Bristol City Council

River Avon Flood Risk Management Strategy

Preliminary WFD Assessment

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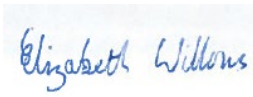
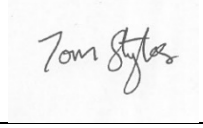
		Signature			
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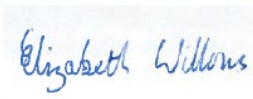
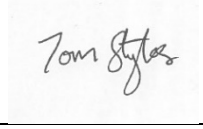
		Signature			
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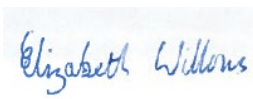
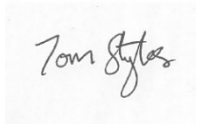
		Signature			
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Contents

Page

1 Introduction 1

2 Legislative context 1

3 Assessment methodology 2

4 Scheme proposal and potential impacts 3

4.1 Detriment mitigation measures 4

5 Baseline assessment (screening) 4

6 Preliminary assessment (scoping) 11

7 Conclusion 16

1 Introduction

This Preliminary Water Framework Directive (WFD) Assessment has been undertaken by Ove Arup and Partners Ltd. (Arup) for Bristol City Council as part of the Strategic Environmental Assessment (SEA) to assess the potential impacts of the River Avon Flood Risk Management Strategy[1] on water bodies within the Strategy area. The assessment identifies potential impacts that could cause deterioration in the ecological status of a water body or that could prevent the water body from meeting its WFD objectives. This assessment was originally produced by AECOM in September 2017 and has been updated by Arup in April 2020 to reflect subsequent changes to the Strategy (hereafter referred to as the 'amended Strategy').

2 Legislative context

The European Union (EU) WFD has been in force since 2000 and is currently the largest and most influential piece of EU legislation relating to the water environment. The Directive was transposed into UK law by The Water Environment (Water Framework Directive) (England and Wales) Regulations (amended 2017)[2].The Environment Agency is the 'competent authority' responsible for delivering the Directive in England.

The WFD aims to protect and enhance the quality of the water environment across all EU Member States. It takes a holistic approach to the sustainable management of water by considering the interactions between surface water, groundwater and water-dependent ecosystems.

Under the WFD, 'water bodies' are the basic management units and are defined as all or part of a river system or aquifer. These water bodies form part of a larger River Basin District (RBD), for which River Basin Management Plans (RBMPs) are developed by EU Member States and environmental objectives are set. These RBMPs are produced every six years, in accordance with the river basin management planning cycle.

The WFD requires all EU Member States to classify the current condition or 'status or potential' of surface water and groundwater bodies and to set a series of objectives for maintaining or improving conditions so that water bodies reach and/or maintain 'good status or potential'. These overall Environmental Objectives are to:

- prevent the deterioration in the status of aquatic ecosystems, protect them and improve the ecological condition of waters;

[1] Arup, 2020, *Strategic Environmental Assessment, River Avon Flood Risk Management Strategy, Bristol City Council.*
[2] Statutory Instruments, 2017 No.407, *The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017*

- aim to achieve at least 'Good' status for all water bodies by 2015. Where this is not possible and subject to the criteria set out in the Directive, aim to achieve Good status by 2021 or 2027;
- meet the requirements of Water Framework Directive Protected Areas;
- promote sustainable use of water as a natural resource;
- conserve habitats and species that depend directly on water;
- progressively reduce or phase out the release of individual pollutants or groups of pollutants that present a significant threat to the aquatic environment;
- progressively reduce the pollution of groundwater and prevent or limit the entry of pollutants; and
- contribute to mitigating the effects of floods and droughts.

All new (and current on-going) activities in the water environment now need to be guided by the requirements of the WFD. This includes ensuring that no changes occur that causes a deterioration of current status of a water body or prevents the achievement of the future status objectives of a water body. This principle is now integrated into the WFD under the planning permission application process for proposed developments/activities.

3 Assessment methodology

WFD assessments typically comprise a stepped process undertaken in parallel with the design development for a proposed scheme. This includes the following key steps:

- Baseline assessment (screening);
- Preliminary assessment (scoping);
- Detailed impact assessment (where required); and
- Application of Article 4.7[3] (where applicable).

This assessment comprises the high-level screening and scoping stages of the River Avon Flood Risk Management Strategy[1].

The spatial scope of the assessment presented here includes all WFD designated surface water and groundwater bodies potentially affected by the amended Strategy. The assessment considers the potential impacts of the amended Strategy on all the relevant quality elements associated with the water bodies affected.

[3] Article 4.7 of the WFD allows derogation from the Directive; where its requirements are met, Member States can fail to achieve the objectives or cause a deterioration in status. It is only available subject to stringent conditions and any reliance on Article 4.7 should be very much a last resort (Planning Inspectorate Advice note 18 – The WFD)

The assessment focuses on the potential permanent impacts of the Strategy. Temporary impacts are not considered to result in deterioration in WFD status and so have not been considered within the assessment in accordance with current guidance[4]. In this sense, impacts are not considered to result in a deterioration of status if the water body:

- is only impacted for a short time period;
- is likely to recover within a short time period; and/or
- is likely to recover without the need for any restoration measures.

Whilst there is no established methodology for assessing compliance with WFD legislation, the WFD Compliance Assessment will be based upon expert judgement, established best practice and consultation with the EA and will be undertaken in accordance with relevant EA guidance[5] [6], particularly the guidance for estuarine and coastal waters[7], and the recent advisory guidance provided by The Planning Inspectorate[8].

4 Scheme proposal and potential impacts

The amended Strategy maintains the core flood risk management approach identified in the AECOM Environmental Report[9] through construction of Low and High defences over the following time periods:

- Low Defences during 2024-2065 (Epoch 1)
- Upgrade to High Defences from 2065 to 2125 (Epoch 2)

The implementation of Low Defences involves identifying low spots in the existing defences and then raising the existing defence levels or constructing new floodwalls or similar defences (e.g. embankments) in these locations. Low defences represent an adaptive approach to sea level rise and would be constructed with a shorter term design life than high defences. The implementation of High Defences involves identifying low spots and raising of Low Defences or constructing new floodwalls or similar defences (i.e. embankments) in these locations.

Where construction of these defences requires in-channel works e.g. piling into the channel and constructing new channel walls, impacts on the water body quality elements must be assessed and any necessary mitigation outlined.

[4] Natural Resources Wales (2017), *Guidance for assessing activities and projects for compliance with the Water Framework Directive.*
[5] Environment Agency (2010), *Assessing new modifications for compliance with WFD: detailed supplementary guidance.*
[6] Environment Agency (2016), *Water Framework Directive risk assessment – How to assess the risk of your activity*
[7] Environment Agency (2016), *Clearing the Waters for All - Water Framework Directive assessment: estuarine and coastal waters*
[8] The Planning Inspectorate (2017), *Advice note eighteen: The Water Framework Directive.*
[9] AECOM (2017) *Strategic Environmental Assessment: AECOM Environmental Report. River Avon Tidal Flood Risk Management Strategy, Bristol City Council.*

Where proposed raised or new defences are set back from the water body and do not require in-channel works, they will not alter the morphological regime or water quality and therefore do not require assessment. Also, the replacement or raising of existing lock gates would be unlikely to cause change or deterioration of water body status as these works would be undertaken within the existing footprint of the defence, or landwards.

Piling does have the potential to intercept groundwater levels. However, there are currently no groundwater SPZs in the Strategy area and no groundwater abstractions close to the River Avon that would be likely to be affected and as such impact to groundwater is screened out of this assessment. This position should be reassessed at the detailed design stage because new groundwater abstraction licences could be granted near the River Avon in the intervening period which could be impacted by piling.

4.1 Detriment mitigation measures

Numerical modelling has indicated that construction of the amended Strategy's main Low and High defences may lead to an increased risk of localised flooding (detriment) in some areas of four water bodies:

- Bristol Avon
- Bristol Avon (By Bk to Netham Weir)
- The Malago - source to conf R Avon (Bris New Cut)
- Brislington Bk - source to conf R Avon (Brist)

Detriment mitigation measure works in these water bodies have therefore been included in the amended Strategy to address the issue. In the Bristol Avon water bodies (Bristol Avon and Bristol Avon (By Bk to Netham Weir)) these measures include defences that require in-channel works and are therefore included in the assessment. In The Malago and Brislington Bk water bodies the proposed mitigation measures comprise set-back defences and therefore do not require assessment. The works proposed on the Brislington Bk water body no longer requires in-channel works (culverting) as part of the amended Strategy.

5 Baseline assessment (screening)

A baseline (screening) assessment has been undertaken to identify the WFD surface water and groundwater bodies potentially affected by the amended Strategy. These water bodies are listed in Table 1 and the screening decision rationale summarised in Table 2 along with the latest available EA WFD baseline data.

Table 1 – List of screened water bodies

Water Body ID	Water Body Type	Water Body Name	River Basin District	Screening Decision
GB530905415405	Transitional Water	Bristol Avon	Severn	Screened In
GB70910601	Canal	Bristol Floating Harbour	Severn	Screened In
GB109053027371	River	Bristol Avon (By Bk to Netham Weir)	Severn	Screened In
GB109053027530	River	Trym - source to conf R Avon (Brist)	Severn	Screened Out
GB109054026650	River	Chestle Pill	Severn	Screened Out
GB109053021970	River	The Malago - source to conf R Avon (Brist New Cut)	Severn	Screened Out
GB109053021980	River	Brislington Bk - source to conf R Avon (Brist)	Severn	Screened Out
GB109053027840	River	Frome (Brist) - Bradley Bk to conf Floating Hbr	Severn	Screened Out
GB40902G804800	Groundwater Body	Bristol Triassic	Severn	Screened Out
GB40901G806800	Groundwater Body	Carboniferous Limestone (Bristol)	Severn	Screened Out
GB40902G805300	Groundwater Body	Portishead Mercia Mudstone	Severn	Screened Out

Table 2 - WFD water body baseline (screening) assessment

Water body name, type, hydromorphological designation and ID	Baseline data (from EA Catchment Data Explorer)	Screening decision	Preliminary assessment of deterioration	Assessment of cumulative effects	Sensitive/critical habitats check	Will the proposed works prevent Good Ecological Status/Potential being achieved? Could they help progress towards GES/P?	Will the scheme impact on the ability to deliver proposed water body measures?	Mitigation measures to limit impact of scheme	Conclusions
Bristol Avon Transitional water Heavily modified GB530905415405	**Current Status or Potential:** Moderate (2016) **Objective:** Good (2021) **Ecological:** Moderate **Biological:** High **Hydromorphological:** Supports Good **Specific Pollutants:** High **Supporting Elements (Surface Water):** Moderate **Chemical:** Good **Other Pollutants:** does not require assessment **Priority hazardous substances:** does not require assessment **Priority substances:** does not require assessment	Screened in: work in water body is proposed in the amended Strategy, including detriment mitigation measures	A non-temporary impact from new piled walls and piling on the hydrological regime and ecology is unlikely but cannot be ruled out.	Sheet piling is likely to cause temporary impacts as a result of noise and vibration and scour during construction that could disturb sensitive ecological species and may need mitigation. Piling may mobilise sediment into the water column through piling activities in potentially contaminated areas. Further investigation will be required to quantify any mitigation requirements.	The new piled walls are likely to result in a loss of priority habitat of intertidal zone and mudflats. Further WFD assessment will be required, and mitigation to ensure no net loss. Protected Areas: Eutrophic sensitive areas, Nitrate vulnerable zones, Horseshoe Bend SSSI, Severn Estuary Ramsar, Severn Estuary SAC, Avon Gorge SSSI, Avon Gorge Woodlands SAC Potential impacts on protected European Sites to be assessed using Appropriate Assessment under the Habitats Regulations.	Works are unlikely to prevent good status being achieved for the water body, however further WFD assessment and proposal of mitigation measures will be required for potential localised impacts identified. Overall the nature and scale of the scheme is unlikely to have a significant impact or influence on progress towards WFD GEP, due to the nature and timescales of the project.	The scheme will not restrict the ability to deliver waterbody improvements. The scheme is an investment opportunity that could be used to improve aquatic habitats.	Mitigation will be required for loss of habitat. Construction method statements should be used to plan and minimise non-temporary impacts during sheet piling construction. A code of construction practice should be adopted to minimise temporary impacts on waterbodies from mobilisation of contaminated sediments.	The scheme is low in impacts in WFD terms and is designed to improve flood defence for wider social benefits. Further WFD assessment and mitigation will be required to address loss of priority habitats and to identify other mitigation measures required to ensure no non-temporary impacts on the status of the water body. Suitable mitigation and/or compensation may be required within the water body and this should be planned in close consultation with Natural England, the Environment Agency and other key stakeholders.
Bristol Floating Harbour Canal Artificial GB70910601	**Current Status or Potential:** Moderate (2016) **Objective:** Good (2027) **Ecological:** Moderate **Physico-chemical:** Moderate **Supporting Elements (Surface Water):** Moderate **Chemical:** Good **Other Pollutants:** does not require assessment **Priority hazardous substances:** does not require assessment **Priority substances:** does not require assessment	Screened in: work in water body is proposed in the amended Strategy	A non-temporary impact from new piled walls and piling on ecology is unlikely but cannot be ruled out.	Sheet piling is likely to cause temporary impacts as a result of noise and vibration and scour during construction that could disturb sensitive ecological species and may need mitigation. Piling may mobilise sediment into the water column through piling activities in potentially contaminated areas, further investigation will be required to quantify any mitigation requirements.	A non-temporary impact from new piled walls and piling on ecology is unlikely but cannot be ruled out.	Works are unlikely to prevent good status being achieved for the water body, however further WFD assessment and proposal of mitigation measures will be required for potential localised impacts identified. Overall the nature and scale of the scheme is unlikely to have a significant impact or influence on progress towards WFD GEP, due to the nature and timescales of the project.	The scheme will not restrict the ability to deliver waterbody improvements. The scheme is an investment opportunity that could be used to improve aquatic habitats.	Mitigation may be required for loss of habitat. Construction method statements should be used to plan and minimise non-temporary impacts during sheet piling construction. A code of construction practice should be adopted to minimise temporary impacts on waterbodies from mobilisation of contaminated sediments.	The scheme is low in impacts in WFD terms and is designed to improve flood defence for wider social benefits. Further WFD assessment is needed to identify any mitigation measures required to ensure no n-temporary impacts on the status of the water body. Suitable mitigation and/or compensation may be required within the water body and this should be planned in close consultation with Natural England, the Environment Agency and other key stakeholders.
Bristol Avon (By Bk to Netham Weir) River Heavily modified GB109053027371	**Current Status or Potential:** Moderate (2016) **Objective:** Good (2027) **Ecological:** Moderate **Biological:** Good **Hydromorphological:** Supports Good **Physico-chemical:** Moderate **Specific Pollutants**: High **Supporting Elements (Surface Water):** Moderate Mitigation Measures Assessment: Good **Chemical:** Good **Other Pollutants**: Good **Priority hazardous substances:** Good **Priority substances:** Good	Screened in: work in water body is proposed in the amended strategy, including detriment mitigation measures	A non-temporary impact from new piled walls and piling on the hydrological regime and ecology is unlikely but cannot be ruled out.	Sheet piling is likely to cause temporary impacts as a result of noise and vibration and scour during construction that could disturb sensitive ecological species and may need mitigation. Piling may mobilise sediment into the water column through piling activities in potentially contaminated areas, further investigation will be required to quantify any mitigation requirements.	The new piled walls are likely to result in a loss of riparian habitat which could impact critical or sensitive species. Further WFD assessment will be required, and mitigation may be required to ensure no net loss.	Works are unlikely to prevent good status being achieved for the water body, however further WFD assessment and proposal of mitigation measures will be required for potential localised impacts identified. Overall the nature and scale of the scheme is unlikely to have a significant impact or influence on progress towards WFD GEP, due to the nature and timescales of the project.	The scheme will not restrict the ability to deliver waterbody improvements. The scheme is an investment opportunity that could be used to improve aquatic habitats.	Mitigation will be required for loss of habitat. Construction method statements should be used to plan and minimise non-temporary impacts during sheet piling construction. A code of construction practice should be adopted to minimise temporary impacts on waterbodies from mobilisation of contaminated sediments.	The scheme is low in impacts in WFD terms and is designed to improve flood defence for wider social benefits. Further WFD assessment and mitigation will be required to address loss of habitats and to identify other mitigation measures required to ensure no non-temporary impacts on the status of the water body. Suitable mitigation and/or compensation may be required within the water body and this should be planned in close consultation with Natural England, the Environment Agency and other key stakeholders.

Trym - source to conf R Avon (Brist) River Heavily modified GB109053027530	**Current Status or Potential:** Moderate (2016) **Objective:** Good (2027) **Ecological:** Moderate **Biological:** Bad **Hydromorphological:** Supports Good **Physico-chemical:** Moderate **Supporting Elements (Surface Water):** Moderate **Chemical:** Good **Other Pollutants:** does not require assessment **Priority hazardous substances:** Good **Priority substances:** does not require assessment	Screened out: no intended development in this water body							
Chestle Pill River Artificial GB109054026650	**Current Status or Potential:** Moderate (2016) **Objective:** Good (2027) **Ecological:** Moderate **Biological:** Poor **Physico-chemical:** Moderate **Supporting Elements (Surface Water):** Moderate **Chemical:** Good **Other Pollutants:** does not require assessment **Priority hazardous substances:** does not require assessment **Priority substances:** does not require assessment	Screened out: no intended development in this water body							
The Malago - source to conf R Avon (Brist New Cut) River Heavily modified GB109053021970	**Current Status or Potential:** Moderate (2016) **Objective:** Good (2027) **Ecological:** Moderate **Biological:** Moderate **Hydromorphological:** Supports Good **Physico-chemical:** Moderate **Supporting Elements (Surface Water):** Moderate **Specific Pollutants:** High **Chemical:** Good **Other Pollutants:** does not require assessment **Priority hazardous substances:** Good **Priority substances:** does not require assessment	Screened out: proposed detriment mitigation measures will not intrude on water course							

Brislington Bk - source to conf R Avon (Brist) River Heavily modified GB109053021980	**Current Status or Potential:** Moderate (2016) **Objective:** Good (2027) **Ecological:** Moderate **Biological:** Poor **Hydromorphological:** Supports Good **Physico-chemical:** Moderate **Supporting Elements (Surface Water):** Moderate **Specific Pollutants:** High **Chemical:** Good **Other Pollutants:** does not require assessment **Priority hazardous substances:** Good **Priority substances:** does not require assessment	Screened out: proposed detriment mitigation measures will not intrude on water course.							
Frome (Brist) - Bradley Bk to conf Floating Hbr River Heavily modified GB109053027840	**Current Status or Potential:** Moderate (2016) **Objective:** Good (2027) **Ecological:** Moderate **Biological:** High **Hydromorphological:** Supports Good **Physico-chemical:** Moderate **Supporting Elements (Surface Water):** Moderate **Specific Pollutants:** High **Chemical:** Good **Other Pollutants:** does not require assessment **Priority hazardous substances:** Good **Priority substances:** Good	Screened out: no intended development in this water body							
Bristol Triassic Groundwater GB40902G804800	**Current Status or Potential:** Poor (2016) **Objective:** Good (2027) **Quantitative:** Good **Chemical (GW):** Poor	Screened out: there are no receptors in this groundwater body							
Carboniferous Limestone (Bristol) Groundwater GB40901G806800	**Current Status or Potential:** Good (2016) **Objective:** Good (2015) **Quantitative:** Good **Chemical (GW):** Good	Screened out: no intended development in this water body							

Portishead Mercia Mudstone Groundwater GB40902G805300	**Current Status or Potential:** Good (2016) **Objective:** Good (2015) **Quantitative:** Good **Chemical (GW):** Good	Screened out: no intended development in this water body							

6 Preliminary assessment (scoping)

A preliminary (scoping) assessment has been undertaken to establish the potential impacts of the amended Strategy on the WFD status elements of the 'Bristol Avon', the 'Bristol Avon (By Bk to Netham Weir)' and the Floating Harbour.

Impacts have been considered with regard to the risk of the Strategy:

- causing a deterioration in current status of the water body; and/or
- preventing the future achievement of water body status objectives.

The assessment process for determining the potential risk of status deterioration uses the following colour rating system to assign the magnitude of the likely effect anticipated on each of the quality elements of the affected water bodies:

- **Dark Blue**: beneficial effect of a scale sufficient to increase status class for the quality element at water body scale;
- **Light Blue**: minor/localised beneficial effect resulting in a localised improvement but insufficient to increase status class for the quality element at water body scale;
- **Green**: no measurable change to (or effect on) status class for the quality element at water body scale;
- **Yellow**: minor localised adverse effect when balanced against mitigation included in the design – insufficient to affect status class for the quality element at water body scale;
- **Amber**: an adverse effect is possible when balanced against mitigation included in the design – the extent of effect is uncertain, and there remains a potential to affect status class for the quality element at water body scale. Additional mitigation and residual effects need to be considered;
- **Red**: adverse effect of sufficient scale to impact on status class for the quality element at a water body scale (certain). Additional mitigation or re-design required to avoid non-compliance.

Where adverse (amber or red) effects on quality elements with a risk of causing deterioration of status or preventing future attainment of the objectives are identified, the assessment identifies additional mitigation requirements and the resultant residual effect.

Where any residual adverse (amber or red) effects remain following consideration of additional mitigation, Article 4.7[4] derogation assessment requirements should be considered in consultation with the EA.

For this preliminary assessment, the potential impacts upon the three screened-in water bodies have been assessed using one framework combining quality elements for both transitional/coastal and river/canal water bodies. At the full WFD assessment stage the transitional Bristol Avon water body will be assessed

separately following the EA's Clearing the Waters for All guidance on assessing the impact of activities in estuarine and coastal waters.

The results of the preliminary (scoping) assessment are presented in Table 3.

Table 3 – Preliminary (scoping) assessment of the potential impacts of the Strategy on WFD quality elements in the 'Bristol Avon', 'Floating Harbour' and 'Bristol Avon (By Bk to Netham Weir)' water bodies

WFD Quality Elements		Scheme	Bristol Flood Risk Management Strategy proposed flood defences						Overall impact	Further WFD Assessment and Mitigation (to retain or promote good status)
		Phase	Construction	Construction	Construction	Construction	Operation	Operation		
		Identified impacts	Noise and vibration from piling	Temporary landtake	Pollution due to discharges	Scour	Permanent landtake for new sheet piled wall	Change to hydraulics		
Hydromorphological	**Hydrological Regime:** Quantity and dynamics of water flow		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No significant impact anticipated.	None Required
	Hydrological Regime: Connection to groundwater bodies		No measurable change anticipated.	No measurable change anticipated.	Possible minor impact from piling into groundwater at the foreshore locations in the three water bodies, where there is the possibility of mobilising contaminated sediments.	No measurable change to element anticipated.	New piled walls will have possible minor impacts in the connection of groundwater to surface water in the three water bodies, but it is unlikely that there would be any significant impact at the waterbody scale. Overall, impacts are considered unlikely but cannot be ruled out at this stage as groundwater levels in the areas are not known.	Possible minor loss of groundwater baseflow. However, water quality is expected to be dominated by upstream sandstone catchment. Overall, impacts considered unlikely but cannot be ruled out at this stage.	Potential localised impacts anticipated in all three water bodies but not considered significant at the water body scale.	To be considered further at full WFD assessment stage. Further site investigation is proposed at the detailed design stage to make sure that the introduction of a sheet piled wall will not prevent groundwater flow towards the water bodies or increase risk of groundwater flooding from mounding of groundwater behind the wall. If risk is found to exist suitable mitigation must be incorporated into the design to prevent the build-up of groundwater behind the new piled structures.
	River Continuity: Migration of aquatic organisms		Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Works to Netham water sluice gates could provide an opportunity to improve eel passage at this structure.
	River Continuity: Sediment transport		No measurable change anticipated.	There is potential for minor impacts due to changes in local hydraulics and substrate transport at the perimeter of the land take required for construction of river frontage pile walls in the three water bodies, but unlikely to be significant at waterbody scale, and likely to recover naturally.	No measurable change anticipated.	There is potential for scour local to works in the foreshore in the three water bodies, but this is unlikely to be significant at waterbody scale, and likely to recover naturally.	No measurable change anticipated.	No significant impact anticipated.	No significant impact anticipated.	None Required
	Morphological conditions: River depth and width variation		No measurable change anticipated.	There is potential for minor impacts due to changes in local hydraulics and substrate transport at the perimeter of the land take required for construction of river frontage pile walls in the three water bodies, but unlikely to be significant at waterbody scale, and likely to recover naturally.	No measurable change anticipated.	No measurable change anticipated.	There is potential for minor impacts on channel width due to construction of river frontage pile walls in the three water bodies, but unlikely to be significant at waterbody scale. It is expected that the scheme design will take into account site-specific bank characteristics and ensure that changes to those characteristics are minimal.	There is potential for minor impacts on channel hydraulics due to construction of river frontage pile walls in the three water bodies, but unlikely to be significant at waterbody scale. It is expected that the scheme design will take into account site-specific bank characteristics and ensure that changes to those characteristics are minimal.	Potential localised impacts anticipated in all three water bodies. Overall impacts are considered unlikely to be significant at the water body scale but cannot be ruled out at this stage.	To be considered further at full WFD assessment stage.
	Morphological conditions: Estuarine depth and width variation		No measurable change anticipated.	There is potential for minor impacts due to changes in local hydraulics and substrate transport at the perimeter of the land take required for construction of river frontage pile walls in the Bristol Avon water bodies, but unlikely to be significant at waterbody scale, and likely to recover naturally.	No measurable change anticipated.	No measurable change anticipated.	There is potential for minor impacts on channel width due to construction of river frontage pile walls in the three water bodies, but unlikely to be significant at waterbody scale. It is expected that the scheme design will take into account site-specific bank characteristics and ensure that changes to those characteristics are minimal.	There is potential for minor impacts on channel hydraulics due to construction of river frontage pile walls in the three water bodies, but unlikely to be significant at waterbody scale. It is expected that the scheme design will take into account site-specific bank characteristics and ensure that changes to	Potential localised impacts anticipated in all three water bodies. Overall impacts are considered unlikely to be significant at the water body scale but cannot be ruled out at this stage.	To be considered further at full WFD assessment stage.

								those characteristics are minimal.		
	Morphological conditions: Structure and substrate of the river bed		No measurable change anticipated.	There is potential for minor impacts due to changes in local hydraulics and substrate transport at the perimeter of the land take required for construction of river frontage pile walls in the three water bodies, but unlikely to be significant at waterbody scale, and likely to recover naturally.	No measurable change anticipated.	There is potential for scour local to works in the foreshore in the three water bodies, but this is unlikely to be significant at waterbody scale, and likely to recover naturally.	No measurable change anticipated.	No significant impact anticipated.	No significant impact anticipated.	None Required
	Morphological conditions: Quantity, structure and substrate of the Estuary bed		No measurable change anticipated.	There is potential for minor impacts due to changes in local hydraulics and substrate transport at the perimeter of the land take required for construction of river frontage pile walls in the Bristol Avon water bodies, but unlikely to be significant at waterbody scale, and likely to recover naturally.	No measurable change anticipated.	There is potential for scour local to works in the foreshore in the Bristol Avon water bodies, but this is unlikely to be significant at waterbody scale, and likely to recover naturally.	No measurable change anticipated.	No significant impact anticipated.	No significant impact anticipated.	None Required
	Morphological conditions: Structure of the riparian zone/intertidal zone.		No measurable change anticipated.	There is potential for minor impacts due to changes in local hydraulics and substrate transport at the perimeter of the land take required for construction of river frontage pile walls in the three water bodies, but unlikely to be significant at waterbody scale, and likely to recover naturally.	No measurable change anticipated.	There is potential for scour local to works in the foreshore in the three water bodies, but this is unlikely to be significant at waterbody scale, and likely to recover naturally.	New walls could have the potential for some minor detrimental impacts on the structure of the riparian zone/intertidal zone compared to existing conditions in the three water bodies. Where new walls are constructed this could result in a loss of riparian/intertidal environment. This is unlikely to be significant at the water body scale but mitigation may be required to ensure no net loss in habitat.	No significant impact anticipated.	Potential localised impacts anticipated in all three water bodies. Overall impacts are considered unlikely to be significant at the water body scale but cannot be ruled out at this stage.	To be considered further at full WFD assessment stage. The potential loss of riparian/intertidal environments will need to be quantified and, if required, mitigation included to ensure no net loss in priority ecological environments.
	Tidal Regime: Freshwater flow		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No significant impact anticipated at waterbody scale and therefore no measurable change anticipated.	No significant impact anticipated.	No significant impact anticipated.	None Required
	Tidal Regime: Wave exposure		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No significant impact anticipated at waterbody scale and therefore no measurable change anticipated.	No significant impact anticipated at waterbody scale and therefore no measurable change anticipated.	No significant impact anticipated.	None Required
Biological	**Macroalgae and angiosperms**		No measurable change anticipated.	There is the potential for minor temporary impacts in the three water bodies due to loss of habitat during works on the foreshore and channel. This is unlikely to be significant at the waterbody scale.	No measurable change anticipated (impact mitigated through CEMP).	There is potential for scour local to works in the foreshore, affecting the ecological habitats in the three water bodies, but this is unlikely to be significant at waterbody scale.	New walls in the three water bodies will result in some loss of habitat on the foreshore and channel. Overall impacts are considered unlikely to be significant at the waterbody scale but cannot be ruled out at this stage.	No measurable change anticipated.	Potential localised impacts anticipated in all three water bodies. Overall impacts are considered unlikely to be significant at the water body scale but cannot be ruled out at this stage.	To be considered further at full WFD assessment stage.
	Benthic invertebrate fauna: Composition		No measurable change anticipated.	There is the potential for minor temporary impacts in the three water bodies due to loss of habitat during works on the foreshore and channel. This is unlikely to be significant at the waterbody scale.	No measurable change anticipated (impact mitigated through CEMP).	There is potential for scour local to works in the foreshore, affecting the ecological habitats in the three water bodies, but this is unlikely to be significant at waterbody scale.	New walls in the three water bodies will result in some loss of habitat on the foreshore and channel. Overall impacts are considered unlikely to be significant at the waterbody scale but cannot be ruled out at this stage.	No measurable change anticipated.	Potential localised impacts anticipated in all three water bodies. Overall impacts are considered unlikely to be significant at the water body scale but cannot be ruled out at this stage.	To be considered further at full WFD assessment stage.
	Benthic invertebrate fauna: Abundance		No measurable change anticipated.	There is the potential for minor temporary impacts in the three water bodies due to loss of habitat during works on the foreshore and channel. This is unlikely to be significant at the waterbody scale.	No measurable change anticipated (impact mitigated through CEMP).	There is potential for scour local to works in the foreshore, affecting the ecological habitats in the three water bodies, but this is unlikely to be significant at waterbody scale.	New walls in the three water bodies will result in some loss of habitat on the foreshore and channel. Overall impacts are considered unlikely to be significant at the waterbody scale but cannot be ruled out at this stage.	No measurable change anticipated.	Potential localised impacts anticipated in all three water bodies. Overall impacts are considered unlikely to be significant at the water body scale but cannot be ruled out at this stage.	To be considered further at full WFD assessment stage.
	Fish fauna: Species composition and abundance		Possible temporary effects from piling in foreshore area. Mitigation will be needed depending on	There is the potential for minor temporary impacts in the three water bodies due to loss of habitat during works on the foreshore and channel. This is unlikely to be significant at the waterbody scale.	No measurable change anticipated (impact mitigated through CEMP).	There is potential for scour local to works in the foreshore, affecting the ecological habitats in the three water bodies, but this is unlikely to be significant at waterbody scale.	New walls in the three water bodies will result in some loss of habitat on the foreshore and channel. Overall impacts are considered unlikely to be significant at the waterbody scale but	No measurable change anticipated.	Potential localised impacts anticipated in all three water bodies. Overall impacts are considered unlikely to be significant at the water body scale but cannot be ruled out at this stage.	To be considered further at full WFD assessment stage.

			methodology and timing.				cannot be ruled out at this stage.			
	Fish fauna: Presence of type-specific disturbance sensitive species		Possible temporary effects from piling in foreshore area. Mitigation will be needed depending on methodology and timing.	There is the potential for minor temporary impacts in the three water bodies due to loss of habitat during works on the foreshore and channel. This is unlikely to be significant at the waterbody scale.	No measurable change anticipated (impact mitigated through CEMP).	There is potential for scour local to works in the foreshore, affecting the ecological habitats in the three water bodies, but this is unlikely to be significant at waterbody scale.	New walls in the three water bodies will result in some loss of habitat on the foreshore and channel. Overall impacts are considered unlikely to be significant at the waterbody scale but cannot be ruled out at this stage.	No measurable change anticipated.	Potential localised impacts anticipated in all three water bodies. Overall impacts are considered unlikely to be significant at the water body scale but cannot be ruled out at this stage.	To be considered further at full WFD assessment stage.
	Fish fauna: Age structure of fish communities		Possible temporary effects from piling in foreshore area. Mitigation will be needed depending on methodology and timing.	There is the potential for minor temporary impacts in the three water bodies due to loss of habitat during works on the foreshore and channel. This is unlikely to be significant at the waterbody scale.	No measurable change anticipated (impact mitigated through CEMP).	There is potential for scour local to works in the foreshore, affecting the ecological habitats in the three water bodies, but this is unlikely to be significant at waterbody scale.	New walls in the three water bodies will result in some loss of habitat on the foreshore and channel. Overall impacts are considered unlikely to be significant at the waterbody scale but cannot be ruled out at this stage.	No measurable change t anticipated.	Potential localised impacts anticipated in all three water bodies. Overall impacts are considered unlikely to be significant at the water body scale but cannot be ruled out at this stage.	To be considered further at full WFD assessment stage.
Critical sensitive habitats and species	**Priority habitats and species:** Various species using mudflats		Possible temporary effects from piling in foreshore area in the Bristol Avon water bodies. Mitigation will be needed depending on methodology and timing.	There is the potential for minor temporary impacts in the Bristol Avon water bodies due to loss of habitat during works on the foreshore and channel. This is unlikely to be significant at the waterbody scale.	No measurable change anticipated (impact mitigated through CEMP).	There is potential for scour local to works in the foreshore, affecting the ecological habitats in the Bristol Avon water bodies, but this is unlikely to be significant at waterbody scale.	New walls in the Bristol Avon water bodies will result in some loss of habitat on the foreshore and channel. Overall impacts are considered unlikely to be significant at the waterbody scale but cannot be ruled out at this stage.	No measurable change anticipated.	Potential localised impacts in the Bristol Avon water bodies. Overall impacts are considered unlikely to be significant at the water body scale but cannot be ruled out at this stage.	To be considered further at full WFD assessment stage. The potential loss of intertidal environments will need to be quantified and, if required, mitigation included to ensure no net loss in priority ecological environments. Full WFD assessment should reference the HRA Appropriate Assessment that will specifically consider potential impacts on protected European Sites in the water bodies.
	Priority habitats and species: Intertidal mudflat		Possible temporary effects from piling in foreshore area in the Bristol Avon water bodies. Mitigation will be needed depending on methodology and timing.	There is the potential for minor temporary impacts in the Bristol Avon water bodies due to loss of habitat during works on the foreshore and channel. This is unlikely to be significant at the waterbody scale.	No measurable change anticipated (impact mitigated through CEMP).	There is potential for scour local to works in the foreshore, affecting the ecological habitats in the Bristol Avon water bodies, but this is unlikely to be significant at waterbody scale.	New walls in the Bristol Avon water bodies will result in some loss of habitat on the foreshore and channel. Overall impacts are considered unlikely to be significant at the waterbody scale but cannot be ruled out at this stage.	No measurable change anticipated.	Potential localised impacts in the Bristol Avon water bodies. Overall impacts are considered unlikely to be significant at the water body scale but cannot be ruled out at this stage.	To be considered further at full WFD assessment stage. The potential loss of intertidal environments will need to be quantified and, if required, mitigation included to ensure no net loss in priority ecological environments. Full WFD assessment should reference the HRA Appropriate Assessment that will specifically consider potential impacts on protected European Sites in the water bodies.
Physico-chemical	Ammonia, Biochemical Oxygen Demand (BOD), Dissolved Oxygen, pH, Phosphate, Temperature		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated (impacts mitigated through CoCP and best practice for design, construction and operations). There is potential for mobilisation of contaminated sediment into the water column through piling activities in potentially contaminated areas. Impacts cannot be ruled out at this stage.	No measurable change anticipated (no structures in river channel).	Possible impact on surface water run-off (and therefore water quality) into the three water bodies. Impacts considered unlikely to be significant at the waterbody scale but cannot be ruled out at this stage.	No measurable change anticipated.	Potential localised impacts anticipated in all three water bodies. Overall impacts are considered unlikely to be significant at the water body scale but cannot be ruled out at this stage.	To be considered further at full WFD assessment stage. Further site investigation is proposed at the detailed design stage to clarify the potential for contaminated land in the areas of proposed new piling.
Chemical	**Pollution by all priority hazardous substances identified as being discharged into the water body**									
	Pollution by other priority substances identified as being discharged in significant quantities into the water body									

7 Conclusion

Following this preliminary assessment, it is concluded that there is potential for adverse impacts on the 'Bristol Avon', the 'Bristol Avon (By Bk to Netham Weir)' and the 'Floating Harbour'. The construction of defences via piling has the potential to negatively impact the ecological status of the water bodies as the work will involve a reduction of aquatic habitat as well as potentially having a negative effect on hydromorphology. Whilst individual defence scheme elements are assessed as having only minor, localized adverse effects on WFD quality elements within a reach, the cumulative effect of multiple defence elements within a water body may cause deterioration. The Preliminary WFD Assessment therefore recommends that a full WFD Assessment be undertaken to evaluate the total combined length and percentage of the water bodies affected to assess the overall significance of the impacts. It is intended that the full WFD will be carried out as part of the optioneering to provide an evaluation which help will inform design.

The full WFD Assessment should include detailed consideration of mitigation measures that will best address adverse impacts on the water body quality elements. It should also seek to suggest enhancement opportunities to improve the overall status of the water bodies where possible. To do this it should reference the programme of measures identified by the Environment Agency in the Severn River Basin Management Plan[10] and any specific actions identified for the improvement of each water body. It should ensure that there is no conflict between the amended Strategy and the Environment Agency's goals for the water bodies and that the amended Strategy is used as an opportunity to design in enhancements where possible.

Impacts to groundwater bodies were screened out during this assessment given the lack of SPZs and abstractions close to the proposed works. However, this should be reassessed at the full WFD Assessment stage because new groundwater abstraction licences could be granted in the intervening time that could be impacted by piling.

[10] Measure in the Bristol Avon and North Somerset catchment - Severn river basin district River Basin Management Plan. (Updated 2015) p73. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/718336/Severn_RBD_Part_1_river_basin_management_plan.pdf [Online]. Accessed: 01/05/20