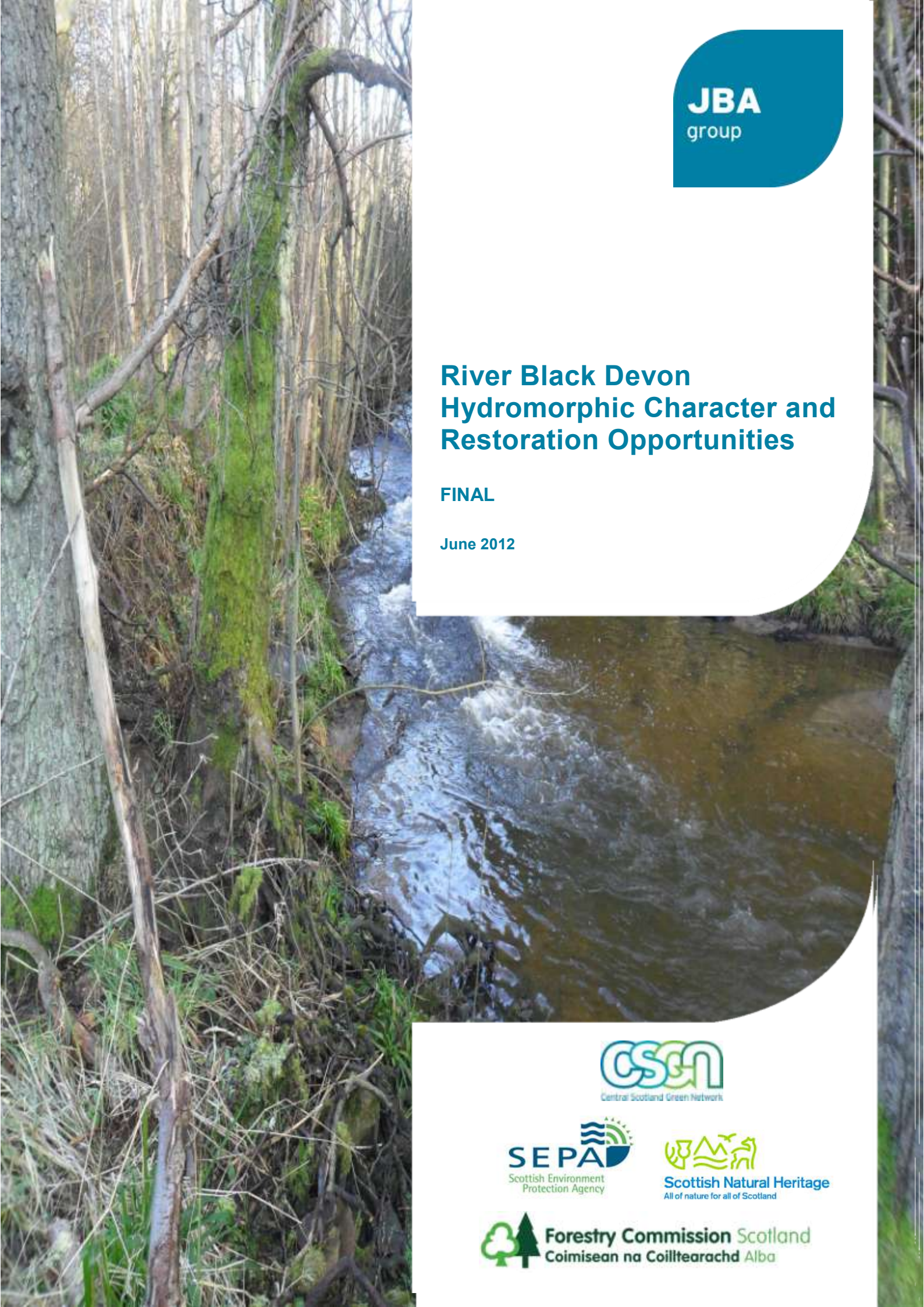

River Black Devon Hydromorphic Character and Restoration Opportunities

FINAL

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Contract

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Abbreviations

JBA	JBA Consulting – Engineers & Scientists
NGR	National Grid Reference
OS	Ordnance Survey
OS NGR	Ordnance Survey National Grid Reference

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1 Black Devon hydromorphology

1.1 Background to the study

The River Basin Management Plan for the Scotland River Basin District reports 56% of rivers as achieving 'good or better ecological' status / potential or better, with a target of increasing this to 63% by 2015. The task of improvement must be viewed in the context of a generally dynamic river network across Scotland where the geology, topography and climate have created a diversity of channel types. Many of these rivers remain sensitive to local alterations to the flow and sediment regime linked to climate change and human activity. Catchment practices including forestry, livestock management, power generation, water abstraction, effluent discharge and land drainage continue to invoke a response from impacted rivers, which varies according to river type. Similarly, direct intervention and alteration in the form of river training, flood defence works and bank protection has invariably created instability and system degradation.

This level of reactivity and responsiveness to local and catchment wide alterations presents significant challenges to river restoration, with physical change inevitable. Restoration feasibility and design must incorporate a detailed evaluation of linked local and catchment river functioning to ensure that appropriate morphologies are proposed to encourage morphological and ecological development linked to the anticipated flow and sediment regime. Failure to achieve this will result in extensive and relatively rapid destabilisation. The project to deliver multiple benefits through river basin management planning in the Forth sub-basin recognises the dynamic nature of the rivers in the Forth river basin and this report documents the hydromorphic assessment of the River Black Devon, one of 4 watercourses targeted at the end of the first phase of the project for priority restoration.

1.2 River Basin Management Plan - Water Body Information Sheet

In 2010 the Black Devon (Source to Birkhill Plantation) (water body ID: 4403) was classified as having an overall status of Good with high confidence, with overall ecological status of Good and overall Physico-chem status of Good. In 2008, SEPA set the overall environmental objectives for this water body for the first, second and third River Basin Management Planning (RBMP) cycles, these are detailed below in Table 1-1.

Table 1-1: Extract from complete classification of water body in 2008

Year	2008	2015	2021	2027
Status	Moderate	Moderate	Moderate	Good

The pressures on the water body are point source pollution (sewage disposal) and diffuse source pollution (mixed farming).

An extract from the 2010 classification for this water body is shown below in Table 1-2.

Table 1-2: Extract from 2010 classification of water body

Parameter	2010 Status
Overall Status	Good
Pre-HMWB status	Good
Overall Ecology	Good
Hydromorphology	Good
Hydrology	High
Morphology	Good

In terms of the pressures being considered within this study (morphology, urban and diffuse pollution), this water body is failing due to both morphology and diffuse pollution.

1.3 General character of the Black Devon

The River Black Devon was subject to walkover survey In January 2012 from the A823 bridge upstream of Knock Hill west through to the open cast workings at Knowehead (Figure 1-1). This involved looking at the characteristics of the watercourse itself as well as the surrounding land use and the influences that this is having on the river.

The Black Devon begins where the Nettley Burn, which rises on Park Hill in Fife, passes beneath Outh Bridge near the Knockhill Motor Racing Circuit and flows in a general south westerly direction until it reaches the River Forth at Clackmannan. The upper reaches of the river are dominated by sheep farming with some suckler cows. The land is managed extensively and there are large stretches of rushy pasture intermixed with improvements, some of which are now reverting. The river cuts through this landscape in a gorge, which is partly wooded, and has scattered patches of floodplain along its length. These are usually dominated by sharp-flowered rush *Juncus acutiflorus* but occasionally other species, such as bottle sedge *Carex rostrata,* make an appearance.

Further down the river the land use changes to a mixture of improved grassland farming systems, mixed with arable production. Here the river meanders its way across a broader floodplain than in the constrained upper reaches and the area is dominated by the extensive quarrying (Meadowhill OCCS) that is taking place near the river in the Knowhead area.

Further downstream the river makes its way through extensive areas of forestry plantations before flowing through the town of Clackmannan. Here the river is constrained with floodwalls and suffers the usual deprivations of watercourses in urban environments. Beyond the town the river emerges onto the carse of Stirling and meanders its way across the fertile floodplain of the River Forth until it becomes tidal, finally reaching the Forth just downstream of the Alloa Inches, an important feeding area for wading birds, which also frequent the mudflat at Clackmannan Pow.

Figure 1-1: The River Black Devon Survey Limits

The character of the river varied considerably along the length of the surveyed watercourse. These are briefly described below working downstream.

1.4 Upstream of West Lethans

Upstream of West Lethans the land use is exclusively extensive agriculture, in particular sheep farming, usually of lowland or mule varieties. This type of farming is typical for the uplands of Britain although the land surface in this area is lower than most upland farms and much of the land has been improved in the past. Much of the grassland is now reverting and is criss-crossed by drystane dykes and stock fences and, in places there are extensive patches of soft rush, a typical coloniser of grasslands in the north and west of Britain.

Figure 1-2: Black Devon near Outh Bridge showing acid grassland (right) and heather/acid grassland mosaic (left) where ungrazed. Photograph also shows vehicle tracks through the river

The river here is incised within a steep-sided valley that becomes deeper and incised the further downstream you go. The sides of the valley are composed of unimproved grassland towards Outh Bridge but as you move towards West Lethans the sides become steeper, grazing becomes more problematical and many more trees begin to make an appearance on the steeper, rockier valley sides. Here downy birch *Betula pubescens* is the most common species although rowan *Sorbus aucuparia* is also common along with the occasional alder *Alnus glutinosa*. A key feature of the upper Black Devon is the presence of the Knockhill Motor Racing Circuit. This unusual land use for the area has increased the heterogeneity of the land cover in the vicinity of the river and the motor-related activities have impacted on the Black Devon itself, where an off-road vehicle training course crosses and follows the river in a number of locations (see Figure 1-2).

The river to the west of Knock Hill is significantly stained by Iron Ochre deposits (Figure 1-3), which is normally associated with acid mine water discharge. The exact source is unknown although there are disused mines within this area and it would be advisable to contact the Coal Authority to determine whether this area is on their priority list. The Iron Ochre is coating the bed material for a significant length of the watercourse. Passive treatment would be advised as close to the source as possible. Once in the watercourse the diffuse pollution could also be treated by planting appropriate wetlands and encouraging flows out across the floodplain through the wetland.

Upstream of West Lethans the reach is not confined and the wooded valley gives way to a more open setting (Figure 1-4). Extensive berm features extend across the valley floor (Figure 1-4). The Knockhill motor racing circuit at the head of the valley is impacting on the river but its effect on sediment delivery is minimal compared with natural sediment sources.

Figure 1-3: Iron Ochre Deposits

Figure 1-4: Valley and river character upstream of West Lethans

1.5 West Lethans to Threepsikes

Downstream from West Lethans the land use adjacent to the Black Devon gorge remains much the same, although the improvements in the fields on the South side of the river are more recent. Here the key difference is the size of the Black Devon gorge, which is now much wider and, as you go downstream, becomes increasingly wooded. This woodland is semi-natural in character and typically dominated by birch and alder, although many large beech *Fagus sylvatica* trees are present and it is obvious that these were planted some 250 years ago. This area, downstream of the waterfall is known as Swallow Craig Glen (after the falls) and here the ground flora is dominated by greater woodrush *Luzula sylvatica* with the occasional patch of bracken *Pteridium aquilinum*.

Downstream of Swallow Craig Glen, the valley broadens out a little more, although the sides are still steep. The steepness of the ground has prevented the ploughing of the land and, as a result, much of the land adjacent to the river is unimproved although some has suffered some improvement in terms of top-dressing and fertilisation. The retreat of the woodland here is a response to the slackening of the gradient of the valley sides and the use of these areas for pastoral farming.

As we approach Threepsikes, an abandoned farm on the North side of the river, the valley once again becomes steeper and more incised and woodland again makes an appearance. Here though the grassland above the valley is wet and rushes are a common component of the sward. This wet, rushy character to the grassland on the North side of the river is in stark

contrast to the improved pastures on the South side (see Figure 1-5), which have benefitted from agricultural improvement and extensive field drainage works.

Figure 1-5: Unimproved Acid Grassland (foreground) just upstream of Threepsikes with improved grassland on the opposite bank. The photograph also shows the increasingly wooded nature of the river valley as it approached Threepsikes

The river becomes strongly confined upstream of Threepsikes and displays a consistent in-channel pool-rapid morphology with rapids composed of bedrock or boulder/cobble step features. Incision has generated a number of waterfalls (Figure 1-6). Woody debris is common and traps some mixed sediment to increase hydromorphic diversity. Limited lateral deposits exist along portions of the valley side (Figure 1-7). Valley side sediment supply is strong through this reach including supply from steep bedrock dominated tributaries.

Figure 1-6: A waterfall close to West Lethans

Figure 1-7: Valley side deposits in the confined river valley

1.6 Threepsikes to Balgonar

The river remains moderately confined upstream of Balgonar and berm areas are planted up. The character changes from pool/plane-riffle to pool-rapid as the valley becomes more confined.

The sides of the valley are dominated by native ash *Fraxinus excelsior* woodland with alder on the banks of the narrow floodplain below. Here and there are patches of older, planted trees, most notably sycamores *Acer pseudoplatanus*. Above the valley the land use is mainly improved grassland grazed by sheep, cattle and horses although there is quite a bit of forestry here with plantations of coniferous species, especially norway spruce *Picea abies* common on the North side of the river.

At Balgonar Bridge itself there are a number of farm buildings and dwellings in close proximity to the steep valley sides. This gives a distinctive flavour to the landscape here and has led to some negative urban-fringe type effects on the local ecology.

1.7 Confined section at Balgonar

Downstream of the Balgonar Bridge the river is confined in a steep valley with densely wooded sides. These woodlands are dominated by ash, although english oak *Quercus robur* is a common species here as are a number of non-native conifer species that have been planted-in to the woodland.

The land use on the raised floodplain is typically improved grassland grazed by cattle and sheep, although there are areas of steeper ground near the valley sides that are covered in unimproved acid grassland.

Extensive sub-horizontal bedrock outcrops in the channel create a long bedrock cascade (Figure 1-8). Elsewhere bedrock/boulder rapids dominate.

Figure 1-8: Bedrock cascade at Balgonar

1.8 The channel around Devonside

Here the floodplain is broad and wide with only gently sloping valley sides set well back from the river. Once again the land use type is pastoral with herds of suckler cows making an appearance. In places these are left out all winter and fed in-field on silage. This has led to some localised poaching of some of the grasslands near the river channel (see Figure 1-9).

Figure 1-9: Localised Poaching of Semi-natural Grassland adjacent to the River Channel by Supplementary feeding of Out wintered Cattle

This is also the location where the Saline Burn joins the Black Devon and, at this confluence, there is a large sewage works. The North side of the river is clearly the remains of parkland as there are a number of ancient specimen parkland trees within a matrix of unimproved neutral grassland that is grazed by cattle.

After coming out of the confined section the river continues as an active sinuous single thread channel with well developed pool-riffle-point bar system (Figure 1-10). Channel movement is strong locally and is creating a very diverse in-channel hydromorphology. Floodplain areas are farmed reducing the resistance of the banks to erosion.

Figure 1-10: The active sinuous single thread channel at Devonside

1.9 Confined reach between Shieldbank and Langfaulds Farm

Initially the land is quite steep due to the incised nature of the river as it cuts through a bed of hard strata. Here, the steepness of the ground has led to a lack of improvement so most of the higher land around this hard rock liner is composed of unimproved and semi-improved grazings, some of which have been ungrazed for some time. These unimproved areas contrast markedly with the more improved grasslands upstream and downstream of this location.

As with elsewhere on the river, here the steep sides have reduced the potential for improvement and grazing and, as a result, native woodland, mainly composed of alder, has remained with a ground cover of great woodrush.

Downstream of this constriction the land once again opens out as the river turns Northwest. The flat nature of the land here has allowed the development of meanders which have been colonised by alders and willows along the river sides and, within the loops, small areas of unimproved grassland remain (see Figure 1-11). On the land either side, the gentle slopes have permitted the development of arable production. This is mixed in with improved grassland, grazed by sheep.

Figure 1-11: Scattered Alder Stools alongside the Black Devon near Langfaulds

The river here becomes variably confined with extensive bedrock exposures in the bed and banks creating rapid areas. The channel remains locally sinuous and a number of well developed bar features exist where confinement is reduced (Figure 1-12). An old

crossing/small weir has created a wider anastomosed reach (Figure 1-13). Woody debris is common throughout the reach.

Figure 1-12: Well developed bar features in the confined valley upstream of the B913

Figure 1-13: Anastomosed channel developing around redundant structure

1.10 Four Braes

The river through Four Braes is largely confined and bedrock influenced with a highly diverse hydromorphology. Plane-bed - pool - riffle - rapid areas are all common and the bed material is highly variable ranging from sands through to gravels and boulders. Valley side sediment inputs are common. Sections of the valley open out slightly and the valley floor displays well developed alternating low terrace and floodplain areas. An old river crossing has generated some instability locally and a short anastomosed section of channel has developed further adding to the morphologic diversity through this reach.

This is a large area of woodland that has been planted on the hillsides as the river once again cuts through an outcrop of harder rock, which is exposed in the bed of the river and in places as the river cuts into the banks. The steep valley sides are clothed in great woodrush and silver birch *Betula pendula* is much the commonest tree here, especially on the steepest slopes where some scree is in evidence. Other species that have clearly been planted include sycamore, beech and ash. At the bottom of the steep sides there is a small area of floodplain some 20m to 30m wide through which the river flows, mostly as a single thread but occasionally with islands and bars in the channel. This part of the woodland is dominated by alder and is wet with a good growth of bryophytes (see Figure 1-14) as well as tufted hair-grass and other wet-loving species, such as soft rush *Juncus effusus*.

Figure 1-14: Riverside Alder Showing Luxuriant Growth of Bryophytes

Higher up the valley sides, where the slope becomes convex and the land rises gently to the fields beyond, the nature of the woodland changes. Here beech is pre-eminent and the ground flora has responded by becoming thinner, with only patches of *Eurynchium striatum*, and *Rhytidiadelphus triquetrus* and bracken breaking up the leaf-litter. This area is bisected by tributary streams that flow in deep gullies from the fields and then plunge down in cascades to the valley floor in a manner reminiscent of hanging valleys in glaciated areas. There are no paths in the woodland although there are tracks that are used by roe deer *Capreolus capreolus* and red deer *Cervus elaphus.*

Downstream of the woodland the river flows at the southern end of its floodplain, with the northern side taken up by an arable field. Here the river is once again lined with alders on the field side whilst the other bank is steep with the eroding bedrock exposed, especially along the bend immediately downstream of North Shaw Wood (see Figure 1-15).

Figure 1-15: Bedrock Exposed by Erosion Just Upstream of Black Devon Bridge

1.11 Around Gartknowie

The land use here is mainly pastoral with the flatter land to the south of the Black Devon being improved grassland whilst that on the steeper slopes to the north of the river being less improved. The only exception to this is the arable field just downstream of Black Devon Bridge on the North bank of the river. Once again the river here making its way through an area of harder rocks and has cut into these leaving a steep, narrow valley. Some incised meanders are present here and one of these is cut-off, although this has suffered from illegal dumping and is in danger of losing its character as well as being a source of pollution (see Figure 1-16).

Figure 1-16: Illegal Dumping in Incised Cut-off Meander - River Black Devon in Background

The tree cover is intermittent and is dependent on the presence or absence of stock fencing which, in turn, is dependent on the slopes, which are very variable in this reach.

Upstream of the influence of the open cast workings (Meadowhill - OS NGR 2276 6942) the river becomes steeper and slightly more confined, displaying only a very limited floodplain. The channel morphology is predominantly gravel/cobble pool-rapid (Figure 1-16). A set of paleo-channels exist close to the main channel suggesting some straightening of the watercourse (Figure 1-18). A swan neck meander exists close to the B913 which is presently

heavily degraded. Channel widening is marked by the development of stable mid-channel bar features creating a diverse hydromorphology (Figure 1-19).

Figure 1-17: Gravel/cobble pool-rapid around Garthknowie

Figure 1-18: Paleo-channel features created by river straightening

Figure 1-19: Channel widening and mid-channel bar stabilisation

1.12 Around Knowehead and Piperpool

The river is a single thread along which alder and willow trees grow intermittently. The floodplain is wide an there are numerous paleo-channels which are home to patches of rushy pasture in the generally improved grassland landscape on the South side of the river. The ground here is undulating on account of these and has not been ploughed out although some improvement in terms of fertilising and top-dressing with seeds has taken place (see Figure 1-20).

The North side of the river is very different: this is dominated by a large open-cast quarry which has abandoned areas of once productive grassland separating the quarry for the Black

Devon. Here tufted hair-grass is dominant and there are some settling ponds that drain into a channel that makes its way into the river somewhere upstream. A notable species her on a couple of the in-channel sediment bars was reed sweet-grass *Glyceria maxima,* an uncommon species at this latitude in the UK.

Figure 1-20: Opencast Workings Beyond River Devon (Line of Trees) with Semi-improved Grassland and Rushy Pasture in Paleo-channels in Foreground.

A heavily modified sinuous alluvial single thread channel exists around Knowehead (Figure 1-21). Here the river is over-deep and appears to be backed up displaying only sluggish flow. Occasional woody debris dams (live and dead material) create limited local hydraulic diversity and trap fine sediment to increase the bed elevation of the channel (Figure 1-22). Fine sediment inputs are very high through this reach and have resulted in a degraded sandy/silty bed smothering natural river gravels. The left bank floodplain upstream of the confluence with Roughcleigh Burn is well developed and displays some paleo-channel features.

Figure 1-21: The heavily modified sinuous alluvial single thread channel around Knowehead

Figure 1-22: Woody debris dams in the channel around Knowehead

1.12.1 Summary

Overall the River Black Devon displays a limited well connected floodplain downstream giving way to extensive berm bar and terrace formations higher up. It has an excellent and diverse functional in-channel morphology adversely affected by fine sediment and channel alteration around the open cast workings. Numerous functional woody debris jams exist created by both live and dead wood. In many areas the valley and riparian vegetation has been significantly disrupted, particularly where the valley is less confined. This disruption has allowed rapid channel erosion locally.

1.13 Black Devon restoration opportunities

The issues on the Black Devon mainly revolve around agricultural activity and poor practices, although this is not always the case. In the upper reaches of the river near Outh Bridge it can clearly be seen that the left bank of the river generally has a greater variety of trees and a more interesting ground flora than the right bank, which is composed in the main of unimproved acid grassland with scattered patches of rushy pasture. This lack of diversity is related to the fact that the right bank is grazed and, if the grazing pressure is removed, the right bank will be colonised by the same mix of plants that are present on the left bank: in particular birch and rowan trees, great woodrush and heather. The vegetation on the right bank has, over the years, responded to the grazing pressure by simplifying its structure, however, the presence of propagules in the area should allow the rapid colonisation of this bank and the restoration of a wooded cleuch in this location. This will act as a more efficient wildlife corridor from the Swallow Craig Falls woodland to Outh Bridge.

Figure 1-23: Black Devon near Outh Bridge showing ungrazed and grazed banks of river

Upstream of Balgonar Bridge there is a large section that is dominated by ash woodland. Here the canopy is dense and all the trees are of the same age-class. Non-native invasive species are not a particular problem on this river, however, at one location within this area of semi-natural woodland there is a large specimen of cherry laurel *Prunus laurocerasus*. This is an invasive, poisonous species and this should be removed as part of the restoration plan.

Figure 1-24: Cherry laurel upstream of Balgonar Bridge

At Balgonar Bridge there are a number of dwelling houses, one of which has been routinely burning and tipping material down the steep valley sides onto the narrow floodplain of the river. Over the years this has changed the shape of the valley sides and the vegetation cover (see Figure 1-25): it is now more rural in nature. An education campaign highlighting that this activity is damaging to the riparian habitat is recommended as is a clear-up of the tipped material and the planting-in of native tree species to aid the recovery of this area (see Figure 1-26).

Figure 1-25: Tipped material (some burned) building up on the slopes above the Black Devon at Balgonar Bridge

Figure 1-26: Ruderal vegetation at Balgonar Bridge resulting from tipping operations and a change in the nutrient status of the underlying soil

Further downstream near Devonside, cattle are outwintered on an area of unimproved grassland that is suffering from extreme poaching (Figure 1-9 above) and it is obvious that this has been going on for some time. The proximity of this activity to the watercourse must be having a deleterious effect and the scraping-away of the mounds of uneaten silage and dung into ridges around the feeding site is not best practice and neither is the tipping of rotten baled-silage on nearby unimproved grasslands, although this is at a safe distance from the river.

Figure 1-27: Rotting silage dumped on unimproved grassland

The extreme poaching observed near Devonside should cease and the stock should be fed on hard-standing areas a good distance from any watercourse.

Near Knowehead there is a cut-off meander that has been used as an illegal dump for farm waste, including rotting baled silage. This area, as it is still in direct contact with the main thread of the Black Devon, will be acting as a point source for pollution downstream. In particular it will be imparting a high Biochemical Oxygen Demand to the water downstream as well as potential other pollutants (Figure 1-28).

Figure 1-28: Illegal dumping in a cut-ff meander near Knowehead

It is important that this dumping cease and the existing material be removed to restore this meander to good ecological status. Habitats such as this are quite rare and are ideal sheltering and laying-up locations for fish.

Despite displaying generally excellent in-channel morphology the Black Devon offers a number of local opportunities for restoration. The restoration options are summarised below in Table 1-4. Full details of each restoration option considered are detailed in Appendix C (Table C-1) with locations of the options are shown in Figure C-1. Each restoration measure has been given a unique ID and a corresponding consecutive number for each measure working from upstream to downstream, the code descriptions are listed below in Table 1-3). Estimated costs have also been calculated for each of the proposed options and are included in

Appendix C (Table C-1). Details regarding how costs have been derived are outlined in Appendix D.

Table 1-3: Restoration opportunities codes

Category	Code
Abandon channel	ACh
Assess abstraction value	AV
Channel creation	ChC
Channel reconnection	ChRc
Channel restoration	ChR
Construction management	CM
Create transverse bar	TBC
Diffuse source control	DSC
Education - farm practice	EdFP
Education - riparian management	EdRM
Flood banks/ flood walls - remove / set back	FBRe
Flow restoration	FlR
Indentify diffuse source	IDS
Introduce large woody debris	LWD
Invasive removal	InRe
Natural regeneration	NR
Plantation forestry removal	PFRe
Point source control	PSC
Remove channel	ChRe
Remove channel infill	CIRe
Remove culvert	CRe
Remove debris / material	DRe
Remove fence	FRe
Remove geotextile	GRe
Remove lined channel	LCRe
Remove pipe	PRe
Remove road	RdRe
Remove structure eg. Greybank, in-channel structures etc	StRe
Remove waste	WaRe
Replace structure - footbridge	BrRp
Riparian margin creation	RMC
Vegetation - planting	VP
Vegetation - removal and planting	VRP
Vegetation removal	VRe
Weir removal / modification	WRe
Wetland creation	WC

A summary of the restoration options is shown in Table1-4.

Table 1-4: Restoration opportunities for the Black Devon

Issue	Unique ID	Action	Location Description	OS NGR	Pressure	Pros	Cons	Cost (£k)	Movement towards GES - Capacity released
ISSUE 1: Point source sediment inputs from surrounding farmland	Bla_PSC_1	Control point source sediment input	Upper reaches – downstream of Outh Bridge	306391E 694511N to 306188E 694487N	Rural diffuse source pollution (mixed farming)	Reduced fine sediment inputs will lead to more open gravel bed and will have positive impacts on aquatic ecosystems. Nutrient reduction will also improve aquatic ecosystems and general water quality.	Overall diffuse inputs require targeted control. Will potentially require ongoing monitoring / liaison with landowner.	Initial investigation cost = 0.59, but requires further assessment to determine further actions and costs.	None – no information available for improvements to point source pollution
ISSUE 2: Limited floodplain development, incised channel	Bla_NR_1	Natural regeneration and fencing	Upper reaches	306162E 694468N to 304761E 694707N	Rural diffuse source pollution (mixed farming)	Improved marginal habitats, reduced fine sediment load input. Aesthetic improvements. Will benefit a large section of the upper catchment.	Altered aesthetics.	11.4	None – not capacity assessed
ISSUE 3: Iron ochre deposits throughout reach from any unknown source	Bla_IDS_1	Identify diffuse source. Contact Coal Authority to identify whether this location is on their priority list. Passive treatment (eg. Wetland) as close to source as possible.	Upper reaches	305916E 694500N to 305279E 694753N	Rural diffuse pollution	Improvements to aquatic ecosystems and general water quality.	May be difficult to identify source. Overall diffuse inputs require targeted control. Will potentially require ongoing monitoring / liaison with landowner.	Requires further investigation – initial two day investigation = £1.2k	None – capacity not assessed. No information available for improvements to diffuse source pollution.
ISSUE 4: Limited floodplain development, incised channel	Bla_VP_1	Plant low valley sides and terraces	Upper reaches	303550E 694452N to 304760E 694706N	Morphological	Improved riparian and floodplain habitat quality and aesthetics. Reduction in local and downstream flood risk. Removed sources of invasive propagules. Actions will benefit a large portion of the upper catchment.	Altered aesthetics.	65	None – capacity not assessed
ISSUE 5: Lack of vegetation on valleys and terraces	Bla_VP_2, Bla_VP_3	Plant low valley sides and terraces	Upper reaches	303071E 694214N to 303033E 694167N – Bla_VP_2 302615E 694083N to 302578E 694117N – Bla_VP_3	Rural diffuse source pollution (mixed farming)	Improved riparian habitat quality, reduced fine sediment load inputs. Aesthetic improvements. Relatively low estimated cost.	Altered aesthetics. Actions will affect relatively small areas adjacent to the burn.	5.7	None – capacity not assessed.
ISSUE 6: Redundant blockstone / masonry walling	Bla_StRe_1, Bla_StRe_2	Remove and allow natural erosion processes to occur	Upstream and downstream of Balgonar Bridge	302200E 693770N to 302136E 693744N	Morphological	Exposure of natural banks allowing fluvial processes to operate and revealing bank side habitat.	Potential for local bank erosion. Traffic management and temporary access required to access site.	26.3	None – capacity not assessed
ISSUE 7: Point source pollution input	Bla_PSC_2	Control point source input	Downstream of Burnside Bridge	301469E 693291N	Rural point source pollution (sewage disposal)	Reduced fine sediment inputs will lead to more open gravel bed and will have positive impacts on aquatic ecosystems. Nutrient reduction will also improve aquatic ecosystems and general water quality.	Overall diffuse inputs require targeted control. Will potentially require ongoing monitoring / liaison with landowner.	Initial investigation cost = 0.59, but requires further assessment to determine further actions and costs.	None – capacity not assessed. None – no information available for improvements to point source pollution

ISSUE 8: Redundant blockwork / masonry walling	Bla_StRe_3	Remove walling	Downstream of sewage works	301503E 693326N to 300515E 693268N	Morphological	Exposure of natural banks allowing fluvial processes to operate and revealing bank side habitat. Benefits a large section of the reach.	Potential for local bank erosion. Large estimated cost.	405	None – capacity not assessed.
ISSUE 9: Lack of riparian margin and vegetation	Bla_RMC_1	Create riparian margin	Downstream of sewage works	301428E 693331N to 301131E 693350N	Rural diffuse source pollution (mixed farming)	Improved riparian habitat quality reduced bank erosion and channel movement, reduced fine sediment load input.	Altered aesthetics.	11.3	None – capacity not assessed.
ISSUE 10: Point source pollution input	Bla_PSC_3	Control point source pollution input	Downstream of sewage works	301046E 693349N	Rural point source pollution (sewage disposal)	Reduced fine sediment inputs will lead to more open gravel bed and will have positive impacts on aquatic ecosystems. Nutrient reduction will also improve aquatic ecosystems and general water quality.	Will require targeted control and potentially ongoing monitoring / liaison with Scottish Water.	Initial investigation cost = 0.59, but requires further assessment to determine further actions and costs.	None – capacity not assessed. None – no information available for improvements to point source pollution
ISSUE 11: Underdeveloped riparian margin – river flows against terrace on the true left bank	Bla_VP_4	Plant low valley sides and terraces on true right bank	Farmland	300754E 693250N	Rural diffuse source pollution (mixed farming)	Improved riparian habitat quality reduced bank erosion and channel movement, reduced fine sediment load input. Relatively low estimated cost.	Altered aesthetics. Benefits to a small localised area of the reach.	4.6	None – capacity not assessed.
ISSUE 12: No riparian margin	Bla_RMC_2	Create riparian margin	Langfaulds farm	300429E 693295N to 300660E 693268N	Rural diffuse source pollution (mixed farming)	Improved riparian habitat quality reduced bank erosion and channel movement, reduced fine sediment load input. Estimated cost is relatively cheap.	Altered aesthetics.	7.2	None – capacity not assessed.
ISSUE 13: Active meandering channel	Bla_VP_5, Bla_VP_6, Bla_VP_7, Bla_VP_8	Plant low valley sides and terraces	Langfaulds farm	300361E 693505N to 300274E 693584N	Morphological	Improved riparian and floodplain habitat quality reduced bank erosion and channel movement, reduced fine sediment load input. Estimated cost is relatively cheap.	Altered aesthetics.	10	None – capacity not assessed.
ISSUE 14: Degraded riparian strip	Bla_VP_9	Improve riparian strip with planting	Langfaulds farm	300260E 693595N to 300135E 693850N	Rural diffuse source pollution (mixed farming)	Improved riparian habitat quality reduced bank erosion and channel movement, reduced fine sediment load input. Estimated cost is relatively cheap.	Altered aesthetics.	11.2	None – capacity not assessed.
ISSUE 15: Old weir / bridge crossing – restricting flow and fish passage, causing debris buildup behind structure.	Bla_WRe_1	Remove weir	Langfaulds farm	299747E 694054N	Morphological	Aquatic ecosystem benefits through removing barrier to fish passage. Improvements to flow through reach. Estimated option is relatively cheap.		5.9	None – capacity not assessed.
ISSUE 16: Plantation forestry surrounding burn	Bla_PFRe_1	Remove and replace plantation forestry	Farmland downstream of B913	299230E 694006N to 299151E to 693958N	Rural diffuse pollution	Improved riparian and floodplain habitat quality reduced bank erosion and channel movement, reduced	Altered aesthetics.	13.7	None – capacity not assessed.

						fine sediment load input.			
ISSUE 17: Degraded riparian strip, lack of riparian vegetation	Bla_VP_10, Bla_VP_11	Improve riparian strip with planting, plant low valley sides and terraces	Farmland downstream of B913	299088E 693882N to 298847E 693859N	Rural diffuse pollution	Improved riparian and floodplain habitat quality reduced bank erosion and channel movement, reduced fine sediment load input. Estimated option is relatively cheap.	Altered aesthetics.	5.6	None – capacity not assessed.
ISSUE 18: Degraded riparian strip	Bla_VP_12, Bla_VP_13	Improve riparian strip with planting	West Saline Farm	298799E 693856N to 298496E 694156N – Bla_VP_12 298777E 693803N to 298512E 693935N – Bla_VP_13	Rural diffuse source pollution (mixed farming)	Improved riparian habitat quality. Improved riparian and floodplain habitat quality reduced bank erosion and channel movement, reduced fine sediment load input. Estimated option is relatively cheap	Altered aesthetics.	11.8	None – capacity not assessed.
ISSUE 19: Paleo channel disconnected Illegal dumping – old baled silage and other materials – on the left bank of the cut-off meander	Bla_ChRc_1, Bla_DRe_1	Reconnect meander of paleo channel Remove illegally dumped materials	West Saline Farm	298333E 694209N	Rural diffuse source pollution (mixed farming) Morphological	Re-connection of several well preserved channel features creating much improved in-channel hydromorphology. Aesthetic improvements. Will allow natural riparian vegetation to regenerate.	May instigate minor local erosion, although natural this may create land management issues.	33	None – capacity not assessed.
ISSUE 20: Point source pollution input	Bla_PSC_4	Control point source pollution input	West Saline Farm	298333E 694209N – Bla_ChRc_1 298340E 694192N – Bla_PSC_3	Rural point source pollution (sewage disposal)	Reduced fine sediment inputs will lead to more open gravel bed and will have positive impacts on aquatic ecosystems. Nutrient reduction will also improve aquatic ecosystems and general water quality.	Overall diffuse inputs require targeted control. Will potentially require ongoing monitoring / liaison with landowner.	Initial investigation cost = 0.59£k, but requires further assessment to determine further actions and costs.	None – capacity not assessed. None – no information available for improvements to point source pollution
ISSUE 21: Degraded riparian strip and lack of vegetation on floodplain	Bla_VP_14, Bla_VP_15, Bla_VP_16	Improve riparian strip on true left bank with planting; plant low valley sides and terraces on true right bank of meander bends	West Saline Farm	298306E 694189N to 297594E 694191N	Rural diffuse source pollution (mixed farming)	Improved riparian habitat quality.	Altered aesthetics.	23.4	None – capacity not assessed.
ISSUE 22: Diffuse sediment along reach – downstream of open cast works. High fine sediment load and sediment deposition along reach; point sediment input	Bla_DSC_1, Bla_PSC_5	Investigate and control sources of point and diffuse pollution inputs	Farmland – Piperpool Moss, through Parklands Muir and Gartgreenie	297471E 694176N to 296004E 693765N – Bla_DSC_1 297267E 693746N – Bla_PSC_4	Rural diffuse pollution	Major improvement to long reach of the river through bed recovery. Restoration of appropriate morphology. Reduced fine sediment inputs will lead to more open gravel bed and will have positive impacts on aquatic ecosystems. Nutrient reduction will also improve aquatic ecosystems and general water quality.	Required to be carried out in combination with morphologic improvement. Overall diffuse inputs require targeted control. Will potentially require ongoing monitoring / liaison with landowner.	Requires further assessment. Initial investigation costs = £1.2k. Further costs will be provided after investigation.	None – no information available for improvements to point and diffuse source pollution
ISSUE 23: Cutoff channel in two locations	Bla_ChRc_2, Bla_ChRc_3	Reconnect paleo channel	Farmland – Piperpool Moss	297260E 693715N – Bla_ChRc_2 297151E 693664N – Bla_ChRc_3	Morphological	Re-connection of several well preserved channel features creating much improved in-channel hydromorphology.	May instigate minor local erosion, although natural this may create land management issues.	36.4	None – capacity not assessed.
ISSUE 24: Poor channel morphology	Bla_LWD_1	Introduce large woody debris to encourage naturalisation and	Farmland –through Parklands Muir and Gartgreenie	296672E 693455N to 296144E 693605N	Morphological	Re-connection of several well preserved channel features creating much improved in-	May instigate minor local erosion, although natural this may create land	2.2	None – capacity not assessed.

		sinuosity				channel hydromorphology. Relatively low estimated cost.	management issues. Site is at least 1km from nearest road.			
ISSUE 25: Piecemeal low flood banks which cut off paleo features restricting floodplain connectivity	Bla_FBR_1	Remove flood banks to improve floodplain connectivity	Farmland – Piperpool Moss	297181E 693659N	Morphological	Reconnection of significant floodplain area and processes. Improved local floodplain flood storage.	Altered in-channel dynamics as flood flows are no longer in bank may result in sedimentation. High estimated cost.	316		Full
ISSUE 26: Engineered tributary to the Black Devon lined with flood banks and flood walls with poor channel morphology and poor riparian strip	Bla_FBR_2, Bla_FBR_3, Bla_VP_17	Remove flood banks and flood walls; improve riparian strip with planting on both sides of the burn.	Farmland – Piperpool plantation	296984E 693090N to 296704E 693440N	Morphological	Improved low flow conveyance will improve local hydromorphic diversity and restore process alongside fine sediment control work outlined above.	Restored energetics will encourage some bank erosion and channel movement, although natural this may create land management issues. High estimated cost.	430	None – capacity not assessed.	
ISSUE 27: Ponding in section of reach which may be due to local factors such as large woody debris and fine sediment buildup	Bla_FIP_1	Further investigation to determine cause of ponding	Downstream reaches	296655E 693453N to 295980E 693774N	Morphological	Improved low flow conveyance will improve local hydromorphic diversity and restore processes alongside fine sediment control work outlined above.	Restored energetics will encourage some bank erosion and channel movement, although natural this may create land management issues.	Initial investigation cost = 0.59£k, but requires further assessment to determine further actions and costs.	None – capacity not assessed.	
ISSUE 28: Cutoff channel	Bla_ChRc_4	Reconnect paleo channel	Farmland – Gartgreenie	296155E 693635N	Morphological	Re-connection of several well preserved channel features creating much improved in-channel hydromorphology. Relatively low estimated cost.	May instigate minor local erosion, although natural this may create land management issues.	3.4	None – capacity not assessed.	

details of each restoration option are considered in Appendix C (Table C-1) with locations of the options shown in Figure C-1. Table C-1 includes a consideration of funding streams which could be used to deliver the restoration opportunities identified. Appendix D outlines how costs have been estimated.

1.14 Discussion of SEPA morphological pressures & JBA findings

The Black Devon is not deemed to be failing due to morphology; capacity data was therefore not supplied to JBA by SEPA.

Figure A-1 (Appendix A) shows the pressures identified within SEPA's pressures database. The pressures identified by SEPA are culverts and low impact channel realignment.

JBA's audit has been documented in terms of the restoration opportunities present (Figure C-1). These do not always map on to the specific pressures as per SEPA's pressure database. It must be remembered that the restoration recommendations made here address the issues identified while undertaking the hydromorphological / ecological audit of the watercourse and not necessarily all of the high level pressures in the SEPA dataset.

1.15 Options assessment - multi-criteria analysis

Multi-criteria analysis was conducted to prioritise implementation of the various proposed options and is shown in Appendix F. The multi-criteria analysis was based on the three-level assessment scale described in 'Priority Catchment Restoration Scoping Studies - Phase 1: Overall Approach and Methods Report' (SNIFFER, 2011). The analysis considered a variety of different indicators including length of reach, flood risk reduction, capacity release, ecological and socio-economic benefits and cost of implementation. For each issue, each indicator was rated as positive, neutral or low benefits. Indicators highlighted at being most important in this study were weighted so that these indicators were favoured over other indicators. The weighting of different indicators is able to be adjusted easily to favour various indicators as necessary.

1.16 Recommendations

The restoration measures discussed within this report present the opportunity to improve this rural reach of river with respect primarily to reducing point and diffuse pollution.

Initiatives are also being considered into developing footpath networks along the River Devon to the south and expanding these networks along the River Black Devon could further increase public access which at present is limited due to this area being predominantly farm land. This report discusses the use of riparian planting, wetland creation and best practice (farming and fly tipping) education with the aim of dealing with point and diffuse pollution.

Based on the multi-criteria analysis it is recommended that the following options be prioritised for implementation:

- Issue 20 - Control point source pollution input
- Issue 22 - Investigate and control sources of point and diffuse pollution inputs
- Issue 10 - Control point source pollution input
- Issue 3 - Identify diffuse source
- Issue 1 - Control point source sediment input
- Issue 7 - Control point source input
- Issue 9 - Create riparian margin

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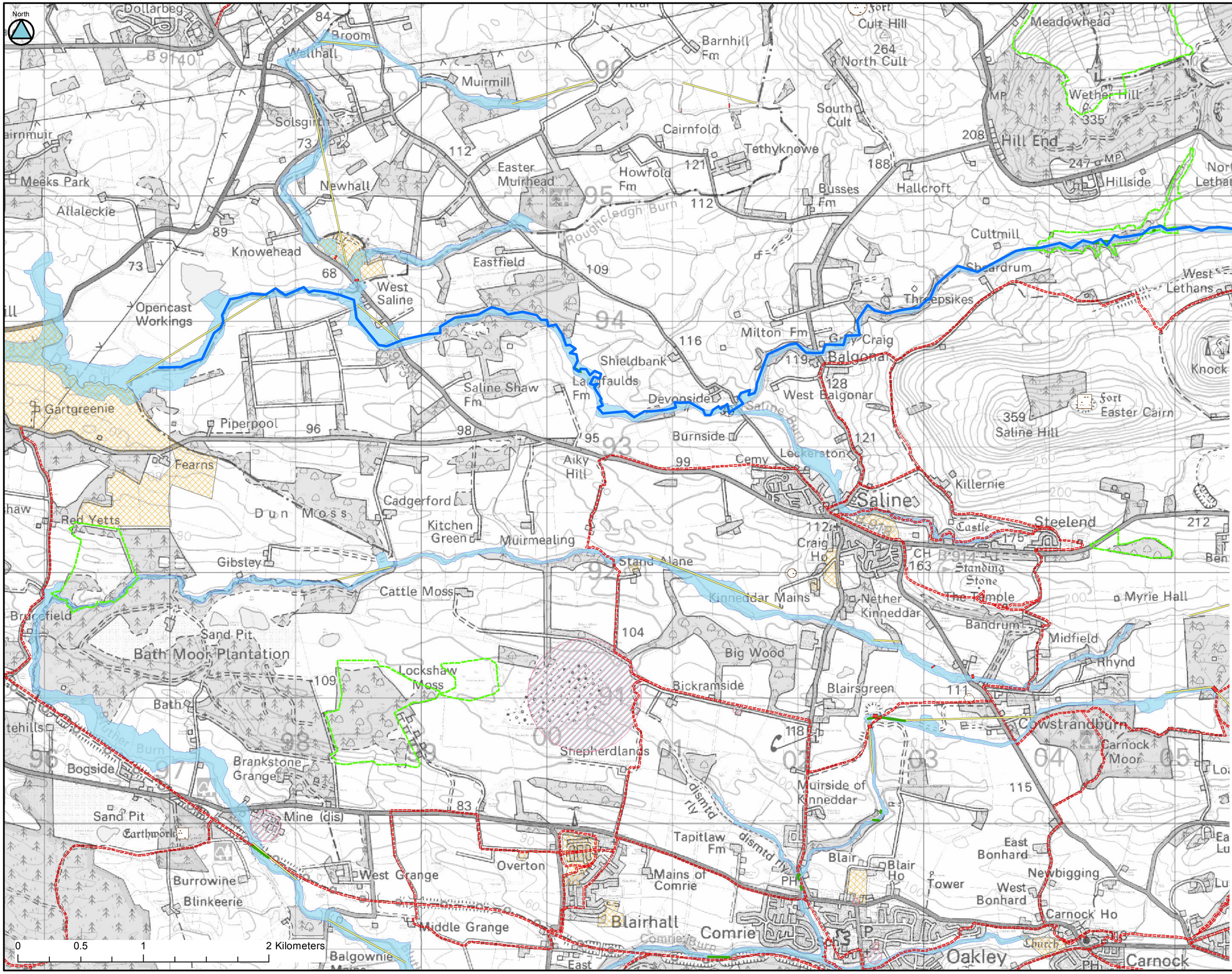
Appendices

A Phase 1 screening features



LEGEND

- Black Devon
- Forth_Culverts
- Forth_Emb+reinf
- Forth_FloodBypassChan
- Forth_GreenBankReinf
- Forth_GreyBankReinf
- Forth_HIR
- Forth_LIR
- Forth_SetbackEmb
- Point source pollution
- Core Path
- Local Nature Consevation Site
- National Nature Consevation Site
- Derelict and vacant sites area
- Local Plan housing
- Historic Scotland Scheduled Monuments
- Fluvial 200 year flood area

NOTE:
SEPA pressure database layers are labelled as provided (eg. Forth_Culverts)

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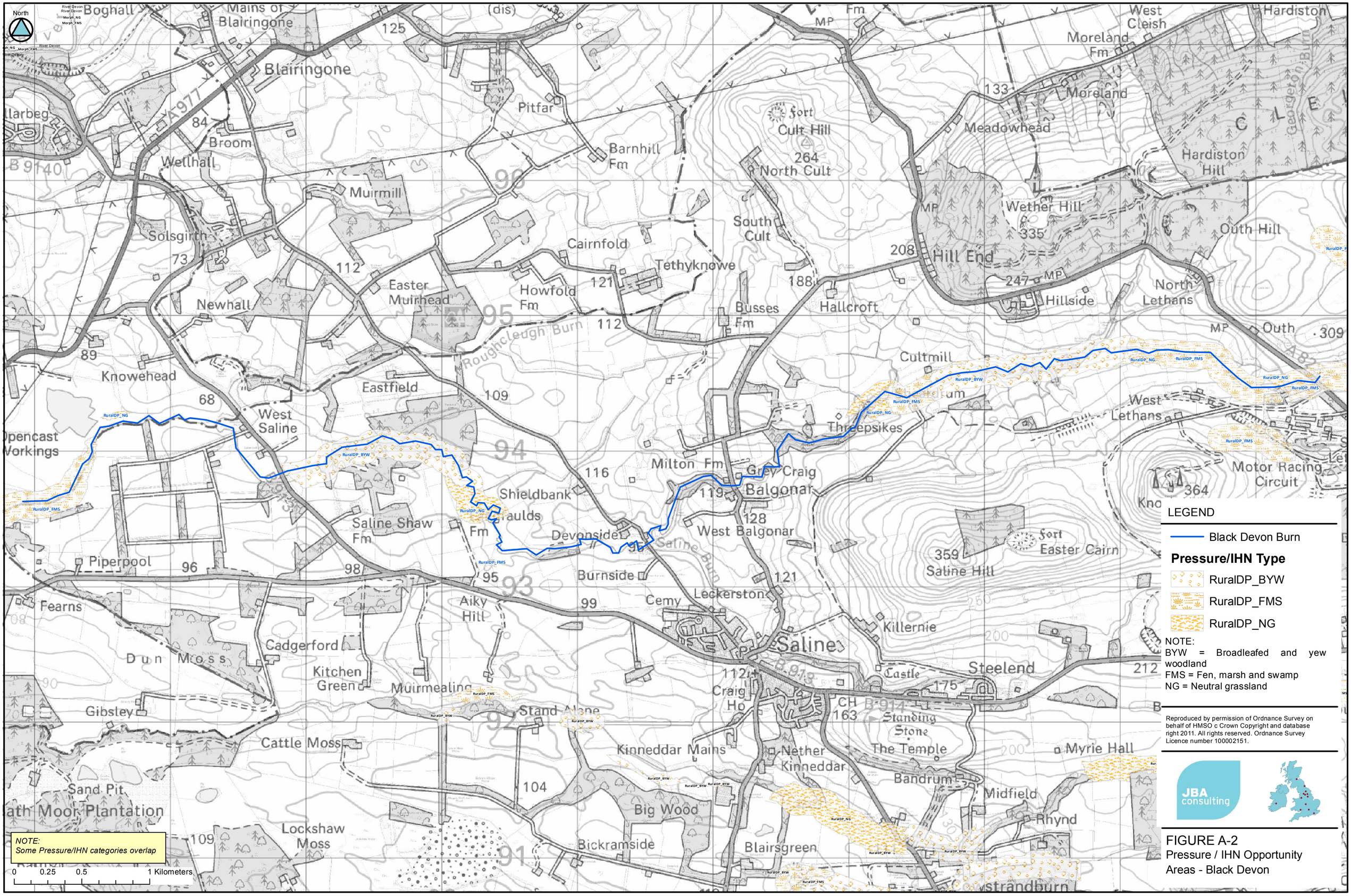
FIGURE A-1
Pressure and Opportunity Screening Data - Black Devon



LEGEND

Black Devon Burn

Pressure/IHN Type

RuralDP_BYW

RuralDP_FMS

RuralDP_NG

NOTE:
BYW = Broadleafed and yew woodland
FMS = Fen, marsh and swamp
NG = Neutral grassland

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FIGURE A-2
Pressure / IHN Opportunity Areas - Black Devon

B Photo record of the hydromorphic audit

Series of photographs taken along the reach and displayed from upstream to downstream (see Figure C-1 for photo locations).

	Location : 1 Description: Widened valley with sinuous channel OS NGR: 30643 69450 Notes: Floodplain and berm development. Planting opportunities
	Location : 2 Description: Incised bedrock influenced valley OS NGR: 30635 69451 Notes: Planting opportunities

	Location : 3 Description: Managed valley OS NGR: 30629 69451 Notes: Planting opportunities
	Location : 4 Description: Diverse floodplain hydromorphology OS NGR: 30621 69447 Notes: Analogue restoration environment
	Location : 5 Description: Limited floodplain development OS NGR: 30614 69446 Notes: Planting opportunities

	Location : 6 Description: Limited floodplain development. Iron ochre deposits. OS NGR: 30603 69448 Notes: Planting opportunities.
	Location : 7 Description: Incised channel. Iron ochre deposits. OS NGR: 30591 69449 Notes: Valley side planting opportunities.
	Location : 8 Description: Incised channel. Iron ochre deposits. OS NGR: 30580 69459 Notes:

	Location : 9 Description: Tributary fan deposit. Iron ochre deposits. OS NGR: 30575 69465 Notes:
	Location : 10 Description: Developing berm / floodplain. Iron ochre deposits. OS NGR: 30570 69471 Notes:
	Location : 11 Description: Migrating channel. Iron ochre deposits. OS NGR: 30561 69472 Notes: Low berm area created.

	Location : 12 Description: Limited high terrace. Iron ochre deposits. OS NGR: 30548 69473 Notes:
	Location : 13 Description: Limited high terrace OS NGR: 30538 69474 Notes:
	Location : 14 Description: Open managed valley sides. Iron ochre deposits. OS NGR: 30528 69474 Notes:

	Location : 15 Description: Waterfall. Iron ochre deposits. OS NGR: 30312 69432 Notes:
	Location : 16 Description: Woody debris dam OS NGR: 30311 69430 Notes:
	Location : 17 Description: Erosion below Ash. OS NGR: 30308 69426 Notes:

	Location : 18 Description: Cobble pool - riffle OS NGR: 30307 69422 Notes:
	Location : 19 Description: Low Terrace OS NGR: 30305 69417 Notes: Planting opportunities
	Location : 20 Description: Valley side tributary OS NGR: 30299 69415 Notes:

	Location : 21 Description: Valley side erosion OS NGR: 30297 69413 Notes: Woody and sediment channel obstruction
	Location : 22 Description: Confined channel OS NGR: 30295 69411 Notes: Riffle – pool channel
	Location : 23 Description: Low terrace OS NGR: 30293 69409 Notes: Planting opportunities

	Location : 24 Description: Low terrace / floodplain OS NGR: 30290 69408 Notes: Planting opportunities
	Location : 25 Description: Low terrace OS NGR: 30286 69408 Notes: Cobble riffle – pool channel
	Location : 26 Description: Incised channel OS NGR: 30283 69408 Notes: Cobble riffle - pool

	Location : 27 Description: Widened valley OS NGR: 30279 69408 Notes: Cobble riffle - pool
	Location : 28 Description: Large woody debris OS NGR: 30276 69407 Notes:
	Location : 29 Description: Waterfall OS NGR: 30273 69406 Notes: Steep valley tributary inputs, often bedrock influenced

	Location : 30 Description: Widening valley OS NGR: 30270 69405 Notes: Managed terrace
	Location : 31 Description: Low Berm OS NGR: 30267 69407 Notes: Opportunity to vegetate
	Location : 32 Description: Sediment inputs OS NGR: 30263 69408 Notes:

	Location : 33 Description: Bedrock channel OS NGR: 30260 69409 Notes:
	Location : 34 Description: Narrow berm OS NGR: 30258 69411 Notes:
	Location : 35 Description: Strongly confined reach OS NGR: 30254 69411 Notes: Valley side sediment input

	Location : 36 Description: Strongly confined reach OS NGR: 30251 69408 Notes: Bedrock pool - rapid
	Location : 37 Description: Strongly confined reach OS NGR: 30249 69404 Notes: Bedrock cascade
	Location : 38 Description: Strongly confined reach OS NGR: 30247 69399 Notes: Local bedrock collapse creating boulder rapid

	Location : 39 Description: Strongly confined reach OS NGR: 30248 69394 Notes: Mixed sediments
	Location : 40 Description: Strongly confined reach OS NGR: 30249 69389 Notes: Cobble/gravel plane-bed
	Location : 41 Description: Large woody debris dam OS NGR: 30244 69388 Notes: Recent tree fall creating local flow and sediment diversity

	Location : 42 Description: Large woody debris dam OS NGR: 30238 69388 Notes: Woody debris creating local flow and sediment diversity
	Location : 43 Description: Bedrock / cobble rapid OS NGR: 30237 69383 Notes:
	Location : 44 Description: Cobble riffle OS NGR: 30232 69381 Notes: Cobble riffle in plane-bed – riffle reach

	Location : 45 Description: Low berm OS NGR: 30227 69381 Notes: Well developed low berm features along cobble pool – rapid reach
	Location : 46 Description: Abandoned outer channel OS NGR: 30223 69381 Notes: Cutoff channel at meander bend
	Location : 46 Description: Valley sediment sources and bar sediment storage OS NGR: 30223 69381 Notes: Mixed bedrock influenced plane-bed – rapid channel with mixed cobble/gravel/sand point-bar feature and overbank fine sediment berm. Chute channel cutoff and outer bank channel abandonment

	Location : 47 Description: Confined valley OS NGR: 30220 69380 Notes: Mixed bedrock influenced plane-bed – rapid channel with mixed cobble/gravel/sand lateral bar feature and overbank fine sediment berm.
	Location : 48 Description: Meander bend OS NGR: 30220 69378 Notes: Valley side erosion and point sediment inputs through plane-bed – rapid reach
	Location : 49 Description: Balgonar Bridge right bank OS NGR: 30218 69374 Notes: Managed bankside

	Location : 50 Description: Balgonar Bridge left bank OS NGR: 30219 69373 Notes: Planted low berm and valley side
	Location : 51 Description: Balgonar Bridge looking upstream OS NGR: 30217 69373 Notes: Bedrock cascade with upstream glide
	Location : 52 Description: Balgonar Bridge looking downstream OS NGR: 30214 69374 Notes: Bedrock cascade

	Location : 53 Description: bedrock cascade OS NGR: 30201 69379 Notes:
	Location : 54 Description: High berm / terrace development OS NGR: 30174 69368 Notes:
	Location : 55 Description: Degraded channel after Burnside Bridge OS NGR: 30154 69334 Notes:

	Location : 56 Description: Burnside Bridge OS NGR: 30150 69331 Notes: Cobble/gravel rapid
	Location : 57 Description: Active sinuous channel OS NGR: 30143 69333 Notes: point-bar – pool – riffle morphology
	Location : 58 Description: Active bank erosion OS NGR: 30130 69325 Notes:

	Location : 59 Description: Slightly confined channel OS NGR: 30097 69329 Notes:
	Location : 60 Description: River flowing against valley side OS NGR: 30070 69323 Notes: Left bank floodplain planting opportunities
	Location : 61 Description: Terrace area OS NGR: 30051 69326 Notes: Planting opportunities

	Location : 62 Description: Silted bed OS NGR: 30042 69356 Notes:
	Location : 62 Description: Active meandering OS NGR: 30042 69356 Notes: Clear chute channel development
	Location : 63 Description: Active meandering channel OS NGR: 30031 69361 Notes:

	Location : 64 Description: Farmland mixed sediment inputs OS NGR: 30013 69384 Notes:
	Location : 65 Description: Mixed sediment transport OS NGR: 29998 69400 Notes:
	Location : 66 Description: Extensive low berm / floodplain OS NGR: 29986 69405 Notes: Planting opportunities

	Location : 67 Description: Old Weir / bridge crossing OS NGR: 29975 69406 Notes:
	Location : 68 Description: Bedrock rapid OS NGR: 29963 69408 Notes:
	Location : 69 Description: Well developed lower berm. OS NGR: 29915 69391 Notes:

	Location : 70 Description: bedrock influenced channel. OS NGR: 29898 69386 Notes:
	Location : 71 Description: Black Devon Bridge. OS NGR: 29880 69383 Notes: Poor state gabion baskets.
	Location : 72 Description: Bedrock influenced boulder – rapid channel OS NGR: 29865 69382 Notes:

	Location : 73 Description: Farmed floodplain OS NGR: 29855 69392 Notes: Riparian degraded
	Location : 74 Description: Farm Bridge OS NGR: 29848 69412 Notes:
	Location : 75 Description: Cutoff meander OS NGR: 29833 69419 Notes:

	Location : 75 Description: Cutoff meander OS NGR: 29833 69419 Notes: Reconnection and restoration opportunity
	Location : 76 Description: Low berm development OS NGR: 29816 69423 Notes:
	Location : 77 Description: Valley side OS NGR: 29800 69423 Notes: Planting opportunity

	Location : 78 Description: Natural transverse bar development OS NGR: 29776 69420 Notes: Restoration analogue
	Location : 79 Description: Cutoff channel OS NGR: 29758 69419 Notes:
	Location : 80 Description: Cutoff channel OS NGR: 29726 69371 Notes:

	Location : 81 Description: Excessive fine sediment OS NGR: 29715 69366 Notes:
	Location : 82 Description: Cutoff meander OS NGR: 29694 69363 Notes:
	Location : 83 Description: Engineered glide OS NGR: 29682 69360 Notes: Straightened channel

	Location : 84 Description: Left bank floodplain OS NGR: 29669 69356 Notes: Restoration opportunity
	Location : 85 Description: Piperpool plantation OS NGR: 29664 69344 Notes: Degraded glide biotope
	Location : 86 Description: Degraded channel OS NGR: 29629 69347 Notes: Engineered section with high fine sediment load

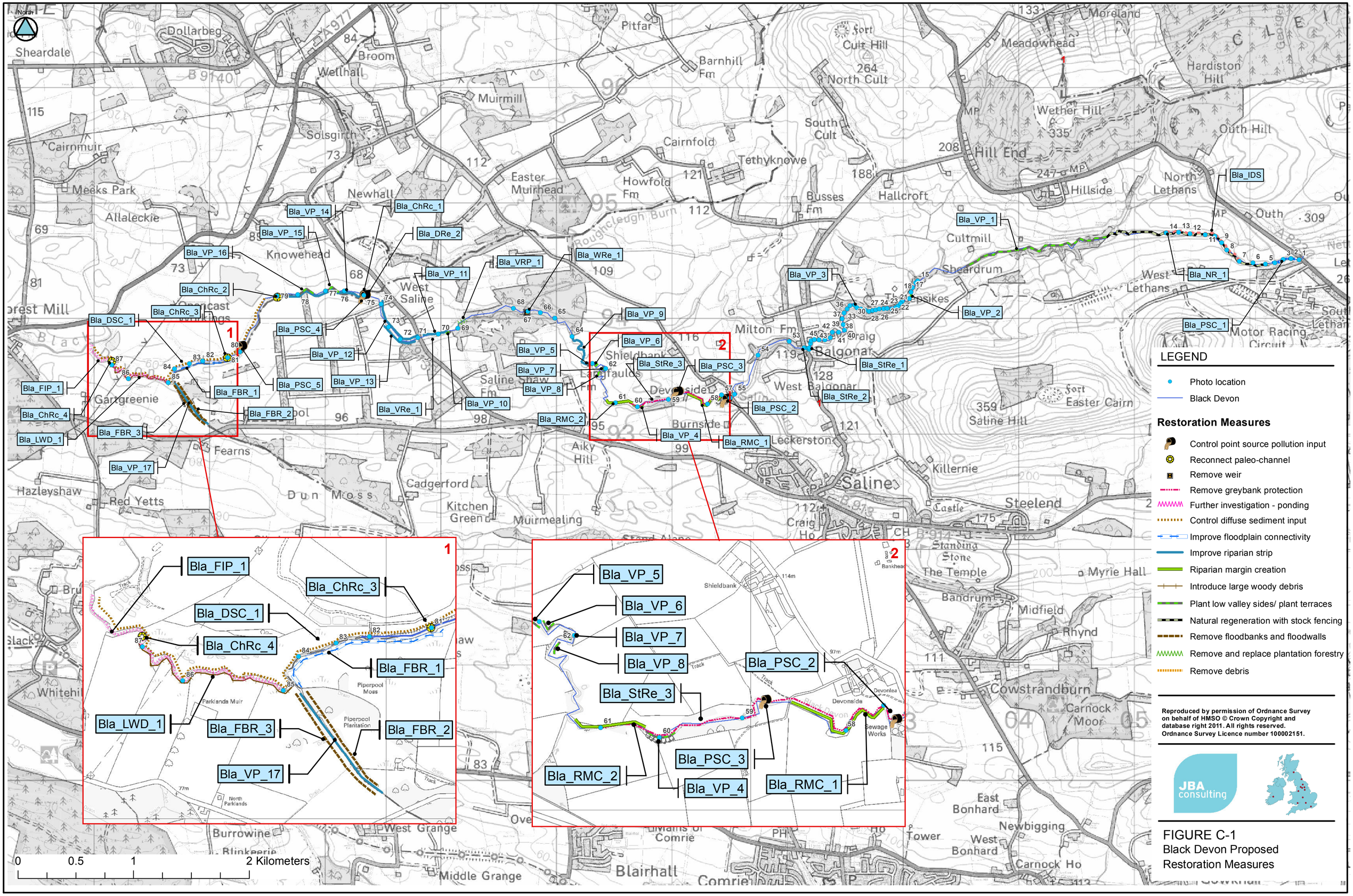
Location : 87

Description: Degraded channel

OS NGR: 29615 69359

Notes: Engineered section with high fine sediment load

C Restoration opportunity maps and tables



LEGEND

- Photo location
- Black Devon

Restoration Measures

- Control point source pollution input
- Reconnect paleo-channel
- Remove weir
- Remove greybank protection
- Further investigation - ponding
- Control diffuse sediment input
- Improve floodplain connectivity
- Improve riparian strip
- Riparian margin creation
- Introduce large woody debris
- Plant low valley sides/ plant terraces
- Natural regeneration with stock fencing
- Remove floodbanks and floodwalls
- Remove and replace plantation forestry
- Remove debris

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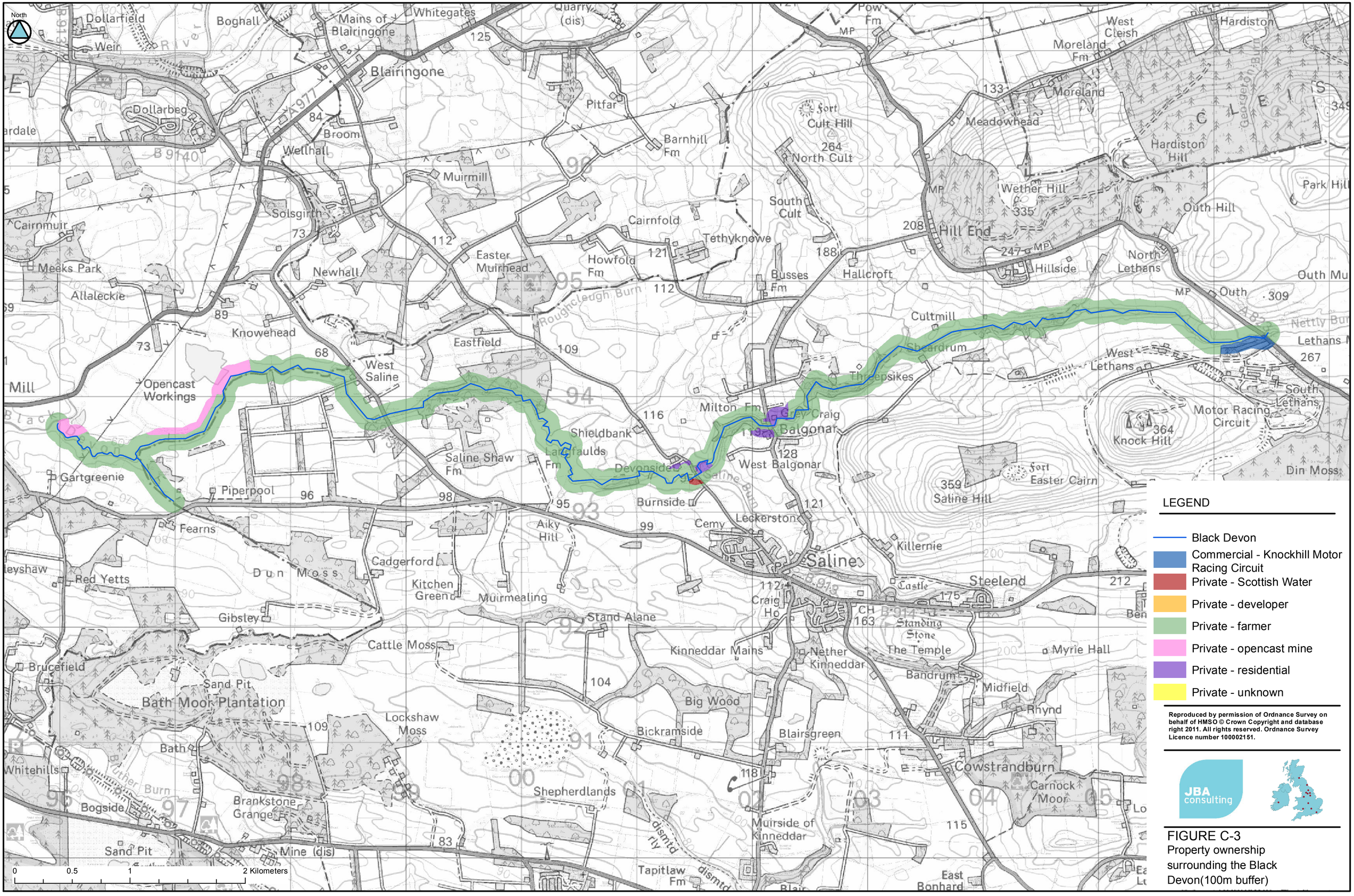
FIGURE C-1
Black Devon Proposed Restoration Measures

Figure C-2 not created - capacity data to be created



LEGEND

- Black Devon
- Commercial - Knockhill Motor Racing Circuit
- Private - Scottish Water
- Private - developer
- Private - farmer
- Private - opencast mine
- Private - residential
- Private - unknown

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FIGURE C-3
Property ownership surrounding the Black Devon(100m buffer)

Table C- 1: Restoration Measure Assessment Tables

ISSUE 1: Point source sediment inputs from surrounding farmland				**ACTION:** Control point source sediment input					**Unique ID:** Bla_PSC_1
Site information	Description	Upper reaches – downstream of Outh Bridge		**Cost estimate**	Estimate (£k)	Requires further assessment, but initially a one day site investigation will be required (£590)			
	OS NGR	306391E 694511N to 306188E 694487N			Assumptions	Two people on site – one senior, one site agent.			
	Photo reference	Appendix B – photos 1 to 4		**Further considerations**	Funding mechanism / opportunities	**Fund name**			**Applicability**
	Site access	Via farm driveway				Scotland Rural Development Fund	Challenge Funds		✖
Pressure	Pressures to be addressed through regulatory means	• Rural diffuse source pollution (mixed farming) • Point source pollution (sewage disposal)					Rural Development Contracts – Land Manager Options		✓
	IHN	• Fen, marsh and swamp • Neutral grassland					Rural Priorities – Forth Area		✓
	JBA ID	• 186_4403_RuralDP_NG_304235_694573 • 194_4403_RuralDP_FMS_301659_694309				Scottish Natural Heritage	Natural Project Grants		✖
	Associated data sources	Core path running parallel to the burn located on the farm driveway to the south					Community Grants		✓
Habitat	Type of existing habitat	Improved grassland typically above the braes with unimproved acid grassland on the grazed slopes on the right bank. Left bank is ungrazed and has a mosaic of dwarf shrub heath, bracken and birch woodland.					Central Scotland Green Network		✖
	Extent of existing habitat	Full length of sub-reach				SEPA Scottish restoration fund			✖
	Quality of existing habitat	Good, below the braes; poor above				Land developer (ie. of surrounding area)			✖
	Sensitivity of existing habitat to land use / habitat change	High, below the braes; low above				Other: • The Naturesave Trust • The Woodward Charitable Trust • The Steel Charitable Trust			✓ ✓ ✓
	Indicative species mix for restoration	Rowan, alder, downy birch, bird cherry, creeping bent, great woodrush			Other surveys required	**Survey Type**			**Required**
	Establishment techniques required	Direct planting and seeding				Ecological habitat survey			✖
Benefits	Barrier to restoration?	✖				Hydrological survey			✖
	Capacity released – contribution to obtaining GES	None – no information available for improvements to point source pollution				Ground investigation			✓
	Flood risk benefit?	✖				Topographical survey			✖
	Public access (existing or can connect to?)	✓	Core path along farm driveway, not directly adjacent to burn			Water quality monitoring			✓
	Multiple WFD benefits	**Potential benefit**			Construction / restoration costs	Methods	Access required	N/A	
		Opportunity to expand green/ecological network	✖				Machinery required	N/A	
		Help achieve good ecological status	✓				Mitigation measures	N/A	
		Contribute to addressing flood risk	✖			Timing	N/A		
		Reduce invasive non-native species	✖			Logistics	Will potentially require ongoing liaison with landowner and monitoring of waterway / discharge.		
		Climate change adaptation	✖		CAR licensing required	N/A			
		Raise awareness of the benefits of healthy water environments	✓						
	Wider environmental benefits	Enhance IHN – fen, marsh and swamp and neutral grassland habitats	✓						
Ownership	Suggested action owner	Landowner / SEPA							
	Land owner	Private – farmer							

ISSUE 2: Limited floodplain development, incised channel				**ACTION:** Natural regeneration and fencing				**Unique ID:** Bla_NR_1
Site information	Description	Upper reaches		**Cost estimate**	Estimate (£k)	11.4		
	OS NGR	306162E 694468N to 304761E 694707N			Assumptions	Fencing on one side of the burn only		
	Photo reference	Appendix B – photos 5 to 14		**Further considerations**	Funding mechanism / opportunities	**Fund name**		**Applicability**
	Site access	Via farm driveway and across farmland				Scotland Rural Development Fund	Challenge Funds	✖
	Reach length (m)	1615					Rural Development Contracts – Land Manager Options	✓
Pressure	Pressures to be addressed through regulatory means	• Rural diffuse source pollution (mixed farming) • Point source pollution (sewage disposal)					Rural Priorities – Forth Area	✓
	IHN	• Fen, marsh and swamp • Neutral grassland • Broadleaved and yew woodland				Scottish Natural Heritage	Natural Project Grants	✖
	JBA ID	• 160_4403_RuralDP_NG_304235_694573 • 161_4403_RuralDP_FMS_301659_694309 • 162_4403_RuralDP_BYW_300582_694232 • 186_4403_RuralDP_NG_304235_694573					Community Grants	✓
	Associated data sources	• Partially within fluvial 200 year • Partially within national nature conservation site (downstream section of reach) • Core path running along the farm driveway to the south of the burn					Central Scotland Green Network	✖
Habitat	Type of existing habitat	Semi-improved acid grassland, wet grassland and flushes on the right banks with improved grassland (above the brae) on the left bank with birch woodland below on the steep slope.				SEPA Scottish restoration fund		✓
	Extent of existing habitat	Full length of sub-reach				Land developer (ie. of surrounding area)		✖
	Quality of existing habitat	Very good (below the brae)				Other: • Awards for All Scotland • The Naturesave Trust • The Ibrahim Foundation • The Steel Charitable Trust		✓ ✓ ✓ ✓
	Sensitivity of existing habitat to land use / habitat change	Very high						
	Indicative species mix for restoration	Alder, rowan						
	Establishment techniques required	Direct planting						
Benefits	Barrier to restoration?	✖			Other surveys required	**Survey Type**		**Required**
	Capacity released – contribution to obtaining GES	None – not capacity assessed				Ecological habitat survey		✖
	Flood risk benefit?	✓	Natural regeneration will increase floodplain roughness, reducing flood flow velocities.			Hydrological survey		✖
	Public access (existing or can connect to?)	✓	Core path along farm driveway, not directly adjacent to burn (about 500m to the south)			Ground investigation		✖
	Multiple WFD benefits	**Potential benefit**				Topographical survey		✖
		Opportunity to expand green/ecological network	✓			Water quality monitoring		✖
		Help achieve good ecological status	✓		Construction / restoration costs	Methods	Access required	✓
		Contribute to addressing flood risk	✓				Machinery required	✖
		Reduce invasive non-native species	✖				Mitigation measures	✖
		Climate change adaptation	✖			Timing	Avoid periods were stock numbers are high in surrounding fields.	
		Raise awareness of the benefits of healthy water environments	✓			Logistics	Liaise with farmer regarding timing.	
	Wider environmental benefits	Enhance IHN – fen, marsh and swamp, neutral grassland and broadleaved and yew woodland habitats	✓		CAR licensing required	N/A		
Ownership	Suggested action owner	Landowner						
	Land owner	Private – farmer						

ISSUE 3: Iron ochre deposits throughout reach from an unknown source				**ACTIONS:** - Identify diffuse source. Contact Coal Authority to identify whether this location is on their priority list - Passive treatment (eg. Wetland) as close to source as possible			**Unique ID:** Bla_IDS_1
Site information	Description	Upper reaches		**Cost estimate**	Estimate (£k)	Requires further investigation – initial two day investigation = £1.2k	
	OS NGR	305916E 694500N to 305279E 694753N			Assumptions	Two days site work / research for senior plus one day for site agent.	
	Photo reference	Appendix B – photos 7 to 14		**Further considerations**	Funding mechanism / opportunities	**Fund name**	**Applicability**
	Site access	Via farm driveway and across farmland				Scotland Rural Development Fund – Challenge Funds	✗
Pressure	Pressures to be addressed through regulatory means	• Rural diffuse source pollution (mixed farming) • Point source pollution (sewage disposal)				Scotland Rural Development Fund – Rural Development Contracts – Land Manager Options	✓
	IHN	• Fen, marsh and swamp • Neutral grassland				Scotland Rural Development Fund – Rural Priorities – Forth Area	✓
	JBA ID	• 160_4403_RuralDP_NG_304235_694573 • 161_4403_RuralDP_FMS_301659_694309				Scottish Natural Heritage – Natural Project Grants	✗
	Associated data sources	• Partially within fluvial 200 year • Core path running along the farm driveway to the south of the burn				Scottish Natural Heritage – Community Grants	✓
Habitat	Type of existing habitat	Semi-improved acid grassland, wet grassland and flushes on the right banks with improved grassland (above the brae) on the left bank with birch woodland below on the steep slope.				Scottish Natural Heritage – Central Scotland Green Network	✗
	Extent of existing habitat	Flush is limited in extent but the rest is full length of reach				SEPA Scottish restoration fund	✗
	Quality of existing habitat	Very good				Land developer (ie. of surrounding area)	✗
	Sensitivity of existing habitat to land use / habitat change	Very high				Other: • The Naturesave Trust • The Woodward Charitable Trust • The Steel Charitable Trust	✓ ✓ ✓
	Indicative species mix for restoration	Bottle sedge, alder, grey sallow					
	Establishment techniques required	Direct planting					
Benefits	Barrier to restoration?	✗			Other surveys required	**Survey Type**	**Required**
	Capacity released – contribution to obtaining GES	None – not capacity not assessed. No information available for improvements to diffuse source pollution.				Ecological habitat survey	✗
	Flood risk benefit?	✗				Hydrological survey	✗
	Public access (existing or can connect to?)	✓	Core path along farm driveway, no directly adjacent to burn (about 500m to the south)			Ground investigation	✓
	Multiple WFD benefits	**Potential benefit**				Topographical survey	✗
		Opportunity to expand green/ecological network	✗			Water quality monitoring	✓
		Help achieve good ecological status	✓		Construction / restoration costs	Methods – Access required	N/A
		Contribute to addressing flood risk	✗			Methods – Machinery required	N/A
		Reduce invasive non-native species	✗			Methods – Mitigation measures	N/A
		Climate change adaptation	✗			Timing	N/A
		Raise awareness of the benefits of healthy water environments	✓			Logistics	Will require liaison with farmer, Coal Authority and any other identified parties
	Wider environmental benefits	Enhance IHN – fen, marsh and swamp, neutral grassland habitats	✓		CAR licensing required	N/A	
Ownership	Suggested action owner	Unknown					
	Land owner	Farmer					

ISSUE 4: Limited floodplain development, incised channel				**ACTION:** Plant low valley sides and terraces				**Unique ID:** Bla_VP_1
Site information	Description	Upper reaches		**Cost estimate**	Estimate (£k)	65		
	OS NGR	303550E 694452N to 304760E 694706N			Assumptions	Planting to be done on both sides of the burn at a 50m width. Includes fencing, plants and labour costs.		
	Photo reference	None		**Further considerations**	Funding mechanism / opportunities	**Fund name**		**Applicability**
	Site access	Via farm driveway and across farmland				Scotland Rural Development Fund	Challenge Funds	✓
	Reach length (m)	1335					Rural Development Contracts – Land Manager Options	✓
Pressure	Pressures to be addressed through regulatory means	• Rural diffuse source pollution (mixed farming) • Point source pollution (sewage disposal)					Rural Priorities – Forth Area	✓
	IHN	• Fen, marsh and swamp • Neutral grassland • Broadleaved and yew woodland				Scottish Natural Heritage	Natural Project Grants	✖
	JBA ID	• 158_4403_RuralDP_NG_304235_694573 • 159_4403_RuralDP_NG_304235_694573 • 160_4403_RuralDP_NG_304235_694573 • 161_4403_RuralDP_FMS_301659_694309 • 162_4403_RuralDP_BYW_300582_694232					Community Grants	✓
	Associated data sources	• Fully within fluvial 200 year • Partially within national nature conservation site (upstream section of reach) • Nearest core path is located approximately 500m south of the burn					Central Scotland Green Network	✓
Habitat	Type of existing habitat	Flush, wet grassland, semi-improved and unimproved acid grassland, bracken, broadleaved native woodland and scrub on both banks.				SEPA Scottish restoration fund		✓
	Extent of existing habitat	Valley sides				Land developer (ie. of surrounding area)		✖
	Quality of existing habitat	Very good				Other: • The Naturesave Trust • The Ibrahim Foundation • The Steel Charitable Trust		✓ ✓ ✓
	Sensitivity of existing habitat to land use / habitat change	Very high						
	Indicative species mix for restoration	Downy birch, rowan, bird cherry			Other surveys required	**Survey Type**		**Required**
	Establishment techniques required	Direct planting (where safe)				Ecological habitat survey		✖
Benefits	Barrier to restoration?	✖				Hydrological survey		✖
	Capacity released – contribution to obtaining GES	None – capacity not assessed				Ground investigation		✖
	Flood risk benefit?	✓	Planting will increase floodplain roughness, reducing flood flow velocities.			Topographical survey		✖
	Public access (existing or can connect to?)	✓	No direct public access to burn. Core path is located to the south of the reach. Opportunity to expand access.			Water quality monitoring		✖
	Multiple WFD benefits	**Potential benefit**			Construction / restoration costs	Methods	Access required	N/A
		Opportunity to expand green/ecological network	✓				Machinery required	N/A
		Help achieve good ecological status	✓				Mitigation measures	N/A
		Contribute to addressing flood risk	✓			Timing	• Ideally between November and February • Avoid frost and snow where possible	
		Reduce invasive non-native species	✓			Logistics	N/A	
		Climate change adaptation	✓		CAR licensing required	N/A		
		Raise awareness of the benefits of healthy water environments	✖					
	Wider environmental benefits	Enhance IHN – fen, marsh and swamp, neutral grassland and broadleaved and yew woodland habitats	✓					
Ownership	Suggested action owner	Landowner						
	Land owner	Private - farmer						

ISSUE 5: Lack of vegetation on valleys and terraces				**ACTION:** Plant low valley sides and terraces				**Unique ID:** Bla_VP_2, Bla_VP_3
Site information	Description	Upper reaches		**Cost estimate**	Estimate (£k)	5.7		
	OS NGR	303071E 694214N to 303033E 694167N – Bla_VP_2 302615E 694083N to 302578E 694117N – Bla_VP_3			Assumptions	Planting to be done on both sides of the burn at a 50m width. Includes fencing, plants and labour costs.		
	Photo reference	Appendix B – photos 18 and 19 (Bla_VP_2), photos 33 and 34 (Bla_VP_3)		**Further considerations**	Funding mechanism / opportunities	**Fund name**		**Applicability**
	Site access	Via farm driveway and across farmland				Scotland Rural Development Fund	Challenge Funds	✖
	Reach length (m)	115 (total length)					Rural Development Contracts – Land Manager Options	✓
Pressure	Pressures to be addressed through regulatory means	• Rural diffuse source pollution (mixed farming) • Point source pollution (sewage disposal)					Rural Priorities – Forth Area	✓
	IHN	None – gap in network. Neutral grassland habitat within 100m of site (to the north of the burn).				Scottish Natural Heritage	Natural Project Grants	✖
	JBA ID	N/A					Community Grants	✓
	Associated data sources	• Fully within fluvial 200 year • Nearest core path is located approximately 300m south of the burn					Central Scotland Green Network	✓
Habitat	Type of existing habitat	Mainly semi-improved acid grassland with inliers of gorse scrub on right bank. Left bank is unimproved acid grassland, improved grassland and a small area of alder woodland.				SEPA Scottish restoration fund		✓
	Extent of existing habitat	Full length of proposed works				Land developer (ie. of surrounding area)		✖
	Quality of existing habitat	Poor (improved grassland) with all other habitats being good				Other: • The Naturesave Trust • The Ibrahim Foundation The Steel Charitable Trust		✓ ✓ ✓
	Sensitivity of existing habitat to land use / habitat change	High (improved grassland is low)						
	Indicative species mix for restoration	Alder, downy birch, rowan and ash						
	Establishment techniques required	Direct planting						
	Barrier to restoration?	✖			Other surveys required	**Survey Type**		**Required**
	Capacity released – contribution to obtaining GES	None – capacity not assessed.				Ecological habitat survey		✖
	Flood risk benefit?	✓	Planting will increase floodplain roughness, reducing flood flow velocities.			Hydrological survey		✖
	Public access (existing or can connect to?)	✓	No direct public access to burn. Core path is located to the south of the reach. Access to the waterway could be improved by extending path.			Ground investigation		✖
Benefits	Multiple WFD benefits	**Potential benefit**				Topographical survey		✖
		Opportunity to expand green/ecological network	✓			Water quality monitoring		✖
		Help achieve good ecological status	✓		Construction / restoration costs	Methods	Access required	N/A
		Contribute to addressing flood risk	✓				Machinery required	N/A
		Reduce invasive non-native species	✖				Mitigation measures	N/A
		Climate change adaptation	✓			Timing	• Ideally between November and February • Avoid frost and snow where possible	
		Raise awareness of the benefits of healthy water environments	✖			Logistics	N/A	
	Wider environmental benefits	Opportunity to extend / connect to nearby neutral grassland habitat	✓		CAR licensing required	N/A		
Ownership	Suggested action owner	Landowner						
	Land owner	Private - farmer						

ISSUE 6: Redundant blockstone / masonry wall		**ACTION:** Remove and allow natural erosion processes to occur			**Unique ID:** Bla_StRe_1, Bla_StRe_2		
Site information	Description	Upstream and downstream of Balgonar Bridge	**Cost estimate**	Estimate (£k)	26.3		
	OS NGR	302200E 693770N to 302136E 693744N		Assumptions	Walls to be removed on both sides of the burn. Includes costs for site engineer and ground investigation, hydrological model (£3k) and topographical survey (£2k).		
	Photo reference	Appendix B – photos 49 to 52		Funding mechanism / opportunities	**Fund name**		**Applicability**
	Site access	Via Bolgonar Bridge			Scotland Rural Development Fund	Challenge Funds	✗
	Reach length (m)	60				Rural Development Contracts – Land Manager Options	✗
Pressure	Pressures to be addressed through regulatory means	• Rural diffuse source pollution (mixed farming) • Point source pollution (sewage disposal)				Rural Priorities – Forth Area	✓
	IHN	None – gap in network. Neutral grassland habitat located within 500m (to the north of the burn).			Scottish Natural Heritage	Natural Project Grants	✗
	JBA ID	N/A				Community Grants	✗
	Associated data sources	• Within fluvial 200 year • Nearest core path is located approximately 80m south of the burn				Central Scotland Green Network	✓
Habitat	Type of existing habitat	Mixed semi-natural plantation woodland on left bank and native, semi-natural broadleaved woodland on the right bank.			SEPA Scottish restoration fund		✓
	Extent of existing habitat	Full length of proposed bank works			Land developer (ie. of surrounding area)		✗
	Quality of existing habitat	Very good			Other: • Awards for All Scotland • The Naturesave Trust • The Ibrahim Foundation		✓ ✓ ✓
	Sensitivity of existing habitat to land use / habitat change	Very high					
	Indicative species mix for restoration	Not applicable					
	Establishment techniques required	Not applicable					
Benefits	Barrier to restoration?	✗		**Further considerations**	**Survey Type**		**Required**
	Capacity released – contribution to obtaining GES	None – capacity not assessed			Other surveys required	Ecological habitat survey	✗
	Flood risk benefit?	✓	Reconnection of floodplain as flood flows will not be confined to the lined channel.			Hydrological survey	✓
	Public access (existing or can connect to?)	✓	No direct public access to burn. Core path is located to the south of the reach. Access to the waterway could be improved by extending path.			Ground investigation	✓
	Multiple WFD benefits	**Potential benefit**				Topographical survey	✓
		Opportunity to expand green/ecological network	✗			Water quality monitoring	✗
		Help achieve good ecological status	✓		Construction / restoration costs	Methods	Access required ✓ May require traffic management and temporary access via Bolgonar Bridge
		Contribute to addressing flood risk	✓				Machinery required ✓ Machinery to be stored outside floodplain
		Reduce invasive non-native species	✗				Mitigation measures ✓ Machinery to keep out of waterway where possible
		Climate change adaptation	✗			Timing	Works to be carried out during low flow periods
		Raise awareness of the benefits of healthy water environments	✗			Logistics	• Potentially multiple landowners to liaise with • May require traffic management for accessing site from road
	Wider environmental benefits	Allow natural fluvial processes to occur; improvements to local riparian and bank habitat	✓		CAR licensing required	Registration	Simple licence ✓ Complex licence
Ownership	Suggested action owner	Farmer				Grey bank reinforcement ≤ 100m in length	
	Land owner	Private – farmer, with private residential owners to the north and south of the burn					

ISSUE 7: Point source pollution input adjacent to sewage works				**ACTION:** Control point source input				**Unique ID:** Bla_PSC_2
Site information	Description	Downstream of Burnside Bridge		**Cost estimate**	Estimate (£k)	Requires further assessment, but initially a one day site investigation will be required (£590)		
	OS NGR	301469E 693291N			Assumptions	Two people on site – one senior, one site agent.		
	Photo reference	Appendix B – downstream of photo 56		**Further considerations**	Funding mechanism / opportunities	**Fund name**		**Applicability**
	Site access	Via Bridge Road (upstream)				Scotland Rural Development Fund	Challenge Funds	×
Pressure	Pressures to be addressed through regulatory means	• Rural diffuse source pollution (mixed farming) • Point source pollution (sewage disposal)					Rural Development Contracts – Land Manager Options	×
	IHN	None – gap in network. Neutral grassland and fen, marsh and swamp habitats located within 1km of site.					Rural Priorities – Forth Area	✓
	JBA ID	N/A				Scottish Natural Heritage	Natural Project Grants	×
	Associated data sources	• Fully within fluvial 200 year • Nearest core path is located approximately 450m south of the burn					Community Grants	✓
Habitat	Type of existing habitat	Semi-improved neutral grassland (right banks) and improved grassland (left bank)					Central Scotland Green Network	×
	Extent of existing habitat	Full length of structure				SEPA Scottish restoration fund		×
	Quality of existing habitat	Medium				Land developer (ie. of surrounding area)		×
	Sensitivity of existing habitat to land use / habitat change	Moderate				Other: • The Naturesave Trust • The Woodward Charitable Trust • The Steel Charitable Trust		✓ ✓ ✓
	Indicative species mix for restoration	Not applicable						
	Establishment techniques required	Not applicable						
Benefits	Barrier to restoration?	✓	Located adjacent to sewage works (possible source of inputs)					
	Capacity released – contribution to obtaining GES	None – no information available for improvements to point source pollution						
	Flood risk benefit?	×						
	Public access (existing or can connect to?)	×	No direct public access to burn. Core path is located to the south of the reach. However sewage works is adjacent to burn so may not be appropriate to have public access at this location.					
	Multiple WFD benefits	**Potential benefit**						
		Opportunity to expand green/ecological network	×					
		Help achieve good ecological status	✓					
		Contribute to addressing flood risk	×					
		Reduce invasive non-native species	×					
		Climate change adaptation	×					
		Raise awareness of the benefits of healthy water environments	✓					
	Wider environmental benefits	Improvements to sewage network	✓					
Ownership	Suggested action owner	Scottish Water						
	Land owner	Scottish Water (sewage works) to the south, private landowner to the north						
					Other surveys required	**Survey Type**		**Required**
						Ecological habitat survey		×
						Hydrological survey		×
						Ground investigation		✓
						Topographical survey		×
						Water quality monitoring		✓
					Construction / restoration costs	Methods	Access required	N/A
							Machinery required	N/A
							Mitigation measures	N/A
						Timing	N/A	
						Logistics	Will require liaison with Scottish Water and potentially ongoing monitoring	
					CAR licensing required	N/A		

ISSUE 8: Redundant blockwork / masonry walls				**ACTION:** Remove walls				**Unique ID:** Bla_StRe_3
Site information	Description	Downstream of sewage works		**Cost estimate**	Estimate (£k)	405		
	OS NGR	301503E 693326N to 300515E 693268N			Assumptions	Upper estimate as walls are piecemeal along this section. Walls to be removed on both sides of the burn. Includes costs for site engineer and ground investigation, hydrological model (£3k) and topographical survey (£2k).		
	Photo reference	Appendix B – photos 56 to 61		**Further considerations**	Funding mechanism / opportunities	**Fund name**		**Applicability**
	Site access	Via farm track / surrounding farmland / Burnside Bridge				Scotland Rural Development Fund	Challenge Funds	✗
	Reach length (m)	1220					Rural Development Contracts – Land Manager Options	✓
Pressure	Pressures to be addressed through regulatory means	• Rural diffuse source pollution (mixed farming) • Point source pollution (sewage disposal)					Rural Priorities – Forth Area	✓
	IHN	None – gap in network. Neutral grassland and fen, marsh and swamp habitats located within 500m of site.				Scottish Natural Heritage	Natural Project Grants	✗
	JBA ID	N/A					Community Grants	✗
	Associated data sources	• Fully within fluvial 200 year • Nearest core path is located approximately 500m south of the burn					Central Scotland Green Network	✗
Habitat	Type of existing habitat	Unimproved and semi-improved acid grassland, wet grassland (right bank) and broadleaved native woodland and semi-improved acid grassland (left bank).				SEPA Scottish restoration fund		✓
	Extent of existing habitat	Full length of proposed works				Land developer (ie. of surrounding area)		✗
	Quality of existing habitat	Good				Other: • Awards for All Scotland • The Naturesave Trust • The Ibrahim Foundation		✓ ✓ ✓
	Sensitivity of existing habitat to land use / habitat change	High						
	Indicative species mix for restoration	Alder, downy birch						
	Establishment techniques required	Direct planting						
Benefits	Barrier to restoration?	✗			**Survey Type**			**Required**
	Capacity released – contribution to obtaining GES	None – capacity not assessed.			Other surveys required	Ecological habitat survey		✗
	Flood risk benefit?	✓	Reconnection of floodplain as flood flows will not be confined to the lined channel.			Hydrological survey		✓
	Public access (existing or can connect to?)	✓	No direct public access to burn. Core path is located to the south of the reach. There are also other tracks crossing the burn around the middle of the reach.			Ground investigation		✓
	Multiple WFD benefits	**Potential benefit**				Topographical survey		✓
		Opportunity to expand green/ecological network	✗			Water quality monitoring		✗
		Help achieve good ecological status	✓		Construction / restoration costs	Methods	Access required ✓	May require traffic management for truck movements to and from site. Site is about 1km from road.
		Contribute to addressing flood risk	✓				Machinery required ✓	Machinery to be stored outside floodplain
		Reduce invasive non-native species	✗				Mitigation measures ✓	Machinery to keep out of waterway where possible
		Climate change adaptation	✗			Timing	Works to be carried out during low flow periods	
		Raise awareness of the benefits of healthy water environments	✓			Logistics	N/A	
	Wider environmental benefits	Allow natural fluvial processes to occur; improvements to local riparian and bank habitat	✓		CAR licensing required	Registration	Simple licence	Complex licence ✓
Ownership	Suggested action owner	Landowner - farmer				Grey bank reinforcement > 100m in length		
	Land owner	Private - farmer						

ISSUE 9: Lack of riparian margin and vegetation				**ACTION:** Create riparian margin				**Unique ID:** Bla_RMC_1
Site information	Description	Downstream of sewage works		**Cost estimate**	Estimate (£k)	11.3		
	OS NGR	301428E 693331N to 301131E 693350N			Assumptions	Planting to be done on both sides of the burn at a width of 10m. Includes fencing, plants and labour costs.		
	Photo reference	Appendix B – photos 57 and 58		**Further considerations**	Funding mechanism / opportunities	**Fund name**		**Applicability**
	Site access	Via road at the downstream end of the reach				Scotland Rural Development Fund	Challenge Funds	✖
	Reach length (m)	405					Rural Development Contracts – Land Manager Options	✓
Pressure	Pressures to be addressed through regulatory means	• Rural diffuse source pollution (mixed farming) • Point source pollution (sewage disposal)					Rural Priorities – Forth Area	✓
	IHN	None – gap in network. Both fen, marsh and swamp and neutral grassland habitats within 1km.				Scottish Natural Heritage	Natural Project Grants	✖
	JBA ID	N/A					Community Grants	✓
	Associated data sources	• Fully within fluvial 200 year • Nearest core path is located approximately 500m south of the burn					Central Scotland Green Network	✖
Habitat	Type of existing habitat	Semi-improved acid grassland (right bank) and improved grassland (left bank).				SEPA Scottish restoration fund		✓
	Extent of existing habitat	Full length of sub-reach				Land developer (ie. of surrounding area)		✖
	Quality of existing habitat	Medium				Other: • The Naturesave Trust • The Ibrahim Foundation • The Steel Charitable Trust		✓ ✓ ✓
	Sensitivity of existing habitat to land use / habitat change	Moderate			Other surveys required	**Survey Type**		**Required**
	Indicative species mix for restoration	Alder, grey sallow, creeping bent, water sedge, yellow flag iris, meadowsweet				Ecological habitat survey		✖
	Establishment techniques required	Direct planting and seeding				Hydrological survey		✖
Benefits	Barrier to restoration?	✖				Ground investigation		✖
	Capacity released – contribution to obtaining GES	None – capacity not assessed				Topographical survey		✖
	Flood risk benefit?	✓	Reduction in rate of runoff from surrounding farm land.			Water quality monitoring		✖
	Public access (existing or can connect to?)	✓	No direct public access to burn. Core path is located to the south of the reach. There are also other tracks crossing the burn downstream of the reach.		Construction / restoration costs	Methods	Access required	N/A
	Multiple WFD benefits	**Potential benefit**					Machinery required	N/A
		Opportunity to expand green/ecological network	✓				Mitigation measures	N/A
		Help achieve good ecological status	✓			Timing	N/A	
		Contribute to addressing flood risk	✓			Logistics	N/A	
		Reduce invasive non-native species	✖		CAR licensing required	N/A		
		Climate change adaptation	✖					
		Raise awareness of the benefits of healthy water environments	✖					
	Wider environmental benefits	Encourage development of nearby IHN habitats at site; improved riparian quality	✓					
Ownership	Suggested action owner	Landowner - farmer						
	Land owner	Private - farmer						

ISSUE 10: Point source pollution input				**ACTION:** Control point source pollution input					**Unique ID:** Bla_PSC_3
Site information	Description	Downstream of sewage works		**Cost estimate**	Estimate (£k)	Requires further assessment, but initially a one day site investigation will be required (£590)			
	OS NGR	301046E 693349N			Assumptions	Two people on site – one senior, one site agent.			
	Photo reference	None		**Further considerations**	Funding mechanism / opportunities	**Fund name**			**Applicability**
Pressure	Pressures to be addressed through regulatory means	• Rural diffuse source pollution (mixed farming) • Point source pollution (sewage disposal)				Scotland Rural Development Fund	Challenge Funds		×
	IHN	None – gap in network. Both fen, marsh and swamp and neutral grassland habitats within 500m of site.					Rural Development Contracts – Land Manager Options		×
	JBA ID	N/A					Rural Priorities – Forth Area		✓
	Associated data sources	• Fully within fluvial 200 year • Nearest core path is located approximately 500m of south of the burn				Scottish Natural Heritage	Natural Project Grants		×
Habitat	Type of existing habitat	Bare ground (poached and eroded)					Community Grants		✓
	Extent of existing habitat	Immediately around cattle feeder					Central Scotland Green Network		✓
	Quality of existing habitat	Negligible				SEPA Scottish restoration fund			×
	Sensitivity of existing habitat to land use / habitat change	None				Land developer (ie. of surrounding area)			×
	Indicative species mix for restoration	Creeping bent grass				Other: • The Naturesave Trust • The Woodward Charitable Trust • The Steel Charitable Trust			✓ ✓ ✓
	Establishment techniques required	Seeding							
Benefits	Barrier to restoration?	×			**Survey Type**				**Required**
	Capacity released – contribution to obtaining GES	None – capacity not assessed. None – no information available for improvements to point source pollution			Other surveys required	Ecological habitat survey			×
	Flood risk benefit?	×				Hydrological survey			×
	Public access (existing or can connect to?)	✓	No direct public access to burn. Core path is located to the south of the reach. There are also other tracks crossing the burn upstream of the site. Potential to expand access to the waterway here.			Ground investigation			✓
	Multiple WFD benefits	**Potential benefit**				Topographical survey			×
		Opportunity to expand green/ecological network	×			Water quality monitoring			✓
		Help achieve good ecological status	✓		Construction / restoration costs	Methods	Access required	N/A	
		Contribute to addressing flood risk	×				Machinery required	N/A	
		Reduce invasive non-native species	×				Mitigation measures	N/A	
		Climate change adaptation	×			Timing	N/A		
		Raise awareness of the benefits of healthy water environments	✓			Logistics	Will require liaison with landowner and potentially ongoing monitoring		
	Wider environmental benefits	Improvements to farm practices	✓		CAR licensing required	N/A			
Ownership	Suggested action owner	Scottish Water or farmer							
	Land owner	Private							

ISSUE 11: Underdeveloped riparian margin – river flows against terrace on the true left bank				**ACTION:** Plant low valley sides and terraces on true right bank				**Unique ID:** Bla_VP_4
Site information	Description	Farmland		**Cost estimate**	Estimate (£k)	4.6		
	OS NGR	300754E 693250N			Assumptions	Assume planting on right bank and terrace only at a width of 50m. Includes fencing, plants and labour costs.		
	Photo reference	Appendix B – photo 60		**Further considerations**	Funding mechanism / opportunities	**Fund name**		**Applicability**
	Site access	Via road located upstream of the site and surrounding farmland				Scotland Rural Development Fund	Challenge Funds	✖
	Reach length (m)	105					Rural Development Contracts – Land Manager Options	✓
Pressure	Pressures to be addressed through regulatory means	• Rural diffuse source pollution (mixed farming) • Point source pollution (sewage disposal)					Rural Priorities – Forth Area	✓
	IHN	None – gap in network. Both fen, marsh and swamp and neutral grassland habitats within 500m of site.				Scottish Natural Heritage	Natural Project Grants	✖
	JBA ID	N/A					Community Grants	✓
	Associated data sources	• Fully within fluvial 200 year • Nearest core path is located approximately 500m south of the burn					Central Scotland Green Network	✓
Habitat	Type of existing habitat	Broadleaved native woodland (left bank) and wet grassland (right bank)				SEPA Scottish restoration fund		✓
	Extent of existing habitat	Full length of proposed works				Land developer (ie. of surrounding area)		✖
	Quality of existing habitat	Good				Other: • The Naturesave Trust • The Ibrahim Foundation • The Steel Charitable Trust		✓ ✓ ✓
	Sensitivity of existing habitat to land use / habitat change	High			Other surveys required	**Survey Type**		**Required**
	Indicative species mix for restoration	Alder, grey sallow, reed canary grass				Ecological habitat survey		✖
	Establishment techniques required	Direct planting				Hydrological survey		✖
Benefits	Barrier to restoration?	✖				Ground investigation		✖
	Capacity released – contribution to obtaining GES	None – capacity not assessed.				Topographical survey		✖
	Flood risk benefit?	✓	Planting will increase floodplain roughness, reducing flood flow velocities.			Water quality monitoring		✖
	Public access (existing or can connect to?)	✓	No direct public access to burn. Core path is located to the south of the reach. There are also other tracks crossing the burn upstream of the site. Potential to expand access to the waterway here.		Construction / restoration costs	Methods	Access required	N/A
	Multiple WFD benefits	**Potential benefit**					Machinery required	N/A
		Opportunity to expand green/ecological network	✓				Mitigation measures	N/A
		Help achieve good ecological status	✓			Timing	• Ideally between November and February • Avoid frost and snow where possible	
		Contribute to addressing flood risk	✓			Logistics	N/A	
		Reduce invasive non-native species	✖		CAR licensing required	N/A		
		Climate change adaptation	✓					
		Raise awareness of the benefits of healthy water environments	✖					
	Wider environmental benefits	Encourage development of nearby IHN habitats at site; improved riparian and floodplain habitat quality	✓					
Ownership	Suggested action owner	Landowner - farmer						
	Land owner	Private - farmer						

ISSUE 12: No riparian margin				**ACTION:** Create riparian margin				**Unique ID:** Bla_RMC_2
Site information	Description	Langfaulds farm		**Cost estimate**	Estimate (£k)	7.2		
	OS NGR	300429E 693295N to 300660E 693268N			Assumptions	Assume planting on both sides of the burn at a width of 10m. Includes fencing, plants and labour costs.		
	Photo reference	Appendix B – downstream of photo 61		**Further considerations**	Funding mechanism / opportunities	**Fund name**		**Applicability**
	Site access	Via farm track / farmland				Scotland Rural Development Fund	Challenge Funds	✗
	Reach length (m)	245					Rural Development Contracts – Land Manager Options	✓
Pressure	Pressures to be addressed through regulatory means	• Rural diffuse source pollution (mixed farming) • Point source pollution (sewage disposal)					Rural Priorities – Forth Area	✓
	IHN	None – gap in network. Both fen, marsh and swamp and neutral grassland habitats within 500m of site.				Scottish Natural Heritage	Natural Project Grants	✗
	JBA ID	163_4403_RuralDP_NG_304235_694573					Community Grants	✓
	Associated data sources	• Fully within fluvial 200 year • Nearest core path is located approximately 600m south of the burn					Central Scotland Green Network	✓
Habitat	Type of existing habitat	Arable land on right bank and improved grassland on left bank. There is also a narrow riparian woodland (alder) strip right on the bank.				SEPA Scottish restoration fund		✓
	Extent of existing habitat	Full length of proposals				Land developer (ie. of surrounding area)		✗
	Quality of existing habitat	Poor (excluding alder strip)				Other: • The Naturesave Trust • The Ibrahim Foundation • The Steel Charitable Trust		✓ ✓ ✓
	Sensitivity of existing habitat to land use / habitat change	Low			Other surveys required	**Survey Type**		**Required**
	Indicative species mix for restoration	Creeping bent grass, grey sallow, yellow flag iris and sharp-flowered rush (in wetter areas)				Ecological habitat survey		✗
	Establishment techniques required	Direct planting and seeding				Hydrological survey		✗
Benefits	Barrier to restoration?	✗				Ground investigation		✗
	Flood risk benefit?	✓	Reduction in rate of runoff from surrounding farm land.			Topographical survey		✗
	Public access (existing or can connect to?)	✓	No direct public access to burn. Core path is located to the south of the reach. There are also other tracks crossing the burn upstream of the site. Potential opportunity to expand access to waterway.			Water quality monitoring		✗
	Multiple WFD benefits	**Potential benefit**			Construction / restoration costs	Methods	Access required	N/A
		Opportunity to expand green/ecological network	✓				Machinery required	N/A
		Help achieve good ecological status	✓				Mitigation measures	N/A
		Contribute to addressing flood risk	✓			Timing	N/A	
		Reduce invasive non-native species	✗			Logistics	N/A	
		Climate change adaptation	✗		CAR licensing required	N/A		
		Raise awareness of the benefits of healthy water environments	✗					
	Wider environmental benefits	Encourage development of nearby IHN habitats at site; improved riparian habitat quality	✓					
Ownership	Suggested action owner	Landowner - private						
	Land owner	Private - farmer						

ISSUE 13: Active meandering channel				**ACTION:** Plant low valley sides and terraces				**Unique ID:** Bla_VP_5, Bla_VP_6, Bla_VP_7, Bla_VP_8		
Site information	Description	Langfaulds farm		**Cost estimate**	Estimate (£k)	10				
	OS NGR	300361E 693505N to 300274E 693584N			Assumptions	Planting on one side of the burn only at a width of 50m. Includes fencing, plants and labour costs.				
	Photo reference	Appendix B – photos 62 and 63		**Further considerations**	Funding mechanism / opportunities	**Fund name**				**Applicability**
	Site access	Via farm track / farmland				Scotland Rural Development Fund	Challenge Funds			✗
	Reach length (m)	380 (total length); planting length is only 230m					Rural Development Contracts – Land Manager Options			✗
Pressure	Pressures to be addressed through regulatory means	• Rural diffuse source pollution (mixed farming) • Point source pollution (sewage disposal)					Rural Priorities – Forth Area			✓
	IHN	Neutral grassland				Scottish Natural Heritage	Natural Project Grants			✗
	JBA ID	163_4403_RuralDP_NG_304235_694573					Community Grants			✓
	Associated data sources	• Fully within fluvial 200 year					Central Scotland Green Network			✓
Habitat	Type of existing habitat	Narrow strip or riparian woodland with arable fields beyond on both banks. In places there are wide strips of wet grassland, where cultivation is not possible.				SEPA Scottish restoration fund				✓
	Extent of existing habitat	Full length of proposed works				Land developer (ie. of surrounding area)				✗
	Quality of existing habitat	Good (riparian strip and wet grassland), negligible (arable fields)				Other: • The Naturesave Trust • The Ibrahim Foundation • The Steel Charitable Trust				✓ ✓ ✓
	Sensitivity of existing habitat to land use / habitat change	High for semi-natural habitats and very low for arable fields								
	Indicative species mix for restoration	Grey sallow, alder, creeping bent, yellow flag iris, branched burr-reed, great woodrush, cocksfoot								
	Establishment techniques required	Direct planting and seeding								
Benefits	Barrier to restoration?	✗				**Survey Type**				**Required**
	Capacity released – contribution to obtaining GES	None – capacity not assessed			Other surveys required	Ecological habitat survey				✗
	Flood risk benefit?	✓	Planting will increase floodplain roughness, reducing flood flow velocities.			Hydrological survey				✗
	Public access (existing or can connect to?)	✓	No public access to land and no core path in vicinity. Opportunity to expand access to the waterway.			Ground investigation				✗
	Multiple WFD benefits	**Potential benefit**				Topographical survey				✗
		Opportunity to expand green/ecological network	✓			Water quality monitoring				✗
		Help achieve good ecological status	✓		Construction / restoration costs	Methods	Access required	N/A		
		Contribute to addressing flood risk	✓				Machinery required	N/A		
		Reduce invasive non-native species	✗				Mitigation measures	N/A		
		Climate change adaptation	✓			Timing	• Ideally between November and February • Avoid frost and snow where possible			
		Raise awareness of the benefits of healthy water environments	✓							
	Wider environmental benefits	Improved riparian habitat quality; enhancement of local neutral grassland network	✓			Logistics	N/A			
Ownership	Suggested action owner	Landowner - farmer			CAR licensing required	N/A				
	Land owner	Private – farmer (Langfaulds Farm – the west)								

ISSUE 14: Degraded riparian strip				**ACTION:** Improve riparian strip with planting				**Unique ID:** Bla_VP_9
Site information	Description	Langfaulds farm		**Cost estimate**	Estimate (£k)	11.2		
	OS NGR	300260E 693595N to 300135E 693850N			Assumptions	Assume planting on both sides of the burn at a width of 10m. Includes fencing, plants and labour costs.		
	Photo reference	Appendix B – photo 64		**Further considerations**	Funding mechanism / opportunities	**Fund name**		**Applicability**
	Site access	Via farm track / farmland				Scotland Rural Development Fund	Challenge Funds	✓
	Reach length (m)	390					Rural Development Contracts – Land Manager Options	✓
Pressure	Pressures to be addressed through regulatory means	• Rural diffuse source pollution (mixed farming) • Point source pollution (sewage disposal)					Rural Priorities – Forth Area	✓
	IHN	• Neutral grassland • Broadleaved and yew woodland				Scottish Natural Heritage	Natural Project Grants	×
	JBA ID	163_4403_RuralDP_NG_304235_694573					Community Grants	✓
	Associated data sources	• Fully within fluvial 200 year					Central Scotland Green Network	✓
Habitat	Type of existing habitat	Arable and improved grassland on the right banks and arable and semi-improved grassland on the left bank. There is also a narrow bankside riparian woodland (alder) strip				SEPA Scottish restoration fund		✓
	Extent of existing habitat	Full length of proposed restoration measures				Land developer (ie. of surrounding area)		×
	Quality of existing habitat	Poor (fields)				Other: • The Naturesave Trust • The Ibrahim Foundation • The Steel Charitable Trust		✓ ✓ ✓
	Sensitivity of existing habitat to land use / habitat change	Very low (fields)						
	Indicative species mix for restoration	Alder, grey sallow, great woodrush, creeping bent, cocksfoot						
	Establishment techniques required	Direct planting and seeding						
Benefits	Barrier to restoration?	×				**Survey Type**		**Required**
	Capacity released – contribution to obtaining GES	None – capacity not assessed			Other surveys required	Ecological habitat survey		×
	Flood risk benefit?	✓	Planting will increase floodplain roughness, reducing flood flow velocities.			Hydrological survey		×
	Public access (existing or can connect to?)	✓	No public access to land and no core path in vicinity. Opportunity to expand public access to waterway and surrounding woodland area connecting to the core path to the south east.			Ground investigation		×
	Multiple WFD benefits	**Potential benefit**				Topographical survey		×
		Opportunity to expand green/ecological network	✓			Water quality monitoring		×
		Help achieve good ecological status	✓		Construction / restoration costs	Methods	Access required	N/A
		Contribute to addressing flood risk	✓				Machinery required	N/A
		Reduce invasive non-native species	×				Mitigation measures	N/A
		Climate change adaptation	✓			Timing	• Ideally between November and February • Avoid frost and snow where possible	
		Raise awareness of the benefits of healthy water environments	✓			Logistics	N/A	
	Wider environmental benefits	Improvement to riparian and floodplain habitat quality; enhance local broadleaved and yew woodland and neutral grassland habitats	✓		CAR licensing required	N/A		
Ownership	Suggested action owner	Landowner - farmer						
	Land owner	Private - farmer						

ISSUE 15: Old weir / bridge crossing – restricting flow and fish passage, causing debris buildup behind structure.				**ACTION:** Remove weir				**Unique ID:** Bla_WRe_1
Site information	Description	Langfaulds farm		**Cost estimate**	Estimate (£k)	5.9		
	OS NGR	299747E 694054N			Assumptions	Includes hydrological model (£3k) and topographical survey (£2k) and time for 2 days site investigation / supervision. Assume approximate dimensions of 5m width and 1m height.		
	Photo reference	Appendix B – photos 67		**Further considerations**	Funding mechanism / opportunities	**Fund name**		**Applicability**
	Site access	Via farm track / farmland				Scotland Rural Development Fund		
	Reach length (m)	5					Rural Development Contracts – Land Manager Options	✓
Pressure	Pressures to be addressed through regulatory means	• Rural diffuse source pollution (mixed farming) • Point source pollution (sewage disposal)					Rural Priorities – Forth Area	✓
	IHN	Neutral grassland				Scottish Natural Heritage	Natural Project Grants	×
	JBA ID	163_4403_RuralDP_NG_304235_694573					Community Grants	×
	Associated data sources	• Fully within fluvial 200 year					Central Scotland Green Network	✓
Habitat	Type of existing habitat	Mixed plantation woodland on both sides of the river				SEPA Scottish restoration fund		✓
	Extent of existing habitat	Full length of structure				Land developer (ie. of surrounding area)		×
	Quality of existing habitat	Good				Other: • The Naturesave Trust • The Ibrahim Foundation • Peoples Postcode Lottery • The Steel Charitable Trust		✓ ✓ ✓ ✓
	Sensitivity of existing habitat to land use / habitat change	Moderate			Other surveys required	**Survey Type**		**Required**
	Indicative species mix for restoration	Not applicable				Ecological habitat survey		×
	Establishment techniques required	Not applicable				Hydrological survey		✓
Benefits	Barrier to restoration?	×				Ground investigation		✓
	Capacity released – contribution to obtaining GES	None – capacity not assessed				Topographical survey		✓
	Flood risk benefit?	✓	Removal will prevent debris and water backing up behind structure.			Water quality monitoring		×
	Public access (existing or can connect to?)	✓	No public access to land and no core path in vicinity. Opportunity to expand public access to waterway and surrounding woodland area connecting to the core path to the south east.		Construction / restoration costs	Methods	Access required ✓	Site may be difficult to access through North Shaw Wood and farmland.
	Multiple WFD benefits	**Potential benefit**					Machinery required ✓	
		Opportunity to expand green/ecological network	✓				Mitigation measures ✓	Sediment control measures to minimise sediment disturbance and movement downstream during removal
		Help achieve good ecological status	✓			Timing	To be carried out during low flow periods	
		Contribute to addressing flood risk	✓			Logistics	May be difficult to for machinery to access this section of the burn through the woodland	
		Reduce invasive non-native species	×		CAR licensing required	Registration	Simple licence ✓	Complex licence
		Climate change adaptation	×			In-stream structure in river > 3m wide affecting ≤ 50m of river length		
		Raise awareness of the benefits of healthy water environments	✓					
	Wider environmental benefits	Improvements to flow and fish passage through reach	✓					
Ownership	Suggested action owner	Landowner / SEPA						
	Land owner	Private - farmer						

ISSUE 16: Plantation forestry surrounding burn				**ACTION:** Remove and replace plantation forestry					**Unique ID:** Bla_VRP_1
Site information	Description	Farmland downstream of B913		**Cost estimate**	Estimate (£k)	13.7			
	OS NGR	299230E 694006N to 299151E to 693958N			Assumptions	Assume clearance and planting on both sides of the burn at a width of 20m. Includes plants, labour, clearance and some offsite disposal.			
	Photo reference	Appendix B – upstream of photo 69		**Further considerations**	Funding mechanism / opportunities	**Fund name**			**Applicability**
	Site access	Via farm track / farmland				Scotland Rural Development Fund	Challenge Funds		✓
	Reach length (m)	90					Rural Development Contracts – Land Manager Options		✓
Pressure	Pressures to be addressed through regulatory means	• Rural diffuse source pollution (mixed farming) • Point source pollution (sewage disposal)					Rural Priorities – Forth Area		✓
	IHN	Broadleafed and yew woodland				Scottish Natural Heritage	Natural Project Grants		✖
	JBA ID	165_4403_RuralDP_BYW_300582_694232					Community Grants		✓
	Associated data sources	• Fully within fluvial 200 year					Central Scotland Green Network		✓
Habitat	Type of existing habitat	Mixed plantation woodland on both banks of the stream.				SEPA Scottish restoration fund			✓
	Extent of existing habitat	Full length of reach				Land developer (ie. of surrounding area)			✖
	Quality of existing habitat	Medium				Other: • The Naturesave Trust • The Ibrahim Foundation • The Steel Charitable Trust			✓ ✓ ✓
	Sensitivity of existing habitat to land use / habitat change	Low							
	Indicative species mix for restoration	None							
	Establishment techniques required	None - allow recolonisation of streamside							
Benefits	Barrier to restoration?	✖			Other surveys required	**Survey Type**			**Required**
	Capacity released – contribution to obtaining GES	None – capacity not assessed				Ecological habitat survey			✓
	Flood risk benefit?	✖				Hydrological survey			✖
	Public access (existing or can connect to?)	✓	No public access to land and no core path in vicinity. Potential opportunity to create access to waterway and surrounding woodland connecting to the core path to the south east.			Ground investigation			✖
	Multiple WFD benefits	**Potential benefit**				Topographical survey			✖
		Opportunity to expand green/ecological network	✓			Water quality monitoring			✖
		Help achieve good ecological status	✓		Construction / restoration costs	Methods	Access required	✓	
		Contribute to addressing flood risk	✖				Machinery required	✓	Machinery to be stored outside the floodplain
		Reduce invasive non-native species	✖				Mitigation measures	✓	Machinery not to enter the watercourse
		Climate change adaptation	✖			Timing	• Avoid nesting time • Ideally between November and February • Avoid frost and snow where possible		
		Raise awareness of the benefits of healthy water environments	✓			Logistics	Need to arrange access for machinery through farmland and woodland areas.		
	Wider environmental benefits	Improved riparian and floodplain habitat quality; enhancement of local broadleaved and yew woodland habitat	✓		CAR licensing required	N/A			
Ownership	Suggested action owner	Landowner - farmer							
	Land owner	Private - farmer							

ISSUE 17: Degraded riparian strip, lack of riparian vegetation				**ACTION:** Improve riparian strip with planting, plant low valley sides and terraces			**Unique ID:** Bla_VP_10, Bla_VP_11
Site information	Description	Farmland downstream of B913		**Cost estimate**	Estimate (£k)	5.6	
	OS NGR	299088E 693882N to 298847E 693859N			Assumptions	Planting on one side of the burn only: riparian strip (Bla_VP_11) at a width of 10m, valley and terrace (Bla_VP_10) at a width of 50m. Includes plants, labour and clearance costs.	
	Photo reference	Appendix B – photo 70		**Further considerations**	Funding mechanism / opportunities	**Fund name**	**Applicability**
	Site access	Via farm track / farmland				Scotland Rural Development Fund – Challenge Funds	✓
	Reach length (m)	Total length = 260 (Bla_VP_10 = 50m, Bla_VP_11 = 210m)				Scotland Rural Development Fund – Rural Development Contracts – Land Manager Options	✓
Pressure	Pressures to be addressed through regulatory means	• Rural diffuse source pollution (mixed farming) • Point source pollution (sewage disposal)				Scotland Rural Development Fund – Rural Priorities – Forth Area	✓
	IHN	Broadleafed and yew woodland				Scottish Natural Heritage – Natural Project Grants	×
	JBA ID	165_4403_RuralDP_BYW_300582_694232				Scottish Natural Heritage – Community Grants	✓
	Associated data sources	• Fully within fluvial 200 year				Scottish Natural Heritage – Central Scotland Green Network	✓
Habitat	Type of existing habitat	Arable field on bank				SEPA Scottish restoration fund	✓
	Extent of existing habitat	Full length of sub-reach				Land developer (ie. of surrounding area)	×
	Quality of existing habitat	Very low				Other: • The Naturesave Trust • The Ibrahim Foundation • The Steel Charitable Trust	✓ ✓ ✓
	Sensitivity of existing habitat to land use / habitat change	Negligible			Other surveys required	**Survey Type**	**Required**
	Indicative species mix for restoration	Alder, grey sallow, great woodrush, cocksfoot, creeping bent, false oat grass				Ecological habitat survey	×
	Establishment techniques required	Direct planting and seeding				Hydrological survey	×
Benefits	Barrier to restoration?	×				Ground investigation	×
	Capacity released – contribution to obtaining GES	None – capacity not assessed				Topographical survey	×
	Flood risk benefit?	✓	Planting will increase floodplain and riparian roughness, reducing flood flow velocities.			Water quality monitoring	×
	Public access (existing or can connect to?)	✓	No public access to land and no core path in vicinity. Potential opportunity to create access to waterway connecting to the core path to the south east.		Construction / restoration costs	Methods – Access required	N/A
	Multiple WFD benefits	**Potential benefit**				Methods – Machinery required	N/A
		Opportunity to expand green/ecological network	✓			Methods – Mitigation measures	N/A
		Help achieve good ecological status	✓			Timing	• Ideally between November and February • Avoid frost and snow where possible
		Contribute to addressing flood risk	✓			Logistics	N/A
		Reduce invasive non-native species	×		CAR licensing required	N/A	
		Climate change adaptation	✓				
		Raise awareness of the benefits of healthy water environments	✓				
	Wider environmental benefits	Improved riparian and floodplain habitat quality; enhancement of local broadleaved and yew woodland habitat	✓				
Ownership	Suggested action owner	Landowner - farmer					
	Land owner	Private - farmer					

ISSUE 18: Degraded riparian strip				**ACTION:** Improve riparian strip with planting				**Unique ID:** Bla_VP_12, Bla_VP_13
Site information	Description	West Saline Farm		**Cost estimate**	Estimate (£k)	11.8		
	OS NGR	298799E 693856N to 298496E 694156N – Bla_VP_12 298777E 693803N to 298512E 693935N – Bla_VP_13			Assumptions	Assume planting width of 10m. Includes plants, labour and clearance costs.		
	Photo reference	Appendix B – photos 71 to 74		**Further considerations**	Funding mechanism / opportunities	**Fund name**		**Applicability**
	Site access	Via farm track / farmland				Scotland Rural Development Fund	Challenge Funds	✓
	Reach length (m)	525 (Bla_VP_13 does not extend the full length of reach)					Rural Development Contracts – Land Manager Options	✓
Pressure	Pressures to be addressed through regulatory means	• Rural diffuse source pollution (mixed farming) • Point source pollution (sewage disposal)					Rural Priorities – Forth Area	✓
	IHN	None – gap in network (area of broadleaved and yew woodland habitat upstream)				Scottish Natural Heritage	Natural Project Grants	✖
	JBA ID	N/A					Community Grants	✓
	Associated data sources	• Fully within fluvial 200 year					Central Scotland Green Network	✓
Habitat	Type of existing habitat	Arable fields on the right bank. Scattered scrub and improved grassland on the left bank with a strip of trees immediately along the river bank.				SEPA Scottish restoration fund		✓
	Extent of existing habitat	Full length of sub-reach				Land developer (ie. of surrounding area)		✖
	Quality of existing habitat	Medium				Other: • The Naturesave Trust • The Ibrahim Foundation • The Steel Charitable Trust		✓ ✓ ✓
	Sensitivity of existing habitat to land use / habitat change	Moderate			Other surveys required	**Survey Type**		**Required**
	Indicative species mix for restoration	Alder, grey sallow, ash, great woodrush, cocksfoot, false oat grass				Ecological habitat survey		✖
	Establishment techniques required	Direct planting and seeding				Hydrological survey		✖
Benefits	Barrier to restoration?	✖				Ground investigation		✖
	Capacity released – contribution to obtaining GES	None – capacity not assessed				Topographical survey		✖
	Flood risk benefit?	✓	Planting will increase floodplain and riparian roughness, reducing flood flow velocities.			Water quality monitoring		✖
	Public access (existing or can connect to?)	✓	No public access to land and no core path in vicinity. Potential opportunity to create access to waterway connecting to the core path to the south east.		Construction / restoration costs	Methods	Access required	N/A
	Multiple WFD benefits	**Potential benefit**					Machinery required	N/A
		Opportunity to expand green/ecological network	✓				Mitigation measures	N/A
		Help achieve good ecological status	✓			Timing	• Ideally between November and February • Avoid frost and snow where possible	
		Contribute to addressing flood risk	✓			Logistics	N/A	
		Reduce invasive non-native species	✖		CAR licensing required	N/A		
		Climate change adaptation	✓					
		Raise awareness of the benefits of healthy water environments	✓					
	Wider environmental benefits	Improved riparian and floodplain habitat quality; opportunity to connect to nearby broadleaved and yew woodland habitat	✓					
Ownership	Suggested action owner	Landowner - farmer						
	Land owner	Private – farmer (West Saline Farm)						

ISSUE 19: - Paleo channel disconnected - Illegal dumping – old baled silage and other materials – on the left bank of the cut-off meander				**ACTIONS:** - Reconnect meander of paleo channel - Remove illegally dumped materials				**Unique ID:** Bla_ChRc_1, Bla_DRe_1
Site information	Description	West Saline Farm		**Cost estimate**	Estimate (£k)	33		
	OS NGR	298333E 694209N			Assumptions	Includes hydrological model (£3k) and topographical survey (£2k), 3 days time for engineer – site investigation and supervision. Includes removal of debris		
	Photo reference	Appendix B – photo 75		**Further considerations**	Funding mechanism / opportunities	**Fund name**		**Applicability**
	Site access	Via farm track / farmland				Scotland Rural Development Fund	Challenge Funds	×
	Reach length (m)	45					Rural Development Contracts – Land Manager Options	✓
Pressure	Pressures to be addressed through regulatory means	• Rural diffuse source pollution (mixed farming) • Point source pollution (sewage disposal)					Rural Priorities – Forth Area	✓
	IHN	None – gap in network. Broadleaved and yew woodland within 500m of site; fen, marsh and swamp and neutral grassland within 1km of site.				Scottish Natural Heritage	Natural Project Grants	×
	JBA ID	N/A					Community Grants	×
	Associated data sources	• Fully within fluvial 200 year					Central Scotland Green Network	✓
Habitat	Type of existing habitat	Steep gorge with improved and semi-improved grassland above the break of slope, On the valley sides, the slopes are dominated by broadleaved native woodland.				SEPA Scottish restoration fund		✓
	Extent of existing habitat	Full length of restoration site				Land developer (ie. of surrounding area)		×
	Quality of existing habitat	Good (very low in cut-off meander)				Other:		×
	Sensitivity of existing habitat to land use / habitat change	High (negligible in cut-off meander)						
	Indicative species mix for restoration	Alder, oak and ash, great woodrush						
	Establishment techniques required	Direct planting						
Benefits	Barrier to restoration?	×			Other surveys required	**Survey Type**		**Required**
	Capacity released – contribution to obtaining GES	None – capacity not assessed				Ecological habitat survey		×
	Flood risk benefit?	✓	Will improve floodplain connectivity allowing natural flood flow processes to occur			Hydrological survey		✓
	Public access (existing or can connect to?)	✓	No public access to land and no core path in vicinity. Potential opportunity to create access to waterway connecting to the core path to the south east.			Ground investigation		✓
	Multiple WFD benefits	**Potential benefit**				Topographical survey		✓
		Opportunity to expand green/ecological network	×			Water quality monitoring		×
		Help achieve good ecological status	✓		Construction / restoration costs	Methods	Access required ✓	
		Contribute to addressing flood risk	✓				Machinery required ✓	
		Reduce invasive non-native species	×				Mitigation measures ✓	Sediment control measures to minimise sediment disturbance and movement during restoration
		Climate change adaptation	×			Timing	To be carried out during low flow periods	
		Raise awareness of the benefits of healthy water environments	✓			Logistics	N/A	
	Wider environmental benefits	Improvements to main and tributary channel morphology; aesthetic improvements to waterway area	✓		CAR licensing required	Registration	Simple licence ✓	Complex licence
Ownership	Suggested action owner	SEPA?				Realignment for rivers ≤ 3m wide		
	Land owner	Private – farmer (West Saline Farm)						

ISSUE 20: Point source pollution input				**ACTION:** Control point source pollution input					**Unique ID:** Bla_PSC_4
Site information	Description	West Saline Farm		**Cost estimate**	Estimate (£k)	Requires further assessment, but initially a one day site investigation will be required (£590)			
	OS NGR	301048E 693356N – Bla_PSC_3			Assumptions	Two people on site – one senior, one site agent.			
	Photo reference	Appendix B – photo 75		**Further considerations**	Funding mechanism / opportunities	**Fund name**			**Applicability**
	Site access	Via farm track / farmland				Scotland Rural Development Fund	Challenge Funds		✖
Pressure	Pressures to be addressed through regulatory means	• Rural diffuse source pollution (mixed farming) • Point source pollution (sewage disposal)					Rural Development Contracts – Land Manager Options		✓
	IHN	None – gap in network. Broadleaved and yew woodland within 500m of site; fen, marsh and swamp and neutral grassland within 1km of site.					Rural Priorities – Forth Area		✓
	JBA ID	N/A				Scottish Natural Heritage	Natural Project Grants		✖
	Associated data sources	• Fully within fluvial 200 year					Community Grants		✓
Habitat	Type of existing habitat	Steep gorge with improved and semi-improved grassland above the break of slope, On the valley sides, the slopes are dominated by broadleaved native woodland.					Central Scotland Green Network		✓
	Extent of existing habitat	Full length of restoration site				SEPA Scottish restoration fund			✓
	Quality of existing habitat	Good (very low in cut-off meander)				Land developer (ie. of surrounding area)			✖
	Sensitivity of existing habitat to land use / habitat change	High (negligible in cut-off meander)				Other: • The Naturesave Trust • The Woodward Charitable Trust • The Steel Charitable Trust			✓ ✓ ✓
	Indicative species mix for restoration	Not applicable							
	Establishment techniques required	Not applicable							
Benefits	Barrier to restoration?	✖				**Survey Type**			**Required**
	Capacity released – contribution to obtaining GES	None – capacity not assessed. None – no information available for improvements to point source pollution.			Other surveys required	Ecological habitat survey			✖
	Flood risk benefit?	✖				Hydrological survey			✖
	Public access (existing or can connect to?)	✓	No public access to land and no core path in vicinity. Potential opportunity to create access to waterway connecting to the core path to the south east.			Ground investigation			✓
	Multiple WFD benefits	**Potential benefit**				Topographical survey			✖
		Opportunity to expand green/ecological network	✖			Water quality monitoring			✓
		Help achieve good ecological status	✓		Construction / restoration costs	Methods	Access required	N/A	
		Contribute to addressing flood risk	✖				Machinery required	N/A	
		Reduce invasive non-native species	✖				Mitigation measures	N/A	
		Climate change adaptation	✖			Timing	N/A		
		Raise awareness of the benefits of healthy water environments	✓			Logistics	N/A		
	Wider environmental benefits	Improvements to farm practices	✓		CAR licensing required	Will potentially require ongoing liaison with landowner and monitoring of waterway / discharge.			
Ownership	Suggested action owner	Landowner - farmer							
	Land owner	Private – farmer (West Saline Farm)							

ISSUE 21: Degraded riparian strip and lack of vegetation on floodplain				**ACTION:** Improve riparian strip on true left bank with planting; plant low valley sides and terraces on true right bank of meander bends			**Unique ID:** Bla_VP_14, Bla_VP_15, Bla_VP_16
Site information	Description	West Saline Farm		**Cost estimate**	Estimate (£k)	23.4	
	OS NGR	298306E 694189N to 297594E 694191N			Assumptions	Includes plants, labour and clearance costs. Riparian strip width (Bla_VP_14) – 10m, planting valley sides (Bla_VP_15 & Bla_VP_16) – 50m width.	
	Photo reference	Appendix B – photos 76 to 79		**Further considerations**	Funding mechanism / opportunities	**Fund name**	**Applicability**
	Site access	Via farm track / farmland				Scotland Rural Development Fund – Challenge Funds	✗
	Reach length (m)	785 (total length); Bla_VP_15 & Bla_VP_16 combined length = 285m				Scotland Rural Development Fund – Rural Development Contracts – Land Manager Options	✓
Pressure	Pressures to be addressed through regulatory means	• Rural diffuse source pollution (mixed farming) • Point source pollution (sewage disposal)				Scotland Rural Development Fund – Rural Priorities – Forth Area	✓
	IHN	None – gap in network (neutral grassland area downstream of site)				Scottish Natural Heritage – Natural Project Grants	✗
	JBA ID	N/A				Scottish Natural Heritage – Community Grants	✓
	Associated data sources	• Fully within fluvial 200 year • Groundwater flood hazard area in the downstream section of the reach				Scottish Natural Heritage – Central Scotland Green Network	✓
Habitat	Type of existing habitat	Improved grassland above the break of slope on both banks with some semi-improved on the right bank at the upstream end. Below the braes there is native broadleaved woodland.				SEPA Scottish restoration fund	✓
	Extent of existing habitat	Full length of sub-reach				Land developer (ie. of surrounding area)	✗
	Quality of existing habitat	Poor (fields), good (woodland)				Other: • The Naturesave Trust • The Ibrahim Foundation • The Steel Charitable Trust	✓ ✓ ✓
	Sensitivity of existing habitat to land use / habitat change	Low (fields), high (woodland)					
	Indicative species mix for restoration	Alder, ash, oak, great woodrush, bluebell (local provenance)					
	Establishment techniques required	Direct planting					
Benefits	Barrier to restoration?	✗			Other surveys required	**Survey Type**	**Required**
	Capacity released – contribution to obtaining GES	None – capacity not assessed				Ecological habitat survey	✗
	Flood risk benefit?	✓	Planting will increase floodplain and riparian roughness, reducing flood flow velocities. Reduce rate of runoff from farmland			Hydrological survey	✗
	Public access (existing or can connect to?)	✓	No public access to land and no core path in vicinity. Potential opportunity to create access to waterway connecting to the core path to the south east.			Ground investigation	✗
	Multiple WFD benefits	**Potential benefit**				Topographical survey	✗
		Opportunity to expand green/ecological network	✓			Water quality monitoring	✗
		Help achieve good ecological status	✓		Construction / restoration costs	Methods – Access required	N/A
		Contribute to addressing flood risk	✓			Methods – Machinery required	N/A
		Reduce invasive non-native species	✗			Methods – Mitigation measures	N/A
		Climate change adaptation	✓			Timing	• Ideally between November and February • Avoid frost and snow where possible
		Raise awareness of the benefits of healthy water environments	✓			Logistics	
	Wider environmental benefits	Improvements to riparian and floodplain habitat quality; opportunity to connect to downstream neutral grassland habitat	✓		CAR licensing required	N/A	
Ownership	Suggested action owner	Landowner - farmer					
	Land owner	Private - farmer					

ISSUE 22: Diffuse sediment along reach – downstream of open cast works. High fine sediment load and sediment deposition along reach; point sediment input				**ACTION:** Investigate and control sources of point and diffuse pollution inputs			**Unique ID:** Bla_DSC_1, Bla_PSC_5
Site information	Description	Farmland – Piperpool Moss, through Parklands Muir and Gartgreenie		**Cost estimate**	Estimate (£k)	Requires further assessment. Initial investigation costs = £1.2k. Further costs will be provided after investigation.	
	OS NGR	297471E 694176N to 296004E 693765N – Bla_DSC_1 297267E 693746N – Bla_PSC_4			Assumptions	Two day site investigation – 2 people (1 senior, 1 site agent)	
	Photo reference	Appendix B – photos 80 to 87					
	Site access	Via farm track / farmland to the south or via opencast mine to the north					
	Reach length (m)	2160					
Pressure	Pressures to be addressed through regulatory means	• Rural diffuse source pollution (mixed farming) • Point source pollution (sewage disposal)					
	IHN	Fen, marsh and swamp					
	JBA ID	23_4403_RuralDP_FMS_301659_694309					
	Associated data sources	• Fully within fluvial 200 year • Most of reach is within groundwater flood hazard area in the downstream section of the reach • Downstream section of reach is in planned development area • Nearest core path is south of the downstream section of the reach in Gartgreenie Wood					
Habitat	Type of existing habitat	Neutral grassland (right bank) and improved grassland (left bank) with a narrow line of alder and willow trees along the riverbank.					
	Extent of existing habitat	Full length of sub-reach					
	Quality of existing habitat	Poor					
	Sensitivity of existing habitat to land use / habitat change	Low					
	Indicative species mix for restoration	Not applicable					
	Establishment techniques required	Not applicable					
Benefits	Barrier to restoration?	✓	Possibly – planned development to the south of the downstream end of the reach.	**Further considerations**			
	Capacity released – contribution to obtaining GES	None – capacity not assessed. No information on capacity released through improvements to point and diffuse source pollution.					
	Flood risk benefit?	×					
	Public access (existing or can connect to?)	✓	No public access to land. Nearest core path is to the south of the burn. Potential opportunity to improve access to the waterway connecting to the core path to the south east.				
	Multiple WFD benefits	**Potential benefit**					
		Opportunity to expand green/ecological network	×				
		Help achieve good ecological status	✓				
		Contribute to addressing flood risk	×				
		Reduce invasive non-native species	×				
		Climate change adaptation	×				
		Raise awareness of the benefits of healthy water environments	✓				
	Wider environmental benefits	Improve local fen, marsh and swamp habitat quality; improvements to farm practices	✓				
Ownership	Suggested action owner	Opencast mine owner					
	Land owner	Private – farmer (to the south of the burn); private – open cast mine (to the north)					

Funding mechanism / opportunities	**Fund name**			**Applicability**
	Scotland Rural Development Fund	Challenge Funds		×
		Rural Development Contracts – Land Manager Options		✓
		Rural Priorities – Forth Area		✓
	Scottish Natural Heritage	Natural Project Grants		×
		Community Grants		✓
		Central Scotland Green Network		✓
	SEPA Scottish restoration fund			✓
	Land developer (ie. of surrounding area)			✓
	Other: • The Naturesave Trust • The Woodward Charitable Trust • The Steel Charitable Trust			✓ ✓ ✓
Other surveys required	**Survey Type**			**Required**
	Ecological habitat survey			×
	Hydrological survey			×
	Ground investigation			✓
	Topographical survey			×
	Water quality monitoring			✓
Construction / restoration costs	Methods	Access required	N/A	
		Machinery required	N/A	
		Mitigation measures	N/A	
	Timing	N/A		
	Logistics	Will potentially require ongoing liaison with landowner and monitoring of waterway / discharge.		
CAR licensing required	N/A			

ISSUE 23: Cutoff channel in two locations; illegally dumped rubbish		**ACTION:** Reconnect paleo channel; remove illegal dumped debris				**Unique ID:** Bla_ChRc_2, Bla_ChRc_3, Bla_DRe_2		
Site information	Description	Farmland – Piperpool Moss		**Cost estimate**	Estimate (£k)	36.4		
	OS NGR	297260E 693715N – Bla_ChRc_2 297151E 693664N – Bla_ChRc_3			Assumptions	Will require further investigation to provide more detailed cost. Includes costs for hydrological model (£4k) and topographic al survey (£3k) and three days site investigation.		
	Photo reference	Appendix B – photos 79 and 80				**Fund name**		**Applicability**
	Site access	Via farm track / farmland				Scotland Rural Development Fund	Challenge Funds	✖
Pressure	Pressures to be addressed through regulatory means	• Rural diffuse source pollution (mixed farming) • Point source pollution (sewage disposal)					Rural Development Contracts – Land Manager Options	✓
	IHN	Fen, marsh and swamp					Rural Priorities – Forth Area	✓
	JBA ID	23_4403_RuralDP_FMS_301659_694309				Scottish Natural Heritage	Natural Project Grants	✖
	Associated data sources	• Fully within fluvial 200 year • Most of reach is within groundwater flood hazard area in the downstream section of the reach					Community Grants	✖
Habitat	Type of existing habitat	Improved grassland (left bank) and unimproved neutral grassland (right bank). Very narrow line of alder trees on the edge of the watercourse.			Funding mechanism / opportunities		Central Scotland Green Network	✓
	Extent of existing habitat	Full length of sub-reach				SEPA Scottish restoration fund		✓
	Quality of existing habitat	Poor				Land developer (ie. of surrounding area)		✓
	Sensitivity of existing habitat to land use / habitat change	Low				Other:		✖
	Indicative species mix for restoration	Alder, creeping bent, branched burr-reed						
	Establishment techniques required	Direct planting and seeding						
Benefits	Barrier to restoration?	✓		**Further considerations**		**Survey Type**		**Required**
	Capacity released – contribution to obtaining GES	Will release some capacity – need to reassess in Mimas			Other surveys required	Ecological habitat survey		✖
	Flood risk benefit?	✓	Will improve floodplain connectivity allowing natural flood flow processes to occur			Hydrological survey		✓
	Public access (existing or can connect to?)	✓	No public access to land and no core path in vicinity. Potential opportunity to create access to waterway connecting to the core path to the south east.			Ground investigation		✓
	Multiple WFD benefits	**Potential benefit**				Topographical survey		✓
		Opportunity to expand green/ecological network	✖			Water quality monitoring		✖
		Help achieve good ecological status	✓		Construction / restoration costs	Methods	Access required ✓	Site is at least 1km from nearest road
		Contribute to addressing flood risk	✓				Machinery required ✓	
		Reduce invasive non-native species	✖				Mitigation measures ✓	Sediment control measures to minimise sediment disturbance and movement during restoration
		Climate change adaptation	✖			Timing	To be carried out during low flow periods	
		Raise awareness of the benefits of healthy water environments	✓			Logistics	Arrange temporary access with farmer	
	Wider environmental benefits	Improvements to main and tributary channel morphology	✓		CAR licensing required	Registration	Simple licence ✓	Complex licence
Ownership	Suggested action owner	SEPA				Realignment for rivers ≤ 3m wide		
	Land owner	Private - farmer						

ISSUE 24: Poor channel morphology				**ACTION: :** Introduce large woody debris to encourage naturalisation and sinuosity		**Unique ID:** Bla_LWD_1	
Site information	Description	Farmland –through Parklands Muir and Gartgreenie		**Cost estimate**	Estimate (£k)	2.2	
	OS NGR	296672E 693455N to 296144E 693605N			Assumptions	Includes 3 days site work for 2 people.	
	Photo reference	Appendix B – photos 85 to 87		**Further considerations**	Funding mechanism / opportunities	**Fund name**	**Applicability**
	Site access	Via farm track / farmland				Scotland Rural Development Fund – Challenge Funds	✖
	Reach length (m)	710				Scotland Rural Development Fund – Rural Development Contracts – Land Manager Options	✓
Pressure	Pressures to be addressed through regulatory means	• Rural diffuse source pollution (mixed farming) • Point source pollution (sewage disposal)				Scotland Rural Development Fund – Rural Priorities – Forth Area	✓
	IHN	Fen, marsh and swamp				Scottish Natural Heritage – Natural Project Grants	✖
	JBA ID	23_4403_RuralDP_FMS_301659_694309				Scottish Natural Heritage – Community Grants	✖
	Associated data sources	• Fully within fluvial 200 year • Partially within groundwater flood hazard area • Planned development area to the south of the burn • Nearest core path is south of the downstream section of the reach in Gartgreenie Wood				Scottish Natural Heritage – Central Scotland Green Network	✓
Habitat	Type of existing habitat	Wet grassland on both banks				SEPA Scottish restoration fund	✓
	Extent of existing habitat	Full length of sub-reach				Land developer (ie. of surrounding area)	✓
	Quality of existing habitat	Medium				Other: • The Naturesave Trust • The Ibrahim Foundation • The Steel Charitable Trust	✓ ✓ ✓
	Sensitivity of existing habitat to land use / habitat change	Moderate					
	Indicative species mix for restoration	Not applicable					
	Establishment techniques required	Not applicable					
Benefits	Barrier to restoration?	✓	Possibly – planned development to the south of the downstream end of the reach.		Other surveys required	**Survey Type**	**Required**
	Capacity released – contribution to obtaining GES	None – capacity not assessed				Ecological habitat survey	✖
	Flood risk benefit?	✖				Hydrological survey	✖
	Public access (existing or can connect to?)	✓	No public access to land. Nearest core path is to the south of the burn. Potential opportunity to improve access to the waterway.			Ground investigation	✖
	Multiple WFD benefits	**Potential benefit**				Topographical survey	✖
		Opportunity to expand green/ecological network	✖			Water quality monitoring	✖
		Help achieve good ecological status	✓		Construction / restoration costs	Methods – Access required	✓
		Contribute to addressing flood risk	✖			Methods – Machinery required	N/A
		Reduce invasive non-native species	✖			Methods – Mitigation measures	N/A
		Climate change adaptation	✖			Timing	Works to be carried out during low flow periods
		Raise awareness of the benefits of healthy water environments	✓			Logistics	N/A
	Wider environmental benefits	Improvements to channel hydromorphology	✓		CAR licensing required	Registration ☐ Simple licence ✓ Complex licence ☐	
Ownership	Suggested action owner	Landowner				In-stream structures in rivers ≤ 3m wide	
	Land owner	Private – farmer					

ISSUE 25: Piecemeal low flood banks which cut off paleo features restricting floodplain connectivity				**ACTION:** Remove flood banks to improve floodplain connectivity			**Unique ID:** Bla_FBR_1
Site information	Description	Farmland – Piperpool Moss		**Cost estimate**	Estimate (£k)	316	
	OS NGR	297181E 693659N			Assumptions	100% of material disposed of offsite. Includes supervision time for site engineer. Includes hydrological model (£3k), topographical survey (£2k) and ecological survey (£2k). Assume flood wall dimensions of 3m height and 3m width.	
	Photo reference	Appendix B – photos 82 to 84		**Further considerations**	Funding mechanism / opportunities	**Fund name**	**Applicability**
	Site access	Via farm track / farmland				Scotland Rural Development Fund – Challenge Funds	×
	Reach length (m)	630				Scotland Rural Development Fund – Rural Development Contracts – Land Manager Options	✓
Pressure	Pressures to be addressed through regulatory means	• Rural diffuse source pollution (mixed farming) • Point source pollution (sewage disposal)				Scotland Rural Development Fund – Rural Priorities – Forth Area	✓
	IHN	Fen, marsh and swamp				Scottish Natural Heritage – Natural Project Grants	×
	JBA ID	23_4403_RuralDP_FMS_301659_694309				Scottish Natural Heritage – Community Grants	×
	Associated data sources	• Fully within fluvial 200 year • Within groundwater flood hazard area in the downstream section of the reach • Adjacent to planned development area (south west of the reach)				Scottish Natural Heritage – Central Scotland Green Network	✓
Habitat	Type of existing habitat	Semi-improved neutral grassland (left bank) and unimproved neutral grassland on the right bank. Very narrow riparian strip of trees on bankside.				SEPA Scottish restoration fund	✓
	Extent of existing habitat	Full length of sub-reach				Land developer (ie. of surrounding area)	×
	Quality of existing habitat	Medium				Other:	×
	Sensitivity of existing habitat to land use / habitat change	Moderate			Other surveys required	**Survey Type**	**Required**
	Indicative species mix for restoration	Alder, crack willow, creeping bent, yellow flag iris				Ecological habitat survey	✓
	Establishment techniques required	Direct planting and seeding				Hydrological survey	✓
Benefits	Barrier to restoration?	×				Ground investigation	✓
	Capacity released – contribution to obtaining GES	Will release some capacity – need to reassess in Mimas				Topographical survey	✓
	Flood risk benefit?	✓	Increase in floodplain connectivity; reduce water backing up through area and lower risk of upstream flooding. Removal of material will increase storage capacity of floodplain but may increase flood risk of surrounding farmland.			Water quality monitoring	×
	Public access (existing or can connect to?)	✓	No public access to land and no core path in vicinity. Potential opportunity to create access to waterway connecting to the core path to the south east.		Construction / restoration costs	Methods – Access required: ✓	
	Multiple WFD benefits	**Potential benefit**				Methods – Machinery required: ✓ – Machinery to be stored out of the floodplain	
		Opportunity to expand green/ecological network	×			Methods – Mitigation measures: ✓ – • Sediment control to minimise sediment disturbance and movement downstream • Machinery to be kept out of the watercourse	
		Help achieve good ecological status	✓			Timing	To be carried out during low flow periods
		Contribute to addressing flood risk	✓			Logistics	N/A
		Reduce invasive non-native species	×		CAR licensing required	Registration: ☐ Simple licence: ✓ Complex licence: ☐	
		Climate change adaptation	×			All set-back embankments and set-back floodwalls	
		Raise awareness of the benefits of healthy water environments	✓				
	Wider environmental benefits	Reconnection of floodplain allowing floodplain processes and habitats to regenerate; enhancement of local fen, marsh and swamp habitat	✓				
Ownership	Suggested action owner	SEPA? / landowner					
	Land owner	Private – farmer (to the south of the burn); private - open cast mine (to the north)					

ISSUE 26: Engineered tributary to the Black Devon lined with flood banks and flood walls with poor channel morphology and poor riparian strip				**ACTION:** Remove flood banks and flood walls; improve riparian strip with planting on both sides of the burn.				**Unique ID:** Bla_FBR_2, Bla_FBR_3, Bla_VP_17
Site information	Description	Farmland – Piperpool plantation		**Cost estimate**	Estimate (£k) floodwall removal	430	Estimate (£k) planting	12.7
	OS NGR	296984E 693090N to 296704E 693440N			Assumptions	100% of material disposed of offsite. Includes supervision time for site engineer. Includes hydrological model (£3k) and topographical survey (£2k). Flood wall removal and planting to be done on both sides of the burn. Assume planting width of 10m.		
	Photo reference	Appendix B – photo 83		**Further considerations**	Funding mechanism / opportunities	**Fund name**		**Applicability**
	Site access	Via road upstream of the reach				Scotland Rural Development Fund	Challenge Funds	×
	Reach length (m)	450					Rural Development Contracts – Land Manager Options	✓
Pressure	Pressures to be addressed through regulatory means	• Rural diffuse source pollution (mixed farming) • Point source pollution (sewage disposal)					Rural Priorities – Forth Area	✓
	IHN	Fen, marsh and swamp				Scottish Natural Heritage	Natural Project Grants	×
	JBA ID	23_4403_RuralDP_FMS_301659_694309					Community Grants	✓
	Associated data sources	• Partially within fluvial 200 year (downstream section of reach) • Within groundwater flood hazard area at the downstream section of the reach • Adjacent to planned development area (west of the reach)					Central Scotland Green Network	✓
Habitat	Type of existing habitat	Wet grassland on both sides with (downy) birch woodland near the right bank of tributary burn.				SEPA Scottish restoration fund		✓
	Extent of existing habitat	Full length from road to Black Devon				Land developer (ie. of surrounding area)		×
	Quality of existing habitat	Medium				Other: • The Naturesave Trust • The Ibrahim Foundation • The Steel Charitable Trust		✓ ✓ ✓
	Sensitivity of existing habitat to land use / habitat change	Moderate			Other surveys required	**Survey Type**		**Required**
	Indicative species mix for restoration	Creeping bent, alder, yellow flag, sharp-flowered rush, water cress				Ecological habitat survey		×
	Establishment techniques required	Direct planting and seeding				Hydrological survey		✓
	Barrier to restoration?	✓	Planned development to the west of the burn.			Ground investigation		✓
	Capacity released – contribution to obtaining GES	None - capacity not assessed				Topographical survey		✓
	Flood risk benefit?	✓	Increase floodplain connectivity; reduce water backing up through area and lower risk of upstream flooding. However, may increase flood risk to adjacent farmland.			Water quality monitoring		×
	Public access (existing or can connect to?)	✓	No public access to land and no core path in vicinity. Potential opportunity to create access to waterway connecting to the core path to the south east.		Construction / restoration costs	Methods	Access required	✓
Benefits	Multiple WFD benefits	**Potential benefit**					Machinery required	✓
		Opportunity to expand green/ecological network	✓				Mitigation measures	✓
		Help achieve good ecological status	✓			Timing	To be carried out during low flow periods	
		Contribute to addressing flood risk	✓			Logistics	N/A	
		Reduce invasive non-native species	×		CAR licensing required	Registration	Simple licence ✓	Complex licence
		Climate change adaptation	✓			All set-back embankments and set-back floodwalls		
		Raise awareness of the benefits of healthy water environments	✓					
	Wider environmental benefits	Reconnection of floodplain allowing floodplain processes and habitats to regenerate; enhancement of local fen, marsh and swamp habitat	✓					
Ownership	Suggested action owner	Landowner / SEPA						
	Land owner	Private - farmer						

ISSUE 27: Ponding in section of reach which may be due to local factors such as large woody debris and fine sediment buildup				**ACTION:** Further investigation to determine cause of ponding				**Unique ID:** Bla_FIP_1
Site information	Description	Downstream reaches		**Cost estimate**	Estimate (£k)	Requires further assessment, but initially a one day site investigation will be required (£590)		
	OS NGR	296655E 693453N to 295980E 693774N			Assumptions	1 day site investigation – 2 people (1 senior, 1 site agent)		
	Photo reference	Appendix B – photos 85 to 87		**Further considerations**	Funding mechanism / opportunities	**Fund name**		**Applicability**
	Site access	Via surround farmland / farm track				Scotland Rural Development Fund	Challenge Funds	×
	Reach length (m)	970					Rural Development Contracts – Land Manager Options	✓
Pressure	Pressures to be addressed through regulatory means	• Rural diffuse source pollution (mixed farming) • Point source pollution (sewage disposal)					Rural Priorities – Forth Area	✓
	IHN	Fen, marsh and swamp				Scottish Natural Heritage	Natural Project Grants	×
	JBA ID	23_4403_RuralDP_FMS_301659_694309					Community Grants	×
	Associated data sources	• Fully within fluvial 200 year • Partially within groundwater flood hazard area at the downstream section of the reach • Adjacent to planned development area (south of the reach)					Central Scotland Green Network	✓
Habitat	Type of existing habitat	Wet grassland on both banks				SEPA Scottish restoration fund		✓
	Extent of existing habitat	Full length of proposed investigations				Land developer (ie. of surrounding area)		✓
	Quality of existing habitat	Good				Other:		×
	Sensitivity of existing habitat to land use / habitat change	Moderate						
	Indicative species mix for restoration	Not applicable						
	Establishment techniques required	Not applicable						
Benefits	Barrier to restoration?	×			Other surveys required	**Survey Type**		**Required**
	Capacity released – contribution to obtaining GES	None – capacity not assessed				Ecological habitat survey		×
	Flood risk benefit?	✓	Resolving ponding issue will lower baseline water levels, reducing flood depths			Hydrological survey		✓
	Public access (existing or can connect to?)	✓	No public access to land and no core path in vicinity. Potential opportunity to create access to waterway connecting to the core path to the south west.			Ground investigation		✓
	Multiple WFD benefits	**Potential benefit**				Topographical survey		×
		Opportunity to expand green/ecological network	×			Water quality monitoring		×
		Help achieve good ecological status	✓		Construction / restoration costs	Methods	Access required	N/A
		Contribute to addressing flood risk	×				Machinery required	N/A
		Reduce invasive non-native species	×				Mitigation measures	N/A
		Climate change adaptation	×			Timing	Investigation to be carried out during low flow periods.	
		Raise awareness of the benefits of healthy water environments	✓			Logistics	N/A	
	Wider environmental benefits	Improved flow conveyance and local hydromorphic diversity	✓		CAR licensing required	N/A		
Ownership	Suggested action owner	Landowner - farmer						
	Land owner	Private - farmer						

ISSUE 28: Cutoff channel				**ACTION:** Reconnect paleo channel			**Unique ID:** Bla_ChRc_4
Site information	Description	Farmland – Gartgreenie		**Cost estimate**	Estimate (£k)	3.4	
	OS NGR	296155E 693635N			Assumptions	Will require further investigation to provide more detailed cost. Includes costs for hydrological model (£3k) and topographic al survey (£2k) and three days site investigation.	
	Photo reference	None		**Further considerations**	Funding mechanism / opportunities	**Fund name**	**Applicability**
	Site access	Via road upstream of the reach				Scotland Rural Development Fund – Challenge Funds	×
Pressure	Pressures to be addressed through regulatory means	• Rural diffuse source pollution (mixed farming) • Point source pollution (sewage disposal)				Scotland Rural Development Fund – Rural Development Contracts – Land Manager Options	✓
	IHN	Fen, marsh and swamp				Scotland Rural Development Fund – Rural Priorities – Forth Area	✓
	JBA ID	23_4403_RuralDP_FMS_301659_694309				Scottish Natural Heritage – Natural Project Grants	×
	Associated data sources	• Fully within fluvial 200 year • Within groundwater flood hazard area • Adjacent to planned development area				Scottish Natural Heritage – Community Grants	✓
Habitat	Type of existing habitat	Wet grassland on both banks				Scottish Natural Heritage – Central Scotland Green Network	✓
	Extent of existing habitat	Full length of river feature				SEPA Scottish restoration fund	✓
	Quality of existing habitat	Good				Land developer (ie. of surrounding area)	✓
	Sensitivity of existing habitat to land use / habitat change	Moderate				Other:	×
	Indicative species mix for restoration	Yellow flag iris, alder, crack willow, creeping bent					
	Establishment techniques required	Direct planting and seeding					
Benefits	Barrier to restoration?	×			Other surveys required	**Survey Type**	**Required**
	Capacity released – contribution to obtaining GES	None – capacity not assessed				Ecological habitat survey	×
	Flood risk benefit?	✓	Will improve floodplain connectivity allowing natural flood flow processes to occur			Hydrological survey	✓
	Public access (existing or can connect to?)	✓	No public access to land and no core path in vicinity. Potential opportunity to create access to waterway connecting to the core path to the south west.			Ground investigation	✓
	Multiple WFD benefits	**Potential benefit**				Topographical survey	✓
		Opportunity to expand green/ecological network	×			Water quality monitoring	×
		Help achieve good ecological status	✓		Construction / restoration costs	Methods – Access required	✓
		Contribute to addressing flood risk	✓			Methods – Machinery required	✓
		Reduce invasive non-native species	×			Methods – Mitigation measures	✓ Sediment control measures to minimise sediment disturbance and movement during restoration
		Climate change adaptation	×			Timing	To be carried out during low flow periods
		Raise awareness of the benefits of healthy water environments	✓			Logistics	N/A
	Wider environmental benefits	Improvements to main and tributary channel morphology	✓		CAR licensing required	Registration	Simple licence ✓ Complex licence
Ownership	Suggested action owner	Landowner - farmer				Realignment for rivers ≤ 3m wide	
	Land owner	Private – farmer					

D Methodology for calculation of costs of proposed restoration measures

Cost estimates for restoration options are difficult to define at the outline stage due to uncertainty regarding the choice and phasing of the proposed options, the volumes of material and sediment involved and other aspects such as access, local contractor rates and planting costs.

Indicative costs have been built up using a range of cost information available from research reports, guidance documents, unit costs and price indices documents (e.g. SPONs[1]). Costs for these options are generic and should be considered to be indicative at this stage before more detailed operations are defined.

A spreadsheet provided by Natural England[2] for use in other restoration works has been used as a baseline tool to build up costs for each of the options assessed[3]. This has been used for a number of restoration studies by the Environment Agency and Natural England.

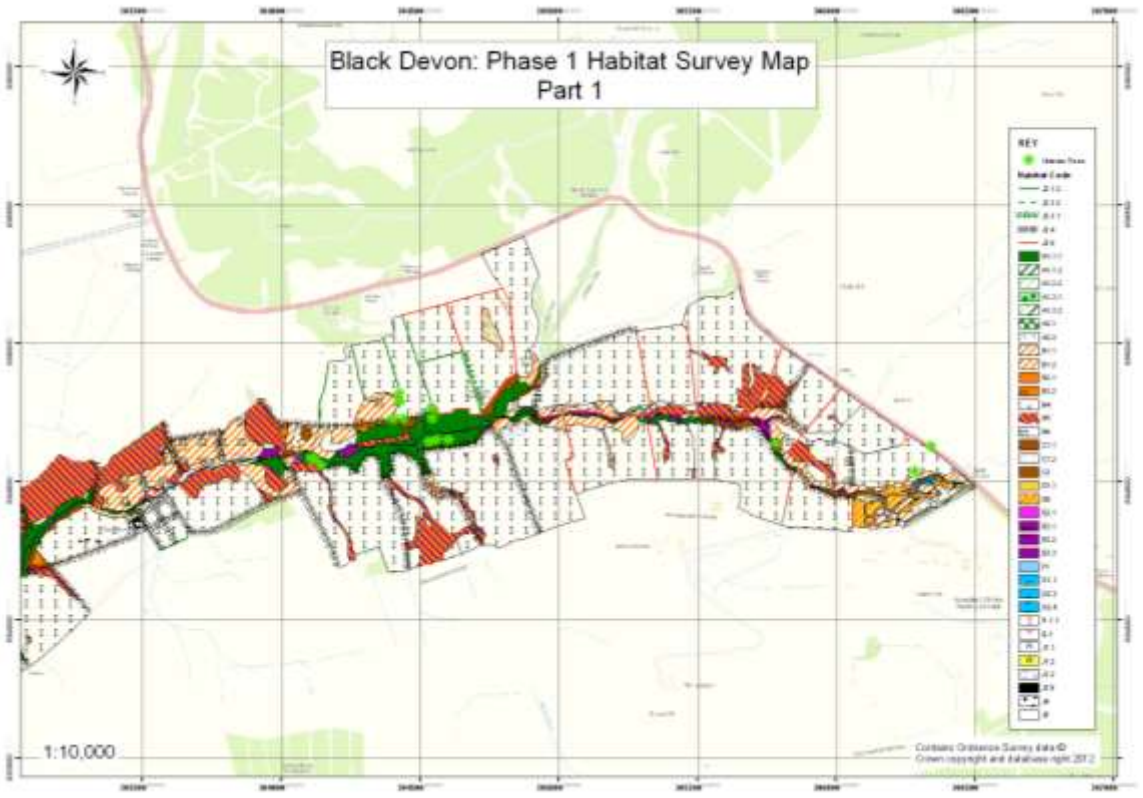
The following general assumptions to all options apply:

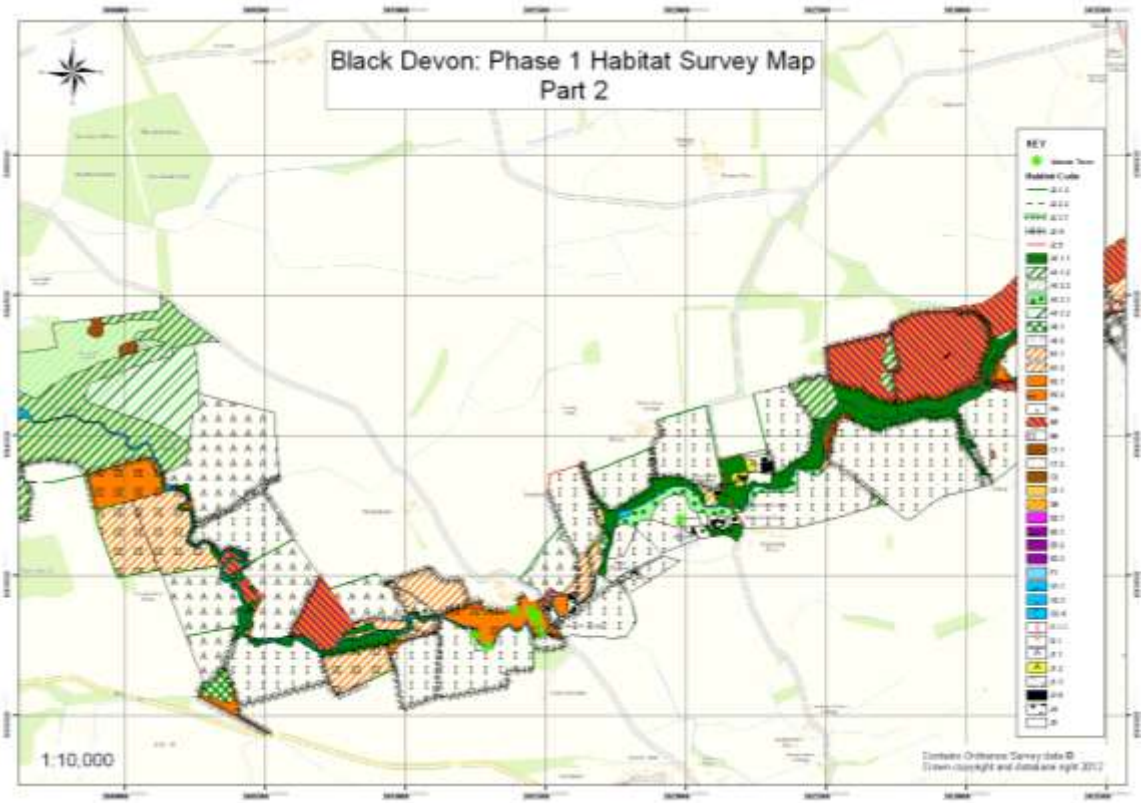
- Capital costs have been assumed. Long term maintenance costs have not been calculated, but are assumed to be minimal. Some additional maintenance or monitoring costs may also be applicable but have not been determined at this stage.
- An optimism bias of 60% has been used. This is appropriate at this level of study due to the uncertainties involved and the inherent systematic tendency to be over-optimistic about key project parameters. At detailed design stage it is common practice to develop a risk register and this will enable the reduction of the optimism bias[4].
- No land purchase costs have been assumed. If land purchase is required, the costs for this could be significant.
- Contractor management costs have been assumed based on the following typical assumptions (see cost breakdown for actual costs assumed).
- Planting personnel (@ £80 per day)
- Site agent (@ £240 per day)
- Site engineer (@ £350 per day)
- No costs for stakeholder consultation and negotiation have been included at this time.
- There are no costs included for the possible construction of new access tracks.

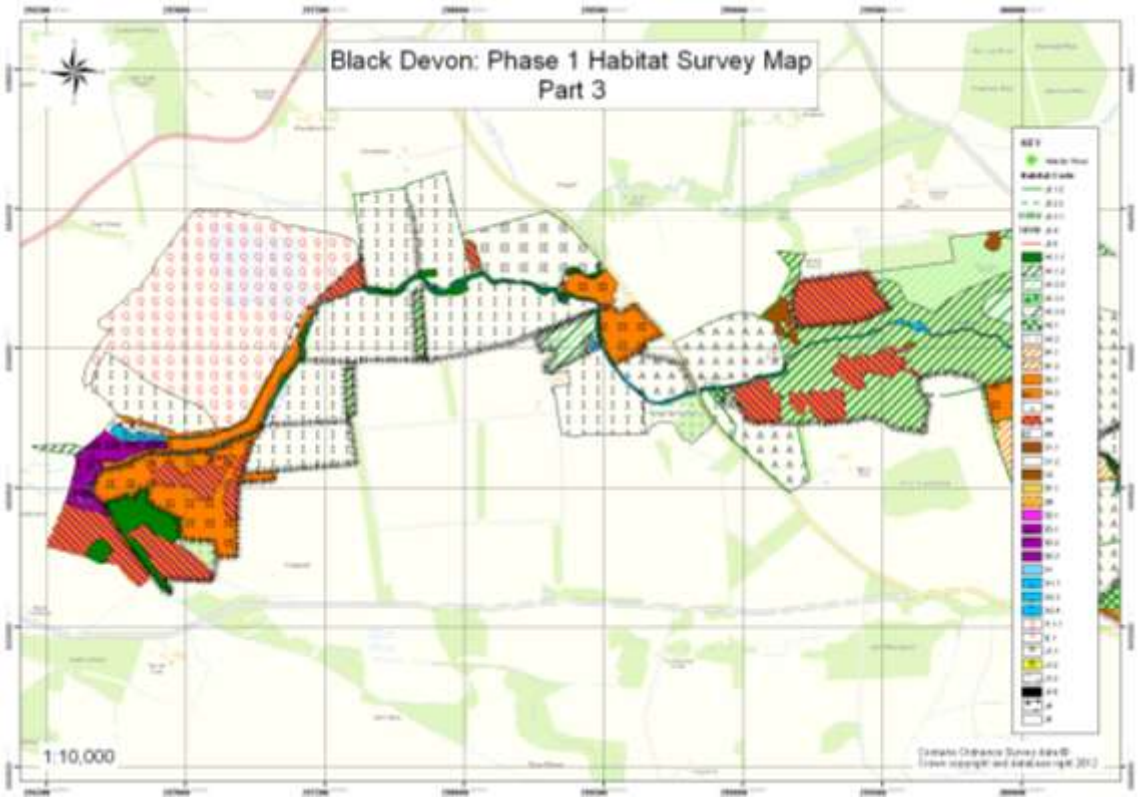
All other assumptions relating to specific calculations for individual proposed restoration measures are included in the explanation tables for each measure.

[1] SPON'S Civil Engineering and Highway Works Price Book, 2008
[2] 'EA River Restoration project spreadsheet', Natural England, 2008
[3] This spreadsheet was used for the 'Estimating costs of delivering the river restoration element of the SSSI PSA target', Final Report January 2008 (Environment Agency).

E Phase 1 habitat mapping






Black Devon: Phase 1 Habitat Survey Map
Part 3
1:10,000

F Options assessment: multi-criteria analysis

INDICATOR AND RATING DESCRIPTIONS

Feature	Indicator	Description	Rating			Weighting of indicator
			Positive	Neutral	Low	
Area / length	Length of reach	What is the length of reach that the measure will improve?	> 1km	200m - 1km	<200m	Secondary
Flood risk	Flood risk reduction	Will the measure reduce or increase flood risk? Consider no. of properties affected, depth of flooding, velocities, frequency etc.	Reduction in flood risk	No change to flood risk	Increase in flood risk to adjacent land	Primary
Capacity	Release capacity	Does the measure release capacity to contribute to obtaining GES?	≥1%	<1%	None	Primary
Multiple benefits	Multiple benefits	Does the measure provide multiple benefits? Eg. Expand ecological network, achieve ecological status, address flood risk, reduce invasive species, climate change adaptation, raise public awareness	3 or more potential benefits	1 or 2 potential benefits	None of these potential benefits	Primary
Ecology / morphology	Habitat expansion / connection	Will action increase length of existing good habitat by linking or extending reaches of existing good quality habitat?	Links 2 or more good areas	Links one good area	No linkage of good quality habitat	Primary
	Biological status	Does the action contribute to improving biological status?	Strong improvement	Some improvement	No likely improvement	Secondary
	Chemical status	Does the action contribute to improving chemical status?	Strong improvement	Some improvement	No likely improvement	Secondary
	Broader ecological effects	Does the measure have potential wider ecological benefits or adverse effects? Eg. to local terrestrial or aquatic populations.	Strong improvement	Some improvement	No improvement; Deterioration	Secondary
	Invasive non-native species reduction	Will the action reduce non-native species populations	Long term eradication / removal over large area		No reduction or removal of species	Primary
Climate change	Climate change adaptation	Does the measure contribute to helping adapt to climate change?	Yes - does contribute to climate change adaptation		No - does not contribute to climate change adaptation	Primary
Socio - economic	Public awareness	Does the measure increase public awareness of the benefits of healthy waterways and environments?	Large contribution	Moderate contribution	Little or no contribution	Primary
	Recreation	Is the measure compatible with current recreation in the area? Does it increase public access to the waterway (core paths) or create other recreation opportunities?	Potential for new opportunity	No effect on current recreation access	Not compatible with current recreation in the area	Secondary
	Costs to landowner or business	Will the action result in long term or significant losses to businesses / adjacent landowners. Eg. reduced yield or land value	No long-term costs	Some long-term costs	Significant long-term costs	Primary
	Upstream or downstream effects?	Any adverse or positve effects on upstream or downstream parties. Eg. Flood risk, recreation, habitat, fisheries... Etc.	Positive upstream or downstream effects	No upstream or downstream effects	Potential adverse upstream or downstream effects	Secondary
	Physical barrier to restoration	Are there physical barriers that may restrict the implementation of the measure? Any historic features that may be protected?	No physical or historic barriers		Physical / historic barrier present	Primary
	Community / landowner support	Is there landowner / community support?	Known landowner / community support	Potentially favoured	Not supported by community or landowner	Secondary
	On-going management	Will the measure require on-going maintenance, monitoring or any other works?	Minimal on-going management	Small-scale management needed	Intensive or long-term management required	Secondary
	Cost of implementation	What is the estimated cost of the measure?	< £10k	≥ £10k < £50k	≥ £50k	Primary
	Funding	Likelihood of potential funding?	Potential funding highly likely	Some potential funding options	No funding possibilities	Secondary
	Construction / restoration impacts	Access impacts, environmental impacts, logistics, effects on surrounding residents	Little or no impacts during construction / restoration (impacts are able to be effectively managed)	Some impacts during construction / restoration (with mitigation)	Moderate to high impacts during constrution / restoration - impacts not able to be fully mitigated	Secondary

Values allocated for different factors

Rating	Value
Positive	1
Neutral	2
Low	3

* Lower scores indicate more favourable options
** Primary factors have been weighted by dividing values by 2

BLACK DEVON OPTIONS

Issue No	ID	Measure	Length of reach	Flood risk reduction	Capacity release	Multiple benefits	Habitat expansion / connection	Biological status	Chemical status	Broader ecological effects	Invasive non-native species	Climate change adaptation	Public awareness	Recreation	Costs to landowner or business	Upstream or downstream effects?	Physical barrier	Community / landowner support	On-going management	Cost of implementation	Funding	Construction / restoration impacts	Average score
1	Bla_PSC_1	Control point source sediment input	> 1km	Neutral	Unknown	Positive	Low	Positive	Positive	Neutral	Low	No	Positive	Neutral	Low	Positive	Not present	Unknown	Low	Unknown	Positive	Positive	1.42
2	Bla_NR_1	Natural regeneration and fencing	> 1km	Positive	Unknown	Positive	Positive	Positive	Neutral	Positive	Low	Yes	Positive	Neutral	Neutral	Positive	Not present	Unknown	Neutral	Neutral	Positive	Positive	1.54
3	Bla_IDS_1	Identify diffuse source	> 1km	Neutral	Unknown	Neutral	Low	Positive	Positive	Neutral	Low	No	Positive	Neutral	Low	Positive	Not present	Unknown	Low	Unknown	Positive	Unknown	1.38
4	Bla_VP_1	Plant low valley sides and terraces	> 1km	Positive	Unknown	Positive	Positive	Positive	Neutral	Positive	Low	Yes	Positive	Positive	Neutral	Positive	Not present	Unknown	Neutral	Low	Positive	Neutral	1.58
5	Bla_VP_2, Bla_VP_3	Plant low valley sides and terraces	<200m	Positive	Unknown	Positive	Positive	Positive	Neutral	Positive	Low	Yes	Positive	Positive	Neutral	Positive	Not present	Unknown	Neutral	Positive	Positive	Positive	1.73
6	Bla_StRe_1, Bla_StRe_2	Remove and allow natural erosion processes to occur	<200m	Positive	Unknown	Neutral	Low	Neutral	Low	Neutral	Low	No	Positive	Positive	Positive	Positive	Not present	Unknown	Positive	Neutral	Neutral	Low	1.71
7	Bla_PSC_2	Control point source input	> 1km	Neutral	Unknown	Neutral	Low	Positive	Positive	Neutral	Low	No	Low	Neutral	Low	Positive	Not present	Unknown	Low	Unknown	Neutral	Unknown	1.43
8	Bla_StRe_3	Remove walling	> 1km	Positive	Unknown	Positive	Low	Positive	Low	Neutral	Low	No	Neutral	Positive	Positive	Positive	Not present	Unknown	Positive	Low	Neutral	Low	1.50
9	Bla_RMC_1	Create riparian margin	200m - 1km	Positive	Unknown	Positive	Positive	Positive	Neutral	Positive	Low	No	Neutral	Positive	Neutral	Positive	Not present	Unknown	Neutral	Neutral	Positive	Positive	1.43
10	Bla_PSC_3	Control point source pollution input	> 1km	Neutral	Unknown	Neutral	Low	Positive	Positive	Neutral	Low	No	Neutral	Positive	Low	Positive	Not present	Unknown	Low	Unknown	Neutral	Unknown	1.32
11	Bla_VP_4	Plant low valley sides and terraces on true right bank	<200m	Positive	Unknown	Positive	Positive	Positive	Neutral	Positive	Low	Yes	Positive	Positive	Neutral	Positive	Not present	Unknown	Neutral	Positive	Positive	Positive	1.73
12	Bla_RMC_2	Create riparian margin	200m - 1km	Positive	Unknown	Positive	Positive	Positive	Neutral	Positive	Low	Yes	Positive	Positive	Neutral	Positive	Not present	Unknown	Neutral	Neutral	Positive	Positive	1.54
13	Bla_VP_5, Bla_VP_6, Bla_VP_7, Bla_VP_8	Plant low valley sides and terraces	200m - 1km	Positive	Unknown	Positive	Positive	Positive	Neutral	Positive	Low	Yes	Positive	Positive	Neutral	Positive	Not present	Unknown	Neutral	Neutral	Positive	Positive	1.54
14	Bla_VP_9	Improve riparian strip with planting	200m - 1km	Positive	Unknown	Positive	Positive	Positive	Neutral	Positive	Low	Yes	Positive	Positive	Neutral	Positive	Not present	Unknown	Neutral	Neutral	Positive	Positive	1.54
15	Bla_WRe_1	Remove weir	> 1km	Positive	Unknown	Positive	Positive	Positive	Low	Positive	Low	No	Positive	Positive	Positive	Positive	Not present	Unknown	Positive	Positive	Positive	Low	1.50
16	Bla_PFRe_1	Remove and replace plantation forestry	<200m	Neutral	Unknown	Positive	Positive	Positive	Neutral	Positive	Low	No	Positive	Positive	Positive	Positive	Not present	Unknown	Positive	Neutral	Neutral	Neutral	1.65
17	Bla_VP_10, Bla_VP_11	Improve riparian strip with planting, plant low valley sides and terraces	200m - 1km	Positive	Unknown	Positive	Positive	Positive	Neutral	Positive	Low	Yes	Positive	Positive	Neutral	Positive	Not present	Unknown	Neutral	Positive	Positive	Positive	1.64
18	Bla_VP_12, Bla_VP_13	Improve riparian strip with planting	200m - 1km	Positive	Unknown	Positive	Positive	Positive	Neutral	Positive	Low	Yes	Positive	Positive	Neutral	Positive	Not present	Unknown	Neutral	Neutral	Positive	Positive	1.54
19	Bla_ChRc_1, Bla_DRe_1	Reconnect meander of paleo channel; Remove illegally dumped materials	<200m	Neutral	Unknown	Positive	Low	Neutral	Low	Neutral	Low	No	Positive	Positive	Positive	Positive	Not present	Unknown	Neutral	Neutral	Positive	Low	1.71
20	Bla_PSC_4	Control point source pollution input	> 1km	Neutral	Unknown	Neutral	Low	Positive	Positive	Positive	Low	No	Positive	Positive	Low	Positive	Not present	Unknown	Low	Unknown	Positive	Unknown	1.23
21	Bla_VP_14, Bla_VP_15, Bla_VP_16	Improve riparian strip on true left bank with planting; plant low valley sides and terraces on true right bank of meander bends	> 1km	Positive	Unknown	Positive	Positive	Positive	Neutral	Positive	Low	Yes	Positive	Positive	Neutral	Positive	Not present	Unknown	Neutral	Neutral	Positive	Neutral	1.54
22	Bla_DSC_1, Bla_PSC_5	Investigate and control sources of point and diffuse pollution inputs	> 1km	Neutral	Unknown	Neutral	Low	Positive	Positive	Positive	Low	No	Positive	Positive	Low	Positive	Not present	Unknown	Low	Unknown	Positive	Unknown	1.23
23	Bla_LWD_1	Introduce large woody debris to encourage naturalisation and sinuosity	200m - 1km	Positive	Unknown	Neutral	Low	Positive	Neutral	Positive	Low	No	Positive	Positive	Positive	Positive	Not present	Unknown	Neutral	Positive	Positive	Low	1.58
24	Bla_ChRc_2, Bla_ChRc_3	Reconnect paleo channel	200m - 1km	Positive	Unknown	Positive	Low	Neutral	Low	Neutral	Low	No	Positive	Positive	Positive	Positive	Not present	Unknown	Positive	Neutral	Positive	Low	1.64
25	Bla_FBR_1	Remove flood banks to improve floodplain connectivity	200m - 1km	Positive	Unknown	Positive	Low	Neutral	Low	Neutral	Low	No	Positive	Positive	Low	Positive	Not present	Unknown	Positive	Low	Positive	Neutral	1.65
26	Bla_FBR_2, Bla_FBR_3, Bla_VP_17	Remove flood banks and flood walls; improve riparian strip with planting on both sides of the burn.	200m - 1km	Positive	Unknown	Positive	Positive	Positive	Neutral	Positive	Low	Yes	Positive	Positive	Low	Positive	Present	Unknown	Neutral	Low	Positive	Low	1.63
27	Bla_FIP_1	Further investigation to determine cause of ponding	> 1km	Positive	Unknown	Neutral	Low	Positive	Neutral	Positive	Low	No	Positive	Positive	Positive	Positive	Not present	Unknown	Neutral	Unknown	Positive	Neutral	1.50
28	Bla_ChRc_4	Reconnect paleo channel	200m - 1km	Positive	Unknown	Positive	Low	Neutral	Low	Neutral	Low	No	Positive	Positive	Positive	Positive	Not present	Unknown	Positive	Positive	Positive	Neutral	1.77

**Average score only averages values if greater than or equal to 1.
ie. If there are any unknowns this indicator will not be calculated in the average.

Lower scores = better
High/positve = 1
Med/neutral = 2
Low/negative = 3

Weighting for primary factors (divisor)
2

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