Brooks Ecological
Grounded advice

Gynn Lane, Honley

River Condition Assessment Report

Report Ref. ER-7732-04B

05/11/2024

Vivly Living

Report reference	**ER-7732-04B – River Condition Assessment Report**
Author	Courtney Halstead BSc (Hons) Assistant Ecologist
Technical Review	Rob Weston BSc(Hons) MSc MCIEEM Technical Director
QA	Mary Fleming BSc MSc Graduate Ecologist
Authorised	Rob Weston BSc(Hons) MSc MCIEEM Technical Director
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Report duration	*In accordance with CIEEM (2019), unless otherwise stated the findings of this report remain valid for a period of 18 months. After this period advice should be sought on the scope of any updating work required.*

Revision	Date	Author	QA	Summary
ER-7732-04B	07/04/2025	CH	MF	Updated with post-development forecasting and new red line boundary

Unit A, 1 Station Road, Guiseley, Leeds, LS20 8BX
Phone: 01943 884451
01943 879129
www.brooks-ecological.co.uk
Registered in England Number 5351418

Summary

A Modular River Physical (MoRPh) survey has been undertaken at Gynn Lane, Honley, to inform a River Condition Assessment of Ludhill Dike. The dike has been assessed as being in Fairly Poor condition for 81m of its length.

Forecasting has predicted no change in condition by application of the post-development layout, and a reduction to the encroachment extent. This data will be used to inform a BNG Assessment of the Site, reported separately.

Introduction

1. Brooks Ecological was commissioned by Vivly Living to carry out a River Condition Assessment (RCA) at Gynn Lane, Honley, concerning Ludhill Dike, which runs along the Site's eastern boundary.

2. This survey is required to provide the baseline condition of the watercourse to inform a Biodiversity Net Gain (BNG) Assessment of the Site through the DEFRA Statutory Biodiversity Metric Calculator.

3. The scope of this survey has been devised based on guidance presented in *A Guide to Assessing River Condition* (Gurnell *et al.*, 2024) and *The MoRPh Survey Technical Reference Manual 2022 version* (Gurnell & Shuker, 2022).

Figure 1 The Site (red line boundary) and watercourse.

Methodology

4. Survey and assessment were directed by Courtney Halstead BSc (Hons). Courtney is trained in use of the Modular River Physical Survey River Condition Assessment for informing Statutory Biodiversity Metric.

5. Methods outlined in the River Condition Assessment training course and technical documents were followed throughout the assessment.

River Type Assessment

6. River Type was assessed following standard Modular River Survey techniques (Appendix A).

Field Survey

7. MoRPh surveys were undertaken in September 2024. The visit was undertaken during suitable weather conditions, with no adverse river conditions or high flow.

8. MoRPh surveys record general physical habitat availability to highly mobile organisms, as well as typical morphological units within the watercourse, contemporary hydromorphological processes, and any pressures acting on the surveyed subreach(es).

9. The Site was subject to an initial walkover survey to determine suitable locations for survey. Locations were chosen based on their degree of degradation and accessibility to survey. The field surveyor ensured that the most physically degraded part of the river was surveyed.

10. A minimum of 20% of the river's length, where it flows through or by the Site, was surveyed to capture varying river conditions. Surveys were composed of MoRPh5s, each made up of five MoRPh modules, surveyed contiguously in a downstream direction from a suitable location on the river bank.

11. Module length was determined by MoRPh river width (Table 1, overleaf), based on data obtained from aerial mapping and visual assessment of the river.

12. MoRPh river width is defined as the water width, plus any areas of emergent vegetation at the channel margin or exposed but frequently inundated sediment.

Table 1 Relation between MoRPh river width and module length.

River width	Module length
<5 m	10m
5 to <10 m	20m
10 to <20 m	30m
20 to <30m	40m
Large rivers and canals	50m

13. Information on the river's channel dimensions, bank top (extending 10m back from the edge of each bank), bank face, channel margin, and channel bed, were recorded in the field.

River Condition Assessment

14. Data recorded in the Field Survey and River Type Assessment were uploaded to Cartographer, the MoRPh survey software.

15. Cartographer calculates a River Type based on data from the River Type Assessment, which may be overridden by the user based on their professional judgement.

16. Cartographer calculates 32 condition indicators based on data from the Field Survey, 19 of which are positive indicators (ranked from 0 to 4), and 13 of which are negative indicators (ranked from 0 to -4). A mean average is calculated for the positive and negative indicators, and these averages are summed to produce a Preliminary Condition score. A summary of these indicators is presented in Appendix A.

17. River Type and Preliminary Condition Score are then combined to produce a Final Condition Class, ranging from Poor to Good. If the surveyor considers the channel to be overdeepened (see Appendix A), the Final Condition may be lowered by one Class.

Field Survey

Limitations

18. Survey was conducted in September 2024, outside of the optimal (April–June) but within the suboptimal (July–September) MoRPh survey seasons. As such, vegetation features were estimated using remains of plants from the previous growing season, and the surveying ecologist's professional judgement. From the ecologist's experience of other similar surveys at the same time of year, vegetation dieback was not considered a significant constraint.

19. The watercourse displays evidence of Iron Oxide pollution, likely resulting from nearby historical mining practices. This appears to be a persistent state and was not considered a constraint.

Ludhill Dike

20. Ludhill dike runs roughly east to west along the Site's northern boundary, from its source in Hey Wood c. 1.3km east of the Site, to its confluence with the River Holme 300m west.

21. The dike was assessed as having a MoRPh river width of <5m. Therefore, modules were 10m long, and MoRPh5 50m long. The beck runs for 81m through and alongside the Site, and so a single 50m MoRPh5 was sufficient to achieve survey of 20% of the river's length.

22. During the walkover, the watercourse was identified as presenting reasonably homogenous levels of naturalness, with the exception of the artificial features.

23. The dike has an average MoRPh river width of 1.8m (2.5 to 1.5m). The bed is generally shallow, averaging 0.08cm in depth, being shallower (0.05) upstream where the river is wider, and deeper (0.1) downstream, and comprises mainly unvegetated gravel and pebble, with occasional boulders thought to be artificially introduced. There are frequent accumulations of organic material within the channel.

24. The majority of the length of the watercourse appears generally natural, with a mixture of steeply sloped to vertical bank faces. Reinforcement generally relates to the culvert, bridge and pipe outflow. The riverbed appears free of artificial reinforcement throughout, and no other artificial features were observed within the channel.

25. The bank tops both support deciduous woodland for much of the length, with ground flora comprising short and creeping herbs and grasses, tall grasses, and bramble scrub. A number of trees of a range of sizes and ages are present providing tree features such as overhanging branches, fallen trees and large wood along the full surveyed length.

26. The bank faces are comprised of earth sediment where visible, with reinforcement associated with culvert, bridge and pipe outflow being of cemented laid brick. Vegetation comprises mosses, grasses, short and creeping herbs and scrub, with some small trees.

27. Trace amounts of the Non-Native Invasive Plant (NNIP) Himalayan balsam were observed on the left bank top in modules 4 and 5.

Figure 2 MoRPh survey sites on Ludhill Dike.

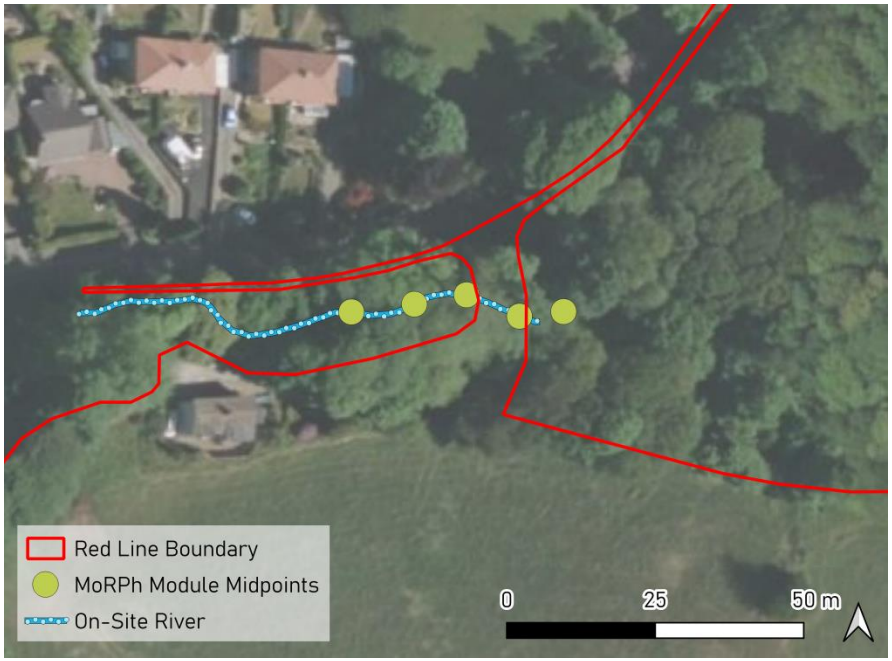

Figure 3 View of culvert at Module 1.

Figure 4 View of channel with brick reinforcement at Module 2.

Figure 5 View from end of module 3, facing upstream.

Figure 6 View of organic matter within channel bed.

Figure 7 Typical view of channel, bank face and bank top.

Figure 8 Himalayan Balsam in module 4.

Figure 9 View of module 5 facing downstream.

Results

Watercourse Condition

28. The river was assessed as being of type D, overridden to **Type F**. The rationale supporting this assessment is presented in Appendix B.

29. A preliminary condition score of 0.907 was generated for this length of Ludhill Dike. When assessed against the table of threshold values (see Appendix A), for a type F river, this is indicative of Moderate condition.

30. This stretch of the river has also been classed as overdeep, with a river shape index of 1.96, reducing the condition class to **Fairly Poor**.

Table 2 River Condition and length of river.

Condition	River	Length
Fairly Poor	Ludhill Dike	81m

Encroachment

31. The levels of watercourse encroachment were assessed as part of this survey, according to Statutory Metric Guidance. This has been entered into the Biodiversity Metric, as described in Table 3 below:

Table 3 Baseline encroachment extents.

Length	Encroachment extents		
	Watercourse	Riparian Zone (N)	Riparian Zone (S)
13m	Major	Major	Major
48m	No encroachment	Major	Minor
20m	No encroachment	Major	No encroachment

32. The watercourse encroachment has been assessed based on the presence of reinforcement to the bank faces from the bridge and facilitating the pipe outflow.

33. The riparian zone encroachments have been assessed based on the presence of Gynn Lane running along the full length of the northern bank, and the access track to the Site running along the majority length of the southern bank.

Figure 10 Encroachment assessment of Ludhill Dike.

34. The above data will be used to inform a BNG Assessment of the Site, reported separately, reported in ER-7732-06.

Post-development Forecasting

Watercourse Condition

35. Effects on the condition indicators measured during the MoRPh survey have been forecast based on the Planting Plan, dwg. PP01.00, rev. P2 (PGLA Ltd, Sept 2024).

36. Due to the location of the site boundary, changes directly affecting the watercourse and bank top are restricted to the effects of widening of the existing bridge, from c. 5m to 8.8m, and associated bank face and channel bed re-enforcement required to facilitate this.

Table 4 Summary of changes made to condition indicators.

Module	Summary of Changes
1, 4, 5	None
2	Increased bank face reinforcement extent on both bank faces, extending to support widened bridge; changed material from brick/laid stone to concrete
3	Changed bank face reinforcement on both bank faces (brick/laid stone to concrete); increased bridge shadow.

37. The above assumes no other engineering will be enacted on the river, including to its bank tops, faces, or anywhere within channel, outside of the site boundary, and that no other artificial features or re-enforcement will be installed within the boundary, beyond that of the bank faces to facilitate bridge widening.

38. The above described changes have effected a slight reduction in the preliminary condition score from 0.907 to 0.830. This has not resulted in a change in condition class, and so the river is still considered to be in **Fairly Poor** condition.

Encroachment

39. Changes to the riparian zones have resulted in a reduction in the extent of riparian zone encroachment to the middle 41m of the watercourse. The watercourse encroachment has been retained.

40. This has been assessed based on the change from access track and vegetated garden to an area of POS to the south of the river.

41. The most upstream 14m, and most downstream 26m have retained their baseline encroachment extents.

Figure 11 Post-development encroachment assessment of Ludhill Dike.

**Riparian zone encroachment symbology is indicative only, and not to scale with respect to the full riparian zone.*

Table 5 Post-development encroachment extents.

Length	Encroachment extents		
	Watercourse	Riparian Zone (N)	Riparian Zone (S)
13m	Major	Major	Major
48m	No encroachment	Major	No encroachment
20m	No encroachment	Major	No encroachment

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Appendix A Accompanying Data, Explanatory Notes and Resources Used

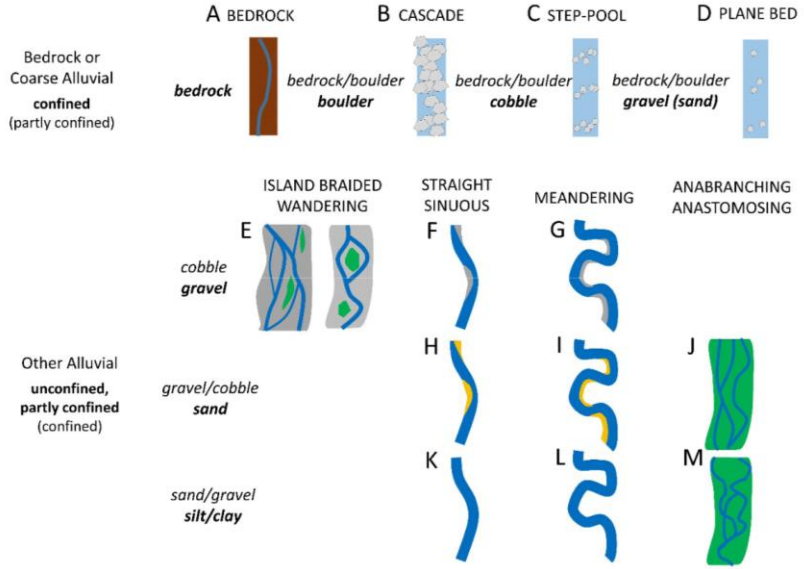
River Type

Aerial mapping software was used to determine reach length and indicators A1–A5, which must be derived from aerial maps or images. Google Earth Pro is the recommended data source; however, constraints include (but are not limited to) the river being obscured by vegetation, changes in the baseline since aerial mapping was taken, and inaccurate topography.

The river reach used to calculate river type was determined by the surveyor. A reach usually covers a 0.5-10km length of river, including the field survey location(s), with similar planform along its length, and no major tributaries or weirs that may drastically impact flow type and sediment deposition.

Twenty-two broad natural and semi-natural river types have been identified across Europe (Rinaldi *et al.*, 2016), based on valley confinement and slope, planform, and bed material size. Fifteen are included in the MoRPh classification system, including canals and navigable rivers, large rivers, and 13 river planform bed material types A-M as shown in Figure 2, below.

Figure A1 River types A-M (thirteen near-natural river types that might be encountered in England). From Gurnell *et al.* (2022).



Eight river type indicators (Table 1, below) are combined to produce an indicative river type. Indicators A1-A5 are calculated in the Desk Study phase, using Google Earth or similar mapping software; indicators A6-A8 are derived from values recorded in the Field Survey stage.

Table A1 River type indicators and their location sources. Based on Gurnell *et al.* (2022).

Code	Name	Source
A1	Braiding index (BI)	Desk Study
A2	Sinuosity index (SI)	Desk Study
A3	Anabranching index (AI)	Desk Study
A4	Level of confinement (U, PC, C)	Desk Study
A5	Valley gradient	Desk Study
A6	Bedrock reach	Field Survey
A7	Coarsest bed material size class	Field Survey
A8	Average bed material size class	Field Survey

Overdeepening

A channel may be considered 'overdeep' when is comparatively deep relative to its width, suggesting that the bed has been incised/dredged and/or that the bank tops have been raised artificially. This results in a channel that is disconnected from its bank tops and floodplain, with flood flows less likely to burst the banks than if the cross-profile were unmodified. As this reduces the channel's value for biodiversity, the Final Condition Class may be lowered by one class if the surveyor considers it to be overdeep.

The River Shape and Average Width indicators generated in Cartographer from river dimensions collected in the field can be used to provide a numerical estimate of the likelihood of overdeepening, although professional judgement should always be applied on a case-by-case basis.

Encroachment

Encroachment extents are assessed according to the Statutory Metric Biodiversity Metric User Guide, and considers any features or intervention within the riparian zone or watercourse that reduce the quantity, quality or ecological function of the riparian habitat, or that adversely affects the natural function of the watercourse.

River Condition Scores and Indicators

Table A2 Likely best and worst preliminary condition scores for each river type (from Gurnell *et al.*, 2024).

River Type	Canals and Navigable rivers	Large rivers	A	B	C	D	E	F	G	H	I	J	K	L	M
Likely best Provisional Condition Score	1.8	2.2	2.4	2.7	2.7	2.7	2.7	2.8	3.0	2.9	3.1	2.8	2.4	2.4	2.4
Lower threshold for GOOD	>1.4	>1.8	>1.9	>2.2	>2.2	>2.2	>2.2	>2.3	>2.5	>2.4	>2.5	>2.3	>1.9	>1.9	>1.9
Lower threshold for FAIRLY GOOD	>0.9	>1.3	>1.2	>1.4	>1.4	>1.4	>1.4	>1.5	>1.6	>1.6	>1.7	>1.5	>1.2	>1.2	>1.2
Lower threshold for MODERATE	>0.3	>0.5	>0.2	>0.2	>0.2	>0.2	>0.2	>0.4	>0.5	>0.5	>0.6	>0.4	>0.2	>0.2	>0.2
Lower threshold for FAIRLY POOR	>-0.5	>-0.4	>-1.0	>-0.9	>-0.9	>-0.9	>-0.9	>-0.9	>-0.9	>-0.9	>-0.8	>-0.9	>-1.0	>-1.0	>-1.0
Likely worst Provisional Condition Score	-1.5	-1.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5	-2.5

Table A3 River condition assessment indicators table (from Gurnell *et al.*, 2024).

(NNIPS = non-native invasive plant species, positive indicators underlined, *negative indicators in italic font*)

Location	Code	Name
Bank top	B1	Bank top vegetation structure
	B2	Bank top tree feature richness
	B3	Bank top water-related features
	B4	*Bank top NNIPS cover*
	B5	*Bank top managed ground cover*
Bank face	C1	Bank face riparian vegetation structure
	C2	Bank face tree feature richness
	C3	Bank face natural bank profile extent
	C4	Bank face natural bank profile richness
	C5	Bank face natural bank material richness
	C6	Bank face bare sediment extent
	C7	*Bank face artificial bank profile extent*
	C8	*Bank face reinforcement extent*
	C9	*Bank face reinforcement material severity*
	C10	*Bank face NNIPS cover*
Channel – water margin	D1	Channel margin aquatic vegetation extent
	D2	Channel margin aquatic morphotype richness
	D3	Channel margin physical feature extent
	D4	Channel margin physical feature richness
	D5	*Channel margin artificial features*
Channel bed	E1	Channel aquatic morphotype richness
	E2	Channel bed tree features richness
	E3	Channel bed hydraulic features richness
	E4	Channel bed natural features extent
	E5	Channel bed natural features richness
	E6	Channel bed material richness
	E7	*Channel bed siltation*
	E8	*Channel bed reinforcement extent*
	E9	*Channel bed reinforcement severity*
	E10	*Channel bed artificial features severity*
	E11	*Channel bed NNIPS extent*
	E12	*Channel bed filamentous algae extent*

Table A4 Condition Indicators and scores obtained for river baseline. C8 is highlighted showing the only change in condition score.

Indicator (positive indicators shaded)	Code	Baseline	Post-dev
Bank top vegetation structure	B1	4	4
Bank top tree feature richness	B2	3	3
Bank top water-related features	B3	0	0
Bank top NNIPS cover	B4	-1	-1
Bank top managed ground cover	B5	-4	-4
Bank face riparian vegetation structure	C1	4	4
Bank face tree feature richness	C2	3	3
Bank face natural bank profile extent	C3	3	3
Bank face natural bank profile richness	C4	3	3
Bank face natural bank material richness	C5	1	1
Bank face bare (unvegetated) sediment extent	C6	4	4
Bank face artificial bank profile extent	C7	0	0
Bank face reinforcement extent	**C8**	**-2**	**-3**
Bank face reinforcement material severity	C9	-3	-3
Bank face NNIPS cover	C10	0	0
Channel margin aquatic vegetation extent	D1	2	2
Channel margin aquatic morphotype richness	D2	1	1
Channel margin physical feature extent	D3	2	2
Channel margin physical feature richness	D4	1	1
Channel margin artificial features	D5	-1	-1
Channel aquatic morphotype richness	E1	0	0
Channel bed tree features richness	E2	2	2
Channel bed hydraulic features richness	E3	2	2
Channel bed natural features extent	E4	3	3
Channel bed natural features richness	E5	3	3
Channel bed material richness	E6	4	4
Channel bed siltation	E7	-4	-4
Channel bed reinforcement extent	E8	0	0
Channel bed reinforcement severity	E9	0	0
Channel bed artificial features severity	E10	-4	-4
Channel bed NNIPS extent	E11	0	0
Channel bed filamentous algae extent	E12	0	0

Table A5 Indicator score averages and overall score/condition

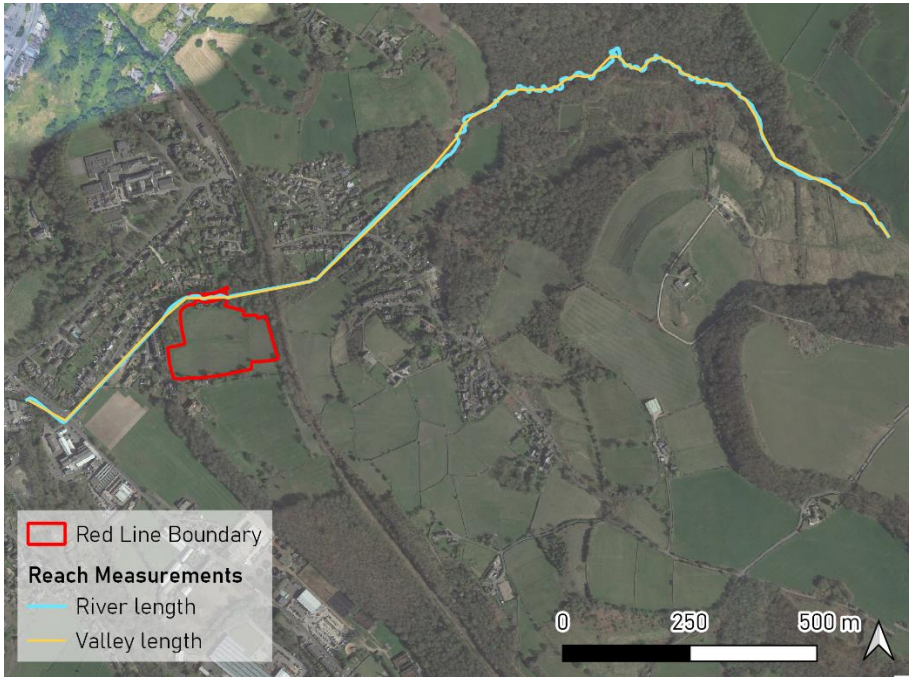
	Ludhill Dike	
	Baseline	Post-development
River Type	F	
Average positive indicators	2.37	2.37
Average negative indicators	-1.46	-1.54
Overall score	0.91	0.83
Preliminary condition	Moderate	Moderate
Overdeep?	Yes	Yes
Final condition	Fairly Poor	Fairly Poor

Appendix B River Type Assessment

Ludhill Dike

The reach used for the River Type Assessment was defined as lying between grid reference SE 15888 12290, upstream, and SE 14195 11970, downstream. The upstream limit was set at the dike's source, and the downstream limit at its convergence with the River Holme.

Figure B1 The reach of Ludhill Dike, showing river and valley length.



This encompasses a river length of 2.42km, with a valley length (ignoring meanders but including valley side spurs) of 2.15km. River length is divided by valley length to calculate sinuosity.

The elevation of the reach starts at 223m and ends at 102m, resulting in a valley gradient of 0.06 (to 2dp).

The river occupies a single wetted channel, with no braiding or anabranching, and has bank faces distinctly unconfined by the valley side.

Table B1 River Type values.

Indicator	Score
A1: Braiding index	1
A2: Sinuosity	1.13
A3: Anabranching index	1
A4: Level of confinement	Unconfined
A5: Reach valley gradient	0.06
A6: Bedrock reach?	No
A7: Coarsest bed material class size	Boulder
A8: Average bed material class size	Gravel-Pebble

Values A6 to A8 are determined by observations in the Field.

Value A7 automatically calculates as Boulder, however this did not reflect the judgement of the ecologist, and so was overridden as cobble.

This data resulted in a calculated river type of D – other alluvial, straight-sinuous to plane bed, coarsest sediment boulder/bedrock, average sediment gravel/pebble.

This does not align with what the surveyor observed during the field survey, and therefore has been overridden to **river type F** – other alluvial, straight-sinuous, coarsest sediment cobble, average sediment gravel/pebble.

Appendix C Opportunities for further enhancement of full survey length according to condition indicators

Condition indicators (see Table A3) calculated from field survey data and extracted from Cartographer, can be used to inform opportunities for enhancement. The opportunities listed are colour coded by their impact potential, based on the potential for increase in score. It should be noted that these are listed for transparency, regardless of their feasibility, and not all may be applicable to this Site, or in this context. A license from the Environment Agency may be required before significant changes are made to rivers, and any plans may need to be informed by further study to prevent unintended impacts.

Table C1 Enhancement opportunities, based on score alone, and their potential opportunity to impact overall condition score. Rows are colour-coded to indicate interventions with **major**, **moderate**, **minor**, and **no potential impact** on the watercourse's condition score.

Indicator (+positive or -negative)		Enhancement strategy	Potential Impact
Bank top vegetation structure (+)	B1	Enhance bank top vegetation structure (B1) by planting a range of riparian vegetation types on the bank top	none
Bank top tree feature richness (+)	B2	Enhance bank top tree feature richness (B2) by planting riparian trees such as willow and alder, and allowing for the retention of fallen and leaning trees, large wood, and branches trailing into the canal	minor
Bank top water-related features (+)	B3	Introduce bank top water-related features (B3) such as ponds, side channels, and wetlands	major
Bank top NNIPS cover (-)	B4	Reduce bank top NNIPS cover (B4) by controlling Himalayan balsam	minor
Bank top managed ground cover (-)	B5	Minimise encroachment of managed ground cover into the bank top areas post-development (B5)	major
Bank face riparian vegetation structure (+)	C1	Enhance bank face riparian vegetation structure (C1) by planting a range of riparian vegetation types on the bank face (include only if plausible for bank face type)	none
Bank face tree feature richness (+)	C2	Enhance bank face tree feature richness (C2) by planting riparian trees such as willow and alder, and allowing for the retention of fallen and leaning trees, large wood, and branches trailing into the canal	minor
Bank face natural bank profile extent (+)	C3	Enhance bank face natural profile extent (C3) by allowing natural geomorphic processes to take place to increase the extent of natural bank profiles	minor
Bank face natural bank profile richness (+)	C4	Enhance bank face natural profile richness (C4) by allowing natural geomorphic processes to take place to increase variation in the types of natural bank profiles present	minor
Bank face natural bank material richness (+)	C5	Enhance bank face natural bank face material richness (C5), by allowing natural geomorphic processes to take place to expose a variety of natural sediments	moderate
Bank face bare sediment extent (+)	C6	Enhance bank face bare sediment extent (C6) by controlling invasive or dominating plants to allow natural geomorphic processes to take place	none
Bank face artificial bank profile extent (-)	C7	Minimise the artificial bank profile extent (C7) by naturalising the bank profile	none
Bank face reinforcement extent (-)	C8	Reduce bank face reinforcement extent (C8) through replacement of existing reinforcement with lower severity options, e.g. willow spilling, biotex, or coir	moderate

Indicator (+positive or -negative)		Enhancement strategy	Potential Impact
Bank face reinforcement material severity (-)	C9	Reduce bank face reinforcement severity (C9) through replacement of existing reinforcement with lower severity options, e.g. willow spilling, biotex, or coir.	moderate
Bank face NNIPS cover (-)	C10	Reduce bank face NNIPS cover (C10) by controlling invasive weeds, such as Himalayan balsam, Japanese knotweed or Giant Hogweed	none
Channel margin aquatic vegetation extent (+)	D1	Enhance channel margin aquatic vegetation extent (D1) by planting a range of native aquatic species at the water's edge	minor
Channel margin aquatic morphotype richness (+)	D2	Enhance channel margin aquatic morphotype richness (D2) by planting a range of native aquatic species at the water's edge	moderate
Channel margin physical feature extent (+)	D3	Enhance channel margin physical feature extent (D3) by investigating measures to generate side bars and marginal backwaters	minor
Channel margin physical feature richness (+)	D4	Enhance channel margin physical feature richness (D4) by investigating measures to generate side bars and marginal backwaters	moderate
Channel margin artificial features (-)	D5	Reduce impact of channel margin artificial features (D5) by investigating removal of pipe outflows, jetties or artificial deflecting features	minor
Channel aquatic morphotype richness (+)	E1	Investigate measures to enhance channel aquatic morphotype richness (E1)	major
Channel bed tree feature richness (+)	E2	Investigate measures to enhance channel bed tree feature richness (E2) such as planting trees within the channel	minor
Channel bed hydraulic features richness (+)	E3	Investigate measures to enhance channel bed hydraulic feature richness (E3)	minor
Channel bed natural features extent (+)	E4	Retain channel bed natural features to enhance extent (E4) by removing artificial channel bed features and allowing natural hydraulic processes to take place	minor
Channel bed natural features richness (+)	E5	Retain channel bed natural features to enhance richness (E5) by removing artificial channel bed features and allowing natural hydraulic processes to take place	minor
Channel bed material richness (+)	E6	Enhance channel bed material richness (E6) by removing artificial channel reinforcement and allowing natural hydraulic processes to take place	none
Channel bed siltation (-)	E7	Investigate measures to reduce channel bed siltation (E7)	major
Channel bed reinforcement extent (-)	E8	Reduce channel bed reinforcement extent (E8) by removing artificial in-channel reinforcement	none
Channel bed reinforcement severity (-)	E9	Reduce channel bed reinforcement severity (E9) by replacing artificial in-channel reinforcement with materials of lesser severity, such as wood pilling, rip-rap, gabions, or builder's waste	none
Channel bed artificial features severity (-)	E10	Reduce channel bed artificial features (E10) by removing large trash, and investigating measures to remove or reduce severity of weirs, or to open existing culverts	major
Channel bed NNIPS extent (-)	E11	Reduce channel bed NNIPS cover (E11) by controlling invasive weeds, such as floating pennywort	none
Channel bed filamentous algae extent (-)	E12	Investigate measures to increase water quality and reduce channel bed filamentous algae (E12)	none