A1 in Northumberland: Morpeth to Ellingham

Scheme Number: TR010059

Surface Water Outfall Strategy

Rule 8(1)(c)

Planning Act 2008

Infrastructure Planning (Examination Procedure) Rules 2010

February 2021

Infrastructure Planning

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Surface Water Outfall Strategy

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TABLES

FIGURES

1 OVERVIEW

1.1.1. This technical note sets out the design strategy for the surface water outfalls for the Scheme, and has been produced in response to paragraphs A73, A74, A75 and A89 within the Relevant Representation made by the Environment Agency (**7.9.1 Appendix A Response to RR-04 Environment Agency** [**REP1-064**]). The purpose of this technical note is to provide clarity on the proposed approach to outfall design and demonstrate that the design of the surface water outfalls will consider the objectives of the WFD and the Northumbrian River Basin Management Plan (RBMP), as detailed in the response to paragraphs A73, A74, A75 and A89 of the Relevant Representation made by the Environment Agency (**7.9.1 Appendix A Response to RR-04 Environment Agency** [**REP1-064**]).

1.1.2. The detailed design of the surface water drainage strategies for each Part would be confirmed and secured though Requirement 8 of the DCO [**APP-014**] in consultation with the relevant authority (Northumberland County Council as Lead Local Flood Authority and Land Drainage Authority and as required through the application for Ordinary Watercourse Consent; and the Environment Agency for works within 8 m of main rivers and as required through the application of a Flood Risk Activities Permit (FRAP)).

1.1.3. The surface water drainage strategies are detailed in **Appendix 10.5: Drainage Strategy Report Part A** [**APP-258**] and **Appendix 10.4: Drainage Strategy Report Part B** [**APP-314**], submitted as part of the DCO application. **Figure 1** and **Figure 2** below are taken from **Appendix 10.3: Drainage Network Water Quality Assessment Part A** [**APP-256**] and **Appendix 10.3: Drainage Network Water Quality Assessment Part B** [**APP-313**] and show the location of the proposed outfalls for Part A and Part B of the Scheme respectively. The location of the outfalls has not changed since the submission of the Development Consent Order (DCO) application. **Appendix 10.3: Drainage Network Water Quality Assessment Part A** [**APP-256**], **Appendix 10.5: Drainage Strategy Report Part A** [**APP-258**], **Appendix 10.3 Drainage Network Water Quality Assessment Part B** [**APP-313**] and **Appendix 10.4: Drainage Strategy Report Part B** [**APP-314**] detail the location of the outfalls but do not include information regarding the design of the outfalls. It is this design information which is presented within this technical note.

1.1.4. The treatment provision within the surface water drainage strategies is assessed and discussed in **Appendix 10.3: Drainage Network Water Quality Assessment Part A** [**APP-256**] and **Appendix 10.3 Drainage Network Water Quality Assessment Part B** [**APP-313**].

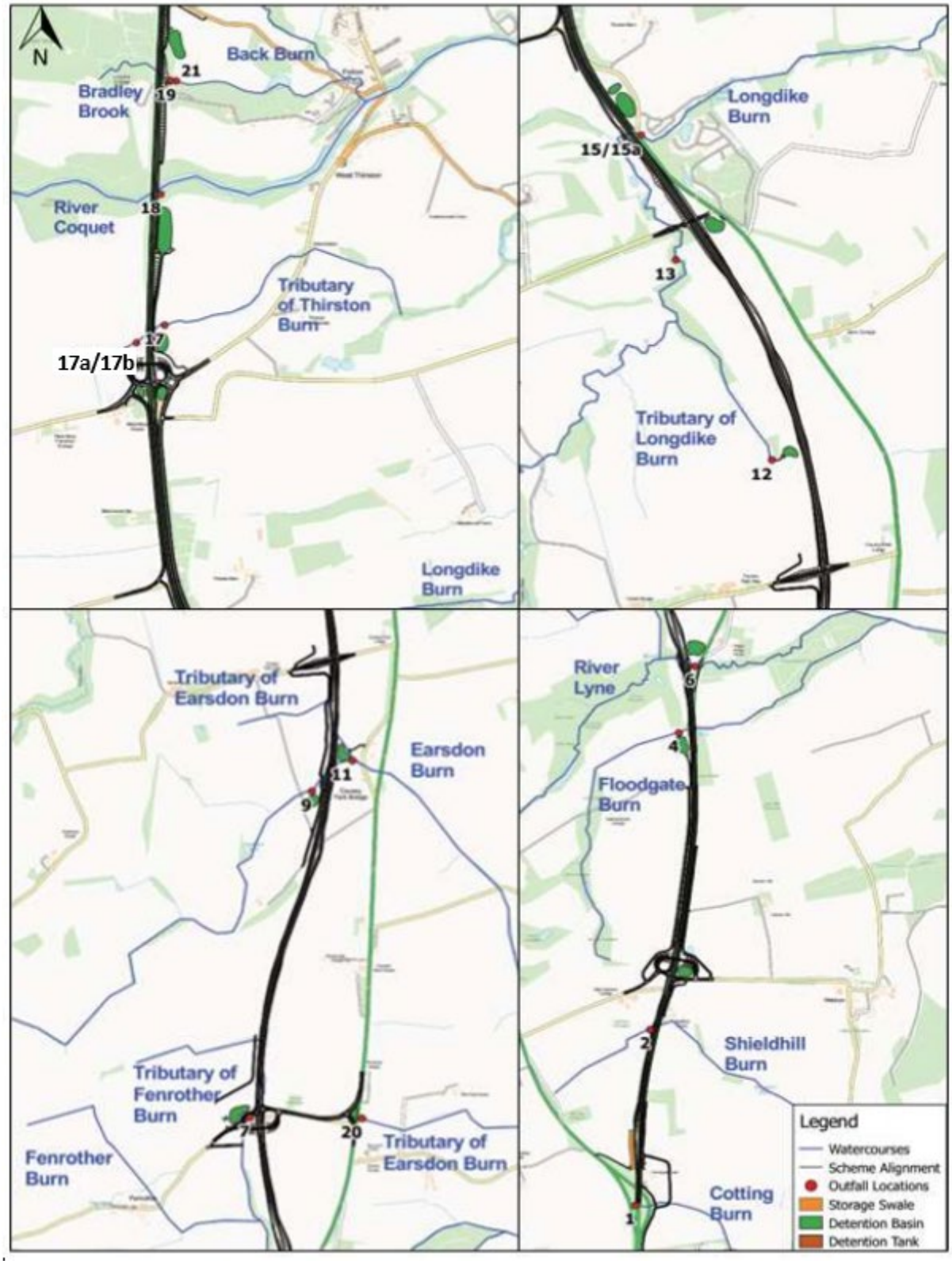

Figure 1 - Location of Proposed Outfalls for Part A

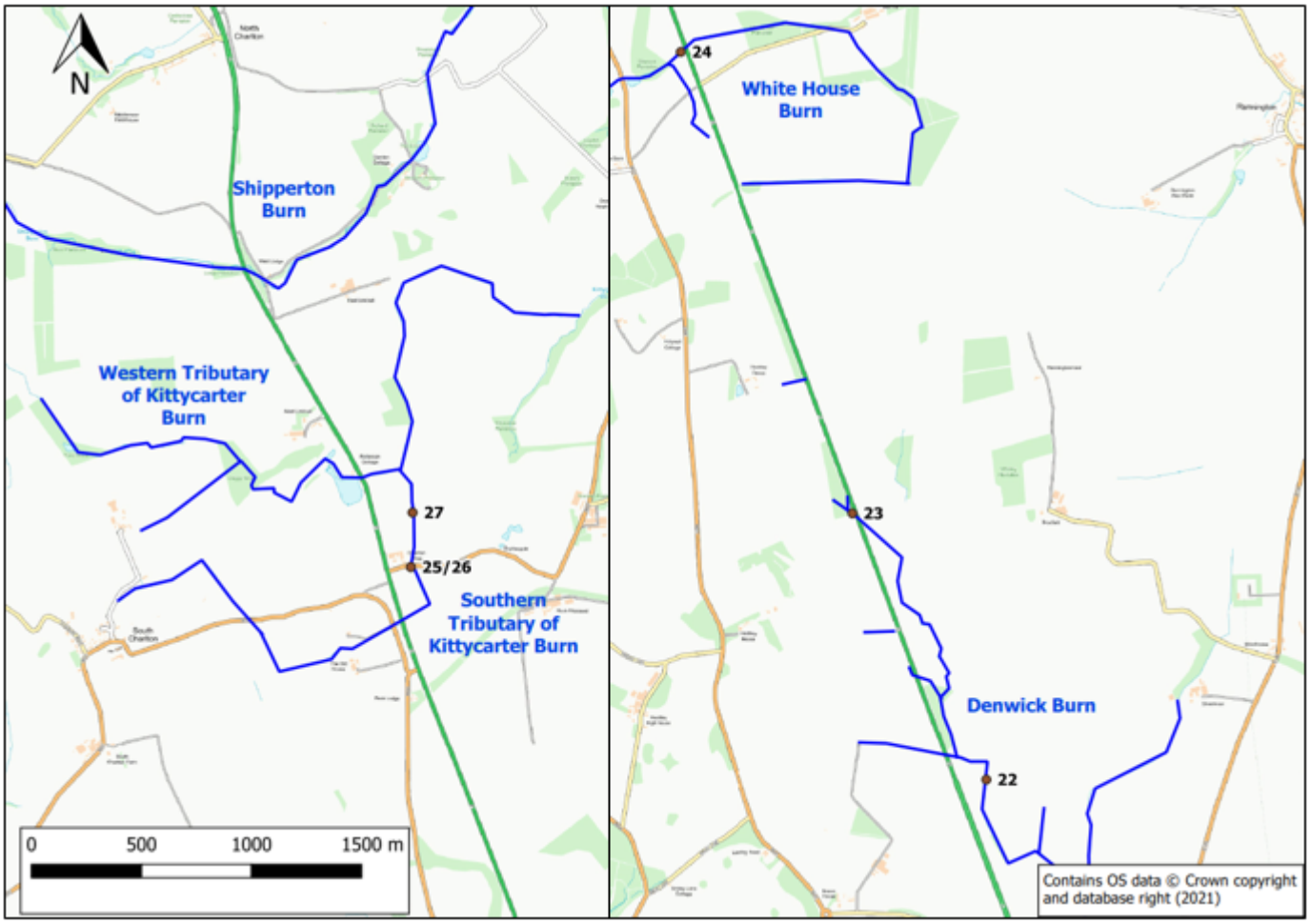

Figure 2 - Location of Proposed Outfalls for Part B

1.1.5. **Table 1-1** details the proposed discharge rates at each of the outfalls and the outfall design parameters for both Part A and B of the Scheme. The outfall design parameter provides additional, enhanced information giving greater detail than was originally included as part of the DCO submission. The watercourse description presented in **Table 1-1** is summarised from information presented in **Appendix 10.2: Water Framework Directive Assessment Part A** [**APP-255**] and **Appendix 10.2: Water Framework Directive Assessment Part B** [**APP-312**]. The remainder of the information presented in **Table 1-1** is taken from **Appendix 10.3 Drainage Network Water Quality Assessment Part A** [**APP-256**] and **Appendix 10.3 Drainage Network Water Quality Assessment Part B** [**APP-313**].

Table 1-1 – Summary of Surface Outfall

	Outfall	Receiving Watercourse	Watercourse Description	Discharge rate (l/s)	Outfall Design Parameter
Part A	1	Cotting Burn	Ordinary watercourse that comprises a narrow straight ditch with low ecological value.	37.6	Outfall at channel bank
	2	Shieldhill Burn	Ordinary watercourse that has been realigned along field boundaries in straight channel with low ecological value. Culverted beneath A1 downstream of outfall.	20.0	Outfall at channel bank
	4	Floodgate Burn	Ordinary watercourse that comprises a predominantly narrow straight channel at location of outfall 4, although evidence of natural adjustment upstream of Scheme. Aquatic ecology survey identified 3-spined stickleback.	24.9	Set back outfall
	6	River Lyne	Ordinary watercourse that comprises a meandering channel with sections that have been realigned along field boundaries. Aquatic ecology survey identified 3-spined stickleback and bullhead species.	42.8	Set back outfall
	7	Tributary of Fenrother Burn	Ordinary watercourse that has been realigned along field boundaries and comprises a narrow straight ditch of low ecological value.	38.0	Outfall at channel bank
	9	Earsdon Burn	Ordinary watercourse that has been realigned along field boundaries and flows within straight channel close to Scheme and at proposed outfall locations, although upstream of Scheme comprises a gently meandering channel. Low ecological value.	20.2	Set back outfall
	11			31.0	
	20	Tributary of Earsdon Burn	Ordinary watercourse that comprises a narrow straight ditch of low ecological value.	8.3	Outfall at channel bank
	12	Tributary of Longdike Burn	Ordinary watercourse that comprises a narrow straight ditch of low ecological value.	17.6	Outfall at channel bank
	13	Longdike Burn	Main river that comprises a predominantly meandering channel upstream of Scheme and at outfall 13, but that has been straightened and realigned along field boundaries at outfalls 15/15a in vicinity of and downstream of Scheme. The watercourse has a high ecological value.	32.1	Set back outfall
	15/15a			37	
	17a/17b	Tributary of Thirston Burn	Ordinary watercourse that comprises a heavily modified straight narrow channel with low ecological value.	19.5	Outfall at channel bank
	17			39.9	

	Outfall	Receiving Watercourse	Watercourse Description	Discharge rate (l/s)	Outfall Design Parameter
	18	River Coquet	Main river that comprises a bedrock meandering channel with high ecological value.	37.4	Set back outfall
	19	Bradley Brook	Ordinary watercourse that comprises a small gently meandering ditch of low ecological value.	32.9	Outfall at channel bank
	21			12	
Part B	22	Denwick Burn	Ordinary watercourse that has been predominantly realigned along field boundaries at location of proposed outfalls, although that comprises a narrow gently meandering channel in sections between proposed outfalls and downstream of the Scheme. Low ecological value.	36.2	Set back outfall
	23			36.6	
	24	White House Burn	Ordinary watercourse that has been realigned along field boundaries in vicinity of Scheme and outfall 24, although with gently meandering upstream of Scheme. Low ecological value.	60.4	Set back outfall
	25/26	Southern tributary of Kittycarter Burn	Ordinary watercourse that comprises a small straight ditch that has been realigned along field boundaries of low ecological value.	34.6	Outfall at channel bank
	27			30.8	

1.2 DESIGN PARAMETERS

SET BACK OUTFALLS

1.2.1. Surface water outfalls located along Floodgate Burn, River Lyne, Earsdon Burn, Longdike Burn, Denwick Burn and White House Burn would not protrude into the watercourse channel and would be set back from the channel where possible to reduce impact by minimising the loss of bankside vegetation and riparian habitat. This outfall design has been proposed for these watercourses to reflect the ecological value or potential of the watercourse, informed by review of ecological survey, planform and flow dynamics.

1.2.2. A new channel would connect the outfall to the watercourse. In addition to minimising the loss of riparian vegetation, this approach would also prevent erosion and scour to the bed and banks of the receiving watercourse and limit any impact upon the geomorphological processes. The channel would be designed to be as natural as possible to tie into the surrounding riparian habitat.

1.2.3. Where required, boulders would be placed within the channel connecting the outfall to the watercourse to dissipate energy and manage the risk of scour downstream.

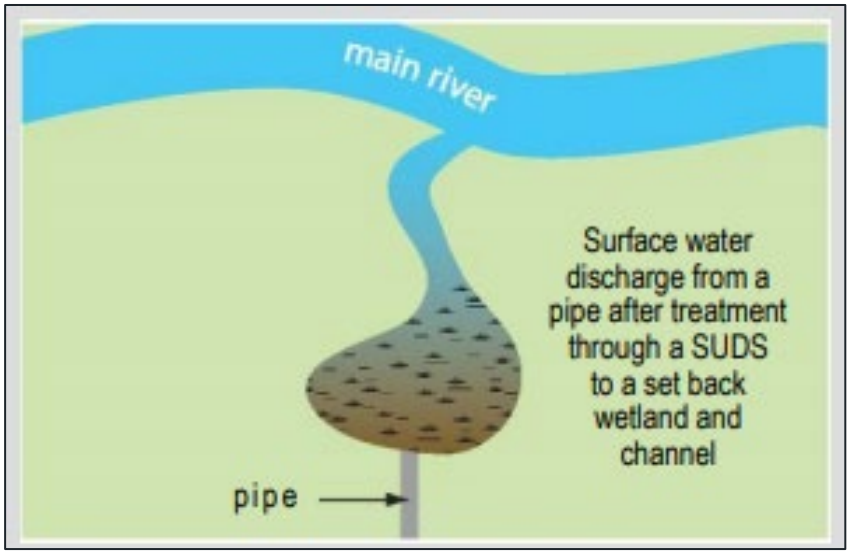

Figure 3 - Example of a Set Back Outfall Design[1]

1.2.4. The River Coquet has a bedrock channel and so a setback outfall similar to the design shown in **Figure 3** above is not suitable for the outfall design. The outfall would discharge into a sediment trap or similar feature prior to discharging into the watercourse and would

[1] Source: https://www.sepa.org.uk/media/150984/wat_sg_28.pdf

not be located near the normal water level. Scour protection would not be required due to the underlying bedrock. It is assumed that the outfall will be a similar design to the existing outfall although this will be reviewed at detailed design and agreed with the Environment Agency as part of the FRAP application.

OUTFALL AT CHANNEL BANK

1.2.5. Where it is not feasibile to set back outfalls from the watercourse channel due to spatial and design constraints within the Order limits and where the ecological quality or potential of the receiving watercourse is not considered significant, outfalls structures would be placed within the bank of the receiving watercourse channel with the outfall pipe positioned at an approximate 45˚ angle in the direction of flow. The outfall structure would not protude to within the watercourse channel. This applies to the following watercourses: Cotting Burn, Shieldhill Burn, tributary of Fenrother Burn, tributary of Earsdon Burn, tributary of Longdike Burn, tributary of Thirston Burn, Bradley Brook and the southern tributary of Kittycarter Burn.

1.2.6. By positioning the outfalls at an approximate 45˚ angle, this would reduce the liklihood of scour around the structure and erosion of the watercourse banks and bed. Bed protection would be included to further reduce scour if a residual risk was identified during detailed design. The alignment of the outfall would be in line with the flow of water within the watercourse in order to reduce turbulence within the channel. **Figure 4** below shows an example of an outfall structure that is aligned at the channel bank with the outflow pipe aligned at an angle to the receiving watercourse.

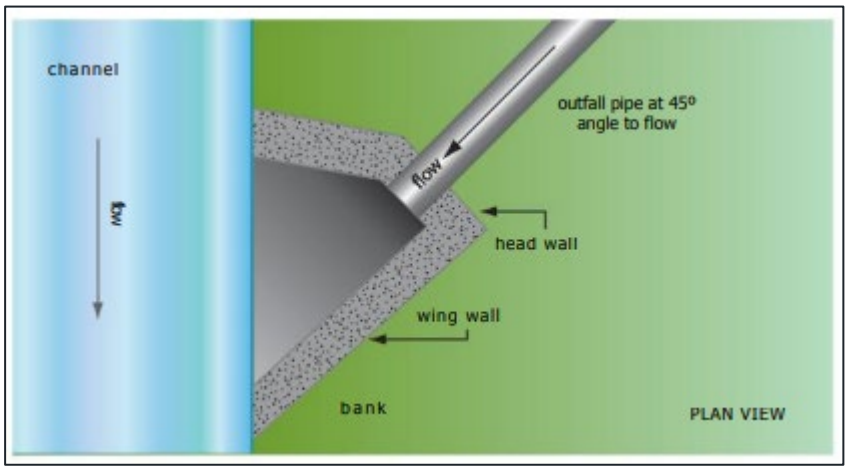

Figure 4 - Example of Perpendicular Outfall Alignment[2]

[2] Source: https://www.sepa.org.uk/media/150984/wat_sg_28.pdf

SUMMARY

1.2.7. The outfalls would be designed to be sympathetic to the surrounding environment and proportionate to the importance of the receiving watercourses. The outfalls would not introduce a barrier to fish migration or adversely affect hydromorphology. For those watercourses that are considered to have higher ecological value or potential, setting the outfalls back from the watercourse channel would minimise the loss of riparian vegetation and requirement for in-channel bed protection. The proposed strategy for outfall design is therefore deemed to comply with the objectives of the Northumbrian River Basin Management Plan. The design of the outfalls would be confirmed during detailed design and secured though Requirement 8 of the DCO [**APP-014**] in consultation with the relevant authority (Northumberland County Council as Lead Local Flood Authority and Land Drainage Authority; and the Environment Agency for works within 8m of main rivers).

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