

Appendix D Project level HRA stage 1 and stage 2 reports

Appendix D1 Project level HRA Stage 1 report

Stage 1 Habitats Regulations Assessment

Environment Agency record of screening for likely significant effects

This is a record of the screening for likely significant effects required by Regulation 63 of the Conservation of Habitats and Species Regulations 2017 (as amended), undertaken by the Environment Agency in respect of the Sowey/King's Sedgemoor Drain (KSD) Enhanced Capacity Scheme. Due to the scale of the scheme it will be necessary to undertake the works in several phases. This project level HRA considers Phase 1 of the Sowey/KSD Enhanced Capacity Scheme.

Revision	Date	Description	Author	Checked	Reviewed	Approved
P01.1	17/10/19	Review draft	J Halls	M Olivier	L. Rudd	
P01.2	11/11/19	Amendments following internal review	J Halls	M Olivier	L. Rudd	T. Wilson
P01.3	13/01/19	Amendments following EA review	J Halls	M Olivier	L Rudd	I. Ball

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1. Permission, plan or project (PPP) details

Type of PPP:	Flood Risk Management Scheme (phased delivery)
Environment Agency reference no:	ENVRESW001353
National grid reference:	ST40932760 (Monk's Leaze Clyce) to ST35173774 (Parchey Bridge)
Site/project name or reference:	Sowy/King's Sedgemoor Drain (KSD) Enhanced Capacity Scheme – Phase 1

2. Description of proposal

Introduction

This Stage 1 Habitats Regulations Assessment (HRA) is for Phase 1 of the Sowy and King Sedgemoor's Drain (KSD) Enhanced Capacity Scheme. The Sowy/KSD Enhanced Capacity Scheme will improve flood risk management on the Sowy River (Sowy) and King's Sedgemoor Drain (KSD) within the Somerset Levels. The Sowy/KSD Enhanced Capacity Scheme forms part of the 20-year Somerset Levels and Moors Flood Action Plan which was published by the Somerset Rivers Authority (SRA) in spring 2014 in response to the extreme and prolonged flooding that the area suffered the previous winter. The primary objective of the Sowy/KSD Enhanced Capacity Scheme is to reduce the risk, depth and duration of such flood events that threaten property and infrastructure. This will be achieved through increasing the capacity of the Sowy and part of the KSD, which operate as a flood relief channel for the River Parrett and its tributaries. The proposals follow-on from a scheme to increase channel capacity of a short length of the Sowy and Langacre Rhyne under the A372 Beer Wall, which was completed in 2016 (EA reference SW0057).

A HRA is required because the scheme is:

- likely to have a significant effect on one or more European sites (either alone or in combination with other plans or projects), and
- is not directly connected with or necessary to the management of the site for its European nature conservation interest.

Although not part of the European site network (sites designated to fulfil obligations under the Habitats Directive and Birds Directive), it is Government policy that Ramsar sites (wetlands of international importance) are also included in an HRA.

Due to the scale of the scheme it will be necessary to undertake the works in several phases. This HRA considers Phase 1 of the overall 'Strategic' long-term aim of delivering an increased flow capacity along the whole length of the flood relief channel of up to 24m³/s. A strategic HRA for the full Sowy/KSD Enhanced Capacity Scheme is being produced concurrently with this Phase 1 HRA, to ensure that the delivery of the full Sowy/KSD Enhanced Capacity Scheme (if fully implemented in the future) would be compliant with the Habitats Regulations.

This Phase 1 project level HRA will focus on the potential construction and operational impacts on European site features, based on the level of detail currently available. It is not envisaged that the flood relief channel and associated water level management structures would be totally decommissioned so this stage has not been assessed. Any proposed decommissioning, future modifications or change in operating procedures would be subject to a separate assessment at that time.

Location

The scheme is located within the Somerset Levels, to the south-east of Bridgwater, along the whole length of the Sowy corridor and part of the KSD corridor (Figure 1, Appendix A). These artificial watercourses act as flood relief channels when the River Parrett overtops and/or when water is deliberately re-routed via an inlet control structure at Monk's Leaze Clyce. The working corridor will run from Monk's Leaze Clyce, along the Sowy through to the KSD and as far

downstream as Parchey Bridge. The KSD continues from here for a further 5.5 km before reaching the gravity outfall sluice into the River Parrett at Dunball, downstream of Bridgwater.

Part of the working corridor passes either through or close to several component Sites of Special Scientific Interest (SSSI) of the Somerset Levels and Moors SPA and Ramsar sites (Figure 1, Appendix A).

Scheme description

Design concept

In order to achieve the enhanced capacity targets there is a need to increase the height of existing informal flood banks located along the left and right banks of the Sowy and KSD. This will mostly be achieved through the infilling of low spots rather than wholesale raising. It is anticipated that the material to raise the embankments will be primarily obtained from reprofiling the existing informal flood embankments, and also from widening the adjoining lengths of watercourse (which will also increase capacity).

Outline design

Phase 1 focusses on capacity enhancements between Monk's Leaze Clyce on the Sowy and Parchey Bridge on the KSD, as summarised in Table 1 and shown in Figure 2 (Appendix A).

It should be noted that at this early stage of design it is uncertain whether the full programme of works set out in Table 1 can be undertaken as one operation with the funding currently available. Raising of the existing informal flood embankments from the Sowy/KSD confluence to Parchey Bridge and channel widening works proposed between Beer Wall and Parchey Bridge will be prioritised first within the detailed design. Second priority will be raising of the existing informal flood embankments between Monk's Leaze Clyce and Beer Wall, followed by raising of existing flood embankments from the Beer Wall to Sowy/KSD confluence section and then channel widening works between Beer Wall and Monk's Leaze Clyce.

Table 1. Outline design solutions

Location	Bank raising	Channel widening
Sowy between Monk's Leaze Clyce and Beer Wall	Raising of existing informal flood banks on left and right bank by up to 0.6m (allowing for 0.1m settlement, final level of 0.5m) to achieve capacity of 17m ³ /s.	Where works will be required in this area to raise the banks, we will look for opportunities to create embayments and lengths of two-stage channel on the right bank. Up to 15 potential locations have been identified for these features, with the number created likely to be dependent on the location and extent of bank raising work. This will be looked at in more detail as part of detailed design.
Sowy between Beer Wall and A361	Raising of existing informal flood banks on left and right bank by up to 0.4m (allowing for 0.1m settlement, final level of 0.3m) to achieve a capacity of 24m ³ /s.	Creation of embayments lengths of two-stage channel and backwaters (KSD only) on the right bank in at least 7 and up to 14 locations.

Location	Bank raising	Channel widening
Sowy between A361 and Sowy/KSD confluence	Raising of existing informal flood banks on left bank by up to 0.4m (allowing for 0.1m settlement, final level of 0.3m) on the left bank. No bank raising on the right bank.	
KSD between Sowy/KSD confluence and Parchey Bridge	Raising of existing informal flood banks on left and right bank by up to 0.6m (allowing for 0.1m settlement, final level of 0.45m) to achieve a capacity of 27m ³ /s (24m ³ /s from the Sowy and 3m ³ /s from the Cary).	

Raising of informal flood banks

Where existing informal flood banks are to be reprofiled or raised, the crest width will be maintained at a minimum of 4m or increased to 4m, with formed battered embankment sides of 1 in 5 slopes. Along the KSD and Sowy between the Sowy/KSD confluence to A361 and Beer Wall to Monk's Leaze Clyce, material required for the raising will be won through reprofiling of the existing informal flood embankments on the right and left banks. Along the Sowy between the A361 and Beer Wall material for reprofiling embankments would be obtained through reprofiling of the existing informal flood embankments on the left and right bank of the KSD. Material would be transferred between the KSD to the Sowy between the A361 and Beer Wall by road.

Channel widening

Channel widening works will only take place on the right bank of the Sowy and KSD, within land currently owned the Environment Agency. Embayments, two-stage channels and back waters would be designed to offer ecological and geomorphological benefit. Individual embayments and backwaters or stretches of two-stage channel created on the right bank would not exceed 150m in length and would be spaced by at least 300m. Exact locations and dimensions of these features will be identified at the detailed design stage, where the following principles will apply:

- Two-stage channels: widening of between 1-2m, with a minimum of 3-5m marginal shelf and shelf level of 300mm below summer pen
- Embayments: up to 6m in width, with shelf level of 300m below summer pen
- Backwaters: back channel of between 8-10m wide and 100m in length, with a "planted island" of 5-6m width.

Material won through channel widening would be placed on the landward side of the existing informal flood embankments. This would then be available for use within future phases of the full Sowy/KSD Enhanced Capacity Scheme.

Additional works

Minor works to two structures on the KSD, Cossington Right Outfall and Chilton Right Outfall structures (as shown on Figure 2), will likely be required. This will involve raising of the existing concrete headwalls by 300-400mm.

Programme and methods

Subject to obtaining the necessary consents, the aim is to commence work in August 2020 and work progressively upstream from Parchey Bridge towards Monk's Leaze Clyce until early November 2020, ensuring no area is visited more than once. The actual end date for construction activities will be determined by ground / weather conditions as well as any timing constraints for avoiding disturbance to wintering birds.

Works to existing informal flood banks will be undertaken from the landward side wherever possible. No haul routes will be constructed within the Sowey between the A361 and Monk's Leaze Clyce, with transport of material along the bank only and limited to distances of up to 200 m. Transfer of material from the KSD to the Sowey between A361 and Beer Wall would predominantly be via the local road network, although short lengths of haul route may be required on the left and right banks of the KSD and right bank of the Sowey between the A361 and Beer Wall. The requirement for use of haul routes will be minimised through the use of existing tracks, and a potential opportunity to barge material between the KSD and Sowey between A361 and Beer Wall will also be considered (especially where ground conditions are not favourable). Temporary storage may be required at the layby at Beer Wall, on the A361 road bridge and farm access track bridge to the south. All work will be undertaken following liaison with the landowners and the local community to minimise disruption to local people and infrastructure. Where portable satellite compounds are required, these will be located within 100m of the scheme and not within privately owned land. A permanent compound may be required, and this would be located either within an area of existing hardstanding at Beer Wall or within a local agricultural yard within the village of Othery.

All site activities with potential to cause disturbance and measures required to protect and enhance the environment will be managed and/or implemented in accordance with an Environmental Action Plan (EAP) which will outline the key mitigation measures that have been identified in the Environmental Statement, and a Construction Environmental Management Plan (CEMP) which will detail the contractor's standard precautions to be taken to minimise the risk of environmental impact. The EAP will be updated as the scheme design and environmental assessment process progresses and will inform the development of the contractor's CEMP.

Traffic generated movements within the site and along the local highway will be managed in accordance with a Construction Traffic Management Plan (CTMP). A Materials Management Plan (MMP) for the Proposed Scheme would be developed, and any waste would be managed in accordance with a Site Waste Management Plan (SWMP).

Operation and maintenance

There will be no change in the current operating procedures for Monk's Leaze Clyce as they relate to an assumed channel capacity that can contain flows of up to 17m³/s. Although some sections of the Sowey will have their capacity increased to take flows of 24m³/s and the KSD 27m³/s (to account for additional flow of 3m³/s from the River Carey), the section between Monk's Leaze Cycle and the Beer Wall will be increased to 17m³/s only during Phase 1. The two engineered spillways on the right-hand bank of the Parrett (Aller Moor and Beasley's) will continue to operate during flood events (when the river reaches 7.9 m AOD and 7.5 m AOD) in tandem with the opening / closing of Monk's Leaze Clyce i.e. a maximum agreed volume of water entering the Sowey can be achieved by incrementally opening or closing the Clyce.

Existing water control structures will continue to provide a mechanism to achieve the required summer and winter pen levels on the moors. Uncontrolled flooding across the wider floodplain will also continue to occur when either one or both of the spillways run and the channel capacity

of the Sowy and low-level embankments is exceeded. This effect is particularly noticeable at the Aller Moor spillway because a culverted crossing immediately downstream causes a throttle effect with excess water spilling over the Sowy, into Middle Moor and from there through Aller Moor and down to Beer Wall (Figure 3). However, due to the increase in channel capacity there will be a reduction in the frequency, duration and extent of some of the more regular, low level events that provide temporary 'splash' conditions that are beneficial for waterbirds during the winter months. Renovation works to existing water control structures within Middle Moor, West Moor and Egypt's Clyce will be undertaken in 2020, together with revisions to Water Level Management Plans (WLMPs).

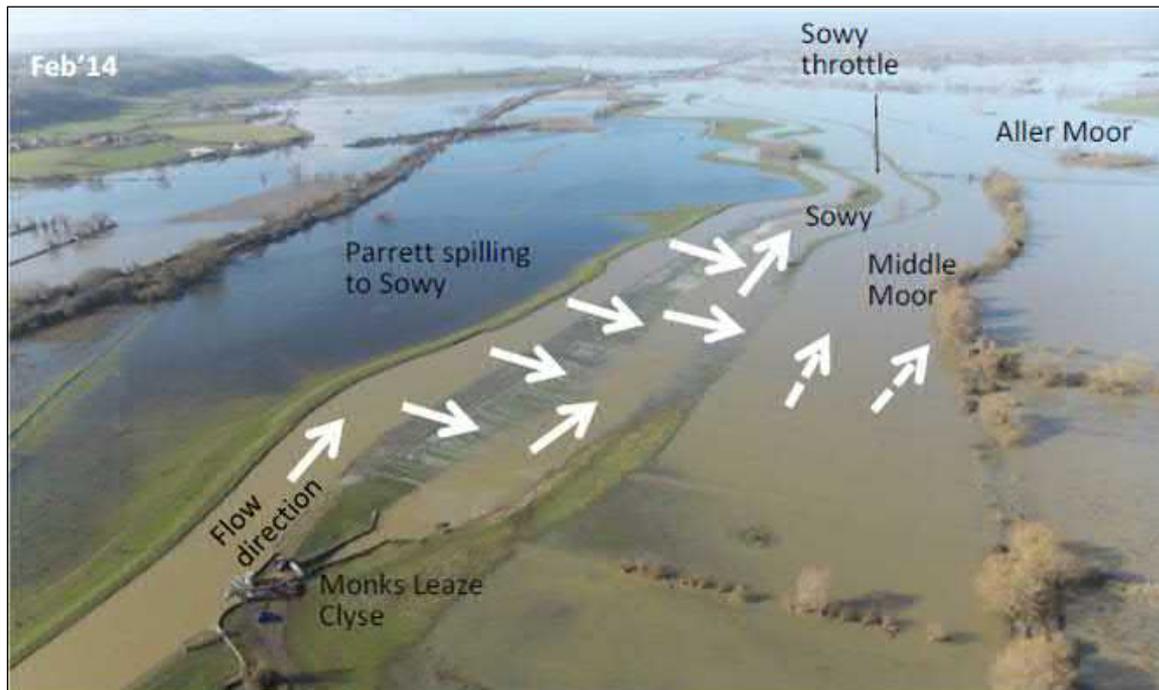


Figure 3: Flood pathways when the Sowy capacity is exceeded and Aller Moor spillway is running

Current and future maintenance

Current reactive maintenance undertaken on the KSD may include removal of fallen branches or occasional desilting. Desilting works were undertaken at Parchey Bridge during 2019.

The principal maintenance activity along the Sowy is routine weed cutting and clearing carried out at least once and sometimes twice per year depending on need. Future maintenance will need to take account of any further restrictions that may be introduced by raising of the existing informal flood embankments which will increase their width/footprint in places.

Future maintenance will need to take account of any further restrictions that may be introduced by raising of the existing informal flood embankments (which will increase their width/footprint in places).

As a result, a new maintenance regime will be developed in conjunction with our internal specialist teams, which will focus on ensuring continued contribution of the channel widening works to Water Framework Directive (WFD) objectives. Whilst maintenance would take place annually, different reaches would be cleared each year, ensuring that channel capacity is maintained whilst also ensuring variability in the maturity of marginal habitats.

Mitigation measures

During the initial development of the full Sowy/KSD Enhanced Capacity Scheme in 2015-2016, concern was raised about the potential impacts on designated sites, including:

- a reduction in the frequency and duration of small-scale flood events through King's Sedgemoor, which provide valuable feeding and roosting conditions for many of the non-breeding bird features;
- the increased capacity and ability to divert water along the Sowey in advance of a flood event could mean that some of the moors along the River Parrett would no longer flood; and
- for larger events where land along the River Parrett was flooded then the ability to reduce river levels quicker, through sending more water down the Sowey, would mean that the pumps could operate earlier and thereby remove standing flood water.

To address these concerns and potential impacts it was agreed to investigate the likely changes in extent and duration of flooding during 'typical' events compared to what currently happens. It was concluded that there would be a reduction in extent and frequency of shallow flooding, so mitigation measures would be required. Proposals have now been made to undertake improvements to a range of water control structures in the area, which will help with retention and management of areas of shallow flood throughout the appropriate seasons. The details will be presented and analysed in the Stage 2 Appropriate Assessment.

Incorporated mitigation

Following the judgement of *People over Wind*, *Peter Sweetman v Coillte Teoranta* and the subsequent publication of an advice note by the Planning Inspectorate (PINS 05/2018), mitigation measures required specifically to avoid or reduce potential harmful effects on European site features can no longer be considered during the Stage 1 assessment of likely significant effect. Consequently, the mitigation measures described above cannot be used, but have been included to demonstrate that they form an integral part of the scheme when it comes to the Stage 2 Appropriate Assessment.

It should be noted that where 'standard' measures for protecting the environment are included as a matter of good practice and/or because of other statutory, legal or health and safety requirements then these can be treated as essential features or characteristics of a plan or project and therefore can be considered at Stage 1. This is because they have been included irrespective of whether a European site might be affected i.e. although they may incidentally provide some benefit to a European site, their inclusion and purpose is not to avoid or reduce harmful effects on the site (Tyldesley and Chapman, 2013). For this scheme the incorporation of pollution prevention and biosecurity measures during construction and maintenance activities are considered standard good practice.

3. Figure showing project location and European sites

See Appendix A.

4. European sites requiring assessment

Initial screening

The following sites were considered during initial screening due to the potential risk of direct and/or indirect effects as a consequence of scheme construction, operation or maintenance activities:

Somerset Levels and Moors Special Protection Area (SPA) - screened in due to potential direct and indirect effects. Construction will partly be within the King's Sedgemoor and Southlake Moor component SSSIs as well as non-designated land that may represent supporting, functional habitat.

Somerset Levels and Moors Ramsar site - screened in due to potential direct and indirect effects. Construction will partly be within the King's Sedgemoor and Southlake Moor component SSSIs as well as non-designated land, which represents supporting, functional habitat.

Severn Estuary Special Area of Conservation (SAC) - screened out due to: no pathways or mechanisms for direct impacts on SAC habitats during construction or maintenance; migratory fish features do not use the KSD or Soway; and no clear pathways for indirect impacts on features (no significant changes in quantity or quality of water discharging at Dunball into the lower R. Parrett and Bridgwater Bay).

Severn Estuary SPA - screened in due to potential effects on non-breeding bird features that utilise both the estuary and the Somerset Levels and Moors depending on prevailing weather, tidal and other conditions. This is a very large site, extending to 24,700 ha along both the English and Welsh sides of the estuary. For this HRA it is assumed that the likely interchange of birds will be with the Bridgwater Bay SSSI component.

Severn Estuary Ramsar site - screened in due to the potential effects on non-breeding birds that utilise both the estuary and the Somerset Levels and Moors. Also for eels, which migrate through the KSD and beyond via Dunball. Features where there is considered to be no risk of any likely significant effect whatsoever are the other listed migratory fish species as (unlike eels) they do not pass through Dunball (Andy Baines, EA Technical Specialist, Fisheries, Biodiversity & Geomorphology pers. comm.); extreme tidal range; presence of four Habitats Directive Annex 1 habitats (see SAC above) and unusual estuarine communities. There are no pathways for either direct or indirect impacts on these features including no significant changes in quantity or quality of water discharging at Dunball into the lower R. Parrett and Bridgwater Bay.

European site name	Qualifying features likely to be sensitive to the scheme (EA habitat/species group code)
Somerset Levels and Moors SPA	Bewick's Swan <i>Cygnus columbianus bewickii</i> (3.4, 3.6, 3.7)
	Golden Plover <i>Pluvialis apricaria</i> (3.4, 3.7)
	Lapwing <i>Vanellus vanellus</i> (3.4)
	Teal <i>Anas crecca</i> (3.4, 3.6)
	Waterbird assemblage (3.4, 3.6, 3.7)
Somerset Levels and Moors Ramsar	Bewick's Swan (3.4, 3.6, 3.7)
	Lapwing (3.4)
	Teal (3.4, 3.6)
	Waterbird assemblage (3.4, 3.6, 3.7)
	17 Red Data Book invertebrate species
Severn Estuary SPA	Bewick's Swan (3.4, 3.6, 3.7)
	Dunlin <i>Calidris alpina alpina</i> (3.4)
	Redshank <i>Tringa totanus</i> (3.4, 3.7)
	Gadwall <i>Anas strepera</i> (3.6)
	Shelduck <i>Tadorna tadorna</i> (3.6)
	Greater White-fronted Goose <i>Anser albifrons albifrons</i>
	Waterbird assemblage (3.4, 3.6, 3.7)
Severn Estuary Ramsar	Bewick's Swan (3.4, 3.6, 3.7)
	Dunlin (3.4)
	Redshank (3.4, 3.7)
	Gadwall (3.6)
	Shelduck (3.6)
	Greater White-fronted Goose (3.4, 3.6)
	Waterbird assemblage (3.4, 3.6, 3.7)
	European eel <i>Anguilla anguilla</i>

The habitat group numbers relate to groups of birds, which, because of the type of habitat that supports them, have similar sensitivities to Environment Agency permissions, plan or projects. The habitat groups are:

- 3.1 Birds of uplands
- 3.2 Birds of woodland and scrub
- 3.3 Birds of lowland heaths and brecks
- 3.4 Birds of lowland wet grasslands
- 3.5 Birds of lowland dry grassland
- 3.6 Birds of lowland freshwaters and their margins
- 3.7 Birds of farmland (for this scheme any cropped areas)
- 3.8 Birds of coastal habitats
- 3.9 Birds of estuarine habitats
- 3.10 Birds of open sea and offshore rocks

Those highlighted habitat groups are relevant to the habitats that have the potential to be directly or indirectly impacted by the scheme.

5. Conservation objectives¹

The assessment of likely significant effects will consider the implications of the proposal in view of the site's conservation objectives.

Generic conservation objectives for SACs

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its qualifying features, by maintaining or restoring:

For qualifying habitats

- The extent and distribution of qualifying habitats
- The structure and function (including typical species) of qualifying habitats, and
- The supporting processes on which qualifying habitats rely.

For qualifying species

- The extent and distribution of habitats of qualifying species
- The structure and function of habitats of qualifying species
- The supporting processes on which habitats of qualifying species rely
- The populations of qualifying species, and
- The distribution of qualifying species within the site.

In addition, Natural England has recently published supplementary advice on the Conservation Objectives for the Somerset Levels and Moors SPA (Natural England, 2019). The Severn Estuary SPA is part of a European Marine Site (EMS) so has a published Regulation 33 conservation advice package from 2009 (Natural England, 2009). These provide site-specific attributes and associated targets for each of the qualifying features, which are primarily used for condition monitoring in relation to maintenance or restoration, but which are also relevant when undertaking a HRA.

6. Risks relevant to the type of PPP being assessed

The risks relevant to the scheme and assessed within this HRA screening are:

- Change in flow or velocity regime
- Changed water chemistry
- Changes in physical regime
- Changes in surface water flooding
- Competition from non-native species
- Disturbance
- Habitat loss
- Habitat/community simplification

¹ Generic conservation objectives are based on 'Natural England (2014) Conservation Objectives for European Sites in England Strategic Standard 01/02/2014 V1.0'

- Physical damage
- Turbidity

Where one or more of these risks could directly or indirectly have any effect on a qualifying feature then they have been considered in the screening table in the following section.

7. HRA Stage 1 screening table

At the screening stage, given the narrow range of habitats involved and the inability to consider scheme specific mitigation, all the bird features have been grouped together.

EA habitat/species group	Risk	Likely significant effect alone?	?	Likely significant effect in combination?	?
Somerset Levels and Moors SPA and Ramsar					
Severn Estuary SPA and Ramsar					
3.4 Birds of lowland wet grasslands 3.6 Birds of lowland freshwaters and their margins 3.7 Birds of farmland (for this scheme any cropped areas or grassland areas which do not function as wet grassland at any time of year)	Change in flow or velocity regime	<p><u>Construction</u></p> <p>There may be localised changes in flow or velocity during in-channel works within parts of the Sowy that are within the SPA and Ramsar. However, these would be small-scale and temporary, with no likely effect whatsoever on bird features or the habitats and food sources that they are dependent upon.</p> <p>No likely significant effect.</p> <p><u>Operation</u></p> <p>This risk will only be relevant when the increased capacity allows more water to be directed down the relief channel and when there is overtopping of the River Parrett spillways.</p> <p>Changes in velocity will not be significant but out of bank flow and associated volume changes will alter the extent and duration of shallow flooding used by birds.</p>	No	No prospect of any significant in-combination effects as the effects of the works alone would be inconsequential.	No
			Yes	As there is a likely effect alone during operation there is no need to consider the risk of in combination effects at Stage 1. These will be considered as part of the Stage 2 assessment if relevant.	N/A

EA habitat/species group	Risk	Likely significant effect alone?	?	Likely significant effect in combination?	?
		Likely significant effect.			
	Changed water chemistry	<p><u>Construction</u> During construction there will be a risk of pollution to the watercourses in the vicinity of all the works, including the Sowy and other waterbodies within the SPA and Ramsar. There will be a number of potential polluting substances on site including fuel and lubricants.</p> <p>During clearance and preparatory works vegetation and topsoil will be removed. This will increase the potential for sediments to become mobilised and enter waterbodies. In-channel works will increase the risk of pollution from localised disturbance of sediment on the channel bed.</p> <p>Pollution risks will be managed through the use of standard best practice measures when undertaking construction activities in and adjacent to watercourses and sensitive wetland environments. These will be specified in the Construction Environment Management Plan and the risks and control measures highlighted to all staff through site induction, toolbox talks and emergency drills. With these measures in place, even if there were to be an incident then</p>	No	No prospect of any significant in-combination effects as the effects of the works alone would be inconsequential.	No

EA habitat/species group	Risk	Likely significant effect alone?	?	Likely significant effect in combination?	?
		<p>it is likely to be contained and small-scale with no long-lasting effects. No likely significant effect.</p> <p><u>Operation</u> Increasing the capacity of the flood relief channel and changes in operational procedures could have an effect on water chemistry and quality within habitats used by bird features. The scale, duration and impact of any changes are uncertain without undertaking a thorough assessment.</p> <p>Risk of likely significant effect due to changes in operational procedures is uncertain.</p> <p>Weed cutting, desilting and other maintenance activities could also have an effect on water chemistry and quality. However, standard pollution prevention measures (including timing of activities and emergency response procedures) will be incorporated into the method statements to minimise the risk of this occurring and reducing any effect to a temporary and negligible one.</p> <p>No risk of likely significant effect due to maintenance activities.</p>	?	As there is uncertainty over a likely effect alone, this risk will be carried forward to the Stage 2 assessment and any in combination effects considered there.	N/A
	Changes in physical regime	<u>Construction</u>	No		N/A

EA habitat/species group	Risk	Likely significant effect alone?	?	Likely significant effect in combination?	?
		<p>There would be no changes in physical regime during the construction works that could have an effect on habitats or prey species. No likely significant effect.</p> <p><u>Operation</u> Changing flow patterns due to the increased channel capacity and different cross-sectional profiles have the potential to alter erosion and sedimentation patterns within the flood relief channels (which are used by some of the bird features). Additionally, during uncontrolled flooding there is potential for erosion on the spillways and other land over which flood water runs until it reaches the moors. These changes could affect habitats used by SPA species. Weed cutting and de-silting could result in short-term, temporary impacts within the channel. The significance of these impacts is uncertain without undertaking a thorough assessment. The scale and duration of any changes in physical regime is unknown, so there is uncertainty as to whether or not there would be a likely significant effect.</p>	?	<p>Not applicable as there are no predicted effects at all, so no prospect of in-combination effects.</p> <p>As there is uncertainty over a likely effect alone, this risk will be carried forward to the Stage 2 assessment and any in combination effects considered there.</p>	N/A
	Changes in surface water flooding	<p><u>Construction</u> There may be some localised changes in surface water flooding due to the presence of haul routes, bare ground, bunds and material</p>	No	No prospect of any significant in-combination effects as the effects of the works alone would be inconsequential.	No

EA habitat/species group	Risk	Likely significant effect alone?	?	Likely significant effect in combination?	?
		<p>storage. However, these would be temporary and not at a scale that could result in any impacts that would undermine the conservation objectives for the bird features. No likely significant effect.</p> <p><u>Operation</u> The scheme's principal aim is to provide additional capacity within the Sowey/KSD so that at times of anticipated and actual flood events a greater volume of water can be diverted out of the River Parrett and into the relief channel, up to the height of the embankments. There will be no change during normal or low flow condition.</p> <p>There is the potential for the frequency of out-of-bank flows to be reduced and also affect the extent, depth and duration of flooding.</p> <p>There will be a reduction in the volume of uncontrolled flooding onto the moors when Aller and/or Beasley's spillways from the River Parrett run and the capacity of the Sowey and Langacre are exceeded. This is likely to be noticeable for shorter duration events where they currently run for less than 24 hours. This has implications for the King's Sedgemoor SSSI component of the SPA as well as non-</p>	Yes	As there is a likely effect alone there is no need to consider the risk of in combination effects at Stage 1.	N/A

EA habitat/species group	Risk	Likely significant effect alone?	?	Likely significant effect in combination?	?
		designated land in the floodplain that represents functional habitat. Furthermore, the potential for changes in associated water levels in the River Parrett requires investigation in relation to spillways that impact other component SSSIs. Likely significant effect alone.			
	Competition from non-native species	<p><u>Construction</u></p> <p>There is a risk that invasive non-native species could be introduced from other sites and/or spread within the site if already present. Depending on the species, this could have at least a localised impact on food sources used by birds and the amount of open water habitat. This risk will be managed through the use of biosecurity best practice measures for working in and close to watercourses. The approach will be based on 'Check, Clean, Dry' and pre-start surveys, periodically repeated during construction, to confirm that no non-native species are present in the works area. No likely significant effect alone.</p> <p><u>Operation</u></p> <p>There will be no increased risk of the spread or introduction of non-native species, which could</p>	No	Even with use of best practice measures there is a small risk that non-native species could be inadvertently introduced during construction. However, this would be at a localised, small-scale and competition from non-native species is not identified as a current threat to the site (Natural England, 2015). Consequently, there is no risk of in-combination effects that could compromise the conservation objectives.	No
			No	Not applicable to the increased capacity and operating procedures as there are no predicted effects, so no prospect of in-combination effects.	N/A

EA habitat/species group	Risk	Likely significant effect alone?	?	Likely significant effect in combination?	?
		<p>impact bird habitats, as a result of the increased capacity and revised operating procedures.</p> <p>There is a risk of the spread or introduction of non-native species during maintenance activities. However, this will be managed through the use of biosecurity best practice measures for working in and close to watercourses. The approach will be based on 'Check, Clean, Dry'. If there were to be an accidental introduction then it is likely that non-native species would be confined to the flood relief channel and measures could be taken to control and eradicate. There would be no threat to the overall site conservation objectives.</p> <p>No likely significant effect alone.</p>	No	<p>Even with use of best practice measures there is a small risk that non-native species could be inadvertently introduced during maintenance. However, this would be at a localised, small-scale and competition from non-native species is not identified as a current threat to the site (Natural England, 2015). Consequently, there is no risk of in-combination effects that could compromise the conservation objectives.</p>	No
	Disturbance	<p><u>Construction</u></p> <p>The presence of construction plant, vehicles and operatives could result in disturbance and displacement of birds.</p> <p>Given that the works will be programmed outside of the winter period, when the largest numbers of non-breeding birds are present and also when temperatures are at their lowest (making birds more vulnerable to disturbance), the risk of there being a significant effect is low. There is the potential for disturbance during autumn months when numbers of some species</p>	No	<p>No prospect of any significant in-combination effects as the effects of the works alone would be inconsequential.</p>	No

EA habitat/species group	Risk	Likely significant effect alone?	?	Likely significant effect in combination?	?
		<p>will be beginning to build. However, the localised nature of the works, with a relatively small zone of influence (maximum of 300m) and with a degree of habituation once works are underway means that there is unlikely to be any impacts that would undermine the site conservation objectives. No likely significant effect alone.</p> <p><u>Operation</u> There is a risk of disturbance to bird features during maintenance activities. The actual impact would depend on the nature of the activity, specific location, time of year and duration. However, the zone of influence would be relatively small and any impacts temporary, so would not lead to any effects that would compromise any of the conservation objectives. No likely significant effect alone.</p>	No	No prospect of any significant in-combination effects as the effects of the works alone would be inconsequential.	No
	Habitat loss	<p><u>Construction</u> There will be a net loss in plan area of some habitats and an increase in others. The broad categories of habitat that will be affected are grassland, marginal vegetation and open water. Although only a relatively small area is likely to be affected, along a narrow corridor, there is a need to assess the changes against the available site information and general knowledge about</p>	?	As there is uncertainty over a likely effect alone, this risk will be carried forward to the Stage 2 assessment and any in combination effects considered there.	N/A

EA habitat/species group	Risk	Likely significant effect alone?	?	Likely significant effect in combination?	?
		<p>sections of flood bank. This will not affect habitat that is critical to the bird features, notwithstanding the fact that there will be an overall improvement due to a net increase in open water and marginal vegetation. Inconsequential effect alone.</p> <p><u>Operation</u> The operation of the enhanced capacity scheme will not lead to any physical damage of habitats used by the bird features. Routine maintenance activities such as weed cutting will cause some physical damage to habitats, but these will be temporary and not at a scale or significance that would compromise site conservation objectives. No likely significant effect alone.</p>	No	Not applicable as there are no predicted effects at all, so no prospect of in-combination effects.	N/A
	Turbidity	<p><u>Construction</u> In-channel working could result in mobilisation of sediments and an increase in turbidity, both locally and downstream. There is no prospect of this having a direct impact on any of the bird features. Although there could be an impact on food sources (aquatic plants, invertebrates and fish) this would be a localised and temporary effect within a habitat that is not used by, or critical to, large numbers of non-breeding birds.</p>	No	Not applicable as there are no predicted effects at all, so no prospect of in-combination effects.	N/A

EA habitat/species group	Risk	Likely significant effect alone?	?	Likely significant effect in combination?	?
		<p>Uncertain as to whether or not there will be a likely significant effect alone.</p> <p><u>Operation</u> The increased capacity and volumes of water at times of flood will create turbidity, but this is unlikely to be measurably different from what currently occurs.</p> <p>There is a risk of turbidity during weed cutting, desilting and other in-channel maintenance activities. The risks are no greater than under current conditions and will only result in localised, temporary impacts that would not compromise the conservation objectives.</p> <p>No likely significant effect alone.</p>			No
Somerset Levels and Moors Ramsar					
RDB Invertebrates	All risks except disturbance	<p>There are no records of any of these species within the proposed working corridor based on data supplied by the Environment Agency and Somerset Environmental Records Centre in 2016. A literature search noted that most of the species are very rare and localised within the Ramsar site (e.g. have only ever been recorded at Shapwick Heath) and those that have been recorded within the King's Sedgemoor SSSI tend to utilise habitats in the smaller rhynes and</p>	No	Not applicable as there are no predicted effects at all, so no prospect of in-combination effects.	N/A

EA habitat/species group	Risk	Likely significant effect alone?	?	Likely significant effect in combination?	?
		<p>ditches. A survey of the Sowy and KSD commissioned by the Environment Agency in 2016 did not record any of the species on the list.</p> <p>Due to the unsuitability of the flood relief channel for these species, the low likelihood of occurrence on King's Sedgemoor and the fact that they are not reliant upon flooding to maintain their ditch/rhyne habitat there is unlikely to be any significant effect during construction, operation or maintenance of the Phase 1 works.</p> <p>No likely significant effect alone.</p>			
Severn Estuary Ramsar					
European Eel	Water chemistry and water quality	<p>There is a large eel migration through the KSD and beyond.</p> <p><u>Construction</u> In-channel activities could kill or injure eels as well as adversely affect water quality. These risks will be managed by standard best practice measures to avoid pollution incidents, minimise turbidity and monitor dissolved oxygen levels. Any effects that did occur would therefore be temporary and reversible so would not compromise the habitat used by eels or reduce population levels.</p> <p>No likely significant effect alone.</p>	No	The use of best practice measures during any in-channel construction and maintenance activities will reduce any risks to an inconsequential level, hence there is no prospect of likely significant effects in combination.	No

EA habitat/species group	Risk	Likely significant effect alone?	?	Likely significant effect in combination?	?
		<p><u>Operation</u> Changes in channel profile and operating procedures will have no effect on the habitat used by eels. There are no requirements to introduce structures across the channel that could impede eel migration.</p> <p>Maintenance activities, including summer weed cutting in the Soway and de-silting, have the potential to adversely affect water quality. These risks will be managed by standard best practice measures to avoid pollution incidents, minimise turbidity and monitor dissolved oxygen levels. Any effects that did occur would therefore be temporary and reversible so would not compromise the habitat used by eels or reduce population levels.</p> <p>No likely significant effect alone.</p>			

8. Alone assessment (further details)

The risk of likely significant effects has been assessed with respect to the nature, scale and location of the Phase 1 construction activities as well as the subsequent operation and maintenance. It has been possible to consider pollution prevention and biosecurity measures as they are an integral part of any construction project within or close to water, irrespective of whether or not European sites could be affected.

The assessment has concluded that there are likely significant effects alone on the qualifying bird features from:

- change in flow or velocity regime during operation
- changes in surface water flooding during operation
- habitat/community simplification during operation

and uncertainty over likely significant effects from:

- changes in physical regime during operation
- changed water chemistry during operation
- habitat loss during construction

There are no anticipated impacts on the Somerset Levels and Moors Ramsar site RDB invertebrates. Eels (Severn Estuary Ramsar) would be potentially be at risk during construction and from some maintenance activities, notably water quality issues associated with disturbance of sediments and summer weed cutting. However, these would be managed by standard best practice measures such as avoiding in-channel works when water temperatures are high and monitoring dissolved oxygen levels. No structures will be installed across the Sowey or KSD that could impede eel migration. There will be works to some of the water level management control structures as part of the strategic mitigation package. However, the design of these will need to ensure that they are compliant with the Eels (England and Wales) Regulations 2009.

It is not envisaged that the flood relief channel and associated water level management structures would be totally decommissioned so this stage has not been assessed. Any proposed decommissioning, future modifications or change in operating procedures would be subject to a separate assessment at the time.

9. In combination assessment (further details)

Where the screening has identified likely significant effects, or there is uncertainty, there has been no need to consider potential in-combination effects as they will be investigated at the Stage 2 Appropriate Assessment.

For risks where the conclusion has been no effect whatsoever, or where any effect would be inconsequential, there is no prospect of there being significant in-combination effects so no need to consider other plans, projects and policies.

10. Advice

This section summarises the advice requested / received during the screening.

Environment Agency internal advice and consultation (if applicable)

Natural England advice (if applicable)

Natural England agreed to the approach to undertake a Strategic HRA in order to establish whether the overall scheme would be compliant with the Habitats Regulations.

Third party advice (if applicable)

N/A

11. References

Natural England (2009). Regulation 33 Conservation Advice Package for the Severn Estuary SPA. Available at

<http://publications.naturalengland.org.uk/publication/3184206?category=3212324>

Natural England (2015). Site Improvement Plan for the Somerset Levels and Moors SPA (SIP 221). Available at

<http://publications.naturalengland.org.uk/publication/6561001356918784?category=5755515191689216>

Natural England (2019). European Site Conservation Objectives: Supplementary advice on conserving and restoring site features – Somerset Levels and Moors SPA. Available at

<http://publications.naturalengland.org.uk/publication/4598158654963712?category=5374002071601152>

PINS Note 05/2018. Consideration of avoidance and reduction measures in Habitats Regulations Assessment: People over Wind, Peter Sweetman v Coillte Teoranta

Downloaded from Aylesbury Vale DC

https://www.aylesburyvaledc.gov.uk/sites/default/files/page_downloads/ED32A%20PINS%20note%20052018_0.pdf

Tyldesley, D. and Chapman, C. (2013). The Habitats Regulations Handbook, Sep 2019 edition UK. DTA Publications Limited www.dtapublications.co.uk

12. Decision

The Environment Agency:

Concludes there is a likely significant effect, or uncertain effects, that need to be considered by a Stage 2 Appropriate Assessment.

Name of Environment Agency officer:	Will MacLennan
Job title:	Senior Environmental Project Manager, NEAS
Date:	

13. Natural England advice on the screening for likely significant effect

Date sent to Natural England:	
Date response received from Natural England:	
Do Natural England have concerns about the assessment and/or decision?	Yes/No (delete as appropriate)

Write here...

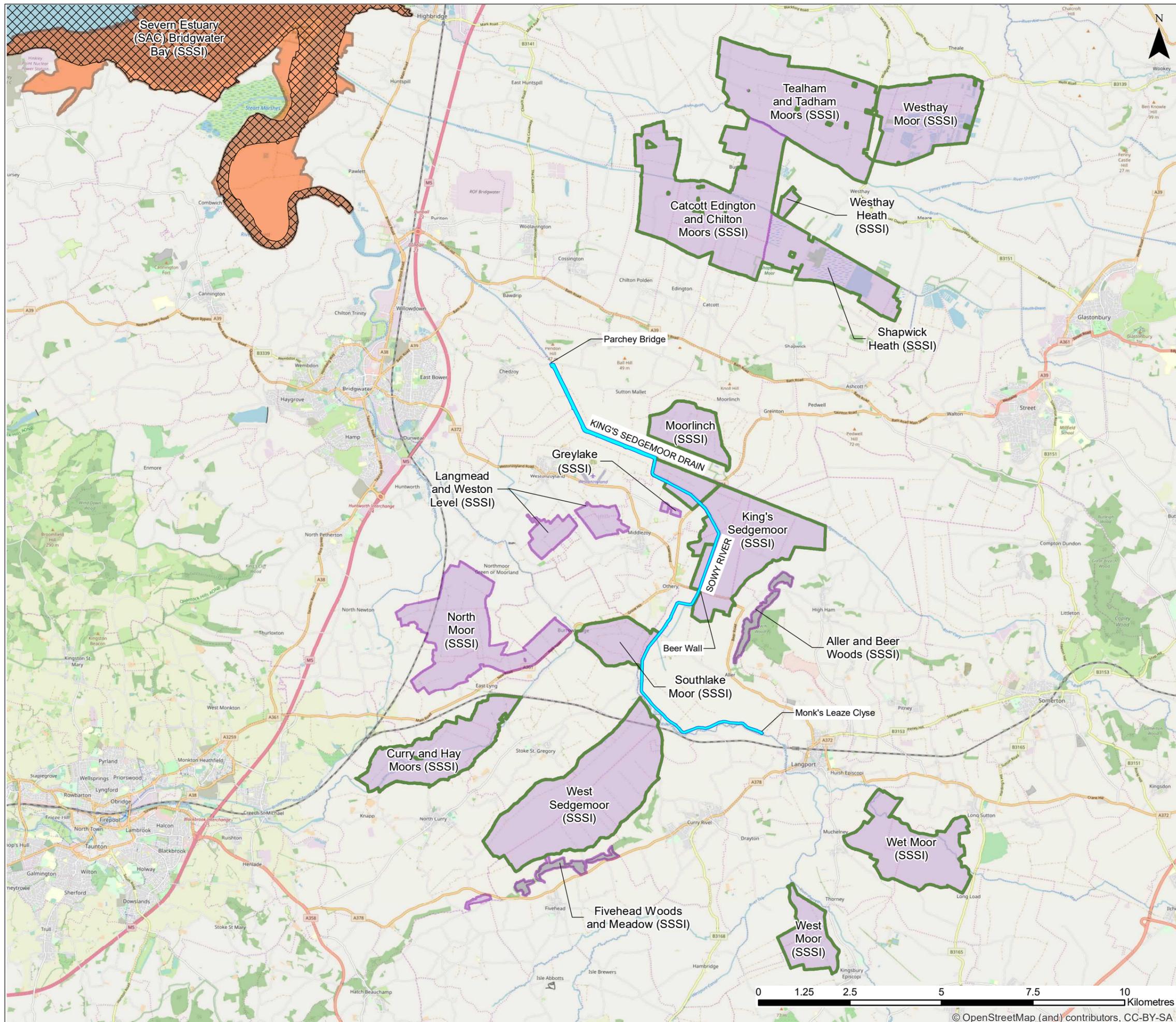
Name of Natural England officer	
Job title:	
Date:	

Appendix A

Figure 1 – Designated sites in relation to Scheme corridor

FIGURE 1

- Legend**
-  Main works area
 -  Somerset Levels and Moors Ramsar and Special Protection Area (SPA)
 -  Severn Estuary Special Protection Area (SPA) and Ramsar site (Bridgwater Bay SSSI component)
 -  Severn Estuary Special Area of Conservation (SAC)
 -  Site of Special Scientific Interest (SSSI)



P00	24/09/2019	First issue	FL	JH	LR	IB
Rev.	Date	Description of revision	Drawn	Check'd	Rev'd	Appr'd

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Client


Project
 Sowy/King's Sedgemoor Drain (KSD) Enhanced Capacity Scheme: Phase 1

Drawing Title
 Scheme location in relation to designated sites

Scale @ A3	1:100,000	DO NOT SCALE
Jacobs No.	B2368000	

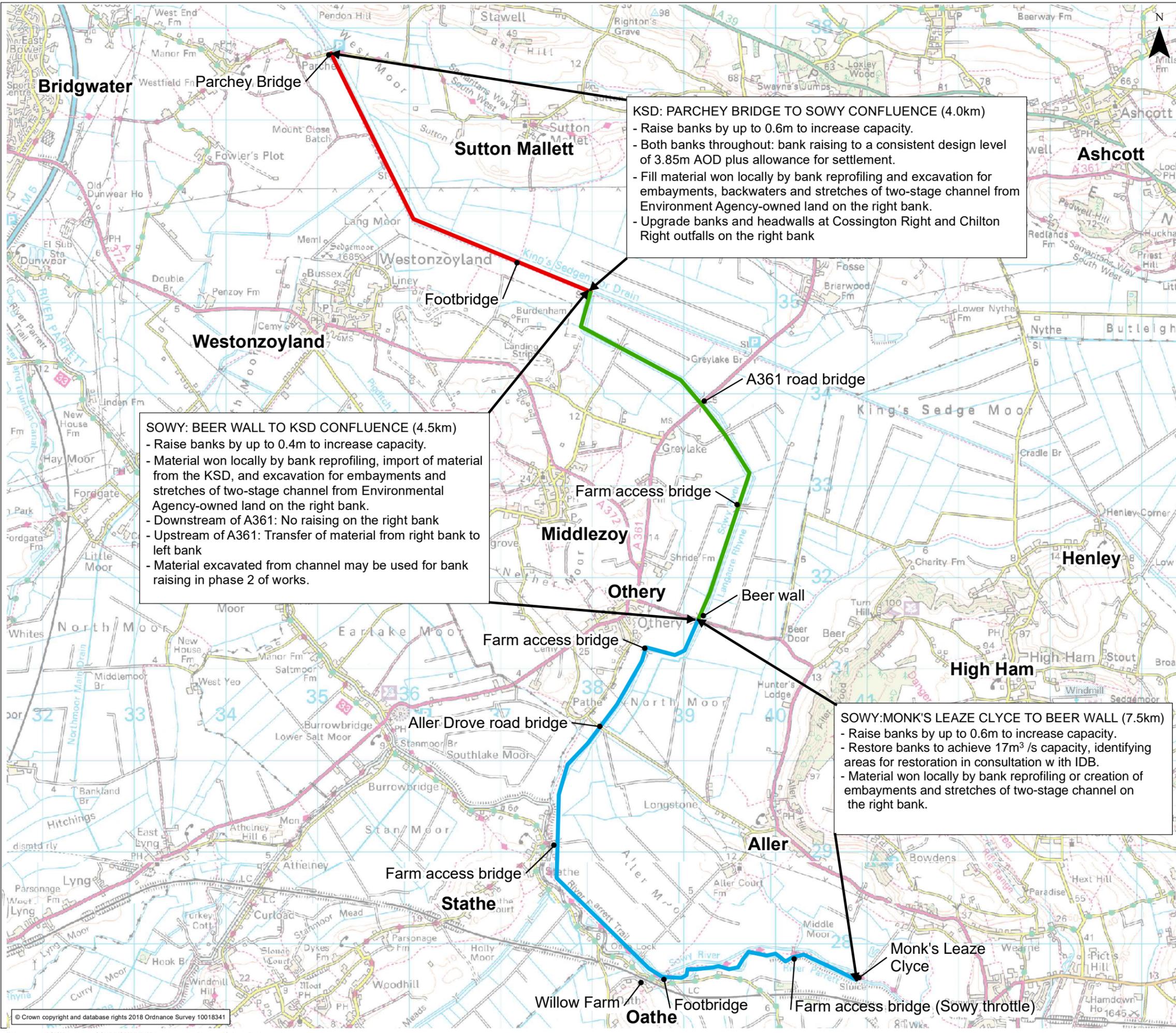


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Figure 2 – Study area plan

FIGURE 2



Proposed Scheme

- KSD
- Upper Sowy
- Lower Sowy

KSD: PARCHEY BRIDGE TO SOWY CONFLUENCE (4.0km)

- Raise banks by up to 0.6m to increase capacity.
- Both banks throughout: bank raising to a consistent design level of 3.85m AOD plus allowance for settlement.
- Fill material won locally by bank reprofiling and excavation for embayments, backwaters and stretches of two-stage channel from Environment Agency-owned land on the right bank.
- Upgrade banks and headwalls at Cossington Right and Chilton Right outfalls on the right bank

SOWY: BEER WALL TO KSD CONFLUENCE (4.5km)

- Raise banks by up to 0.4m to increase capacity.
- Material won locally by bank reprofiling, import of material from the KSD, and excavation for embayments and stretches of two-stage channel from Environmental Agency-owned land on the right bank.
- Downstream of A361: No raising on the right bank
- Upstream of A361: Transfer of material from right bank to left bank
- Material excavated from channel may be used for bank raising in phase 2 of works.

SOWY: MONK'S LEAZE CLYCE TO BEER WALL (7.5km)

- Raise banks by up to 0.6m to increase capacity.
- Restore banks to achieve 17m³/s capacity, identifying areas for restoration in consultation with IDB.
- Material won locally by bank reprofiling or creation of embayments and stretches of two-stage channel on the right bank.



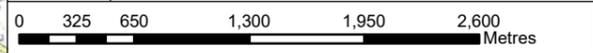
PO1	27/11/2019	First issue	RS	MO	SK	TW
Rev.	Date	Description of revision	Drawn	Check'd	Rev'd	Appr'd



Client: Environment Agency
Project: Sowy/King's Sedgemoor Drain (KSD) Enhanced Capacity Scheme: Phase 1

Drawing Title: Proposed Scheme Design

ENVRESW001353-CH2-ZZ-400-DR-EN-1038
Scale @ A3: 1:40,000 DO NOT SCALE
Jacobs No.: B2368000



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Appendix D2 Project level HRA Stage 2 report

Stage 2 Habitats Regulations Assessment



Environment Agency record of appropriate assessment

This is a record of the Appropriate Assessment required by Regulation 63 of the Conservation of Habitats and Species Regulations 2017 (as amended), undertaken by the Environment Agency in respect of the River Sowy and King's Sedgemoor Drain Enhancements Scheme. Due to the scale of the scheme it will be necessary to undertake the works in several phases. A strategic level HRA has previously been completed. This document is the **project level HRA for Phase 1 of the full River Sowy and King's Sedgemoor Drain Enhancements Scheme and considers likely significant effects covered by the construction of the Phase 1 scheme only**. The strategic level HRA considers the operational effects of Phase 1 of the full River Sowy and King's Sedgemoor Drain Enhancements Scheme as well as all further future phases.

Revision	Date	Description	Author	Checked	Reviewed	Approved
P0.1	21/04/20	Review draft	J Halls	M Olivier	L Rudd	I Ball
P0.3	08/07/20	Update post review	R Smedley	M Olivier	J Halls	I Ball
P0.4	21/07/20	Changes to design details etc.	R. Thompson	Cath Walker	Cath Walker	I Ball

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Permission, plan or project (PPP) details

Type of PPP:	Flood Risk Management Scheme (phased delivery)
Environment Agency reference no:	ENVRESW001353
National grid reference:	ST40932760 (Monk's Leaze Clyce, Sowy River) to ST35173774 (Parchey Bridge, King Sedgemoor Drain)
Site reference:	River Sowy and King's Sedgemoor Drain Enhancements Scheme: Phase 1

Description of proposal

Introduction

The River Sowy and King's Sedgemoor Drain Enhancements Scheme aims to improve the options available for flood risk management in part of the Somerset Levels. The proposals form part of the 20-year *Somerset Levels and Moors Flood Action Plan*¹, which was published by the Somerset Rivers Authority (SRA) in spring 2014 in response to the extreme and prolonged flooding that the area suffered the previous winter. The primary objective of the Scheme is to reduce the risk, depth and duration of such flood events that threaten property and infrastructure. This will be achieved through increasing the capacity of the Sowy River (Sowy) and parts of the King's Sedgemoor Drain (KSD), which operate as a flood relief channel for the River Parrett and its tributaries.

Due to the scale of the full River Sowy and King's Sedgemoor Drain Enhancements Scheme it will be necessary to undertake the works over several phases. This document represents the Stage 2 Habitats Regulations Assessment (HRA) of the first phase of works, termed the River Sowy and King's Sedgemoor Drain Enhancements Scheme: Phase 1 (the Scheme), that are planned to be undertaken in 2020. It follows the completion of strategic level HRA Stage 1 and Stage 2 assessments for the full River Sowy and King's Sedgemoor Drain Enhancements Scheme. to examine the effects of the overall aim of increasing the flow capacity within the flood relief channel of up to 27m³/s (KSD) and 24m³/s (Sowy). The strategic level HRA focussed on the potential operational effects and what mitigation measures would be required to ensure that the full River Sowy and King's Sedgemoor Drain Enhancements Scheme objectives are compliant with the Habitats Regulations.

Each phase of the full River Sowy and King's Sedgemoor Drain Enhancements Scheme will be undertaken under the Environment Agency's permitted development powers, although will still be subject to an appraisal of all environmental effects under the Environmental Impact Assessment (Land Drainage Improvement Works) (Amendment) Regulations 2017. The Environment Agency is therefore both proponent (with the SRA) and determining authority for the Scheme. It is also, therefore, a competent authority with respect to the Habitats Regulations. However, because the full River Sowy and King's Sedgemoor Drain Enhancements Scheme is being progressed through permitted development, prior approval must also be sought from the local planning authority where any likely significant effects have been identified (Regulations 75-78).

This Stage 2 project level HRA is required because the Stage 1 assessment concluded there was likely to be some significant effects on the non-breeding bird features of the Somerset Levels and Moors SPA and Ramsar sites, as well as the Severn Estuary SPA and Ramsar sites (Table 1

¹ <https://www.somersetiversauthority.org.uk/flood-risk-work/somerset-20-year-flood-action-plan/>

below). This was partly because it is not possible at Stage 1 to take into account mitigation measures that are specifically required to avoid likely significant effects on European site features (see *Mitigation Measures* and *Incorporated Mitigation* below).

At the time that the Stage 1 HRA was completed there were still some design details to be finalised. Where these differ from the description in the Stage 1 document they have been highlighted below, with a full description available in the Environmental Statement. The final design has not led to any change in the conclusions of the Stage 1 assessment.

Location

The Scheme focuses on raising the existing embankments situated between Monk’s Leaze Clyce on the River Sowy and Parchey Bridge on the KSD to a level such that the capacity of the system is increased in the KSD and Sowy between Beer Wall and the confluence with the KSD. is located within the Somerset Levels, to the south-east of Bridgwater, along the whole length of the Sowy corridor and part of the KSD corridor (Appendix 1). The working corridor will run from Monk’s Leaze Clyce, along the Sowy through to the KSD and as far downstream as Parchey Bridge. The KSD continues from here for a further 5.5 km before reaching the gravity outfall sluice into the River Parrett at Dunball, downstream of Bridgwater.

Part of the working corridor passes either through or close to several component SSSIs of the Somerset Levels and Moors SPA and Ramsar sites, notably the King’s Sedgemoor SSSI (Appendix 1).

Scheme description

Design

In order to achieve the enhanced capacity targets, there is a need to reprofile the existing informal flood banks located along selected lengths of the left and right banks of both the Sowy and KSD, as summarised in Table 1 and shown in the drawings in Appendix 2.

Table 1. Summary of proposed works

Location		Bank raising	Channel widening
Upper Sowy	Sowly between Monk’s Leaze Clyce and Beer Wall	Raising of existing informal flood banks on right bank by up to 0.5m to achieve capacity of 17m ³ /s..	None
Lower Sowy	Sowly between Beer Wall (A372) and A361	Raising of existing informal flood banks on left and right bank by up to 0.3m to achieve a capacity of 24m ³ /s.	On the right banks: <ul style="list-style-type: none"> • One embayment • One section of two-stage channel
	Sowly between A361 and Sowly/KSD confluence	Raising of existing informal flood banks on left bank by up to 0.3m to achieve a capacity of 24m ³ /s.	On the right bank: <ul style="list-style-type: none"> • One embayment • One section of two-stage

Location		Bank raising	Channel widening
			channel
KSD	KSD between Sowy/KSD confluence and Parchey Bridge	Raising of existing informal flood banks on left and right bank by up to 0.5m to achieve a capacity of up to 27m ³ /s.	On the right bank: <ul style="list-style-type: none"> • One embayment • One backwater • One section of two-stage channel

Where existing informal flood embankments are to be raised, the crest width will be designed and maintained at a minimum of 3m, with formed battered embankment sides of 1 in 3 slopes on the channel side and 1 in 5 slopes on the landward side (see Figure 1 below). Material required for raising of the existing informal flood embankments on the KSD will be won through reprofiling of the existing informal flood embankments on both the left and right bank. Material for bank raising along both the Upper and Lower Sowy would be imported under CL:AIRE Code of Practice from a soils processing plant located off the A372 near Westonzoyland. Material won through the channel widening works will be placed on the landward side of the existing informal flood embankments.

In addition to the embankment reprofiling, the opportunity will also be taken to create habitat enhancements that will help deliver Water Framework Directive (WFD) targets. The type and location of the enhancements are indicated under 'channel widening' in Table 1 and shown on the figures in Appendix 2. Indicative cross-sections are included in Appendix K of the Environmental Statement [Note: these can be included within the HRA alone if we wish to issue as a standalone document, but are not yet available], but the approximate dimensions are:

- Two-stage channels: 150m in length, with channel widening of 1.5-2m and a c.5m marginal shelf with shelf level of 300mm below summer pen
- Embayments: 135-150m in length depending on location and 5-6m in width, with shelf level of 300mm below summer pen
- Backwater: back channel 5-6m wide and 100-150m in length, with a "planted island" of 5m width, with access to island via bridge provided for maintenance purposes

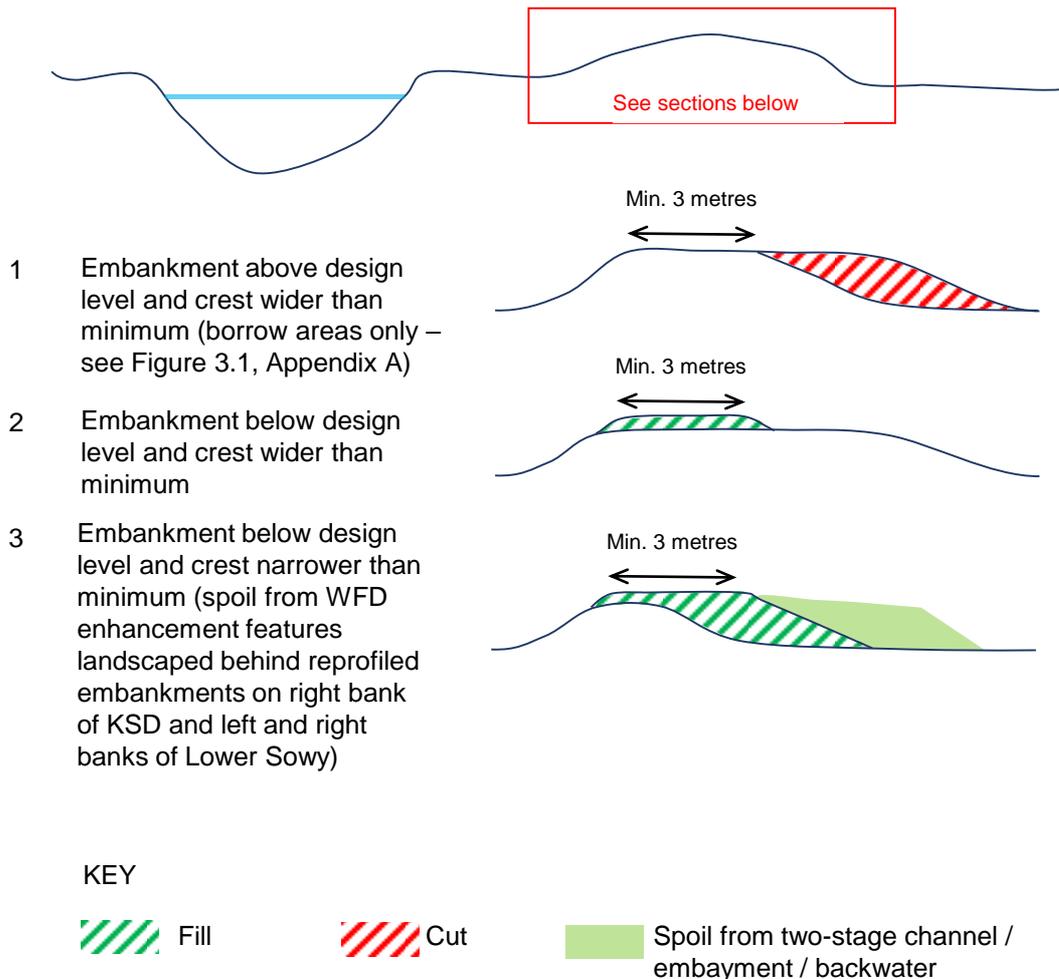


Figure 1. Schematic illustration of bank reprofiling process

In addition to the embankment works it will be necessary to replace the steel sheet-piled wing walls of the Cossington Right and Chilton Right outfalls on the KSD, as well as raise the existing concrete headwalls.

Habitat change

Within the Scheme corridor the main permanent habitat changes will result from the construction of the WFD enhancements:

- Increase in open water through channel widening – 0.08ha
- Increase in marginal, emergent vegetation on berms due to embayments and two-stage channel, plus within the new backwaters – 0.42ha
- Increase in rough/wet grassland adjacent to marginal vegetation and extending to the reprofiled embankments – 0.20ha

As part of the baseline ecological study for the Scheme, a Phase 1 Habitat survey was undertaken between August and September 2019. This covered a 100m wide corridor either side of the Sowy and KSD. The results are presented in Appendix G of the Environmental Statement. With respect to habitats that will be directly affected by the WFD enhancement features and embankment raising and reprofiling, the survey showed that the existing embankments and other terrestrial habitat through to the watercourse margins predominantly comprise species-poor grassland and tall ruderal vegetation. Neutral semi-improved grassland was frequent throughout the study area although always beyond the embankments.

In addition to the permanent habitat changes there will be some temporary changes through the working corridor due to the movement and operation of plant. These areas will be restored through appropriate ground preparation and re-seeding with bespoke neutral wet grassland mix (or alternative appropriate seed mix). The areas will be available again for grazing (where relevant) once the EA is satisfied that they have re-established satisfactorily.

Design uncertainties

It should be noted that it is currently uncertain whether the full programme of works set out in **Error! Reference source not found.** can be undertaken within the currently available funding and within the programme outlined below.

Should funding or programme constrain delivery of the Proposed Scheme, raising of the existing informal flood embankments on the Lower Sowey (between the confluence of the Sowey and KSD and Beer Wall) and the Upper Sowey (between Monk's Leaze Clyce and Beer Wall) will be prioritised along with the WFD enhancement features along this stretch. The next priority for Phase 1 delivery will then be raising of the existing informal flood embankments on the KSD along with the WFD enhancements along this stretch. Any works not delivered in Phase 1 will be undertaken as part of the Phase 2 proposals.

The HRA is based on the full programme being delivered. There would be no additional risks or increase in existing identified risks to the designated site features if only part of the Scheme was completed in 2020.

Construction programme

Construction would commence at the earliest in September 2020 and finish in late October (or early November pending agreement with Natural England), taking a maximum of eight weeks for the of earthworks activities, reseeding of the reprofiled embankments and planting of the embayments, two-stage channels and backwaters.

There would be up to five gangs working at any one time during the 8 week construction period, with two gangs starting on each of the left and right bank of the KSD and left and right bank of the Lower Sowey concurrently. Within the Lower Sowey, Raising will start at the mid-point between access locations, working backwards towards the access locations. This will prevent the need for construction traffic to cross areas of completed raising work. Once the gang on the KSD have completed their works, they would move onto the right bank of the Upper Sowey to complete the works in this section whilst bank raising on the Lower Sowey is completed. The fifth gang would focus on creation of the WFD enhancement features, starting on the right bank of the KSD working from north to south, and then moving onto the Lower Sowey.

Maintenance

Current reactive maintenance undertaken on the section of the KSD included within the Proposed Scheme may include removal of fallen branches or occasional desilting. Desilting works were undertaken at Parchey Bridge during 2018.

The principal current maintenance activity along the Sowey is routine weed cutting and clearing carried out at least once, and sometimes twice, per year depending on need. In theory, this work is undertaken from alternate banks in order to share the burden of deposited cut weed on the adjacent farm land. However, the majority of the work is undertaken from the right bank as there are fewer access (and therefore safety) constraints.

A longer term maintenance regime will be developed in conjunction with our internal specialist teams, however the onus will remain on newly created WFD enhancement feature habitats developing naturally following completion of the initial construction aftercare period.

Map showing project location and European sites

See Appendix 1.

Summary of Stage 1 (likely significant effect) conclusion

At Stage 1 it was not possible to rule out the likelihood of significant effects, and those potential effects relating to the construction phase of the Scheme that require appropriate assessment are summarised below in Table 2.

Table 2. Stage 1 likely significant effect risk summary based on EA bird group

EA bird group	Risk	Likely significant effect alone	Likely significant effect in combination [#]
Somerset Levels and Moors SPA and Ramsar			
Severn Estuary SPA and Ramsar			
3.4 Birds of lowland wet grassland	Habitat loss	Uncertain	No
3.6 Birds of lowland freshwaters and their margins			
3.7 Birds of farmland (for this Scheme any cropped or grassland areas which do not function as wet grassland at any time of year)			

[#] Where a likely significant effect alone is identified at the screening there is no need to consider in combination effects at that stage. If the appropriate assessment concludes no adverse effect alone on site integrity then the potential for in combination effects will be considered.

The relevant species and which EA bird groups they fall into, based on the types of habitat that could be affected, are shown in Table 3 below. EA species and habitat groups are used to consider species with similar habitat requirements and sensitivities as a whole and are particularly useful at the screening stage. As can be seen from Table 3, each species can belong to more than one bird group.

Table 3. Qualifying features and bird groups

Site and qualifying feature	Bird group		
	3.4	3.6	3.7
Somerset Levels and Moors SPA and Ramsar			
Bewick's Swan	Y	Y	Y
Golden Plover	Y		Y
Lapwing	Y		Y
Teal	Y	Y	
Waterfowl assemblage	Y	Y	Y
Severn Estuary SPA and Ramsar			
Bewick's Swan	Y	Y	Y
Dunlin	Y		
Redshank	Y	Y	
Gadwall		Y	
Shelduck		Y	
Greater White-fronted Goose	Y		
Waterfowl assemblage	Y	Y	Y

Table 4 lists the ‘main component’ species of the waterfowl assemblage of the designated sites i.e. those that fall in one or more of the following categories:

- i) present in nationally important numbers ($\geq 1\%$ GB population);
- ii) migratory species present in internationally important numbers ($\geq 1\%$ biogeographic population);
- iii) those species comprising $\geq 2,000$ individuals (i.e. $\geq 10\%$ of minimum total to qualify for an internationally-important assemblage);
- iv) ‘named components’ otherwise listed on the SPA citation.

Other important component species that do not fall in the above categories but need to be considered by the assessment are ‘red-listed’ Birds of Conservation Concern and/or those included on Section 41 of the Natural Environment and Rural Communities Act 2006.

Table 4. Components of waterfowl assemblage apart from named qualifying features

Site / species	Peak mean to 2017/18 ²	Named component species	Red List	Section 41
Somerset Levels and Moors SPA				
Mute Swan	1,097	-	-	-
Gadwall	688	-	-	-
Shoveler	1,333	-	-	-
Wigeon	21,835	-	-	-
Pintail	780	-	-	-
Pochard	216	-	Y	-
Bittern	11	-	-	Y
Little Egret	117	-	-	-
Whimbrel	0	Y	-	-
Curlew	16	-	Y	Y
Black-tailed Godwit	205	-	Y	Y
Ruff	8	-	Y	-
Snipe [#]	829	Y	-	-
Green Sandpiper	8	-	-	-
Severn Estuary SPA and Ramsar*				
Mute Swan	420	-	-	-
Shoveler	487	-	-	-
Wigeon	7,751	Y	-	-
Teal	5,374	Y	-	-
Pintail	745	Y	-	-
Pochard	291	Y	Y	-
Tufted duck	812	Y	-	-
Little Egret	198	-	-	-
Curlew	3,571	Y	Y	Y
Whimbrel	221	Y	-	-

² Wetland Bird Survey (WeBS) data from Waterbirds in the UK 2017/18 © copyright and database right 2019. WeBS is a partnership jointly funded by the BTO, RSPB and JNCC, in association with WWT, with fieldwork conducted by volunteers

Site / species	Peak mean to 2017/18 ²	Named component species	Red List	Section 41
Black-tailed Godwit	765	-	Y	Y
Ruff	35	-	-	-
<i>Peak mean above that of importance at the international (biogeographic) level</i>				
<i>Peak mean above that of importance at the GB level</i>				

Non-breeding snipe are notoriously difficult to census by the count method. Although numbers do not reach the threshold of GB importance this is still the highest peak mean of all WeBS sites.

* Excludes species that don't utilise the Somerset Levels or are only likely to be found very infrequently and in small numbers, so there is no risk of likely significant effects on the SPA population (e.g. Grey Plover).

The only component species of the Severn Estuary SPA and Ramsar that isn't a component of the Somerset Levels and Moors (SLM) SPA is tufted duck. Relatively small numbers occur on the SLM, with a peak mean of 205 birds to 2017/8 compared to the GB threshold of 1,100.

Conservation objectives³

The appropriate assessment will consider the implications of the proposal in view of the site's conservation objectives. The conservation objectives for the sites requiring appropriate assessment are below:

Table 5. Conservation Objectives for the Special Protection Areas

Somerset Levels and Moors SPA (UK9010031) (Natural England 2020a)⁴
With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified and subject to natural change: Ensure that the integrity of the site is maintained or restored as appropriate, and to ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:
<ul style="list-style-type: none"> - the extent and distribution of the habitats of the qualifying features - the structure and function of the habitats of the qualifying features - the supporting processes on which the habitats of the qualifying features rely - the populations of the qualifying features, and - the distribution of the qualifying features within the site.
Severn Estuary SPA (UK9015022) (Natural England 2020b)⁵
With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified and subject to natural change: Ensure that the integrity of the site is maintained or restored as appropriate, and to ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:
<ul style="list-style-type: none"> - the extent and distribution of the habitats of the qualifying features - the structure and function of the habitats of the qualifying features - the supporting processes on which the habitats of the qualifying features rely - the populations of the qualifying features, and - the distribution of the qualifying features within the site.

There are currently no conservation objectives for any Ramsar sites. However, given that it is only the Ramsar non-breeding bird features that are being considered they are adequately covered by the SPA objectives.

³ Generic conservation objectives are based on 'Natural England (2014) Conservation Objectives for European Sites in England Strategic Standard 01/02/2014 V1.0'

⁴ <http://publications.naturalengland.org.uk/publication/4598158654963712>

⁵ <http://publications.naturalengland.org.uk/publication/5601088380076032>

The individual species that are qualifying features of the sites are listed in Table 3 above, with additional notable species within the waterfowl assemblage shown in Table 4.

Supplementary Advice

In addition to the generic SPA objectives, Natural England has recently published supplementary advice on the Conservation Objectives for the Somerset Levels and Moors SPA (Natural England, 2019b). These provide site-specific attributes and associated targets for each of the qualifying features, which are primarily used for condition monitoring in relation to maintenance or restoration, but which are also relevant when undertaking a HRA. A summary of the ones relevant to this assessment are shown in Table 6.

Table 6. Summary of attributes and targets for qualifying features of the SLM SPA

Attribute	Target
Population abundance	<p><i>Bewick's Swan</i>: restore size to a level at or above that at the time of classification (310 birds).</p> <p><i>Golden Plover</i>: maintain at a level above that at the time of classification.</p> <p><i>Teal</i>: maintain at a level above that at the time of classification.</p> <p><i>Lapwing</i>: restore size to a level at or above that at the time of classification.</p>
Assemblage abundance	Maintain the overall abundance of the non-breeding assemblage at a level above 20,000 individual wintering wetland birds. There were 58,093 individuals (5-year peak mean) at the time of classification and the current figure is 93,946.
Diversity of species that make up the assemblage	Maintain the species diversity of the waterfowl assemblage. The species composition and numbers of individuals of all species within the assemblage will clearly change over time. However, the focus of the target is maintenance and restoration of populations of the 'main component' assemblage species (Table 2 above).
Extent and distribution of supporting non-breeding habitat	Maintain the extent and distribution of suitable habitat within and outside the SPA boundary, which supports the qualifying features for all necessary stages of the non-breeding/wintering period (moulting, roosting, loafing, feeding).
	Within the SPA boundary maintain 6,394.18ha of habitat, including grazing marsh, fen, reedbeds, neutral grassland, open water, rivers, artificial drainage channels and ditches
	Outside the SPA boundary: an unquantified area of land of functional importance for qualifying features. Such land includes arable, species-poor and species-rich grassland and a variety of high-quality wetland sites as nature reserves such as RSPB Greylake.
Supporting habitat (within and outside the SPA): water quantity	<p>Maintain the supply of water to a standard, which provides the necessary conditions to support the qualifying features of the SPA. In winter the flood regime must provide a mixture of splash, shallow and deep flooded areas (target depths and area of flooding is provided in the <i>Supplementary Advice</i>).</p> <p>The provision of suitable conditions depends on an integrated approach to water level and flood risk management. The use of Raised Water Level Areas (RWLAs) within the SSSIs contributes to this.</p>
Supporting habitat (within	The SPA qualifying features are relatively insensitive to organic

Attribute	Target
and outside the SPA): water quality	and nutrient pollution. The current water quality of the Somerset Levels and Moors is likely to be adequate to support the SPA qualifying features. However, it should be noted that some of the component SSSIs are currently listed as <i>unfavourable – declining</i> due to elevated phosphorous levels that are having an adverse effect on aquatic plant and invertebrate communities.
Supporting habitat (within and outside the SPA): conservation measures	Maintain management or other measures (whether within and/or outside the site boundary as appropriate) necessary to maintain the structure, function and/or the supporting processes associated with the feature and its supporting habitats. For non-breeding birds the key measures are sward management (grazing and cutting), water level management and maintenance of watercourses and associated structures.
Supporting habitat (within and outside the SPA): air quality	Maintain concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution Information System (www.apis.ac.uk).
Supporting habitat (within and outside the SPA): minimising disturbance caused by human activity	Reduce the frequency, duration and/or intensity of disturbance within close proximity of affecting roosting, foraging, feeding, moulting and/or loafing birds so that the qualifying features are not significantly disturbed.
Supporting habitat (within and outside the SPA): landscape structure	Maintain open and unobstructed terrain within and around roosting and feeding areas with no overall decrease in field sizes.
Supporting habitat (within and outside the SPA): connectivity with supporting habitats	Maintain the safe passage of birds moving between roosting and feeding areas within and outside the component SSSIs and between the Somerset Levels and Moors and Severn Estuary SPAs. The advice notes that research into the role of the flyway between the estuary and inland moors and the extent and importance of functionally-linked land outside the SPA boundary is required.
Supporting habitat (within and outside the SPA): Food availability within supporting habitat	<i>Bewick's Swan</i> Maintain the availability of cereal grains, rape, potatoes and sugar beet, where these sources are locally important to feeding flocks. <i>Golden Plover and Lapwing</i> Maintain the availability of key invertebrate prey species (e.g. earthworms and beetles) of preferred prey sizes. <i>Teal</i> Maintain the cover/abundance of preferred food plants (e.g. <i>Polygonum</i> , <i>Eleocharis</i> , <i>Rumex</i> , <i>Ranunculus</i> , and <i>Juncus</i>). <i>Assemblage</i> Maintain the cover/abundance of preferred food plants and availability of key invertebrate prey species.

For population abundance it should be noted that where the current 5-year peak mean (see Table 8 below) is in excess of the figure at the time of classification there is a requirement to maintain and avoid deterioration from the current level. For lapwing and Bewick's swan, where

current levels are below that at the time of classification then there is a need to restore the size of the populations to the original baseline.

For the Severn Estuary SPA, advice formerly given under Regulation 33 of the Conservation (Natural Habitats & c.) Regulations was published in 2009 (Natural England and Countryside Council for Wales, 2009). Although this identifies some hazards and vulnerabilities of the SPA features these all relate to saltmarsh and other intertidal habitats within the estuary (despite the fact that the boundary includes some coastal grazing marsh on the landward side of the sea walls), so is not relevant to this assessment.

Site Improvement Plans for the Somerset Levels (Natural England 2015a) and Severn Estuary (Natural England 2015b) provide a high-level overview of the issues (both current and predicted at the time of publication) affecting site condition and outline the priority measures required to improve the condition of the features. They include actions relevant to water level management, including dealing with summer flooding and prolonged, deep winter flooding.

Site condition and conservation status of qualifying features

Somerset Levels and Moors SPA and Ramsar sites

The SPA and Ramsar have 12 component SSSIs, with five located in the Brue valley and seven on the floodplains of the Rivers Parrett and Tone. The Scheme has the potential to affect, directly or indirectly, the seven sites in the Parrett and Tone floodplains so it is those that will be included in this assessment. Table 7 summarises the site condition of each component SSSI based on information published on Natural England’s Designated Sites View webpages (Natural England 2019a).

Table 7. Site condition of component SSSI of the Somerset Levels and Moors SPA and Ramsar in the Parrett and Tone floodplains

SSSI	Condition
Curry and Hay Moors	<p><u>Overall</u>: All but one of the 24 units in Unfavourable - recovering, mainly due to high phosphate levels, the presence of Nuttall’s waterweed and a poor range of ditch succession.</p> <p><u>Non-breeding birds</u>: Relatively few birds noted as using the site due to lack of suitable splash conditions.</p>
King’s Sedgemoor	<p><u>Overall</u>: All 21 units are listed as <i>Unfavourable - Declining</i> following site checks made in 2017. The stated reason is elevated levels of phosphorous in the ditch network, resulting in algal dominance and loss of vascular plant diversity since the previous assessment. Most other site features, including birds, are in favourable condition.</p> <p><u>Non-breeding birds</u>: The site supports relatively high numbers of waders and wintering waterfowl, the key locations being the RWLAs where they can feed and roost without suffering any significant disturbance.</p>
Moorlinch	<p><u>Overall</u>: 10 of the units <i>Unfavourable - recovering</i> and the other one (doves) <i>Favourable</i>.</p> <p><u>Non-breeding birds</u>: No recent figures or condition quoted - favourable based on data up to 2011-12.</p>

SSSI	Condition
Southlake Moor	<p><u>Overall</u>: All 3 units are listed as <i>Unfavourable - Declining</i> due to elevated levels of phosphorous in the ditch network, resulting in algal dominance and loss of vascular plant diversity since the previous assessment.</p> <p>Most other site features, including birds, are in favourable condition.</p> <p><u>Non-breeding birds</u>: The site consistently supports large numbers of birds due to the provision of both shallow and deep-water conditions between December and February. This is partly achieved through taking water directly from the Sowey and the ability to discharge it back when required.</p>
West Moor	<p><u>Overall</u>: All 10 units <i>Unfavourable - declining</i> due to water quality issues plus lack of full range of ditch succession stages in most units.</p> <p><u>Non-breeding birds</u>: No specific reference though appropriate splash conditions noted in 5 of the 10 units.</p>
West Sedgemoor	<p><u>Overall</u>: All 7 units are listed as <i>Unfavourable - Declining</i> following site checks in 2016. Elevated levels of phosphorous in the ditch network, resulting in algal dominance, are having a negative effect on plant communities.</p> <p>Most other site features, including birds, are in favourable condition.</p> <p><u>Non-breeding birds</u>: West Sedgemoor supports considerable numbers of waterfowl due to the provision of extensive areas of shallow flood where birds can safely roost and feed.</p>
West Moor	<p><u>Overall</u>: Of the 20 units, 12 are listed as <i>Unfavourable - recovering</i>; 7 as <i>Favourable</i> and 1 (the River Yeo) as <i>Unfavourable - no change</i>.</p> <p><u>Non-breeding birds</u>: Considered to be favourable in terms of numbers of birds and the presence of suitable splash conditions in those units where these features are mentioned.</p>

The SSSI condition status gives an indication of the health of each SPA component site, though in the case of non-breeding birds it should be noted that some sites are more important to these features than others. Raised Water Level Areas (RWLA) within some of the sites are managed between December and February to provide suitable conditions for waterbirds, ranging from 'splash' to shallow water through to deeper water.

Furthermore, many of the qualifying species will also utilise areas of functional / supporting habitat outside of the SSSIs. Unless specifically managed as part of an agri-environment scheme, functional habitat tends to only be of value when there is standing water present and that is often the result of pluvial and/or fluvial flooding. The exception is for species such as lapwing, golden plover, Bewick's swan and mute swan that regularly utilise cropped fields and non-flooded grassland for feeding.

Wetland Bird Survey

Wetland Bird Survey (WeBS) data provides useful figures and information about non-breeding bird populations at the SPA level as well as the ability to query and compare individual species data across sites. The WeBS Report Online (Frost et al 2019) details the latest published peak mean counts together with 'Alerts'. The latter analyses trends in abundance of waterbird features on designated sites and highlights those where there is a >25% decline (Amber Alert) or more than 50% decline (Red Alert) over the short (5 years), medium (10 years) and long-term

(up to 25 years) periods. The latest WeBS Alerts were published in 2019 utilising data up to 2017/18 (Woodward *et al* 2019).

Table 8. Somerset Levels and Moors SPA and Ramsar features, 5-year peak mean numbers⁶

Feature	Peak mean at classification	Peak mean to 2017/18	Peak mean to 2016/17	Peak mean to 2015/16	Peak mean to 2014/15	Peak mean to 2013/14
Bewick's swan	310	4	5	4	16	22
Golden Plover	3,110	12,881	12,578	12,778	10,370	9,638
Teal	7,476	17,906	21,908	21,816	25,707	23,328
Lapwing	36,565	33,779	32,662	31,651	39,783	37,041
Waterfowl assemblage	58,093	93,946	90,183	94,737	107,391	101,751

Annex 1 species (Article 4.1)

The large drop in numbers of **Bewick's swan** is reflected in both national and regional (south-west) trends since the mid-1990s. However, reductions on the Somerset Levels pre-dated the national declines so there are likely to be some site-specific drivers of decline.

The increase in **golden plover** numbers is reflected in national and international trends. They are far less dependent upon areas of shallow flood and spend most of their time feeding (daytime, but more particularly at night) on permanent pasture and ploughed fields. They will roost on the latter but may also move to coastal areas (Brown and Grice 2005).

Migratory / non-breeding species (Article 4.2)

Increases in **teal** are also a reflection of national and regional trends over the last 30 years. The current **lapwing** peak is lower than at the time of classification, but they still represent the most numerous single species and SLM is the most important site for them in the whole of Britain.

Waterfowl assemblage (Article 4.2)

At the time of classification, in addition to the Annex 1 and migratory species referenced above, the following assemblage species occurred in nationally important numbers: gadwall, wigeon, shoveler, pintail, snipe and curlew. The current status of these and additional species which now occur in nationally or internationally important numbers are shown in Table 4 above.

Severn Estuary SPA and Ramsar sites

The site comprises 12 component SSSIs extending to 24,488 ha, of which approximately 10% is grazing marsh and other habitats landward of the sea defences. For the purpose of this assessment, the Bridgwater Bay SSSI has been considered as the site from where there is most likely to be an interchange of birds within the Somerset Levels.

Bridgwater Bay SSSI is divided into 30 units of which 14 are listed as 'neutral grassland (lowland)', so are assumed to be grazing marsh or similar. The condition of 12 of the neutral grassland units is Unfavourable - recovering and the other two as Favourable. Two of the units have RWLAs.

Qualifying species

Data on the qualifying species has been obtained from WeBS online⁷ and the SPA and Ramsar citations.

⁶ Contains Wetland Bird Survey (WeBS) data from Waterbirds in the UK 2017/18 © copyright and database right 2019. WeBS is a partnership jointly funded by the BTO, RSPB and JNCC, in association with WWT, with fieldwork conducted by volunteers

⁷ Frost et al 2019 <https://app.bto.org/webs-reporting/>

Table 9. Severn Estuary SPA features that may use the Somerset Levels and Moors

Feature	Peak mean at classification	Peak mean to 2017/18	Peak mean on SLM 2017/18
<i>Article 4.1</i>			
Bewick's swan	289	150	4
<i>Article 4.2</i>			
Shelduck	2,892	4,450	68
Gadwall	330	190	688
Redshank	2,013	5,720	6
Dunlin	41,683	29,189	777
Greater white-fronted goose	3,002	125	0
<i>Waterfowl assemblage</i>	68,026	88,178	93,946
Mute swan	n/a	420	1,097
Shoveler	n/a	487	1,333
Wigeon	3,977	7,751	21,835
Teal	1,998	5,374	17,906
Pintail	523	745	780
Pochard	1,686	291	216
Tufted duck	913	812	475
Little egret	n/a	198	117
Curlew	3,096	3,571	16
Whimbrel	246	221	0
Spotted redshank	3	8	0

Bewick's swan: This is the only Annex 1 qualifying feature. As with the Somerset Levels and Moors SPA, numbers of this species have declined since the site was classified in 1993, with a peak mean of 289 birds (1988/89-1992/93), to 122 for the period 2017/18. These birds are all probably concentrated around the Slimbridge Wetland Centre and unlikely to use the Somerset Levels over the wintering period or on migration.

Shelduck: Primarily associated with estuaries and other coastal habitats throughout the year although some birds will use freshwater wetlands, though typically never that far inland. The large numbers that use the Severn Estuary are partly a reflection of the post-breeding moult gathering in Bridgwater Bay.

Gadwall: Most birds will be associated with coastal grazing marsh, but the overall numbers are much lower than within the SLM, though there is likely to be a movement of birds from the estuary inland at the time of harsh winter weather conditions on the coast.

Redshank: Primarily an estuarine species, but birds will nest inland in freshwater environments, as they do in the SLM. Very few birds are recorded in the SLM during WeBS counts and the peak numbers are often recorded in March, which is likely to represent bird returning from elsewhere to breed.

Dunlin: Primarily a coastal species but birds will use inland sites whilst on migration and during harsh weather. The SLM peak mean is currently 777 birds and it is highly likely that some of

these will be using Bridgwater Bay and/or the wider Severn estuary. They will feed on bare, muddy margins.

Greater white-fronted goose: The number of geese has declined markedly since classification, in line with national trends. Most of the birds that currently use the Severn estuary will be in and around Slimbridge. The current peak mean for SLM is 0 although there is suitable habitat present and they used to occur regularly.

Appropriate assessment: assessing the impacts alone

Scoping of qualifying features

Rather than undertake the assessment based on 'bird groups' (see Table 2 above), each of the qualifying species of the designated sites that are listed in Tables 3 and 4 have been considered. Initially this has involved scoping out species where there is either considered to be no likelihood of any effect whatsoever (in the absence of the incorporated mitigation measures), or that if there was the prospect of any effects then they would be so small or inconsequential that they would neither be significant alone, nor could they combine with other plans and projects to result in a significant effect.

Table 10. Bird features that have been scoped out of the assessment

Feature	SLM	Severn Estuary	Reason for scoping out
Bewick's swan <i>Annex 1</i>	Y	Y	A reduction in the extent, frequency and duration of shallow flood events would not have any effects on the few birds that currently occur, nor would it compromise the ability to restore the relatively small numbers of birds that there were at the time of the SLM classification (310). The birds favour permanent bodies of deeper water for roosting and a variety of agricultural land for feeding and daytime loafing. Suitable deep-water roost sites exist at Southlake and West Sedgemoor in the Parrett valley as well as at the complex of flooded peat workings in the Brue valley. Although Bewick's swan will utilise areas of shallow flood in cultivated fields and pasture they are not dependent upon it and will feed on sites with no standing water whatsoever. Sufficient habitat would therefore remain throughout the SPA even if there were a reduction in the extent of shallow water.
Golden plover <i>Annex 1</i>	Y	-	This species tends to roost on coastal flats and feed (daytime and night-time) on ploughed fields and permanent pasture. The presence of areas of shallow flood within the SLM is not critical to either feeding or roosting. Furthermore, the current peak mean is four times that at the time of classification (and rising), suggesting that overall environmental conditions are favourable.

Feature	SLM	Severn Estuary	Reason for scoping out
Shelduck	-	Y	Numbers of birds on the Severn Estuary SPA have remained stable long-term, and there are no Alerts over any of the three time periods. The figures include the long-established post-breeding moult gathering in Bridgwater Bay. The peak mean count for the SLM is just 68 (cf 4,450 for the Severn) and birds are more likely to be found on permanent deeper waterbodies where they do occur inland. Suitable deep waterbodies can be found during the winter months at Southlake and West Sedgemoor in the Parrett valley as well as at the complex of flooded peat workings in the Brue valley.
Greater white-fronted goose	-	Y	Numbers have been declining in the Severn Estuary SPA and nationally for many years. The majority of birds use Slimbridge, and whilst the SLM has plenty of suitable habitat they are rarely recorded here and would be unlikely to be dependent upon this area even if numbers in the Severn recovered to the peak at the time of classification (3,002).
Bittern	Y	-	This species is not dependent upon areas of splash or shallow flood.
Gadwall	Y	Y	The current peak mean for SLM is 688 and the Severn Estuary 190. Although the former exceeds the threshold for a site of international importance, the vast majority of birds using the larger, permanent waterbodies in the Brue valley with very few recorded in the Parrett and Sowey/KSD corridors (including the RSPB reserves of West Sedgemoor and Greylake which are used by large numbers of other duck such as teal and shoveler).
Pochard	Y	Y	A diving duck that tends to be found on permanent, deeper waterbodies and will not be reliant on RWLAs or other areas of shallow flood.
Tufted duck	-	Y	As pochard.
Curlew	Y	Y	The current peak mean is 16, which is highest that it has been since 1991/92 when it was 33. Whilst a Red List and section 41 species, there is no prospect of there being any significant adverse effect. The ability to reduce the extent and duration of flooding in late spring and summer represents a small beneficial effect on the breeding population.

Feature	SLM	Severn Estuary	Reason for scoping out
Whimbrel	Y	Y	Although a component of the waterfowl assemblage on the SLM classification, the current peak mean is 0 so there is no prospect of any significant effect.
Redshank	-	Y	The current peak mean is eight and the highest that it has been historically back to 1991/92 is 52 so, there is no prospect of there being any significant adverse effect. The ability to reduce the extent and duration of flooding in late spring and summer represents a small beneficial effect on the breeding population.
Spotted redshank	-	Y	There are no recent records from the WeBS counts for SLM and the current peak mean for the Severn is only eight birds.
Green sandpiper	Y	-	Although numbers exceed those of importance at the GB level, the peak mean is just eight birds so there is no prospect of any significant effect.
Ruff	Y	-	Although numbers exceed those of importance at the GB level, the peak mean is just eight birds so there is no prospect of any significant effect.

This leaves the following species that are considered to be highly dependent upon the existence of temporary areas of splash and shallow flood in the SLM during the core winter period (December to February inclusive):

- Mute swan
- Dabbling ducks – shoveler, teal, pintail, wigeon (mostly grazing but always in close proximity to water)
- Little egret
- Waders – lapwing, dunlin, snipe and black-tailed godwit

The waterfowl assemblage calculation for the SLM incorporates all species, however the majority of the peak mean total (currently 93,946) is accounted for by lapwing, wigeon, teal, golden plover, shoveler and mute swan (total 87,831 for species contributing at least 1,000 birds). Of these species, golden plover (12,881) is the only one that has been scoped out of the assessment.

Change in flow or velocity regime during operation

The Scheme will not result in any changes in flow or velocity regime that would compromise the Conservation Objectives and therefore there will be no adverse effect on the integrity of the designated sites. No mitigation measures are required to reach this conclusion. These impacts are assessed for the full River Sowy and King's Sedgemoor Drain Enhancements Scheme in the strategic level HRA Stage 2 Assessment report.

Changed water chemistry during operation and maintenance

The Scheme will not result in any changes in water chemistry that would compromise the Conservation Objectives and therefore there will be no adverse effect on the integrity of the designated sites. Standard environmental protection measures will be used to minimise

impacts, but nothing is required specifically for any risk to the designated site features. These impacts are assessed for the full scheme in the strategic level HRA Stage 2 Assessment report .

Changes in physical regime within the flood relief channels

The Scheme will not result in any changes in physical regime within the Sowey/KSD that would compromise the Conservation Objectives. Consequently, there will be no adverse effect on the integrity of the designated sites from this risk. No mitigation measures are required to reach this conclusion. These impacts are assessed for the full scheme in the strategic level HRA Stage 2 Assessment report .

Changes in surface water flooding

The increase in capacity to accommodate flows of 27m³/s in the KSD, 24m³/s in the Lower Sowey and 17m³/s in the Upper Sowey, subject to the implementation of the incorporated mitigation measures, will not have an adverse effect the integrity of the designated sites. These impacts are assessed for the full scheme in the strategic level HRA Stage 2 Assessment report .

Habitat loss

The Scheme works will result in a net loss of terrestrial habitat (species-poor grassland and ruderal) and an increase in open water and marginal habitats. The latter changes are a consequence of the WFD enhancements. Material for reprofiling and raising the embankments will be sourced from re-use of existing material of site (KSD) and through material import under CL:AIRE (Upper and Lower Sowey).

The net increase in open water and marginal habitats comprise

- Increase in open water through channel widening – 0.08ha
- Increase in marginal, emergent vegetation on berms due to embayments and two-stage channel, plus within the new backwaters – 0.69ha
- Increase in rough/wet grassland adjacent to marginal vegetation and extending to the reprofiled embankments – 0.35ha

The main value of habitats within the scheme corridor are the watercourses (Sowey, Langacre Rhyne and KSD), which are used by the wildfowl species. They become particularly important during severe cold weather as they provide an open water refuge when the moors are frozen (S. Parker, Natural England, *pers. comm.*). The grassland alongside these channels is unlikely to be used by large numbers of over-wintering birds during daylight because it provides sub-optimal feeding compared to the moors proper and is also constrained by poor sight lines and disturbance in places viz. low embankments, undulating ground; presence of trees and hedge lines; proximity to roads, footbridges and buildings in places. However, there is no specific survey data to confirm this and it is also possible that some species could use the corridor at night-time. There is evidence that the corridor is used for feeding in the early spring by breeding waders, in particular redshanks and curlews (John Leece *pers. comm.*).

The Supplementary Advice on conserving site features (Natural England, 2019b) notes that maintaining the extent and distribution of supporting non-breeding habitat is a key attribute and measure for site integrity. In this case the loss of grassland is from within a corridor that is not important to non-breeding birds, irrespective of the fact that the main change is to open water and marginal habitats that are of greater value in this context.

The small net loss of grassland habitat within the working corridor will not compromise the Conservation Objectives; indeed there may be a minor beneficial effect for non-breeding waterbirds as a result of the increase in open water and marginal habitat. Consequently, there

will be no adverse effect on the integrity of the designated sites. No mitigation measures are required to reach this conclusion.

Habitat /community simplification

There will be no operational changes following implementation of the Scheme. Although there may be a reduction in out of bank flooding this would not lead to any changes in the type or extent of wet grassland features (vegetation type and structure) that non-breeding waterbirds depend upon. Consequently, there will be no adverse effects on the integrity of the designated sites. No mitigation measures are required to reach this conclusion. These impacts are assessed for the full River Sowy and King's Sedgemoor Drain Enhancements Scheme in the strategic level HRA Stage 2 Assessment report .

Appropriate assessment: conclusion alone

The permanent habitat changes from the Scheme works, specifically the increase in open water and marginal vegetation at the expense of grassland and ruderal vegetation due to the WFD enhancements, are small-scale.

The other risks considered will not result in any adverse effect on designated site integrity.

Appropriate assessment: assessing the impacts in combination

The assessment of impacts alone has concluded that, with the proposed strategic mitigation measures, there will be no adverse effects on the integrity of the designated sites. The mitigation package has been designed and agreed with Natural England to take account of the combined effects (which would be additive) of the Scheme with recently completed and planned dredging on the River Parrett.

Other routine maintenance works along the Sowy and KSD, including small-scale dredging around bridges and other structures, would not result in additional effects that in combination could result in an adverse effect on site integrity.

Appropriate assessment: conclusion in combination

The Scheme, when incorporating of the proposed mitigation measures for the full River Sowy and King's Sedgemoor Drain Enhancement Scheme, will not result in any adverse effects to the integrity of the designated sites, either alone or in-combination with other plans or projects, or impede the ability of the sites to achieve their conservation objectives.

Stage 2 Habitats Regulations Assessment conclusion

Qualifying Feature	Predicted Risk	Potential Impact on Conservation Objective	Will scale of impact lead to adverse effect on integrity of the site alone?	Will scale of impact lead to adverse effect on integrity of the site in combination?	Can adverse effects be avoided or mitigated?
<p>All species from the SLM and Severn Estuary SPA and Ramsar sites scoped into the assessment:</p> <p><i>Mute swan</i> <i>Shoveler,</i> <i>Teal,</i> <i>Pintail,</i> <i>Wigeon</i> <i>Little egret</i> <i>Lapwing</i> <i>Snipe</i> <i>Dunlin</i> <i>Black-tailed godwit</i></p>	<p>Habitat loss</p>	<p>There will be some small-scale changes in the relative amounts of grassland and open water along the Sowy-KSD channel. Any reduction in important habitat could compromise Conservation Objectives.</p>	<p>No. The nature and extent of habitat changes is considered to be insignificant given the location and scale of impact on terrestrial habitat that are of low value for the bird features.</p>	<p>No.</p>	<p>N/A</p>

Stage 2 Habitats Regulations Assessment summary

Somerset Levels and Moors SPA

Somerset Levels and Moor Ramsar

Severn Estuary SPA

Severn Estuary Ramsar

The Scheme (Phase 1 of the full River Sowy and King's Sedgemoor Drain Enhancement Scheme), as proposed, can be shown to have no adverse effect on the integrity of any of these sites. The mitigation measures proposed for the full River Sowy and King's Sedgemoor Drain Enhancement Scheme will cancel the effects of a reduction in the frequency and volume of uncontrolled over-topping that contributes to the maintenance of suitable splash and shallow flood conditions along the Sowy/KSD corridor. The Scheme will not result in any significant construction related effects, either through disturbance or changes in habitat (temporary and permanent).

No additional conditions or restrictions on the way that the plan is implemented are required.

Advice

Environment Agency internal advice and consultation

N/A

Natural England advice

Natural England officers have been involved in discussions throughout Scheme development, including providing advice on potential impacts and the formulation of suitable mitigation measures. Natural England will be the owners of the Mitigation Implementation Plan (MIP), which will be accepted and delivered by all partner organisations involved in water level management, to ensure mitigation for the Scheme is in place for the longer term.

Third party advice

None specifically on the HRA.

Somerset Drainage Board Consortium (incorporating the Parrett IDB) have been involved in discussions on the potential in-combination effects of dredging in the River Parrett and the mitigation measures required to counter these both in the short term and with respect to completion of the full Sowy-KSD enhancements. They undertook the hydraulic modelling analysis to identify the potential changes in extent and duration of flooding following an increase in the capacity of the River Parrett and the Sowy-KSD.

The RSPB have also contributed local land management experience and advice on the mitigation measures.

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⁸ Contains Wetland Bird Survey (WeBS) data from *Waterbirds in the UK 2017/18* © copyright and database right 2019. WeBS is a partnership jointly funded by the BTO, RSPB and JNCC, in association with WWT, with fieldwork conducted by volunteers

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Decision

The Environment Agency has completed the appropriate assessment and the draft conclusion is that the plan would not have an adverse effect on the integrity of the following sites, either alone or in combination with other plans and projects:

- Somerset levels and Moors SPA
- Somerset Levels and Moors Ramsar
- Severn Estuary SPA
- Severn Estuary Ramsar

Name of Environment Agency officer:	Will Maclennan
Job title:	Senior Environmental Project Manager, NEAS
Date:	xxxx 2020

This appropriate assessment has been sent to Natural England for consultation

Date sent to Natural England:	xxxx 2020
Date response received from Natural England:	

Natural England comments:

Natural England advise:

Delete as appropriate

- that the operation can go ahead
- against the issuing of the PPP

Please ensure that Natural England's response is attached to this Formal Notice.

Name of Natural England officer:	
Job title:	
Date:	

Final appropriate assessment record

This is a record of the appropriate assessment required by Regulation 63 of the Conservation of Habitats and Species Regulations 2017 (SI 2017/1012), undertaken by the Environment Agency.

The Stage 1 assessment concluded that the Scheme (River Sowy and King's Sedgemoor Drain Enhancements Scheme: Phase 1) would be likely to have a significant effect on the following site(s):

- Somerset levels and Moors SPA
- Somerset Levels and Moors Ramsar
- Severn Estuary SPA
- Severn Estuary Ramsar

An appropriate assessment has been undertaken of the implications of the proposal in view of the relevant site conservation objectives.

The Environment Agency has concluded that the plan would not have an adverse effect on the integrity of the following sites, either alone or in combination with other plans and projects:

- Somerset levels and Moors SPA
- Somerset Levels and Moors Ramsar
- Severn Estuary SPA
- Severn Estuary Ramsar

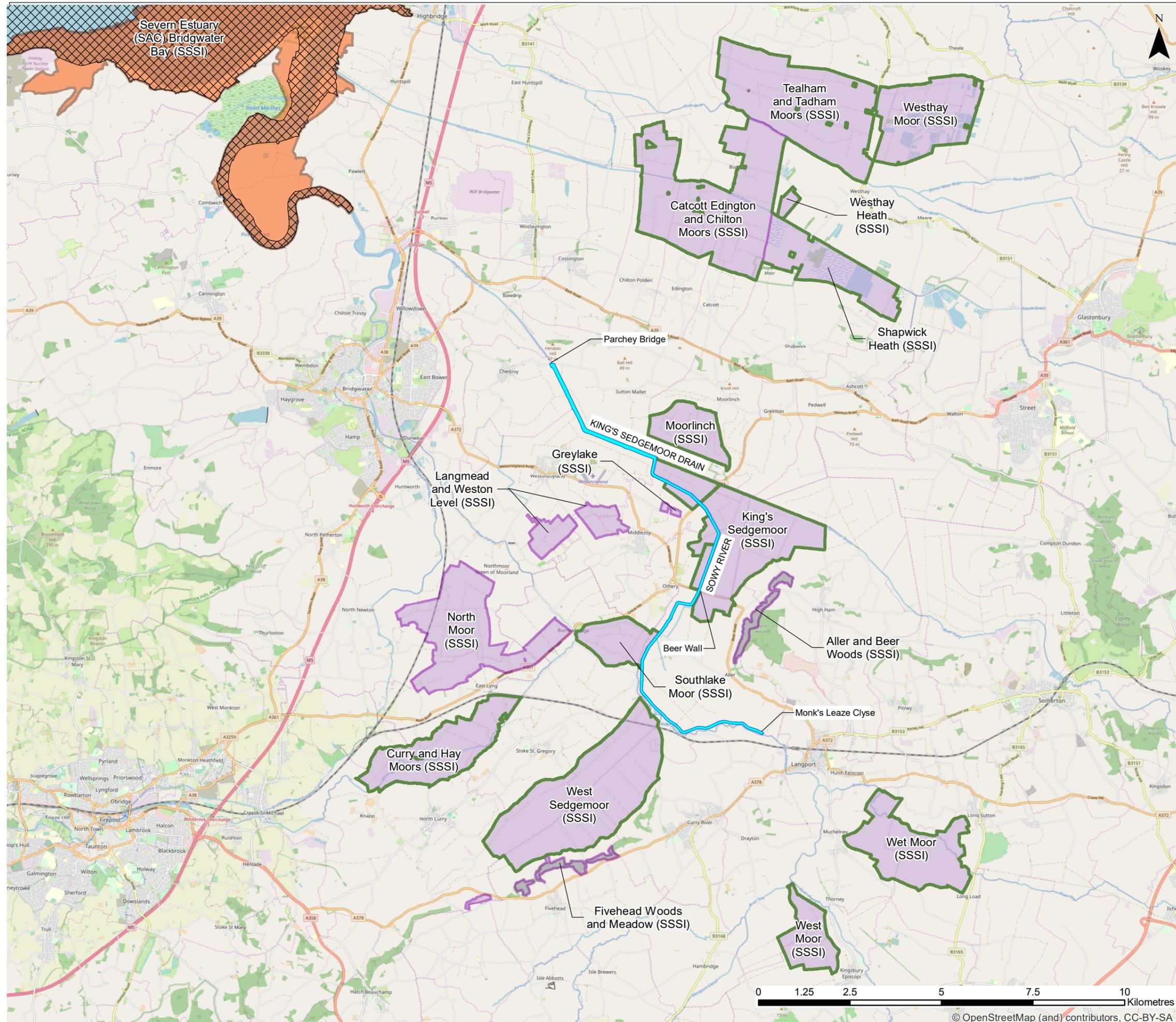
Natural England were consulted on the appropriate assessment and the Environment Agency's conclusions on [date] and their representations, to which the Environment Agency has had regard, are attached in Annex 1. The conclusions of this appropriate assessment are in accordance with the advice and recommendations of Natural England.

Name of Environment Agency officer:	Will Maclennan
Job title:	Senior Environmental Project Manager, NEAS
Date:	xxxx

Appendix 1 – Figure showing scheme location in relation to designated sites

FIGURE 1

- Legend**
-  Main works area
 -  Somerset Levels and Moors Ramsar and Special Protection Area (SPA)
 -  Severn Estuary Special Protection Area (SPA) and Ramsar site (Bridgwater Bay SSSI component)
 -  Severn Estuary Special Area of Conservation (SAC)
 -  Site of Special Scientific Interest (SSSI)



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Client
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Project
 River Sowy and King's Sedgemoor Drain Enhancements Scheme: Phase 1

Drawing Title
 Scheme location in relation to designated sites

ENVRESW001353-CH2-XX-400-DR-EN-1055		
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Appendix 2 Temporary and permanent works proposed under the Scheme

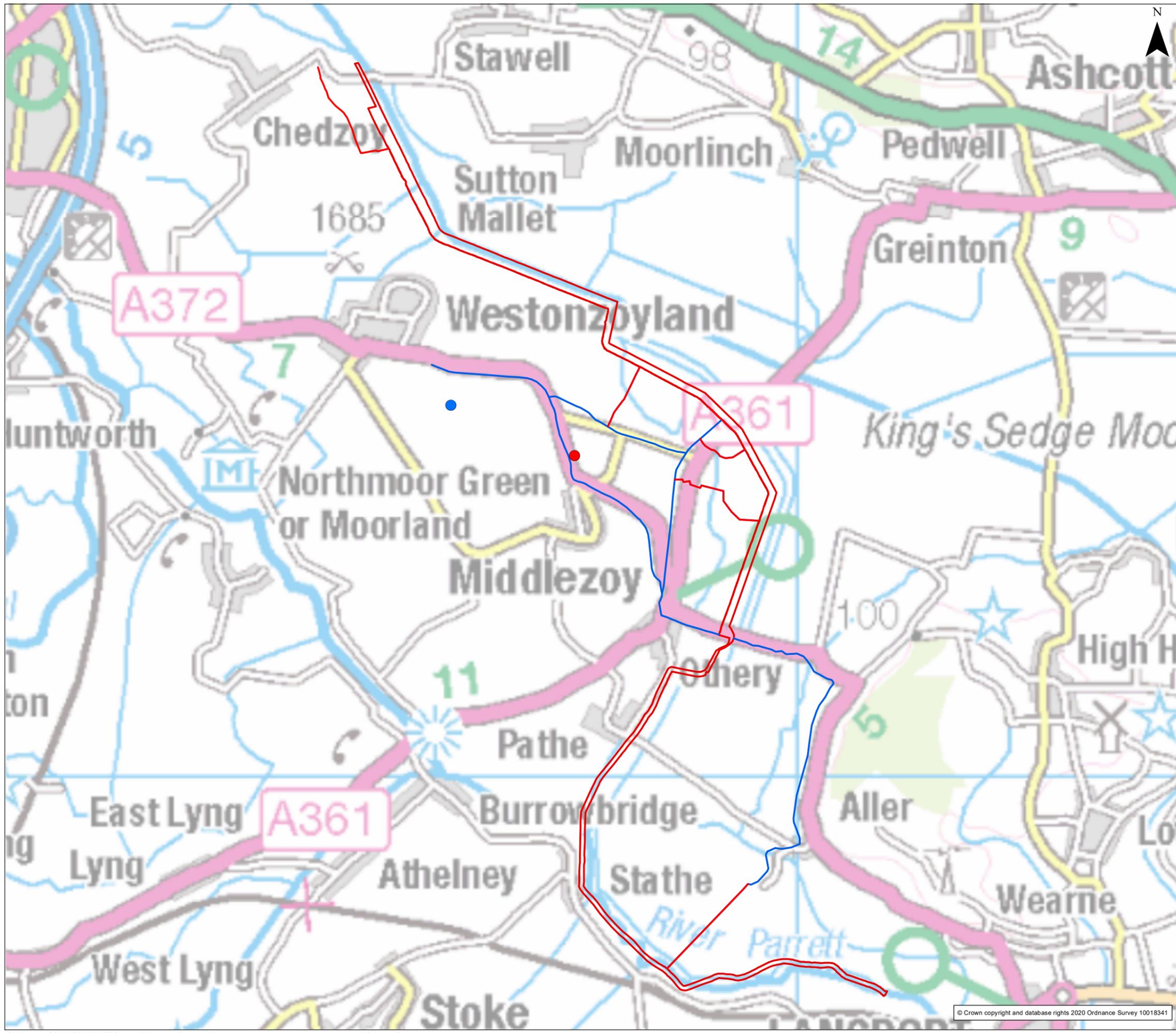
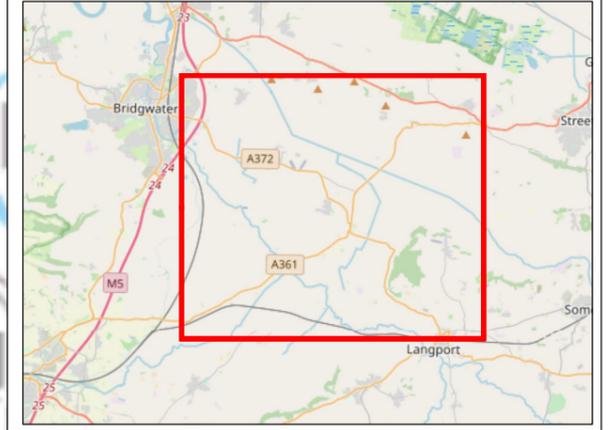


FIGURE 2

- Legend**
- Construction (temporary) works**
- Construction footprint
 - 'Just in time' stockpiles
 - Mobile welfare locations
 - Main compound (offsite)
 - Source of imported material
 - ▲ Chedzoy New Cut culvert
 - ▲ Cossington Right Rhine culvert
 - Existing flood embankments reprofiled to generate fill
 - Haulage route
 - Temporary stockproof fencing
- PRoW**
- Bridleway
 - Footpath
 - Restricted Byway
 - River Parrett Trail
- Permanent works**
- Bank raising (min. 3m crest width and 1:5 back slope)**
- 0-0.1m
 - 0.1-0.3m
 - 0.3-0.5m
- Water Framework Directive (WFD) enhancements**
- Backwater (max. dimensions 150m length and 15m width)
 - Embayment (max. dimensions 150m length and 5m width)
 - Two stage channel (max. dimensions 150m length and 6m width)
- Sluice upgrade – raising of headwall**
- ▲ Chilton Right Rhine outfall
 - ▲ Cossington Rhine outfall



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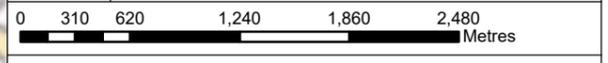


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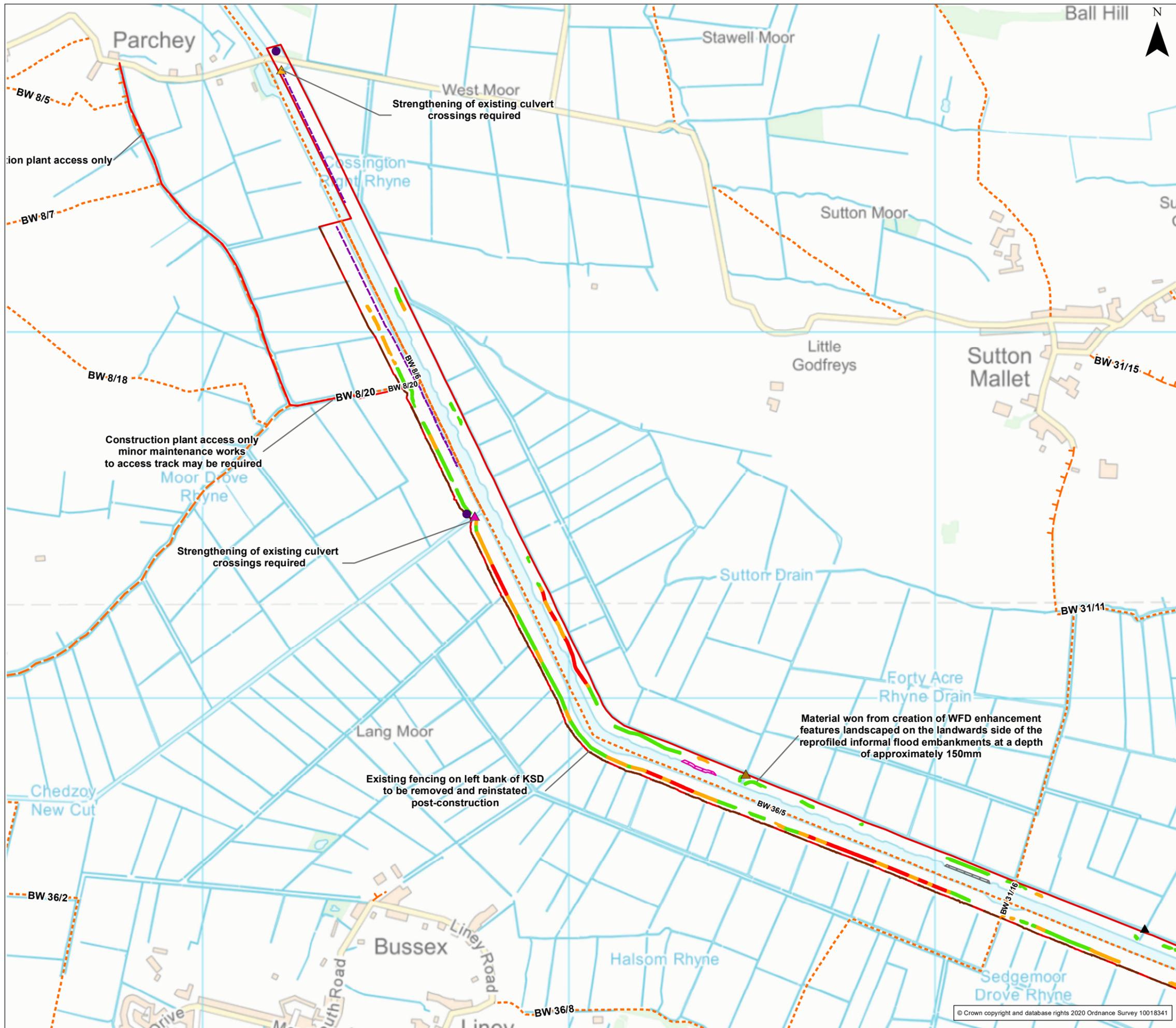
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 Temporary and permanent works under the Proposed Scheme
 Sheet 1 of 6

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FIGURE 2



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Construction (temporary) works

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- Source of imported material
- Chedzoy New Cut culvert
- Cossington Right Rhyne culvert

Permanent works

Bank raising (min. 3m crest width and 1:5 back slope)

- 0-0.1m
- 0.1-0.3m
- 0.3-0.5m

Sluice upgrade – raising of headwall

- Chilton Right Rhyne outfall
- Cossington Rhyne outfall

Existing flood embankments reprofiled to generate fill

Haulage route

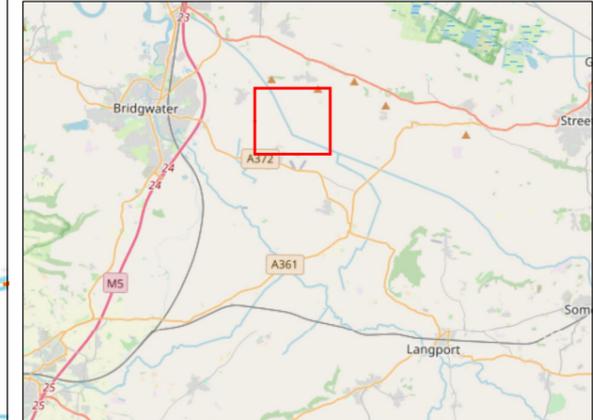
Temporary stockproof fencing

PRoW

- Bridleway
- Footpath
- Restricted Byway
- River Parrett Trail

Water Framework Directive (WFD) enhancements

- Backwater (max. dimensions 150m length and 15m width)
- Embayment (max. dimensions 150m length and 5m width)
- Two stage channel (max. dimensions 150m length and 6m width)



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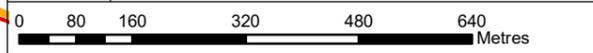


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Project: River Sowy and King Sedgemoor's Drain Enhancements Scheme: Phase 1

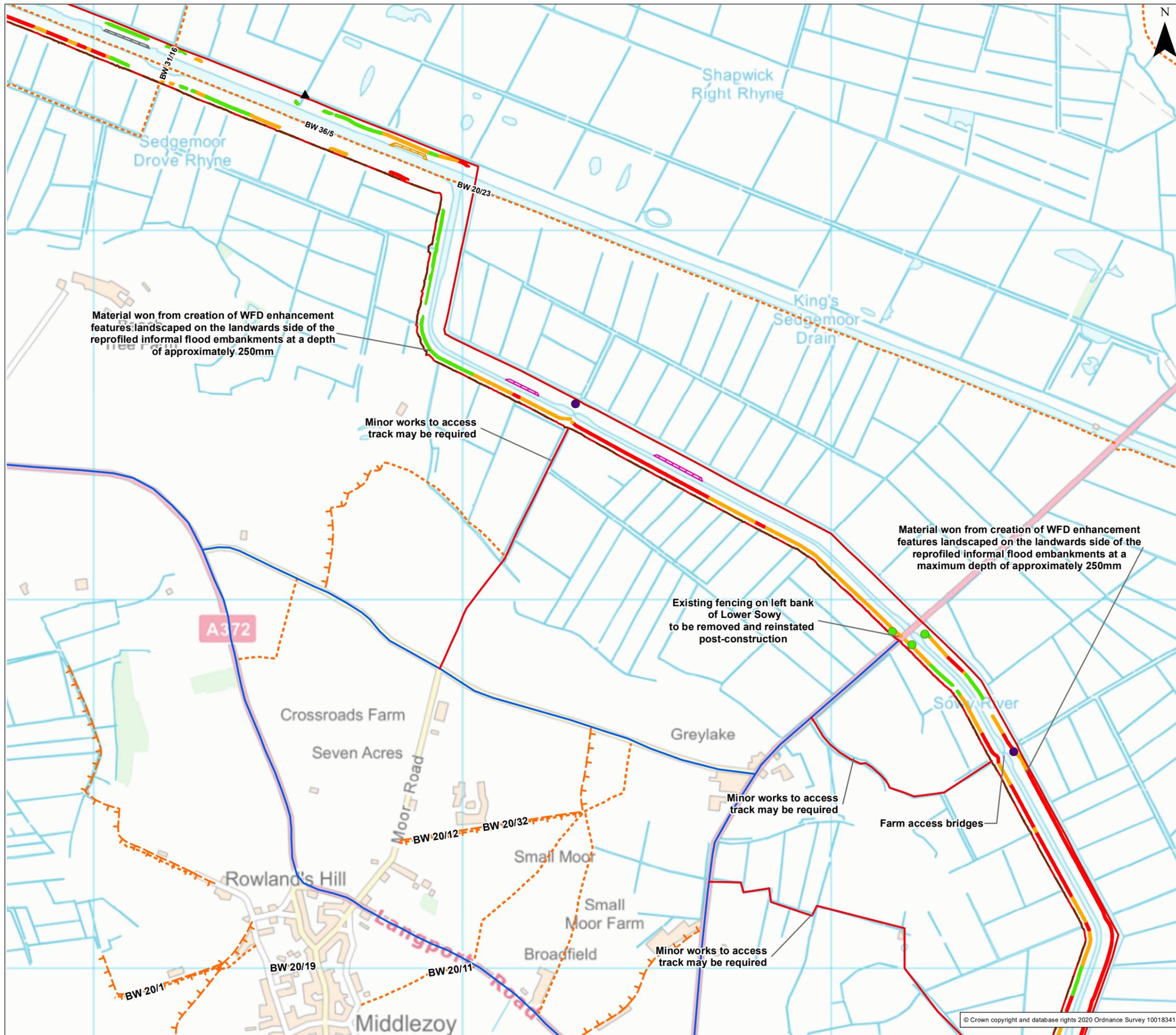
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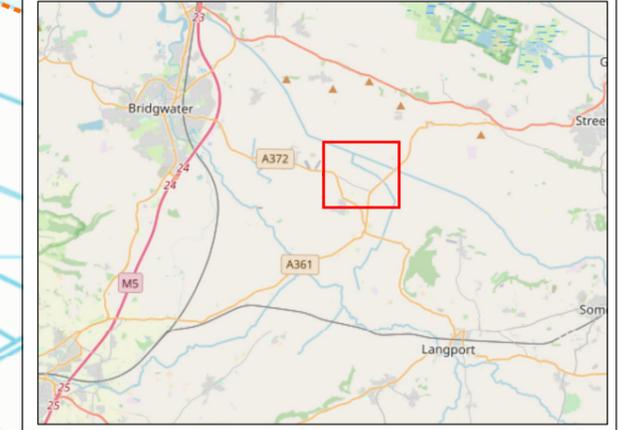
PRoW

- Bridleway
- Footpath
- Restricted Byway
- River Parrett Trail

Existing flood embankments reprofiled to generate fill

Haulage route

Temporary stockproof fencing



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River Sowy and King Sedgemoor's Drain Enhancements Scheme: Phase 1

Drawing Title

Temporary and permanent works under the Proposed Scheme

Sheet 3 of 6

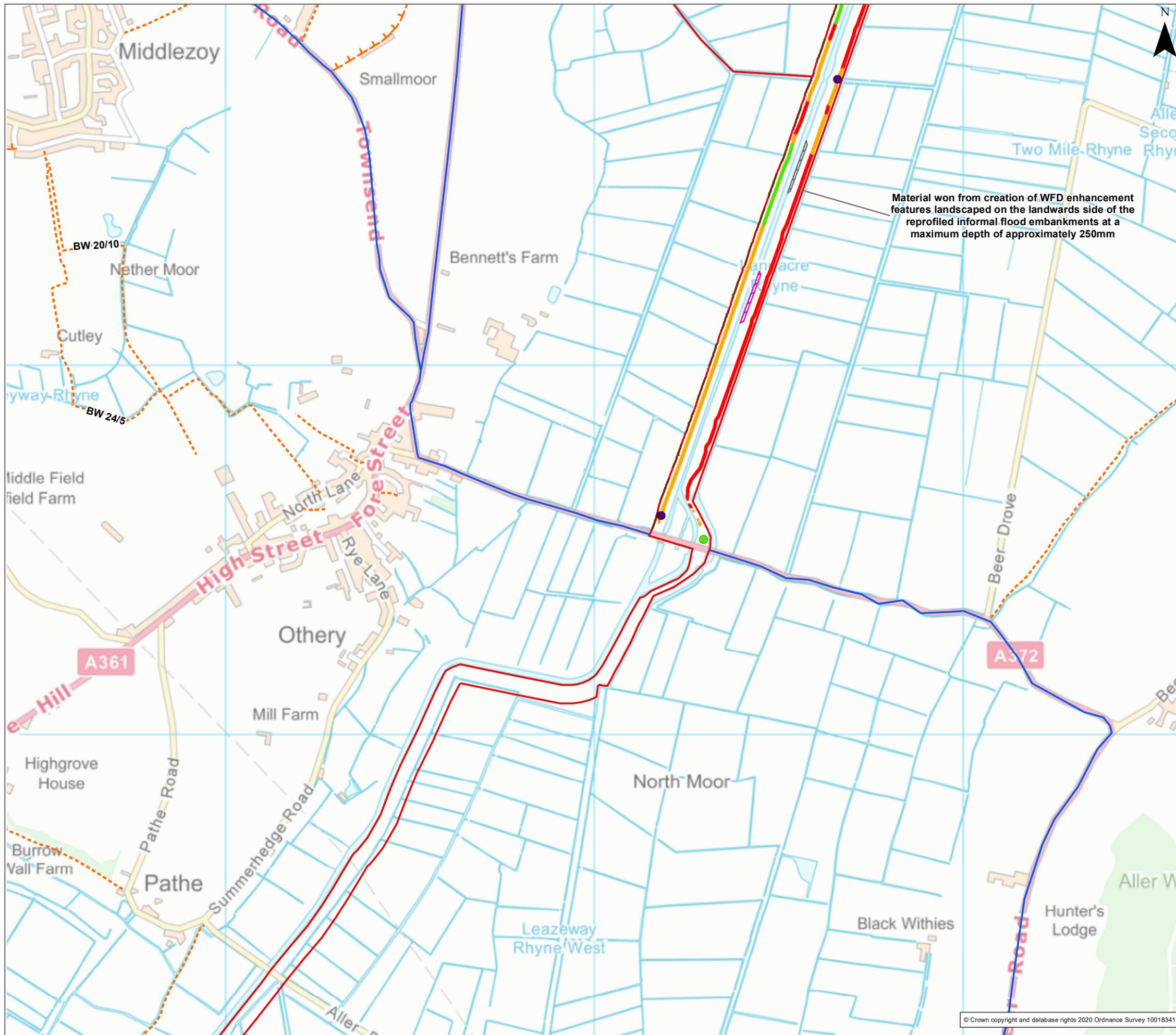
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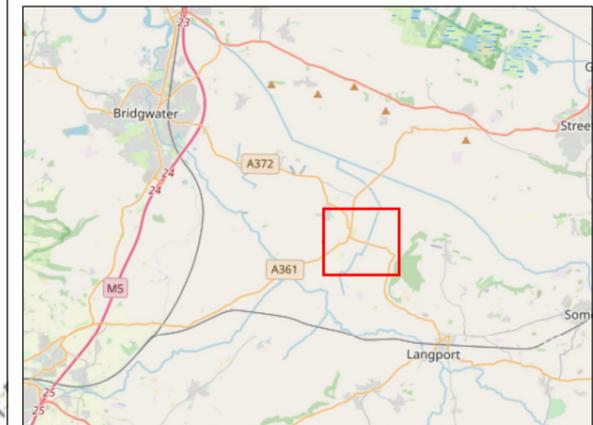


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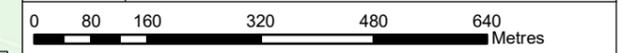


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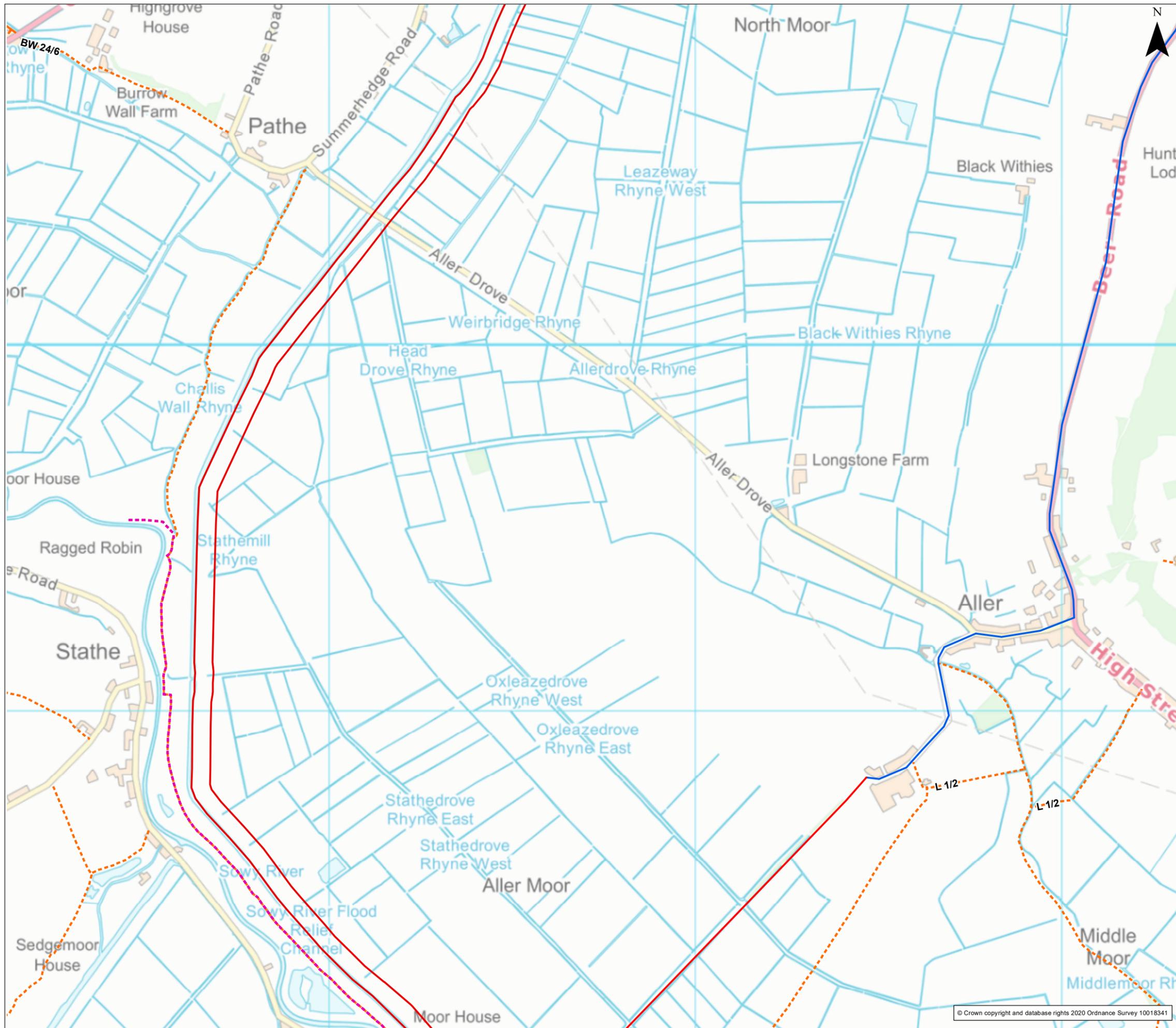
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 Temporary and permanent works under the Proposed Scheme
 Sheet 4 of 6

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PRoW

- Bridleway
- Footpath
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Permanent works
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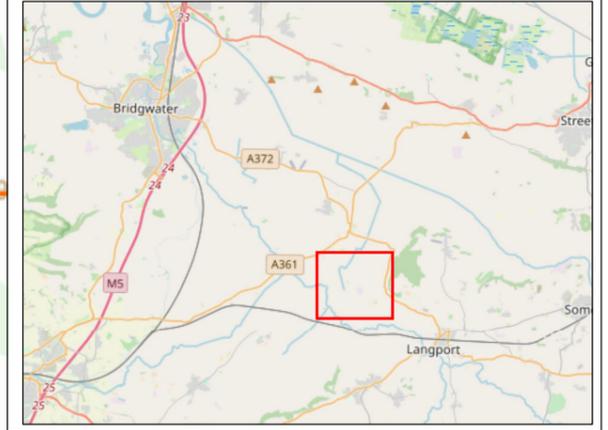
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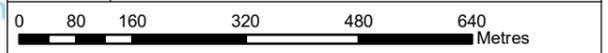
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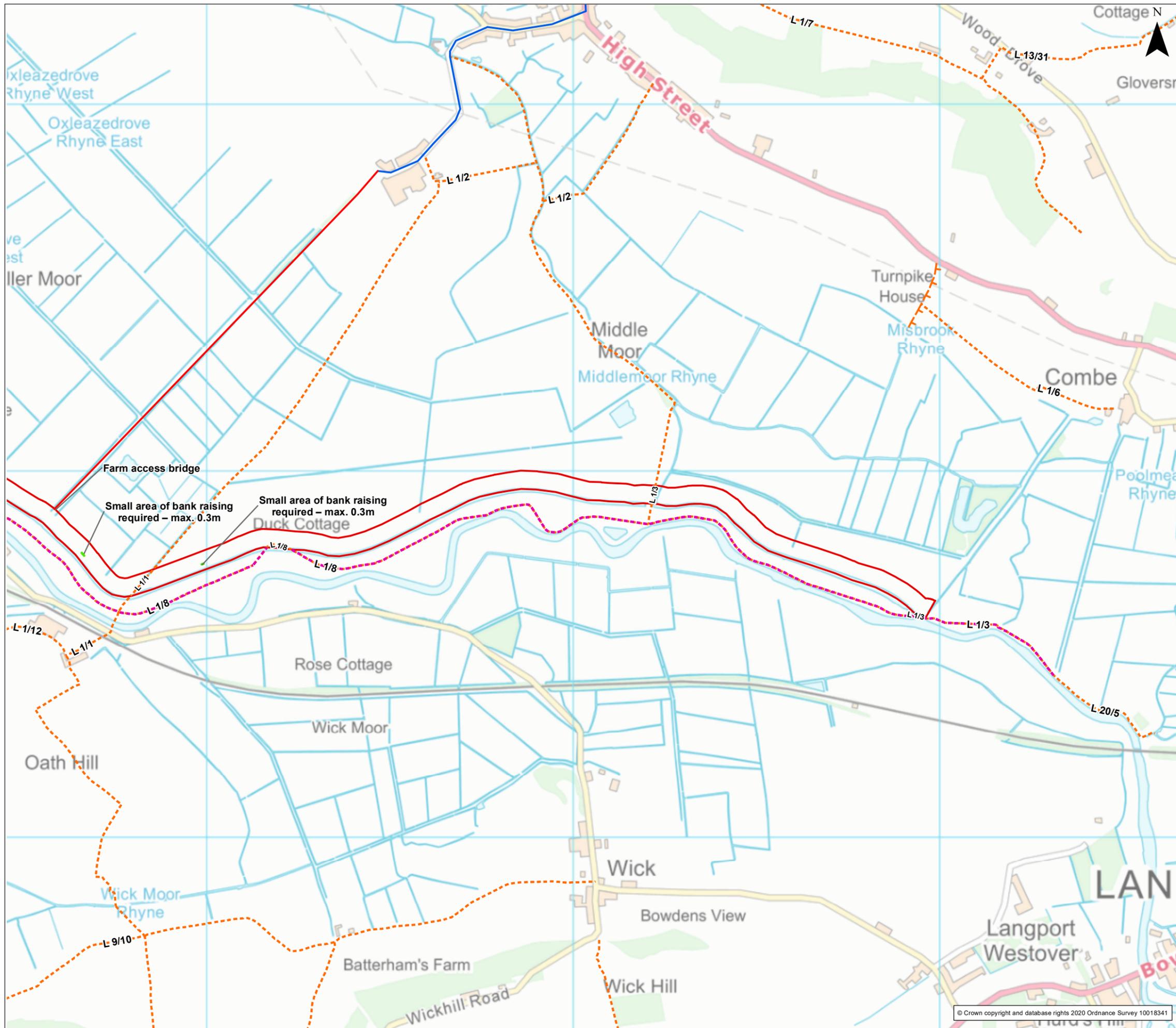
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Temporary and permanent works under the Proposed Scheme
Sheet 5 of 6

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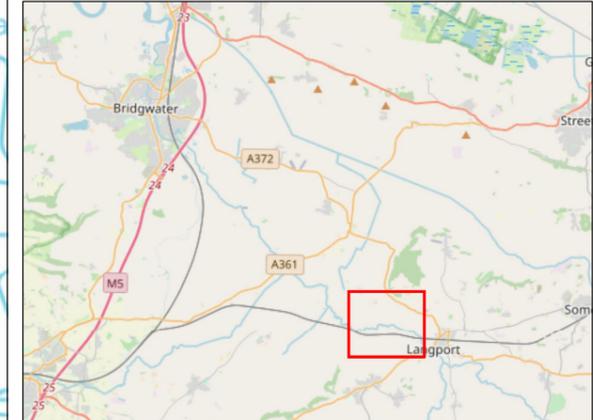


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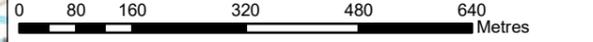
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Environment Agency

Project
River Sowy and King Sedgemoor's Drain Enhancements Scheme: Phase 1

Drawing Title
Temporary and permanent works under the Proposed Scheme
Sheet 6 of 6

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