Natural Resources Wales

Stephenson Street Flood Alleviation Scheme

WFD Compliance Assessment

274580-ARP-XX-XX-RP-EN-0003

Issue | 11 May 2021

Job number 274580-00

4 Pierhead Street
Capital Waterside
Cardiff CF10 4QP
United Kingdom
000000000000000000000000000000

ARUP

Contents

Tables

Appendices

No table of contents entries found.

1 Introduction

Ove Arup and Partners (Arup) has been commissioned by Natural Resources Wales (NRW) to undertake a Water Framework Directive compliance assessment for works to works to reduce flood risk to the Lliswerry area around Stephenson Street, Newport.

The Water Framework Directive (WFD)[1] is implemented in England and Wales by the Water Environment (Water Framework Directive) Regulations 2017. It establishes a legislative framework for the protection of surface waters and groundwater, and its aims are:

- to prevent deterioration of the status of all water bodies; and
- to protect, enhance and restore water bodies to good status/potential.

All proposed schemes with the potential to interact with the water environment must be assessed to ensure that the aims of the WFD are being met. Where a scheme is shown to contravene the WFD, an Article 4.7 derogation would need to be sought from the relevant authority.

This report follows guidance produced by Natural Resources Wales[2] and the Planning Inspectorate[3] to produce a WFD Compliance Assessment report which identifies the activities related to the scheme that may cause deterioration or prevent a water body from meeting its objectives. Activities noted as having the potential to cause deterioration or prevent a water body from meeting its objectives will be subject to further assessment following consultation and agreement with Natural Resources Wales.

[1] European Commission. Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy
[2] Natural Resources Wales: OGN 72 Complying with the WFD: how to assess and appraise projects and activities. Version 3.
[3] The Planning Inspectorate. Advice Note 18: The Water Framework Directive (June 2017). Available at: https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2017/06/advice_note_18.pdf

2 Screening

2.1 Project Details

Table 1: Details of the proposed project.

Project Details	
Applicant name	Natural Resources Wales (NRW)
Project Stage	Detailed Design
Description of activities	The proposed flood defences comprise: **Stephenson Street Embankment**: o Raising and reprofiling of the existing bund through Coronation Park, circa 240m in length. Public realm and landscaping improvements will also be undertaken in Coronation Park. o Raising of the existing bund using a sheet pile wall from Coronation Park down to the Hanson's conveyor belt site, circa 590m in length. o A new reinforced concrete flood wall circa 640m in length through the Felnex Industrial Estate, connecting into a railway embankment to the east. o A new highway is proposed to connect the current dead-end of Corporation Road to East Bank Road. An embankment is proposed as part of the upgrade to carry the proposed highway over the defence level at East Bank Road. **Corporation Road**: A flood gate across Corporation Road where it passes beneath the railway embankment. **North of the Transporter Bridge**: Infilling of three low spots to the north of Stephenson Street, including at the Grade I Listed Newport Transporter Bridge. **Railway Wall**: A circa 50m long reinforced concrete wall. A permanent maintenance track will also be constructed to the southern side of the wall. **North of the Nash Wastewater Treatment Works**: A circa 30m long reinforced concrete wall. Permanent maintenance tracks will also be required to the north and south of the wall.
Location of activity (central point XY coordinates or national grid reference)	ST 31931 86132
Footprint of activity (ha)	Approximately 2.4
Timings of activity (including start and finish dates)	Construction Start - Autumn 2021
Relevant Documents	Drawing 1000 (Version P02) – Site Overview Plan

2.2 Baseline Information

2.2.1 Surface water

Table 2: River Usk water body data. Based on Cycle 2 2015 and 2018 Interim Classification data from Water Watch Wales.

Water Body Name	**River Usk**	
Water Body ID	GB530905415404	
Water body type	Transitional	
River Basin District	Severn	
Area (km^2)	4.358	
Element	**2015 Cycle 2 Classification**	**2018 Interim Classification**
Overall Status	Moderate	Moderate
Ecological Status	Moderate	Moderate
Hydro-morphological Supporting Elements	N/A	N/A
Chemical Status	Good	Good
Failing Quality Element(s)	Invertebrates (*Moderate – Very Certain*) Infaunal Quality Index (*Moderate – Very Certain*)	Invertebrates (*Moderate – Very Certain*) Infaunal Quality Index (*Moderate – Very Certain*), Dissolved Inorganic Nitrogen (*Moderate – Uncertain*)
Reason(s) for Failure	Unknown (pending investigation)	
Objective	Good by 2021	Good by 2021
Artificial or Heavily Modified	Designated as Heavily Modified	
Mitigation Measures Assessment	**Use:** Flood Protection **Measures identified for Stephenson Street area:** - Preserve or restore habitats - Enhance ecology - Retain habitats - Remove of soften hard banks (deemed not technically feasible) - Realign flood defence (deemed not technically feasible) **Specific actions identified for Stephenson Street area:** - Increase habitat creation on new and existing hard flood defences; - Provide bioengineering designs for flood embankments; On planned new developments, provide information and advice to landowners/developers on sustainable management practices to protect and enhance if possible the river corridor.	

2.2.2 Groundwater

Table 3: Usk Devonian Old Red Sandstone groundwater body data. Based on Cycle 2 2015 Classification data from Water Watch Wales.

Water Body Name	**Usk Devonian Old Red Sandstone**
Water Body ID	GB40902G201700
River Basin District	Severn
Area (km^2)	1,254
Overall Status	Good
Quantitative Status	Good
Chemical Status	Good
Failing Quality Element(s)	N/A
Reason(s) for Failure	N/A
Objective	Good by 2015

2.2.3 Protected Sites

The following WFD protected areas have been identified within 2km of the scheme:

- River Usk Special Area of Conservation (SAC); adjacent.
- Severn Estuary SAC and Special Protection Area (SPA); 1.2km south-west of scheme.

2.3 Risk Screening

Activities that may result in an impact on WFD quality elements may take place during construction and/or operation of the project. Table 4 details the expected activities and screens them for inclusion in the next stage of the assessment.

Table 4: Screening of proposed activities

Proposed Activity	**Screen In/Out**	**Justification**
Construction (temporary) activities		
Works near to the River Usk	In	Although a temporary activity, there is potential for longer lasting effects, particularly given the proximity to the SAC
Piling works to construct Stephenson Street embankment	In	Potential for vibration effects on fish in the River Usk.
Permanent activities		
Infilling of three low spots in the existing embankment to the north of the Transporter Bridge	In	Proximity to River Usk SAC In combination affects alongside wider scheme

Proposed Activity	Screen In/Out	Justification
Raising and reprofiling of the existing bund through Coronation Park, circa 240m in length	In	Proximity to River Usk SAC In combination affects alongside wider scheme
Raising of the existing bund using a sheet pile wall from Coronation Park down to the Hanson's conveyor belt site, circa 590m in length.	In	Proximity to River Usk SAC In combination affects alongside wider scheme
A new reinforced concrete flood wall circa 640m in length through the Felnex Industrial Estate, connecting into a railway embankment to the east.	In	Proximity to River Usk SAC In combination affects alongside wider scheme
A flood gate across Corporation Road where it passes beneath the railway embankment.	Out	Minor works within existing highway.
A new highway is proposed to connect the current dead-end of Corporation Road to East Bank Road to maintain access to businesses in Corporation Road and provide a means of escape when the flood gate is closed. An embankment is proposed as part of the upgrade to carry the proposed highway over the defence level.	In	Proximity to River Usk SAC Drainage details In combination affects alongside wider scheme
Railway Wall: A circa 50m long reinforced concrete wall.	In	Proximity to River Usk SAC In combination affects alongside wider scheme
North of the Nash Wastewater Treatment Works: A circa 30m long reinforced concrete wall.	In	Proximity to River Usk SAC In combination affects alongside wider scheme

3 Scoping

This stage of the assessment identifies elements within the River Usk Transitional water body which may be impacted, in the absence of mitigation measures, as a result of activities screened in at the previous stage. Where a potential risk is identified, these elements will progress to the detailed assessment stage. Table 5 presents this scoping exercise.

Table 5: WFD scoping assessment for Stephenson Street Flood Scheme

Activity	Quality element(s) at risk of impact	Justification	Scope In/Out
Construction (temporary) activities			
Works near to the River Usk water body and SAC (including concrete works)	Hydromorphology – structure of the intertidal zone	Working area immediately adjacent to intertidal zone (and within SAC boundary). Potential for direct effects via vehicle tracking or works themselves or indirect effects via sediment runoff / generation.	In
	Biological – all elements	Potential indirect impacts to any biological quality elements as a result of changes in other elements at risk.	
	Physico-chemical – transparency, oxygenation and nutrients	Potential indirect effects as a result of sediment or concrete washwater release from working areas.	
	Specific Pollutants and/or Priority Substances	Potential for construction works to disturb contaminated material, create new pathways or introduce pollutant as a result of spillage.	
	Invasive Non-Native Species	Potential for construction works to introduce or spread INNS.	
Piling works to construct Stephenson Street embankment	Biological – fish	Vibratory works such as piling have the potential to disturb fish migration and/or spawning.	In
Permanent activities			
Infilling of three low spots in the existing embankment to the north of the Transporter Bridge	None noted.	The works proposed are minor raising/infilling (up to 0.2m) of an existing embankment, which will not materially alter its footprint. There is no	Out

Activity	Quality element(s) at risk of impact	Justification	Scope In/Out
		pathway of potential impact to WFD quality elements.	
Raising and reprofiling of the existing bund through Coronation Park, circa 240m in length	Hydromorphology – structure of the flood plain zone	The raised structure will not extend further into the flood plain zone than at present but has the potential to locally reduce habitat quality through insensitive design.	In
Raising of the existing bund using a sheet pile wall from Coronation Park down to the Hanson's conveyor belt site, circa 590m in length.	Hydromorphology – structure of the flood plain	The raised structure will not extend further into the flood plain than at present but has the potential to locally reduce habitat quality through insensitive design.	In
A new reinforced concrete flood wall circa 640m in length through the Felnex Industrial Estate, connecting into a railway embankment to the east.	None noted.	The structure will be located away from the River Usk and outside flood plain. There is no pathway for effect upon WFD quality elements.	Out
A new highway is proposed to connect the current dead-end of Corporation Road to East Bank Road to maintain access to businesses in Corporation Road and provide a means of escape when the flood gate is closed. An embankment is proposed as part of the upgrade to carry the proposed highway over the defence level. Surface water drainage would issue to the River Usk via an outfall through the new flood embankment.	For Ordinary Watercourse receiving runoff from new highway: Hydromorphology – structure and substrate of riverbed	The new outfall from the highway drainage system has the potential to direct sediment into the River Usk and/or to induce scour through inappropriate headwall design	In
	Specific Pollutants / Priority Substances related to highways (e.g. heavy metals, hydrocarbons)	The new highway may be a source of pollutants to the River Usk SAC.	
	Biological – fish, invertebrates	Indirect effects upon fish and invertebrates as a result of potential pollution due to runoff from the new highway.	
Railway Wall: A circa 50m long reinforced concrete wall.	None noted.	The structure will be located away from the River Usk and outside flood plain. There is no pathway for effect upon WFD quality elements.	Out
North of the Nash Wastewater Treatment Works: A circa 30m long reinforced concrete wall with a 500mm culvert.	None noted.	The structure will be located away from the River Usk and outside flood plain. There is no	Out

Activity	Quality element(s) at risk of impact	Justification	Scope In/Out
		pathway for effect upon WFD quality elements.	
In-combination effects related to components of the scheme and interaction with other activities in the area.	Hydromorphology	Potential for in combination impacts on the hydromorphology of the water body or SAC	In
	Biological – all elements	Potential for indirect in combination impacts as a result of direct impacts on hydromorphology	

4 Detailed Compliance Assessment

This stage considers the potential impacts of an activity, identifies mitigation measures that avoid or reduce impacts, and concludes if the activity may cause deterioration or prevent any quality element within any water body achieving good status/potential.

4.1 Embedded mitigation

Table 6 considers the effect of mitigation measures embedded in the scheme design and/or construction methodology to avoid or reduce the potential for impact upon quality elements scoped into the assessment.

Table 6: Detailed assessment of scoped-in activities and embedded mitigation measures

Proposed Activity	Quality element and description of potential impact(s)	Mitigation measure(s)	Assessment Outcome
Construction (Temporary) Activities			
Works near to the River Usk water body and SAC (including concrete works)	**Element:** Hydromorphology – structure of the intertidal zone **Potential impact(s):** Direct effects via vehicle tracking or works themselves or indirect effects via sediment runoff / generation.	Proposed construction methods (hydraulic piling secured in the project's construction contracts via the EAP) avoid the need for temporary or permanent working areas to encroach beyond the extent of existing embankments and into the flood plain area. This also avoids works in the SAC. Contractor to implement best practice for working near to water (e.g. GPP5) to reduce the risk of sediment runoff. For example, installing silt netting, keeping exposed earthworks to a minimum.	Potential direct impacts upon the hydromorphology of the intertidal zone are avoided. Potential indirect impacts are managed by suitable working practices. Provided the mitigation measures listed are implemented, these activities pose a minimal risk to the quality element. This activity is determined to not result in a decline in any WFD quality elements or prevent them from attaining Good status or potential in the future. Enhancements: during the construction phase, NRW will commit the contractor to clearing marine litter from the foreshore, especially larger items that cannot be removed by the current volunteer efforts.
	Element: Physico-chemical – transparency, oxygenation and nutrients **Potential impact(s):** Potential indirect effects as a result of sediment or concrete washwater release from working areas.	Concrete works are generally located away from the intertidal zone which reduces this risk. Contaminated water within these areas should be pumped to a suitable treatment solution or to a tanker for disposal offsite at a licensed facility. Contractor to implement best practice for working near to water (e.g. GPP5) to reduce the risk of sediment runoff. For example, installing silt netting, keeping exposed earthworks to a minimum.	Potential indirect impacts are managed by suitable working practices. Provided the mitigation measures listed are implemented, these activities pose a minimal risk to the quality element. This activity is determined to not result in a decline in any WFD quality elements or prevent them from attaining Good status or potential in the future.

Proposed Activity	Quality element and description of potential impact(s)	Mitigation measure(s)	Assessment Outcome
	Element: Specific Pollutants and/or Priority Substances **Potential impact(s):** Potential for construction works to disturb contaminated material, create new pathways or introduce pollutant as a result of spillage.	Contractor to implement best practice for working near to water (e.g. GPP5) to reduce the risk or impact of accidental spillage. For example, using plant with biodegradable fluids, drip trays/bunds and providing spill kits. The industrial nature of the working area means that there is potential for contaminated material to be present. Ground investigation is currently being undertaken to determine whether contaminated material is present. Any material encountered during the construction displaying visual or olfactory evidence of contamination will be safely stockpiled to ensure there is no leaching of contamination to other areas prior to appropriate disposal.	Provided the mitigation measures listed are implemented, these activities pose a minimal risk to the quality elements. This activity is determined to not result in a decline in any WFD quality elements or prevent them from attaining Good status or potential in the future.
	Element: Biological – all elements **Potential impact(s):** Potential indirect impacts to any biological quality elements as a result of changes in other elements at risk (listed above).	Mitigation measures are not required as the risk of indirect impacts upon biological quality elements is addressed by mitigation for other direct impacts.	These activities pose a minimal risk to the quality elements. This activity is determined to not result in a decline in any WFD quality elements or prevent them from attaining Good status or potential in the future.
	Element: Invasive Non-Native Species **Potential impact(s):** Potential for construction works to introduce or spread INNS.	INNS identified to date has been treated and will be monitored. All equipment and footwear will be cleaned thoroughly before entering the site with a suitable disinfectant. In addition, all equipment and footwear will be thoroughly cleaned and disinfected when leaving site. No works will be undertaken within 7m of any INNS, where this is unavoidable INNS management as per the EAP will be required.	Provided the mitigation measures listed are implemented, these activities pose a minimal risk to the quality elements. This activity is determined to not result in a decline in any WFD quality elements or prevent them from attaining Good status or potential in the future.
Piling works to construct Stephenson	**Element:** Biological - fish **Potential impact(s):**	Hydraulic piling will be used for the Stephenson Street embankment which avoids the potential for vibration	Potential impacts are avoided. Provided the mitigation measures listed are implemented, this activity

Proposed Activity	Quality element and description of potential impact(s)	Mitigation measure(s)	Assessment Outcome
Street embankment	Vibratory works such as piling have the potential to disturb fish migration and/or spawning.	impacts upon fish. The distance from the river (>30m) also mitigate this potential impact in accordance with NRW Fisheries Team recommendations.	poses a minimal risk to the quality element. This activity is determined to not result in a decline in any WFD quality elements or prevent them from attaining Good status or potential in the future.
Permanent Activities			
Raising and reprofiling of the existing bund through Coronation Park, circa 240m in length Raising of the existing bund using a sheet pile wall from Coronation Park down to the Hanson's conveyor belt site, circa 590m in length.	**Element:** Hydromorphology – structure of the flood plain **Potential impact(s):** The raised structures will not extend further into the flood plain than at present. Despite this, they have the potential to locally reduce habitat quality through insensitive design and contradict the HMWB mitigation measures in place. These measures are: - Increase habitat creation on new and existing hard flood defences; - Provide bioengineering designs for flood embankments.	The structures are located above the typical tidal range, and have been positioned as such to avoid encroachment into the River Usk SAC. Therefore, incorporating benefits to inter-tidal habitat into the design of the structures is not possible. The embankment face should be planted with a species mix that does not compete with and ideally complements, the adjacent SAC habitat. The dry side of the embankment will be planted with a wildflower species mix to provide biodiversity benefits e.g. to pollinators. This will also reduce erosion and increased sedimentation into the River Usk and onto saltmarsh habitats. During planned embankment maintenance (e.g. mowing) litter picks should also be undertaken to avoid potential detriment to the SAC.	Potential impacts are avoided. Provided the mitigation measures listed are implemented, this activity poses a minimal risk to the quality element. This activity is determined to not result in a decline in any WFD quality elements or prevent them from attaining Good status or potential in the future. Enhancements: Tree planting in Coronation Park will provide cover for otter. Wildflower planting along the new bund will increase species richness and provide habitat for pollinators such as bees (bee corridor). Available enhancement measures limited by the location of works within and adjacent to River Usk SAC / SSSI and distance from the watercourse / MHWS.
A new highway is proposed to connect the current dead-end of Corporation Road to East Bank Road to maintain access to businesses in Corporation Road and provide a means of escape when the flood gate is closed. An embankment is proposed as	**Element:** Hydromorphology – structure and substrate of riverbed of ordinary watercourse to the rear of the flood embankment receiving runoff from new highway. **Potential impact(s):** The new outfall from the highway drainage system has the potential to direct sediment into the watercourse to the rear of the flood embankment and/or to induce scour through inappropriate headwall design.	The outfall structure from the highway drainage system through the flood embankment to the River Usk should be designed to reduce the likelihood of erosion. The headwall should be appropriate to the waterbody and expected flow volumes and should be flush with or set back from the existing bank and angled to direct flows downstream. The highway drainage design incorporates sustainable drainage features such as swales to trap sediment before it reaches the wider water environment.	Potential impacts are reduced. Provided the mitigation measures listed are implemented, this activity poses a minimal risk to the quality element. This activity is determined to not result in a decline in any WFD quality elements or prevent them from attaining Good status or potential in the future. Enhancements: The drainage design includes swales and settlement ponds which will provide a level of pollutant removal above the minimum required. These features will be vegetated which will promote the settlement of

Proposed Activity	Quality element and description of potential impact(s)	Mitigation measure(s)	Assessment Outcome
part of the upgrade to carry the proposed highway over the defence level.			sediments and provide habitat of reasonable quality.
	Element: Specific Pollutants / Priority Substances related to highways (e.g. heavy metals, hydrocarbons) **Potential impact(s):** The new highway may be a source of pollutants to the River Usk SAC.	The highway drainage design incorporates sustainable drainage features such as swales and settlement ponds to trap pollutants before they reach the wider water environment. A simple index assessment has been undertaken, which has shown that these features provide a suitable level of pollutant removal given the relatively low traffic movements expected on the new highway. Additional measures, such as oil interceptors, are not required as such measures are not compliant with sustainable drainage / SAB Consent requirements. .	Potential impacts are reduced. Provided the mitigation measures listed are implemented, this activity poses a minimal risk to the quality element. This activity is determined to not result in a decline in any WFD quality elements or prevent them from attaining Good status or potential in the future. Enhancements: Swale planting will improve the quality of existing water discharge from the surface water drainage system. Reedbed planting mix is integrated into the Landscape Masterplan to provide habitat enhancement for Schedule 1 protected Cetti's warbler, which along with the proposed urban forest will provide more cover and resting places for any local otter. Similarly, the new tree and vegetation planting has considered the proximity of the SSSI saltmarsh habitat so that it will remain unaffected by the proposed planting but will also deliver considerable biodiversity enhancement relative to the baseline at Coronation Park and along the flood bund. The new planting will enhance connectivity along the SAC / SSSI boundary also enhancing the SINC designation. The planting mix will also support local bee and insect populations benefiting the SINC, SSSI, SAC and the Beeline Cymru: Newport's in the Corridor project.
	Element: Biological – fish, invertebrates **Potential impact(s):** Indirect effects upon fish and invertebrates as a result of potential pollution due to runoff from the new highway.		

4.2 In combination impacts

The accumulated impact of the various activities that form the scheme are deemed to be minimal, provided the proposed mitigation measures to avoid or reduce impacts are included in the design and construction of the scheme.

One project, the Transporter Bridge Visitor Centre (Planning App 19/1164), has been identified in the vicinity of the proposed scheme as having the potential to result in cumulative impacts during the construction period. The likelihood of in combination impacts has been considered in the Habitats Regulation Assessment[4] for the scheme and was found to not be likely to result in significant in combination impacts.

4.3 Assessment of deterioration

The assessment undertaken in Table 6 has concluded that the activities would not result in deterioration of any quality elements.

4.4 Prevention of good status / potential

The assessment undertaken in Table 6 has concluded that the activities would not prevent the River Usk Transitional water body from reaching good potential in the future.

4.5 Compromising mitigation measures

The scheme is in the River Usk Transitional water body which is designated as heavily modified with a Flood Protection use. The scheme supports the mitigation measures in place to address this modification by incorporating bioengineering into the design of the embankments.

Additional enhancement of habitat value, such as through the creation of salt marsh habitat are limited. The proposed scheme is located above the typical tidal range and is designed to not encroach into the River Usk SAC which constraints opportunities to enhance existing or create new habitat. Enhancements to benefit riverine habitats and species have been incorporated into the scheme; refer to the Landscape Masterplan for details.

4.6 Protected area objectives

A Habitat Regulations Assessment is being undertaken along this assessment for the scheme. This considers whether the proposed activity prevents the River Usk SAC from achieving its objectives.

5 Consultation

The outcomes of this assessment have been consulted on within NRW. Relevant comments and how they have been taken into account during the assessment are listed in Table 7.

[4] Ove Arup & Partners, Stephenson Street FAS Preliminary HRA, October 2020.

Table 7: Consultation responses and how they have been accounted for in the assessment

Reviewer & date of correspondence	Summary of response	Action Taken
NRW Fisheries – Phillip Howell [20/01/2016]	NRW Fisheries - '*Percussive piling works within 30m of the River Usk during the shad migration period will only be undertaken during the falling tide of the river (high tide plus one hour and low tide minus one hour). Should it be necessary to undertake percussive piling during the shad migration period outside the time constraint identified above, it will be necessary to first agree appropriate mitigation measures as required with NRW and Newport City Council prior to any such works taking place*.'	No piling will take place within 30m of the River Usk MHWS mark. Hydraulic piling has also been adopted.
NRW Newport, Caerphilly & Blaenau Gwent Environment Team - Nick Hudson, Protected Sites Officer. [27/05/2020]	Concern regarding vibration-sensitive fish. - NRW Fisheries Team recommendations were shared and NRW Fisheries Team advice accepted. Query regarding habitat composition on riverside toe of embankment. - NVC Report shared in addition to NRW Botanist comments for information. Query regarding access track footprint. - Confirmation provided that specification of a 'silent' piling rig precludes the need for a temporary access track at the base of the riverside toe of the embankment. Query regarding operational maintenance of the embankment (mowing). - NRW Operations Team confirmed that no operational access track required.	
NRW - Newport, Blaenau Gwent and Caerphilly Environment Team – Nick Hudson, Tamarind Falk [11/08/2020]	The hydraulic piling method has been specified and secured within the EAP to avoid the need for a temporary construction access track in the River Usk SAC. Best practice pollution prevention has also been secured within the EAP. Updated Response [10/09/20] – Nick Hudson: *The updated method using a Giken push piler as set out in Design Freeze ECI Review appears to be a preferable option, which on the current information I support as the preferred approach on the basis that it removes the need for significant operations within the SSSI. Re the HRA, if this method is the intended approach and can be secured it appears reasonable to base the assessment on this. However, if unavailable re-assessment will be necessary.* Initial Responses [11/08/20]: Conservation Officer (Nick Hudson) - Protected Sites – Severn Estuary/Mor Hafren SPA, Severn Estuary/Mor Hafren Ramsar, Severn Estuary/ Mor Hafren SAC, River Usk / Afon Wysg SAC, River Usk (Lower Usk)/Afon Wysg (Wysg Isaf) SSSI. *I support the comments made by the Specialist Advisor - Marine and Coastal Physical Processes, with regard to matters relevant to the above European Protected Sites and the River Usk SSSI. The project has stated that the works have to be carried out on the seaward side of the seawall, within the SSSI/SAC. The saltmarsh feature of the SSSI is present within the proposed*	

Reviewer & date of correspondence	Summary of response	Action Taken
	footprint of the works. Two options of construction access are discussed within the ECOR document - bog mats (temporary ground covering) or a temporary stone track. The use of bog mats to carry out the works would likely lead to some low-level disturbance of the saltmarsh in the handling, moving and storage of these items. It is likely that due to the nature of bog matting it would be left in situ for relatively short time periods. This is the preferred option. *The other option is a temporary stone track. No information has been supplied regarding the type and construction of track, the method of installation, any soil handling/storage method, material/s to be used, the removal and restoration, or overall working footprint. Whilst it is not certain that this option would cause long-term damage to the saltmarsh feature, it is also not clear what the outcomes would be. This option is carries a higher risk of detrimental impact on the SSSI due to the uncertainties involved and is not recommended (unless information/evidence can reasonably demonstrate that disturbance levels can be kept within acceptable limits).* Environment Officer (Tamarind Falk) - *Welcome the FAS ECOR Part A document (p. 25) states: 'Pollution Incident – EAP to include best practice; e.g. GPP5, CIRIA, etc. Any further mitigation required during construction to be controlled through EAP'.*	
NRW Geomorphology – Anne Lewis [28/07/2020]	NRW Geomorphology - *The proposed scheme is below the tidal limit and I do not anticipate any significant upstream impacts. As a fluvial geomorphologist I therefore have no comments to offer on the scheme. The impacts on geomorphology should be address by the marine and tidal waters team.*	No action required.
NRW WFD – Jeremy Tanner [29/07/2020]	*"Under WFD the Usk estuary is a Heavily Modified Water Body precisely because of its flood defences. It is not currently meeting the target of Good Ecological Potential (GEP) as all potential mitigation measures have not been deemed to be in place, and this is exactly the sort of scheme that should be considering each and every one of the potential mitigation measures that could apply and looking to implement them where possible in order to move us towards GEP. I strongly recommend that the WFD Report includes potential WFD improvements as part of the scheme."*	Report updated to clarify that opportunity for enhancement is limited as scheme is above tidal limit and design principle is to avoid encroachment into SAC; view shared by NRW Newport, Blaenau Gwent and Caerphilly Environment Team.
NRW Marine Fish and Fisheries – Alexander Scorey [25/08/2020]	NRW Marine Fish and Fisheries - *The use of non-vibratory methods sounds really promising if they can be secured.* *I'm happy that the >30m separation distance would mitigate for impacts on the diadromous species in the Usk from vibratory piling activities.* *Should vibratory piling be used within 30m of the river, then an impact pathway would remain for*	No piling will take place within 30m of the River Usk MHWS mark. The hydraulic piling method has been specified and secured within the EAP.

Reviewer & date of correspondence	Summary of response	Action Taken
	all diadromous fish species in the Usk that would need to be assessed in the HRA. My original comments below on the scope of the HRA would then apply. Whilst shads are most sensitive, they migrate at different times to salmon and lampreys so a seasonal application of the mitigation in March-June would not benefit key migratory life stages of the other species. Furthermore, the downstream post-spawning migration of adult twaite shad, and the downstream migration of juvenile shads happens later in the year (through to October/November). [31/07/2020] *General comment to inform HRA: Within the HRA, it is advised that the process to identify impact pathways from the scheme to all the designated diadromous fish features of the River Usk SAC (sea lamprey, river lamprey, twaite shad, allis shad and Atlantic salmon) is documented and justified as these species migrate past the location of the scheme. It is advised that impact pathways of noise and vibration caused by piling and other construction activities, any artificial lighting, and the risk of pollution events or other water quality effects from site run-off are considered. These impact pathways, if present, could affect individuals as they are migrating through the estuary as either juveniles or adults. It is advised that the assessment discusses the timing of construction activities in relation to the timing of migration of the diadromous fish features. It is also advised that the assessment discusses the location of construction activities relative to the estuary, at high tide and low tide. If all activities are to be conducted at tidal states when the water level is >40m from the embankment, then it is advised that this is secured by the EAP. Finally, it is advised that the magnitude and duration of the impacts generated by the construction activities (including piling methods, piling sound source levels, pile numbers and piling duration) is considered if an impact pathway is present.*	
NRW Marine Geomorphology and Physical Processes – Emmer Litt [02/09/2020]	*Initial Response to Draft ECOR [06/08/2020]:* *Key Issues* *1. No direct footprint losses have been calculated although it is not clear at present whether this will be a factor. If direct losses are identified, further discussion will be needed.* *Detailed comments* *2. We would recommend further detail is provided on the construction methodology, at present it is difficult to understand if further geomorphological or physical process assessment will be needed. There is little baseline characterisation on the River Usk/Severn to understand how this project may interact with the physical characteristics.*	Design principle that works will not encroach into SAC.

Reviewer & date of correspondence	Summary of response	Action Taken
	3. Concern is raised around using an aggregate based solution as a temporary track, further information will be required. A stone track sounds large, industrious and potentially hard to ensure all is removed. The stone could become trampled into the saltmarsh and buried, depending on the size fraction, and at the very least cause depressions potentially in a linear feature. The removal method would need detailing as well. Bog mats are recommended alongside a slow driving speed. *4. Further information is required about re-seeding of the SSSI as mentioned on page 24.* *5. Appendix B Enhancement Opportunities* *It is unclear what is meant by line 13 on geoengineering: Bioengineering techniques to promote further colonisation of erosional features / mudflats: reedbed creation, coir roll / pallet installation, etc. Need to confirm constructability, resilience (i.e. flood may wash structure away) and need versus SAC management. All the above mentioned measures will need further design and consideration.*	
NRW Marine Ecology – Ben Wray [05/08/2020]	*No specific marine benthic ecology issues as I would consider this a riverine proposal (despite the tidal influence) and therefore should be dealt with by a relevant specialist in the environment team. That said, there may be some water quality and potential migratory fish, bird considerations.* *I would also suggest that a full biosecurity risk assessment should be undertaken if any of the works are to be undertaken using marine vessels/equipment (which I could review in that instance), and there also might be options for biodiversity enhancement of any new artificial infrastructure. But again, one of the specialists in the environment team would be better placed to advise on potential biodiversity interventions.*	No action required.
NRW – Marine – Lucie Haines [05/08/2020]	*Updated Response [20/08/2020]:* *Many thanks for highlighting the additional information that has been provided to us for review. Following review of these documents, including the "Ecological Appraisal" for the scheme and the "Design Freeze ECI Review", I can confirm that the initial comments I provided remain unchanged; neither of these documents address our concerns in relation to WFD and we have not been given the opportunity to review of the "OBC Design WFD Assessment" which is referred to in the "Environmental Constraints and Opportunities Record", upon which our initial comments are based.* *We advise that a WFD Assessment is required for the project in its entirety – including works associated with Phase 1 and 2 of the project, in order to determine if the project is compliant with the Directive.* *Initial Response [05/08/2020]:* *Key Issues*	WFD Compliance Assessment completed for all stages of the project. Screening assessment undertaken in the absence of mitigation measures; requisite mitigation considered in formal assessment. Best practice construction techniques (GPP and CIRIA) to protect water quality and biosecurity measures are secured within the EAP. Report updated to clarify that opportunity for enhancement is limited as scheme is above tidal limit and design principle is to avoid encroachment into SAC.

Reviewer & date of correspondence	Summary of response	Action Taken
	Both construction and operational phase effects on water quality have been screened out and the document states that "The OBC Design WFD Assessment concluded that with mitigation in place, neither temporary nor operational phase impacts would affect the current status for the various WFD elements or prevent this or any other water body from reaching GEP (or Good Ecological Status)".We have not been consulted on this document however and given the large scale and tidal location of the proposed scheme, we strongly advise the scoping out of water quality aspects is incorrect and that water quality will need to be scoped in for further consideration as part of the detailed WFD Assessment. We strongly advise that all elements of the WFD will need to be scoped in where a pathway for effect arising from the project exists. We advise this is likely to include, but not necessarily limited to, hydromorphology, biology: fish and water quality. Please refer to OGN72 for further information in this regard. *Mitigation should not be utilised at the scoping stage to reduce the magnitude of effect; activities where potential pathways for effect on receptors exist should be scoped in for further assessment and then mitigation applied after a detailed assessment of potential effects has been carried out.* *Detailed Comments* *The document has correctly identified the Usk transitional WFD water body as being designated as heavily modified; currently failing to achieve its objective of good ecological potential (GEP) due to some of the water body mitigation measures being "not in place". It should be emphasised that the water body is designated as Heavily Modified for flood protection use and that its mitigation measures relate to this use. We welcome that the project will aim to support the water body mitigation measures.* *In relation to the information provided in Table 4 on shad; other migratory fish species will need to be scoped into the assessment of potential effects and considered in the WFD assessment; currently only shad are mentioned.* *While the information provided in Table 4 of the WFD assessment in relation to preliminary mitigation is helpful, mitigation should not be utilised at the scoping stage to reduce the magnitude of effect; activities where potential pathways for effect on receptors exist should be scoped in for further assessment and then mitigation applied after a detailed assessment of potential effects has been carried out. Please refer to NRW's internal guidance document, OGN72, for guidance on how to carry out a WFD assessment.* *We welcome inclusion of GPP5 to manage works in or near water and a Biosecurity Risk Assessment for appropriate management to*	All diadromous species included within WFD Assessment.

Reviewer & date of correspondence	Summary of response	Action Taken
	reduce the risk of introduction and spread of INNS. *Both construction and operational phase effects on water quality have been screened out and the document states that "The OBC Design WFD Assessment concluded that with mitigation in place, neither temporary nor operational phase impacts would affect the current status for the various WFD elements or prevent this or any other water body from reaching GEP (or Good Ecological Status)". This approach to scoping must be revisited. I have not been provided with the OBC Design WFD Assessment for review as part of this or any other consultation on this project so I cannot concur I agree with this conclusion and that any potential effects of the project on water quality can be scoped out. I strongly advise this is not likely to be the case however, given the scale of the scheme and the nature of the works, I would consider this likely to require potential effects to water quality to be scoped in and a WFD Assessment to be provided in support of the proposed works, which will need to be reviewed and agreed prior to commencement of the works. We welcome the suggestion that the project will endeavour to incorporate enhancements into its design and welcome further discussion in this regard.*	
NRW - Marine Water Quality - Eleanor Howlett [17/08/2020]	*What the rationale is for comparing contaminants to freshwater values when the River Usk water body is a transitional one (see the Soil row of Table 3). The Ecological Appraisal shows the site is quite close to the mouth of the Usk. Has the salinity been examined to ensure it is freshwater? I would expect saline quality standards to be used if the site proves to be saline. We need to ensure the correct standards are used to protect the biota in the estuary of the Usk. The Water row of Table 3 does not mention what the risk of suspended sediment release is – this should be considered in the WFD compliance assessment. I agree that mitigation measures (section 5.1 of the Ecological Appraisal, paragraphs 9-10) should be considered at Appropriate Assessment stage. Note that the WFD compliance assessment should also consider these at the Detailed Assessment stage, rather than screening out earlier.*	Assessment reviewed and updated accordingly.

6 Summary and Conclusions

This WFD compliance assessment has concluded that provided the mitigation measures listed in Table 6 are implemented, the scheme will not cause deterioration to the status of any water body or prevent a water body from achieving either Good Ecological Status or Potential in the future.

The scheme aids the delivery of the mitigation measures for the River Usk Transitional heavily modified water body, via the incorporation of bioengineered flood embankments and landscape planting using native species.

This assessment has been based on currently available WFD baseline data and design information for the scheme. It is considered a 'live' document and should be reviewed and updated during design and construction, particularly if:

- Natural Resources Wales update or provide additional WFD baseline data for the relevant water bodies; and/or
- Significant changes to the nature, spatial extent, scale or construction methods of the scheme are made.

The outcomes of this assessment should be shared and agreed with Natural Resources Wales as part of the consenting process.

Technical Note

ARUP

4 Pierhead Street
Capital Waterside
Cardiff CF10 4QP
United Kingdom
www.arup.com

t +44 29 2047 3727
f +44 29 2047 2277

Project title	Stephenson Street Embankment Appraisal	Job number	246344
cc		File reference	4-70
Prepared by	Candice Constantine	Date	11 December 2015
Subject	Geomorphology and WFD technical note		

1 Introduction

Natural Resources Wales (NRW) is currently investigating the feasibility of improving the degree of flood risk management along the lower River Usk between Stephenson Street and Corporation Road. Currently, limited protection is offered by a grassed embankment that is set back by approximately 40m from the top of the river bank. The area between the river and embankment is open grassland, and the ground is generally soft and marshy.

The purpose of this technical note is to provide a summary of potential geomorphological risks that should be considered in the design and appraisal of a scheme that will raise the existing embankment at Stephenson Street. This note also discusses the context of the scheme with reference to the EU Water Framework Directive and how WFD issues should be taken into account.

2 Site walkover

A site walkover by an experienced fluvial geomorphologist was completed on 23rd November 2015. The NRW project manager, end user and environmental lead were also in attendance. Access was gained via the path along the embankment, so the content of this note reflects what could be seen from the embankment and the floodplain area immediately accessible from the embankment. This sections summaries the observations made in the field.

At the northern end of the scheme near the transporter bridge, there is an outfall situated approximately 18m from the toe of the embankment (see Outfall 1 on Figure 1 and Figure 2). Flow discharges from a pipe covered with a flap valve and runs along a channel eroded into the river bank. The head of the channel around the outfall shows evidence of recent slumping.

File Note

246344 11 December 2015

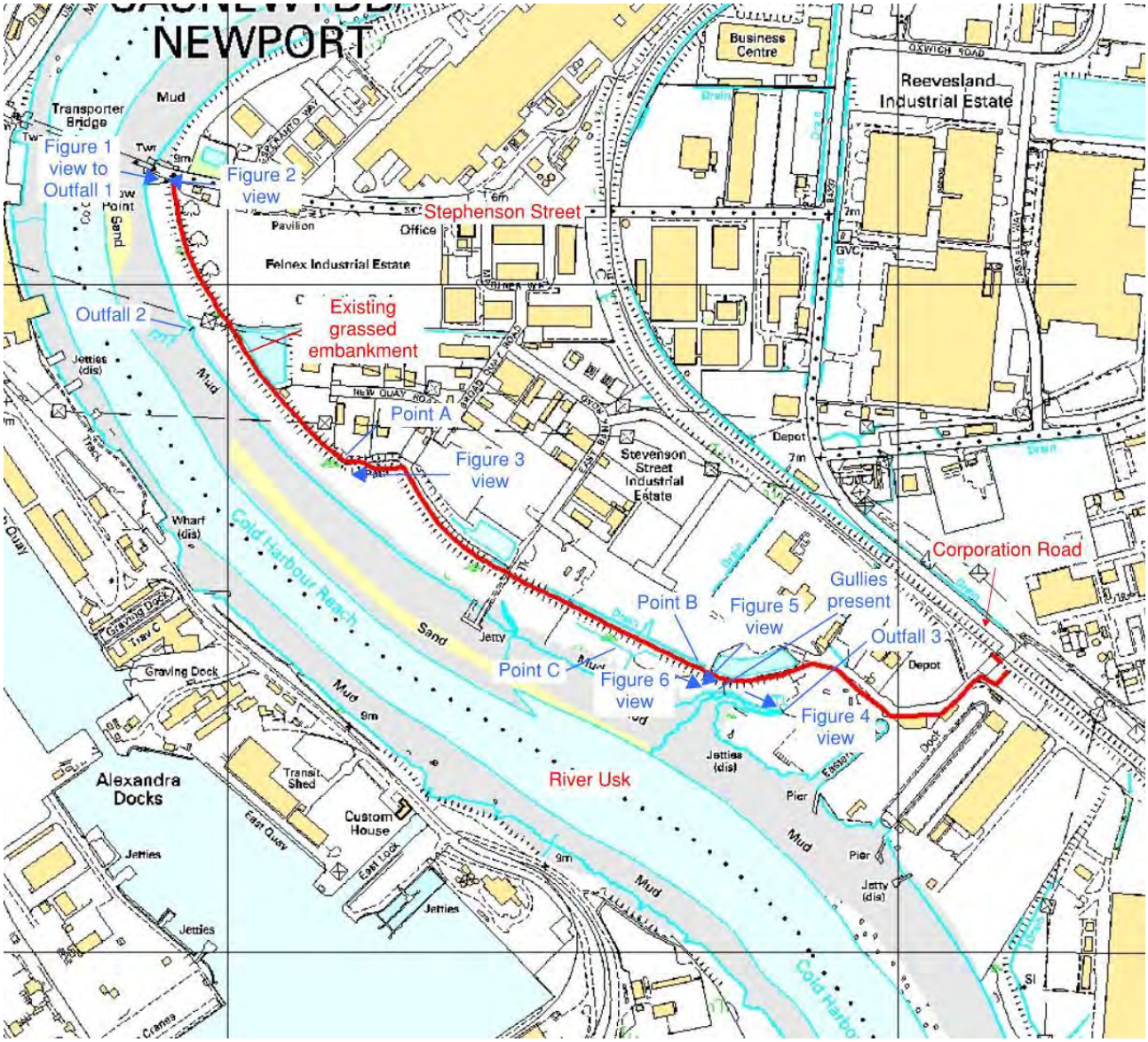

Figure 1 – Location plan. Reproduced by permission of Ordnance Survey on behalf of HMSO. © Crown Copyright and database right 2015. Ordnance Survey licence number 100019741.

Figure 2 – Outfall 1 at northern end of embankment.

Although the bed of the channel is level with the outfall, the channel gradient is steeper downstream (Figure 3). Upstream progression of a head cut could result in further bank instability and slumping with headward progression of the channel towards the embankment. The vegetated nature of the channel suggests that changes are occurring slowly. There is no evidence of aggressive and widespread erosion in this area at present.

Figure 3 – Looking towards the River Usk from Outfall 1

Outfall 2 could not be accessed from the embankment and will be surveyed from the river at a later date.

From approximately Point A to Point B indicated on Figure 1, the ground along the river side of the embankment appears to have been tracked by plant. Rutting has resulted in areas of standing water (Figure 4). These low areas contain a significant amount of fly-tipped rubbish, including tyres, brick and other debris as well as drift wood and plastic debris deposited during high tide. The presence of these features could result in a preferred flow path along the toe of the embankment during periods of high tide.

Further away from the embankment, the floodplain is hummocky and characterised by a good cover of long grass.

Figure 4 – Rutting and standing water at toe of embankment. View looking northwest along the embankment towards Point A.

The channel feature marked as Point C on Figure 1 is a relatively low area adjacent to the embankment and does not significantly stand out from the low spots and rutting elsewhere along the embankment. No active erosion was visible in the immediate vicinity of the embankment.

Outfall 3 discharges into a channel formed in the floodplain (Figures 5-7). The lower part of the channel is unvegetated (Figure 6) as a result of regular disturbance by the ebb and flow of the tide. The upper part of the channel is largely vegetated with the exception of the bed which shows signs of recent siltation (Figure 7). Some gullies were observed along the bank of the channel where the floodplain between the channel and the embankment is narrowest (see label on Figure 1). Grass growth along the gullies suggests that they are relatively stable.

Figure 5 – Outfall 3

Figure 6 – Looking downstream towards the main river along the channel at Outfall 3.

Figure 7 – Looking upstream along the channel towards Outfall 3.

East of Outfall 3, the embankment turns away from the river bank, and geomorphological risk is less of a concern.

A number of ponds and drains are situated adjacent to the embankment on its landward side. The connectivity and flow outlets for these features are unknown. General flow velocities are anticipated to be low and accordingly, erosion of the embankment is considered unlikely. Ground levels are relatively low in this area and the implications of this for embankment stability should be considered by geotechnical specialists.

3 Review of historical maps

Historical maps of the area were viewed on old-maps.co.uk (accessed on 24th November 2015). The maps show that an embankment has been present along its current alignment since at least 1883. The tidal channel at Outfall 3 is also shown on these early maps. The outfalls themselves appear to have been constructed prior to 1956. Comparison of maps from 1883 to present suggests that little change has occurred in the alignment of the river and extent of the grassed floodplain. It is possible that the channel at Outfall 3 has widened over time, but the accuracy of the maps is insufficient to confidently quantify this change.

4 Concurrent Work

It has been proposed that a pier for a new M4 bridge over the River Usk is constructed on the floodplain just south and east of the jetty at the end of East Bank Road. At the time of writing, this report and associated flood modelling of the area was not available. The impacts of the new pier on flow dynamics at the toe of the embankment should be investigated by the M4 design team and scour protection incorporated into the M4 scope if required to ensure the integrity of the flood defence.

5 Water Framework Directive

The site is located along the River Usk (Transitional Waterbody GB530905415404), which is classified as a Heavily Modified Water Body (HMWB) with a current overall status of Moderate Ecological Potential. Data from 2015 received from NRW[1] indicates that failure to achieve Good Ecological Potential is linked to the lack of measures to mitigate the impacts of flood protection.

Actions moving forward include:

- Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone. This measures applies to all hard defence structures within the tidal reaches of the River Usk and requires the installation of features to enhance the habitat value of hard defences; and
- Retain marginal aquatic and riparian habitats. This measures applies to earth embankments, including existing embankments that require reconstruction, and specifically refers to the use of bioengineering in embankment design.

6 Summary and Recommendations

The observations made in the field and by viewing historical photographs indicate that the features adjacent to the embankment are relatively stable (i.e. no significant erosional features or deposits of fine sediment) and geomorphological risk to the embankment is relatively low. It is likely that sediment transport processes are active but that they vary spatially and temporarily with some areas experiencing mild erosion and others mild deposition at any one time.

Limited geomorphological risk (from either combined or separate fluvial and tidal sources) was identified in three areas:

- Outfall 1: Some recent slumping at the head of the channel leading from the outfall was observed. The distance between the outfall and the embankment is such that the risk is considered low and could be managed through regularly monitoring with stabilisation work undertaken in the future should slumping continue. If stabilisation is desired immediately, a bioengineering solution should be developed such as installing rock rolls at the toe of the bank and reprofiling and vegetating the upper part of the bank;

[1] Received 24th November 2015

- Plant tracking resulting in rutting and standing water at the toe of the embankment: If this low area along the toe of the embankment serves as a preferred flow path during high tide, locally elevated flow depths and velocities could result in scour of the embankment. No signs of scour were observed during the site visit, but as a precaution, these areas could be filled in when the embankment is raised. This would be subject to an assessment of the impacts on the SSSI. The implications of the low areas and standing water for the geotechnical stability of the embankment should also be considered;
- Channel at Outfall 3: Gullies were observed leading from the channel at Outfall 3 towards the embankment. These features could continue to grow, eventually posing a significant risk to the embankment. The gullies are vegetated, however, suggesting that they are evolving slowly. This risk could therefore be reasonably managed through monitoring with work undertaken in the future as needed or, if desired, bioengineering products could be installed within the gullies to help encourage siltation and stabilise the features.

It should be noted that significant changes in the flow, tide or bed levels within the River Usk would alter the dynamics at the site and the associated level of geomorphological risk.

With regard to the scheme design for raising the embankment, the options appraisal should take into account the following recommendations:

- From a WFD compliance perspective, an earthworks solution to raising the existing embankment is preferred to the introduction of any hard structures. A bioengineering approach should be adopted to encourage plant growth and protect the embankment from erosion;
- If hard structures are required because of constraints such as those associated with the adjacent SSSI, then an effort should be made to minimise the extents and intrusiveness of the structures. A detailed WFD assessment is likely to be required in this instance. The design of any hard structures should include features to mitigate any impacts to the ecological value of the riparian zone and the wider waterbody. Measures should be selected based on the local ecology and position of the embankment relative to the river, floodplain and tide levels.

DOCUMENT CHECKING (not mandatory for File Note)

	Prepared by	Checked by	Approved by
Name			
Signature		11/12/15	11/12/2015