M54 to M6 Link Road

TR010054

8.8 P(A) Statement of Common Ground with Environment Agency

APFP Regulation 5(2)(q)

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M54 to M6 Link Road

Development Consent Order 202[ ]

8.8 P(A) Statement of Common Ground with Environment Agency

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7 (P09)	7 April 2021	Issue to the ExA at Deadline 8

STATEMENT OF COMMON GROUND

This Statement of Common Ground has been prepared and agreed by (1) Highways England Company Limited and (2) Environment Agency.

Signed…… **……..**
Andrew Kelly
Project Manager
on behalf of Highways England
Date: 06/04/21

Signed… **.**
Lisa Shepherd
Sustainable Places Team Leader
on behalf of Environment Agency
01/04/21

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1 Introduction

1.1 Purpose of this document

1.1.1 This Statement of Common Ground ('SoCG') has been prepared in respect of an application for a Development Consent Order ('the Application') under section 37 of the Planning Act 2008 ('PA 2008') for the proposed M54 to M6 Link Road ('the Scheme') made by Highways England Company Limited ('Highways England') to the Secretary of State for Transport ('Secretary of State').

1.1.2 This SoCG does not seek to replicate information which is available elsewhere within the Application documents. All documents are available on the Planning Inspectorate website.

1.1.3 This SoCG has been produced to confirm to the Examining Authority where agreement has been reached between the parties to it, and where agreement has not (yet) been reached. SoCGs are an established means in the planning process of allowing all parties to identify and so focus on specific issues that may need to be addressed during the examination.

1.2 Parties to this Statement of Common Ground

1.2.1 This SoCG has been prepared by (1) Highways England as the Applicant and (2) Environment Agency (also referred to as 'EA' in this SoCG).

1.2.2 Highways England became the Government-owned Strategic Highways Company on 1 April 2015. It is the highway authority in England for the strategic road network and has the necessary powers and duties to operate, manage, maintain and enhance the network. Regulatory powers remain with the Secretary of State. The legislation establishing Highways England made provision for all legal rights and obligations of the Highways Agency, including in respect of the Application, to be conferred upon or assumed by Highways England.

1.2.3 The Environment Agency is an executive non-departmental public body, sponsored by the Department for Environment, Food and Rural Affairs with the stated purpose "*to protect or enhance the environment, taken as a whole*". Within England it is responsible for:

- regulating major industry and waste;
- treatment of contaminated land;
- water quality and resources;
- fisheries;
- some inland river, estuary and harbour navigations;
- conservation and ecology; and
- managing the risk of flooding from main rivers, reservoirs, estuaries and the sea.

1.3 Terminology

1.3.1 In the tables in the Issues chapter of this SoCG, ‘Agreed’ indicates where the issue has been resolved.

1.3.2 It can be taken that any matters not specifically referred to in the Issues chapter of this SoCG are not of material interest or relevance to the Environment Agency, and therefore have not been the subject of any discussions between the parties. As such, those matters can be read as agreed, only to the extent that they are either not of material interest or relevance to the Environment Agency.

2 Record of Engagement

2.1.1 A summary of the meetings and correspondence that has taken place between Highways England and the Environment Agency in relation to the Application is outlined in Table 2.1. A list of the initials, names, role and organisation of the people mentioned in the Table is included at Appendix A.

Table 2.1: Record of Engagement

Date	Form of correspondence	Key topics discussed and key outcomes
31/01/2019	Email from TP (AECOM) to General Enquiries (EA)	Advising of Scheme, providing details and requesting to set up for discretionary advice service.
11/02/19	Letter from JF (EA) to GB (Planning Inspectorate)	Scoping response re Scoping Opinion sought on 14/01/2019 requesting hydraulic assessment, a detailed FRA, WFDa, a waste management plan and highlighting need for a Flood Risk Activity Permit.
14/02/2019	Email from JF (EA) to TP (AECOM)	Attaching scoping response and responding to request in email of 31/01/2019.
05/03/2019 – 02/05/2019	Emails (Multiple)	Multiple e-mails between TP & JF setting up discretionary advice service and initial meeting.
09/05/19	Initial meeting with JF, IC, SBal, RB, KH, PB, (EA), TB (Amey), DL, AS, HH, DH, DT, OT, SB, Sba (AECOM)	EA representatives included: Planning Specialist, Flood Risk, Groundwater and Contaminated Land, Biodiversity. Discussed flood risk, drainage design, groundwater and contaminated land and water quality. Ongoing flood modelling discussed, and agreement on the percentage of climate change to be used during the modelling. Drainage design presented that flows will be attenuated through attenuation ponds, sized for 100 year ply 40% climate change flows. EA unaware of further constraints in the area. The outline of the ground investigation which will start in June was presented. Agreed know constraints of historic landfill located near J11 M6, west of A460. Water quality monitoring was outlined, with the data being used to inform the assessment and the HAWRAT calculations. EA stated that shallow and deeper aquifer in the area, and avoidance of contamination would be needed during construction. AECOM stated that this risk would be managed by the use of CEMP during construction. Regarding permits, EA stated that it is a two-month time period for determination of consents. Dewatering will need

Date	Form of correspondence	Key topics discussed and key outcomes
		to be permitted. Consideration of whether permits can be included in DCO application.
17/05/19	Email from JF (EA) to (AECOM)	Confirmation that an allowance for the 50% climate change flood event should be accounted for when considering fluvial flood risk.
23/05/2019	Email from TP (AECOM) to JF (EA)	Attaching minutes of meeting on 09/05/19 and PPT presentation. Agreement to EA's suggested scope summary subject to minor amendments. Advising of and inviting JF to initial meeting with Staffordshire County Council (SCC) as Lead Local Flood Authority (LLFA).
24/05/19 to 05/06/19	Letter sent to EA by Highways England in relation to section 42(1)(d) and 44 of the PA 2008.	Letter sent to EA to inform them of statutory consultation period in relation to the Scheme.
04/06/2019	Email from TP (AECOM) to JF (EA)	Attaching form for payment for discretionary advice. Enquiring whether EA received S42 consultation brochure.
14/06/2019	Email from TP (AECOM) to JF (EA)	Asking that EA review a draft of WFDa and asking for comments on previous minutes.
05/07/19	Email from JF (EA) to AK (HE)	Section 42 consultation comments on the Preliminary Environmental Information Report.
18/07/19	Meeting with JF, KH, KY (EA), HH, Sba, DH, AB, TP, AS (AECOM)	The FRA progress was presented, with the drainage design on a watercourse by watercourse basis. All the watercourses were scoped in from a WFD perspective. Watercourse 1 – no impact to culvert. Watercourse 2 – noted that the approximately 180m long culvert was not desirable and should be minimised but permitting authority is LLFA (SCC) and not the EA. Watercourse 3 – a 2m weir is proposed to maintain water levels within the Lower Pool and Hilton Hall Ponds. There is historically a weir structure here for that purpose. EA stated a weir is undesirable, but the permitting authority is LLFA (SCC) and not the EA. Watercourse 4 – loss of Brookfield Farm pond has no impact on flood risk, and pond is offline to the watercourse. Watercourse 5 – discussion on the design of the watercourse crossing. This would need to be consented by LLFA, so suggested a meeting with EA/LLFA SCC/AECOM required. Watercourse 6 & 7 – no concerns from flood risk. DH requested details on a borehole received in scoping report data request, but not later requests. Clarity sought. KY confirmed no EA permits would be required for any FZ3 works. All permits to come from LLFA (SCC).

Date	Form of correspondence	Key topics discussed and key outcomes
26/07/2019	Email from AS (AECOM) to JF (EA)	Sending and agreeing dates for meeting with AECOM, EA and LLFA to discuss watercourse crossings. Requesting that EA hydromorphologist is present.
02/08/2019	Email from DH (AECOM) to KH, JF (EA)	Seeking agreement on scoping out Mill Ride Country Sports Fishery and former sand and gravel pits/ponds, Watercourse 8 and all Abstractions more than 2km from the Scheme boundary, and listed abstractions between 1km and 2km. Attaching abstraction information and setting out queries.
02/08/2019	Email from AS (AECOM) to JF (ES)	Attaching slides of watercourse crossings for discussion at meeting on 06/08/2019.
05/08/2019	Email from DH (AECOM) to JF (EA)	Re Timescales for receiving a response to abstraction query.
08/08/2019	Email from JF (EA) to DH (AECOM)	Response to above stating would try to resolve quickly.
06/08/2019	Meeting JF et al (EA), SL, CA (SCC), HH, Amc, TP, AS (AECOM) & HM (Tyler Grange)	Detailed update on watercourse crossing design proposals. SCC require model scenarios. Update on Ecology and provision for mammals resulting from watercourse changes. Update on Flood Risk.
08/08/2019	Email from JF (EA) & TP & AS (AECOM)	Requesting an update on scheme progress and when DCO will be submitted.
14/08/2019	Email from JF (EA) to AS (AECOM)	Attaching EA's comments on the watercourse crossing.
28/08/2019	Email from AS (AECOM) to JF (EA)	Sent meeting minutes and presentation slides from meetings 18/07/19 and 06/08/19 for comment.
02/09/2019	Email from DH (AECOM) to JF (EA)	Follow up requesting response to abstraction query mail of 08/08/2019.
09/09/2019	E-mail from Enquiries_Westmids@environment-agency.gov.uk to DH (AECOM)	EA confirm no objection to scoping out of issues as stated in e-mail DH to EA 02/08/2019, and do not require further consideration of these matters.
08/10/2019	Email from JF (EA) to AS/TP (AECOM)	Acknowledge receipt of minutes and requesting scheme update and when EA review of WDFa would be required.
04/11/2019	Email from AS(AECOM) to JF (EA)	Responding to request for an update and stating WFDa for EA review end November, DCO submission will be the end of January 2020.
11/11/2019 to 11/12/2019	Non-statutory Supplementary Consultation	Non-statutory consultation on the changes to the draft Order limits to ensure relevant stakeholders (including the EA) and those affected by the changes have an opportunity to make their views known. Changes included:

Date	Form of correspondence	Key topics discussed and key outcomes
		Inclusion of the full length of the existing A460 between M54 Junction 1 and M6 Junction 11 in the draft order limits. Extension of the draft order limits to the south of the M54 to include Whitgreaves Wood. Change to the draft order limits in the area to the north of the M54 between Junctions 1 and 2. Removal of small areas that are no longer required.
20/11/2019	Tel TP (AECOM) to EA Helpdesk	TP contacted EA helpdesk to obtain contact name of replacement of JF EA. Advisor from EA tried to contact KH EA and KY EA, not available. Provided contact e-mail of JF's line manager Jim.davies@environment-agency.gov.uk.
20/11/2019	Email from TP (AECOM) to JD (EA) and swwmplanning@environment-agency.gov.uk	Attaching draft FRA and Hydraulic Model Report for review and requested comment by 11/12/2019.
20/11/2019	Email from swwmplanning@environment-agency.gov.uk to TP (AECOM)	Auto response received from swwmplanning@environment-agency.gov.uk stating EA would endeavour to respond to you within 21 days.
26/11/2019	Email from TP (AECOM) to JD (EA) and swwmplanning@environment-agency.gov.uk	Attaching WFDa for review and requesting comment by 17/12/2019.
26/11/2019	Email from swwmplanning@environment-agency.gov.uk to TP (AECOM)	Auto response received from swwmplanning@environment-agency.gov.uk stating EA would endeavour to respond to you within 21 days.
06/12/19	HH (AECOM) to JD (EA).	Notification of posting of accompanying model for the M54-M6 FRA to the EA on memory stick to EA office Fradley, password to encryption provided.
12/12/19	Tel TP(AECOM) to EA helpdesk	Request contact with JD, or alternative contact within EA due to urgency of WFDa & FRA review. EA advisor confirmed will respond as soon as possible.
13/12/19	Tel, AMM (EA) to TP (AECOM).	Discussed urgency of EA review of FRA and WFDa to enable response to be captured in DCO application, requested review and discussion of a Groundwater Technical note via telecon as soon as possible. Confirmed new EA contact as PG available to discuss the following week.

Date	Form of correspondence	Key topics discussed and key outcomes
18/12/19	Tel, PG (EA) to TP (AECOM).	Discussed urgency of EA review of FRA and WFDa to enable response to be captured in DCO application and requested review and discussion of a Groundwater Technical note via telecon as soon as possible. Agreed TN to be provided by AECOM 19/12/19, PG stated EA specialists not available until after the holidays.
19/12/2019	Email from TP (AECOM) to PG (EA)	Attaching a Technical Note re groundwater levels during construction and operation. Requesting a conference call to discuss in Jan 2020. Requesting comments again on the FRA and WFD asap. Advising that a draft SoCG will be sent for EA comment in early 2020.
20/12/2019	Email from RB (EA) to TP (AECOM)	Confirming receipt of groundwater technical note, enquiring about the ground investigation and confirming availability for a conference call on the 07/01/20 or 09/01/20.
20/12/2019	Email from AS (AECOM) to PG & RB (EA)	Arranging a conference call on 07/01/20 to discuss Groundwater Technical Note.
07/01/2020	Email from TP (AECOM) to PG & RB (EA)	Stating that no one from EA had joined conference call and requesting confirmation of their satisfaction with the approach and conclusions to the Groundwater Technical Note. Also asking for any comments/questions on the FRA and WFDa.
21/02/20	E-mail TP (AECOM) to PG (EA).	E-mail to confirm called to discuss approach to ongoing consultation. Will call again next week.
26/02/20	Tel. TP (AECOM) to PG (EA)	Discussed approach to on-going consultation. PG stated EA generally happy with the scheme and would defer to LLFA on all matters, providing advice to LLFA if required. Agreed TP to send all communications to LLFA and EA jointly going forward and EA would liaise with LLFA.
27/03/20	Email TP (AECOM) to PG (EA) and CA (SCC)	Notification that the Scheme had been accepted for examination by the Planning Inspectorate. Responses to comments on draft FRA and WFDa and how these were addressed prior to submission of the draft DCO. These responses are provided in a draft SoCG. A four-week period for review of the draft SOCG was requested.
27/04/20	Email from TP (AECOM) to PG (EA) and CA (SCC)	Request review and comment on draft SoCG sent on 27/03/20. Notified CA and PG that HE is extending the relevant representations period until 18/05/20. TP requested early sight of relevant representations if possible.
24/06/20	Email from TP (AECOM) to PG (EA) and CA (SCC)	Request review and comment on the draft SoCG sent on 27/03/20. HE is looking to reach an agreement as far as possible prior to the examination. Offered to set up a conference call to discuss any areas where an agreement has yet to be reached with the relevant specialists.

Date	Form of correspondence	Key topics discussed and key outcomes
24/06/20	Email from PG (EA) to TP (AECOM)	Apologies for the delay in response. The EA does not require any amendments to the SoCG as produced.
03/08/20	Email from JF (EA) to TP (AECOM)	Notification of return to work. Acknowledging that the ExA have requested an SoCG with the EA and enquiring on timescales for this and progress on this matter. The EA's hydromorphologist is currently looking at responses to matters raised to provide an update to the EA's position. The EA will be working with the LLFA where appropriate to respond to First Written Questions as the EA have delegated responsibility of flood risk matters to the LLFA.
03/08/20	Email from TP (AECOM) to JF (EA)	Forwarded latest correspondence with PG (EA) on the draft SoCG. Based on this last correspondence it was assumed the EA were in agreement with all issues. SoCG is currently being updated to reflect that and ensure that it covers all topics listed by the ExA. The SoCG will be reissued to the EA as soon as it has been reviewed. Informed the EA that a number of design changes are currently being considered. Application document 8.3, Notification of proposed scheme changes attached to the email. All topic assessments are being reviewed and a technical note will be prepared to outline any implications of these design changes for the Environmental Statement. A further consultation exercise will be undertaken prior to the start of examination. Confirm that there has been no confirmation of programme from the ExA yet though examination is anticipated to start in mid-October.
21/08/20	Letter from HE to JF (EA)	Supplementary consultation letter sent.
24/08/20	Email from AS (AECOM) to JF (EA)	Sent amended draft SoCG to EA for review following comments from PG. Advise the EA that the ExA have released draft timescales for the examination. Draw attention to the work undertaken following updates to the noise and air quality methodology.
03/09/20	Email from JF (EA) to TP and AS (AECOM)	Comments on the draft SoCG in relation to Chapter 8: Biodiversity, Appendix 8.2: Biodiversity Metric Calculation, Appendix 13.4 WFD and Figure 13.1 which require ongoing discussion.
16/09/20	Email from JF (EA) to AS (AECOM)	Comments on the draft SoCG, matters relating to Chapter 9: Geology and Soils, Chapter 10: Material Assets and Waste, Chapter 13: Road Drainage and the Water Environment, Appendix 13.1: Flood Risk Assessment and Appendix 13.2: Drainage Strategy are agreed.

Date	Form of correspondence	Key topics discussed and key outcomes
		Matters relating to Chapter 8: Biodiversity, Appendix 13.4 WFD are under discussion. Advice provided with regards to consents and licences.
21/09/20	Email from JF (EA) to AK (HE)	EA have no objections to the changes to the scheme as detailed. The only point of note is that Change 7 proposes reducing the land required for environmental mitigation which is of concern because to date the scheme does not provide clear evidence of achieving no net loss to biodiversity and no details of it will achieve biodiversity net gain. It may be wise to keep this land included within the boundary to maximise opportunities available for mitigation / enhancement.
15/10/20	Email from JF (EA) to AS (AECOM)	Checking of status of updates to SoCG.
19/10/20	Email from AS (AECOM) to JF (EA)	Currently progressing updates to the SoCG. Requested contact details for colleague who provided comments on the WFD to allow us to clarify a number of points and ensure we fully understand the concerns raised. The SoCG will be submitted to the EA prior to Deadline 1 however we recognise that there would be limited time to review the updated SoCG and therefore a number of points will remain under discussion. Request virtual meeting to discuss response week ending 30th October.
30/10/20	Email from AS (AECOM) to JF (EA)	Sent SoCG for review and comment.
30/10/20	Email from JF (EA) to AS (AECOM)	Acknowledge receipt of SoCG.
03/11/20	Email from JF (EA) to AS (AECOM)	Sent suggestion for amended text in Table 3.1 on the issue of the Flood Risk Assessment. These amendments relate to the responsibility of the LLFA and EA to comment on flood risk issues.
04/11/20	Email from AS (AECOM) to JF (EA)	SoCG as submitted to the ExA on 03 November 2020 sent for information. Request to set up a meeting to discuss any outstanding issues in the SoCG on 19 or 20 November.
10/11/20	Email from JF (EA) to AS (AECOM)	Propose meeting on 19 November
19/11/20	Virtual meeting JF, PB and SV (EA) and OT, NW, TP and AS (AECOM)	Meeting to discuss outstanding issues as set out in the SoCG. These relate to Biodiversity Net Gain, the impact and mitigation for the culverting of watercourses and the articles and requirements of the draft DCO. Two further issues agreed.

Date	Form of correspondence	Key topics discussed and key outcomes
07/12/20	Email from AS (AECOM) to JF (EA)	Sent meeting minutes, presentation slides and a copy of the document marked up during the meeting.
22/12/20	Email from AS (AECOM) to JF (EA)	Sent updated SoCG for comment and WFD Summary Report for information and comment
11/01/21	Email from JF (EA) to AS (AECOM)	Confirmed receipt of SoCG and WFD Summary Report and that these have been sent on to the appropriate specialists. Enquire as to when the final SoCG will need to be submitted to the ExA.
11/01/21	Email from AS (AECOM) to JF (EA)	Confirm the final deadline for signed Statements of Common Ground is 7 April 2021 (Deadline 8).
01/02/21	Email from AS (AECOM) to JF (EA)	Request comments on SoCG prior to Deadline 6 following release of the Third Round of Written Questions.
05/02/21	Email from JF (EA) to AS (AECOM)	Sent updated comments on the WFD elements of this scheme and the biodiversity metric.
03/03/21	Email from AS (AECOM) to JF (EA)	Sent responses to comments received on the outstanding issues in the SoCG, the biodiversity metric and WFD compliance.
12/03/21	Email from JF (EA) to AS (AECOM)	Sent comments confirming the current position on issues in the SoCG and with regards to WFD compliance.
16/03/21	Email from OT (AECOM) to PB and JF (EA)	Sent responses to comments received on WFD compliance and updates to the summary tables provided as part of WFD Summary Report.
18/03/21	Email from JF (EA) to OT (AECOM)	Provided mark-up of the WFD summary report document missing from previous email. Agree to review the latest response and additional information submitted to discuss in a call.
18/03/21	Email from OT (AECOM) to JF (EA)	Confirm that we would like the opportunity to explain the mitigation measures proposed for Watercourse 2.
18/03/21	Email from AS (AECOM) to JF (EA)	Email to set up meeting in week beginning 22/03/21.
19/03/21	Email from JF (EA) to OT (AECOM)	Confirm availability for a meeting on 25/03/21.
25/03/21	Virtual meeting JF, PB and SV (EA) and OT, NW, RR and AS (AECOM), TdlR (Highways England)	Meeting to discuss WFD compliance, the final outstanding point in the SoCG. Agreement was reached that the Scheme would be WFD compliant.

2.1.2 It is agreed that this is an accurate record of the key meetings and consultation undertaken between (1) Highways England and (2) Environment Agency in relation to the issues addressed in this SoCG.

3 Issues

3.1 Introduction and General Matters

3.1.1 This chapter sets out the 'issues' which are agreed, not agreed, or are under discussion between the Environment Agency and Highways England.

3.1.2 The progress note submitted by the Planning Inspectorate on the 20 July 2020 under Section 88 of the PA 2008 (as amended) and Rules 5 and 17 of the Infrastructure Planning (Examination Procedure) Rules 2010, sets out in Annex B the Examining Authority's (ExA) 'Initial Assessment of Principle Issues'. In Annex C the Planning Inspectorate sets out a list of SoCG that the ExA request Highways England to enter into with a number of parties including the Environment Agency.

3.1.3 The ExA requested the SoCG between the Environment Agency and Highways England to cover the following issues:

- Water environment effects, including abstraction and discharge.
- Drainage including provision for containment and treatment /disposal of contaminated run-off.
- Waste management issues, including permitting and formal exemption requirements, and the likelihood that any such requirements outside the DCO process may be obtained.
- The dDCO provisions and requirements including future procedures for approval of details.

3.2 Issues related to the Environmental Statement (ES)

Table 3.1: Issues Related to the Environmental Statement

ES Chapter	Paragraph Reference	Sub-section	Environment Agency Comment	Highways England Response	Status	Agreement likely?	
						APP?[1]	IP?
Appendix 8.2: Biodiversity Metric Calculation	-	Biodiversity Metric Calculation	The biodiversity net gain assessment report doesn't include any details of river morph units. The Environment Agency do not agree that additional creation of hedgerow habitats is a suitable enhancement for the loss of watercourse habitats. Furthermore, the report concludes that the biodiversity units would be 4.99% in net loss, although this is considered as no overall net loss of the biodiversity. This should be clarified. Following discussions at the meeting held on the 19 November, the EA is content to defer detailed assessment on the adequacy of the application of the biodiversity metric to Natural England. We welcome	A biodiversity metric calculation undertaken for the Application submitted in January 2020 was based on the method published by Defra in Biodiversity Offsetting Pilots Technical Paper: the metric for the biodiversity offsetting pilot in England (Defra, 2012), to determine effects of the Scheme. This methodology provided an overall net losses/ gains figure and did not separate out area habitats, linear habitats and rivers. Proposed changes to the Scheme formally submitted and adopted in October 2020 alter the impact of the Scheme on some existing habitats and allow for retention and restoration of selected areas. A re-calculation using Defra Metric 2.0 has been undertaken by the Applicant and submitted to the inspectorate as a revision of Appendix 8.2: .Biodiversity Metric Calculations [AS-103/6.3] The Biodiversity Metric	Agreed	Agreed	Agreed

[1] Indication on likelihood that the matter will be agreed by the close of the Examination period as rated by the Applicant (app) and the Interested Party (IP). Dark green = agreed, Light green = high likelihood of agreement, orange = medium likelihood of agreement, red = low likelihood of agreement. Inserted as one column here as most issues raised already agreed.

ES Chapter	Paragraph Reference	Sub-section	Environment Agency Comment	Highways England Response	Status	Agreement likely?	
						APP?[1]	IP?
			the project underway to provide offsite net gain, and are feeding into this project outside the planning system.	Calculations Version 3 (Appendix 8.2 [AS-103/6.3]) show that following completion of the Scheme, total biodiversity units would be marginally higher, with an area based gain of 2.21% of units, a linear based gain of 29.01% and a gain of 2.23% of river based units no loss or gain. The Scheme is within the range -5 % to +5 % for area based habitats (woodland, grassland etc.) which can be classed as no net loss in accordance with Table 11.9 of CIRIA C776a Good practice principles for development (Ref 8.47). It should be noted that Highways England's project team for the M54 to M6 link road has submitted an application for funding from the 'designated fund' for an initial feasibility study to identify opportunities and appropriate sites which could be improved to provide biodiversity net gains to be delivered on land outside of the Order limits in partnership with key stakeholders and landowners. This funding application has been successful, and the feasibility study is underway. However, this process is separate from the Application and its success or otherwise is not a material consideration for decision making on the Application.			

ES Chapter	Paragraph Reference	Sub-section	Environment Agency Comment	Highways England Response	Status	Agreement likely?	
						APP?[1]	IP?
Chapter 9: Geology and Soils [APP-048/6.1]	-	Geology and soils	Chapter 9 of the ES shows that site investigations and assessment over the summer of 2019 did not reveal much in terms of contaminated land or groundwater (other than some ubiquitous PAHs and metals), even though Made Ground was confirmed at various locations across the Scheme's footprint (especially at either end, as a result of previous M6 and M54 motorway construction and Hilton colliery) and groundwater was found at all locations monitored (albeit at various depths, see Table 9.12). We agree with the conceptual model set out, incl. likely sources, pathways and Controlled Water receptors and as such the resulting risk assessment as summarised in Section 9.6.38 seems appropriate, i.e. there appears to be negligible risk to identified receptors from organic contaminants and only a very low risk from metals including cadmium, chromium, copper, nickel and zinc, negating the	This is noted by Highways England. Mitigation measures related to Chapter 9: Geology and Soils are set out in the OEMP [APP-218/6.11], the delivery of which is a Requirement of the draft DCO.	Agreed	Agreed	Agreed

ES Chapter	Paragraph Reference	Sub-section	Environment Agency Comment	Highways England Response	Status	Agreement likely?	
						APP?[1]	IP?
			need for further monitoring and/or remediation. Furthermore, the pollution mitigation measures to be incorporated in the design, construction and operation of the proposed Scheme as set out in Section 9.8 (and the OEMP) are all sound and based on good practice and regulation (e.g. the production of an earthworks strategy, pollution 'discovery' plan, materials management plan, piling risk assessment where needed, road drainage controls, water management plan etc).				
Chapter 10: Material Assets and Waste [APP-049/6.1]	-	Material assets and waste	The EA is content that the Environmental Statement appropriately assesses the effect of the Scheme on material assets and waste and that impacts would be managed through adherence to mitigation measures detailed in the OEMP.	Delivery of the OEMP [APP-218/Volume 6.11] is a Requirement in the draft DCO.	Agreed	Agreed	Agreed
Chapter 13: Road Drainage and the	-	Road drainage and the water	The EA is content that the Environmental Statement appropriately assesses the effect of the Scheme on road drainage and the water	Delivery of the OEMP [APP-218/Volume 6.11] is a Requirement in the draft DCO.	Agreed	Agreed	Agreed

ES Chapter	Paragraph Reference	Sub-section	Environment Agency Comment	Highways England Response	Status	Agreement likely?	
						APP?[1]	IP?
Water Environment [APP-52/ 6.1]		environment	environment and that impacts would be managed through adherence to mitigation measures detailed in the OEMP.				
Appendix 13.1 Flood Risk Assessment [APP-200/ 6.3]		Flood risk	The EA is to provide comments on flooding with regards to the Latherford Brook only (Watercourse 5), as this has a mapped floodplain. We have no objection to the assessment of flood risk in relation to this watercourse, subject to the land acquisition agreement proposed within para 4.2.8 of the FRA going ahead. We will work with the LLFA where this would be beneficial.	Noted. The land referred to in para 4.2.8 affected by the change in floodplain is within the Scheme boundary (includes areas of plots 5/11i, 5/22 and 5/23 as shown on the Land Plans [AS-065/2.2]) and is to be purchased to allow other environmental mitigation and compensation measures to be implemented, including the woodland planting proposed to compensate for the impact on ancient woodland.	Agreed	Agreed	Agreed
Appendix 13.2 Drainage Strategy [APP201/ 6.3]	-	Drainage – discharge rates	The EA considers that the drainage strategy as reported in Appendix 13.2 of the ES, utilises an appropriate discharge rate.	The discharge rate was agreed with the LLFA in June 2019 and further discussed and agreed in a joint meeting with the LLFA and Environment Agency in July 2019. As reported in Appendix 13.2 [APP-201/ 6.3] a discharge rate of 5 l/s/ha has been agreed.	Agreed	Agreed	Agreed
Appendix 13.2 Drainage Strategy [APP-	-	Drainage – climate change allowance	The EA is content with the climate change allowance provided for attenuation features as outlined in the drainage	Attenuation within SuDS features has been provided to ensure no flooding in a 1 in 100 year + 40% climate change allowance return period event as	Agreed	Agreed	Agreed

ES Chapter	Paragraph Reference	Sub-section	Environment Agency Comment	Highways England Response	Status	Agreement likely?	
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201/Volume 6.3]			strategy, Appendix 13.2 of the ES.	reported in the. Drainage Strategy, Appendix 13.2 of the ES [APP-201/ 6.3].			
Appendix 13.4: Water Framework Directive Assessment [APP-203/ 6.3].	Para 5.4.14	Mitigation measures	The reports provided state that 'Within the constraints of the Scheme, mitigation for the loss of aquatic habitats includes provision of 12 new ecological mitigation ponds and a total of 408 m of watercourse habitat'. We were not able to find any documents detailing these enhancements. Following Highways England's response the EA is content that the mitigation and enhancement measures set out in the Outline Environmental Management Plan [REP4-010/6.11] are appropriate and that these measures are appropriately secured through the DCO, with the exception of mitigation for the impacts on the Penk Catchment which is covered by a separate row in this SoCG.	The measures described are embedded mitigation measures for the loss of ponds and impacts on watercourses as a result of the construction of the Scheme, not enhancement measures. These mitigation measures are outlined in Chapter 8: Biodiversity of the ES [APP-047/6.1], Chapter 13: Road Drainage and the Water Environment [APP-052/6.1] illustrated in Figures 2.1 to 2.7 of the ES [APP-057 to 063/6.2] and set out in the Outline Environmental Management Plan Table 3.4, D-WAT1 to D-WAT6 and D-BIO1. These measures are secured through Requirement 3 of the draft DCO [APP-018/3.1 and subsequent revisions] and focus on mitigation to reduce the impact of culverting, the diversions of watercourses to those culverts and the creation of new ditchcourses and pond habitats. Further detail of the mitigation for culverts and compensation for the loss of riparian habitat is provided in Chapter 8: Biodiversity [AS-083/6.1], Chapter 13: Road Drainage and the Water Environment [APP-052/6.1], Appendix	Agreed	Agreed	Agreed

ES Chapter	Paragraph Reference	Sub-section	Environment Agency Comment	Highways England Response	Status	Agreement likely?	
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				13.2 Drainage Strategy [APP-201/6.3], Figure 2.1 of the ES Draft Environmental Masterplan Overview [APP-057/6.2], and Outline Drainage Works [AS-072/2.11] (see Sheets 3-5). However, to support the interpretation of the environmental commitments made and to help illustrate what the proposals aspire to provide, Highways England has prepared an additional figure, Figure 1: Proposed Watercourse which is appended to this SoCG. Although the detailed design of new ditchcourses, channel diversions and realignments will be done during the detailed design stage, and will be site specific, (a figure will be produced and provided to support this ongoing discussion), to illustrate project aspiration in terms of ditchcourse and existing channel diversion/realignment design. Following the result of 2020 great crested newt (GCN) surveys these mitigation measures have been reviewed and amended as appropriate. The surveys confirmed the likely absence of GCN in those ponds which would be lost as a result of the Scheme. As no ponds known to support GCN would be lost the replacement of pond habitat is only required at an			

ES Chapter	Paragraph Reference	Sub-section	Environment Agency Comment	Highways England Response	Status	Agreement likely?	
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				approximate ratio of 1:1. Seven ponds would be lost as a result of the Scheme, with the partial loss of two further ponds. Therefore, eight ponds and suitable terrestrial habitats are proposed to replace this lost habitat as well as forming part of a mosaic of a habitats to support protected species such as bats. Chapter 8: Biodiversity (Version 3) [AS-083/6.1] and Figure 2.1 to 2.7 (Version 2) [AS-086 to 092/6.2] of the ES and the OEMP (Version 3) [AS-112/6.11] have been updated and issued to the Examining Authority on 8 October 2020. As before these mitigation measures are secured through Requirement 3 of the draft DCO [APP-018/3.1 and subsequent revisions]. A summary of the WFD Assessment has been produced which sets out the impact on each of the WFD criteria for each watercourse, how this impact is mitigated and where this is secured by the DCO. This was submitted to the EA for comment on 22 December 2020. The WFD Summary Report is presented in Appendix B and details the balance of impact and mitigation proposed.			
Appendix 13.4: Water		Mitigation	The direct loss of 111m of watercourse within the Penk catchment has not been	As set out in Table 3 in this SoCG the Scheme would result in the loss of 335m of channel in Watercourse 2 as a result	Agreed	Agreed	Agreed

ES Chapter	Paragraph Reference	Sub-section	Environment Agency Comment	Highways England Response	Status	Agreement likely?	
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Framework Directive Assessment [APP-203/ 6.3].		Measures – River Penk Catchment	mitigated for. If it is not possible to provide like for like mitigation i.e. the addition of an equivalent length of comparable watercourse, some other proportionate improvement in the catchment should be sought which could ultimately be counted as mitigation in order to bring the scheme into WFD compliance. The WFD Summary Report is somewhat confusing and would benefit from further clarity. However following Highways England's response, the submission of a revised WFD Summary Report and discussions at a meeting on 25 March 2021, the EA is content that the Scheme would be WFD compliant.	of the need to realign and culvert (218m) the watercourse. The total culvert length has been minimised as far as is possible. The two culverts (166m and 52m) have been sized accordingly to avoid flood risk and scour effects and the culvert inverts would be recessed by a minimum of 300 mm for bed continuity. To compensate for the impact of culverting the watercourse approximately 165m to 185m of new open channel will be provided as part of the realignment of the watercourse. The design of these channels will follow best practice to maintain flow and stream processes, whilst seeking to provide morphological and ecological enhancement on current channel form (including riparian habitat). These channels will be designed as an improvement on the current channel form as secured by the OEMP, commitment D-WAT2 . The loss of the remaining 170m of open channel would be compensated through the provision of approximately, 32 m of ditchcourse linking Pond 2 to Watercourse 2, 75 m of ditchcourse linking Pond 1 to Watercourse 1, the retention of approximately 90 m of redundant			

ES Chapter	Paragraph Reference	Sub-section	Environment Agency Comment	Highways England Response	Status	Agreement likely?	
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				channel in the woodland north of new junction which would be retained as ditch habitat and the creation of new ponds. The design of new ditchcourses would be informed by a geomorphologist and ecologist and would include where practicable 'natural' features such as a sinuous low flow channel (albeit perhaps along a straight corridor) incorporating shallow berms and occasional sections where the channel is narrowed to improve flow. The ditchcourses would also be suitably landscaped and their margins planted to provide suitable riparian habitat to compensate for new culverting proposed by the Scheme, as secured by the OEMP, commitment D-WAT6. On balance this would result in 362m of channel of varying quality and type. It should also be noted that Watercourse 2 is fairly remote from the River Penk and that the channel in this location is generally of a poor quality. Para 3.1.24 to 3.1.26 of the WFD Summary report acknowledges that there would be some loss of existing channel habitat but that this loss is unavoidable and unlikely to have significant detriment to the overall			

ES Chapter	Paragraph Reference	Sub-section	Environment Agency Comment	Highways England Response	Status	Agreement likely?	
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				condition and value of the River Penk (from Source to Saredon Brook) water body and is therefore WFD compliant.			
Appendix 13.4 Water Framework Directive of the ES [APP-203/6.3]	Paragraph 5.4.3 Section 5 Mitigation Measures	Drainage Strategy - mitigation	No details provided for the proposed Drainage Strategy, this detail appears under section 5.5.1 Environmental Enhancement Opportunities, even though its mitigation not enhancement. There is no detail on how the Drainage strategy will be managed long-term to monitor the quality of the water being discharged or maintained in perpetuity to ensure no detriment to water quality under WFD. Following the explanation provided, the EA is content that the proposed drainage will be managed by Highways England as part of standard operating protocols. It is also noted that water quality monitoring of highway outfalls is not routine, no additional monitoring is requested for this scheme.	Appendix 13.4 Water Framework Directive is a technical appendix to the Environmental Statement [APP-203/6.3]. As referred to in paragraph 5.4.5 and elsewhere within the report, a separate Drainage Strategy (i.e. Appendix 13.2 of the Environmental Statement [APP-201/6.3]) has been produced. Para 5.4.5 summarises the Drainage Strategy, although does not include details of management. Management of SuDS and the drainage would be undertaken by Highways England and their management partners according to standard methods and operating protocols. Water quality monitoring is not considered necessary as the treatment train has been developed using best practice risk assessment guidance, for which the Environment Agency was involved in the development (i.e. HEWRAT and M-BAT). Water quality monitoring of highway outfalls is not something that is done routinely across the UK. However, the Environment Agency's own network of monitoring stations could potentially be used to detect if there are any	Agreed	Agreed	Agreed

ES Chapter	Paragraph Reference	Sub-section	Environment Agency Comment	Highways England Response	Status	Agreement likely?	
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				changes once the Scheme has been constructed and opened to traffic.			
Appendix 13.4 Water Framework Directive of the ES [APP-203/6.3]		Drainage strategy – water quality	The Environment Agency have further concerns regarding the water quality within the proposed 408m of watercourse if these are part of the SUDs network for the road. It would be difficult to say the scheme is WFD complaint without seeing these details. Following Highways England's Response and discussions at the meeting held on the 11th of November, the EA is content that the water quality within the ditches proposed as part of the SUDs would convey treated runoff and that the water quality risk has been assessed in the HEWRAT assessment, Appendix 13.3 of the ES.	Commitment D-WAT6 in the OEMP [APP-218/6.11 and subsequent revisions] states that the ditchcourses would convey treated runoff to the receiving watercourses from new treatment ponds. As shown on the Outline Drainage Works figures [AS-072/2.11] (Sheets 3-5), these would be provided for drainage ponds 1 to 4 (currently the outfall from Pond 5 would be a pipe and engineered outfall, but options to include a cascade ditch arrangement are being considered to see if these are practical and cost effective). Having the final discharge from these treatment drainage ponds conveyed by an open ditchcourse is more sustainable avoiding the need to construct a new engineered outfall supported by concrete headwalls, whilst also encouraging greater connectivity between the existing watercourse network and the Sustainable Drainage Systems (SuDS) being proposed as part of the Scheme. Given the environmental benefits of this design Highways England would expect the Environment	Agreed	Agreed	Agreed

ES Chapter	Paragraph Reference	Sub-section	Environment Agency Comment	Highways England Response	Status	Agreement likely?	
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				Agency to welcome this rather than conventional drainage options. The proposed operational phase surface water drainage strategy is described in Appendix 13.2: Drainage Strategy [APP-201/6.3] and summarised in paragraphs 13.8.11 to 13.8.20 of Chapter 13 of the ES [APP-052/6.1]. Appendix 13.3: Assessment of Routine Road Runoff and Accidental Spillage Risk (HEWRAT) [APP-202/6.3] presents full details of the water quality risk assessment that has been carried out, which is summarised in paragraphs 13.9.57 to 77 of Chapter 13 of the ES [APP-052/6.1]. Appendix 13.4: Water Framework Directive Assessment [APP-203/6.3] also includes consideration of surface water drainage proposals and the assessment carried out. The previous estimates of the new ditchcourses failed to include the ditch to Watercourse 1 and thus the total length is in fact 483 m of new ditchcourses as opposed to 408 m reported in the ES and associated appendices. This includes 75 m of ditch to Watercourse 1, 32 m to Watercourse 2, 280 m to and from Pond 3 to Watercourse 3, and 96 m to and from Pond 4 to Watercourse 4. In addition, it should be noted that the			

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				Scheme will also provide new channels for Watercourse 2 (where it is diverted) and Watercourse 3 (due to the relocation of the impoundment to Lower Pool), which will also be designed to improve upon the current channel form, with the estimated lengths provided in the WFD Summary presented in Appendix B. The proposed road drainage networks 5, 8 and 10 (i.e. to Watercourses 2, 3 and 4, respectively) are not reliant on the proposed ditchcourses to provide treatment of highway runoff. Treatment of highway runoff from road drainage network 3 (to Watercourses 1) will primarily be from the proposed wet pond. However, to ensure adequate treatment is provided the proposed ditchcourse from Pond 1 is required to provide some treatment. Overall, as the flow within these ditchcourses will come from highway surfaces via a treatment train, water quality will be influenced by the type and range of chemical compounds that may be found in highway runoff. However, the proposed ditchcourse will still provide biodiversity benefits, and are preferred to discharging water from the treatment pond via a pipe and new engineered			

ES Chapter	Paragraph Reference	Sub-section	Environment Agency Comment	Highways England Response	Status	Agreement likely?	
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				headwall. In addition, although direct comparison between the existing highway alignments and the Scheme is not straight forward (for instance due to the remodelling if M54 Junction 1) the provision of new treatment measures where none currently exist will provide some improvement in water quality along local watercourses (in particular Watercourse 2 and Watercourse 6).			
Appendix 13.4 Water Framework Directive of the ES [APP-203/Volume 6.3]	Para 5.4.4, Section 5.4	Mitigation measures	The WFD should include a commitment to proposed enhancements to realigned and retained watercourses. The EA is content that these enhancements are appropriately secured.	The commitment to provide morphological and ecological enhancement on current channel form where possible, is set out in D-WAT2 to D-WAT6 of the Outline Environmental Management Plan (OEMP) and secured through the requirements of the draft DCO.	Agreed	Agreed	Agreed
Appendix 13.4 Water Framework Directive of the ES [APP-203/ 6.3]	Para 5.5.1, Section 5.5	Drainage Strategy	The WFDa mentions the Drainage Strategy, SuDS Swales & Ditches. These are not enhancement measures these are mitigation measures to mitigate the potential impacts of the pollution from road runoff. Following the Highways England response and the amendments to the WFD (prior to the submission of the DCO	This is a complex issue and depends on what is considered as the base environment. The baseline for the current assessment includes existing roads for which there is not necessarily any water quality treatment measures in place. Thus, the provision of new treatment measures on existing roads where none currently exist could be seen as an improvement, and thus enhancing the 'current' baseline.	Agreed	Agreed	Agreed

ES Chapter	Paragraph Reference	Sub-section	Environment Agency Comment	Highways England Response	Status	Agreement likely?	
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			application), the EA is satisfied that SuDs are not being considered as enhancement measures.	However, it is also accepted that this may be viewed as the Scheme belatedly addressing mitigation requirements that were not provided when existing roads were constructed, dealing with an existing pressure on a watercourse. Therefore, paragraph 5.5.1 Appendix 13.4 Water Framework Directive of the ES [APP-203/ 6.3] has been moved to the previous section on operation mitigation rather than be included under 'Environmental Enhancement Opportunities' in the final WFD Assessment.			
Appendix 13.4 Water Framework Directive of the ES [APP-203/ 6.3]	Para 5.5.2, Section 5.5	Mitigation and enhancement measures	Ditches are not natural features they are proposed as part of the scheme to convey the water runoff from the road, while they can be designed to have some habitat value they are a separate habitat to the natural watercourses so do not constitute an enhancement. Following the Highways England response provided and the amendment to the WFD (prior to the submission of the DCO application), the EA is satisfied that ditches are not being	Rather than installing pipes to convey runoff from treatment ponds to existing watercourses the Scheme is committed to, wherever possible, providing new ditches. Furthermore, rather than construct uniform ditches of an unnatural character, the Scheme is committed to ensuring that each is designed with some asymmetry and variation in channel form in order to maximise any biodiversity benefits that they can provide. This goes beyond standard practice and is why it was included in this section on enhancement. The ditches would connect with existing watercourses and extent to the new attenuation ponds that	Agreed	Agreed	Agreed

ES Chapter	Paragraph Reference	Sub-section	Environment Agency Comment	Highways England Response	Status	Agreement likely?	
						APP?[1]	IP?
			considered as enhancement measures.	are proposed. These ditches would therefore support local habitats and green corridors. However, it is accepted that this measure does not enhance an existing receptor and thus paragraph 5.5.2 Appendix 13.4 Water Framework Directive of the ES [APP-203/Volume 6.3] has been moved to the previous section on operation mitigation rather than be included under 'Environmental Enhancement Opportunities' in the final WFD Assessment.			
Appendix 13.4 Water Framework Directive of the ES [APP-203/ 6.3]	Para 5.5.3, Section 5.5	Mitigation and enhancement measures	The diversion of the existing channel to facilitate culverting, design and installation method of culverts are **not** an enhancement they are methods to mitigate some the detrimental impact from the proposal to modify the watercourse in order to facilitate engineering. Environmental Enhancement is the increase or improvement in quality, value or extent of an environmental feature. For example the removal of the weir at watercourse 3 would provide an improvement to the existing biological and geomorphological function of that watercourse.	Paragraph 5.5.3 Appendix 13.4 Water Framework Directive of the ES [APP-203/ 6.3] has been moved to the operation mitigation section in the final WFD Assessment. Further commentary has been included in the final WFD Assessment report (prior to the submission of the DCO application in January 2020) on enhancement opportunities and how this has been considered. However, Highways England are able to offer the following comments on Watercourses 2, 3 and 4 (that would be culverted) below: Watercourse 2 within the Scheme boundary is the further most upstream reach and has the character of a ditch/drain and typical of those found in	Agreed	Agreed	Agreed

ES Chapter	Paragraph Reference	Sub-section	Environment Agency Comment	Highways England Response	Status	Agreement likely?	
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			The loss of open watercourse could be enhanced by improving the habitat and function a length of watercourse up or downstream greater than the length to be degraded by the culvert. Following the Highways England response provided and the amendment to the WFD (prior to the submission of the DCO application), the EA is satisfied that mitigation measures are not being considered as enhancement measures.	agricultural settings. For the Environmental Impact Assessment, the importance of the hydromorphology of Watercourse 2 is considered to be low, and from an ecological perspective the habitat is low-moderate (and of local importance only). The watercourse would be diverted and realigned in places and through best practice design enhancement of the current channel could be delivered by the project. This would ensure there are adequate buffers strips of vegetation to reduce sediment run off from land in addition to fencing to stop livestock accessing the river to reduce poaching and direct sediment input into the watercourse. However, given the small flows and low gradients, there are limitations as to what could be achieved in terms of morphological diversity. Watercourse 3 near Lower Pool was observed during site visits as being typically dry. Further downstream and outside to the Scheme boundary this watercourse was a typical agricultural ditch/stream that has been modified by past land use and with areas of the bed covered in fine silt. However, there were short reaches were good and clean gravels were being washed clear.			

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						APP?[1]	IP?
				Options such as introducing buffers strips of vegetation to reduce sediment run off from land in addition to fencing to stop cattle accessing the river to reduce poaching and direct sediment input into the river. There may also be some opportunities to narrow the channel to improve flow and self-cleaning of fine sediments, creation of berms and marginal wetlands, and management of existing vegetation (e.g. thinning of overgrown sections and selected removal of undesirable shrubs and small trees). The removal of the weir at Watercourse 3 would result in the loss of Lower Pool which forms part of a Site of Biological Importance as well as being a feature of Hilton Park a non-designated historic park that has been defined as Historic Parkland within the South Staffordshire Local Plan. A new length of channel would be provided for Watercourse 3 following the need to construct a new impoundment structure across Lower Pool. The diversion of Watercourse 3 would be informed by hydromorphological and ecology surveys to ensure that where enhancement on the existing channel is possible this is provided.			

ES Chapter	Paragraph Reference	Sub-section	Environment Agency Comment	Highways England Response	Status	Agreement likely?	
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				Watercourse 4 is similar to Watercourse 2. Watercourse 4 within the Scheme boundary is the furthest most upstream reach of the ditch/drain. However, the Scheme boundary around Watercourse 4 is very constrained and this prohibits any meaningful enhancement of the channel upstream (where there are a series of ponds) and downstream (Brookfield Farm). Watercourse 5 within the Scheme boundary is tree lined and the surrounding land use is mainly agricultural and rough pasture. The river here has good habitat variety, such as pool/riffles, instream tree roots and good clean cobble/pebble substrate, however there are patches of silt – resulting from the agricultural land use. Shading of Watercourse 5 was high (90%), mainly resulting from bankside trees and shrubs. The clear span bridge proposed across this watercourse would ensure the diverse aquatic habitat remains the same. Furthermore, the shading expected from the bridge shall not exceed the current shading from bankside trees.			

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Appendix 13.4 Water Framework Directive of the ES [APP-203/ 6.3]	Annex B of Appendix 13.4	Mitigation measures	Annex B; Has some additional mitigation measures not mentioned in the report, including mammal ledges which are suitable mitigation for biological connectivity. Following the explanation provided and the amendment to the WFD (prior to the submission of the DCO application), the EA is satisfied that mitigation measures are listed in the main body of the report.	Annex B of Appendix 13.4 Water Framework Directive of the ES [APP-203/6.3] has been reviewed to ensure that all mitigation measures are also described in the summary sections of the main body of the report. Although Highways England recognises that mitigation for mammals is important, mammals are not a WFD biological quality element and therefore this is not directly relevant to the outcome of the WFD Assessment. An assessment of impacts on mammals has been presented in Chapter 8: Biodiversity of the Environmental Statement [APP-047/ 6.1] and associated appendices [TR010054/APP/6.3].	Agreed	Agreed	Agreed
Appendix 13.4 Water Framework Directive of the ES [APP-203/6.3]	Annex B of Appendix 13.4	Mitigation measures – over pumping	It also states that no mitigation measures are required for over-pumping on the Latherford Brook because they think there are no fish. We have records of Bullhead 2km downstream so would expect evidence for this assumption. Following Highways England's response and the amendment to the WFD (prior to the submission of the DCO application), the EA considers	The Aquatic Invertebrates, Fish and Aquatic Macrophytes Report (Appendix 8.14 of the Environmental Statement [APP-186/ 6.3]) for this Scheme does describe a good community of fish in Latherford Brook. The report has been reviewed to ensure that Appendix 13.4 Water Framework Directive of the ES [APP-203/6.3] includes a summary of the most up to date information. Clarification on the mitigation proposed for fish during construction has been provided in the WFD Assessment,	Agreed	Agreed	Agreed

ES Chapter	Paragraph Reference	Sub-section	Environment Agency Comment	Highways England Response	Status	Agreement likely?	
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			that appropriate mitigation measures for over-pumping are outlined in the ES and OEMP.	reiterating the mitigation is presented in Chapter 8: Biodiversity of the Environmental Statement [APP-047/6.1], and the OEMP [APP-218/6.11]. For example, if there is a need to over-pump or flume Latherford Brook during the construction of the bridge (which may not be required given it is a clear-span structure), a fish rescue and removal would need to be completed. In addition, areas of the channel beyond the primary channel would need to be sectioned off with stop nets and fish captured within this area during the draw-down of water. Any water pumps used would need to be fitted with a fine mesh to stop fish being pulled though the pump in addition to a fisheries consultant monitoring the area of the pump abstraction to reduce the risk of fish entrainment. Captured fish should be kept in aerated holding facilities on the river bank until all fish have been captured. The fish should then be moved upstream of the construction works (approx. 100 m) where they would not be impacted and then released safely in to the watercourse. The construction work should only go ahead when the fisheries team/Ecological Clerk of Works have approved that all fish			

ES Chapter	Paragraph Reference	Sub-section	Environment Agency Comment	Highways England Response	Status	Agreement likely?	
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				have been removed and with any consents from SCC and the EA. If over-pumping/fluming is required, water would be returned to the channel in the shortest possible distance downstream to minimise the depleted reach. No downstream impacts are predicted.			
Appendix 13.4 Water Framework Directive of the ES [APP-203/ 6.3]	Section 5.3 Operation	Impact on Latherford Brook	No justification provided on why a 10m wide clear span bridge has been selected and what the detrimental impacts on the Latherford Brook will be. Following the Highways England response provided, the EA agree that the bridge span has been justified and that the impacts on Latherford Brook are reflected in the WFD Assessment.	Specialists in geomorphology/ hydromorphology have been involved with the design of this structure. The issue is discussed in para 6.1.30 to 6.1.34 of Appendix 13.4 Water Framework Directive of the ES [APP-203/ 6.3]. Section 5 is only an introduction to potential impacts which could occur without mitigation in place. The assessment of the Scheme is presented in Annex B and summarised in Section 6. Paragraph 6.1.30 states: "Watercourse 5 (Latherford Brook) has been historically straightened, however, there is evidence that the watercourse is returning to its natural form. At the location of the proposed crossing the watercourse is showing signs of lateral movement, most likely as a result of localised change in gradient, and secondary channels active during high flow events.	Agreed	Agreed	Agreed

ES Chapter	Paragraph Reference	Sub-section	Environment Agency Comment	Highways England Response	Status	Agreement likely?	
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				Culverting or straightening of the watercourse would result in further modification of the Latherford Brook at the crossing location, therefore representing a risk to the current WFD ecological and overall status. Therefore, it is recommended that the new link road crosses Watercourse 5 (Latherford Brook) supported on a 10 m clear-span bridge structure. This solution allows the naturally returning morphology of the waterbody to be retained as far as possible." There is a primary (permanently wet) channel at this location and also a 'semi-dry' secondary channel within the floodplain. The current wetted river corridor of the existing primary channel at the crossing location is assessed to be approximately 14 m wide. This excludes the relic secondary channel at this location which would add an additional 4 m in width. Paragraph 6.1.34 goes on to state: "Ideally, a structure at this location would be at least wide enough to encompass both the primary and secondary channels in their existing alignments (18 m). This would allow the channel to continue to function and evolve naturally, therefore having			

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				minimal impact on the hydromorphology of the channel. However, the watercourse is a low energy stream with relatively cohesive banks and therefore the channel planform does not naturally actively change. What is occurring at the crossing location is considered to be adjustment, triggered by historic anthropogenic modification (e.g. straightening), as the watercourse attempts to re-establish equilibrium. Taking this into account it is considered that an acceptable compromise for the width of the structure at this location would be a minimum width of 10 m. This would allow the primary channel to be accommodated with minimal modification to channel geometry. It is considered that there is limited residual risk that the modifications required to build the structure would result in sufficient acceleration of the secondary currents to cause significant morphological adjustments to the channel. The minimum 10 m width also allows for a 0.5 m buffer either side of the new channel cross-section to provide a residual floodplain. This buffer would allow for some lateral re-working of gravels as the channel adjusts to a new equilibrium post-construction."			

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				The preliminary design for this structure was submitted as part of the draft DCO sent to the EA on 7 December 2020 for information. As set out in Para 4.3.5 of the WFD summary report the impact on aquatic habitat would be as a result of the semi-enclosure of the currently open channel resulting in shading. There is also the potential for indirect habitat impacts resulting from changes in hydraulic and sedimentary flow conditions resulting from the floodplain narrowing and loss of riparian woody material inputs from the channel, but these would be minor.			
Appendix 13.4 Water Framework Directive of the ES [APP-203/ 6.3]	Section 5.3 Operation	Impact on Latherford Brook	The current functional width of the Latherford Brook is 17 m so this would result in a loss of functional planform for the river and this is not mentioned in this section. Following the Highways England response provided, the EA is comfortable that the bridge span provided is appropriate.	It is unclear what is meant by 'functional width.' If it is referring to function in terms of river channel movement laterally across the floodplain then Highways England disagrees that the river is naturally sufficiently powerful to cause planform change in response to secondary currents at this location. Paragraphs 6.1.30 to 6.1.34 of the report (as stated above) describe the river corridor and why a clear-span of 10 m is considered appropriate. This solution has been reached in the context that wider bridge spans are increasingly expensive, complicated to build and	Agreed	Agreed	Agreed

ES Chapter	Paragraph Reference	Sub-section	Environment Agency Comment	Highways England Response	Status	Agreement likely?	
						APP?[1]	IP?
				have a wider footprint. A compromise has been proposed that maintains the primary channel with minimal modification to channel geometry balanced against cost, land take and engineering considerations. Although not described in the WFD assessment, hydraulic modelling to determine flood risk changes as a result of this crossing of the Latherford Brook has been undertaken and is presented in Annex B (Hydraulic Model Report) of Flood Risk Assessment (Appendix 13.1 of the Environmental Statement [TR010054/APP/6.3]). The Flood Risk Assessment was provided to Environment Agency and LLFA for review on 20th November 2019. Hydraulic modelling showed that a structure of around 3 m by 3 m would be sufficient to convey flows. A 10 m clear span is considerably greater than a minimum of 3 m. The proposal for a 10 m clear-span bridge is therefore being recommended to maintain the river corridor for the primary channel for hydromorphological and ecological reasons (e.g. in comparison to a culvert of standard dimensions required to manage flood risk only). It is also considered that a 10 m width would			

ES Chapter	Paragraph Reference	Sub-section	Environment Agency Comment	Highways England Response	Status	Agreement likely?	
						APP?[1]	IP?
				avoid development of the vena contracta effect through the bridge orifice, thereby avoiding natural erosion downstream.			
Appendix 13.4 Water Framework Directive of the ES [APP-203/ 6.3]		Hydromorphology	The reports provided have an insufficient hydromorphological assessment (considering all the elements of hydro-morphological quality elements). Flow impacts are only one element of hydromorphology. Culvert design does not mitigate the negative impacts of culverting on the loss of natural bank conditions, marginal vegetation, and sediment supply from banks etc. The Environment Agency are not able to find any separate documents related to morphological assessment. However, the fish survey shows the availability of the fish in this minor watercourses and it proves some morphological value exists in this watercourses, so the impacts of the scheme on this element need to be assessed.	The impact of culverting would be mitigated by the design of the culvert (to reduce adverse impacts on the hydromorphology of the watercourse and channel continuum), the design of diversions/enhancements to provide enhancement on existing modified channels, and by the creation of new drainage ditchcourses (and ecological ponds) (to compensate for the loss of riparian habitat, shading of existing channels etc.). In general, due to the small size of watercourses that would be culverted by the Scheme there will be limited downstream transportation of coarse sediment. Although the channel of Watercourse 4 downstream of the A460 includes alternating (embryonic) lateral gravel bars (suggesting that flows are capable of transporting small diameter gravels), the location of the proposed culvert is between two sets of ponds near Brookfield Farm, which will significantly reduce the downstream transport of course material. Therefore, it is not expected that there would be any significant interruption of sediment	Agreed	Agreed	Agreed

ES Chapter	Paragraph Reference	Sub-section	Environment Agency Comment	Highways England Response	Status	Agreement likely?	
						APP?[1]	IP?
			The EA welcome the submission of WFD summary which we find is easier to understand. Following Highways England's Response, the EA is content that sufficient hydromorphology assessment has been undertaken.	supply as a result of the Culverts proposed for the Scheme. All watercourses were surveyed (access permitting) and a summary of the hydromorphology of each watercourse was included in Appendix 13.4 WFD Assessment. Further surveys were undertaken in November 2020 and have informed recent discussions with the Environment Agency and the summary of the WFD Assessment. A summary of the WFD Assessment has been produced and is presented in Appendix B which sets out the impact on each of the WFD criteria for each watercourse, how this impact is mitigated and where this is secured by the DCO. This was submitted to the EA for comment on 22 December 2020.			
Appendix 13.4 Water Framework Directive of the ES [APP-203/ 6.3]		Impact on improvements to Saredon Brook.	The Environment Agency believe that the scheme will have an impact on mitigations measures identified by the Environment Agency to improve Saredon Brook under WFD. This is because the culverted watercourse would impact on the measures including:	Watercourses 3-5 as shown on Figure 13.1B [AS-029/6.2] of the ES are within the Saredon Brook WFD water body catchment. Paragraph 6.2.5 of Appendix 13.4 WFD Assessment [APP-203/6.3] states "*It is acknowledged that the culverts proposed for Watercourse 3 and Watercourse 4, and the outfalls to Watercourse 5 (Latherford Brook) are potentially inconsistent with the above mitigation measures proposed by the*	Agreed	Agreed	Agreed

ES Chapter	Paragraph Reference	Sub-section	Environment Agency Comment	Highways England Response	Status	Agreement likely?	
						APP?[1]	IP?
			• retain marginal aquatic and riparian habitats (channel alteration) • preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone • preserve and, where possible, restore historic aquatic habitats, and • increase in-channel morphological diversity Following Highways England's response the EA is content that the Scheme would not impact on mitigation measures identified for Saredon Brook under WFD.	*Environment Agency to improve the status of some WFD parameters of this water body. However, the physical impact of these structures would be very localised in nature and affecting the first order and minor channels of headwater tributaries, rather than the main stem of the water body. The impact would also be compensated by the creation of new ditchcourses as part of the highway drainage system, but designed to best practice and linking existing green corridors with proposed treatment and attenuation ponds along the Scheme*." In addition, and not explicitly mentioned in Appendix 13.4 WFD Assessment [APP-203/6.3], the Scheme will also extend the channel of Watercourse 3 where the impoundment for Lower Pool is relocated (refer to Figure 1 appended to this SoCG) which provides further compensation for the proposed 55 m culvert. Highways England are not aware of any specific Environment Agency led initiatives to implement these mitigation measures within the Scheme boundary, but where possible the views of the Environment Agency could be taken into account where new ditchcourses or other channels are being created by the Scheme. The overall effect of the Scheme is to			

ES Chapter	Paragraph Reference	Sub-section	Environment Agency Comment	Highways England Response	Status	Agreement likely?	
						APP?[1]	IP?
				provide a net gain in new watercourse channel/riparian habitat within the Saredon Brook Catchment. In total 241 m of new ditchcourse channel will be provided as shown in the Table 2, Appendix B of this SoCG. Table 4 provides full details of the net balance of all relevant mitigation pertaining to proposed culverts and bridges within the Saredon Brook (Source to River Penk) WFD water body catchment. Overall, it is predicted and reported in Appendix 13.4 WFD Assessment [APP-203/6.3] that the Scheme will not prevent improvement of the Saredon Brook from Source to River Penk (GB104028042571) WFD water body. Please refer to commitments D-WAT2-7 and D-BIO1 in Table 3.4 of the latest version of the OEMP (December 2020) for details of the mitigation proposed with regards to the design of culverts, ditchcourses from treatment ponds, and diversions and realignments of watercourses. A summary of the WFD Assessment has been produced which sets out the impact on each of the WFD criteria for each watercourse, how this impact is mitigated and where this is secured by the DCO. This was submitted to the EA			

ES Chapter	Paragraph Reference	Sub-section	Environment Agency Comment	Highways England Response	Status	Agreement likely?	
						APP?[1]	IP?
				for comment on 22 December 2020. The WFD Summary is presented in Appendix B.			
Chapter 14:Climate [APP-053/ 6.1], Appendix 13.1 Flood Risk Assessment [APP-200/6.3] and Appendix 13.2: Drainage Strategy [APP-201/6.3].	-	Climate change allowance	The EA is content that the climate change provisions included within the drainage design and the flood risk mitigation proposals take account of latest UK Climate Projections.	Climate change allowance agreed with the EA and LLFA as reported in the Environmental Statement, Appendix 13.1 [APP-200/6.3] and Appendix 13.2 [APP-201/6.3].	Agreed	Agreed	Agreed
Chapter 15: Assessment of Cumulative Effects [APP-054/6.1]		Cumulative assessmen t	The EA is content that the Environmental Statement appropriately assesses the cumulative effects of the Scheme and that impacts would be managed through adherence to mitigation measures detailed in the OEMP.	Delivery of the OEMP [APP-28/6.11] is a Requirement in the draft DCO.	Agreed	Agreed	Agreed

3.3 Issues related to other documents

3.3.1 The table below shows those matters which have been agreed or yet to be agreed by the parties, including a reference number for each matter, and the date and method by which it was agreed. The document reference column is included where the matter pertains to a specific section of a document submitted as part of the Application or following submission. This column is left blank where there is no document reference for the issue.

Table 3.2: Issues Related to Other Relevant Documents

Section	Paragraph reference	Sub-section	Environment Agency Comment	Highways England Response	Status	Agreement likely (APP)?[2]	Agreement likely (IP)?
OEMP [APP-218/6.11] Section 4.2 Consents and permissions	Table 4.1	Consents and Agreements	The EA is content that there are no Main Rivers directly affected by the Scheme. Any works to floodplains can be considered through the Land Drainage Consent application procedure.	A meeting regarding Water and drainage consents was held on 21/01/20 with AECOM and LLFA to inform Table 4.1 of the OEMP which is also captured within the Consents and Agreements Position Statement [APP-020/3.3.].	Agreed	Agreed	Agreed
OEMP [APP-218/6.11] Section 4.2 Consents and permissions	Table 4.1	Consents and Agreements	The EA is content that the appropriate consents and licences which may be required to construct the Scheme are outlined in Table 4.1 of the OEMP [APP-218/6.11] along with the correct consenting authority.	A meeting regarding Water and drainage consents was held on 21/01/20 with AECOM and LLFA to inform Table 4.1 of the OEMP which is also captured within the Consents and Agreements Position Statement [APP-020/3.3.].	Agreed	Agreed	Agreed

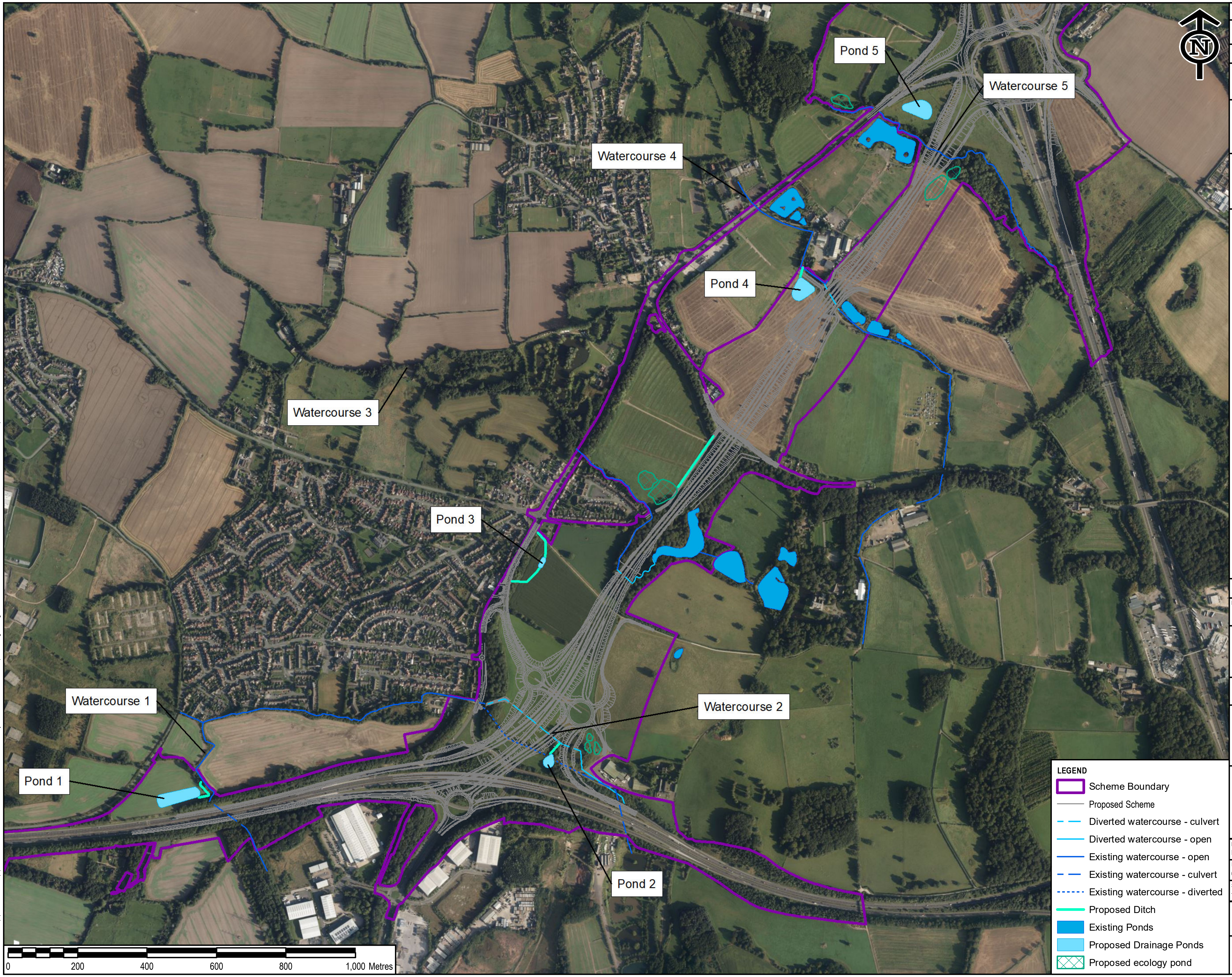
[2] Indication on likelihood that the matter will be agreed by the close of the Examination period as rated by the Applicant (app) and the Interested Party (IP). Dark green = agreed, Light green = high likelihood of agreement, yellow = medium likelihood of agreement, red = low likelihood of agreement. Inserted as one column here as most issues raised already agreed.

Section	Paragraph reference	Sub-section	Environment Agency Comment	Highways England Response	Status	Agreement likely (APP)?[2]	Agreement likely (IP)?
			We agree that a temporary EPR water or ground discharge permit might be required if there is a need to dispose of waste waters or sewage during construction. Also, a WRA dewatering permit / water abstraction licence may also be required in case of high watertable for footings / foundations. Additionally, discharge/Impoundment/Abstraction licencing that may be required should be able to avoid any significant detrimental impact via the adoption of fairly standard mitigation practices, so is unlikely to cause undue delays. Fish Rescue/Translocation licencing is generally a straightforward process and is unlikely to be refused providing appropriate methodologies are adhered to. The EA believe that there is a high likelihood that agreement will be reached regarding the various consents that will be required further to this DCO.	Highways England welcomes the EA's agreement in relation to the high likelihood that consents and licences will be agreed upon if approval of the draft DCO is granted. Further discussions with the EA, regarding consents and permissions, will be undertaken as the detailed design of the Scheme progresses. Delivery of the OEMP [APP-218/Volume 6.11] is a Requirement in the draft DCO.			

Section	Paragraph reference	Sub-section	Environment Agency Comment	Highways England Response	Status	Agreement likely (APP)?[2]	Agreement likely (IP)?
OEMP [APP-218/ 6.11] Section 4.2 Consents and permissions	Table 4.1	Consents and Agreements (Waste)	The EA is content that waste management permits and formal exemptions outlined in Table 4.1 of the OEMP [APP-218/6.11] are appropriate. The EA believe that all considerations of production, movement and handling of waste have been considered. The construction will of course have to comply with relevant waste regulation (incl. DoWCoP) when handling, transporting, treating or disposing of Controlled Waste. The EA confirm that there is a high likelihood the outlined consent and permits would be granted. Please be minded, regarding permits, it is at least a three-month time period for determination of consents. Due to this, ensure enough time is factored in when applying for permits.	Highways England welcomes the EA's agreement in relation to the high likelihood that consents will be agreed upon if approval of the draft DCO is granted. Further discussions with the EA will be undertaken as the detailed design of the Scheme progresses. Delivery of the OEMP [APP-218/6.11] is a Requirement in the draft DCO. Highways England note the three month time period for the determination of consents.	Agreed	Agreed	Agreed

Section	Paragraph reference	Sub-section	Environment Agency Comment	Highways England Response	Status	Agreement likely (APP)?[2]	Agreement likely (IP)?
Draft DCO [AS-075/3.1]	-	Articles and Requirements of the draft DCO	The EA have no comments on the Articles and Requirements of the draft DCO.	Draft DCO sent to the EA for information on 07 December 2021.	Agreed	Agreed	Agreed

Figure 1



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Revision Details	By / Check	Date	Suffix

Purpose of issue
FOR INFORMATION

Client
Highways England
The Cube
199 Wharfeside Street
Birmingham
B1 1RN

Working on behalf of highways england

Development Consent Order Number
TR010054

Project Title
M54 TO M6 LINK ROAD

Drawing Title
PROPOSED WATERCOURSES

Designed	Drawn	Checked	Approved	Date
LC	LC	OT	AS	19/11/2020

Internal Project No.	Suitability
60536736	S8

Scale @ A3	Zone
1:10,000	M54 to M6 Link Road

Drawing Number
Highways England PIN | Originator | Volume
HE514465 -ACM -EGN -
M54_SW_PR_Z -DR - EG - 0038
Location | Type | Role | Number

Rev
P03

Plot Date: 19 November 2020 10:36:10
File Name: \\Uklds2pfpsw001\ukIds2pfpsw001-v1ie\ENVIRONMENT\Practice Areas\GIS\Projects\M54-M6 Link\Workspace\Stage 4 Figures\General\HE514465-ACM-EGN-M54_SW_PR_Z-DR-LE-0038 - Proposed_Watercourses.mxd

Appendix A - Initials and details of individuals involved

Initials	Name	Role or Discipline	Organisation
AB	Andrew Brookes	Hydromorphology	AECOM
AMM	Anne Marie Mcloughlin	Planning Specialist	Environment Agency
AS	Amy Spencer	Deputy Environment Lead	AECOM
CA	Chris Archer	Flood Risk Officer	Staffordshire County Council
DH	Diane Harrower	Water Quality	AECOM
DL	Dave Last	Project Manager	AECOM
DT	Dyfan Thomas	Highways	Amey
GB	Gail Boyle	EIA & Land Rights Advisor	Planning Inspectorate
HH	Hannah Howe	Flooding/Water	AECOM
IC	Ian Cook	Flood Risk	Environment Agency
JF	Jane Field	Planning Specialist	Environment Agency
JD	Jim Davies	Planning Specialist	Environment Agency
KH	Karen Hall	Environment Officer	Environment Agency
KY	Karen Yates	Flood Risk	Environment Agency
NW	Neil Williams	Associate Geomorphologist	AECOM
OT	Owen Tucker	Road Drainage/Water Quality Lead	AECOM
PG	Paul Gethins	Planning Specialist	Environment Agency
PB	Petrina Brown	Biodiversity/Fisheries	Environment Agency
RB	Richard Brandsma	Groundwater/Contam Land	Environment Agency
RR	Rob Ramshaw	Project Manager	AECOM
SB	Sally Ball	Flood Risk	Environment Agency
SBa	Sally Barnett	Highways/Drainage Design	AECOM
SBl	Sarah Blackburn	Groundwater/Contaminated Land	AECOM
SV	Sangeetha Viswan	Geomorphology Specialist	Environment Agency
TB	Tom Bennett	Former Stakeholder Lead	Amey
TdlR	Tom de la Rosa	Senior Environmental Advisor	Highways England
TP	Tamara Percy	Environmental Lead	AECOM

Appendix B – WFD Summary Report

M54 to M6 Link Road
TR010054

Water Framework Directive Assessment Summary Report

Regulation 5(2)(q)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

March 2021

Infrastructure Planning

Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

M54 to M6 Link Road

Development Consent Order 202[ ]

Water Framework Directive Assessment: Summary Report

Regulation Number	Regulation 5(2)(q)
Planning Inspectorate Scheme Reference	TR010054
Application Document Reference	N/A
Author	M54 to M6 Link Road Project Team and Highways England

Version	Date	Status of Version
2	March 2021	Issue to the Environment Agency for Information

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1 Introduction

1.1.1 Highways England are developing a new road between the M54 and M6 to provide a link between Junction 1 of the M54, M6 North and the A460 to Cannock. The M54 to M6 Link Road (herein referred to as 'the Scheme') aims to reduce congestion on local / regional routes, particularly the A449 and A460, and deliver improved transport links to encourage the development of the surrounding area.

1.1.2 As part of the Development Consent Order (DCO) application for the Scheme a Water Framework Directive assessment (WFDa) was undertaken and is presented in Appendix 13.4 of the ES [APP-203/6.3]. The WFDa considers the impact on relevant Water Framework Directive (WFD) objectives for designated waterbodies in the study area, to determine whether the Scheme is compliant with the requirements of the WFD.

1.2 Purpose of this report

1.2.1 This Report has been prepared in response to a consultation meeting with the Environment Agency on 19 November 2020, in which the Environment Agency requested a concise summary of the WFDa presented in Appendix 13.4 of the ES [APP-203/6.3] to cover:

- an overview of the findings of the WFDa;
- a summary of the mitigation measures proposed to reduce the impacts of the Scheme on the affected watercourses; and
- confirmation of where the proposed mitigation measures are secured through the DCO Application documents.

1.2.2 This report deals specifically with the potential impact and proposed mitigation/enhancement related to physical changes to water bodies through new culverts and bridges. Please refer to the WFDa presented in Appendix 13.4 of the ES [APP-203/6.3] for full details of other impacts related to construction works and operational highway runoff discharges and the risk of chemical spillages.

1.2.3 All mitigation measures set out in this report are included as commitments in Tables 3.2 to 3.4 of the Outline Environmental Management Plan (Version 4, submitted to the Examining Authority at Deadline 4 [REP4-010/6.11]). The commitments of most relevance to this summary document are those set out in Table 3.4, D-WAT1 to D-WAT7 These commitments are secured through the Requirements of the draft DCO [REP6-006/3.1].

1.3 Previous Assessments

1.3.1 This summary note does not replace the detailed WFD technical assessments already prepared (such as for full details of baseline information, approach and methods, scheme information, detailed discussion of impacts and mitigation), and should only be used as a guide to aid review of the following documents:

- Appendix 13.4: Water Framework Directive Assessment Report of the ES [APP-203/6.3];
- Chapter 13 Road Drainage and the Water Environment of the ES [APP-052/6.1];

- Appendix 13.2: Drainage Strategy of the ES [APP-201/6.3];
- Appendix 13.3: Assessment of Routine Road Runoff and Accidental Spillage Risk (HEWRAT) of the ES [APP-202/6.3];
- Figure 2.1: Environmental Masterplan Overview of the ES [AS-086/6.2];
- Outline Environmental Management Plan [APP-218/6.11 and subsequent revisions]; and
- Outline Drainage Works [REP3-021].

1.3.2 Where reference to relevant sections of the full WFD assessment are made it is done so by this Technical Note in the following format:

Refer to Relevant Document
Section abc

2 Watercourse Crossings Overview

2.1.1 The locations of the surface watercourses are shown on Figure 13.1B [AS-029/6.2] of the Environment Statement, and Figure 1 in Appendix B of this report.

2.1.2 All surface watercourses are within the Penk Rivers and Lakes Operational Catchment of the Humber River Basin Management Plan (RBMP) and are tributaries to the River Penk or Saredon Brook.

2.1.3 The seven surface watercourses within the Scheme's zone of influence are listed in Table 2.1, together with WFD impact screening.

2.1.4 The watercourses are generally small first order streams in catchment headwaters, although Watercourse 5, Latherford Brook, is a 'named watercourse' on Ordnance Survey maps.

Table 2.1: M54 Watercourses, Risks, and Screening

WFD Water-body	Watercourse	Main River or Ordinary	Approx. flow rate at crossings*	Hydro-morphological Designation	Proposed Scheme Effect	WFD Screening
River Penk from Source to Saredon Brook (GB104028046680)	Watercourse 1	Ordinary	Estimated 0.001 m^3/s	Not designated Artificial or Heavily Modified	No changes to existing culvert	Screened Out
	Watercourse 2	Ordinary	Estimated 0.003 m^3/s	Not designated Artificial or Heavily Modified	Realignment and two new culverts	**Screened In**
Saredon Brook source to River Penk (GB104028046740)	Watercourse 3	Ordinary	Estimated 0.003 m^3/s	Not designated Artificial or Heavily Modified	Realignment and one new culvert	**Screened In**
	Watercourse 4	Ordinary	Estimated 0.001 m^3/s	Not designated Artificial or Heavily Modified	One new culvert	**Screened In**
	Watercourse 5 (Latherford Brook	Ordinary	Estimated 0.004 m^3/s	Heavily Modified Water Body	Clear span bridge crossing	**Screened In**
	Watercourse 6	Ordinary	Estimated 0.002 m^3/s	Heavily Modified Water Body	Not crossed	Screened Out
	Watercourse 7	Ordinary	Estimated 0.007 m^3/s	Heavily Modified Water Body	Not crossed	Screened Out

* As watercourse flow data is unavailable for any of the potentially impacted watercourses, calculation of Q95 low flows (i.e. the flow that is equalled or exceeded 95% of the time) has been undertaken through a desk-based exercise using catchment data and Wallingford Hydrosolutions Ltd LowFlows software. This is an estimation method that can be used for a first order estimate of the natural Q95 flow. The estimated flow data is therefore a best estimate. Locations for all low flow estimations are shown on Figure 13.2 of the Environmental Statement.

2.1.5 WFD surface water impacts 'screened in' to the WFD assessment are summarised in Table 2.2 for the River Penk catchment, and Table 2.3 for the Saredon Brook catchment.

Table 2.2: M54 Watercourse Impacts and Mitigation– River Penk Catchment

Watercourse	Impacts	Structure Design Embedded Mitigation	Mitigation and Compensatory Enhancement (lengths all approx. and in m)	Residual net length impact (lengths all approx. and in m)
Watercourse1	No direct impact on Watercourse 1.	No structures proposed.	Approx. 75 m of new ditch habitat created downstream of Pond 1. Commitments D-WAT1, D-WAT6 and D-BIO1 in the OEMP [REP-010/6.11]*.	Approx. 75 m of new channel gained linking Pond 1 to Watercourse 1.
Watercourse 2	Approx. 335 m of existing channel / habitat would be lost and replaced with: • 218 m of culvert (2 culverts) • 165 m of new open channel	Culverts sized accordingly to avoid flood risk and scour effects. – 166 m long box culvert (1.2m x 2m). – 52 m long 1.2m diameter circular culvert. Culvert inverts recessed by a minimum of 300 mm for bed continuity. Watercourse realigned to minimise total culvert length. Supports mitigation of historically straightened channel.	It is proposed that the new section of realigned channel upstream of the new junction (**approx. 65 m lower estimate**) and the new open channel downstream of the new junction (**approx. 90 m**) will be designed to enhance existing channel form/ character. In addition, **approx. 10 m** of new open channel would connect the two culverts between the mainline and slip road. This 10 m of new open channel would be connected to Pond 2 via **32 m** of new ditch. Ditchcourses will be suitably landscaped and their margins planted to provide suitable riparian habitat. Downstream the existing woodland channel will be retained but flow will be diverted along a new course (**approx. 90 m**). However, this will not be a flowing channel but it will retain some ecological value. Furthermore, 3no. new ecology ponds will also be created to the north of the realigned Watercourse 2 upstream of the new junction. A 600 mm dia. mammal tunnel is also proposed. Commitments D-WAT1, D-WAT2, D-WAT6, D-BIO1, and D-BIO5 in the OEMP [REP-010/6.11]*.	335m of channel would be lost and replaced with 218m of culvert and 197m of new channel which would be enhanced over existing condition. Approx. 90 m of redundant channel in woodland north of new junction will be retained. There will also be the creation of 3no. new ponds.
River Penk Catchment Summary (W1 & W2)	Overall, within this WFD water body catchment approximately 335 m of channel would be lost and replaced with 218 m of culvert and 272 m of new channel which would be enhanced over existing condition. Approx. 90 m of redundant channel in woodland north of new junction will be retained. There will also be the creation of 3no. new ponds.			

*Appendix C replicates the mitigation design commitments as set out in the Outline Environmental Management Plan.

Appendix D – provides a further summary of the approximate losses and gains in channel length within the River Penk Catchment.

Table 2.3: M54 Watercourse Impacts and Mitigation – Saredon Brook Catchment

Watercourse	Impacts	Structure Design Embedded Mitigation	Mitigation and Compensatory Enhancement (lengths all approx. and in m)	Residual Net length impact (lengths all approx. and in m)
Watercourse 3	Loss of 35 m of open channel and partial loss (0.46ha) of Lower Pool (impounded online pond) to accommodate the construction of the link road. Replaced by: • 55 m of culvert • 100 m of new channel to divert the watercourse to the culvert. The loss of channel is shorter than the length of the proposed culvert as the point at which the watercourse currently overflows from Lower Pool is within the footprint of the proposed carriageway.	1.2m diameter circular culvert 55m in length sized accordingly to avoid flood risk and scour effects. Culvert invert recessed by 300 mm (at mid-point) for bed continuity. Supports restoration of impounded online pond to naturalised watercourse. Realignment to minimise culvert length, supports mitigation of historically straightened channel.	**Approx. 100 m** of new channel for Watercourse 3 will be created due to the modifications to Lower Pool, diverting the watercourse south to pass under the Scheme. This provides an opportunity to improve the overflow from the lake that is currently overgrown and silted up. **Approx. 280 m** new ditch habitat created upstream and downstream of Pond 3. Two new ecological mitigation ponds and a new ditch (unconnected to local watercourses) to be created downstream of Dark Lane but close to Watercourse 3. 600 mm diameter mammal tunnel proposed. Commitments D-WAT1, D-WAT3, D-WAT6, D-WAT8, D-BIO1, and D-BIO5 in the OEMP [REP-010/6.11]*.	Approx. 345 m of new channel and riparian habitat gained plus two new ecology ponds and an ecology mitigation ditch.
Watercourse 4	Minor realignment and loss of 50m of open channel.	1.2m diameter circular culvert 50m in length sized accordingly to avoid flood risk and scour effects. Invert recessed by 300 mm (at mid-point) for bed continuity.	Approx. **96 m** of new ditch proposed upstream and downstream of Pond 4. 600 mm diameter mammal tunnel proposed. Commitments D-WAT1, D-WAT4, D-WAT6, D-BIO1, and D-BIO5 in the OEMP [REP-010/6.11]*.	Approx. 46 m of new channel and riparian habitat gained.

Watercourse	Impacts	Structure Design Embedded Mitigation	Mitigation and Compensatory Enhancement (lengths all approx. and in m)	Residual Net length impact (lengths all approx. and in m)
Watercourse 5	Semi-enclosure of 30 m of watercourse through a 10 m (minimum) span bridge (total length of structure 70m when with splayed abutments taken into consideration). Minor realignments to the watercourse on entry and exit to accommodate the structure and embankments. Partial loss of bankside habitat through the tunnel due to varying reductions in light level.	Bridge with a minimum 10 m span width defined from ecological and hydromorphological process analysis.	Three new ecological mitigation ponds are proposed, two upstream of the new link road to the south of the channel, and one downstream of the A460 to the north of the channel. Commitments: D-BIO1, D-BIO5, D- WAT5 and D-WAT7 in the OEMP [REP4-010/6.11]*.	Approx. 30 m of channel affected by the new bridge structure.
Saredon Brook Catchment Summary (W3, W4 and W5)	Overall, within this WFD water body catchment approximately 390 m of new open channel will be gained plus two new ecology ponds and an ecology mitigation ditch. Approximately 30 m of bank habitat along Watercourse 5 would be impacted by shading but the open channel will be maintained within structure.			

*Appendix C replicates the mitigation design commitments as set out in the Outline Environmental Management Plan.

2.1.6 Full details of RBMP waterbody statuses, conditions and mitigation measures, and local assessments of baselines, impacts and mitigations are provided in the WFD Assessment Report [APP-203/6.3]. Only brief impact and mitigation summaries are provided in this note in order to guide review of the full WFDa.

Refer to Environmental Statement Appendix 13.4 (WFD Assessment) Section 4.1

2.1.7 The WFD assessment of the baseline and design reviews impacts and opportunities for two types of stream channel:

- Watercourses, which are defined existing permanently wet aquatic habitats that are part of the baseline WFD water body river network and are therefore assessed for impact and mitigation.
- Ditchcourses, which are new drainage connections that would only be activated when highway attenuation and treatment ponds are discharging. These are not part of the WFD baseline and would not necessarily support aquatic habitat but would have residual benefits as partially wet habitats that support biodiversity net gain.

2.1.8 The impact of culverts would be mitigated by the design of the culvert (to minimise adverse impacts on the hydromorphology of the watercourse and channel continuum) and by the creation of new ditchcourses, channel diversions and realignments designed to provide improvement on the current channels form and character (to compensate for the loss of riparian habitat, shading of existing channels etc.). These mitigation measures are set out in the OEMP, Table 3.4, D-BIO1, D-WAT1 to D-WAT6. However, the following highlights in more detail the role of proposed new drainage ditchcourses as mitigation for the loss of channel / riparian habitat due to proposed culverts.

2.1.9 Commitment D-WAT6 in the OEMP [APP-218/6.11 and subsequent revisions] states that the ditchcourses would convey treated runoff to the receiving watercourses from new treatment ponds. The design of new ditches would be informed by a geomorphologist and would include where practicable ‘natural’ features such as a sinuous low flow channel incorporating shallow berms and occasional sections where the channel is narrowed to improve flow.

2.1.10 As shown on the Outline Drainage Works figures [AS-072/2.11] (Sheets 3-5), these would be provided for drainage ponds 1 to 4 (currently the outfall from Pond 5 would be a pipe and engineered outfall, but options to include a cascade ditch arrangement are being considered to see if these are practical and cost effective). Having the final discharge from these treatment drainage ponds conveyed by an open ditchcourse is more sustainable avoiding the need to construct a new engineered outfall supported by concrete headwalls, whilst also encouraging greater connectivity between the existing watercourse network and the Sustainable Drainage Systems (SuDS) being proposed as part of the Scheme.

2.1.11 The proposed road drainage networks 5, 8 and 10 (i.e. to Watercourses 2, 3 and 4, respectively) are not reliant on the proposed ditchcourses downstream of the treatment ponds to provide treatment of highway runoff. As the flow within these ditchcourses will come from highway surfaces via a treatment train, water quality

will be influenced by the type and range of chemical compounds that may be found in highway runoff. However, the proposed ditchcourses will still provide biodiversity benefits, and are preferred to discharging water from the treatment pond via a pipe and new engineered headwall. In addition, although direct comparison between the existing highway alignments and the Scheme is not straight forward (for instance due to the remodelling of M54 Junction 1) the provision of new treatment measures where none currently exist will provide some improvement in water quality along local watercourses (in particular Watercourse 2 and Watercourse 6).

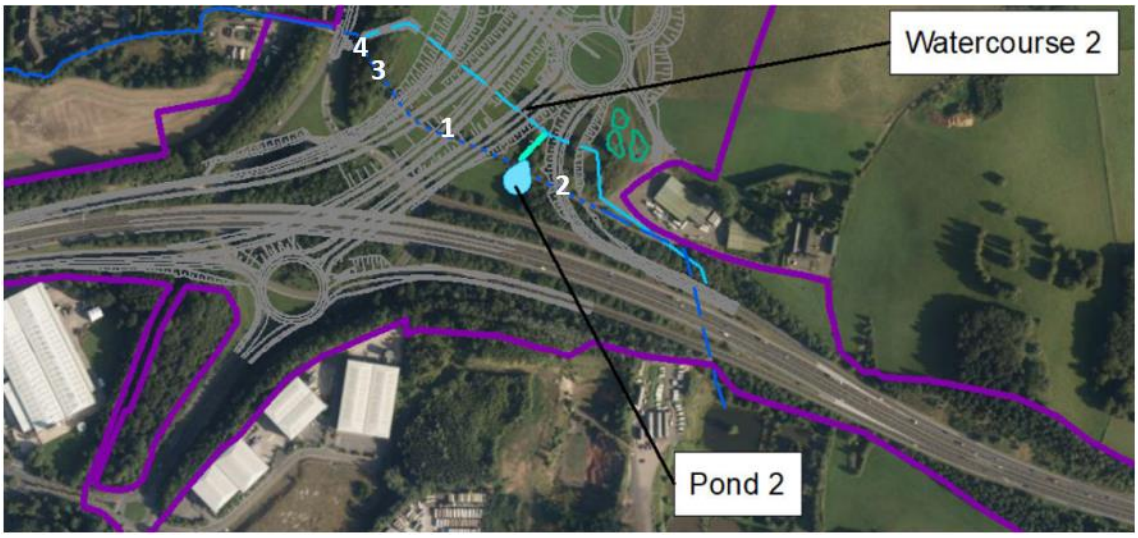
2.1.12 Impact and mitigation summaries for each of the watercourses ‘Screened In’ for WFD assessment are presented in subsequent sections of this report.

3 River Penk Catchment

3.1 Watercourse 2

The context of the Watercourse 2 crossings is summarised in Figure 3-1: Watercourse 2 crossings: setting, and representative images

3.1.1 Impacts and mitigation are briefly summarised below. In Figure 3.1, existing watercourse configurations are shown in dark blue, proposed are in light blue, compensatory ecology ponds outlined in green hatch, proposed ditches are in green and images locations are in white text. Pond 2 is required for runoff attenuation.



1. Degraded watercourse at proposed M54 Junction 1 crossing

2. Degraded watercourse at proposed M54 slip road crossing

3. Higher quality woodland watercourse downstream of crossing

4. Existing small diameter A460 culvert disconnects impacted watercourse from downstream channel. Additional culverts immediately upstream of the site and Tower House Farm where existing M54 crosses the channel, beyond which catchment modified by series of ponds/lakes at Hill Farm

Figure 3-1: Watercourse 2 crossings: setting, and representative images

3.1.2 Watercourse 2 is a small, unnamed tributary to the River Penk (from Source to Saredon Brook) WFD water body, set between existing culverts beneath the A460 downstream and the M54 upstream, of the Scheme. Between the A460 and the existing M54, Watercourse 2 is culverted for approximately half its length.

Biology

3.1.3 There would be direct loss of habitat and biodiversity due to culverting of existing open channels and depleted photosynthesis. Indirect habitat impacts could also result from changes in hydraulic and sedimentary flow conditions in the culvert. The channel diversion (lengthening) is an opportunity to create / restore habitats in an historically straightened channel. Impact and mitigation lengths are summarised below.

3.1.4 Habitats upstream and downstream of the culverts would be disconnected, but these headwaters are already disconnected from the River Penk catchment by a small diameter culvert beneath the A460. Impacts would be contained locally and would not transfer through the A460 culvert to have any effect on the main water body network. Mammal tunnels are proposed for mobile terrestrial species, and culvert inverts would be recessed below bed level for bed habitat continuity.

3.1.5 Aquatic habitat surveys for Watercourse 2 identified Bullhead, which is a species listed on Annex II of the EC Habitats Directive. The watercourse supports a diverse macroinvertebrate community, although no species of conservation interest were recorded. Macrophyte surveys have not been undertaken.

Physico-Chemistry

3.1.6 The inclusion of SuDs as part of the Drainage Strategy [APP-201/6.3] will mean that there are no significant impacts on water quality, or there is betterment from improved treatment trains, especially for specific pollutants.

3.1.7 Aquatic habitat temperatures may decrease locally due to culvert shading, but temperatures may already be overly high in this reach due to flow supply being from attenuated and exposed online ponds upstream of the M54, and temperatures are likely to recover within a short distance downstream of the A460 culvert. Outside of a short section where Watercourse 2 flows through a small woodland, the local channel appears choked and over-shaded due to overgrowth of shrub vegetation that is likely to be linked with excess nutrients from diffuse pollutants in local agricultural runoff.

3.1.8 Dissolved oxygen could locally decline due to reduced photosynthesis in new culverts, but biological oxygen demand would also decrease. Acid neutralising capacity, ammonia, pH and phosphates are unlikely to be significantly affected.

Hydromorphology

3.1.9 Quantity and dynamics of watercourse flow should not be significantly impacted by culverting since the existing channels are already enlarged and straightened for drainage purposes. SuDs would regulate highway runoff quantity as well as quality. Culvert gradients are designed to sustain flow and mitigate sedimentation. The diverted and lengthened channel may reduce flow rates, but the channel appears historically straightened and modified (enlarged) to increase drainage rates, so this

is considered a minor benefit. The existing channel length is approximately 335 m long and the new channel arrangement would be approximately 380 m; approximately a 13.5% length increase.

3.1.10 Groundwater would be locally disconnected by the new culverts, but the primary flow in the channel is from upstream and local groundwater emergence at the proposed crossing is not considered to significantly contribute to local surface flow.

3.1.11 Watercourse lateral and longitudinal continuity would be impacted, but the local channel is already over-enlarged and disconnected from the River Penk catchment by the A460 culvert. Where new sections of open channel are proposed upstream, between the mainline and slip road, and downstream of the new M54 Junction 1, there is an opportunity to enhance the form and character of the existing channel over the baseline situation.

3.1.12 Watercourse depth and width variation would decrease in culverts, but the channels are already historically straightened and enlarged. Channel deepening and widening appears to have altered the prevailing sediment dynamics to balance transport or deposition, so there is anticipated to be no local erosive contribution of channel habitat substrate despite the headwater setting.

3.1.13 Impacts on the structure and substrate of the watercourse bed would be minimised by culvert designs including for 300mm of substrate above the culvert inverts.

3.1.14 The structure of riparian zone would be negatively impacted, but the existing riparian structure is poor, and the lengthening channel diversion design will partly mitigate riparian length and quality. A new highway runoff treatment pond connected to Watercourse 2 via a new ditch, together with a cluster of three ecological mitigation ponds close to the realigned Watercourse 2 downstream of the new M54 Junction 1 will help to compensate for the loss of riparian habitat.

Chemistry

3.1.15 The inclusion of SuDs within the design will mean there are no significant impacts on water quality, or there is betterment from improved treatment trains, especially for highway-derived priority substances, priority hazardous substances, and other pollutants.

Cumulative Impacts

3.1.16 The impacts on Watercourse 2 are localised and contained within an area already disconnected from the rest of the River Penk network by the existing A460 culverts. The Scheme would not impact other tributaries to the River Penk.

3.1.17 It is not considered that these impacts on a single tributary watercourse would have a significant cumulative effect on the water body.

Water Body Scale Impacts

3.1.18 Appendix A highlights the course of the River Penk (Source to Saredon Brook) and Saredon Brook (Source to River Penk) WFD water bodies, together with the most significant tributaries as identified from digital Ordnance Survey mapping. In addition, an estimate of the length of major existing culverts along these watercourses was made using gaps on digital Ordnance Survey maps and HADDMS. Using this information estimates of the proportion of the River Penk

(Source to Saredon Brook) WFD water body affected by new culverting by the proposed Scheme can be estimated with the results presented in Table 3.1. Please note that this has not been adjusted for the proposed realignment of Watercourse 2, which effectively makes the watercourse longer (and this would slightly and insignificantly reduce the percentage of the channel impacted).

Table 3.1 Impact on channel length of proposed culverting along Watercourse 2 – River Penk (Source to Saredon Brook)

Watercourse lengths	**Approx. Length (m)**
Estimated total length of tributaries (incl. existing culverts)	28618
Estimated total length of existing culverts on tributaries	3148
Published length of the water body in the RBMP	14000
Estimated total channel length of main stem plus major tributaries within entire water body catchment (see Appendix A)	42618
Estimated total channel length of main stem plus major tributaries within entire water body catchment minus known existing culverts	39470
Total length of new culverts proposed by the Scheme (but excluding new ditchcourses and channel diversions/realignments)	218
Outcome of cumulative appraisal	**Approx. Percentage (%)**
Estimated % proposed Scheme culverting of Watercourse 2 as proportion of length of Watercourse 2	4.07
Estimated % proposed Scheme culverting of Watercourse 2 as proportion of WFD water body published length	1.56
Estimated % proposed Scheme culverting of Watercourse 2 as proportion of WFD water body published length + sub-tributaries (incl. existing culverts	0.55

3.1.19 For Watercourse 2, the proposed culverting represents around 4% of the channel length (this was previously reported as 6% but has now been measured more precisely). As a proportion of the length of the River Penk (Source to Saredon Brook) WFD water body as published in the RBMP the proposed culverts represent around 1.5% of the channel length. However, as the proposed culvert is not on the main stem but on an associated tributary, it would be most appropriate to consider the impact as a proportion of the WFD water bodies main stem plus estimates for all other main tributaries to that WFD water body also (taking into account an estimation for any other known culverts). When this is done the proportion of the total catchment channel length affected is only approximately 0.55%.

3.1.20 Due to the small proportion of the total WFD water body catchment channel length impacted by the proposed culverts to Watercourse 2 (noting that we have not estimated all tributary lengths), the design of the culvert (which seeks to minimise adverse impacts on hydromorphological processes), and the compensation for the loss of riparian habitat provided by new ditchcourses (e.g. from Ponds 1 and 2) an overall minor adverse and localised impact is predicted, that would not be significant at the water body level (i.e. no deterioration of the WFD status of the water body).

3.1.21 The impacts on Watercourse 2 are localised and contained within an area already disconnected from the rest of the River Penk network by the existing A460 culverts. Although the net effect of the proposed Scheme would be the loss of approximately 138 m of channel, this impact would be offset by:

- The new channel would be enhanced over existing conditions through good design;

- Approximately 90 m of redundant channel in the woodland north of the new junction will be retained as wetland habitat;
- Three new ecological mitigation ponds and one highway runoff treatment pond will be created close to the course of the realigned Watercourse 2.

3.1.22 Overall, no deterioration of any WFD element at water body scale is anticipated.

3.1.23 To our knowledge following extensive consultation, no improvements to watercourses in this area are in any form of development, planning or strategy. The Scheme is not considered to prevent future improvements to the water body.

Conclusion

3.1.24 It is acknowledged that the Scheme would result in some loss of existing open channel habitat. The existing watercourse is highly modified and disconnected from the rest of the catchment, so the importance of protecting the local habitat that remains is recognised. However, it also means that local impacts are unlikely to affect the rest of the water body.

3.1.25 The impacts of the Scheme are judged as unavoidable and unlikely to have significant detriment to the overall condition and value of the River Penk (from Source to Saredon Brook) water body.

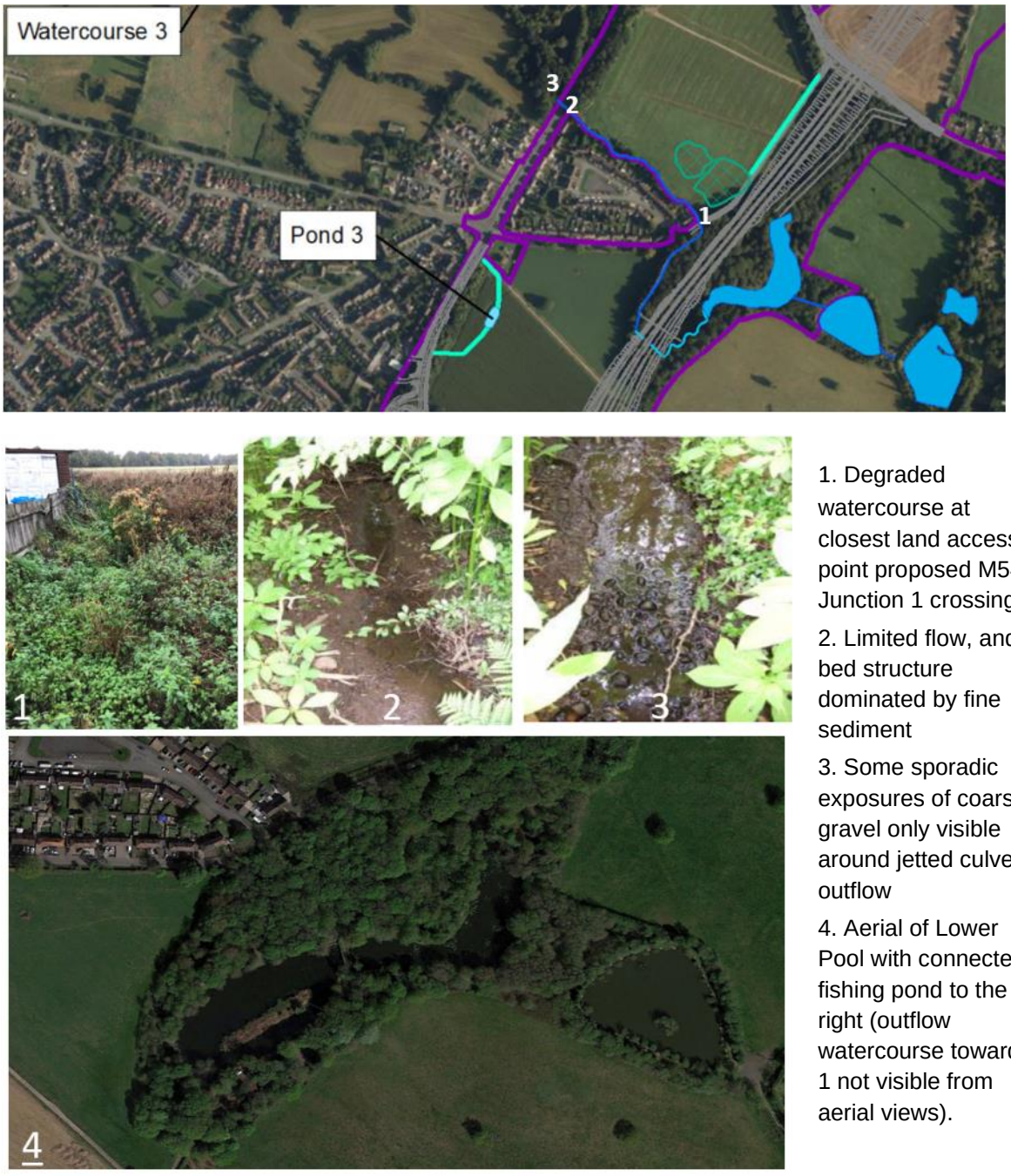
3.1.26 The proposed culvert structures are judged as a reasonable and pragmatic solution in view of what is technically feasible, and cost proportionate for the overriding benefits of the Scheme.

Refer to Environmental Statement Appendix 13.4 (WFD Assessment) Sections 5 and 6

4 Saredon Brook Catchment

4.1 Watercourse 3

4.1.1 The context of the Watercourse 3 crossing is summarised in Figure 4-1. Impacts and mitigation are briefly summarised below. In Figure 4.1, existing watercourse configurations are shown in dark blue, proposed are in light blue, existing lakes/ponds are in light blue, compensatory ecology ponds outlined in green hatch, proposed ditches are in green and images locations are in white text.



1. Degraded watercourse at closest land access point proposed M54 Junction 1 crossing
2. Limited flow, and bed structure dominated by fine sediment
3. Some sporadic exposures of coarse gravel only visible around jetted culvert outflow
4. Aerial of Lower Pool with connected fishing pond to the right (outflow watercourse towards 1 not visible from aerial views).

Figure 4-1: Watercourse 3 crossing: setting, and representative images

4.1.2 Watercourse 3 is a small, unnamed tributary to Saredon Brook (from source to River Penk) WFD water body. Land access has been limited in this area, but from observations downstream the watercourse is thought to be ephemeral in the vicinity of the proposed crossing point. Watercourse 3 is an outflow from a sequence of impounded online small ornamental lakes / ponds upstream of the Scheme, which then flows through two culverts that are downstream of the Scheme, one beneath Dark Lane, and the other beneath the A460. Where the Scheme would cross Watercourse 3 close to its headwaters.

Biology

4.1.3 It is unlikely that the local watercourse would support aquatic habitat. There would still be direct loss of habitat and biodiversity due to culverting of existing open channels and depleted photosynthesis. Indirect ephemeral habitat impacts due to changes in hydraulic and sedimentary flow conditions in the culvert are unlikely. Whilst some pond habitat would be lost and compensated, existing ephemeral channel downstream of the pond impoundment could be restored to a more naturalised stream channel, and the existing channel would be lengthened to provide more watercourse habitat. The current impoundment overflow is overgrown and silted but it is proposed that the new arrangements could improve flows to Watercourse 3. However, given the position close to the headwaters of this small watercourse, and the number of lakes/ponds in series, it is beyond the control of the Scheme to provide a permanent downstream flow from the new impoundment.

4.1.4 These headwaters are already disconnected from the Saredon Brook by the Dark Lane culvert and the A460 culvert. Continuity upstream is prevented by the presence of multiple impoundments. Impacts would therefore be contained locally and would not transfer through these culverts to have any effect on the main water body network downstream.

4.1.5 Aquatic habitat surveys for Watercourse 3 identified Bullhead downstream of the Order Limits, which is a species listed on Annex II of the EC Habitats Directive. Macroinvertebrate and macrophyte surveys have not been undertaken.

Physico-Chemistry

4.1.6 The inclusion of SuDs within the design will mean there are no significant impacts on water quality, or there is betterment from improved treatment trains, especially for specific pollutants.

4.1.7 Aquatic habitat (if present) temperatures may decrease locally due to culvert shading but may be overly high in this reach due to flow supply being from a series of attenuated and exposed online ponds that would change the temperature regime of emergent groundwater. Ecology should not be significantly affected in the retained wooded areas around the new crossings, and temperatures are likely to recover within a short distance downstream of the Dark Lane and A460 culverts. The local channel already appears heavily shaded by natural woodland. Downstream of Dark Lane, the channel appears choked and over-shaded due to overgrowth that is likely to be linked with excessive nutrients from diffuse pollutants from agricultural runoff.

4.1.8 Dissolved oxygen could locally decline with photosynthesis in new culverts, but biological oxygen demand would also decrease. Ammonia, pH and phosphates are unlikely to be significantly affected.

Hydromorphology

4.1.9 Quantity and dynamics of watercourse flow should not be significantly impacted by culverting, since the existing channels are already regulated according to upstream outfall arrangements from existing impoundments. The existing channels were not accessible at this location, but flow at Dark Lane in September 2020 following moderate rainfall for the previous month was barely visible. It is reasonable to assume that the watercourse at the proposed crossing is ephemeral. Outfall arrangements would be modified for sustainable aquatic habitat and the channel lengthened for habitat gain. Culvert gradients are designed to sustain flow and mitigate sedimentation. Open water habitat from Lower Pool would be lost and compensated through the creation of ponds elsewhere, and the existing ephemeral channel downstream of the pond impoundment would be restored to a more naturalised stream channel.

4.1.10 Groundwater would be locally disconnected, but the primary flow in the channel is from upstream and local groundwater emergence at the proposed crossing is not considered to contribute to local surface flow significantly.

4.1.11 Watercourse lateral and longitudinal continuity would be impacted, but the existing local channel is ephemeral, and disconnected from the Saredon Brook catchment by the A460 and Dark Lane culverts, and from upstream by lake / pond impoundments.

4.1.12 Watercourse depth and width variation could decrease in culverts, but the existing channel is ephemeral, and this is not considered significant. There is not anticipated to be any local erosive contribution of channel habitat substrate despite the headwater setting.

4.1.13 Impacts on the structure and substrate of the watercourse bed would be minimised by culvert designs including for 300mm of substrate above the culvert inverts (mid-point as a pipe culvert proposed).

4.1.14 The structure of riparian zone would be negatively impacted, but the existing riparian structure is poor, and the lengthening channel diversion design will allow for greater riparian length and quality to be provided as compensation and enhancement.

Chemistry

4.1.15 The inclusion of SuDs within the design will mean there are no significant impacts on water quality, or there is betterment from improved treatment trains, especially for highway-derived priority substances, priority hazardous substances, and other pollutants.

Water Body Scale Impacts

4.1.16 The impacts on Watercourse 3 are localised and contained within an area already disconnected from the rest of the Saredon Brook by the existing A460 culverts.

4.1.17 As discussed for Watercourse 2, Appendix A highlights the course of the Saredon Brook (Source to River Penk) WFD water body, together with the most significant tributaries as identified from digital Ordnance Survey mapping. In addition, an estimate of the length of major existing culverts along these watercourses was made using gaps on digital Ordnance Survey maps and HADDMS. Using this information estimates of the proportion of the Saredon Brook (Source to River Penk) WFD water body affected by new culverting by the Scheme have been estimated with the results presented in Table 4.2. The assessment considers works to Watercourse 3 and Watercourse 4 as they would be culverted and are within the Saredon Brook catchment.

Table 4.1: Impact on channel length of proposed culverting along Watercourse 3 and Watercourse 4 – Saredon Brook (Source to River Penk)

Watercourse lengths	**Approx. Length (m)**
Estimated total length of tributaries (incl. existing culverts)	11485
Estimated total length of existing culverts on tributaries	491
Published length of the water body in the RBMP	25000
Estimated total channel length main stem plus major tributaries within entire water body catchment	36485
Estimated total channel length main stem plus major tributaries within entire water body catchment minus known culverts	35994
Total length of new culverts proposed by the Scheme (but excluding new ditchcourses and channel diversions/realignments)	105
Outcome of cumulative appraisal	**Approx. Percentage (%)**
Estimated % proposed Scheme culverting of Watercourse 3 as proportion of length of Watercourse 3	1.02
Estimated % proposed Scheme culverting of Watercourse 4 as proportion of length of Watercourse 4	2.26
Estimated % proposed Scheme culverting of Watercourse 3+4 as proportion of WFD water body published length	0.42
Estimated % proposed Scheme culverting of Watercourse 3+4 as proportion of WFD water body published length + sub-tributaries (incl. existing culverts	0.29

4.1.18 As a proportion of Watercourse 3 the proposed culverting represents around 1% of the total channel length. When the proportion of the channel impacted along Watercourse 3 and Watercourse 4 from new culverts is estimated using the length of the Saredon Brook WFD water body as published in the RBMP the proportion affected reduces to around 0.4%. However, as described previously, it would be most appropriate to consider the impact as a proportion of the WFD water body main stem plus estimates for all other main tributaries to that WFD water body (taking into account an estimation for other known culverts). When this is done the proportion of the total catchment channel length affected due to proposed new culverts along Watercourse 3 and 4 is around 0.3%.

4.1.19 Due to the very small proportion of the total WFD water body catchment channel length impacted by the proposed culverts to Watercourse 3 and Watercourse 4, culvert design that has been appropriately sized for flows and to allow a natural bed to form (to reduce adverse impacts on hydromorphological processes), and the compensation for the loss of riparian habitat provided by new ditchcourses linked to attenuation Ponds 3 and 4, plus the new channel diversion proposed for Watercourse 3 (following relocation of the current impoundment structure for Lower

Pool), an overall minor adverse and localised impact is predicted, that would not be significant at the water body level (i.e. no deterioration).

4.1.20 To our knowledge following extensive consultation, no improvements to watercourses in this area are in any form of development, planning or strategy (please refer to Appendix 13.4 of the ES **[APP-203/6.3]** for details of an appraisal against proposed water body mitigation measures). The Scheme is not considered to prevent future improvements to the water body.

Conclusion

4.1.21 It is acknowledged that the Scheme would result in some loss of existing open channel habitat. The existing watercourse is highly modified and disconnected from the rest of the catchment, so the importance of protecting the local habitat that remains is recognised. However, it also means that local impacts are unlikely to affect the rest of the water body.

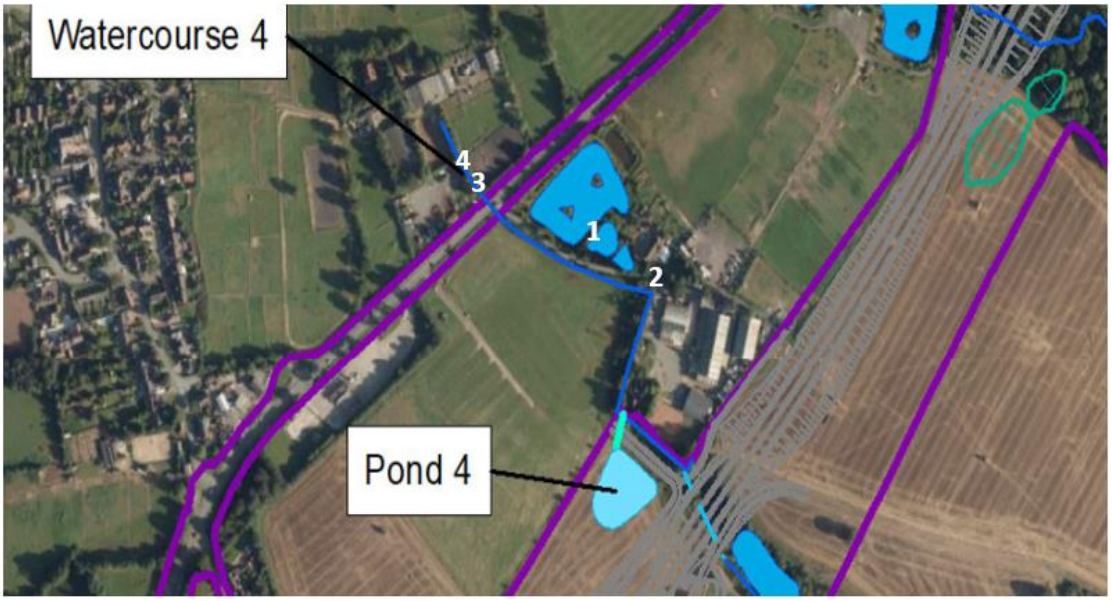
4.1.22 The impacts of the Scheme are judged as unavoidable and unlikely to have significant detriment to the overall condition and value of the Saredon Brook (Source to River Penk) WFD water body.

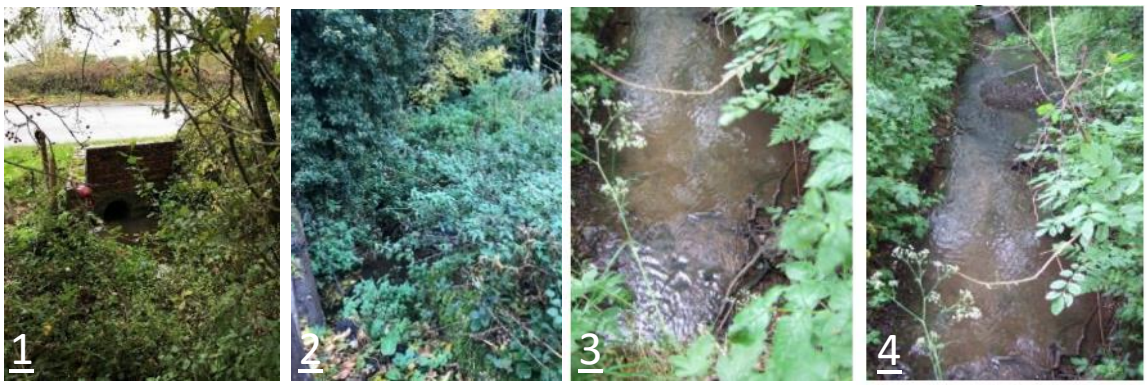
4.1.23 The proposed culvert structure is judged as a reasonable and pragmatic solution in view of what is technically feasible, and cost proportionate for the overriding benefits of the Scheme.

Refer to Environmental Statement Appendix 13.4 (WFD Assessment) Sections 5 and 6

4.2 Watercourse 4

4.2.1 The context of the Watercourse 4 crossing is summarised in Figure 4.2. Impacts and mitigation are briefly summarised below. In Figure 4.2, existing watercourse configurations are shown in dark blue, proposed are in light blue, existing lakes/ponds are in light blue, compensatory ecology ponds outlined in green hatch, proposed ditches are in green and images locations are in white text. Pond 4 is for runoff attenuation.





1. Watercourse flows around the ponds downstream of Brookfield Farm, but the ponds are partly online with offtakes and outfalls
2. Degraded watercourse at the closest access point to the proposed crossing
3. Bed structure with poorly developed pools and a predominance of fine sediment
4. Lateral gravel bars and evidence of active sediment transport and channel adjustment

Figure 4-2 : Watercourse 4 crossing: setting, and representative images

4.2.3 Watercourse 4 is a small, unnamed tributary to the Saredon Brook (from Source to River Penk) WFD water body. The proposed crossing is downstream of a sequence of impounded online ponds, the lowest of which would be lost to the crossing but compensated elsewhere by the Scheme. There is another sequence of partly-online ponds downstream of Brookfield Farm, and a culvert beneath the A460, downstream of the Scheme.

4.2.4 Land access has been limited in this area, but observations downstream are of a well-developed watercourse that has been historically straightened but exhibits dynamic sediment processes and active self-recovery to more naturalised forms.

4.2.5 At the crossing, access was restricted, but the visible channel was much more overgrown and degraded than downstream, with historic straightening fixed in position with linear riparian planting. Flow was well developed, and some sparse bed gravels were visible, but it is reasonable to assume that from the closest access point through the proposed crossing location, flow is highly regulated and substrates are supply-limited, due to the series of impounded online ponds upstream. The Detailed River Network illustrates the channel bypassing the ponds, but this is considered erroneous on the basis of aerial imagery.

Biology

4.2.6 The proposed new culvert would be detrimental to aquatic habitat. There would be direct loss of habitat and biodiversity due to culverting of the existing open channel and depleted photosynthesis. Indirect habitat impacts could also result from changes in hydraulic and sedimentary flow conditions in the culvert.

4.2.7 Habitats upstream and downstream of the culvert would be disconnected, but these headwaters (of Saredon Brook) are already disconnected from the Saredon Brook by the A460 culvert. Impacts would be contained locally and would not transfer through the A460 culvert to have any effect on the main water body network.

4.2.8 Aquatic habitat surveys for Watercourse 4 identified common freshwater fish downstream of the Order Limits. Macroinvertebrate and macrophyte surveys have not been undertaken.

Physico-Chemistry

4.2.9 The inclusion of SuDs within the design will mean that there are no significant impacts on water quality, or there is betterment from improved treatment trains, especially for specific pollutants.

4.2.10 Aquatic habitat temperatures may decrease locally due to culvert shading but may be overly high in this reach due to the upstream series of attenuated and exposed online ponds. Temperatures would be re-impacted by the pond series downstream of the proposed crossing but should then recover to more naturalised conditions downstream of the A460 culverts.

4.2.11 Dissolved oxygen could locally decline with reduced photosynthesis in the new culvert, but biological oxygen demand would also decrease. Ammonia, pH and phosphates are unlikely to be significantly affected.

Hydromorphology

4.2.12 Quantity and dynamics of watercourse flow should not be significantly impacted by culverting, since the existing channel is already regulated according to upstream outfall arrangements. Culvert gradients are designed to sustain flow and mitigate sedimentation. Pond habitat would be lost and compensated.

4.2.13 Groundwater would be locally disconnected, but the primary flow in the channel is from upstream and local groundwater emergence at the proposed crossing is not considered to contribute to local surface flow significantly.

4.2.14 Watercourse lateral and longitudinal continuity would be impacted, but the existing local channel is ephemeral, and disconnected from the Saredon Brook catchment by the A460 culvert, and from upstream by pond impoundments.

4.2.15 Watercourse depth and width variation could decrease in culverts, but the existing watercourse at the proposed crossing is impounded pond. There would be no local erosive contribution of channel habitat substrate from the existing pond.

4.2.16 Impacts on the structure and substrate of the watercourse bed would be minimised by culvert designs including for 300mm of substrate above the culvert inverts (mid-point).

4.2.17 The structure of riparian zone would be negatively impacted, but the existing riparian structure is poor around the ponds and would be compensate in part by riparian planting around new ditchcourses connected to Pond 4.

Chemistry

4.2.18 The inclusion of SuDs within the design will mean there are no significant impacts on water quality, or there is betterment from improved treatment trains, especially for highway-derived priority substances, priority hazardous substances, and other pollutants.

Water Body Scale Impacts

4.2.19 The impacts on Watercourse 4 are localised and contained within an area already disconnected from the rest of the Saredon Brook network by the existing A460 culverts.

4.2.20 Refer to Table 4.2 for details of the impact of culverting within the Saredon Brook catchment. As a proportion of Watercourse 4 the proposed culverting represents around 2% of the total channel length. When the proportion of the channel impacted along Watercourse 3 and Watercourse 4 from new culverts is estimated using the length of the Saredon Brook WFD water body as published in the RBMP the proportion affected reduces to around 0.4%. However, as described previously, it would be most appropriate to consider the impact as a proportion of the WFD water body main stem plus estimates for all other main tributaries to that WFD water body (taking into account an estimation for other known culverts). When this is done the proportion of the total catchment channel length affected due to proposed new culverts along Watercourse 3 and 4 is around 0.3%.

4.2.21 Due to the very small proportion of the total WFD water body catchment channel length impacted by the proposed culverts to Watercourse 3 and Watercourse 4, culvert design that has been appropriately sized for flows and to allow a natural

bed to form (to reduce adverse impacts on hydromorphological processes), and the compensation for the loss of riparian habitat provided by new ditchcourses linked to attenuation Ponds 3 and 4, plus the new channel proposed for Watercourse 3 (following relocation of the current impoundment structure for Lower Pool), an overall minor adverse and localised impact is predicted, that would not be significant at the water body level (i.e. no deterioration).

4.2.22 To our knowledge following extensive consultation, no HMWB mitigation measures are proposed for this area. No improvements to watercourses in this area are in development, planning or strategy. The Scheme is not considered to prevent future improvements to the water body.

Conclusion

4.2.23 It is acknowledged that the Scheme would result in some loss of existing open channel habitat. The existing watercourse is highly modified and disconnected from the rest of the catchment, so the importance of protecting the local habitat that remains is recognised. However, it also means that local impacts are unlikely to affect the rest of the water body.

4.2.24 The impacts of the Scheme are judged as unavoidable and unlikely to have significant detriment to the overall condition and value of the Saredon Brook (from Source to River Penk) WFD water body.

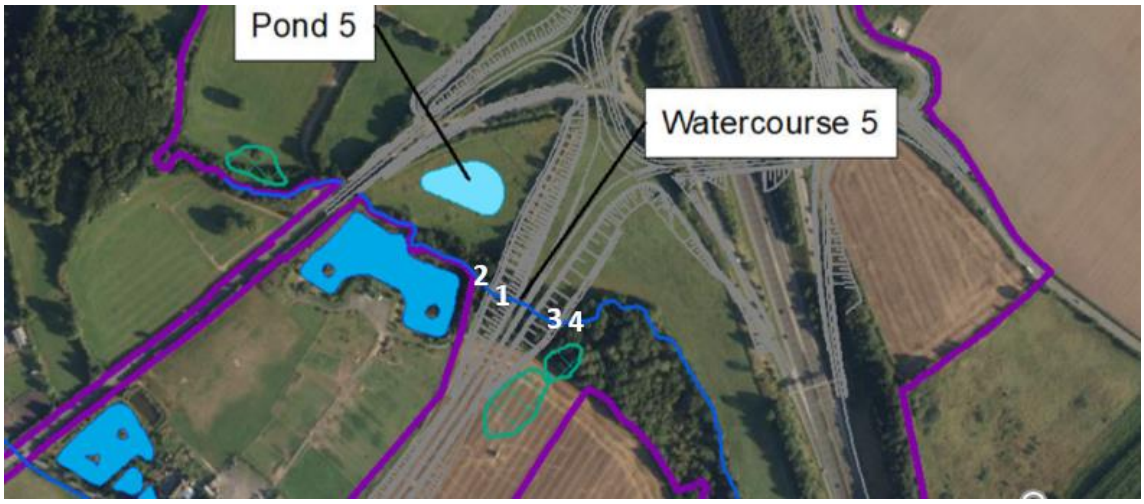
4.2.25 The proposed culvert structure is judged as a reasonable and pragmatic solution in view of what is technically feasible, and cost proportionate for the overriding benefits of the proposed Scheme.

Refer to Environmental Statement Appendix 13.4 (WFD Assessment) Sections 5 and 6

4.3 Watercourse 5: Latherford Brook

4.3.1 The context of the Watercourse 5 crossing is summarised in Figure 4.3. Impacts and mitigation are briefly summarised below. In Figure 4.3, existing watercourse configurations are shown in dark blue, proposed and existing lakes/ponds in light blue, with compensatory ecology ponds outlined in green hatch, and images locations are in white text. Pond 5 is for runoff attenuation.

4.3.2 The proposed crossing at this stage is a 30m long bridge (with a 10m span) for the new carriageways, and there would be no embankment footprint on the watercourse.



1. Diverse channel form and gravel bed with mature wooded bankside vegetation
2. Complex riparian habitat and woody material inputs to the channel
3. Gravel bars
4. Fine sediment load appears excessive and exposed gravel bed is not continuous

Figure 4-3: Watercourse 5 crossing: setting, and representative images

4.3.3 Watercourse 5, Latherford Brook, is an Ordinary Watercourse and principal tributary to the Saredon Brook (from Source to River Penk) WFD water body. The proposed crossing is downstream of an existing culvert beneath the M6, and upstream of a culvert beneath the A460.

4.3.4 Observations at the proposed crossing location are of a dynamic, gravel bedded river that is locally set in mature woodland and has signs of lateral movement. The primary process dynamics appear to be recovery adjustment from historic straightening and deepening, and it is likely that if natural dynamic equilibrium is recovered there would be less active channel change, although this would still continue to be driven by vegetation and woody material inputs to the channel. It was also noted that the river has excess fine sediment that degrades gravel habitats in slower flowing sub-reaches.

Biology

4.3.5 The proposed new 10m width clear span bridge would be detrimental to aquatic habitat, but less so than a culvert. There would be direct loss of bank side habitat and biodiversity due to semi-enclosure of the open channel. A reduction in light may reduce photosynthesis by plants. Indirect habitat impacts could also result from changes in hydraulic and sedimentary flow conditions resulting from floodplain narrowing, and loss of riparian woody material inputs the channel, but these would be minor (see comments on hydromorphology).

4.3.6 Habitats upstream and downstream of the bridge would be disconnected, but this mid-reach of the brook is already disconnected from downstream by the A460 and Saredon Road culverts, and from the Latherford Brook headwaters by the M6 culvert. Impacts would be contained locally and would not transfer through the A460 culvert to have any effect on the main water body network.

4.3.7 Brown trout, a BAP species, are known to be present within Watercourse 5, and Bullhead, a Habitats Directive species, were captured downstream of the Order Limits. The brook supports a moderate macroinvertebrate taxonomic diversity, but no species of conservation interest were recorded. Macrophyte surveys have not been undertaken.

Physico-Chemistry

4.3.8 The inclusion of SuDs within the design will mean there are no significant impacts on water quality, or there is betterment from improved treatment trains, especially for specific pollutants.

4.3.9 Aquatic habitat temperatures may decrease locally due to shading but should recover to more naturalised conditions downstream of the A460 culverts.

4.3.10 Dissolved oxygen could locally decline with photosynthesis under the new bridge, but biological oxygen demand would also decrease. Ammonia, pH and phosphates are unlikely to be significantly affected.

Hydromorphology

4.3.11 Quantity and dynamics of river flow have been assessed to not be significantly impacted by a minimum 10 m bridge span in an option analysis.

4.3.12 River lateral and longitudinal continuity would be impacted, but this would be limited by the minimum 10 m bridge span, and the existing channel is disconnected from the Saredon Brook catchment by the A460 culvert, and from upstream by the M6 culvert.

4.3.13 River depth and width variation could decrease under the bridge, but this would be limited by the minimum 10 m span width to allow for a dynamic corridor and residual floodplain. There would be minimal discontinuity of local bank erosion to generate bed habitat substrate (i.e. the bridge is approx. 30 m in length under the Scheme).

4.3.14 The structure of riparian zone would be negatively impacted, and vegetation driven morphological dynamics would be reduced by depleted woody material inputs to the channel.

4.3.15 The structure and substrate of the river bed should not be significantly impacted by the bridge design, although some dynamics associated with depleted riparian woody materials would be subdued.

4.3.16 Groundwater connectivity should not be significantly affected by a bridge.

Chemistry

4.3.17 The inclusion of SuDs within the design will mean there are no significant impacts on water quality, or there is betterment from improved treatment trains, especially for highway-derived priority substances, priority hazardous substances, and other pollutants.

Water Body Scale Impacts

4.3.18 The impacts on Watercourse 5 are localised (i.e. the bridge is approx. 30 m long) and contained within an area already disconnected from the rest of the Saredon Brook network by the existing A460 culverts. A description of the cumulative impact of proposed culverts and bridges within the Saredon Brook catchment has been discussed earlier for Watercourses 3 and 4 and includes the works to Watercourse 5. No deterioration of any WFD element at water body scale is anticipated.

4.3.19 To our knowledge following extensive consultation, no HMWB mitigation measures are proposed for this area. No improvements to watercourses in this area are in any form of development, planning or strategy. The Scheme is not considered to prevent future improvements to the water body.

Conclusion

4.3.20 It is acknowledged that the Scheme would degrade a reach of channel where the new bridge is constructed and result in some loss of existing bankside and riparian habitat. The existing watercourse is disconnected from the rest of the catchment, so the importance of protecting the local habitat that remains is recognised. However, it also means that local impacts are unlikely to affect the rest of the water body.

4.3.21 The impacts of the Scheme are judged as unavoidable, and the span of the bridge has sought to balance the impact and cost of the structure. It is unlikely that the new bridge would have significant detrimental impact on Watercourse 5 (Latherford Brook) as a whole, or on the overall condition and value of the Saredon Brook (from Source to River Penk) WFD water body.

4.3.22 The proposed minimum 10 m span bridge is judged as a reasonable and pragmatic solution in view of what is technically feasible, and cost proportionate for the overriding benefits of the Scheme.

Refer to Environmental Statement Appendix 13.4 (WFD Assessment) Sections 5 and 6

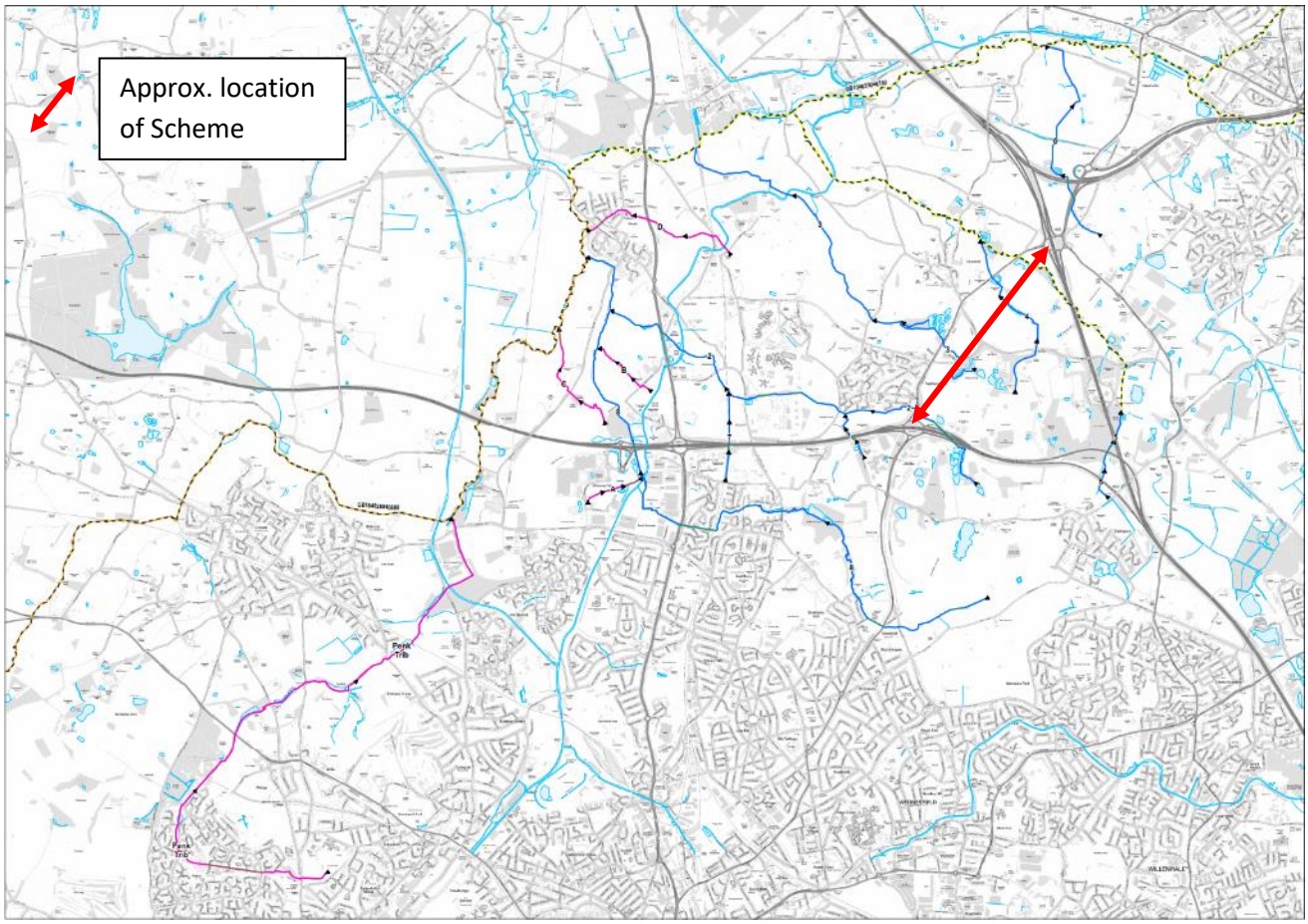
4.4 Cumulative Impact

4.4.1 Watercourses 3, 4 and 5 are all tributaries to the Saredon Brook (from Source to River Penk) WFD water body, so there is a risk of cumulative impacts from the Scheme to multiple components of the water body.

4.4.2 The impacts on Watercourse 3 and 4 are localised and contained within an area already disconnected from the rest of the Saredon Brook network. Watercourse 3 is disconnected from the rest of the Saredon Brook network by the existing A460 and Dark Lane culverts. Watercourse 4 is disconnected from the rest of the Saredon Brook network by the existing A460 culvert. The impacts on Watercourse 5 would be mitigated by a minimum 10 m span bridge and contained within an area already disconnected from the rest of the Saredon Brook network by the existing A460 culvert.

4.4.3 The presence of the existing A460 culverts immediately downstream of all the Scheme crossing points means that multiple Scheme impacts are not considered to have a significant cumulative effect on the water body.

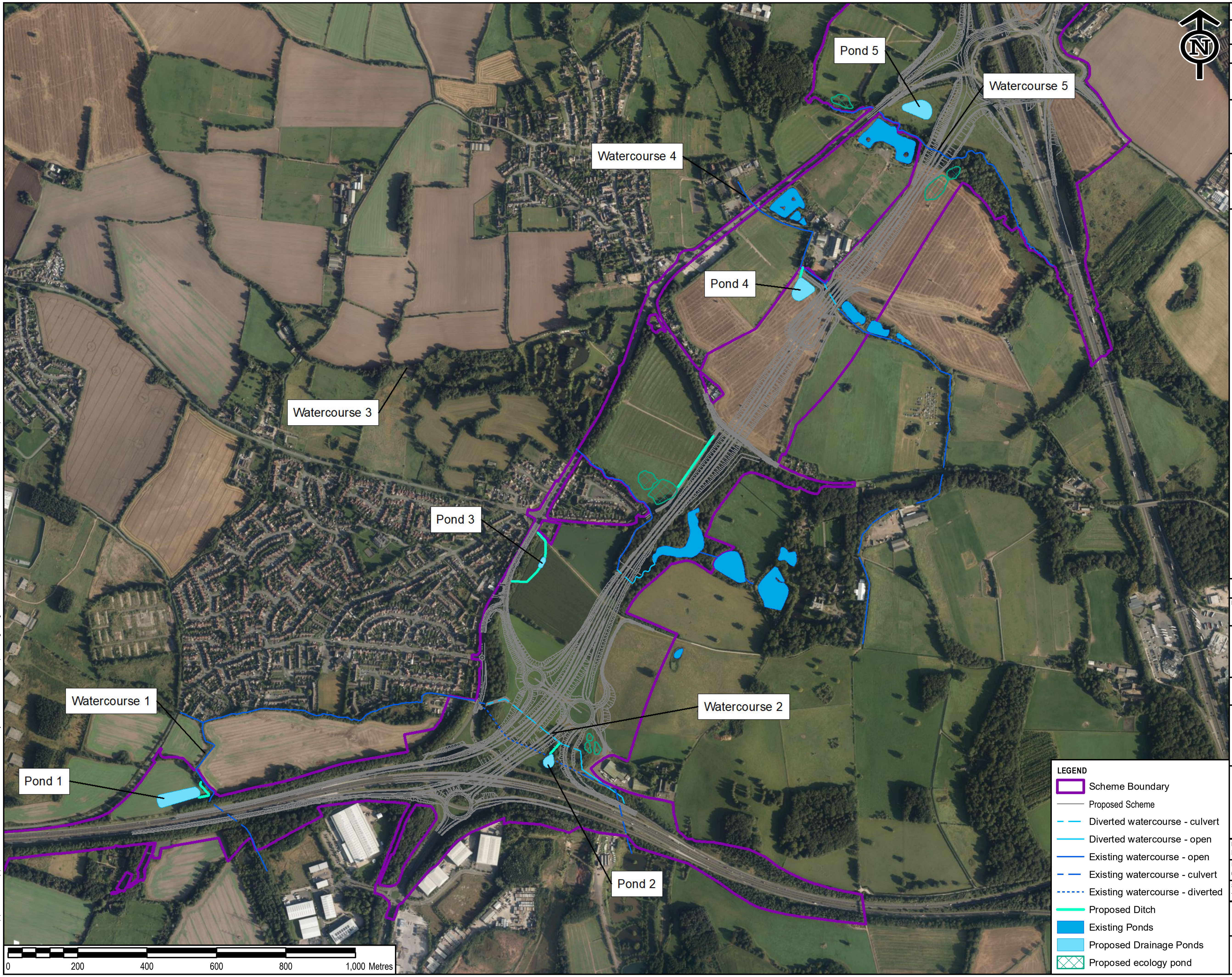
Appendix A: Major tributaries to the River Penk (Source to Saredon Brook) and the Saredon Brook (Source to River Penk) WFD water bodies



ID	Watercourse	Catchment	Length (m)	Length of Known/Existing Culverted (m)
1	1	Penk	638	133
2	2	Penk	5362	691
3	3	Saredon	5394	65
4	4	Saredon	2211	0
5	5	Saredon	1098	266
6	6	Saredon	2782	160
7	7	Penk	1012	117
8	8	Penk	8898	1008
A	Trib of Watercourse 8	Penk	718	160
B	Trib of Watercourse 8	Penk	837	0
C	Trib of Penk	Penk	1464	200
D	Trib of Penk	Penk	1933	133
Penk Trib	Trib of Penk	Penk	7756	706

Appendix B:

Figure 1: Proposed Watercourses



LEGEND

- Scheme Boundary
- Proposed Scheme
- Diverted watercourse - culvert
- Diverted watercourse - open
- Existing watercourse - open
- Existing watercourse - culvert
- Existing watercourse - diverted
- Proposed Ditch
- Existing Ponds
- Proposed Drainage Ponds
- Proposed ecology pond

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

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3. ALL DIMENSIONS IN MILLIMETRES, ALL CHAINAGES, LEVELS AND COORDINATES ARE IN METRES UNLESS DEFINED OTHERWISE.

Revision Details	By / Check	Date	Suffix

Purpose of issue
FOR INFORMATION

Client
Highways England
The Cube
199 Wharfeside Street
Birmingham
B1 1RN

Working on behalf of highways england

Development Consent Order Number
TR010054

Project Title
M54 TO M6 LINK ROAD

Drawing Title
PROPOSED WATERCOURSES

Designed	Drawn	Checked	Approved	Date
LC	LC	OT	AS	19/11/2020

Internal Project No.	Suitability
60536736	S8

Scale @ A3	Zone
1:10,000	M54 to M6 Link Road

Drawing Number
Highways England PIN | Originator | Volume
HE514465 -ACM -EGN -
M54_SW_PR_Z -DR - EG - 0038
Location | Type | Role | Number

Rev
P03

Plot Date: 19 November 2020 10:36:10
File Name: \\Uklds2pfpsw001-v1ie\ENVIRONMENT\Practice Areas\GIS\Projects\M54-M6 Link\Workspace\Stage 4 Figures\General\HE514465-ACM-EGN-M54_SW_PR_Z-DR-LE-0038 - Proposed_Watercourses.mxd

Appendix C: Relevant commitments as set out in OEMP

The below table outlines the design mitigation commitments as set out in the Outline Environment Management Plan (OEMP) which are relevant to the WFD assessment. These commitments are secured through the requirements of the draft DCO.

OEMP Ref	Action Commitment (as set out in the OEMP)
D-WAT1	Drainage treatment areas provided in accordance with ES Appendix 13.2 Drainage Strategy [TR010054/APP/6.3] and Table 13.6 of ES Chapter 13: Road Drainage and the Water Environment [TR010054/APP/6.1].
D-WAT2	Realignment and culverting of Watercourse 2 under the Scheme in a culvert, minimum size 1.2 m x 2 m. The culvert base to be set below the current channel bed by a minimum 300 mm to allow substrate conveyance, improved flow capacity and improved species passage. The detailed design of the realignment and diversion of Watercourse 2 would be undertaken within the detailed design stage and be informed by hydromorphological and ecological surveys. The design will follow best practice to maintain flow and stream processes, whilst seeking to provide morphological and ecological enhancement on current channel form, and linkages where possible with nearby ecological mitigation ponds. Uniform, artificial channels will be avoided, in favour of more natural designs (including riparian habitat). Downstream of the new junction the new channel design and riparian planting should be analogous with the existing woodland corridor, which will be retained with a depleted channel reach.
D-WAT3	Realignment and culverting of Watercourse 3 under the Scheme in a circular culvert, with a minimum diameter of 1.2 m. The culvert base will be set below the existing channel bed by a minimum of 300 mm (mid-point) to allow substrate conveyance, improved flow capacity and improved species passage. The detailed design of the realignment and diversion of Watercourses 3 and Lower Pool would be undertaken within the detailed design stage and be informed by hydromorphological and ecological surveys. The design will follow best practice to maintain flow, stream processes and ensuring flood risk is not worsened downstream, whilst seeking to provide morphological and ecological enhancement on current channel form (including riparian habitat). Uniform, artificial channels will be avoided, in favour of more natural designs.
D-WAT4	Realignment and culverting of Watercourse 4 to pass under the Scheme in a circular culvert, minimum diameter of 1.2 m. The culvert base will be set below the existing channel bed by a minimum of 300 mm (mid-point) to allow substrate conveyance, improved flow capacity and improved species passage. The detailed design of the realignment and diversion of Watercourses 4 would be undertaken within the detailed design stage and be informed by hydromorphological and ecological surveys. The design will follow best practice to maintain flow and stream processes, whilst seeking to provide morphological and ecological enhancement on current channel form (including riparian habitat). Uniform, artificial channels will be avoided, in favour of more natural designs.
D-WAT5	Works to the channel and possible minor realignment of Watercourse 5 (Latherford Brook) through a 10 m wide single span bridge (Latherford Brook bridge), which is to be constructed online with the watercourse. The detailed design of any minor realignment of Watercourses 5 would be undertaken within the detailed design stage and be informed by appropriate geomorphological and ecological technical input based on surveys

OEMP Ref	Action Commitment (as set out in the OEMP)
	and assessment. The design will follow best practice to maintain flow and stream processes, whilst seeking to provide morphological and ecological enhancement on current channel form in keeping with the character of the watercourse and prevailing hydromorphological processes.
D-WAT6	For new highway outfalls the preliminary drainage design includes new ditchcourses from Ponds 1-4 (and Pond 5 if possible – see D-WAT7) to convey treated runoff to the receiving watercourses avoiding the need for engineered pipe outfalls supported by concrete headwalls. The design of new ditches would be informed by a geomorphologist and ecologist and would include where practicable 'natural' features such as a sinuous low flow channel (albeit perhaps along a straight corridor) incorporating shallow berms and occasional sections where the channel is narrowed to improve flow. Where these ditches connect with the existing watercourse the hydromorphology of the receiving watercourse must be taken into account in the design. The ditchcourses would also be suitably landscaped and their margins planted to provide suitable riparian habitat to compensate for new culverting proposed by the Scheme. Ditchcourses will be designed so that they are sustainable and self-regulating, and so that ecology that develops in the new lengths of channels will not be impacted by future maintenance works. Future maintenance of these ditches will take into account their biodiversity function as well as drainage requirements.
D-WAT7	During detailed design consideration of options to avoid an engineered outfall to Latherford Brook from Pond 5 will be considered. However, where this is not possible, and an engineered outfall is required, the location, position and orientation of any new outfall will be carefully determined and informed by a hydromorphological survey to minimise any local adverse impact on river processes, the loss of riparian habitat, the need for bed scour or hard bank protection, and localised flow disturbance or disruption to sediment transport processes. It is not recommended to recess outfalls from the banks because this can risk creation of a dead zone with sedimentation and vegetation blockage risks, and because drainage systems will be designed with treatment trains upstream of the outfalls, and thus only treated water will be discharged to the Latherford Brook. Where possible a pre-fabricated concrete headwall will be used to avoid the need to pour wet concrete into formwork close to the watercourse. The design of any new engineered outfall and the site-specific pollution prevention measures will be determined through consultation with the LLFA when making a Land Drainage Consent application.
D-WAT8	Sensitivity testing will be undertaken during the detailed design stage, concerning the best arrangement of Lower Pool and proposed weir structure to ensure the design of this feature does not cause increased flood risk levels from those assessed in the Flood Risk Assessment (FRA) included in the ES (refer to ES Appendix 13.1 [TR010054/APP/6.3]).
D-WAT9	The drainage for the Scheme will be designed in line with the Drainage Strategy, provided as Appendix 13.2 of the ES [TR010054/APP/6.3] and will ensure that the Scheme does not result in increased flood risk from groundwater above that reported in Chapter 13: Road Drainage and the Water Environment.
D-BIO1	**Aquatic invertebrates and fish:** Replacement ditch habitat for the loss of riparian habitat associated with the culverting of watercourses provided based on a minimum of 1:1 ratio. Within the constraints of the Scheme, mitigation for the loss of running water habitats includes a total of 483 m of watercourse habitat (exceeding the 323 m of watercourses that would be culverted). Although not proposed with ecological benefit as a primary function, ditches would be designed to provide ecological benefit as a secondary function. Where new ponds discharge to the local stream network they would be connected by new

OEMP Ref	Action Commitment (as set out in the OEMP)
	ditches rather than pipes. This avoids the need for engineered outfalls, extends existing green corridors, and provides greater connectivity with the proposed treatment and attenuation ponds. These ditches would be carefully designed so that the final form avoids a uniform cross section and maximises biodiversity opportunities. Ponds lost to the Scheme replaced on a minimum of (equivalent) 1:1 ratio. Highway runoff from the operational Scheme runoff would be collected and managed in accordance with the Drainage Strategy, Appendix 13.2 [TR010054/APP/6.3]. Such measures would manage the quantity and quality of highway runoff to the benefit of all aquatic species.
D- BIO5	**Badger and otter:** Provision of mammal tunnels (adjacent to Watercourse 2, 3 and 4) and a mammal ledge or tunnel (Watercourse 5) to be installed at four locations over the length of the Scheme, the locations of which are shown on the Environmental Masterplans. Installation of badger fencing to guide badgers and other mammals to safe crossing points and avoid badgers crossing the road and entering the highway.

Appendix D – Further summary of mitigation and residual impacts on the Penk Catchment.

Open Channel Balance Baseline v Scheme Penk WFD Water Body	Approximate length (m)	Approx. Length Totals (m)	Commentary (ALL data from WFD Summary V2 (AECOM, March 2021)
Existing Channel			
Approximate length of existing open channel (severed upstream and downstream by existing culverts; Heavily modified and poor riparian habitat)	335		This is the baseline situation without the proposed development.
Sub-total		*335*	
Proposed Channel (on new alignment)			
Proposed new channel upstream of new M54 Junction 1	65		The scheme includes a 166 m box culvert (1.2 m x 2 m) and a 52 m long 1.2 m diameter circular culvert under junction entry slip road (total length of culverts 218m). However, the open channel balance compares total existing and total with scheme open water channel habitat. Therefore, the length of new culverts do not need to be included.
Proposed new channel downstream of new M54 Junction1	90		
Length of open channel maintained between the two new culverts	10		
Length of new ditchcourse between Treatment Pond 2 and realigned Watercourse 2	32		
Sub-total		*197*	*In Table 2.2 of the WFD summary we state that the net effect of the proposed development is a reduction of 138 m of open channel. However, the additional mitigation below also needs to be considered.*
Additional mitigation proposed			
Approx. 90 m of redundant channel along old alignment in the woodland upstream of the A460 to be retained as ditch habitat	90		
Approximately 75 m of new ditch linking Watercourse 1 to Pond 1	75		
There will also be the creation of 3 no. new ponds along the new alignment of Watercourse 2 providing opportunities for greater habitat enhancement			Please refer to Environmental Masterplan for further details.
The culverts have been sized accordingly to avoid flood risk and scour effects, with mamal ledges and the invert recessed by a minimum of 300 mm for bed continuity.			
Sub-total		*165*	*Overall, across the River Penk WFD water body catchment approximately 138 m of flowing channel would be lost to the Scheme. However, this would be offset by the new channel provided being an improvement on the current channel (c. 90m downstream of M54 and 65-80m upstream of the M54), approximately 90 m of redundant channel in the woodland north of new junction being retained as ditch habitat, the provision of approximately, 75 m of ditch linking Watercourse 1 to Pond 1, and the creation of new ponds. This totals 165m.*

Overall Statement of WFD Compliance (paragraphs 3.1.24-26 of WFD Summary Version 2 (AECOM, March 2021):
It is acknowledged that the Scheme would result in some loss of existing open channel habitat. The existing watercourse is highly modified and disconnected from the rest of the catchment, so the importance of protecting the local habitat that remains is recognised. However, it also means that local impacts are unlikely to affect the rest of the water body.
The impacts of the Scheme are judged as unavoidable and unlikely to have significant detriment to the overall condition and value of the River Penk (from Source to Saredon Brook) water body.
The proposed culvert structures are judged as a reasonable and pragmatic solution in view of what is technically feasible, and cost proportionate for the overriding benefits of the Scheme.