Oxford Flood Alleviation Scheme

Water Environment Regulations Compliance Assessment

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2	7/1/21	Addressing EA comments	MJ			
3	25/01/2022	Addressing Additional EA comments	MJ	RW	RW	PM

Contents

1. Introduction

1.1 Purpose of the report

This Water Environment (Water Framework Directive (WFD) Regulations (WER, 2017)[1] compliance assessment report has been prepared for the proposed Oxford Flood Alleviation Scheme (OFAS or the Scheme).

Compliance with the provisions of the legislation needs to be taken into account in the planning of all new activities in the water environment. The Environment Agency (EA), as competent authority in England must exercise its relevant functions so as to secure compliance with the Regulations (including determining any authorisation for an Environmental Permit or a licence to abstract or impound water), and so as best to secure the achievement of the following environmental objectives:

a) measures should be put in place to prevent deterioration of the surface water status or groundwater status of a body of water (subject to the application of Regulations 18 and 19), and

b) measures should otherwise support the achievement of the environmental objectives set for a body of water (subject to the application of Regulations 16 to 19).

Regulations 16 to 19 set out the conditions relevant to extended deadlines for environmental objectives (Reg16), setting less stringent environmental objectives (Regulation17), natural causes of change (Reg18) and modifications to physical characteristics of water bodies (Regulation19).

1.2 Background: Preventing deterioration in Ecological Status or Potential

All water bodies should meet good ecological status (GES) (or good ecological potential (GEP) if an artificial or heavily modified water body) by a set timeframe. Overall ecological status (or potential) is made up of a number of biological, and chemical quality characteristics called elements. The overall status is determined by the lowest element status.

Any activity which has the potential to have an impact on ecology will need consideration in terms of whether it could cause deterioration in the ecological status or potential of a water body or prevent the achievement of Good Ecological Status. It is, therefore, necessary to consider the possible changes associated with the proposed options for the Scheme.

Where there are sites protected under transposed and adopted regulations, WER aims for compliance with any relevant standards or objectives for these sites, including the Conservation of Habitats and Species Regulations (2017) (as amended)[2].

For those water bodies that are not already in 'good' condition (see Table 1), specific mitigation measures (HMWB) or actions (non-HMWB's) have been set for each River Basin District (RBD) to achieve the environmental objectives of the WER. These measures/actions are to mitigate or address impacts that have been or are being caused by human activity and to enhance and restore the quality of the existing environment. These mitigation measures/actions will be delivered through the River Basin Management Plan (RBMP) which also identifies the different organisations responsible for their delivery.

[1] The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 -
[2] The Conservation of Habitats and Species Regulations 2017 (as amended) -

1.3 The Proposed Scheme

The parts of the Scheme that are screened in for assessment are included in Table 1 below. Figure 3.1 in the accompanying Environmental Statement outlines the locations of the permanent works described in Table 1. Some other Scheme activities covered in the separate Environmental Statement are excluded from this assessment as they are not relevant to the water environment or this assessment. These are outlined below for ease of reference:

- All works in Area 1B including;
  - Extension to existing floodwalls and new flood wall in Park and Ride
  - Main embankment at Botley Road
  - New floodwall by the allotments
- All works in area 1C Including
  - Low level embankment at Botley Road allotments
- All works in Area 3D including
  - Raised defences at Ferry Hinksey Road
- All works in Area 4F including
  - Flood Defence wall at New Hinksey
  - Access to make land publicly available
  - Repairs to existing wall at Hinksey Park.

Further details on the individual locations ('sites') of the Scheme within each of the four areas are presented in 1. Only activities scoped in are covered in this table. These activities are taken forward into the impact assessment table and can all be characterised as one of five activities:

1. Modifications to existing channels where they are incorporated into new channel

2. Modifications to floodplain where it forms a new channel

3. New channels and habitat improvements in existing channels

4. New backwater/wetland areas on the floodplain as new (altered) habitats

5. Enlarged crossings of existing channels to accommodate larger channel

Each row in **Table** 1 identifies which activity is relevant by number, as listed above. This is based on the scheme description in the Environmental Statement. Figure 3.1 within the environmental statement shows the proposed works in each area of the Scheme.

Table 1: Description of Scheme

Location/ Receptor/ Activity Number	Description of Flood Alleviation Activities
AREA 1: North of Botley Road	
Seacourt Stream Modifications (Area 1A) **Activity Number: 1**	• Construction of new second stage channel (a lowered section adjoining the Seacourt Stream) starting at Seacourt Stream, approximately 300m to the north of Botley Road. The new second-stage channel will be up to 55m wide with a reduction in ground levels by up to 1m.

Location/ Receptor/ Activity Number	Description of Flood Alleviation Activities
Activity Number: 1	• Locally reprofile Seacourt Stream near Botley Bridge to remove sedimentation and create a continuous graded slope in the channel bed to allow greater water flows under the bridge.
Activity Number: 4 **Activity Number: 3**	• Creation of a backwater up to 1.5m deep connected to the channel, which will be wet most of the year and planted with marginal vegetation, designed to retain existing mature trees on left bank of the Seacourt Stream. An informal grass access track will circle the backwater for maintenance purposes. • Creation of a series of riffles in Seacourt Stream to provide more diverse channel substrates and varied profiles using gravel arisings from new channel works
Activity Number: 3	• Localised reprofiling of left bank to create bays and low-level marginal berms, with localised narrowing in places to improve low flow characteristics.
Botley Bridge Modifications (Area 1A) **Activity Number: 1**	• Lowering of raised channel bed (channel clearance) beneath the bridge to the hard bed and reconstruct in concrete. [It is not practical to widen the bridge, which takes Botley Road over Seacourt Stream]. This will require sheet piling to be installed to form a cofferdam and toe piles. Water will need to be temporarily pumped through the bridge during construction to maintain the flow downstream. Piles will be installed. • Rebuild existing outfall under bridge. • Reinforce wall on right bank of Seacourt Stream, downstream of the bridge below Richer Sounds with a new piled wall clad in brickwork.
AREA 2: Botley Road to Willow Walk North	
Seacourt Stream modifications and new channel between Spillway and Willow Walk (Areas 2A and 2B) **Activity Numbers: 2, 3 and 4**	• Construction of a second stage channel adjoining Seacourt Stream (i.e. ground lowering in some areas on the left bank of Seacourt Stream) south of Botley Road initially through the nature reserve at the northern end of Osney Mead Local Wildlife Site (LWS), before creating a short section of new channel to the south of a new spillway (see below). • After diverting the new second-stage channel (lowered ground) around the pylon and trees, it will re-join Seacourt Stream to the north of Willow Walk. As the second-stage channel nears Willow Walk, it separates from Seacourt Stream again, where it will be narrow and deepen, to pass under a new Willow Walk bridge. From this point on, the new channel will contain water year-round, being a backwater of Bulstake Stream, when the second stage channel is not flowing. As far as possible, construction will be undertaken in the new channel's footprint to minimise impacts on MG4a grassland (with the exception of a 1m width to allow the installation of temporary fencing during re-establishment of the grass in the new channel and the area nearest to Willow Walk). The width of the second stage channel will be kept to a minimum to localise impacts on MG4a grassland. • Removal of 200m length of vegetation and trees (predominantly on the left bank of the stream). Pollarding of trees bordering car park on western side of Seacourt Steam.

Location/ Receptor/ Activity Number	Description of Flood Alleviation Activities
	• Reinstatement and enhancement of Jubilee Scrape in line of an old channel. This is a meandering wetland area created as one of several Oxfordshire Jubilee Wildlife Spaces to mark the Queen's Golden Jubilee in 2002. • Creation of a series of riffles in Seacourt Stream to provide more diverse channel substrates and varied profiles using gravel arisings from new channel excavations. Localised low-level marginal berms and localised narrowing to improve low flow characteristics. • Construction of a new permanent gravel access track from Botley Road to the pylon to provide access for National Grid.
Spillway (Area 2A) **Activity Number: 1**	• Construction of new spillway (fixed-crest weir with shallow side slopes) off-take and localised ground re-profiling. The spillway will be wide enough for vehicle use, so that National Grid can access their pylon.
New Willow Walk Bridge (Area 2B) **Activity Numbers: 1, 2 and 4**	• Construction of new bridge over new channel and permanent hardstanding area for bridge maintenance, with new access gates for maintenance vehicles. • Construction of new first stage channel starts at this location, with the second stage channel flowing into it. The first stage channel here will be a backwater, with flow only when there is flow in the second stage channel.
AREA 3: Willow Walk to Devil's Backbone	
New channel (Areas 3A, 3B and 3C) **Activity Numbers: 1, 2, 3 and 4**	• Construction of new backwater channel continues south of Willow Walk to the next footpath (North Hinksey Causeway). The new channel heads eastwards to connect with Bulstake Stream immediately south of North Hinksey Causeway. The new channel north of this point will be a backwater of the Bulstake Stream during normal flow conditions, flowing only when the second stage further north is flowing. • South of the confluence between the new back water and Bulstake Stream, a second stage channel would be constructed on both banks of Bulstake Stream, with the existing watercourse forming the first channel stage. The existing ditch connecting Seacourt Stream to Bulstake Stream, which does not carry much flow at present, will be severed except during high flows by using a low weir. All flow in Seacourt Stream will continue to flow into Hinksey Stream which we will leave in its current course. • Construction of a new first-stage channel approximately 10 metres south-east of the current connecting ditch between Seacourt Stream and Bulstake Stream, which will divert from the route of Bulstake Stream, carrying all the current flow of Bulstake Stream under normal and low-flow conditions. • Provision of a control weir in the lower reach of the Bulstake Stream, which will become a backwater of the Thames under normal and low flow conditions but will flow when the level of the Bulstake Stream exceeds the height of the weir. The weir will be set slightly above the standard headwater level of the River Thames to ensure water cannot flow from the Thames into Bulstake Stream during low flow conditions when water

Location/ Receptor/ Activity Number	Description of Flood Alleviation Activities
	is needed to keep the Thames open for navigation. The new two-stage channel will flow south and will merge with Hinksey Stream. • Installation of four fixed riffle features to maintain groundwater levels in Hinksey Meadows (to maintain the MG4a grassland). • Diversion of the new channel from the Hinksey Stream will take place further south. Here, most of the combined flow will go down the new channel under normal and high flows, while all flow will go down the new channel during low flows. Some flow will continue down the old Hinksey Stream (i.e. the section of abandoned watercourse, which will be cut off and is on the downstream side of the new channel), except under low flow conditions when it will just hold water that backs up from the fishing lakes alongside the railway. • Creation of a series of riffles in new and retained channels, to provide more diverse channel substrates and varied profiles using gravel arisings from new channel works. • Retain and wash some of the gravels for re-use in the lining of the bed of Bulstake Stream and new channel, if possible, and dependent on available gravel and nature of exposed substrate on the bed of the new channel. • Widening of existing ditches to maximise wetland habitat. • Creation of new backwaters, ponds and scrapes forming a mosaic of wetland habitats within the second stage channel.
Control structures (Areas 3A, 3B and 3E) **Activity Number: 1**	• Bulstake Stream control structure – as described above, new low flow structure to divert majority of low flow into new channel, with Bulstake Stream being retained as a backwater during low flows. During flood flows the structure will be submerged. Water levels in the River Thames will be maintained during low flow periods for navigation purposes. • Construction of a tilting weir at Eastwyke Ditch - to the east of the railway line, the Eastwyke Ditch, which connects to a culvert under the railway line will be fitted with a new electric-powered tilting weir and headwall. This will normally be open but during flood conditions, the weir will close to form a barrier to flood water. It may also be used in periods of very low flows to help retain levels in the River Thames which the Eastwyke Ditch is connected to. • Construction of a new control structure (small fixed crest weir) where the new channel and the Hinksey Stream diverge close to where the Hinksey flows under the railway.
AREA 4: Devil's Backbone to the junction with Hinksey Stream and River Thames. Includes New Hinksey and South Hinksey	
New channel and Hinksey Stream /Mill Stream modifications (Areas 4B, 4C, 4D, 4E and 4G)	• Continuation of channel southwards. It will connect with existing ditches near the railway line. • Creation of new backwaters, ponds and scrapes forming a mosaic of wetland habitats within the second stage channel.

<table>
<tr><th>Location/ Receptor/ Activity Number</th><th>Description of Flood Alleviation Activities</th></tr>
<tr><td>Activity Numbers: 2, 3 and 4</td><td>
Channel clearance required to the east of the railway on Hinksey Stream below the confluence with Weirs Mill Stream, and at Munday’s Bridge under the railway line. This will involve vegetation removal and minor dredging, with no change to the bank profile.
Modifications to the existing channel at the rear of the first few properties along Kennington Road, upstream of Munday’s Bridge, with the channel wall/parapet extending above ground level.
To the west of the railway, the new channel will continue to the ring road, passing through part of the current Kendall Copse. Tree removal required. The channel needs to be water-tight at this location to prevent leaching of pollutants from the former landfill site. Therefore, the channel will be constructed from artificial materials and will have a constrained profile with no scope for natural alignment changes.
Construction of new permanent gravel access track for maintenance.
Construction of a temporary access track from the working area of the new channel to the railway sidings which will require temporary culverting of Hinksey Stream.
</td></tr>
<tr><td>Control structures (4B)
Activity Number: 1</td><td>
Control structures/weirs to ensure water levels are retained: -
Hinksey Pond– new low broad crested weir to maintain water levels in the fishing ponds;
Redbridge Stream – new flow control is required to keep water in the stream after it is severed by the new channel;
Cold Harbour – low flow control weir to allow existing Hinksey Stream to be favoured at low flows;
Removal of Towles Mill weir to increase the flow capacity of Hinksey Stream and to improve fish migration.

Additional flow restrictor on entrance to existing channel which runs north between the railway lines.
</td></tr>
<tr><td>Two bridges at the junction of Old Abingdon Road and Kennington Road (Area 4D)
Activity Number: 5</td><td>
Construction of a new bridge at Old Abingdon Road and a new bridge at Kennington Road – each bridge will have a total span of 20m and will include a central pier.
</td></tr>
</table>

2. Methodology

2.1 Assessment Stages

There are four principal steps to follow in order to undertake a detailed assessment following on from the baseline. The sequence of the steps is summarised:

- **Step 1** - The types of physical works (activities) to be undertaken as part of the Scheme have been categorised. These categories have been used to undertake an assessment of the proposed Scheme against WER elements.
- **Step 2** - Assessment of proposed Scheme against water body measures.
- **Step 3** - Cumulative impact assessment of proposed Scheme in conjunction with other proposed Schemes planned on the water body.
- **Step 4** - Assessment of proposed Scheme against water body status objectives.

2.2 Data collection

Data from the Environment Agency's Catchment Data Explorer website (EA 2021) [3] have been used to support the compliance assessment. In addition, geomorphology site visit notes (undertaken summer 2016) and photographs were also reviewed, along with hydrological modelling outcomes.

[3] Data Catchment Explorer (Environment Agency 2021) https://environment.data.gov.uk/catchment-planning/v/c3-draft-plan

3. Baseline Scoping

The following water bodies (see Figure 1 and Table 2 - Table 4) are either directly linked to the scheme boundary, or located upstream and downstream of such:

- Thames (Evenlode to Thame), which is directly linked to OFAS;
- Thames Wallingford to Caversham which is located is downstream;
- Cherwell (Ray to Thames) and Woodeaton Brook, which is located upstream.

No works will be undertaken within either the upstream or downstream water bodies. Works associated with the Proposed Scheme within the Thames (Evenlode to Thame) waterbody are unlikely to cause impacts that would propagate in to the upstream or downstream waterbodies (identified above). Therefore, the upstream and downstream waterbodies are scoped out of further assessment.

The upstream water body could potentially benefit from improved fish passage through Oxford, in conjunction with other planned improvements independent of the Scheme. Where this is applicable it is outlined in the impact assessment tables.

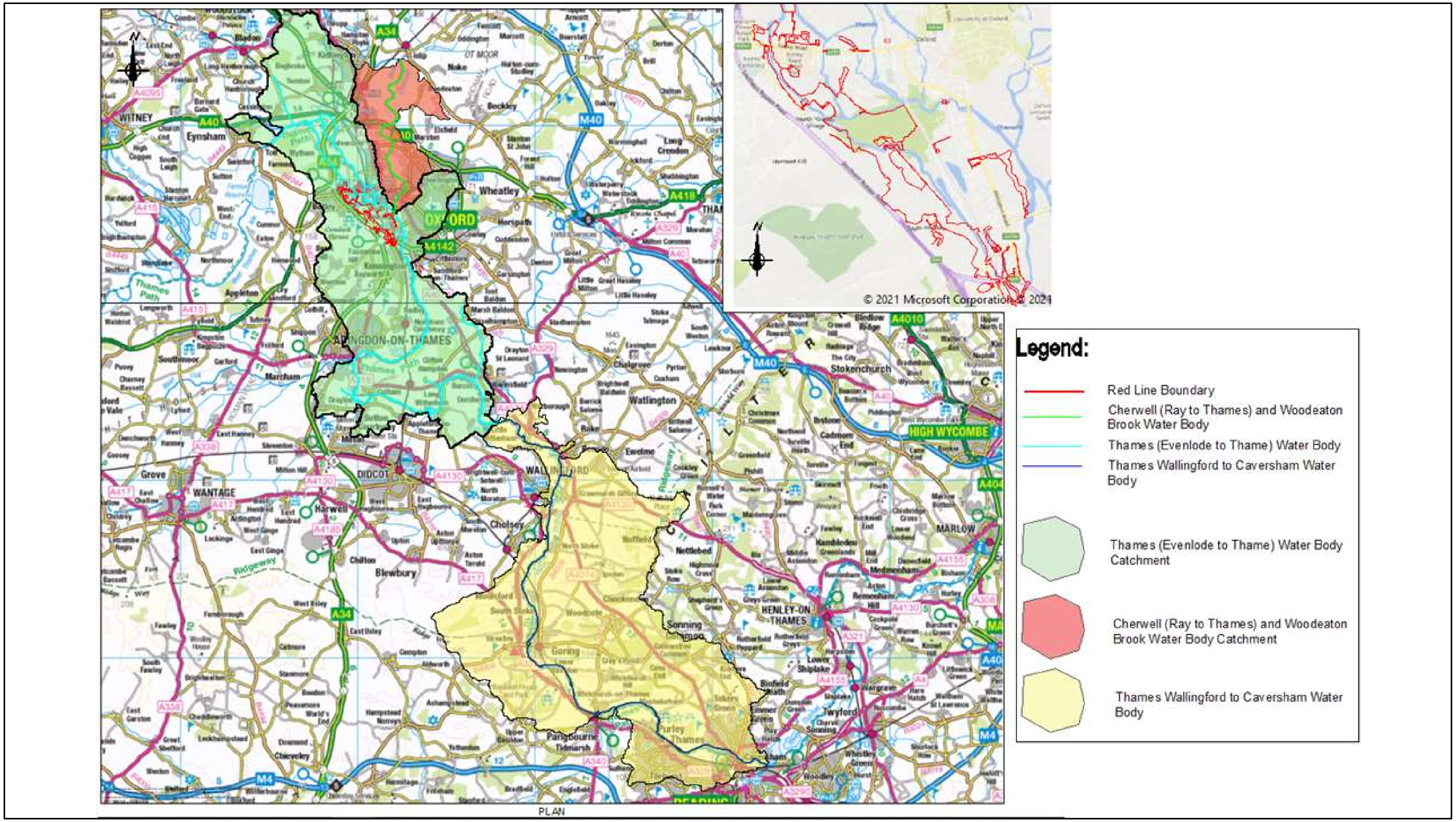

Figure 1: Identified WER catchments associated with the Scheme

Table 2: Baseline description of biological, physico-chemical and hydromorphological quality elements for the Thames (Evenlode to Thame)

Source: Environment Agency Catchment Explorer Classifications from cycle 2 2019 data.

Water body ID	**GB106039030334**
Water body name	Thames (Evenlode to Thame)
NGR	SP4574111361
Length (km)	63.863 Distance (km)
Catchment area (km^2)	149.591 Area (km^2)
Hydromorphological designation	Not designated artificial or heavily modified
Current overall status	Moderate
Reasons for not achieving good status:	Invertebrates - Suspect data. No sector responsible Invasive non-native species. North American signal crayfish. No sector responsible - Invertebrates Phosphate - Diffuse source. Poor nutrient management. Agriculture and rural land management Phosphate - Point source. Sewage discharge (continuous). Water Industry Tributyltin Compounds - Point source. Sewage discharge (continuous). Water Industry
Protected area designation	Water Supply (water quality) Regulations 2000 Habitats and Species Regulations 2018 Nitrate Pollution Prevention Regulations 2017 Urban Wastewater Treatment (England and Wales) Regulations 1994
Hydromorphological supporting elements	Supports Good Hydrological Regime: Supports Good Morphology: Supports Good
Current ecological status (and status objective)	Moderate.
Biological quality elements	Moderate. Good by 2027 Fish: Good Invertebrates: Moderate
Physico-chemical quality elements	Overall - Moderate Ammonia (phys-chem) – High Biological Oxygen Demand – High Dissolved Oxygen - High pH – High Phosphate – Moderate Temperature - High
Chemical quality elements	Fail. (Good by 2027)

Table 3: Baseline description of biological, physico-chemical and hydromorphological quality elements for the Thames Wallingford to Caversham. This is the downstream water body.

Source: Environment Agency Catchment Explorer Classifications. Data extracted from cycle 2 2019 data.

Water body ID	**GB106039030331**
Water body name	Thames Wallingford to Caversham
NGR	SU5975592031
Length (km)	39.401 Distance (km)
Catchment area (km^2)	186.481 Area (km^2)
Hydromorphological designation	Heavily modified
Current overall status	Moderate
Reasons for not achieving good potential:	Physical modification - Recreation. Mitigation Measures Assessment Physical modification - Navigation. Mitigation Measures Assessment Physical modification. Local and Central Government. Mitigation Measures Assessment Phosphate - Point source - Sewage discharge (continuous). Water Industry. Phosphate - Diffuse source. Agriculture and rural land management. Phosphate - Point source. Sewage discharge (continuous). Water Industry. Invertebrates - Invasive non-native species. North American signal crayfish. No sector responsible
Protected area designation	Habitats and Species Regulations 2018 Nitrate Pollution Prevention Regulations 2017 Urban Wastewater Treatment (England and Wales) Regulations 1994
Hydromorphological supporting elements	Supports Good. Hydrological Regime: Supports Good
Current ecological status (and status objective)	Moderate.
Biological quality elements	High Invertebrates: High
Physico-chemical quality elements	Overall - Moderate. Acid neutralising capacity – High Ammonia (phys-chem) – High Biological Oxygen Demand – High Dissolved Oxygen - High pH – High Phosphate – Moderate Temperature - High

Water body ID	GB106039030331
Chemical quality elements	Fail

Table 4: Baseline description of biological, physico-chemical and hydromorphological quality elements for the Cherwell (Ray to Thames) and Woodeaton Brook. This is the upstream water body.

Source Environment Agency Catchment Explorer Classifications. Data extracted from cycle 2 2019 data.

Water body ID	GB106039029800
Water body name	Cherwell (Ray to Thames) and Woodeaton Brook
NGR	SP5120909547
Length (km)	12.153 Distance (km)
Catchment area (km^2)	23.765 Area (km^2)
Hydromorphological designation	Not designated artificial or heavily modified
Current overall status	Poor
Reasons for not achieving good status:	Macrophytes and Phytobenthos Combined - Point source. Sewage discharge (continuous). Water Industry. Phosphate - Point source. Sewage discharge (continuous). Water Industry. Phosphate - Point source. Sewage discharge (continuous). Water Industry. Phosphate - Diffuse source. Poor nutrient management. Agriculture and rural land management. Phosphate - Point source. Sewage discharge (continuous). Water Industry. Phosphate - Diffuse source. Poor nutrient management. Agriculture and rural land management. Phosphate - Diffuse source. Urbanisation - urban development. Urban and transport. Invertebrates -Invasive non-native species. North American signal crayfish
Protected area designation	Nitrate Pollution Prevention Regulations 2017
Hydromorphological supporting elements	Overall: Supports Good Hydrological Regime: Supports Good Morphology: Supports Good
Current ecological status (and status objective)	Poor
Biological quality elements	Overall: Poor Fish: Good Invertebrates: Poor Macrophytes and phytobenthos combined: Moderate
Physico-chemical quality elements	Overall: Moderate. Acid neutralising capacity – High Ammonia (phys-chem) – High

Water body ID	GB106039029800
	Biological Oxygen Demand – High Dissolved Oxygen - Good pH – High Phosphate – Moderate Temperature - High
Chemical quality elements	Fail

The British Geological Society (BGS) Geoindex (2021)[4] indicates that the majority of the Scheme is underlain by superficial unconsolidated alluvium deposits consisting of clay, silt, sands and gravels. Sporadic sandy limestone gravels mapped as relic terraces of the River Thames are also present throughout the Scheme area.

The following bed rock aquifer groundwater bodies are located within the study area:

- Headington Corallian (GB40602G600700) which underlies most of Oxford to the east of OFAS, not under OFAS itself. The aquifer consists of a complex succession of interdigitating limestone, marls, sandstones, siltstones and mudstones (BGS 2021).
- Shrivenham Corallian (GB40602G600600) which underlies the area south-west of the A34 / A4142 ring road, again not under OFAS. The aquifer consists of a complex succession of interdigitating limestone, marls, sandstones, siltstones and mudstones (BGS 2021).

The groundwater bodies do not directly underly the scheme and therefore, the proposed works would take place within unproductive superficial deposits described below. Therefore, groundwater bodies have been scoped out of further assessment due to a lack of a direct pathway to the groundwater body.

It is likely that localised perched groundwater within the superficial deposits described above is present. These are not designated groundwater bodies but could still be locally impacted by the Scheme. Potential impacts are likely to be:

a) Changes to groundwater resources (quantity): there are likely to be some localised changes to shallow groundwater levels around new channel sections which could result in changes in the distribution of local groundwater-dependent floodplain features. This potential impact has been considered within the Chapter 8 – Flora and Fauna within the Environmental Assessment which concludes that impacts are unlikely to be significant at the water body scale.

b) Changes to groundwater quality: In locations where a new channel is being constructed through former landfill, there is potential for creating new pathways for contaminants into groundwater. The required volume of land will be removed from the landfill to create space to facilitate the new channel profile. All material will be removed, segregated and tested to confirm appropriate offsite disposal requirements. The new channel will be lined with a geosynthetic lining over the reaches located within land previous occupied by landfill. The geosynthetic membrane will act as a barrier to leachate and potentially contaminated groundwater flow entering the channel. Therefore, there is unlikely to be any significant impact on the watercourse at the waterbody scale.

For the reasons listed above groundwater has been scoped out of further assessment.

[4] British Geological Society – Geoindex Online map viewer (BGS 2021) https://www.bgs.ac.uk/map-viewers/geoindex-onshore/

A Habitat Regulations Assessment (HRA) Screening Report has been prepared to assess the possible impacts (construction and operation) on Oxford Meadows Special Area of Conservation. The Scheme has been carefully designed to avoid any effects on groundwater levels at the SAC in the long-term, and therefore this site is not considered further in this assessment.

3.1 Screening of Scheme components

Table 1 has described the Scheme from north to south (upstream to downstream) apart from the new flood defences that are distant from the existing channels and natural floodplains of the water body and so have been screened out (see Section 1.3). Table 5 - Table 12 assesses the scheme components screened in and which have, for the purposes of the assessment, been grouped into five categories:

1. Modifications to existing channels where they are incorporated into new channel
2. Modifications to floodplain where they form a new channel
3. Creation of new channels and habitat improvements in existing channels where they are not incorporated into the new channel
4. New backwater/wetland areas on the floodplain as new (altered) habitats
5. Enlarged crossings of existing channels to accommodate larger new channel.

3.2 Scoping of water body elements

The water body elements in scope are each included in the assessment, Table 5- Table 9. These include ecological, hydromorphological and physio-chemical.

4. Water Framework Directive Assessment

4.1 Step 1: Assessment of the proposed Scheme categories against biological, physico-chemical and hydromorphological quality elements

The assessment is structured such that specific elements of the design that will alter the channel and/or surrounding areas (e.g., floodplain) have been categorised. These categories have then been used to assess potential impacts or benefits to the WER elements. Potential impacts and/or benefits of the Scheme categories on WER elements of the water bodies are shown in Table 5 - Table 9.

Temporary impacts related to the construction phase of the Scheme have also been assessed as described above and provided in Table 9 - Table 12.

Table 5: Potential impacts on WER classification and supporting elements from modifications to and incorporation of existing channels in a new channel[5].

Key for Tables 5-12: ✓ positive change; × negative change; - is no change.

Modifications to existing channels where they are incorporated into new channel		
WER quality element	**Likely change**	**Paragraph no. for further detail**
Phytoplankton	-	-
Macrophytes and phytobenthos	✓	1)
Benthic invertebrate fauna	✓	
Fish fauna*[6]	✓	
Hydrological regime		
Quantity and dynamics of water flow	✓	2)
Connection to groundwater bodies	-	-
River continuity		
Morphological conditions		
River depth and width variation	✓	3)
Structure and substrate of the river bed	✓	
Structure of the riparian zone	✓	4)

[5] Note it is understood that the status classification is driven by bio, phys-chem and chemical elements and not the supporting elements.

[6] Also, an improvement to upstream waterbody Cherwell (Ray to Thames) and Woodeaton Brook (GB106039029800). See paragraph 1 for details.

Thermal conditions	-	
Oxygenation conditions	✓	
Salinity	-	-
Acidification status	-	-
Nutrient conditions	-	-
Specific pollutants		
Pollution by all priority substances identified as being discharged into the body of water	-	-
Pollution by other substances identified as being discharged in significant quantities into the body of water	-	-

1) Incorporation of existing channels into the new channel will aid in improving connectivity of the fluvial system. This will allow for increased movement of macro-invertebrates, benthic invertebrates and fish species longitudinally (downstream drift) and laterally (increased connectivity of the channel with wetter marginal areas). Additionally, flow volumes would likely improve during low flow conditions, allowing movement of species over a longer period of time. Modifications to the channel bed including the inclusion of riffles will create varied channel depths, flow velocities and bed sediment which will improve species richness through the provision of additional habitat types, leading to increased species diversity.

2) The proposed scheme would see flow diverted from the Bulstake stream in to a new, improved, naturalised channel which would provide heterogenous flows and improve flow dynamics compared to existing conditions. The new channel would re-join the Thames at the Weirs Mill Stream confluence.

   During low flow conditions, the new channel would be favoured and 100% of flow would be diverted into the new channel. Therefore, during low flow conditions the reach of Bulstake Stream downstream of the control structure would function as a backwater to the Thames, the stage height of which would control water levels over this reach of the Bulstake. This is unlikely to cause the lower Bulstake reach to dry up unless the stage height of the Thames drops significantly. However, it would remove flow volumes received by the Thames between the downstream Bulstake confluence and the Weirs Mill Stream confluence during low flow conditions. This would not cause a deterioration at the waterbody scale as flows within the lower Bulstake are already cut off from the Thames as part of the Low flow protocol for the area and therefore there would be no change to baseline conditions.

   During normal and high flows, Bulstake Stream would function as a flowing tributary of the Thames as it does during existing conditions. Although some flow volume would be removed via diversion to the new channel and returned to the Thames downstream of the Weirs Mill Stream confluence, it is unlikely to be large enough volumes during normal and high flow regimes to cause deterioration at the water body scale.

3) Creation of flow variation will lead to improved fluvial processes including variable channel width and depth. Increased flow heterogeneity will lead to increased sediment heterogeneity and transport of varying sediment sizes improving overall channel substrate and structure.

4) The new channel will provide additional wetland riparian habitat all year round and improve the connection of the existing isolated channels to the floodplain. Improved flow heterogeneity will increase oxygenation conditions. In the main channels thermal conditions will be improved by increased flows which will aid in thermal regulation due to faster moving water. Conversely, the lack of trees in the new channel could be considered detrimental to thermal conditions due to lack of shading. Overall, this is unlikely to cause issues at the waterbody scale.

In summary, there is unlikely to be a risk of deterioration to the current waterbody status for reasons outlined above.

Table 6: Potential impacts to WER elements from modifications to the existing floodplain

Modifications to floodplain where forming new channel		
WER quality element	**Likely change**	**Paragraph no. for further detail**
Phytoplankton	-	
Macrophytes and phytobenthos	✓	5)
Benthic invertebrate fauna	✓	
Fish fauna	✓	
Hydrological regime		
Quantity and dynamics of water flow	-	
Connection to groundwater bodies	-	
River continuity		
Morphological conditions		
River depth and width variation	-	
Structure and substrate of the river bed	-	
Structure of the riparian zone	✓	6)
Thermal conditions	-	
Oxygenation conditions	✓	8)
Salinity	-	
Acidification status	-	
Nutrient conditions	-	
Specific pollutants		
Pollution by all priority substances identified as being discharged into the body of water	-	

Pollution by other substances identified as being discharged in significant quantities into the body of water	-	

5) Creation of a year round wetland within the second stage channel will lead to localised changes in plant communities via planting and colonisation of additional species. This will lead to increased diversity and population numbers of invertebrate species through the provision of varied habitats. For fish, modifications to the floodplain will provide additional heterogenous habitat which will promote species diversity and populations. There is an increased risk of stranding when the second stage channel is not in flow or if backwater areas become ephemeral/overly shallow, however this is a natural function of floodplains and there is still an overall improvement for fish species.

6) Creation of a wetland within the second stage channel will lead to reconnection of the channel to its floodplain. Wetland areas will be wet for the majority of the year leading to overall improvement in biodiversity, morphology and hydrology.

7) Modifications to the floodplain would generally constitute an overall improvement of oxygenation related to the improved heterogenous channel shape and flow conditions.

In summary, there is unlikely to be a risk of deterioration to the current waterbody status for reasons outlined above.

Table 7: Potential impacts of new channels and improvements to existing channels on WER elements

Creation of new channels and habitat improvements in existing channels where they are not incorporated into the new channel		
WER quality element	**Likely change**	**Paragraph no. for further detail**
Phytoplankton	-	-
Macrophytes and phytobenthos	✓	8)
Benthic invertebrate fauna	✓	
Fish fauna	✓	
Hydrological regime		
Quantity and dynamics of water flow	✓	9)
Connection to groundwater bodies	-	-
River continuity		
Morphological conditions		
River depth and width variation	✓	10)
Structure and substrate of the river bed	✓	
Structure of the riparian zone	✓	
Thermal conditions	✓	11)

Oxygenation conditions	✓	
Salinity	-	
Acidification status	-	
Nutrient conditions	-	
Specific pollutants		
Pollution by all priority substances identified as being discharged into the body of water	-	
Pollution by other substances identified as being discharged in significant quantities into the body of water	-	

8) Creation of new channels, reprofiling and habitat improvements to existing channels will create a more natural channel planform with improved fluvial function and sediment/ecological connectivity. The creation of bedforms including localised low level marginal berms and riffles will improve natural channel planform, locally narrowing and widening the channel in places leading to increased flow heterogeneity and additional habitat creation through increased sediment transport and variability. These improvements will promote macrophyte, benthic invertebrate and fish species diversity and populations if conditions are suitable. An increase in heterogenous flows would also improve flow conditions during low flows and facilitate increased fish, and invertebrate passage between localised reaches during such conditions. However, in some locations, including through the old Abingdon Road bridge and Kennington Road bridge the channel would be constrained and would not meet the design standards set for other reaches. Constriction of the channel width would lead to increases in flow velocities over the constrained reach which may lead to unsuitable conditions for macrophyte, benthic invertebrate and fish species due to a reduction in habitat through the re-distribution of sediment or due to increase flow velocities. These are small, localised reaches and would not lead to deterioration at the waterbody scale. Additionally any impacts associated with these locations will be offset by the morphological improvements in the majority of reaches through the Scheme.

9) New channels will improve flow velocities during low flow conditions leading to an overall improvement in the quantity of year round flow, thereby improving resilience to low flow conditions. Inclusion of bed forms within the new and existing channels will lead to increased flow heterogeneity including flow type, and volume. Where the channel is constrained, increases in flow velocities may occur over such reaches . This would not cause deterioration at the waterbody scale and therefore new morphologically diverse channels are considered to constitute an overall improvement.

10) New channels and improvements to existing channels will lead to increases in the amount and suitability of heterogenous features whilst allowing the channel to function better and more naturally. There is a potential for a temporary (post-construction) increase in localised suspended sediment concentrations as the watercourse adjusts but this will not be substantially greater than present background conditions (where sediment concentrations within the river during normal and elevated flows as a result of run-off are high). Fines are likely to settle in the channel margins and be re-suspended/distributed during higher flows. Habitat improvements within the riparian zone, including additional planting of native species will lead to an overall improvement to biodiversity, channel morphology and hydrology. However, constriction of the channel width over localised reaches as described above would lead to increases in flow velocities which may lead to

changes to the structure and type of bed substrate though such reaches. The impacted reaches are small and would not cause a deterioration at the waterbody scale. Additionally, any impacts associated with these locations will be offset by the morphological improvements in the majority of reaches through the Scheme.

11) Improved flow and sediment variability will promote better water quality, including pH, dissolved oxygen (DO), clarity and temperature. There is a potential risk of deterioration in oxygenation, particularly in warmer conditions when shallower water heats up, and de-oxygenates, but due to increases in flow variability and variation in channel wetted width and depth, this is unlikely to be an issue in the new and improved existing channels. Additionally, improved fluvial connectivity would increase flow velocities and volumes and allow temperature regulation during periods of low flow.

In summary, there is unlikely to be a risk of deterioration to the current waterbody status for reasons outlined above.

Table 8: Potential impacts of the creation of backwater/wetland areas on WER elements

New backwater/wetland areas on the floodplain as new (altered) habitats		
WER quality element	**Likely change**	**Paragraph no. for further detail**
Phytoplankton	-	-
Macrophytes and phytobenthos	✓	12)
Benthic invertebrate fauna	✓	
Fish fauna	✓	
Hydrological regime		
Quantity and dynamics of water flow	-	-
Connection to groundwater bodies	-	13)
River continuity		
Morphological conditions		
River depth and width variation	-	-
Structure and substrate of the river bed	-	-
Structure of the riparian zone	✓	13)
Thermal conditions	✓	
Oxygenation conditions	✗	
Salinity	-	-
Acidification status	-	-
Nutrient conditions	-	-

Specific pollutants		
Pollution by all priority substances identified as being discharged into the body of water	-	-
Pollution by other substances identified as being discharged in significant quantities into the body of water	-	-

12) New backwater and wetland areas will improve the structure of the riparian zone through the increased biodiversity, morphology and hydrology. Such areas will provide heterogenous habitat and lead to a more diverse habitat structure, which will promote macrophyte and fish species diversity and population densities. There is a potential for increased risk of stranding of fish in shallow/ephemeral features within the wetlands and backwaters should these areas become cut off from the main channel. However, the creation of such areas is considered an overall improvement. New diverse habitat will also provide additional habitat and shelter, including better refuge for invertebrates and young fish during higher flows.
13) Creation of backwaters and wetland areas present the risk of potential deterioration to oxygenation, particularly in warmer conditions when shallow, slow flowing water heats up, and de-oxygenates. Additionally, during warmer drier weather groundwater levels are likely to be lower and hence there may be a further reduction in baseflow to the channel. Outside of summer months this is unlikely to be an issue. However, during warmer weather, a reduction in baseflow could lower channel resilience and therefore the associated ecological habitats.

In summary, there is unlikely to be a risk of deterioration to the current waterbody status for reasons outlined above.

Table 9: Potential impacts of crossing enlargement on WER elements

Enlarged crossings of existing channels to accommodate new larger channel		
WER quality element	**Likely change**	**Paragraph no. for further detail**
Phytoplankton	-	
Macrophytes and phytobenthos	-	14)
Benthic invertebrate fauna	✓	
Fish fauna	-	
Hydrological regime		
Quantity and dynamics of water flow	-	15)
Connection to groundwater bodies	-	16)
River continuity		
Morphological conditions		
River depth and width variation	✗	17)

Structure and substrate of the river bed	×	
Structure of the riparian zone	-	
Thermal conditions	×	17)
Oxygenation conditions	×	
Salinity	-	
Acidification status	-	
Nutrient conditions	-	
Specific pollutants		
Pollution by all priority substances identified as being discharged into the body of water	-	
Pollution by other substances identified as being discharged in significant quantities into the body of water	-	

14) Enlarging the existing channel crossings to accommodate the new channel will allow for the removal of existing engineered banks. This will allow for improved lateral connectivity of the watercourse to the wider channel resulting in improved movement of benthic invertebrate fauna laterally. In areas where crossings are widened, but revetments replaced as part of new crossing structure, there would be a marginal improvement for macrophytes as a wider channel cross section would provide additional habitat. However, a wider channel may lead to changes in flow volumes which may become unfavourable for such species. Where existing crossings are not being widened, existing engineered solutions would be replaced equating to a no change.

15) Widening of the channel in these locations would increase conveyance through these sections increasing the available flow. Widening also removes potential impoundment. However, channel widening would reduce flow velocities through the widened sections. For most of the year, this is unlikely to be an issue given the flow volumes would likely be sufficient for the marginally wider sections. However, in doing this, during the summer months, lower water levels could cause issues to the flow and quantity of water through these sections. This therefore equates to a no change.

16) Where piling is required there is potential for degradation in groundwater connectivity between the fluvial waterbody and the aquifer with a subsequent impact to riverine baseflows. Should groundwater be shallower than the proposed piling depth, there is potential that piles could reduce baseflow to the watercourse over the length of the piled interval. Longitudinal extents of piling in locations, where they are required would not impact baseflow at the waterbody scale. Therefore, impacts on base flow between the channel and superficial groundwater would be localised and negligible.

17) Where existing crossings are to be widened, channel width will be increased below the crossing locations. This will lead to a marginal increase the lateral space in which the watercourse has to adjust. However, increasing the channel cross section would lead to a reduction in flow velocities through the crossing location, especially during low flows. A negative effect of this is that fines

drop out of suspension, smothering coarser sediment leading to bed homogeneity. Additionally, increases in fine sediment in combination with decreases in water levels (during periods of low flow) can lead to a deterioration of oxygen levels particularly during summer months. This is also applicable to thermal conditions.

A suite of potential negative effects have been identified (as identified in Table 9) in relation to enlargement of the existing crossings. However, these impacts are unlikely to cause deterioration at the waterbody scale.

Temporary Works

Table 10: potential impacts of temporary culverts on WER elements during construction[7]

Temporary works – Temporary culverts during construction		
WER quality element	**Likely change**	**Paragraph no. for further detail**
Phytoplankton	-	
Macrophytes and phytobenthos	-	18)
Benthic invertebrate fauna	-	
Fish fauna	×	19)
Hydrological regime		
Quantity and dynamics of water flow	×	20)
Connection to groundwater bodies	-	
River continuity		
Morphological conditions		
River depth and width variation	-	21)
Structure and substrate of the river bed	-	
Structure of the riparian zone	-	
Thermal conditions	-	
Oxygenation conditions	-	
Salinity	-	
Acidification status	-	
Nutrient conditions	-	

[7] Note that these effects will be temporary over the life cycle of the temporary works. Once works are complete these effects should be negated. During works, construction best practice would be employed to control and/or regulate potential impacts.

Specific pollutants		
Pollution by all priority substances identified as being discharged into the body of water	-	
Pollution by other substances identified as being discharged in significant quantities into the body of water	-	

18) Any temporary culverts required to facilitate the design may cause a localised deterioration in the numbers of macrophytes and invertebrates over the structure's footprint as the natural channel is temporarily removed, and the substrate buried. There may also be a deterioration in numbers around the footprint of the culvert as these species would be displaced due to changes in flow volume. Additionally, the temporary culverts would decrease the channel wetted margin which would cause a localised decline of species depending on this habitat. Culverts would be temporary, and impacts localised to the area spanned by the culvert, this equates to a no change at the waterbody scale.

19) Temporary culverts may be an impediment to fish passage over the culverted duration as natural channel is removed. The culvert design should allow continuity for fish migration and no barrier to fish passage. However, this is temporary and only the length of the road crossing.

20) Temporary culverts could restrict the channel cross section should the channel at the crossing location be wider than the culvert arrangement immediately through and downstream of the culvert location. This would lead to a temporary increase in channel flow velocities at and downstream of the culvert. Conversely, restriction of the channel cross section will likely lead to a back water effect immediately upstream of the culvert. Temporary culverts should be appropriately sized as to ensure there is no restriction in the quantity of flow through the culvert compared to baseline conditions and to minimise increases in flow velocities downstream whilst decreasing backwater effects upstream.

21) Temporary culverts could cause temporary compaction of natural riverine substrate over the culverted length and localised silt build up upstream of the structure starving downstream reaches of fine sediment. Additionally, the construction and use of temporary haul routes could lead to localised inputs of sediment laden runoff entering the channel. Both the aforementioned impacts could result in a deterioration in water clarity and quality through increases in turbidity. However, these impacts would be temporary (over the length of the construction period) and localised and can be mitigated through appropriate temporary works design and implementation of construction best practices. Therefore, there are no significant overall changes to WER elements.

In summary, there is unlikely to be a risk of deterioration to the current waterbody status for reasons outlined above, where possible temporary culverts should be avoided and clear span bridges used.

Table 11: Potential impacts of in channel works on WER elements during construction[8]

Temporary works – In channel works during construction		
WER quality element	**Likely change**	**Paragraph no. for further detail**

[8] Note that these effect will be temporary over the life cycle of the temporary works. Once works are complete these effects should be negated.

Phytoplankton	-	
Macrophytes and phytobenthos	-	22)
Benthic invertebrate fauna	-	
Fish fauna	-	23)
Hydrological regime		
Quantity and dynamics of water flow	-	24)
Connection to groundwater bodies	-	
River continuity		
Morphological conditions		
River depth and width variation	-	25)
Structure and substrate of the river bed	-	
Structure of the riparian zone	-	
Thermal conditions	-	
Oxygenation conditions	-	
Physico-chemical conditions	×	26)
Pollution from other substances	×	27)
Salinity	-	
Acidification status	-	
Nutrient conditions	-	
Specific pollutants		
Pollution by all priority substances identified as being discharged into the body of water	-	
Pollution by other substances identified as being discharged in significant quantities into the body of water	-	

22) Temporary in channel works would cause localised displacement of macrophyte and invertebrate species. Sessile species could deteriorate due to increased fine sediment input generated through the movement of substrate within the working area related to the tracking of plant and machinery.

23) Temporary in channel works would have a localised impact on fish migration. Should the channel be over-pumped during works then this would impede fish migration beyond the dry working area. If the channel is temporary realigned, provisions should be made to ensure the realignment provides suitable fish pass. During works, increases in suspended sediment, particularly to the

downstream section could degrade fish spawning habitat through indirect impacts from construction activities in the channels. However, these would likely be localised to area immediately downstream of the works and can be managed and mitigated through best practice.

24) In channel works would likely lead to a localised temporary change in the quantity and dynamics of flow. The footprint of the working area would be dry and depending on the construction methods employed. Downstream flow quantities and dynamics may also be impacted. This would be a localised temporary impact over the duration of the construction and would not be a significant impact at the waterbody scale.

25) Working within the channel would likely lead to temporary sediment remobilisation during works resulting in potential deterioration in quantity and quality to species along river channel.

26) It is likely that in channel works would lead to a temporary deterioration in physico-chemical water quality immediately downstream of in channel works related to increased turbidity from sediment remobilisation. This would be a temporary localised potential impact over the construction period.

27) Due to the requirement of plant and machinery working in/near the channel there is the potential exposure/displacement of contaminated sediments and/or accidental release of construction chemicals (fuel, hydraulic fluids, etc) during construction.

In summary, although potential negative effects of temporary in channel construction works have been identified, these can be mitigated through the use of construction best practice and pollution prevention plans during construction. Additionally, the temporary works would be confined to the period of during and just after construction, and therefore would only be temporary in nature and unlikely to cause deterioration at the waterbody scale.

Table 12: Potential impacts on WER elements from temporary construction within the floodplain[9]

Temporary works – works within the floodplain		
WER quality element	**Likely change**	**Paragraph no. for further detail**
Phytoplankton	-	
Macrophytes and phytobenthos	-	28)
Benthic invertebrate fauna	-	
Fish fauna	-	
Hydrological regime		
Quantity and dynamics of water flow	-	
Connection to groundwater bodies	-	

[9] Note that these effects will be temporary over the life cycle of the temporary works. Once works are complete these effects should be negated.

River continuity		
Morphological conditions		
River depth and width variation	-	
Structure and substrate of the river bed	-	
Structure of the riparian zone	-	29)
Thermal conditions	-	
Oxygenation conditions	-	
Physico-chemical conditions	✗	30)
Pollution from other substances	✗	
Salinity	-	
Acidification status	-	
Nutrient conditions	-	
Specific pollutants		
Pollution by all priority substances identified as being discharged into the body of water	-	
Pollution by other substances identified as being discharged in significant quantities into the body of water	-	

28) Due to the requirement of plant and machinery working close to the channel margins, there is likely to be localised displacement and potential mortality of macrophytes and invertebrate species, particularly sessile species that occupy the channel margins and bank tops. Additionally, noise generated through the use of such equipment and plant could cause a disturbance for fish species within the channel. These impacts would be localised to the working area and can be minimised through design and construction best practice.

29) Tracking and movement of plant along the floodplain corridor could potentially lead to habitat damage within the riparian corridor. This can be mitigated through construction best practice in the design of potential haul routes as to minimise the removal of existing riparian corridor where practicable.

30) Working in close proximity to the watercourse, within the existing floodplain increases the potential for sediment mobilisation and runoff to enter the channel during the construction period. Therefore, a potential deterioration in quantity and quality of species or ecological communities along the river channel exists. Additionally, there is the potential for exposure/displacement of contaminated sediments and/or accidental release of construction chemicals (fuel, hydraulic fluids, etc) which could enter the watercourse. These impacts would be temporary (over the duration of the works) and can be managed and mitigated through the use of construction best practice and pollution prevention controls.

4.2 Step 2: Assessment of the proposed Scheme against water body measures

The Thames (Evenlode to Thame) water body is not classified as artificial or heavily modified. However, there are some measure actions that have been assigned to the water body that are required to address the reasons that have been identified to be causing a failure (i.e. not achieving good status). These are not to be confused with mitigation measures, which are specific to water bodies that are A/HMWBs

Implementing these actions and hence addressing the reasons for Not Achieving Good Status will contribute towards the achievement of Good status. Table 13 lists the measures and gives an assessment of whether OFAS will contribute to their implementation. As indicated in the table, it is concluded that the OFAS can contribute to some of the identified measures that are currently not in place.

Table 13: Thames (Evenlode to Thame) measures and assessment of whether the Scheme will help to contribute to these.

Title	Description	Does the Scheme prevent or contribute?
Protected area action - Implement scheme to reduce the phosphate loading from various STWs	Reduce the loading from Drayton STW through setting a Permit standard of 1.0 mg\l. Ensuring that alternate technologies for nutrient removal have been considered and implemented where reasonable.	No change – not part of the scheme design or scope. The Proposed Scheme does not reduce phosphate from sewage treatment works nor does it consider technologies to do so.
Water efficiency campaign for abstractors	Run a targeted water efficiency campaign for all licensed abstractors in a waterbody.	No change – not part of the scheme design or scope. The Proposed Scheme does not include a water efficiency campaign for licenced abstractors within the waterbody.
Generic - Manure & fertiliser management	Ensure the implementation of best agricultural practice using the most appropriate mitigation measures (e.g. ADAS measures) and riparian improvements to reduce diffuse pollution. To be delivered through workshops, on farm demonstrations, farm visits or schemes such as woodland for water and Countryside Stewardship.	No change – not part of the scheme design or scope. The scheme does not ensure the implementation of agricultural best practice, although aspects of the scheme including riparian and marginal planting may aid in reducing diffuse pollution from agricultural sources.
Generic - First time sewerage scheme	This is a high-level assessment of what could potentially be put in place to tackle failures in this waterbody. It is not prescriptive and where possible either more detail on actual	No change – not part of the scheme design or scope.

Title	Description	Does the Scheme prevent or contribute?
	actions or more high-level measures would be required.	
Habitat restoration on Oxford watercourse	Undertake physical habitat restoration on the Oxford watercourses and other side channels to improve morphological diversity.	Contributes. – Physical habitats restoration within multiple watercourses will lead to improved morphological diversity in relevant watercourses.
Improve habitat in all the Oxford watercourses	Specifically an action for Thames Water, improvement of habitat in all the Oxford watercourses in order to mitigate against the detrimental impact of the Farmoor abstraction. Expected scheme completion date 31/03/21	Partly contributes. Within Scheme design to attempt improvement to some of the watercourses and will complement the Thames Water actions.
Remove or bypass structures to improve connectivity	Remove or bypass impounding structures to allow fish passage and restore longitudinal connectivity.	Contributes. It is part of Scheme design to facilitate fish passage within channel improvements and new channels.
Improve connectivity to floodplains and create floodplain wetland habitat.	Improve connectivity to floodplains and create floodplain wetland habitat.	Contributes. Part of the scheme design will include creation of a backwaters within the floodplain connected to the channel, which will be wet most of the year and planted with marginal vegetation improving channel connectivity to the floodplain locally.
Retain and restore marginal habitat where opportunities allow	Retain and restore marginal habitat where opportunities allow, including removal or softening of hard revetment. Retain gravel features in river when undertaking gravel removal for navigation.	Contributes. Part of the scheme design is to widen existing crossings and will look to soften revetments where possible. New channels and improvements to existing channels will add and retain gravel features (i.e. within Seacourt Stream) leading to improved morphological heterogeneity and improvements in

Title	Description	Does the Scheme prevent or contribute?
		ecological habitat and diversity.
Implement scheme to reduce the phosphate loading from various sewage treatment works	Reduce the loading from Wanborough STW through setting a Permit standard of 0.5 mg\l as P. Techniques to reduce loading to this level are under development and will be reviewed in light of future findings	No change. The STW is not within Scheme extent and does not address techniques to reduce phosphate loadings.

4.3 Step 3: Cumulative impact assessment of the proposed Scheme in conjunction with other proposed schemes planned or in place along the water body.

Current discussions between the Environment Agency and TWUL are ongoing around the construction of suitable fish pass on the Wolvercote Mill Stream. Current structures on the watercourse related to the historic mill use prevent fish pass upstream of the mill location. Should this proposal be taken forward to completion, it would provide benefits to the upstream waterbody (Cherwell (Ray to Thames) and Woodeaton Brook) in terms of increased fish numbers and species migrating through the waterbody if other conditions are favourable.

4.4 Step 4: Assessment of the proposed scheme against WER objectives

The impact assessment of the Proposed Scheme in sections 4.1 – 4.3 concludes that there is a range of positive and negative outcomes to WER elements locally. For example, there are negative impacts to fish, substrate and water quality as a whole in various locations and for various activities. Where identified, the potential negative impacts are negligible and unlikely to compromise progress towards achieving good ecological status or cause a deterioration of the overall ecological status at the water body scale. This is dependent on the implementation of the designs features that are outlined in Table 5 - Table 12, which will comprise an overall positive contribution towards the water body reaching good status.

5. Conclusions

The OFAS proposes to undertake flood alleviation measures along the Seacourt Stream, Hinksey Stream and tributaries by establishing a new, controlled, flow route to the west of the Thames to carry water that could otherwise result in flooding of urban areas.

The Scheme has the potential to impact only the Thames (Evenlode to Thame) water body. The Scheme would result in a length of new channel being constructed with construction of aquatic and riparian habitat within the new channel and within the floodplain.

The new channel will affect the quantity and dynamics of flow within the channel and river continuity with the floodplain, which will generally be improved. However, at the bridge locations where the channel is widened, there will be a suit of negative impacts included sediment drop out, deterioration in water quality and flow dynamics. Additionally, some channel and riparian habitat loss will be required in relation to the construction of the new channel. However this would be replaced with additional in-channel and riparian habitats associated with the newly formed channel. Where design of the new channel is constrained by external factors including existing infrastructure, negative impacts may be realised as outlined in the assessment. These impacts occur over small, localised reaches and are considered to be negligible at the waterbody scale.

Further, the Scheme will deliver improvement measures within the OFAS area including modification/removal of structures causing impediment to fish passage and introduction of measures to maintain a low flow channel with enhanced morphological features to improve aquatic and riparian habitat. Overall, the combined assessed activities contribute to complying with the Water Environment (WFD) Regulations.