20 year return period EWL. This indicates that whilst the CAFRA modelling uses the climate change allowances derived from the NPPF 2013 guidance it overstates “present day” tidal flood risk compared to the more recent 2018 CFB EWLs. Also Section C together with Tables 3 and 4 in Appendix 1 below compares EWLs at Avonmouth applied in the Portishead Branch Line (MetroWest Phase 1) tidal River Avon modelling (as a downstream boundary condition) with those derived by applying the values of the current CFB 2018 EWLs adjusted to future years with the current sea level rise allowances for flood risk assessments (as updated in the December 2019 NPPF Guidance). In other words using the climate change allowances in the Inspectorate's table for sea level rises opposite.</p> <p>The Applicant however readily acknowledges that ideally the most recent climate change allowances should have been used throughout where possible. The reason for this omission is mainly due to the FRA having being conducted over a number of years prior to the February 2019 NPPF guidance. The Applicant's consultants also agreed with the EA use of the NPPF2013 allowances in September 2015. Subsequently the EA undertook several model reviews as referred to in section 6.2 of the FRA to July 2019 and at no stage were the climate change allowance discrepancies raised.</p>
Year	1990 to 2075	1990 to 2115	2000 to 2035 (mm)	2036 to 2065 (mm)	2066 to 2095 (mm)	2096 to 2125 (mm)	Cumulative 2000 to 2125 (m)																	
Allowance	0.59m	1.14m	HC = 5.8 UE = 7	HC = 8.8 UE = 11.4	HC = 11.7 UE = 16	HC = 13.1 UE = 18.4	HC = 1.21 UE = 1.62																	
<p>The Applicant’s FRA Report suggests throughout that ongoing consultation and agreement has been sought with the Environment Agency regarding the approach and scope of the assessment, however no specific evidence of agreements reached has been provided.</p>								<p>Section B</p> <p>The Applicant has consulted with the EA throughout development of the FRA as detailed in Section 6 of the FRA. This has included several submissions of the draft FRA and hydraulic modelling for review. The EA is currently reviewing modelling undertaken to assess the proposed floodplain compensation at the Clanage Road compound site.</p> <p>The Applicant accepts that there has been no final agreement with the EA but is in dialogue and is aiming to progress with a Statement of Common Ground.</p>																
<p><i>(i) Frequency of incidents of flooding</i></p> <p>At Bower Ashton - the simulation of impacts from River Avon tidal flooding indicates that this section of the operational NSIP would experience tidal flood events once every 5 to 10 years for the assessment year (taken to be 2015) and more than once a year on average in the future (scenarios 2075 and 2115) (taking into account climate change, including sea level rise, into consideration). In preparation for the examination the Inspectorate seeks to understand the extent to which the application of the revised climate change allowances may (or may not) affect the findings in this regard. In particular, whether such detail would result in anticipated flood events at more frequent intervals and at earlier points in the design life of the Proposed Development.</p>								<p>Section C</p> <p>To respond to the Inspectorate's specific query for Bower Ashton, the Applicant has prepared tables 3 and 4 in Appendix 1 which compares EWLs at Avonmouth applied in the Portishead Branch Line (MetroWest Phase 1) tidal River Avon modelling (as a downstream boundary condition) with those derived by applying the values of the current CFB2018 EWLs adjusted to future years with the current sea level rise allowances for flood risk assessments (as updated in the December 2019 NPPF Guidance.) The tables have been prepared for the whole of the Proposed Development but naturally includes Bower Ashton as the first part of the operational railway which may be susceptible to flooding due to its close proximity to the River Avon.</p> <p>The graph below compares EWLs applied in the MetroWest modelling with those derived applying the current CFB dataset (CFB2018) adjusted to future years with the current upper end sea level rise allowances for flood risk assessments, for the 10 year and 200 year return periods. This shows that up to approximately 2065 the EWLs applied in the MetroWest modelling are higher than those derived using the current CFB 2018 values and December 2019 NPPF Guidance climate change allowances -</p>																

Planning Inspectorate’s comment	The Applicant’s response																														
	<p>i.e. until approximately 2065 the MetroWest tidal River Avon flood simulations would give higher flood levels than current upper end simulations.</p> <table><caption>Estimated data points from the graph (mAOD)</caption><tr><th>Year</th><th>Applied in MetroWest FRA - 10yr</th><th>Current EWLs (CFB2018 and December 2019 upper end SLR allowances) - 10yr</th><th>Applied in MetroWest FRA - 200yr</th><th>Current EWLs (CFB2018 and December 2019 upper end SLR allowances) - 200yr</th></tr><tr><td>2017</td><td>8.65</td><td>8.55</td><td>9.15</td><td>9.05</td></tr><tr><td>2040</td><td>8.75</td><td>8.70</td><td>9.30</td><td>9.25</td></tr><tr><td>2065</td><td>8.90</td><td>8.90</td><td>9.45</td><td>9.45</td></tr><tr><td>2080</td><td>9.05</td><td>9.15</td><td>9.60</td><td>9.75</td></tr><tr><td>2100</td><td>9.25</td><td>9.40</td><td>9.80</td><td>10.10</td></tr></table> <p>Present day Based on the MetroWest simulations undertaken, the FRA concludes that the MetroWest railway floods at Bower Ashton approximately once every 5 to 10 years on average for the present day. Table 3 in Appendix 1 shows the updated (i.e. December 2019 NPPF Guidance) tidal boundary conditions for the CFB 2018 dataset base year of 2017 are lower than the 2015 values applied in the MetroWest FRA by 0.03m to 0.09m. Therefore the MetroWest FRA present day simulations overstate flood risk compared to the updated CFB2018 EWLs i.e. the FRA values are slightly more precautionary.</p> <p>2075 (DCO scheme design life year) The current December 2019 NPPPF Guidance* states: “For flood risk assessments and strategic flood risk assessments, assess both the central and upper end allowances to understand the range of impact.” The 2075 EWLs applied in the MetroWest FRA modelling are between the updated CFB2018 values with higher central and upper end allowances applied, and closer to the values with the upper end allowance applied (See Table 3 in Appendix 1).</p>	Year	Applied in MetroWest FRA - 10yr	Current EWLs (CFB2018 and December 2019 upper end SLR allowances) - 10yr	Applied in MetroWest FRA - 200yr	Current EWLs (CFB2018 and December 2019 upper end SLR allowances) - 200yr	2017	8.65	8.55	9.15	9.05	2040	8.75	8.70	9.30	9.25	2065	8.90	8.90	9.45	9.45	2080	9.05	9.15	9.60	9.75	2100	9.25	9.40	9.80	10.10
Year	Applied in MetroWest FRA - 10yr	Current EWLs (CFB2018 and December 2019 upper end SLR allowances) - 10yr	Applied in MetroWest FRA - 200yr	Current EWLs (CFB2018 and December 2019 upper end SLR allowances) - 200yr																											
2017	8.65	8.55	9.15	9.05																											
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2065	8.90	8.90	9.45	9.45																											
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2100	9.25	9.40	9.80	10.10																											

Planning Inspectorate’s comment	The Applicant’s response
	<p>The higher central and upper end allowances are both precautionary. As the MetroWest simulated 2075 River Avon tidal EWLs are consistently higher than the equivalent updated CFB2018 values with higher central allowance applied, and only 0.03m to 0.05m below the upper end allowances (for the 2 year to 200 year return periods), the associated FRA conclusions are considered robust.</p> <p>Table 4 in Appendix 1 details an assessment of the calculated future frequency of flooding to the proposed railway. The calculated frequency of future flooding of the proposed railway is approximately:</p> <ul style="list-style-type: none">- 1 to 2 times per year in 2075 applying the higher central sea level rise allowances,- 2 to 3 times per year in 2075 applying the upper end sea level rise allowances.- Once every 1 to 2 years in 2060 applying the higher central sea level rise allowances,- Once per year in 2060 applying the upper end sea level rise allowances <p>These estimates are considered precautionary as the sea level rise allowances are precautionary. The Applicant has also applied the impact of frequency of future flooding on the proposed train service timetable for 2075 at Appendix 2. As is demonstrated the impact of flooding on the operation of the proposed train service is negligible.</p> <p>2115 (longer climate change horizon simulated as sensitivity test)</p> <p>The 2115 FRA simulations were undertaken as a sensitivity test (the scheme design life is represented by the 2075 simulations). The 2115 EWLs applied in the MetroWest FRA tidal River Avon modelling are between the current CFB 2018 values with higher central and upper end allowances applied, and closer to the values with the higher central allowance applied.</p> <p>As the higher central and upper end allowances are both precautionary, and the MetroWest simulated 2115 River Avon tidal EWLs are consistently higher than the equivalent CFB 2018 values with higher central allowance applied, the 2115 sensitivity test simulations and associated FRA conclusions are considered robust.</p> <p>The calculated frequency of future (2115) flooding of the proposed railway was calculated in the same way as for 2075 (described above). The calculated frequency of future (2115) flooding is approximately 5 to 6 times per year applying the higher central sea level rise allowances, and approximately 8 times per year applying the upper end sea level rise allowances. However, these estimates are considered precautionary as the sea level rise allowances are precautionary. Before Bristol urban areas were exposed to this frequency of flooding, it is likely there would be a strategic intervention to reduce flood risk to Bristol.</p> <p>Therefore taking into account updated climate change allowances, including sea level rises, into consideration there is a small but not significant increase in anticipated tidal River Avon flood events at more frequent intervals (see Table 4 in Appendix 1) but not, as demonstrated in the above graph, at earlier points in the design life of the Proposed Development until after 2065. Appendix 2 also shows the impact of frequency of future flooding on the proposed train service timetable for 2115,</p>

Planning Inspectorate's comment	The Applicant's response
<i>(ii) Potential need for compensation</i>	
The Clanage Road maintenance and access compound will include access ramps to the main road and to the railway. These ramps displace existing floodplain storage. The Applicant proposes compensation to address this displacement by lowering ground levels within the compound site. In preparation for the examination the Inspectorate seeks to understand the extent to which the application of the revised climate change allowances may (or may not) affect the findings in this regard. In particular whether such detail would result in a need for increased levels of flood compensation to address greater levels of floodplain storage being displaced.	<p>Section D</p> <p>The Applicant has now undertaken further modelling to assess whether the proposed floodplain compensation at Bower Ashton (lowering ground levels within the Clanage Road compound site) provides the required compensation – applying the current tidal boundary conditions in the model (i.e. applying the current CFB 2018 dataset and the current climate change allowances as updated in December 2019 NPPF Guidance.</p> <p>This modelling demonstrates the proposed floodplain compensation at Bower Ashton does fully compensate for the ramps to the main road and railway with no simulated increase in offsite flood risk up to the 200 year tidal River Avon flood in 2075 and 2115, applying the December 2019 NPPF Guidance Upper end sea level rise allowances.</p> <p>In any event, as the design life of the proposed development is 2075, the mitigation proposed and the tide levels used to undertake an assessment are greater than those which are required. An assessment has been completed using 2115 tidal predictions which are in excess of those required for an equivalent assessment of a 2075 design life (both Higher Central and Upper End) and is therefore considered to be conservative.</p> <p>The EA is currently considering the Applicant's further modelling. In the meantime therefore, the FRA conclusions are considered robust in this regard.</p>
The Applicant also proposes to increase the footprint of the railway embankment within the Easton-in-Gordano Stream floodplain which would result in displacement of potential floodplain storage, south of the railway. The Applicant therefore proposes floodplain storage compensation. In preparation for the examination the Inspectorate seeks to understand the extent to which the application of the revised climate change allowances may (or may not) affect the findings in this regard. In particular whether such detail would result in a need for increased levels of flood compensation to address greater levels of floodplain storage being displaced.	<p>Section E</p> <p>The December 2019 NPPF Guidance on climate change guidance specifies for small catchments such as the Easton-in-Gordano Stream catchment (<5km²) rainfall climate change allowances should be applied rather than river flow allowances. Assessment of the central and upper end rainfall allowances is required (20% and 40% respectively for both the 2075 and 2115 simulated future years). As mentioned above, the MetroWest Phase 1 FRA modelling of Easton-in-Gordano Stream applies a 20% climate change allowance for 2075 and 30% allowance for 2115.</p> <p>We have now undertaken simulations applying the December 2019 NPPF Guidance upper end climate change allowance (applying 40% uplift for both the 2075 and 2115 simulated future years). Results of these simulations show that the proposed floodplain storage compensation within the Easton-in-Gordano Stream floodplain does provide mitigation when applying the current upper end climate change allowance of 40%.</p> <p>The proposed floodplain storage compensation provides compensation for fluvial flood events up to a peak level of 8.3mAOD. The simulated 100 year return period fluvial flood peak level with 40% climate change allowance is 8.28 mAOD in 2075 and 8.29 mAOD in 2115 i.e. no additional floodplain compensation is required beyond what is proposed in the DCO application.</p>
More generally the Inspectorate is keen to understand the extent to which the application of revised climate change allowances may influence the findings of the assessment and/or the design of the Proposed Development, including any potential consequential needs for lands, rights or powers to deliver mitigation	<p>Section F</p> <p>The significance on the findings of the FRA modelling of applying the climate change allowances in the December 2019 NPPF Guidance (and where relevant, the current Coastal Flood Boundary 2018 dataset) is summarised in Tables 1 to 6 of Appendix 1.</p> <p>Applying the December 2019 NPPF Guidance climate change allowances and current CFB 2018 dataset does not result in a requirement to change the alignment or elevation of the proposed railway and associated development.</p> <p>The significance in terms of floodplain compensation requirements is summarised in Sections D and E above for two critical areas raised by the Inspectorate; Clanage Road compound and Easton in Gordano railway embankment. The floodplain compensation areas proposed in the FRA are sufficient for these two areas and the proposed development generally i.e. no additional lands, rights or powers are required above what is proposed in the DCO application.</p> <p>The December 2019 NPPF Guidance climate change allowances will be applied in the drainage design during the “GRIP 5” detailed design stage. The Applicant's principal consultant team have also given initial thought to whether it is likely the additional percentage specification at GRIP 5 stage might:</p> <ul style="list-style-type: none"> (a) lead to either the need for additional land outside of the existing Order land; (b) lead to additional material works being required; and/or (c) give rise to significant environmental effects beyond those contemplated in the Applicant's ES. <p>The conclusions were that no additional land or material new works are required. No additional significant environmental effects are contemplated.</p>

Planning Inspectorate’s comment	The Applicant’s response
<i>(iii) Update on view of the Environment Agency</i>	
The Inspectorate recommends the Applicant responds to the specific points addressed above and in doing so explains if/how climate change allowances applied in the FRA, are robust and sufficient, taking into account any departure from the allowances proposed in existing guidance. The Applicant should provide confidence with regard to the robustness of the FRA and ideally demonstrate agreement with the Environment Agency on the scope of the assessment.	Section G Responses to the specific points above are presented in this document. Tables 1 to 6 provide further detail of the significance to the FRA of the differences between the climate change allowances applied in the FRA and those in the December 2019 NPPF Guidance. Further to the FRA modelling, additional model simulations have been undertaken to inform responses to the specific points above, applying current climate change allowances. Whilst there has not yet been final agreement with the EA, we are in dialogue and are aiming to progress with a Statement of Common Ground.

APPENDICES

Appendix 1

Table 1: Peak river flow climate change allowances

Peak river flow (Severn)			
Epoch	*17 December 2019 guidance	Allowances applied in MetroWest Phase 1 FRA	Significance of differences
'2080s' (2070 to 2115)	December 2019 NPPF Guidance specifies the Upper end allowance should be applied for Essential Infrastructure projects in Flood Zones 2, 3a or 3b. +70% (Upper end allowance)	2075: +25%** 2115: +25%** ** The MetroWest Phase 1 FRA uses Bristol City Council's (BCC) Central Area Flood Risk Assessment (CAFRA) model to assess fluvial flood risk in Longmoor and Colliter's Brooks (as well as River Avon tidal flood risk). The CAFRA model fluvial climate change allowances specified in the model boundary conditions were retained (+25%) as this was consistent with BCC's CAFRA modelling. In the River Avon flood risk in the vicinity of the MetroWest Phase 1 project is tidally dominated and so determined by the tidal (rather than fluvial) simulated events. Simulated River Avon tide conditions are considered in Tables 3 and 4.	For small catchments (< 5km2), the climate change allowances specified for rainfall intensity are considered more appropriate than those specified for river flows*. As the Longmoor and Colliter's Brooks catchment areas are only slightly larger (Flood Estimation Handbook catchment areas 8.6km2 and 5.4km2 respectively) the peak rainfall allowances are considered more representative for these watercourses than the peak river flow allowances, which are considered representative of larger catchments. Longmoor and Colliter's Brooks climate change allowances are therefore considered in Table 2, under peak rainfall allowances.
'2050s' (2040 to 2069)	+40% (Upper end allowance)	Epoch not included in assessment	Epoch not included in assessment

* 17 December 2019 guidance taken from <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

Table 2: Peak rainfall climate change allowances

Peak rainfall intensity			
Epoch	*December 2019 NPPF Guidance	Allowances applied in MetroWest Phase 1 FRA	Significance of differences
'2080s' (2070 to 2115)	Guidance* specifies: "For flood risk assessments and strategic flood risk assessments, assess both the central and upper end allowances to understand the range of impact." +20% (Central allowance) +40% (Upper end allowance)	For small catchments (< 5km ²) fluvial models (Drove Rhyne and Easton-in-Gordano Stream): 2075: +20% 2115: +30% For Longmoor and Colliter's Brooks (catchment areas 8.6km ² and 5.4km ² respectively): 2075: +25%** 2115: +25%** ** The MetroWest Phase 1 FRA uses Bristol City Council's (BCC) Central Area Flood Risk Assessment (CAFRA) model to assess fluvial flood risk in Longmoor and Colliter's Brooks (as well as River Avon tidal flood risk). The CAFRA model fluvial climate change allowances specified in the model boundary conditions were retained (+25%) as this was consistent with BCC's CAFRA modelling.	Drove Rhyne and Easton-in-Gordano Stream: The December 2019 NPPF Guidance specifies the central and upper end allowances (20% and 40% for both the 2075 and 2115 simulated future years). The MetroWest Phase 1 modelling of Drove Rhyne and Easton-in-Gordano Stream applies a 20% climate change allowance for 2075 and 30% allowance for 2115. Drove Rhyne At the railway crossing of Drove Rhyne locations, simulated 1000 year return period peak flood levels (with a 30% climate change allowance) are more than 0.4m below the railway level. The differences between simulated 1000 year peak flood levels with a 20% allowance and 30% allowance are only approximately 0.01m at the railway crossing. Increasing the climate change allowance to 40% is therefore not expected to significantly increase simulated peak flood levels, and therefore is not expected to impact the railway (and as there is no proposed change to the railway footprint below the flood level the railway would not affect flood risk elsewhere). The conclusions of the FRA would therefore be unlikely to change if a 40% allowance were applied in the Drove Rhyne modelling. The FRA conclusions are therefore considered robust in this regard. Easton-in-Gordano Stream At the railway crossing of Easton-in-Gordano Stream, the simulated 1000 year return period peak flood level (with a 30% climate change allowance) is more than 0.2m below the railway level. The difference between simulated 1000 year peak flood levels with a 20% allowance and 30% allowance is only approximately 0.02m at the railway crossing. Increasing the climate change allowance to 40% is therefore not expected to significantly increase simulated peak flood levels, and therefore is not expected to impact the railway. The MetroWest phase 1 FRA details proposed floodplain compensation on land to the south of (i.e. upstream of) the railway crossing of Easton-in-Gordano Stream, to mitigate a proposed slight increase in railway footprint in the Easton-in-Gordano Stream fluvial floodplain. Table 8.1 in the FRA lists the displaced floodplain storage volumes within 0.1 m level ranges, and the compensation volumes provided up to 8.3 mAOD. Table 8.1 in the FRA shows that the proposed floodplain compensation provides more than the enough compensation for flood levels up to 8.3 mAOD. We have now simulated the 100 year return period Easton-in-Gordano Stream fluvial flood event in 2075 and 2115, applying the December 2019 NPPF Guidance climate change allowance (+40% for both the 2075 and 2115 simulations) and with increased tidal boundaries according to the current climate change guidance. This gives peak 100 year fluvial flood levels in the floodplain directly south of the railway of 8.28mAOD for 2075 and 8.29mAOD for 2115. The proposed flood compensation area is therefore shown to be sufficient when applying the December 2019 NPPF Guidance climate change allowances. The FRA conclusions are therefore considered robust in this regard. Longmoor and Colliter's Brooks The December 2019 NPPF Guidance specifies the central and upper end allowances (20% and 40% for both the 2075 and 2115 simulated future years). The MetroWest Phase 1 modelling of Longmoor and Colliter's Brooks applies a 25% climate change allowance for both 2075 and 2115. We have now simulated flooding in the Longmoor and Colliter's Brooks applying the December 2019 NPPF Guidance climate change allowances (40% uplift in model inflows and current sea level rise allowances applied). Applying these climate change and sea level rise allowances has not resulted in a change in the simulated future frequency of closure of the railway at Longmoor and Colliter's Brooks in 2075 and 2115. This remains at once every 50 to 75 years (i.e. as assessed in the FRA). The FRA conclusions are therefore considered robust in this regard.
'2050s' (2040 to 2069)	+10% (Central allowance) +20% (Upper end allowance)	Epoch not included in assessment	Epoch not included in assessment

* 17 December 2019 guidance taken from <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

Table 3: Comparison of EWLs applied in MetroWest Phase 1 tidal River Avon modelling with EWLs applying the current CFB2018 dataset and December 2019 NPPF climate change guidance*

	*CFB 2018 EWLs adjusted for future year (mAOD)					EWLs applied in MetroWest Phase 1 tidal River Avon modelling (mAOD)			Differences: EWLs applied in MetroWest tidal River Avon modelling minus CFB2018 EWLs adjusted with December 2019 NPPF climate change allowances (m)			
Return period (years)	Base year 2017	adjusted to 2075 UKCP18 Higher central	adjusted to 2075 UKCP18 Upper end	adjusted to 2115 UKCP18 Higher central	adjusted to 2115 UKCP18 Upper end	2015	2075	2115	2075: MetroWest EWLs – CFB2018 EWLs with Higher central adjustment	2075: MetroWest EWLs – CFB2018 EWLs with Upper end adjustment	2115: MetroWest EWLs – CFB2018 EWLs with Higher central adjustment	2115: MetroWest EWLs – CFB2018 EWLs with Upper end adjustment
2	8.22	8.71	8.85	9.20	9.54	8.30	8.81	9.36	0.10	-0.04	0.15	-0.18
5	8.37	8.86	9.00	9.35	9.69	8.46	8.97	9.52	0.11	-0.03	0.16	-0.17
10	8.49	8.98	9.12	9.47	9.81	8.58	9.09	9.64	0.11	-0.03	0.16	-0.17
20	8.61	9.10	9.24	9.59	9.93	8.70	9.21	9.76	0.11	-0.03	0.16	-0.17
50	8.79	9.28	9.42	9.77	10.11	8.88	9.39	9.94	0.11	-0.03	0.16	-0.17
200	9.07	9.56	9.70	10.05	10.39	9.14	9.65	10.20	0.09	-0.05	0.14	-0.19
1000	9.43	9.92	10.06	10.41	10.75	9.46	9.97	10.52	0.05	-0.09	0.10	-0.23

* Sea Level Rise allowances have been applied using the December 2019 NPPF Guidance) to adjust CFB2018 EWLs (base year 2017) at Avonmouth to future years

Table 4: Interpretation of comparison of tidal River Avon EWLs presented in Table 3

Simulation	Comparison	Significance
Present day	MetroWest simulated 2015 River Avon tidal EWLs are consistently higher than the CFB2018 values (with base year 2017)	Based on the MetroWest simulations undertaken, the FRA concludes that the MetroWest railway floods at Bower Ashton approximately once every 5 to 10 years on average for the present day. The MetroWest FRA present day simulations overstate flood risk compared to the current CFB2018 EWLs i.e. the FRA values are slightly more precautionary than the current guidance. The FRA conclusions are therefore considered robust in this regard.
2075 (DCO scheme design life year)	<p>Higher central allowance: MetroWest simulated 2075 River Avon tidal EWLs are consistently higher than the CFB2018 values adjusted to 2075 applying the higher central allowance* by 0.09m to 0.11m (2 year to 200 year return periods) and by 0.05m (1000 year return period).</p> <p>Upper end allowance: MetroWest simulated 2075 River Avon tidal EWLs are consistently lower than the CFB2018 values adjusted to 2075 applying the upper end allowance* by 0.03m to 0.05m (2 year to 200 year return periods) and by 0.09m (1000 year return period).</p>	<p>The December 2019 NPPF Guidance* states: “For flood risk assessments and strategic flood risk assessments, assess both the central and upper end allowances to understand the range of impact.”</p> <p>The 2075 EWLs applied in the MetroWest FRA modelling are between the current CFB2018 values with higher central and upper end allowances applied, and closer to the values with the upper end allowance applied. The higher central and upper end allowances are both precautionary. As the MetroWest simulated 2075 River Avon tidal EWLs are consistently higher than the equivalent CFB2018 values with higher central allowance applied, and only 0.03m to 0.05m below the upper end allowances (for the 2 year to 200 year return periods), the associated FRA conclusions are considered robust.</p> <p>Since the completion of the FRA, the Applicant has undertaken an assessment of the anticipated frequency of flooding of the proposed railway at Bower Ashton in 2075 as follows:</p> <ul style="list-style-type: none"> - Downloaded quality controlled Avonmouth tidal gauge monthly extremes from the British Oceanographic Data centre (https://www.bodc.ac.uk/data/hosted_data_systems/sea_level/uk_tide_gauge_network/processed/) - From this dataset, derived tide levels that are exceeded on average 1, 2, 3, 4, 5, 6, 8 and 10 times per year. This was based on data for the period 2003 to 2011 and so is considered to represent a base year of 2007. - Adjusted these calculated 2007 tidal levels to future years (including 2075) by applying the current specified FRA sea level allowances - The MetroWest FRA modelling indicates there would be flooding of the proposed railway when Avonmouth tide levels reach approximately 8.46mAOD to 8.58mAOD (these are the 5 year and 10 year tide levels in 2015 applied in the MetroWest FRA tidal River Avon modelling, for which the 5 year simulation does not result in flooding to the proposed railway whilst the 10 year simulation does). - The approximate future (2075) frequency of flooding of the railway at Bower Ashton is taken to be the same as the calculated frequency of tide levels exceeding this approximate range in 2075. <p>The calculated frequency of future flooding of the proposed railway is approximately:</p> <ul style="list-style-type: none"> - 1 to 2 times per year in 2075 applying the higher central sea level rise allowances, - 2 to 3 times per year in 2075 applying the upper end sea level rise allowances. - Once per year in 2060 applying the higher central sea level rise allowances, - Once every 1 to 2 years in 2060 applying the upper end sea level rise allowances <p>These estimates are considered precautionary as the sea level rise allowances are precautionary.</p>
2115 (longer climate change horizon simulated as sensitivity test)	<p>Higher central allowance: MetroWest simulated 2115 River Avon tidal EWLs are consistently higher than the CFB2018 values adjusted to 2115 applying the higher central allowance* by 0.14m to 0.16m (2 year to 200 year return periods) and 0.10m (1000 year return period).</p> <p>Upper end allowance: MetroWest simulated 2075 River Avon tidal EWLs are consistently lower than the CFB2018 values adjusted to 2075 applying the upper end allowance from the December 2019 NPPF Guidance by 0.17m to 0.19m (2 year to 200 year return periods) and by 0.23m (1000 year return period).</p>	<p>The 2115 FRA simulations were undertaken as a sensitivity test (the scheme design life is represented by the 2075 simulations).</p> <p>The 2115 EWLs applied in the MetroWest FRA tidal River Avon modelling are between the current CFB2018 values with higher central and upper end allowances applied, and closer to the values with the higher central allowance applied.</p> <p>As the higher central and upper end allowances are both precautionary, and the MetroWest simulated 2115 River Avon tidal EWLs are consistently higher than the equivalent CFB2018 values with higher central allowance applied, the 2115 sensitivity test simulations and associated FRA conclusions are considered robust.</p>

Simulation	Comparison	Significance
		The calculated frequency of future (2115) flooding of the proposed railway was calculated in the same way as for 2075 (described above). The calculated frequency of future (2115) flooding is approximately 5 to 6 times per year applying the higher central sea level rise allowances, and approximately 8 times per year applying the upper end sea level rise allowances. However, these estimates are considered precautionary as the sea level rise allowances are precautionary.
Floodplain compensation within the Clanage Road compound at Bower Ashton to mitigate displacement of floodplain storage by access ramp at Clanage Road		The Applicant has now undertaken further modelling to assess whether the proposed floodplain compensation at Bower Ashton (lowering ground levels within the Clanage Road compound site) provides the required compensation – applying the current tidal boundary conditions in the model (i.e. applying the current EA CFB 2018 dataset and the December 2019 NPPF Guidance climate change allowances). This modelling demonstrates the proposed floodplain compensation at Bower Ashton does fully compensate for the ramps to the main road and railway with no simulated increase in offsite flood risk up to the 200 year tidal River Avon flood in 2075 and 2115, applying the current Upper end sea level rise allowances. The FRA conclusions are therefore considered robust in this regard.

Table 5: Comparison of EWLs applied in MetroWest Phase 1 coastal modelling with EWLs applying the current CFB2018 dataset and December 2019 NPPF climate change guidance*

	*CFB 2018 EWLs (mAOD)					EWLs applied in MetroWest coastal model at Avonmouth (mAOD)			Differences: EWLs applied in MetroWest coastal modelling minus CFB2018 EWLs adjusted with December 2019 NPPF climate change allowances (m)			
Return period (years)	Base year 2017	adjusted to 2075 UKCP18 Higher central	adjusted to 2075 UKCP18 Upper end	adjusted to 2115 UKCP18 Higher central	adjusted to 2115 UKCP18 Upper end	2015	2075	2115	2075: MetroWest EWLs – CFB2018 EWLs with Higher central adjustment	2075: MetroWest EWLs – CFB2018 EWLs with Upper end adjustment	2115: MetroWest EWLs – CFB2018 EWLs with Higher central adjustment	2115: MetroWest EWLs – CFB2018 EWLs with Upper end adjustment
25	8.65	9.14	9.28	9.63	9.97			9.87			0.24	-0.09
50	8.79	9.28	9.42	9.77	10.11			10.00			0.23	-0.10
100	8.92	9.41	9.55	9.90	10.24			10.13			0.23	-0.10
200	9.07	9.56	9.70	10.05	10.39		9.71	10.26	0.16	0.01	0.21	-0.12
1000	9.43	9.92	10.06	10.41	10.75	9.44		10.58			0.17	-0.16

* Sea Level Rise allowances have been applied using the December 2019 NPPF Guidance to adjust CFB2018 EWLs (base year 2017) at Avonmouth to future years

Table 6: Interpretation of comparison of coastal EWLs presented in Table 5

Simulation	Comparison	Significance
Present day	The MetroWest simulated 1000 year return period coastal EWL in 2015 is 0.01m higher than the CFB2018 value (base year 2017).	For this coastal flood event the DCO scheme is outside of the MetroWest FRA simulated flood extent. As the EWL applied in the FRA is higher than the equivalent CFB2018 EWL, the FRA conclusions are considered robust in this regard.
2075 (DCO scheme design year)	The MetroWest simulated 200 year return period coastal EWL in 2015 is 0.16m and 0.01m higher than the CFB2018 value with higher central and upper end allowances applied respectively.	For the 200 year return period coastal flood event in 2075, the DCO scheme is outside of the MetroWest FRA simulated flood extent. As the EWL applied in the FRA is higher than the equivalent CFB2018 EWL applying both the higher central and upper end allowances, the FRA conclusions are considered robust in this regard.
2115 (longer climate change horizon simulated as sensitivity test)	<p>Higher central allowance: MetroWest simulated 2115 coastal EWLs are consistently higher than the CFB2018 values adjusted to 2115 applying the higher central allowance* by 0.21m to 0.24m (25 year to 200 year return periods) and 0.17m (1000 year return period).</p> <p>Upper end allowance: MetroWest simulated 2075 coastal EWLs are consistently lower than the CFB2018 values adjusted to 2115 applying the upper end allowance* by 0.09m to 0.12m (2 year to 200 year return periods) and by 0.16m (1000 year return period).</p>	<p>The 2115 FRA simulations were undertaken as a sensitivity test (the scheme design life is represented by the 2075 simulations).</p> <p>The 2115 EWLs applied in the MetroWest FRA coastal modelling are between the current CFB2018 values with higher central and upper end allowances applied, and closer to the values with the upper end allowance applied.</p> <p>As the higher central and upper end allowances are both precautionary, and the MetroWest simulated 2115 coastal EWLs are consistently higher than the equivalent CFB2018 values with higher central allowance applied, the 2115 sensitivity test simulations and associated FRA conclusions are considered robust.</p> <p>Applying CFB2018 values adjusted to 2115 applying the upper end allowance would change the assessed frequency of coastal flooding of the proposed MetroWest railway in 2115 from approximately once every 100 to 200 years to approximately once every 50 to 100 years, and may slightly increase the frequency of inundation of Portishead station, car parks and the crossing of Portbury ditch from approximately once every 1000 years on average to e.g. once every 200 years on average (estimated).</p>

Appendix 2

	Frequency of flooding	Flooding frequency annualised equivalent (occurrences per year)	Number of high tides for each occurrence ¹	Aggregate flooding occurrences per year	Assumed duration of disruption to passenger train service ²	Aggregate hours of flooding per year	Total hours of passenger train operation (Portishead Line) per year ³	Percentage of train operating hours lost per year due to flooding ⁴
Present Day	1 occurrence every 5 to 10 years on average	0.1 to 0.2	2	0.2 to 0.4	12 hours	2.4 to 4.8	6082	0.04% to 0.08%
2075 (DCO Scheme design life year)	1 to 2 occurrences in 2075 with higher central sea level rise allowances	1 to 2	2	2 to 4	12 hours	24 to 48	6082	0.39% to 0.79%
	2 to 3 occurrences in 2075 with upper end sea level rise allowances	2 to 3	2	4 to 6	12 hours	48 to 72	6082	0.79% to 1.18%
	1 occurrence every 1 to 2 years in 2060 with higher central sea level rise allowances	0.5 to 1	2	1 to 2	12 hours	12 to 24	6082	0.20% to 0.39%
	1 occurrence per year in 2060 with upper end sea level rise allowance	1	2	2	12 hours	24	6082	0.39%
2115 (Longer climate change horizon simulated sensitivity test)	5 to 6 occurrences in 2115 with the higher central sea level rise allowances	5 to 6	2	10 to 12	12 hours	120 to 144	6082	1.97% to 2.37%
	8 occurrences in 2115 with the upper end sea level rise allowances	8	2	16	12 hours	192	6082	3.16%

¹ The frequency of flooding was calculated based on historic monthly tidal extremes data rather than a sub-daily time series dataset, which results in a slight bias towards underestimating frequency of flooding. To compensate for this, the number of high tides has been adjusted (i.e. doubled). This is likely to over-compensate and hence the calculated "Percentage of train operating hours lost per year due to flooding" values are likely to be overestimates.

² 12 hours comprising of 2 hours either side of high tide and 8 hours for Network Rail to inspect the section line affected and remove any debris.

³ Total hours of passenger train operation (Portishead Line) per year, was calculated as table below:

⁴ Percentage of train operating hours lost per year due to flooding is overstated because the calculation assumes that flooding always coincides with when trains operate, however trains will operate a maximum of 18 hours in a 24 hour day.

	Level of service	Hours of operation per day	Hours of operation per week	Total hours of operation per year (less Christmas Day, Boxing Day and New Years day)
Mondays to Saturdays	Monday to Saturday first train 06XX, then hourly to 23XX	18	108	5562
Sundays	Sunday first train 10XX, then hourly to 18XX	10	10	520
Total				6082

Appendix 3

Sea level rise allowances that were current at the time of submitting the DCO application – copied from the February 2019 version of the FRA climate change allowances guidance:

<https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances> (note the website now only includes the current allowances updated in December 2019). For the MetroWest Phase 1 FRA modelling, the South West allowances were applied.

Table 3 sea level allowance for each epoch in millimetres (mm) per year with cumulative sea level rise for each epoch in brackets (use 1990 baseline)

<u>Area of England</u>	1990 to 2025	2026 to 2055	2056 to 2085	2086 to 2115	Cumulative rise 1990 to 2115 / metres (m)
East, east midlands, London, south east	4 (140 mm)	8.5 (255 mm)	12 (360 mm)	15 (450 mm)	1.21 m
South West	3.5 (122.5 mm)	8 (240 mm)	11.5 (345 mm)	14.5 (435 mm)	1.14 m
North west, north east	2.5 (87.5 mm)	7 (210 mm)	10 (300 mm)	13 (390 mm)	0.99 m

ANNEXURE 3

Photos taken from and around Rownham Bridge at 09:00 on 12 March 2020 when the recorded peak tide level at Avonmouth was 8.44mAOD, with a preceding peak tide level at 18:00 on 11 March of 8.63mAOD (source: <https://www.gaugemap.co.uk/#!Detail/8241/3586/2020-03-11/2020-03-12>) and with heavy rain the night before.





