Westnewton Bridge

Habitats Regulations Assessment Report

February 2015

Final Report

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Field Investigations and Data

Where field investigations have been carried out these have been restricted to a level of detail required to achieve the stated objectives of the work. Where any data supplied by the client or from other sources have been used it has been assumed that the information is correct. No responsibility can be accepted by EcoNorth Ltd for inaccuracies in the data supplied by any other party.

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Non-Technical Summary

EcoNorth Ltd was commissioned by Northumberland County Council to undertake an Appropriate Assessment of a proposal for engineering works to strengthen and protect a road bridge (known as Westnewton bridge) on the B6531 at Westnewton, north of Wooler, Northumberland where the road crosses the College Burn.

The assessment of likely significant effects and appropriate assessment is required under the Habitats Regulations (2010) as part of the UKs responsibilities under the EC Habitats Directive 92//43/EEC.

The College Burn forms part of the Tweed Rivers Catchment Special Area of Conservation (SAC) and the aforementioned engineering works will fall, at least in part, within the SAC.

The Tweed Rivers Catchment SAC is designated under the Habitats Regulations (2010) for important aquatic plant communities, important populations of otter and Atlantic salmon as qualifying species and is also noted as being important for brook lamprey, river lamprey and sea lamprey though these are not primary reasons for notification.

This report sets out an assessment of the potential effects of the works on the interest features of the SAC, including an assessment of the in-combination effects with other relevant proposals.

Without the inclusion of mitigation measures the assessment concludes that the proposal will incur 'likely significant effects' on the SAC features and possibly impact upon the 'site integrity' of the SAC and is therefore contrary to the requirements of the Habitats Regulations (2010). To avoid any adverse effects on the site integrity of the Tweed Catchment Rivers SAC a range of avoidance and mitigating measures have been devised by Northumberland County Council and are incorporated into the design philosophy, the features of the design and the working methods proposed.

Following inclusion of mitigating measures the evidence presented in this report indicates that the proposal will not adversely affect the integrity of the Tweed Catchment Rivers SAC and is not contrary to the provisions of the Habitats Regulations. This assessment will ultimately need to be made by the relevant competent authority (in this case Northumberland National Park Authority) before the proposal can proceed .

Northumberland County Council propose to employ an Ecological Clerk of Works ECoW to oversee mitigation measures and works on site to ensure compliance with the details of the method statement proposed.

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1. Introduction

EcoNorth Ltd was commissioned by Northumberland County Council to undertake a Habitats Regulations Assessment (HRA) of a proposal to strengthen and protect a road bridge on the B6531 at Westnewton, north of Wooler, Northumberland where the road crosses the College Burn.

The assessment of likely significant effects and appropriate assessment of any such effects is required under the Habitats Regulations (2010) as part of the UKs responsibilities under the EC Habitats Directive 92//43/EEC

1.1 Background

Following a near catastrophic event at the bridge under flood conditions in 2012, Northumberland County Council has developed a detailed proposal to protect the bridge at Westnewton from further structural damage. Immediately following the flooding and damage which occurred in 2012, Northumberland County Council undertook some remedial works under emergency powers which comprised of remedial works to the bridge and some channel realignment to channel the flow of the river under the main arch of the bridge.

Following the emergency works Northumberland County Council (in conjunction with CBEC – Eco – Engineering) have proposed series of longer term measures to protect the bridge. This report undertakes to assess the proposed works against the requirements of the Habitat Regulations (2010).

This report is also informed by an ecological survey undertaken by EcoNorth (2014) to examine the overall ecological effect of the scheme but also with particular reference to SAC features and key habitats which could support sensitive features or life stages of those species. The EcoNorth Report has identified that the habitats in the vicinity of the bridge where works are proposed are not suitable habitats for the most sensitive stages of either the salmon or lamprey lifecycle (i.e spawning grounds). The survey has also identified that no aquatic plant communities will be directly affected by the footprint of the works.

A thorough survey for otter as part of the EcoNorth survey confirmed their presence in the area though did not identify any holts, couches or dens in the vicinity of the works. Due to the mobility of this species and the time between the EcoNorth survey and the proposed development this aspect of the survey will need to be updated in advance of the works to ensure that European legislation with respect to species protection is adhered to throughout the works.

1.2 Site Context

Figure 1.1 Indicative Site Boundary and Working Areas

(Boundary outlined in red)

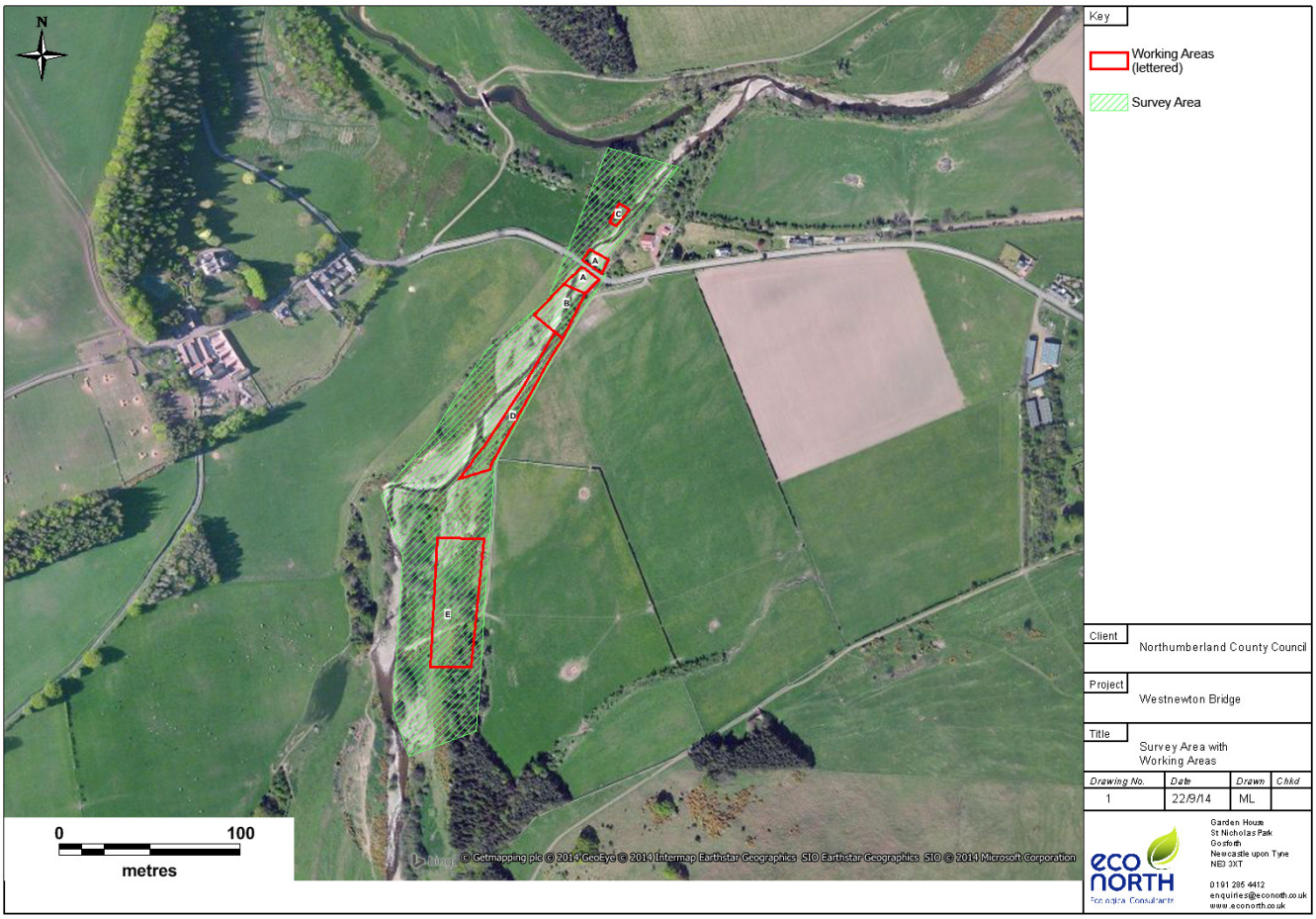
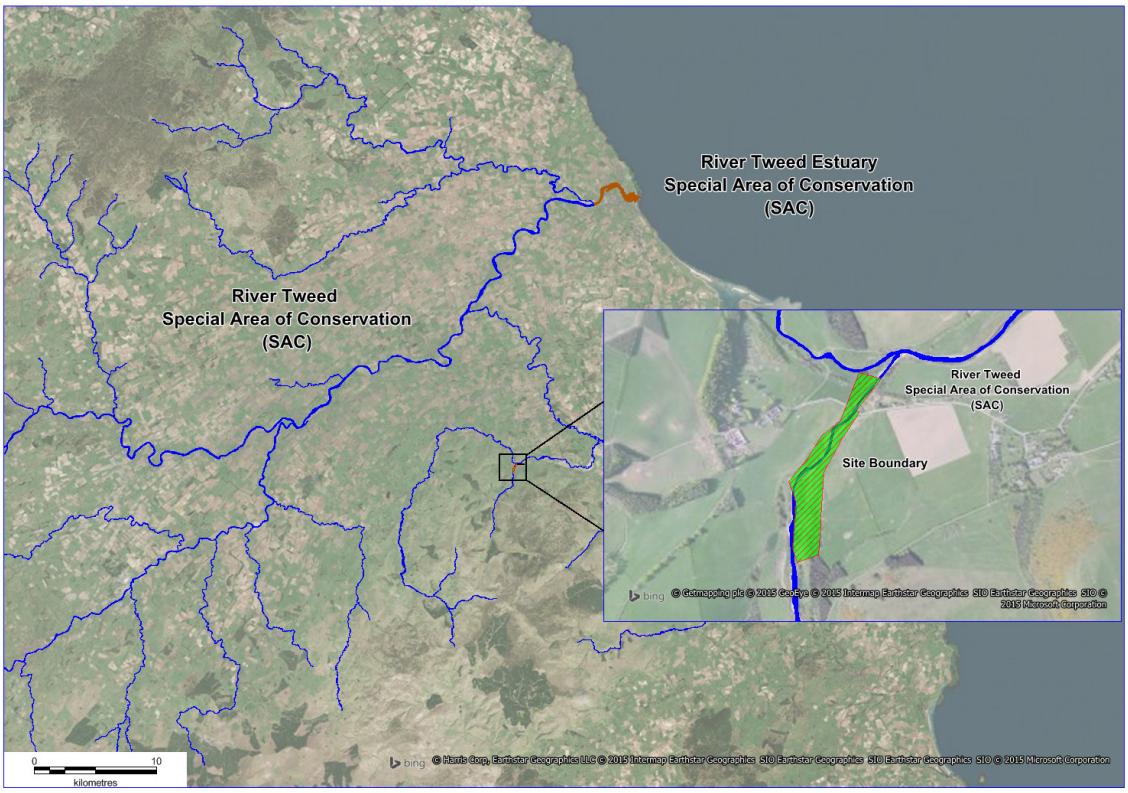


Figure 1.3 Site Location in Relation to Overall Distribution of Tweed Catchment Rivers SAC



1.3 Legislation

The status of the Tweed Catchment Rivers as a classified SAC under the EC Directive 79/409/EEC 1992 on the Conservation of Habitats and Species (the "Habitats Directive"), means that the Conservation of Habitats and Species Regulations 2010, (the "Habitats Regulations") apply to these Natura 2000 sites.

The Regulations require that, where an authority concludes that a development proposal unconnected with the nature conservation management of a Natura 2000 site is likely to have a significant effect on that site, it must undertake an "appropriate assessment" of the implications for the conservation interests for which the area has been designated.

The Local Planning Authority, Northumberland National Park Authority, as competent authority, has a duty to:

> Stage 1: Define the proposal, the qualifying species of the SAC and identify potential effects associated with the proposal

> Stage 2: Determine whether the proposal is directly connected with, or necessary to, site management for conservation; and, if not

> Stage 3: Determine whether the proposal is likely to have a significant effect on the site either individually or in combination with other plans or projects; and, if so, then

> Stage 4: Make an appropriate assessment of the implications (of the proposal) for the site in view of that site's conservation objectives

The competent authority can only agree to the proposal under Regulation 48 after having ascertained that it will not adversely affect the integrity of the site. If this is not the case, and there are no alternative solutions, the proposal can only be allowed to proceed if the proposal is in the interests of preserving public health and safety or if there are imperative reasons of overriding public interest.

For the purposes of assessment the integrity of the site is generally considered to be "the coherence of the site's ecological structure and function, across its whole area, that enables it to sustain the habitats, complex of habitats and/or populations of species for which the site is or will be classified", Tyldesly (2011).

1.4 Policy

River work operations are a key focus of the Tweed Catchment Management Plan. A strategic aim of the Tweed Catchment Management Plan is that 'all river work operations respect the physical, ecological and aesthetic integrity of the river system'. Tweed Forum (2010).

2. Habitat Regulations Assessment

2.1 Define the Proposal, the Interest Features of the Designated Site and Identify Potential Effects Associated with the Proposal

2.1.1 Define the Proposal:

Northumberland County Council has developed a detailed proposal to protect the bridge at Westnewton from further structural damage following flooding and associated damage which occurred in Winter 2012. Immediately following this event Northumberland County Council undertook some works under emergency powers which comprised of remedial works to the bridge and some channel realignment to channel the flow of the river under the main arch of the bridge.

Following the emergency works Northumberland County Council have developed, in conjunction with CBEC – Eco – Engineering, a proposed series of longer term measures to protect the bridge. The measures proposed are outlined below and are described in more technical detail in the 2014 CBEC 2014 Report for the Scheme. The scheme has

been devised taking into account general aims of both The Tweed Catchment Management Plan and Till Restoration Strategy in terms of deploying 'soft' engineering approaches where practicable. The areas referred to relate to those areas illustrated on the proposed works plan prepared by Northumberland County Council. A detailed method statement to undertake the works has been prepared by Northumberland County Council (2014) and this should be referred to for full comprehensive details of the proposal. Full details of works areas are illustrated on NCC drawing HB127276/B/B6531/06/23.

Area 1 - (Marked area A on Figure 4.1). Works in area 1 relate specifically to structurally strengthening the bridge and taking measures to reduce scour through the main central archway and surrounding the aprons of the bridge. The works will require installation of a reinforced concrete invert to current invert levels and will require sheet pilling upstream and downstream of the bridge to facilitate this.

Area 2 - (Marked area C on Figure 4.1). Area 2 refers to an old rail crossing bridge abutment. Modeling has show that this feature has some adverse effects on the flow of the river and this will be removed as part of the works on the site.

Log Arrays - (Works in area B illustrated on figure 1.1). Works which will guide the main flow of water through the central archway of the bridge thus reducing impacts on the supporting structures of the bridge during periods of high flow. This will be achieved using pairs of logs positioned on either side of the river to train the flow of water.

Area 3 –Material arising from emergency works undertaken to protect the bridge in 2012.

Area 4 - (Marked area E on Figure 4.1). Comprises an area which will be elevated by 300mm using material arising from emergency works currently stored in area 3 undertaken to protect the bridge in 2012. This will be undertaken to prevent the existing flood bank breaching.

Area 5 – (Working area D on figure 4.1) Soft engineered timber stockades will be installed in the ground in this area to prevent cut back scour during flood events.

2.1.2 Define the Interest Features of the Designated Site:

The Tweed Catchment Rivers extends its reach throughout much of the Scottish Borders and North Northumberland occupying 3795.88ha. Of this habitat 96% is occupied by inland water bodies (running water) with the remainder comprising small areas of estuarine habitats, bogs, fens marshes and broadleaved woodland.

The Tweed Catchment Rivers SAC qualifies under Article 4.1 of the Directive (2010) by supporting populations of 'European Importance' of the following habitats listed on Annex 1 of the Directive and species listed on Annexe 2 of the Directive:

Table 2.1 SAC Qualifying Features of the Tweed Catchment Rivers

Water courses of plain to montane levels with the R*anunculion fluitantis* and Callitricho-Batrachion vegetation
The Tweed represents sub-type 2 in the north-eastern part of its range. It is the most species-rich example, by far, of a river with *Ranunculus* in Scotland, and is the only site selected for this habitat in Scotland. The river has a high ecological diversity which reflects the mixed geology of the catchment. Stream water-crowfoot Ranunculus penicillatus ssp. pseudofluitans, a species of southern rivers and streams, here occurs at its most northerly location as does fan-leaved water-crowfoot *R. circinatus*, along with river water-crowfoot *R. fluitans*, common water-crowfoot *R. aquatilis*, pond water-crowfoot *R. peltatus* and a range of hybrids. The Tweed is also the most northerly site for flowering-rush *Butomus umbellatus*.
Annexe 2 species which is a primary reason for site selection
Atlantic salmon *Salmo salar*
The River Tweed supports a very large, high-quality salmon *Salmo salar* population in a river which drains a large catchment on the east coast of the UK, with sub-catchments in both Scotland and England. The Tweed is the best example in Britain of a large river showing a strong nutrient gradient along its length, with oligotrophic conditions in its headwaters, and nutrient-rich lowland conditions just before it enters the sea at Berwick. The high proportion of the River Tweed accessible to salmon, and the variety of habitat conditions in the river, has resulted in the Scottish section of the river supporting the full range of salmon life-history types, with sub-populations of spring, summer salmon and grilse all being present. The extensive system supports a significant proportion of the Scottish salmon resource. In recent years, the salmon catch in the River Tweed is the highest in Scotland, with up to 15% of all salmon caught. Considerable work has been done by the Scottish Environment Protection Agency (and previously the Tweed River Purification Board) and the River Tweed Foundation in tackling pollution and easing the passage of salmon past artificial barriers in the river. This has reversed many of the river's historical problems with water quality and access for salmon.
1355 Otter *Lutra lutra*
This large river system contains extensive water and riparian habitat suitable for otters *Lutra lutra*. The extensive tributary burns provide good feeding habitat. The area provides extensive suitable habitat for all the necessary aspects of otter's life cycle and the site is a good representative of the south-east lowlands of Scotland and the north-east of England.
Annexe 2 Species which are not a primary reason for site selection.
Sea lamprey *Petromyzon marinus*
Brook lamprey *Lampetra planeri*
River lamprey *Lampetra fluviatilis*

2.1.3 Consultation

In order to determine which of the SAC features (detailed above) are most relevant to the assessment and to ensure any likely effects are identified a thorough process of consultation has been undertaken with the following organisations.

- Natural England
- Environment Agency
- Tweed Forum
- Tweed Foundation
- Northumberland National Park

A summary of the consultations and responses received are included in Table 2.1 below.

Table 2.1 Summary of Consultations and Responses

Organisation	Detail of Consultation	Summary Responses
Natural England	Site visits and subsequent request for comments on draft document	NE advised that the annexe 1 habitat for which the site is designated cover not only the cited vegetation community but also the morphology of the river. NE advised that both species of lamprey (brook and river) are likely to be present in the college burn and should be fully considered within the assessment. The assessment should include a consideration of alternatives section which should consider the scale and duration of works and those of any alternatives. The potential for barrier effects as a result of the proposal in the short, medium and long term should be considered. NE also raised concerns over the extent of concrete used to form the invert and it was agreed that strict control of this material and any water contaminated with it would be required through the duration of works.
Environment Agency	Site visits and subsequent request for comments on draft document	EA voiced concerns over the extent of channel management on the site during a site visit and echoed concerns over the use of large amounts of concrete to form the invert including potential percolation of concrete down through river gravels and subsequently into the water course. EA considered that removal of the bridge abutment downstream of the bridge could be considered as mitigation for upstream works. EA also indicated that scour protection measures could and possibly should be extended to further upstream of current proposals.
Tweed Forum	Tweed forum were contacted specifically in relation to questions relating to the presence of lamprey and for any information on other plans or projects which should be considered	Tweed Forum referred questions relating to Lamprey distribution to the Tweed Foundation and provided some location specific information to river works which could be assessed within a consideration of cumulative effects.

	in relation to in combination effects.	
Tweed Foundation	Tweed Foundation were contacted specifically in relation to questions relating to the presence of lamprey and for any information on other plans or projects which should be considered in relation to in combination effects.	Tweed foundation referred EcoNorth to a Lamprey report prepared for and held by Natural England. Dr Ronald Campbell at The Tweed Foundation also highlighted the importance of the College Burn for a genetically distinct population of sea trout whose upstream migration is likely to occur between May and September and while this is not an SAC feature the conservation of this feature must be considered within the assessment.
Northumberland National Park Ecologist*	NNPA were contacted specifically in relation to questions relating any information on other plans or projects which should be considered in relation to in combination effects	NNPA Ecologist highlighted that works would need to be timed carefully to avoid effects on SAC features. Initial consultation with NNPA has indicated that some felling is proposed upstream of the bridge in the College Valley and there is therefore a possibility of increased sedimentation interacting with any sedimentation resulting from construction works. NNPA Ecologist also highlighted that the draft HRA report submitted to NNPA in January 2015 did not identify Salmon reds and spawning areas for Lamprey downstream of the bridge which could be affected by sedimentation.

* NNPA Ecologist stated that they may provide further information. If any relevant information becomes available during the planning process this report can be updated accordingly.

2.1.4 Conservation Objectives of Tweed Catchment Rivers SAC

The conservation objectives for the River Tweed are as outlined by Natural England (June 2014):

"To avoid deterioration of the qualifying habitat thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features; and

To ensure for the qualifying habitat that the following are maintained in the long term:

- Extent of the habitat on site
- Distribution of the habitat within site
- Structure and function of the site
- Processes supporting the habitat
- Distribution of typical species of the habitat
- Viability of typical species as components of the habitat
- No significant disturbance of typical species of the habitat"

To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site

makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features; and

To ensure for the qualifying species that the following are maintained in the long term:

- Population of the species, including range of genetic types for salmon as a viable component of the site;
- Distribution of the species with the site;
- Distribution and extent of habitats supporting the qualifying species;
- Structure, function and supporting process of habitats and supporting the species;
- No significant disturbance of the species.

2.1.5 Identify Potential Effects of Proposal on the SAC / SSSI

Table 2.1 below outlines the main potential effects associated with River works on the River Tweed SAC

Table 2.2 Potential Adverse Effects of River works on the Tweed Catchment Rivers SAC Qualifying Features

Potential Effects on the SAC Features		**Effects on SAC features**
Increased Sedimentation throughout construction activities such as excavating river gravels or piling operations	Salmon	Salmon require rivers with a variety of habitats and substrates at different stages of the complex life cycle of the fish. Salmon require rivers with excellent water quality high in dissolved oxygen and low in suspended solids (sediment). Increased nutrients, heavy metal pollution, reduction in dissolved oxygen and heavy sediment loads can all damage salmon populations.
	Lamprey	All lamprey species, like salmon, require well oxygenated watercourses which are low in suspended solids. Increases in sedimentation can smother spawning gravels and silt beds containing juveniles.
	Otter	Increases in sedimentation may have an indirect adverse effect on otter due to a reduction in salmonid and other fish species/numbers which comprise otters prey items.
	Ranunculion fluitantis and *Callitricho-Batrachion* vegetation	River channels supporting this habitat type are typically dominated by clean gravel. Siltation of gravel is a major threat to the habitat as it can interfere with the establishment of sensitive aquatic plant species.

Disturbance to Species during construction activities or during operation	Salmon	Salmon are most sensitive to disturbance in spawning areas known as 'reds'. In these areas eggs incubate in gravel beds over winter and the young alevin remain in these areas until around May. Disturbance to suitable gravels at the wrong time could result in the failure of eggs to spawn and if an important breeding site is effected it may result in a weakened population structure. Noise and vibration may affect older life stages of salmon as it is understood that fish are sensitive to vibrations as a result of operations effecting water such as pile driving, vibrations can affect fish behaviour and in extreme cases cause injury (Hawkins, 2010).
	Otter	Otter can be affected by disturbance in a number of ways which can impact upon their survival. Disturbance can affect commuting routes and habitat connectivity for the species or displace otter from foraging areas. Possibly more significant is the risk of disturbing otters at important resting or den sites where they may be raising dependant young. Due to otters having large home ranges disruption and associated failure of an otter breeding effort could have significant consequences for their distribution and population along a significant stretch of watercourse.
	Lamprey sp.	Similar to salmon lamprey are most sensitive to disturbance during spawning periods and when eggs are incubating in river sediments. During spawning lamprey will openly congregate, often in shallow water. After spawning the eggs can be disturbed during incubation, and the juveniles in silt beds are also vulnerable to disturbance.
	Ranunculion fluitantis and *Callitricho-Batrachion* vegetation	Cutting of the aquatic vegetation and river engineering are often undertaken for fishery and flood alleviation purposes. Both have the potential to disturb the typical species and threaten the habitat. Consideration must be given to the needs of the typical plant species and the habitat when contemplating such schemes.
Habitat Loss / Modification as a result of channel alignment measures or potential obstructions to species movement around bridge reinforcement works	Salmon	Permanent structures within watercourses can potentially restrict the ability of salmon to migrate upstream. This is usually most relevant in terms of weirs and hydro-electric schemes however structures around the bases of bridges also have the potential to restrict migratory movements due to the potential in change of river levels around such structures. Operations which alter or modify the natural meanders of rivers can also reduce the variety of habitat types

		required by different life stages of salmon. Modification of natural processes may inhibit formation of features required at different stages of the species lifecycle such as formations of suitable areas for spawning or nursery areas for younger fish life stages.
	Otter	Otter require several km of watercourse for foraging and so this species may be affected indirectly if any in stream structures affect the ability of fish species to access the full range of the SAC habitat reducing the prey availability in parts of the catchment.
	Lamprey sp.	Permanent in river works relating to in stream structures can potentially restrict the ability of lamprey species to migrate upstream. This is usually most relevant in terms of weirs and hydro-electric schemes however structures around the bases of bridges also have the potential to restrict migratory movements due to the potential in change of river levels around such structures. Modification of natural processes may inhibit formation of features required at different stages of the species lifecycle such as formations of suitable areas for spawning or nursery areas for younger fish life stages.
	Ranunculion fluitantis and *Callitricho-Batrachion* vegetation	Aquatic vegetation may be impacted by river works by habitat loss as a result of excavation of river gravels during the construction phase of the project. Increased sedimentation even on a temporary basis could smother aquatic plant communities downstream of the works.
	River Morphology	Possible changes to river morphology for a distance upstream of the bridge
Pollution incidents during engineering works	Salmon	Salmon require rivers with excellent water quality high in dissolved oxygen and low in suspended solids. Increased nutrients, heavy metal pollution, hydrocarbons, reduction in dissolved oxygen and heavy sediment loads can all damage Salmon populations.
	Lamprey sp.	Salmon require rivers with excellent water quality high in dissolved oxygen and low in suspended solids Increased nutrients, heavy metal pollution, hydrocarbons, reduction in dissolved oxygen and heavy sediment loads may all have the potential to damage lamprey populations.
	Otter	Otter are dependent on the fish present within the Tweed Catchment rivers ecosystem and are vulnerable to pollution which adversely effects populations of the fish (including non-SAC species) which are present

		within the watercourses.

2.2 Determine Whether the Proposal is Directly Connected with, or Necessary to, Site Management for Conservation

The proposed works are aimed at securing the structural integrity of Westnewton bridge and therefore securing the rural road network between Wooler and the Scottish Borders along the B6351. It can therefore be said that the proposed works are not directly connected with, or necessary to, site management for nature conservation.

2.2.1 Consideration of Alternatives

As part of the engineering process for the scheme a number of options to achieve the same objective of safeguarding the structural integrity of the bridge have been considered. The details of this process are considered in Appendix A of this report.

Following a review of other possible structural repair options the only possible solution identified relates to the combination of the provision of a reinforced invert across the river combined with the provision of soft engineering measures to train the flow of the river to a short distance upstream of the bridge and to provide some scour protection further upstream to approximately 100m of the bridge. These measures are less restrictive than the training measures immediately upstream of the bridge and allow for some meandering of the watercourse within the existing channel. During the continuing design process further measures to prevent back scour a distance further upstream have been dropped from the proposals in part to reduce the level of influence held over the Burn in this area.

2.3 Determine Whether the Proposal is Likely to have a Significant Effect on the Site Either Individually or in Combination with Other Plans or Projects

The works proposed to protect Westnewton Bridge are very localised and small scale nature in relation to the full extent of the River Tweed SAC. However given the sensitive nature of the habitats and species present within the SAC, and the potential for effects of the works throughout a more substantial part of the catchment through mechanisms such as sediment transport, this assessment cannot conclude without an appropriate assessment of the proposal that there would be no adverse effect on the integrity of the Tweed Catchment Rivers SAC. For this reason a process of appropriate assessment of effects is undertaken below in accordance with Regulation 48 of the Habitats Regulations (2010).

2.4 Make an Appropriate Assessment of the limplications for the Site in View of that Site's Conservation Objectives

Section 3 of this document therefore sets out an appropriate assessment of potential likely effects of the proposed bridge strengthening and protection works. An appropriate assessment follows the following methodology:

- **Evidence Gathering:** Collecting information on relevant European sites, their conservation objectives and characteristics and other plans or projects. (See Section 2 of this report for details of evidnec gathering.
- **AA Task 1**: Likely significant effects ('screening') – identifying whether a plan is 'likely to have a significant effect' on a European site (See section 2.1.5)
- **AA Task 2**: Ascertaining the effect on site integrity – assessing the effects of the plan on the conservation objectives of any European sites 'screened in' during AA Task 1. (Note: In relation to AA task 2 the project has been screened in following the process followed in Section 3.1.)
- **AA Task 3:** Mitigation measures and alternative solutions – where adverse effects are identified at AA Task 2, the plan should be altered until adverse effects are cancelled out fully

3. Appropriate Assessment

3.1 AA Task 2 Ascertain the Effect on Site Integrity.

In order to ascertain the effect on site integrity the assessment is required to examine the scale, location and nature of the development.

The proposed development being assessed comprises of engineering works designed to protect and secure the structural integrity of a road bridge carrying the B6351 across the College Burn. The relevant potential effects of development on the SAC as defined in Section 2.1.3 above are discussed in Table 3.1 below to ascertain the effect on the Tweed Catchment River's integrity. This table outlines the conservation objectives and examines the effect of the proposal against these objectives.

Table 3.1 Assessment of Likely Significant Effects Against Conservation Objectives

Conservation Objective	**Possible Effect of Project**
Ensure the following characteristic are maintained	
Extent of the habitat on site	Extent of habitat will remain unchanged. A small section of river will be trained and natural morphological processes will be restricted for a short distance
Distribution of the habitat within site	Minor changes to distribution of habitat possible through training of flow. More notably the potential extent of the

	habitat will be restricted from natural meandering for a distance of c30 – 40m as a result of training through installation of logs along the watercourse
Structure and function of the site	Minor changes to the function of a short section through training of flow for a distance of 30 – 40m upstream of the bridge. The current normal flow channel width in this location is approximately 5m (probably extending to 10m during elevated flows). The length of river subject tto training by logs is approximately40m this results in an indivcative area of habitat where function will be restricted of 0.04 ha
Processes supporting the habitat	Proposed works will have minor effects on river processes, through training flow and restricting scour in some locations but will allow limited meandering of the Burn upstream of the bridge
Distribution of typical species of the habitat	Without mitigation within design some potential restrictions to fish migration are possible if the concrete invert was to create a reduction in river levels downstream of the bridge effectively creating a 'step' feature
Viability of typical species as components of the habitat	No effects on the viability of species as components of the habitat are predicted due to the scale of the works area and the much wider distribution of species throughout the remainder of the SAC site
No significant disturbance of typical species of the habitat	Without mitigation disturbance of species associated with the habitat is possible
Conservation Objective To ensure for qualifying species that the following are maintained in the long term	**Possible Effect of Project**
Population of the species, including range of genetic types for salmon as a viable component of the site	The proposals could have an influence on populations of the species through short term pollution events and also if a barrier was formed as a result of the works resulting in a reduction in available habitat.
Distribution of the species with the site	Without mitigation in design the proposal has some potential to restrict movements of salmon and lamprey upstream of the bridge therefore potentially limiting distribution of SAC species.
Distribution and extent of habitats supporting the qualifying species	The proposal through modification of morphology, scour protection and training of the flow may have minor effects on habitats supporting the species. However as no suitable spawning areas are identified in the current extents the profile of the river retained will allow for retention of habitats

	which support more advanced lifestages of qualifying species such as salmon parr who forage in more fast moving riffles. The proposal is unlikely to significantly affect the distribution and extent of habitats supporting qualifying species though may restrict to a small extent the diversity of habitats.
Structure, function and supporting process of habitats and supporting the species	Minor changes to structure through training of flow restricting natural river processes such as meandering for a short section of the Burn.
No significant disturbance of the species	Without mitigation disturbance of species associated with the habitat is possible because the construction will take place within habitat used to some extent by SAC species .

3.2 In Combination Considerations

The following projects plans have been identified through the consultation process outlined above and also through undertaking a trawl of planning applications using the Scottish Borders Council website. Broadly the approach to in combination considerations has been to identify:-

- All accessible proposals on or in the vicinity of the College Burn
- All accessible proposals comprising of river works on the Tweed Catchment
- All major proposals on the Tweed Catchment for which HRA information is available for

The proposals and projects identified through consultation and desk based searches are included in Table 3.2

Table 3.2 Proposals Currently Considered in Relation to in Combination Effects

Site and Project	Information Source	Comments
Clyde Wind Farm	HRA Document	Main potential issue identified was increased sedimentation. Once mitigation measures are applied no adverse effect concluded.
White Law Brae Wind Farm	HRA Document	HRA document concluded no likely significant effects once mitigation measures had been incorporated.
Redundant Weir Structure downstream of the site on River Glen	E-Mail correspondence with Tweed Foundation	Initial studies are underway to investigate options for managing a redundant wier structure. No HRA undertaken to date and unlikely as it is likely to be considered to be part of conservation management of the site however this is likely to have a positive effect on the river system in relation to restoring natural river processes.

Sand and Gravel Extraction on flood plain of River Tweed catchment	Northumberland Local Development Plan. Core Strategy Habitats Regulations Assessment Scoping Report	Plan identifies potential releases of silt or other pollutants into Tweed Ctchment as a potential threat to the integrity of the SPA.
Forestry felling works in the College Valley	Verbal Report from NNPA	NNPA reported that some forestry felling was due to be undertaken in the College Valley and that this may lead to an increase in sedimentation in the College Burn. At this stage it is unlikely that the two operations will be undertaken simultaneously as forestry works are best undertaken during the winter period however no detailed plans of felling are available on the forestry commission register of cases (accessed 4th Feb 2015) and therefore the risk of interaction between the two is considered to be minimal particularly when mitigation measures are considered along with the coarse nature of sediment on site which is not easily suspended.

A search of available information on plans and projects has not identified any evidence of plans or projects where significant effects are predicted or are likely to interact with the proposals being assessed within this document to result in elevated levels of adverse effects on the Tweed Catchment Rivers SAC.

3.3 AA Task 3 Mitigation Measures and Alternative Solutions

Where adverse effects are identified at AA Task 2, the plan should be altered until adverse effects are cancelled out fully.

The text below details a consideration of the main potential effects and outlines the mitigation measures which will be applied where appropriate with reference to specific potential effects. This assessment also takes into account the results of the EcoNorth site survey report which has identified that the habitats in work areas are considered unsuitable spawning areas for both salmon and lamprey.

Consideration of potential effects on site integrity with mitigation measures applied.

3.3.1 Increased Sedimentation Effects on Salmon, Lamprey, Otter and Ranunculus *communities*

The works to Westnewton bridge will involve a likely increase in sediment load within the watercourse on a temporary basis. Without mitigation measures this may have a short term adverse effect on salmon and lamprey populations and *Ranunculus* communities within the catchment. Due to the mobility of otter and likely short term duration of works, no likely significant effects on otter are predicted through sedimentation. The actual severity of the effect on salmon, lamprey and *Ranunculus* communities is likely to be low as observations on site show that the sediments present around Westnewton bridge are of a very coarse granular nature and are unlikely to remain in suspension for a significant duration. The duration of works on site which may release sediments will also be short term and temporary and will avoid spawning periods. The construction method

statement also highlights that sedimats will be employed to capture any siltation arising during in river sections of the works.

In consultation NNPA Ecologist highlighted that the draft HRA report does not identify known spawning areas for salmon and lamprey downstream of the bridge which could be affected by sedimentation however this report based on information available assumes that spawning areas will be present in sections of the River Glen downstream of the site. Given the nature of the river systems in this location it is possible that salmon reds and spawning areas for other species will change annually with varying deposition of relevant sediments. Given this this report is based on an assumption that salmon reds and lamprey spawning areas are present downstream and the works will be timed to avoid negative effects and a vigilant approach to avoiding sedimentation will be adopted throughout the works.

Effect on site Integrity : Following the implementation of mitigation measures described this report considers that effects of increased sedimentation are unlikely to result in adverse effects, due to the coarse nature of sediment present in working areas which is not readily suspended and the mitigation measures proposed.

3.3.2 Disturbance to Species

Timing of the most sensitive phases of the proposed works which will take place in-river or require plant crossing the river will take place between June and October which is identified in guidance by SNH as being the least sensitive period in the year. This is also thought to be applicable in avoiding the most sensitive periods of the year for lamprey.

However while this timing avoids effects on SAC qualifying species it may coincide with the timing of upstream migration of sea trout which do not form part of the SAC designation though are considered important as those in the College Burn are a genetically distinct population (Dr Ronald Campbell, Tweed Foundation *Pers comm*).

Measures to ensure the bridge remains passable to sea trout during construction are therefore considered to be essential and are integrated into the project design. Additionally a 'soft start' approach to installing piling will be applied to avoid disturbance and possible injury through vibration to fish which are present in the vicinity.

A thorough survey for otter in the vicinity of the works has confirmed the species uses the section of the College Burn though no important resting places were identified which would put otter at risk of disturbance at breeding places. To minimise any disturbing effects on otter for the duration of the works, operations will be restricted to full daylight hours avoiding the most active periods of otter in freshwater habitats overnight. Lighting of works areas will be avoided. An updated check for otter resting sites will be undertaken to ensure this assessment remains valid immediately prior to works commencing.

Timing of in river works will be scheduled to minimise the effects on salmon and lamprey and undertaken between June and September in accordance with guidance from SNH (2006),. To further minimise any disturbance to fish species a 'soft start' approach will be taken toward piling operations so that all life stages which will be mobile at the time of works have the opportunity to avoid the works area.

Effect on Site Integrity : Following implementation of timing controls and other measures described the scheme is not considered likely to adversely affect the integrity of the site through disturbance of species.

3.3.3 Habitat Modification

Requirements for fish migration have been incorporated into the design of the invert to ensure that on completion the finished works are passable to SAC qualifying features. The most pertinent of these being salmon which are known to spawn at locations up the College Burn. Salmon are also known to be adept swimmers with a high burst speed and excellent leaping ability, the swimming prowess of salmon is also reflected in the timing of their upstream migration to coincide with elevated flows (Scottish Executive 2001).

The status of lamprey in the College Burn is less clear and they are less likely to be present as a major obstruction is present at Hethpool Linn Waterfall approximately 2.2 km upstream of the bridge. A survey of lamprey on the Tweed catchment commissioned by Natural England and undertaken by the Tweed Foundation (2013) undertook timed electro fishing immediately up stream of Westnewton bridge, which detected no lamprey larvae and lamprey were also absent at the monitoring point further up the College Burn. The same survey detected records of both brook and river lamprey including two size classes both upstream and downstream of the confluence of the College Burn and River Glen. The survey concluded that brook lamprey dominated on the River Glen. Anecdotal presence of river lamprey was also reported from the River Glen immediately upstream and downstream of downstream of the College Burn from 2008 (Bob Cussen *pers. comm*).

Some literature indicates that lamprey are not considered adept at passing major obstacles on upstream migration and require migration routes free of substantial obstacles (Maitland, 2003) however the Tweed Foundation Report (2013) also refers to the presence of lamprey upstream of Stitchill Linn (10m high waterfall) speculating that they may be capable of passing significant obstacles. Lamprey are also they are also reported by Scottish Executive (2001) as being able to ascend fairly rapid rocky reaches using their oral sucker to hold on between bursts of activity . Given the uncertainty relating to lamprey capacity to pass obstacles a precautionary approach must be applied in relation to allowing the passage of these and other fish species and the invert will be set to the lowest practicable level. A central channel will be incorporated to allow passage of relevant SAC species including lamprey which can migrate during all but the lowest flow conditions. The bed of the invert will have cobbles inset to reflect the existing riverbed conditions and larger boulders will be used to channel flow in low conditions to further facilitate fish passage.

The proposals include a number of measures which will influence the course of the river avoiding overflowing onto adjacent fields through inclusions of embankments and controlling the course of the Burn for a short distance to direct the flow through the bridge. This training process will be undertaken over a distance of c40m. The design does allow for meandering though limits the total extent of this. These measures can be said to work against the conservation objective of maintaining the function of natural river processes which support the relevant associated SAC features. The extent of this influence is however very localised and small scale comprising of c0.02ha of trained flow and a further and unlikely to have a significant effect in the long term on the integrity of the features of the Tweed Catchment Rivers SAC. Some further restriction to natural process will extend up to c100m upstream of the bridge through the inclusion of some scour protection measures through installation of timber stockade (groyne features)

Part of the works refers to the removal of the old rail abutment downstream of the bridge. This will have the effect of removing an artificial barrier thus restoring the flows downstream of the bridge to a more natural state which is in line with the Till Rivers Restoration Strategy (TRRS), (Natural England, Environment Agency and Tweed Forum 2013)). This restoration to more natural conditions downstream provides some mitigation for the influence of the works on the course of the river upstream from the bridge.

Effect on Site Integrity: Following measures to ensure fish passage are incorporated into the scheme some minor effects on the morphology of the College Burn are predicted as a result of scour protection measures and training of flows through the installation of logs. This restriction is however unlikely to have a significant effect on the sites 'integrity'.

3.3.4 Pollution

Pollution has been identified as having potential effects on qualifying species of the SAC. The method statement prepared by Northumberland County Council details a range of measures to protect the river from pollution incidents, including the use of vegetable oil lubricants for plant onsite and managing refuelling in designated areas in addition to measures to control the release of sediments as a result of the works.

One key element of pollution relative to the prosed structural strengthening at Westnewton bridge is the extensive use of concrete to form a reinforced invert across the width of the stream. Concrete is highly alkaline and any discharges of concrete into the watercourse prior to setting can quickly alter the pH of the watercourse and the resulting change can have a toxic effect on fish and other aquatic fauna. Given the importance of the College Burn and wider Tweed Catchment Rivers SAC to a range of qualifying fish species and other species such as sea trout the application of strict measures to control concrete on site and to ensure the pH of the river surrounding the site is not affected by release of sediment and pH will be applied

Throughout the course of works while setting concrete any water within works area will be pumped out and run through a neutraliser incorporated as part of a 'siltbuster type system' to ensure no water emanating from the works will alter the pH of the watercourse through the construction phase of the project. It is recommended that water quality monitoring to investigate as a minimum pH and turbidity throughout the construction phase of the project.

Effect on Site integrity: Where inclusion of strict measures to control pollution are required and enforced the proposal is unlikely to have an adverse effect on the site through pollution.

4. Interpretation and Conclusions

This Habitat Regulations Assessment which followed the relevant stages to undertake an Appropriate Assessment under Regulation 48 of the Habitats Regulations 2010 has identified a number of potential effects on the SAC and associated features.

An assessment against the site's conservation objectives before mitigating measures are applied has identified a range of possible effects adverse to the stated conservation objectives of the site. These are:

- Minor effects to the distribution of habitat, structure of habitat and minor limits of processes supporting the habitat
- Possible effects on the distribution of species and disturbance to species associated with the habitat

Following the incorporation of mitigation measures included within the design and working methods a more detailed process of assessment applied to individual features indicates that the proposal is likely to result in effects of a minor magnitude which are unlikely to adversely affect the integrity of the Tweed Catchment Rivers SAC as a whole where site integrity is considered to be "the coherence of the site's ecological structure and function, across its whole area, that enables it to sustain the habitats, complex of habitats and/or populations of species for which the site is or will be classified".

This indication and evidence base should be reviewed by the competent authority which in this case is Northumberland National Park Authority. If the National Park as competent authority are able to conclude that the proposal will result in no adverse effect on site integrity of the SAC then the plan will be able to proceed with relevant conditions and provisions relating to protection of the watercourse during the construction phase of the works.

5. References

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Appendix A – Consideration of Alternatives

Westnewton Bridge – Scour protection measures

A Feasibility study for provision of hardened invert around bridge footings

The flood event of 25th September 2012 caused damage to one the piers of Westnewton Bridge and emergency works have been carried out to temporarily reinstate the foundations.

There remains a substantial risk to the bridge from flood events and, to permanently safeguard the integrity of the bridge foundations, the County Council envisages submitting a detailed scheme for consent with a view to construction in summer 2015.

Furthermore, to minimise scour of the RH bank upstream of the bridge and limit deposition that may block the available waterway through the arches, it is considered that keeping the river on a straight alignment up to and through the bridge would be beneficial. Please see options considered at the bottom of the page.

The permanent options to protect the invert around the bridge from scour are considered as described below:

Option	Advantages	Disadvantages	Conclusion
1. Do not provide invert.	Minimal intervention. No short term cost	Bridge foundations would remain at risk from scour. Potential loss of Highway and large cost to reinstate.	Cannot secure safety of travelling public therefore **disregard**
2. Sheet piled invert with concrete apron around individual abutments and piers.	Will provide permanent protection to bridge foundations. Would leave invert at centre of spans in natural condition. Good for fish passage.	Local scour effects around sheet piling would be significant. Very difficult to install sheet piling in confined head room, probably impossible. Significant works in the river environment.	Probably impossible to carry out therefore **disregard**
3. Underpin	Will provide permanent	Deep excavations required with	Cannot be carried out safely therefore

abutments and piers with concrete footings.	protection to bridge foundations. Would leave invert under bridge spans in natural condition. Good for fish passage.	severe concerns over provision of safe working area. Probably impossible to keep water out of excavation. Significant works in the river environment.	**disregard**
4. Installation of inclined steel piles through masonry to provide support against scour.	Will provide permanent protection to bridge foundations. Would leave invert under bridge spans in natural condition. Good for fish passage.	Very difficult to install sheet piling in confined head room, probably impossible. Major intervention into Listed Building because piles would be cored through masonry. Significant works in the river environment.	Major intervention into Listed Building but probably impossible to carry out therefore **disregard**
5. Manage river by frequent intervention	Used to be carried out on a regular basis by Environment Agency prior to current environmental legislation. Concrete and/or steel installations not required in water course.	Difficult to react in a timely manner to build up of gravels and changes in river alignment. Many consultations/surveys and studies required for every intervention. Significant works in the river environment.	Continual intervention in river corridor needing extensive consultation to achieve consent on each occasion. Not considered realistic therefore **disregard**
6. Concrete Invert provided across whole width of river.	Will provide permanent protection to bridge foundations.	Significant works in the river environment. Risk of step forming in invert that would be a risk to fish passage.	Major scheme – much study and justification required – **possible solution**
7. Soft engineering only	Concrete and/or steel installations not required in water course.	Soft engineering measures around the bridge foundations are not robust enough to resist the extreme turbulence that occurs in this location. Measures have only a short term life spa and would have to be	Expert geomorphologist considers soft engineering to be inappropriate to resist scour forces through the bridge therefore **disregard**

		repeated to maintain protection.	
Conclusion – carry out study of option 6 to include hydrological, geomorphological and ecological issues.			

B Feasibility study for options to maintain river alignment through centre arch of bridge arch

When the river moves laterally it promotes scour on the outside of bends but deposition on the inside. This deposition leads to a reduction of the available waterway through the bridge arches leaving them at greater risk to blockage from debris during flood events. This issue was shown to be a concern after the near catastrophic scour events of September 2012. The deposition used to be removed as it occurred by the Environment Agency and its predecessors but recent environmental legislation prevents this course of action without extensive study and justification. It is proposed to limit the rivers potential for meandering by studying the hydrological and geomorphological characteristics and providing bank protection where needed. The ideal for this aim is to ensure that the river is aligned with the centre arch of the bridge so reducing the propensity for deposition.

Option	Advantages	Disadvantages	Conclusion
A. Do nothing	No intervention into river environment	High potential for deposition and risk of debris blocking available arches for flood water as evidenced on previous occasions	Significant risk of blockage of bridge without intervention to remove deposition. Not a realistic long term solution therefore **disregard**
B. Manage river by frequent intervention	Used to be carried out on a regular basis by Environment Agency prior to current environmental legislation.	Difficult to react in a timely manner to build up of gravels and changes in river alignment. Many consultations/surveys and studies required for every intervention. Significant works in the river environment.	Continual intervention in river corridor needing extensive consultation to achieve consent on each occasion. Not considered realistic therefore **disregard**
C. Protect existing RH bank with hard engineering	RH bank protected against scour and failure	Unlikely to gain approval because of ecological designation	Probably unlikely to gain assent/consent therefore **disregard**
D. Protect existing RH bank with soft engineering	RH bank protected against scour and failure	Soft engineering has a limited lifespan and therefore maintenance likely to be required.	Probably only option that is likely to be acceptable to the consenting bodies. – **Possible solution**

E. Maintain river on straight alignment with hard engineering	River straightened and deposition minimised	Unlikely to gain approval because of ecological designation	Probably unlikely to gain assent/consent therefore **disregard**
F. Maintain river on straight alignment with soft engineering	River straightened and deposition minimised	Soft engineering has a limited lifespan and therefore maintenance likely to be required.	Probably only option that is likely to be acceptable to the consenting bodies. . – **Possible solution**
Conclusion – carry out study of options D and F to include hydrological, geomorphological and ecological issues.			

Addendum to feasibility study to provide soft engineering options to maintain river alignment through centre arch of bridge arch

Option	Advantages	Disadvantages	Conclusion
I. Willow spiling to RH bank	Soft engineering option that promotes ecological values	Existing bank has log soldiers along bulk of length. 30 metre length to be reinstated. Willow spiling would not have the inherent protection below invert level in this high energy location	Not suitable for a high energy scour location therefore **disregard**.
II. Combined solution with willow spiling and armoured rock toe facility	Softer engineering option that can resist some scour at base level.	The use of armoured stones would be unlikely to be accepted by the heritage bodies. Would also be expensive and would require deep excavation to install.	Expensive with large excavations therefore **disregard**
III. Combined solution with willow spiling and toe protection provided by logs spiked to subgrade and laid longitudinally	Softer engineering option that can resist some scour at base level.	Very expensive and time consuming operation. Would require deep excavation to install.	Expensive with large excavations therefore **disregard**
IV. Log soldiers driven in as piles to depth as toe protection.	Quick to install with minimal excavation. Would tie into existing installation.	Existing installation failed due to lack of toe embedment. Proposed installation to have deeper installation.	Potential solution but could require maintenance **– Possible solution**
V. Log soldiers driven in as piled protection against 'cut back'	Quick to install with minimal excavation. Would be hidden by	Limited life span for wood at surface levels therefore adopt hardwood materials to improve resistance against abrasion and rotting	Potential solution but could require maintenance **– Possible solution**

scour	vegetation and be mostly below ground.		
Conclusion – carry out study of options (IV) and (V) to cater for abrasion characteristics of environment and deeper embedment depth			