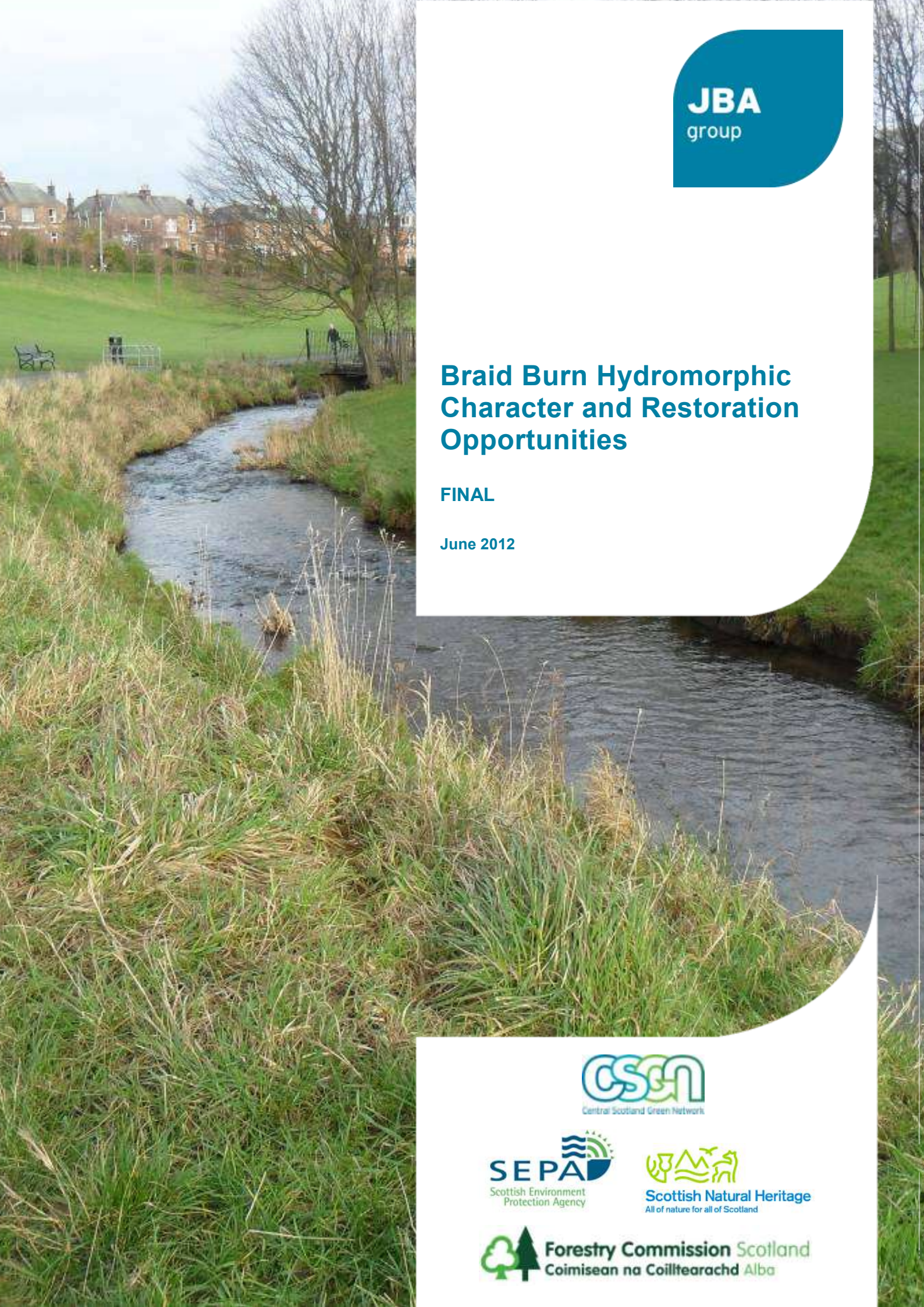


JBA group

Braid Burn Hydromorphic Character and Restoration Opportunities

FINAL

June 2012

Central Scotland Green Network

SEPA Scottish Environment Protection Agency

Scottish Natural Heritage
All of nature for all of Scotland

Forestry Commission Scotland
Coimisean na Coilltearachd Alba

JBA Project Manager

Caroline Anderton
Port Neuk
1 Longcraig Road
South Queensferry
Edinburgh
EH30 9TD

Revision History

Revision Ref / Date Issued	Amendments	Issued to
Draft - 27 February 2012		Emile Wadsworth & Steering Group Pdf copy
Draft - 17 May 2012	Inclusion of Task 2.2.4	Emile Wadsworth & Steering Group Pdf copy
Final - 28 June 2012	Adjustments after Steering Group comments	Emile Wadsworth & Steering Group Pdf copy

Contract

This report describes work commissioned by Emilie Wadsworth, on behalf of Central Scotland Green Network, by a letter dated 16 May 2011. Caroline Anderton, George Heritage, Thomas Crow and Kieran Sheehan of JBA Consulting carried out this work.

Prepared by ..... George Heritage BSc PhD
Head of Hydromorphology

Reviewed by ..... Kieran Sheehan BSc MSc PGCE MIEEM MIfL
Senior Ecologist

Reviewed by ..... Caroline Anderton BSc MSc CEnv CSci MCIWEM C.WEM
Principal Analyst

Purpose

This document has been prepared as a draft for CSGN. JBA Consulting accepts no responsibility or liability for any use that is made of this document other than by the Client for the purposes for which it was originally commissioned and prepared.

JBA Consulting has no liability regarding the use of this report except to CSGN.

Copyright

Carbon Footprint

A printed copy of the main text in this document will result in a carbon footprint of 313g if 100% post-consumer recycled paper is used and 399g if primary-source paper is used. These figures assume the report is printed in black and white on A4 paper and in duplex.

JBA is aiming to achieve carbon neutrality.

Contents

List of Figures

List of Tables

Abbreviations

JBA	JBA Consulting – Engineers & Scientists
SEPA	Scottish Environment Protection Agency
ID	Identifier
NGR	National Grid Reference
NR.....	Network Rail
OS.....	Ordnance Survey
OS NGR.....	Ordnance Survey National Grid Reference
RBMP.....	River Basin Management Plan
SEPA	Scottish Environment Protection Agency

This page is intentionally left blank

1 Braid Burn 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 has 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 Braid Burn, 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 Braid Burn (Upstream Dreghorn Barracks to Portobello) (water body ID: 3500) was classified as having an overall status of Bad ecological potential with medium confidence, with overall ecological status of Bad and a Physico-Chem status of High. In 2008, SEPA set the overall environmental objectives for the 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	Bad ecological potential	Bad	Bad	Good

The pressures on the water body are point source pollution (sewage disposal), diffuse source pollution (sewage) morphological alterations (construction / structures - flood walls), morphological pressure (multiple pressures) and morphological pressure (single pressure).

There is a total capacity of 65.52 % taken up by the morphological pressures on the Braid Burn with 61.56 % of these being on this particular study reach.

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	Bad Ecological Potential
Pre-HMWB status	Bad
Overall Ecology	Bad
Hydromorphology	Bad
Hydrology	High
Morphology	Bad

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

1.3 General character of Braid Burn

The Braid Burn was subject to walkover survey in January 2012 from the Edinburgh Bypass (A72) through Dreghorn, Colinton Mains, the Braid Burn Valley, the Hermitage of Braid, West Mains, Peffermill and Duddingston (Figure 1-1).

Figure 1-1: The Braid Burn hydromorphology survey limits

The character of the river and the surrounding land use varied considerably along the length of the surveyed watercourse, although it was mainly urban in character, with no farming land use anywhere along the surveyed reaches.

The upper part of the burn is steep and flows through ancient woodlands which are now used as a public park. From here the burn enters the city proper and flows between houses and through a number of other parks before leaving the surveyed reaches under the A1 (Milton Road) in Prestonfield. . The reaches surveyed are described below working downstream from the A720 to Prestonfield.

1.3.1 The upper burn between the A720 (Edinburgh Bypass) and Redford Road

The survey began where the Braid Burn flows from the Pentland Hills, where it rises, under the A720 and into the city of Edinburgh. The upper reaches of the Braid Burn are characterised by a moderately steep single thread alluvial channel with a sandy-gravel bed with occasional cobbles (Figure 1-3). The river occupies a moderately confined wooded valley and exhibits only very limited floodplain and valley bottom sedimentary units. The woodlands along the burn are criss-crossed with paths and there are numerous bridges over the burn that are widely used, so much so that in places the ground is bare and/or poached (Figure 1-2). The woodlands are ancient and semi-natural in character and have a number common limes *Tilia platyphyllos* and yew trees *Taxus baccata*. The burn has large banks of water crowfoot *Ranunculus aquatilis agg*. within it and here and there patches of water cress *Rorippa nasturtium-aquaticum*. The ground flora is rich and damp with dryopterid ferns much in evidence as well as large patches of opposite-leaved golden saxifrage *Saxifraga oppositifolia*. The shrub layer contains some holly *Ilex aquifolium* but the main feature is the invasive rhododendron *Rhododendron ponticum* which is ubiquitous within the woodland.

Figure 1-2: Footbridge over the Braid Burn showing invasive Rhododendron ponticum

The floodplain is generally well connected to the main channel through the woodland, however, some higher units were noted. In-channel morphology is well developed and functional, consisting of pool - transverse bar - riffle units alternating with a plane bed channel. Cobble dominated rapids replace riffles where the gradient steepens. Woody debris is common along sections of the river. Occasional historic in-channel structures were seen some of which have been broken and left in situ (Figure 1-4). These are encouraging a diverse local hydromorphology. Elsewhere towards the upper reaches of the main burn sections of channel are fully lined (Figure 1-5).

Figure 1-3: General character of the upper Braid Burn

Figure 1-4: Broken weir on the upper Braid Burn

Figure 1-5: Lined reach of the upper Braid Burn

1.3.2 From Redford Road through Colinton Mains

The river flows over a weir and through a culvert under Redford Road before entering a modified section with lined banks and an ornamental weir (Figure 1-6). It then flows as a pool - riffle channel through an active floodplain area with good hydraulic connectivity along the left bank (Figure 1-7). The floodplain area is composed of damp grassland dominated by Yorkshire fog *Holcus lanatus* with wetter areas containing tufts of soft rush *Juncus effusus*. Here some minor planting has taken place along the streamside but this has been of hawthorn *Crataegus monogyna*, rather than the more suitable alder *Alnus glutinosa* which has self-seeded here in places (Figure 1-8).

Figure 1-6: Ornamental weir on the Braid Burn

Figure 1-7: Bankside Erosion on the Braid Burn

Figure 1-8: Braid Burn near Colinton showing wet grassland on right bank and Alder trees on the left bank

Some flow bifurcation occurs around a transverse bar - island feature along this morphologically active reach (Figure 1-9) and the floodplain riparian margin is well developed. Downstream in this section, there is a footbridge and a stockade metal fence that is presently inhibiting morphologic development (Figure 1-10). This separates another area of the floodplain which contains evidence of anastomosing channels and has large crack willow trees *Salix fragilis* along the burn side.

Figure 1-9: Flow bifurcation and morphologic unit development

Figure 1-10: Concrete footbridge over the Braid Burn

As the river enters Colinton Mains it is artificially straightened and confined between recently constructed flood walls and here there is little if any ecology with floodwalls adjacent to the stream or, when they are set back, the area in between is covered in amenity grassland of low ecological interest (Figure 1-11). The river retains some gradient and has begun to increase its sinuosity locally with some minor berm development. The thin riparian margin is presently monotonous with limited planting, however, the species chosen have been entirely unsuitable and they include butterfly bush *Buddleia davidii*, hawthorn and Leyland cypress *Chamaecyparis leylandii*. The channel morphology is generally pool-riffle with occasional artificial rapids. The reach also suffers from general debris accumulation.

Figure 1-11: Confined channel through Colinton Mains

1.3.3 The Braid Burn Valley

This is a large urban park through which the burn flows in a single thread. The river assumes a more natural setting through the Braid Burn valley and exhibits a plane - riffle bed with active sandy gravels (Figure 1-12). The burn sides are composed in the main of amenity grassland and this extends up the valley sides towards the overlooking houses, although in places there are small copses of ornamental plantings. Most the lower reach of the burn has exposed sides with no riparian trees although further up the valley there are scattered trees, mainly hawthorn and crack willow (Figure 1-13).

Figure 1-12: Plane - riffle morphology through the upper Braid Burn Valley

Figure 1-13: Braid Burn at Braidburn Valley showing amenity grassland surroundings and limited streamside vegetation, with the occasional crack willow

There is no active floodplain upstream, instead higher terraces exist along the valley side. Opportunities exist for island creation and woody debris introduction through the reach. The river opens out slightly downstream and flows through parkland. Here the riparian margin is significantly degraded (Figure 1-14). A Combined Sewer Overflow (CSO) enters the river on the upstream abutments of the Comiston Road culvert.

Figure 1-14: Degraded riparian margin through the lower Braid Burn Valley

1.3.4 The channel through the Hermitage of Braid

After flowing through a short culvert under Comiston Road the river enters the Hermitage of Braid with its significant industrial legacy. The woodland park is used by dog walkers, cyclists, runners and people visiting the visitor centre in vehicles with disabled access. The trees are a mixture of species with English oak *Quercus robur* and ash *Faxinus excelsior* common, although there are a number of other species and exotics have been planted-in at various times. There is some amenity grassland near Hermitage House and there is a good growth of bryophytes on the stone-lined banks of the burn near here, before it enters a large culvert. The invasive cherry laurel *Prunus laurocerasus* is present here.

Willow spiling lines the bank after the culvert and this has generally failed to take hold (Figure 1-15). The moderately steep confined valley through the Hermitage of Braid is well wooded and this is reflected in an increase in woody debris in the channel. The river exhibits a plane bed with some coarser riffle and rapid areas. Small weirs are completely filled with sediment upstream (Figure 1-16). A long (>100 m) culvert exists around the Hermitage.

Figure 1-15: Willow spiling along the Braid Burn

Figure 1-16: Small weirs along the Braid Burn through the Hermitage of Braid

The slopes above the narrow valley bottom are dominated by ancient semi-natural woodland, dominated by sycamore *Acer pseudoplatanus* and silver birch *Betula pendula* (Figure 1- 17).

Figure 1-17: Narrow section of Hermitage of Braid

As the valley opens up past the wooded valley more bedrock is seen in the channel as rapids and general morphologic and ecological diversity increases (Figure 1-18). A golf course dominates the right bank. Significant low terrace areas exist along both sides of the channel with many opportunities for habitat improvement (Figure 1-19).

Figure 1-18: Valley widening at the downstream end of the Hermitage of Braid

Figure 1-19: Low terraces along the lower reaches of the river through the Hermitage of Braid

1.3.5 The river through West Mains and Nether Liberton (including the Cameron Toll Shopping Centre)

At the head of Blackford Glen Road the burn flows through a bridge and then into a straight channel that runs the length of the road, which is on the right bank. Here there is a council road depot on the left bank beyond which there is a golf course on the slope below the King's Buildings of the University of Edinburgh. The left bank here is composed of a hawthorn hedge behind which there is the amenity grassland of the golf course. The right bank is made up of another golf course as well as a nursery with some hobby farming and horticulture on the pastures on the gentle, north-facing slope. This remains the situation until the right hand side of the road becomes more residential as the burn approaches Liberton Brae. The grassland on the left bank opens out here and the burn moves away from the road a touch, into the golf course, and here there is a small footbridge and path over some rushy pasture behind the high grassland wall at Liberton Dams: the remains of a dam that was constructed to feed a series of mills downstream at Gilmerton Road. The present straight course between Liberton Brae and Gilmerton Road is the mill lade and this can still be traced from here through the grounds of Nether Liberton House and alongside the car park of Cameron Toll Shopping Centre where it meets up with the original course of the Braid Burn at Inch Park.

The remainder of the burn's course is very urban with the burn confined between floodwalls or, in the case of Cameron Toll, a long culvert. However, between the entrance to the culvert

and Gilmerton Road there is a small area of trees through which the burn flows adjacent to a large floodwall. There is a slight levee on the opposite bank to the floodwall here and the wet woodland in this area has traces of anastomosing channels (Figure 1-20).

Figure 1-20: Small wet woodland near Cameron Toll showing floodwall and low levee

The river continues as a plane - riffle channel along a heavily modified channel with lined flood walls. A further obstruction is formed by the old gauging structure upstream of Cameron Toll Shopping Centre (Figure 1-21) before the river flows close to masonry flood walls along the right bank. It enters a long (<100 m) culvert under the Cameron Toll Shopping Centre before emerging across a partially restored section of sinuous channel (Figure 1-23) grading into a multi-thread section before the A7 road culvert.

Figure 1-21: SEPA gauge at Liberton Upstream of Cameron Toll Shopping Centre

At Inch Park work has already taken place to reconnect the river to its floodplain and this has been successful with a large wetland area with soft rush and reed canary grass *Phalaris arundinacea*. The restoration has exposed boulder clay in the bed of the sinuous reach and debris build up in the multi-thread reach is significant (Figure 1-24). This area is utilised by ducks and a heron *Ardea cinerea* was seen on the date of the visit, however, the area is spoiled by the large build-up of trash at the entrance to the culvert under the Old Dalkeith Road. The park itself is dominated by improved grassland but now acts as a flood storage reservoir on account of the new floodwalls along the Old Dalkeith Road (Figure 1-22).

Figure 1-22: Floodwalls and wetland being constructed in Inch Park (Google Maps 2012)

Figure 1-23: Partially restored sinuous reach after the Cameron Toll Shopping Centre

Figure 1-24: Partially restored multi-thread reach after the Cameron Toll Shopping Centre

1.3.6 The Duddingston and Peffermill reach

From the Old Dalkeith Road the burn runs in a straight line pretty much all the way to the Innocent Railway at Forkenford. The Braid Burn is joined by a tributary (the Pow Burn) which is highly urbanised draining an older part of Edinburgh and fed by a number of CSO's.

Initially it runs through a floodwall lined channel between houses until it emerges into the playing fields at Peffermill (south) where the land use is amenity grassland on the right bank and housing with high floodwalls on the left bank. The river is straightened and embanked, disconnecting the floodplain. It also has no natural riparian margin. The embankments could be set back here (Figure 1-25). After crossing Peffermill Road the river becomes over-deep and suffers from debris accumulation.

Figure 1-25: Degraded reach of the Braid Burn after the A7

From here the burn passes under the railway and joins a large drain on the left bank before crossing more playing fields (Peffermill North). At the confluence with the drain there is an infestation of giant hogweed *Heracleum mantegazzianum* (Figure 1-26) that continues along the tributary drain (Pow Burn) all the way to Cameron Toll Roundabout. This drain is quite flashy and exhibits trash lines on the overhanging foliage.

Figure 1-26: Railway culvert at Peffermill with giant hogweed on the left bank, where the drain joins the main channel

From the confluence the burn is contained within low levees with amenity grassland on both sides all the way to Peffermill Road which the burn passes under in a culvert into the industrial estate. Here the course is more natural but there is some litter and trash in the watercourse, which now deviates slightly from the straight line by twenty metres or so but soon returns to the original heading. The channel is tree lined on both sides although on the right bank the land use is industrial. The left bank is, once again, a golf course with amenity grassland. This section of the burn ends in a small wetland that has been created upstream of the bridge under the Innocent Railway. Here a few mallard are present and the area is frequented by dog walkers and cyclists.

The final reach of the burn is that from Duddingston Road through Duddingston Park to Milton Road. Immediately downstream of Duddingston Road the banks of the channel are wooded although there are some bad neighbour developments[1], such as a small scrapyard. The woodland continues downstream but is dissected by the road to the Duddingston Golf Club clubhouse which cuts a swathe across the riparian corridor. On the right bank the wet woodland, dominated by white willow *Salix alba* and osier *Salix viminalis* continues as far as the clubhouse whilst on the left bank the woodland is narrower with playing fields and amenity grassland behind this on the floodplain.

Beyond these playing fields, the golf course begins and the banks of the burn are species-poor and the channel is lined in places. All around the land cover is amenity grassland with odd patches of brambles *Rubus fruticosus* and specimen trees, remnants of a landscape park. The final part of this reach is somewhat different; here the burn becomes sinuous in character with the banks covered in butterbur *Petasites hybridus* in a matrix of crack willow woodland. The butterbur has been cut back (Figure 1-27), creating bare bank sides although, as this plant is a herbaceous perennial, it will grow back next year.

Figure 1-27: Cut butterbur on the banks of the Braid Burn near Milton Road

The river is extensively trained through the golf course. The bed exhibits well developed pools and riffles with a mobile gravel bed. The banks, however, are generally lined creating an over-deep channel (Figure 1-28). Some un-mown margins exhibit an improved riparian margin (Figure 1-29). A series of small weirs control the gradient locally and could be considered for removal (Figure 1-30).

[1] As defined in Schedule 2 of the Town and Country Planning (General Permitted Development) (Scotland) Order 1992. "Bad neighbour development includes a number of uses which can have a detrimental impact on residential amenity.

Figure 1-28: Lined banks through Duddingston Golf Course

Figure 1-29: Unmanaged river margins through Duddingston Golf Course

Figure 1-30: Minor weirs through Duddingston Golf Course

A large weir exists immediately upstream of Milton Road and this is influencing the hydromorphology of part of the river upstream through the golf course and impacting on fish passage (Figure 1-31). Japanese Knotweed was also recorded at this weir. The river enters the heavily managed and utilised Friggate Public Park downstream where it continues as a plane bed channel with an unnatural riparian margin. Previous channel bifurcations have been infilled on this reach.

Figure 1-31: Major weir upstream of Milton Road

1.3.7 Summary

The Braid Burn is a diverse channel dominated by moderate energy alluvial pool - riffle and plane - riffle reaches but with occasional cobble and bedrock rapids. It is most modified through urban areas and across golf courses but also exhibits legacy issues from earlier industrial usage. The riparian and floodplain are best developed and most functional along confined reaches such as the Hermitage of Braid and most degraded across playing field areas such as the reach after the A7. Numerous small and large opportunities present themselves for restoration although great care must be taken in the choice and design of options as the channel is sufficiently energetic to alter inappropriate morphologies and external urban pressures act strongly to modify the system away from natural.

1.4 Braid Burn restoration opportunities

The urban nature (including a newly constructed flood prevention scheme) of the Braid Burn makes restoration difficult. However, a number of local opportunities for restoration have been identified. These are discussed below and summarised in Table 1-4.

1.4.1 Dreghorn

Even though the surroundings of the woodland here are urbanised, the woodland still retains many semi-natural characteristics. Some of the engineering that has taken place should be reversed in order to allow the colonisation of the banks by riparian plant species and permit fish passage. This will involve the removal of the weirs in the channel, some of the redundant Victorian structures (including the culvert near Donald's Well) as well as the lined section right at the head of the valley near the A720 (Figure 1-32). The rhododendron in the woodland is spreading and, as it casts a deep shade and out-competes native species, it should be removed.

Figure 1-32: Lined section isolating the burn ecologically from the surrounding woodland

1.4.2 Redford Road to Oxgangs Avenue / Greenbank Cresent

The opportunities for ecological improvements within the new flood prevention scheme are limited, however, the replacement of unsuitable plantings with more suitable species, such as alder and crack, osier and white willows should be undertaken, especially along Colinton Mains. The trash and rubbish in the channel should also be removed. Immediately downstream of Redford Road, the green watergate should be removed and the concrete lined channel in the garden here removed. The footbridge further down should be reconstructed and the stockade fencing removed. This, along with the planting of alder and crack willow will improve the ecology of this isolated area of floodplain.

1.4.3 Braid Burn Valley Park

Once again, opportunities for restoration are limited in this large urban greenspace. Nevertheless, the creation of a wooded riparian corridor would be beneficial and could be undertaken along with the removal of the gabion baskets which have been inserted to prevent bank erosion. This can also be reduced with the planting of appropriate species, such as grey willow *Salix cinerea* and osier.

1.4.4 Hermitage of Braid

The biggest problem here is the very long culvert near the visitors' centre. Consideration should be given to investigating the removal of this structure (if possible). The nearby clump of cherry laurel should be removed. Elsewhere the redundant weirs should be taken out, as should gabion baskets and other channel linings, where these are not falling away already. This will improve the riparian margin and help tie-in the burn ecologically with the surrounding woodland.

1.4.5 Blackford Glen Road

Once again, the infrastructure of the area is restricting the restoration of this reach. However, the concrete structure opposite Blackford Glen Farm should be removed as should the

concrete linings of the channel near the council depot upstream. The downstream section here offers many more possibilities, especially near Liberton Dams. Here a small wetland, similar to the one in Inch Park should be created and the cut-off meander a little upstream could be reconnected to the main channel to create a two-channel reach. There is also the possibility of creating an anastomosed channel between this and the new wetland.

1.4.6 Cameron Toll

The small woodland upstream of the shopping centre should be reconnected to the burn via a number of anastomosing channels in this low energy area and the trash in the burn should be removed.

1.4.7 Inch Park

The works here have been partially successful but the build-up of rubbish on the culvert screen is unsightly and a potential risk and should be removed (Figure 1-33).

Figure 1-33: Trash on the screens on the culvert under the Old Dalkeith Road

1.4.8 Peffermill Playing Fields

Here the channel is engineered straight and there is no semi-natural habitat on the banks. To rectify this, south of the railway, the floodbank should be broken on the right bank and a sinuous course created. This will allow the development of a more natural hydromorphology which will be colonised by marginal species. North of the railway the situation is similar and the floodbanks should be broken on both sides of the burn to create a similar habitat. Upstream of this, where the large drain joins the burn immediately north of the railway embankment, the bank constraining this drain should also be removed and the drain channel altered to create a more natural watercourse. A small wetland, again similar to that at Inch Park, should be created at the confluence of the Braid Burn and this 'new' burn and this confluence should be moved 20m downstream of the present location. Finally the giant hogweed here should be sprayed out prior to works commencing.

1.4.9 Peffermill Industrial Estate

The removal of trash in the channel is recommended as this will improve the visual appearance of the watercourse.

1.4.10 Duddingston

This is a very large area which is mostly golf course and this offer a number of opportunities for improvements in the ecological and geomorphological condition of the watercourse. Immediately downstream of the Duddingston Road West, the road to the golf clubhouse could be re-routed across the area of ruderal ground to tie-in with the line of the Innocent Railway and a new junction on the Duddingston Road. This will allow the removal of the culvert under

the existing road and will permit the planting-up of the road corridor and the connection of the ancient semi-natural woodland on either side of this road. A little further downstream the channel should be allowed to flow into the large area of willow woodland on the right bank. In the golf course itself the bank protection, including gabion baskets should be removed, as should the large number of weirs present (Figure 1-34). Riparian woodland planting should be undertaken and this should be continued, using crack willow, into the final reach of the river, where the butterbur has been cut down. This will eventually overshadow the butterbur and shade it out: butterbur is a dominant species that is considered unsightly where it gains hold on riverbanks and its deep shade prevents the regeneration of tree cover. The large weir and the infestation of Japanese knotweed should also be removed. These measures and the creation of a more natural riparian vegetation management will improve the connectivity of the burn with the surrounding land uses and improve the ecological quality of these habitats.

Figure 1-34: Gabion baskets lining the Braid Burn in Duddingston Park

1.4.11 Barriers to Fish Passage

As mentioned in the paragraphs above there are many potential barriers to fish passage along the urban reach of the Braid Burn. This includes many weir structures and several culverts. Due to the high number of these structures on the burn it has been suggested that locations of these structures be highlighted and further assessment be undertaken to confirm which are actual barriers to fish passage. The structures which need to be assessed are listed in Table 1-3. A map of these structures is also shown in Appendix D, Figure C-4.

Table 1-3: Potential barriers to fish passage

Feature ID	Structure Type	Location
Bra_WRe_1	Weir	Upper reaches of Hermitage of Braid
Bra_CRe_1	Culvert	Upper reaches of Hermitage of Braid
Bra_WRe_2	Weir	Upper reaches of Hermitage of Braid
Bra_WRe_3	Weir	Upper reaches of Hermitage of Braid
Bra_WRe_4	Weir	Downstream of Redford Road
Bra_WRe_5	Weir	Hermitage of Braid
Bra_CRe_2	Culvert	Hermitage of Braid
Bra_CRe_3	Culvert	Hermitage of Braid
Bra_WRe_6	Weir	Downstream of Gilmerton Road
Bra_CRe_4	Culvert	Adjacent to HolyRood High School and Duddingston Golf Course
Bra_WRe_7	Weir	Duddingston Golf Course
Bra_WRe_8	Weir	Duddingston Golf Course
Bra_WRe_9	Weir	Duddingston Golf Course
Bra_WRe_10	Weir	Duddingston Golf Course

The restoration options are summarised below in Table 1-5. 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 1-4: 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	ClRe
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
Re-route path	RRP
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 1-5: Restoration opportunities for the Braid Burn

Issue	Unique ID	Action	Location Description	OS NGR	Pressure	Pros	Cons	Cost (£k)	Movement towards GES - Capacity released
ISSUE 1: Lined channel	Bra_LCRe_1	Remove lined channel	Upper reaches – downstream of A720	322188E 668054N to 322153E 668079N	Morphological	Restoration of natural gravel / cobble bed with associated habitat gains for fish and invertebrates. Exposure of natural banks allowing fluvial processes to operate and revealing bank side habitat.	Potential for local bank erosion. Presently unknown substrate condition, sediments may be contaminated.	16.4	None
ISSUE 2: Broken weir causing local bank stability	Bra_WRe_1	Remove weir	Upper reaches of Hermitage of Braid	322067E 668184N	Morphological	Restored biotic and sediment continuity. Improved local morphology.	Potential for minor temporary release of fine sediment impacting on downstream gravels and aquatic ecosystem. Local bank and bed destabilisation probable without appropriate morphological reinstatement local to weir site.	10.5	None - capacity not assessed for weir removal
ISSUE 3: Poor morphology culverted section	Bra_CRe_1	Remove culvert	Upper reaches of Hermitage of Braid	322173E 668300N to 322230E 668322N	Morphological	Restoration of natural gravel / cobble bed with associated habitat gains for fish and invertebrates. Exposure of natural banks allowing fluvial processes to operate and revealing bank side habitat.	Potential for local bank erosion. Presently unknown substrate condition, sediments may be contaminated. River response dependent on local conditions requires further investigation.	28.8	None
ISSUE 4: Poor channel morphology and redundant weirs	Bra_WRe_2, Bra_WRe_3	Remove weirs	Upper reaches of Hermitage of Braid	322360E 668441N - Bra_WRe_2 322506E 668568N - Bra_WRe_3	Morphological	Improved fish passage, aquatic ecology and local morphology.	Potential for minor temporary release of fine sediment impacting on downstream gravels and aquatic ecosystem.	12.2	None - capacity not assessed for weir removal
ISSUE 5: Ornamental structure, lined channel and redundant weir	Bra_StRe_1, Bra_LCRe_2; Bra_WRe_4	Remove structure; remove lined channel; remove weir	Downstream of Redford Road	322619E 668757N – Bra_WRe_4 322670E 668785N – Bra_StRe_1, Bra_LCRe_2	Morphological	Restored biotic and sediment continuity. Improved local morphology	Potential for minor temporary release of fine sediment impacting on downstream gravels and aquatic ecosystem. Local bank and bed destabilisation probable without appropriate morphological reinstatement local to weir site.	21.7	Removal of embankment with bank protection assessed to release 0.81%. Would need to reassess removal of lined channel in Mimas. Capacity not assessed for removal of weir.
ISSUE 6: Footbridge is constraining channel and restricting floodplain connectivity	Bra_BrRp_1; Bra_FRe_1	Replace / widen footbridge; remove fencing	Downstream of Redford Road	322803E 668841N	Morphological	Improve floodplain hydraulics and allow local channel migration. Increase in floodplain connectivity and ease of flows through reach.	Potential for local bank erosion.	Initial costs = 5.2, requires further assessment to estimate full costs.	None
ISSUE 7: Bank erosion and deposition further downstream	Bra_VP_1	Planting to improve riparian strip	Downstream of Redford Road; adjacent to Colinton Primary School	322844E 668873N to 322885E 668933N	Morphological	Improved riparian habitat quality. Low cost of implementation.	Altered aesthetics. Improvements benefit small area of burn environment.	2.9	None – capacity not assessed for improvements through riparian planting

ISSUE 8: Debris on banks both from upstream sources and illegally dumped there.	Bra_DRe_1, Bra_DRe_2	Remove debris; conduct an education programme.	Upstream and downstream of Colinton Mains Drive	322861E 669177N to 322897E 669219N – Bra_DRe_1 322997E 669357N – Bra_DRe_2	Point source pollution	Improved bed and bank habitat quality. Improved general aesthetics, removed hydraulic obstructions. Increase in public knowledge and awareness of waterway health.	No negative effects, ongoing commitment needed.	16.7 + education costs.	None
ISSUE 9: Low terrace management	Bra_VP_2	Plant low valley sides and plant terraces	Between Colinton Mains Drive and Oxgangs Road North	323033E 669390N	Morphological	Improved riparian habitat quality. Low estimated cost.	Altered aesthetics. Benefits to relatively small section of the burn.	1.1	1252m of low impact channel alignment releases 3.25% capacity. Planting of 23m of this sub-reach will contribute to a portion of this capacity being released.
ISSUE 10: Morphological development and channel widening; debris accumulation; degraded riparian vegetation	Bra_ChR_1; Bra_DRe_3; Bra_TBC_1, Bra_TBC_2, Bra_TBC_3, Bra_TBC_4, Bra_TBC_5; Bra_StRe_2; Bra_VP_3	Improve in channel morphology; Remove debris; Create transverse bars along reach; Remove gabion baskets; Plant low valley sides and terraces	Colinton Mains Park	323169E 669436N to 324028E to 669479N – Bra_ChR_1, Bra_DRe_3 323185E 669430N to 323453E 669472N – Bra_TBC_1 to Bra_TBC_5 323594E 669481N – Bra_StRe_2 323594 669481 – Bra_VP_3	Morphological	Creation of rare morphologic unit with associated increase in hydromorphic diversity. Benefits will impact a large section of the burn.	Some local bank erosion associated with the bar unit.	125.4	Low impact channel realignment along 1252m releases 3.25% of capacity. Improvements to approximately 910m of this sub-reach will release a portion of this capacity.
ISSUE 11: Degraded riparian vegetation	Bra_VP_4	Improve riparian strip with planting	Braidburn Valley	324044E 669476N to 324273E 670171N	Morphological	Improved bank habitat quality. Improved bank strength. Measure will improve a large section of the burn which is regularly used for leisure. Increase in public awareness and knowledge of healthy waterways.	Altered aesthetics.	20.8	None – capacity not assessed for improvements through riparian planting
ISSUE 12: Constrained flood channel	Bra_FBR_1	Remove flood banks and floodwalls	Hermitage of Braid	324444E 670226N to 325150E 670310N	Morphological	Reconnection of significant floodplain area and processes. Improved local floodplain flood storage and decrease in local flood risk.	Altered in-channel dynamics as flood flows are no longer in bank may result in sedimentation. High estimated cost.	251	None
ISSUE 13: Lined channel	Bra_LCRe_2	Remove lined channel	Hermitage of Braid	324566E 670219N	Morphological	Restoration of natural gravel / cobble bed with associated habitat gains for fish and invertebrates. Exposure of natural banks allowing fluvial processes to operate and revealing bank side habitat.	Potential for local bank erosion. Presently unknown substrate condition, sediments may be contaminated.	13.1	None
ISSUE 14: Redundant weir and degraded rapids	Bra_WRe_5, Bra_ChR_2	Remove weir and restore rapids downstream	Hermitage of Braid	324834E 670243N to 324920E 670261N	Morphological	Improvement in fish passage and aquatic ecology.	Potential for minor short term release of sediment, impacting downstream gravels and aquatic ecosystem.	43	None
ISSUE 15: Poor channel morphology in culverted section	Bra_CRe_1, Bra_CRe_2	Remove two culverts	Hermitage of Braid	324944E 670252N to 325020E 670252N	Morphological Point source pollution	Restoration of natural gravel / cobble bed with associated habitat gains for fish and invertebrates. Exposure of natural banks allowing fluvial	Potential for local bank erosion. Presently unknown substrate condition, sediments may be contaminated. River	41.7	0.51%

						processes to operate and revealing bank side habitat. Improved fish passage and aquatic ecosystem health.	response dependent on local conditions requires further investigation.		
ISSUE 16: Constrained floodplain on both banks with limited opportunity on the left bank to connect floodplain across the golf course.	Bra_Sc_1	Improve floodplain connectivity by scraping and reconnecting post paleo feature on floodplain	Hermitage of Braid	325151E 670315N to 325718E 670255N	Morphological	Reconnection of significant floodplain area and processes. Improved local floodplain flood storage and benefits to local flood risk.	Altered in-channel dynamics as flood flows are no longer in bank may result in sedimentation. High estimated cost.	144	None
ISSUE 17: Existing public access along Hermitage of Braid track and Blackford Hill.	Bra_VP_5, Bra_VP_6	Plant areas of floodplain on both sides of the channel	Hermitage of Braid	325651E 670253N to 325833E 670183N	Morphological	Improved riparian habitat quality. Relatively low estimated cost.	Altered aesthetics.	15.4	None
ISSUE 18: Redundant in-channel structure	Bra_StRe_3	Remove in-channel structure	Adjacent to Blackford Glen Road	326072E 670195N	Morphological	Improved bank habitat quality. Improved bank strength.	Altered aesthetics.	9.3	Low impact channel realignment along 510m releases 0.89%, removal of structure would release a small portion of this capacity.
ISSUE 19: Anastomosed wetlands on flood plain	Bra_ChRc_1	Riparian development and reconnection of channel with wetland areas	Adjacent to Blackford Glen Road	366980E 670234N to 327051E 670310N	Morphological	Opportunity to enhance morphology and sedimentology in line with channel processes.	Significant local human pressures on the system may negate naturalisation attempt. High estimated cost.	102	None
ISSUE 20: Degraded riparian and floodplain vegetation	Bra_VP_7	Planting of floodplain	Between Liberton Road and Gilmerton Road	327193E 670505N to 327229E 670567N	Morphological	Improved bank habitat quality. Improved bank strength. Low estimated cost.	Altered aesthetics. Localised impacts.	0.7	None
ISSUE 21: Anastomosed wetlands on flood plain; redundant weir	Bra_ChRc_2; Bra_WRe_6	Riparian development and reconnection of channel with wetland areas; remove weir	Downstream of Gilmerton Road	327288E 670671N to 327260E 670718N	Morphological	Opportunity to enhance morphology and sedimentology in line with channel processes.	Significant local human pressures on the system may negate naturalisation attempt. Will need to re-instate alternative form of gauge.	38	None
ISSUE 22: Re-meandered reach after discharging from culvert downstream of Cameron Toll Shopping Centre	Bra_ChR_3	Improve meander	Downstream of Cameron Toll Shopping Centre	327535E 671091N to 327625E 671077N	Morphological	Opportunity to enhance morphology and sedimentology in line with channel processes.	Significant local human pressures on the system may negate naturalisation attempt.	36.2	High impact realignment along a 332m reach will release 2.48% capacity. Improving the meander along 93m of this sub-reach will release a portion of this capacity.
ISSUE 23: Accumulated urban debris	Bra_DRe_4	Remove debris	Upstream of Old Dalkeith Road	327699E 671095N to 327784E 671085N	Point source pollution	Improved bed and bank habitat quality. Improved general aesthetics, removed hydraulic obstructions.	No negative effects, ongoing commitment needed.	11.3	None
ISSUE 24: Constrained and straightened channel with poor channel morphology	Bra_ChR_4, Bra_FBR_2	Improve channel morphology; set back flood banks	Between Old Dalkeith Road and Peffermill Road	327902E 671172N to 328250E 671598N	Morphological	Reconnection of significant floodplain area and processes. Improved local floodplain flood storage. Potentially releases a large amount of capacity.	Altered in-channel dynamics as flood flows are no longer in bank may result in sedimentation. High estimated cost.	251	Low impact channel realignment along a 1232m section of reach will release 3.24% capacity.

									Removal of embankments with bank protection which in total span 814m (piecemeal on both sides of the burn) releases 8.38%. Setting back flood banks would release a portion of this capacity.
ISSUE 25: Degraded channel and invasive species (Hogweed) present	Bra_InRe_1	Channel restoration and removal of Hogweed	Pow Burn, upstream of the confluence with Braid Burn	327852E 671268N to 328000E 671301N	Morphological Invasive Species	Improvements to local aquatic and riparian habitat and ecosystem.	May require ongoing work.	Requires further assessment	None – capacity not assessed for removal of invasives
ISSUE 26: Debris surrounding channel	Bra_DRe_5	Remove debris	Downstream of Peffermill	328000E to 671301N to 328262E 671617N	Point source pollution	Improved bed and bank habitat quality. Improved general aesthetics, removed hydraulic obstructions.	No negative effects, ongoing commitment needed.	30.5	None
ISSUE 27: Degraded riparian strip	Bra_VP_8; Bra_CRe_2; Bra_RRP_1	Improve riparian strip with planting; remove culvert	Adjacent to Holy Rood High School and Duddingston Golf Course	328756E 672137N to 328946E 672215N – Bra_VP_8 328786E 672145N – Bra_CRe_2 328769E 672103N – Bra_RRP_1	Morphological	Improved bank habitat quality. Improved bank strength. Planting will improve a large section of the burn.	Altered aesthetics.	31.3	None
ISSUE 28: Poor riparian management in reach adjacent to golf course – issues include failing gabions and erosion in some sections	Bra_EdRM_1; Bra_RMC_1, Bra_RMC_2;	Improve riparian management through education and liaison with golf course; Create riparian margin along two specific sections; Remove failing / redundant weirs	Duddingston Golf Course	328949E 672214N to 329292E 672873N – Bra_EdRM_1 329502E 672241N to 329361E 672523N – Bra_RMC_1 329275E 672847N to 329272E 672880N – Bra_RMC_2 328290E 672557N – Bra_WRe_8 329277E 672835N – Bra_WRe_9 329304E 672865N – Bra_WRe_10 329269E 672952N – Bra_WRe_11	Morphological	Improved bank habitat quality. Improved bank strength. Education and improvement of riparian management will create long term positive changes to the management of the waterway	Altered aesthetics. Requires buy-in from golf course.	7.4 + education costs	None
ISSUE 29: Failing / redundant weirs in several locations.	Bra_WRe_7, Bra_WRe_8, Bra_WRe_9, Bra_WRe_10	Remove weirs	Upstream of Milton Road	329269E 672952N	Morphological	Restored biotic and sediment continuity. Improved local morphology. Improvements to fish passage and aquatic ecosystem.	Potential for minor temporary release of fine sediment impacting on downstream gravels. Local bank and bed destabilisation probable without appropriate morphological reinstatement local to weir site. Bra_WRe_10 may be complicated to remove.	54	None

Full 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.

1.5 Discussion of SEPA morphological pressures & JBA findings

Figure C-2 (Appendix C) shows the pressures identified within SEPA's pressures database and the capacity that is calculated as having been used up by each of these pressures. There is a total capacity of 65.52% taken up by the morphological pressures on the Braid Burn with 61.56% of these being on this particular study reach. The pressures identified by SEPA are culverts, set back embankments, green bank protection, grey bank protection, low impact channel realignment and high 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 and this is reflected in the difficulty in determining accurate pressure capacity change related to proposed works (Table 1.4). It must be remembered that the restoration recommendations made here address the environmental issues identified while undertaking the hydromorphological / ecological audit of the watercourse. Whilst implementing the options identified will improve the environment they may not always alter the scores used in the WFD assessment of status. This is a function of the sampled or incomplete nature of the Morphological pressures database used to derive the WFD status.

1.6 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.

1.7 Recommendations

The Braid Burn is a highly urbanised watercourse that has been significantly modified to improve drainage. The recently constructed FPS has a major impact on the watercourse and with the other existing infrastructure imposes major constraints on widespread catchment improvements. It is anticipated that some of these would have been considered during the design of the FPS. There are a number of existing walkways along stretches of the Braid Burn (for example from Colinton Road through to the Braid Burn Valley Park and then on through the Hermitage of Braid). Improving the connectivity of these would be significantly improve access to the amenity of the burn and improve the value of the burn to the community.

While there are a number of constraints there are number of areas which would be perfect for increasing habitat biodiversity, morphological improvement and increasing public access, for example along the Braid Burn through the golf courses particularly at Duddingston Golf Course where improved natural riparian management should be introduced.

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

- Issue 29 - Remove weirs
- Issue 5 - Remove structure, lined channel and weir
- Issue 14 - Remove weir and restore rapids downstream
- Issue 2 - Remove weir
- Issue 4 - Remove weir
- Issue 28 - Improve riparian management through education and liaison with golf course, create riparian margin, remove failing / redundant weirs.

This page is intentionally left blank

Appendices

A Phase 1 screening features

RGH

LEGEND

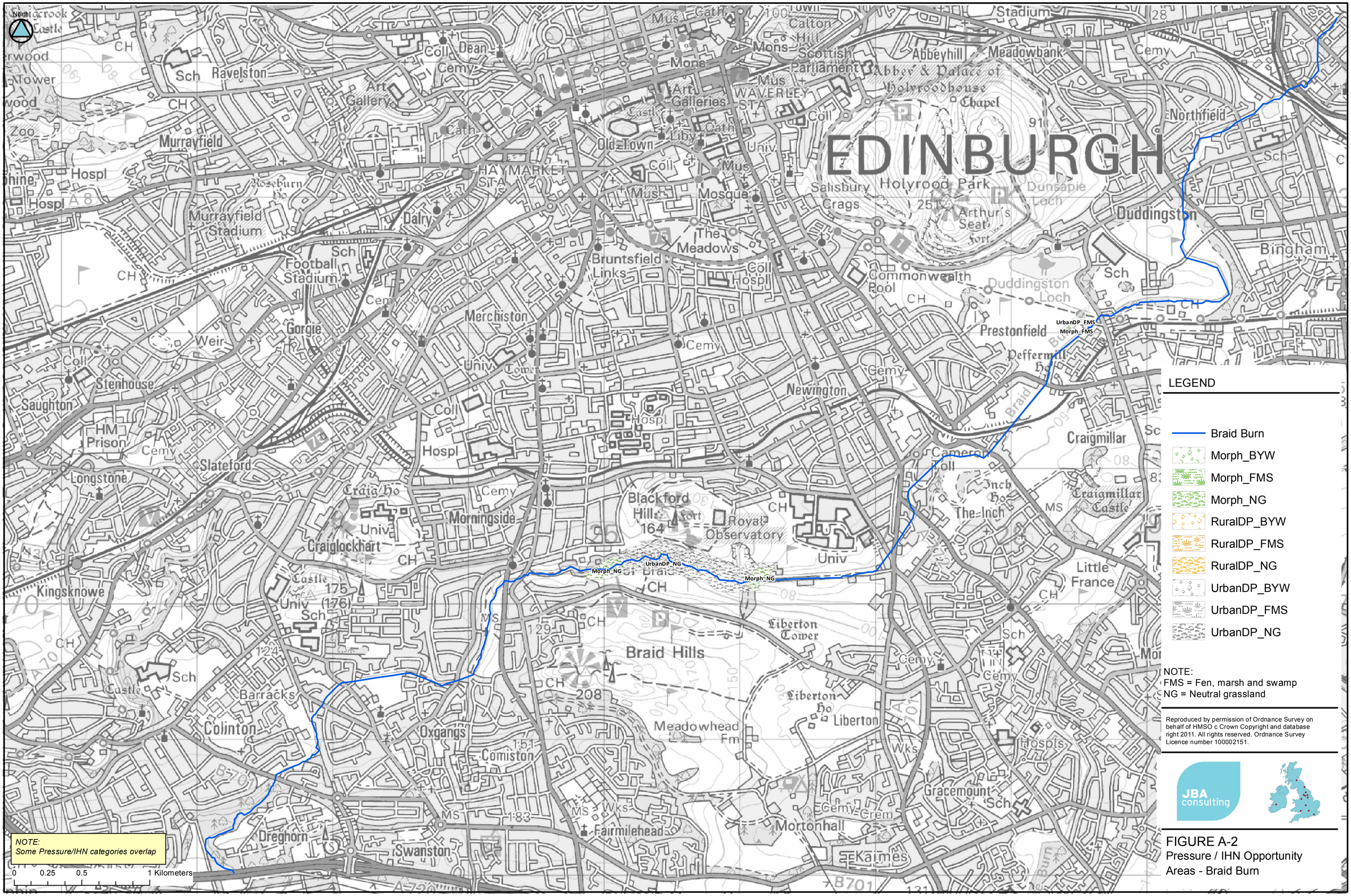
- Braid Burn
- Forth_Culverts
- Forth_Emb+reinf
- Forth_FloodBypassChan
- Forth_GreenBankReinf
- Forth_GreyBankReinf
- Forth_HIR
- Forth_LIR
- Forth_SetbackEmb
- Point source pollution
- Core Path
- Local Nature Consevation Site
- National Nature Consevation Site
- Derelict and vacant sites area
- Local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

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

JBA consulting

FIGURE A-1
Pressure and Opportunity Screening Data - Braid Burn

0 0.5 1 2 Kilometers



JBA consulting

FIGURE A-2
Pressure / IHN Opportunity Areas - Braid Burn

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: Culvert OS NGR: 32227 66802 Notes: Under City of Edinburgh bypass
	Location : 2 Description: Lined channel section OS NGR: 32213 66808 Notes: Associated with steeper reach and footbridge

	Location : 3 Description: Broken weir across bedrock rapid OS NGR: 32206 66818 Notes:
	Location : 4 Description: Short culvert OS NGR: 32220 66832 Notes: Lined channel bed
	Location : 5 Description: Woody debris dam OS NGR: 32245 66852 Notes: Associated sedimentological and hydraulic diversity

	Location : 6 Description: Boulder rapid morphology OS NGR: 32249 66855 Notes:
	Location : 7 Description: Plane bed – riffle channel and wooded valley OS NGR: 32252 66859 Notes:
	Location : 8 Description: Plane bed – riffle channel upstream of Redford Road Weir and culvert OS NGR: 32255 66865 Notes: Evidence of well connected berm / small floodplain area

	Location : 9 Description: Redford Road weir and culvert OS NGR: 32257 66869 Notes: Possible erosion issues on left bank
	Location : 10 Description: Lined channel and weir OS NGR: 32266 66878 Notes: Ornamental structure
	Location : 11 Description: Plane-bed riffle reach OS NGR: 32272 66880 Notes:

	Location : 12 Description: Footbridge OS NGR: 32280 66884 Notes: Constraining channel and restricting floodplain connectivity
	Location : 13 Description: Eroding outer bank and inner bank deposition OS NGR: 32285 66888 Notes: natural migration processes operating
	Location : 14 Description: Gravel bar OS NGR: 32289 66891 Notes: Evidence of active erosion and deposition and strong link to floodplain

	Location : 15 Description: Well developed left bank floodplain OS NGR: 32288 66894 Notes:
	Location : 16 Description: Constrained channel between adjacent flood walls OS NGR: 32286 66907 Notes: Some low berm development
	Location : 17 Description: Plane bed channel through wooded semi-confined reach OS NGR: 32404 66950 Notes:

	Location : 18 Description: Plane-bed – riffle in-channel morphology, strong floodplain connectivity OS NGR: 32409 66962 Notes: Managed floodplain
	Location : 19 Description: Mobile sediments accumulating at over-wide culvert entrance OS NGR: 32427 67017 Notes:
	Location : 20 Description: Constrained flood channel OS NGR: 32432 67016 Notes: Marginal berm development

	Location : 21 Description: Old blockstone walling OS NGR: 32449 67022 Notes:
	Location : 22 Description: Willow spiling OS NGR: 32454 67022 Notes: No evidence of regrowth
	Location : 23 Description: Historic weir OS NGR: 32481 67023 Notes:

	Location : 24 Description: Exit from hermitage of Braid culvert OS NGR: 32507 67026 Notes:
	Location : 25 Description: bedrock / boulder / cobble rapid section OS NGR: 32533 67033 Notes:
	Location : 26 Description: Widening valley and associated floodplain development OS NGR: 32565 67027 Notes:

	Location : 27 Description: Floodplain and berm development OS NGR: 32570 67024 Notes: Redundant fencing
	Location : 28 Description: Straightened and lined section OS NGR: 32631 67017 Notes:
	Location : 29 Description: Obsolete structure (?) OS NGR: 32671 67019 Notes:

	Location : 30 Description: Opportunity for riparian development and channel naturalisation OS NGR: 32687 67021 Notes:
	Location : 31 Description: Constrained flood channel OS NGR: 32710 67038 Notes:
	Location : 32 Description: Gauging weir structure OS NGR: 32728 67068 Notes:

	Location : 33 Description: Walled right bank and wider well connected right bank sediments OS NGR: 32726 67070 Notes:
	Location : 34 Description: Double box culverts under Cameron Toll shopping centre OS NGR: 32725 67084 Notes:
	Location : 35 Description: Re-meandered reach after Cameron Toll culvert OS NGR: 32755 67109 Notes:

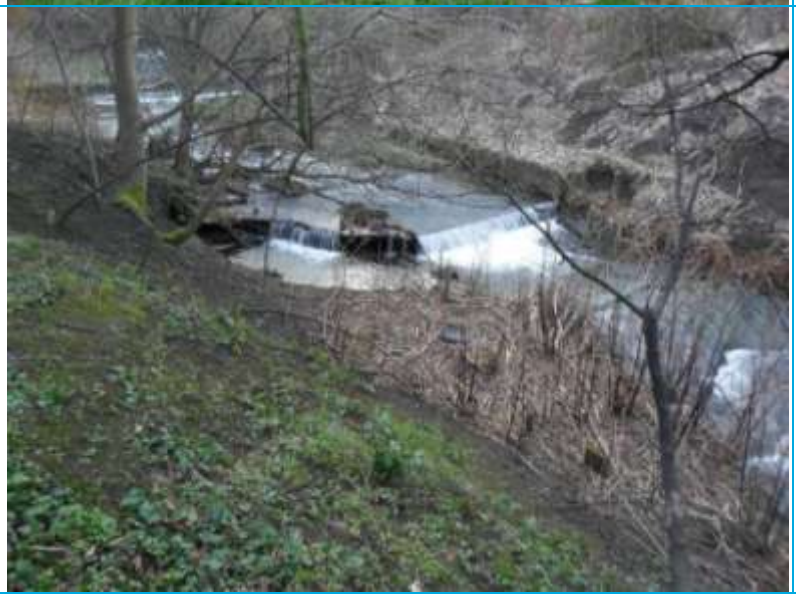
	Location : 36 Description: Issues with sediment balance through re-meandered reach OS NGR: 32758 67108 Notes:
	Location : 37 Description: Created anastomosed low gradient channel and wetland network OS NGR: 32780 67107 Notes: Issues with urban debris
	Location : 38 Description: Trash screen blockage OS NGR: 32783 67110 Notes: Impacting un upstream wetland

	Location : 39 Description: Constrained flood channel OS NGR: 32794 67123 Notes: Poor in-channel morphology
	Location : 40 Description: Straightened and embanked reach OS NGR: 32809 67141 Notes: Incipient meandering evident
	Location : 41 Description: Lined right bank with redundant structures OS NGR: 32828 67173 Notes:

	Location : 42 Description: Re-meandered section with artificial berms OS NGR: 32859 67204 Notes: Morphological uniformity could be reduced
	Location : 43 Description: Well connected ponded reach OS NGR: 32876 67213 Notes:
	Location : 44 Description: Lined channel through golf course OS NGR: 32924 67223 Notes: Limited bed development

	Location : 45 Description: Riparian strip left unmanaged across the golf course OS NGR: 32936 67221 Notes:
	Location : 46 Description: Failing gabion bank protection OS NGR: 32956 67223 Notes:
	Location : 47 Description: Old wooden board toe protection OS NGR: 32949 67248 Notes:

	Location : 48 Description: Constructed rapid under bridge crossing OS NGR: 32931 67254 Notes:
	Location : 49 Description: Erosion upstream of protected bank (gabions) OS NGR: 32927 67273 Notes:
	Location : 50 Description: Constructed low diagonal weir OS NGR: 32928 67279 Notes:

	Location : 51 Description: Large cobble weir OS NGR: 32927 67283 Notes:
	Location : 52 Description: Actively migrating channel reach OS NGR: 32927 67288 Notes:
	Location : 53 Description: Major failing multiple weir structure OS NGR: 32927 67295 Notes:

	Location : 53 Description: Major failing multiple weir structure OS NGR: 32927 67295 Notes:
	Location : 54 Description: Engineered reach under roadway OS NGR: 32927 67314 Notes:
	Location : 55 Description: Plane-bed – riffle morphology through managed parkland. OS NGR: 32931 67321 Notes:

C Restoration opportunity maps and tables

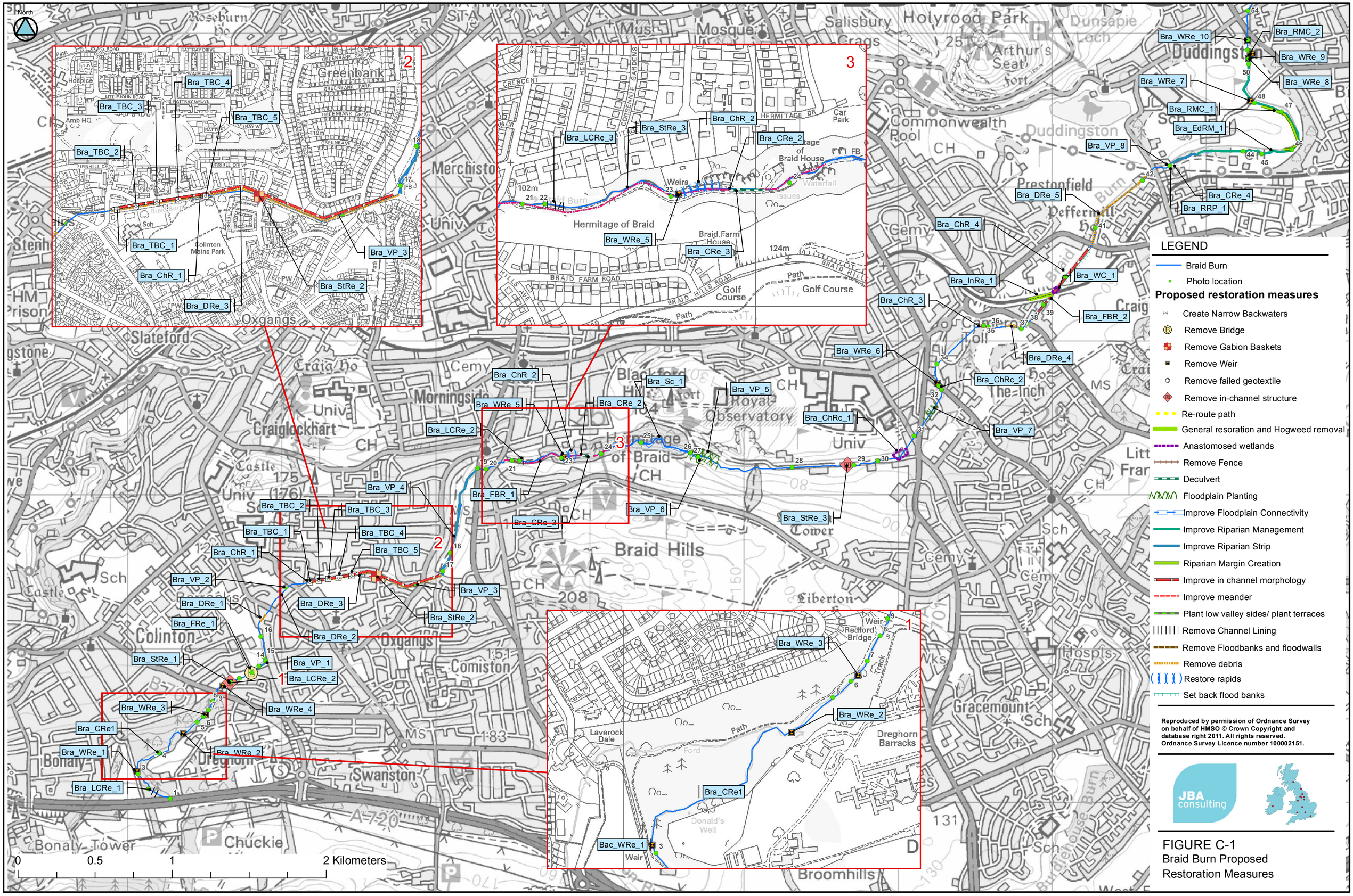


FIGURE C-1
Braid Burn Proposed Restoration Measures

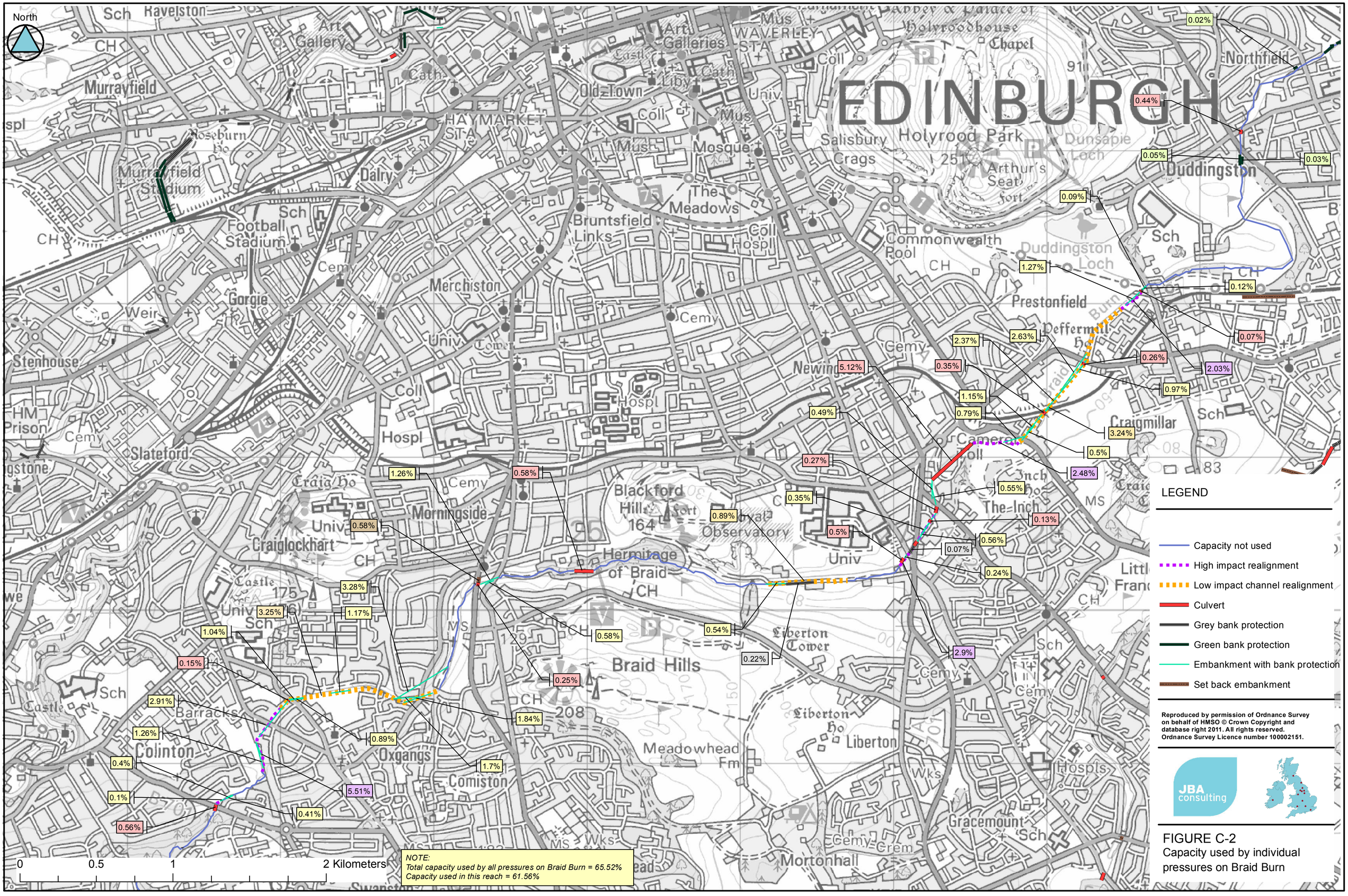


FIGURE C-2
Capacity used by individual pressures on Braid Burn

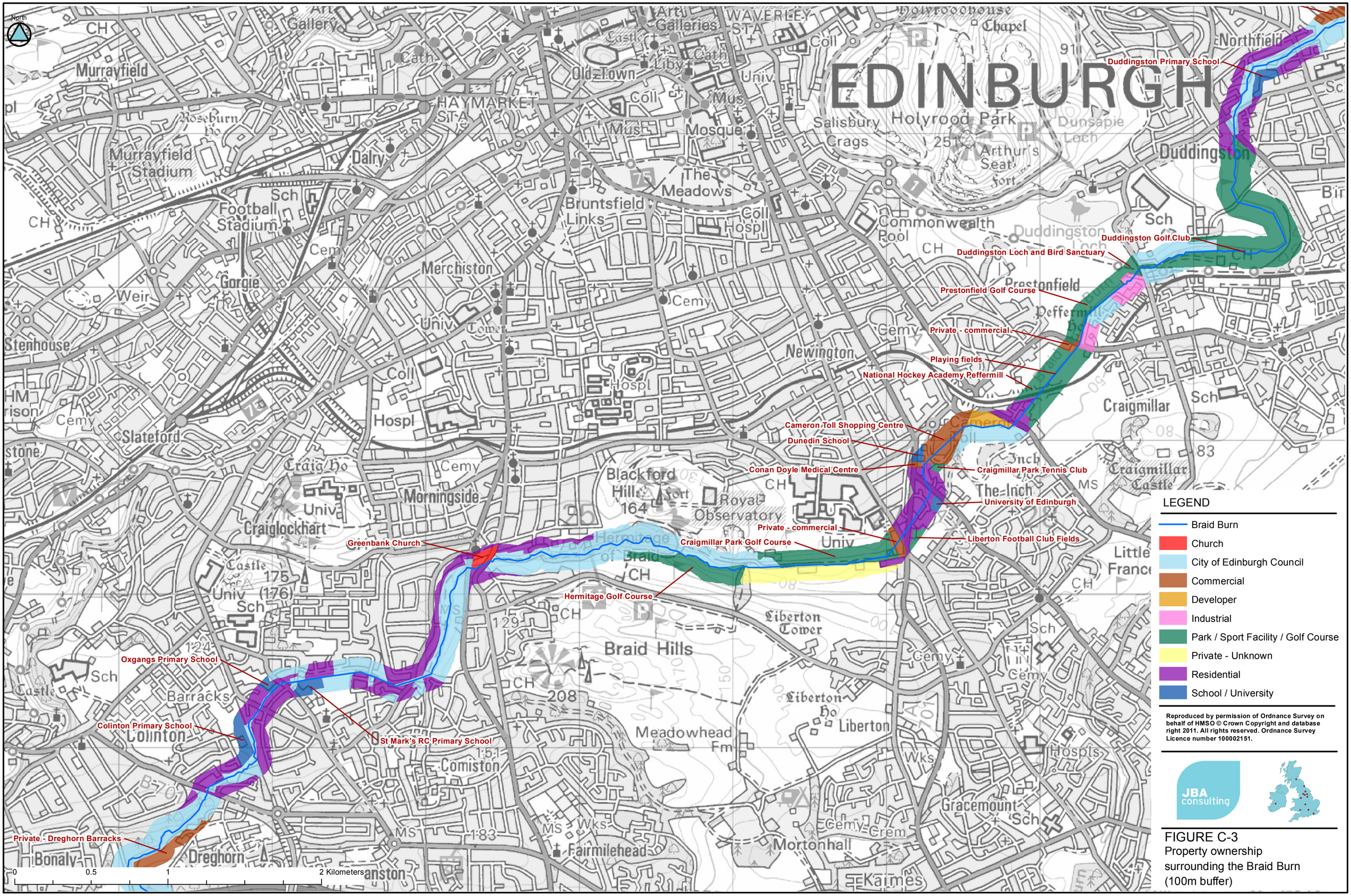


FIGURE C-3
Property ownership surrounding the Braid Burn (100m buffer)

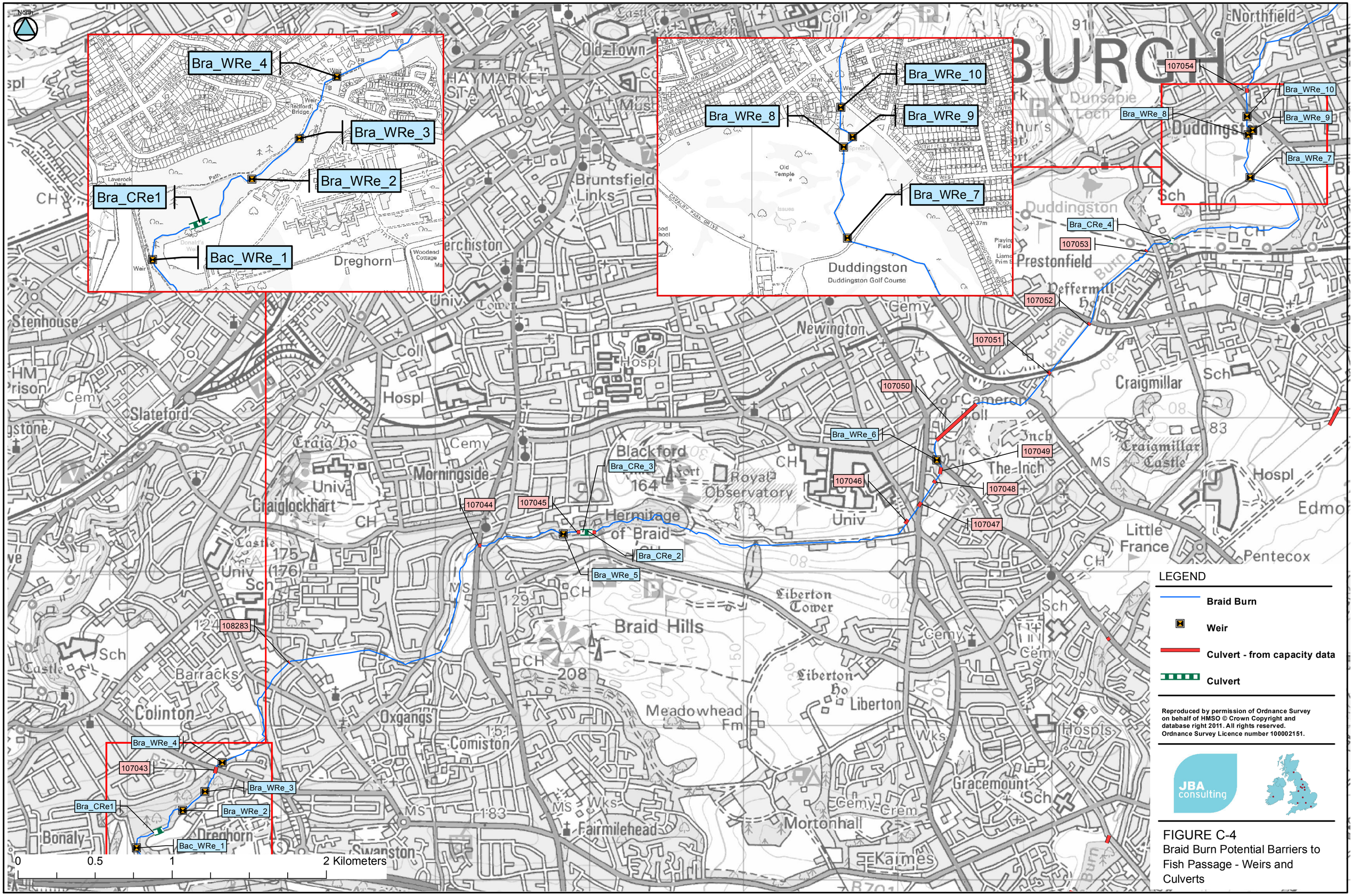


FIGURE C-4
Braid Burn Potential Barriers to Fish Passage - Weirs and Culverts

Table C- 1: Restoration Measure Assessment Tables

ISSUE 1: Lined channel		**ACTION:** Remove lined channel			**Unique ID:** Bra_LCRe_1		
Site information	Description	Upper reaches – downstream of A720	**Cost estimate**	Estimate (£k)	16.4		
	OS NGR	322188E 668054N to 322153E 668079N		Assumptions	Includes costs for site engineer time, ecological survey (£2k) and disposal of all excavated material offsite. Assumes channel dimensions of 3m width and 1m depth.		
	Photo reference	Appendix B – Photo 2		Funding mechanism / opportunities	**Fund name**		**Applicability**
	Site access	Via Dreghorn Barracks to the east of the waterway – however access may be restricted by vegetation.			Scotland Rural Development Fund	Challenge Funds	✖
	Reach length (m)	45				Rural Development Contracts – Land Manager Options	✖
Pressure	Pressures to be addressed through regulatory means	• Urban diffuse pollution • Morphological				Rural Priorities – Forth Area	✖
	IHN	None – gap in network			Scottish Natural Heritage	Natural Project Grants	✖
	JBA ID	N/A				Community Grants	✖
	Associated data sources	Local nature conservation site				Central Scotland Green Network	✖
Habitat	Type of existing habitat	Mixed plantation woodland			SEPA Scottish restoration fund		✓
	Extent of existing habitat	Full length of structure on both banks			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	Moderate					
	Indicative species mix for restoration	Alder, grey sallow					
	Establishment techniques required	Direct planting					
Benefits	Barrier to restoration?	✓	Possible historic / cultural structure	**Further considerations**	**Survey Type**		**Required**
	Capacity released – contribution to obtaining GES	None		Other surveys required	Ecological habitat survey		✓
	Flood risk benefit?	✖			Hydrological survey		✖
	Public access (existing or can connect to?)	✓	There are existing paths within the conservation reserve. The path crosses the burn at this site via a footbridge		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 prevent movement of sediment downstream
		Climate change adaptation	✖		Timing	Works to be carried out during low flow periods	
		Raise awareness of the benefits of healthy water environments	✓				
	Wider environmental benefits	Improvement of riparian habitat	✓		Logistics	• Surrounding landowners to be contacted regarding machinery access • 100% of material to be disposed of off-site	
Ownership	Suggested action owner	City of Edinburgh Council		CAR licensing required	Registration	Simple licence ✓	Complex licence
	Land owner	The City of Edinburgh Council			In stream structure in river ≤ 3m wide		

ISSUE 2: Broken weir causing local bank stability		**ACTION:** Remove weir				**Unique ID:** Bra_WRe_1		
Site information	Description	Upper reaches of Hermitage of Braid		**Cost estimate**	Estimate (£k)	10.5		
	OS NGR	322067E 668184N			Assumptions	Includes costs for hydrological model (£3k), topographical survey (£2k), 2 days work site engineer and disposal of all excavated material offsite. Assumes weir dimensions of 3m width and 1m depth.		
	Photo reference	Appendix B – Photo 3		**Further considerations**	Funding mechanism / opportunities	**Fund name**		**Applicability**
	Site access	Via Dreghorn Loan to the west of the waterway				Scotland Rural Development Fund	Challenge Funds	✗
	Reach length (m)	5 (approximately)					Rural Development Contracts – Land Manager Options	✗
Pressure	Pressures to be addressed through regulatory means	• Urban diffuse pollution • Morphological					Rural Priorities – Forth Area	✗
	IHN	None – gap in network				Scottish Natural Heritage	Natural Project Grants	✗
	JBA ID	N/A					Community Grants	✗
	Associated data sources	Within local nature conservation site					Central Scotland Green Network	✗
Habitat	Type of existing habitat	Broadleaved semi-natural woodland				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 Steel Charitable Trust		✓ ✓
	Sensitivity of existing habitat to land use / habitat change	High						
	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				Ecological habitat survey		✗
	Flood risk benefit?	✗				Hydrological survey		✓
	Public access (existing or can connect to?)	✓	Existing path adjacent to the site.			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 of floodplain
		Reduce invasive non-native species	✗				Mitigation measures ✓	Sediment control to minimise sediment disturbance and movement downstream
		Climate change adaptation	✗			Timing	Works to be carried out during low flow periods	
		Raise awareness of the benefits of healthy water environments	✓			Logistics	Redundant material to be disposed of off-site	
	Wider environmental benefits	Improvements to flow and fish passage through sub-reach	✓		CAR licensing required	Registration	Simple licence ✓	Complex licence
Ownership	Suggested action owner	City of Edinburgh Council				In-stream structure in river ≤ 3m wide		
	Land owner	The City of Edinburgh Council to the west; Dreghorn Barracks to the east						

ISSUE 3: Poor morphology in culverted section of reach		**ACTION:** Remove culvert				**Unique ID:** Bra_CRe_1		
Site information	Description	Upper reaches of Hermitage of Braid		**Cost estimate**	Estimate (£k)	28.8		
	OS NGR	322173E 668300N to 322230E 668322N - Bra_CRe_1			Assumptions	Includes costs for hydrological model (£3k), topographical survey (£2k), 2 days work site engineer and disposal of all excavated material offsite. Assumes excavation width of 2m and depth of 2m.		
	Photo reference	Appendix B – photo 4				**Fund name**		**Applicability**
	Site access	Via Dreghorn Barracks to the east of the waterway or via path to the west.				Scotland Rural Development Fund	Challenge Funds	✖
	Reach length (m)	14					Rural Development Contracts – Land Manager Options	✖
Pressure	Pressures to be addressed through regulatory means	• Urban diffuse pollution • Morphological					Rural Priorities – Forth Area	✖
	IHN	None – gap in network				Scottish Natural Heritage	Natural Project Grants	✖
	JBA ID	N/A					Community Grants	✖
	Associated data sources	Within local nature conservation site					Central Scotland Green Network	✖
Habitat	Type of existing habitat	Broadleaved semi-natural woodland with exotic plantings			Funding mechanism / opportunities	SEPA Scottish restoration fund		✓
	Extent of existing habitat	Full length of reach containing structures				Land developer (ie. of surrounding area)		✖
	Quality of existing habitat	Good				Other: • The Naturesave Trust • The Steel Charitable Trust		✓ ✓
	Sensitivity of existing habitat to land use / habitat change	High						
	Indicative species mix for restoration	Alder, grey sallow						
	Establishment techniques required	Direct planting						
Benefits	Barrier to restoration?	✓	Built heritage	**Further considerations**		**Survey Type**		**Required**
	Capacity released – contribution to obtaining GES	None – not classified in SEPA's database			Other surveys required	Ecological habitat survey		✖
	Flood risk benefit?	✓	Increase in floodplain connectivity reducing likelihood of flows backing up behind culvert.			Hydrological survey		✓
	Public access (existing or can connect to?)	✓	Existing paths in conservation reserve adjacent to the burn (on both sides)			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 downstream
		Climate change adaptation	✖			Timing	To be carried out during low flow periods	
		Raise awareness of the benefits of healthy water environments	✓			Logistics	Access required through woodland area	
	Wider environmental benefits	Improvements to fish passage and flow through sub-reach	✓		CAR licensing required	Registration	Simple licence ✓	Complex licence
Ownership	Suggested action owner	City of Edinburgh Council				Culvert in river ≥ 2m wide		
	Land owner	The City of Edinburgh Council. Dreghorn Barracks is located to the south east of the reach.						

ISSUE 4: Poor channel morphology and redundant weirs		**ACTION:** Remove weirs				**Unique ID:**Bra_WRe_2, Bra_WRe_3		
Site information	Description	Upper reaches of Hermitage of Braid		**Cost estimate**	Estimate (£k)	12.2		
	OS NGR	322360E 668441N - Bra_WRe_2 322506E 668568N - Bra_WRe_3			Assumptions	Both weirs to be surveyed and modelled together. Includes costs for one hydrological model (£3K) and one topographical survey (£2k), 3 days site engineer. All excavated material to be disposed of off-site. Assumes excavation width of 5m and depth of 1m.		
	Photo reference	Appendix B – photos 5 and 6			Funding mechanism / opportunities	**Fund name**		**Applicability**
	Site access	Via Dreghorn Barracks to the east of the waterway or via path to the west.				Scotland Rural Development Fund	Challenge Funds	✖
	Reach length (m)	Approx 5m each weir					Rural Development Contracts – Land Manager Options	✖
Pressure	Pressures to be addressed through regulatory means	• Urban diffuse pollution • Morphological					Rural Priorities – Forth Area	✖
	IHN	None – gap in network				Scottish Natural Heritage	Natural Project Grants	✖
	JBA ID	N/A					Community Grants	✖
	Associated data sources	• Local nature conservation site • Partially within fluvial 200 year					Central Scotland Green Network	✖
Habitat	Type of existing habitat	Broadleaved semi-natural woodland with exotic plantings				SEPA Scottish restoration fund		✓
	Extent of existing habitat	Full length of reach containing structures				Land developer (ie. of surrounding area)		✖
	Quality of existing habitat	Good				Other: • The Naturesave Trust • The Steel Charitable Trust		✓ ✓
	Sensitivity of existing habitat to land use / habitat change	High						
	Indicative species mix for restoration	Alder, grey sallow						
	Establishment techniques required	Direct planting						
Benefits	Barrier to restoration?	✖		**Further considerations**	Other surveys required	**Survey Type**		**Required**
	Capacity released – contribution to obtaining GES	None				Ecological habitat survey		✖
	Flood risk benefit?	✖				Hydrological survey		✓
	Public access (existing or can connect to?)	✓	Existing paths in conservation reserve adjacent to the burn (on both sides)			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 downstream
		Climate change adaptation	✖			Timing	To be carried out during low flow periods	
		Raise awareness of the benefits of healthy water environments	✓			Logistics	Access required through woodland area	
	Wider environmental benefits	Improvements to fish passage and flow through sub-reach	✓		CAR licensing required	Registration	Simple licence ✓	Complex licence
Ownership	Suggested action owner	City of Edinburgh Council				In-stream structure in river ≤ 3m wide		
	Land owner	The City of Edinburgh Council. Dreghorn Barracks is located to the south of the reach.						

ISSUE 5: Ornamental structure, lined channel and redundant weir		**ACTION:** Remove structure; remove lined channel; remove weir			**Unique ID:** Bra_StRe_1, Bra_LCRe_2; Bra_WRe_4			
Site information	Description	Downstream of Redford Road		**Cost estimate**	Estimate (£k)	21.7		
	OS NGR	322619E 668757N – Bra_WRe_4 322670E 668785N – Bra_StRe_1, Bra_LCRe_2			Assumptions	Weir, lined channel and structure to be surveyed and modelled together. Includes costs for one hydrological model (£3K) and one topographical survey (£2.5k), 4 days site engineer. All excavated material to be disposed of off-site. Includes time to liaise with landowner regarding ornamental structure. Assumes weir excavation width of 5m and depth of 1m. Lined channel excavation width of 3m and depth of 1m.		
	Photo reference	Appendix B – Photo 10			Funding mechanism / opportunities	**Fund name**		**Applicability**
	Site access	Potential access via residential areas to either side of the waterway				Scotland Rural Development Fund	Challenge Funds	✖
	Reach length (m)	72 (total length); weir – approx 5m; lined channel – 36m					Rural Development Contracts – Land Manager Options	✖
Pressure	Pressures to be addressed through regulatory means	• Urban diffuse pollution • Morphological					Rural Priorities – Forth Area	✖
	IHN	None – gap in network				Scottish Natural Heritage	Natural Project Grants	✖
	JBA ID	N/A					Community Grants	✖
	Associated data sources	• Fully within fluvial 200 year • Local conservation nature site					Central Scotland Green Network	✖
Habitat	Type of existing habitat	Floodplain grassland (right bank) and broadleaved riparian woodland (left bank) surrounding the weir; riparian woodland/wet grassland surrounding the ornamental structure and lined channel.				SEPA Scottish restoration fund		✓
	Extent of existing habitat	Full length of structure				Land developer (ie. of surrounding area)		✖
	Quality of existing habitat	Moderate (left bank), poor (right bank)				Other: • The Naturesave Trust • The Steel Charitable Trust		✓ ✓
	Sensitivity of existing habitat to land use / habitat change	High						
	Indicative species mix for restoration	Alder, watercress, grey sallow, meadowsweet, creeping bent.						
	Establishment techniques required	Direct planting and seeding						
Benefits	Barrier to restoration?	✓	Need to investigate who is owner of ornamental structure and why it is in burn.	**Further considerations**	Other surveys required	**Survey Type**		**Required**
	Capacity released – contribution to obtaining GES	Removal of embankment with bank protection assessed to release 0.81%. Would need to reassess removal of lined channel in Mimas.				Ecological habitat survey		✓
	Flood risk benefit?	✖				Hydrological survey		✓
	Public access (existing or can connect to?)	✓	Existing path running alongside southern bank of burn.			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	✓ Machinery to keep out of waterway where possible
		Climate change adaptation	✖			Timing	• Works to be carried out during low flow periods • Works to be carried out during normal working hours to minimise noise pollution to residents	
		Raise awareness of the benefits of healthy water environments	✓			Logistics	• 100% of material to be disposed of off-site • Need to consult landowners regarding access for machinery	
	Wider environmental benefits	Improvements to fish passage through sub-reach. Improvements to riparian habitat.	✓		CAR licensing required	Registration	Simple licence ✓	Complex licence
Ownership	Suggested action owner	City of Edinburgh Council				In-stream structure >3m wide affecting ≤ 50m of river length		
	Land owner	The City of Edinburgh Council to the east; private – residential owner to the west.						

ISSUE 6: Footbridge is constraining channel and restricting floodplain connectivity		**ACTION:** Replace / widen footbridge; remove fencing		**Unique ID:** Bra_BrRp_1; Bra_FRe_1		
Site information	Description	Downstream of Redford Road	**Cost estimate**	Estimate (£k)	Requires further assessment to establish whether bridge should be widened or replaced. Initial costs (£k) = 5.2	
	OS NGR	322803E 668841N		Assumptions	Initial costs include hydrological model (£3k), topographical survey (£2k) and one day work site agent.	
	Photo reference	Appendix B – Photo 12	**Further considerations**	Funding mechanism / opportunities	**Fund name**	**Applicability**
	Site access	Via residential streets to the north – Redford Place			Scotland Rural Development Fund – Challenge Funds	✗
	Reach length (m)	2			Scotland Rural Development Fund – Rural Development Contracts – Land Manager Options	✗
Pressure	Pressures to be addressed through regulatory means	• Urban diffuse pollution • Morphological			Scotland Rural Development Fund – Rural Priorities – Forth Area	✗
	IHN	None – gap in network			Scottish Natural Heritage – Natural Project Grants	✗
	JBA ID	N/A			Scottish Natural Heritage – Community Grants	✗
	Associated data sources	• Fully within fluvial 200 year • Within local nature conservation site • Core path approximately 120 m downstream of site			Scottish Natural Heritage – Central Scotland Green Network	✗
Habitat	Type of existing habitat	Footpath			SEPA Scottish restoration fund	✓
	Extent of existing habitat	Full length of structure			Land developer (ie. of surrounding area)	✗
	Quality of existing habitat	Very low			Other:	✗
	Sensitivity of existing habitat to land use / habitat change	Very low				
	Indicative species mix for restoration	Not applicable				
	Establishment techniques required	Not applicable				
Benefits	Barrier to restoration?	✓ Footbridge currently connects residential areas either side of the burn		Other surveys required	**Survey Type**	**Required**
	Capacity released – contribution to obtaining GES	None			Ecological habitat survey	✗
	Flood risk benefit?	✓ Improvement of floodplain connectivity and transmission of flows through sub-reach.			Hydrological survey	✓
	Public access (existing or can connect to?)	✓ Footbridge is currently used to connect residential areas either side of the burn.			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: ✓ – Consult surrounding landowners.	
		Contribute to addressing flood risk: ✓			Methods – Machinery required: ✓ – Machinery to be stored outside of the floodplain	
		Reduce invasive non-native species: ✗			Methods – Mitigation measures: ✓ – Machinery to be kept out of the watercourse where possible.	
		Climate change adaptation: ✗			Timing: To be carried out during low flow periods	
		Raise awareness of the benefits of healthy water environments: ✓				
	Wider environmental benefits	Improvements in floodplain connectivity and transmission of flows through sub-reach: ✓				
Ownership	Suggested action owner	The City of Edinburgh Council		Logistics	Multiple surrounding landowners to consult	
	Land owner	The City of Edinburgh Council		CAR licensing required	Registration ✓ – Simple licence – Complex licence	
					Bridge with no construction on bed and ≤ 20m of total bank affected.	

ISSUE 7: Bank erosion and deposition further downstream		**ACTION:** Planting to improve riparian strip				**Unique ID:** Bra_VP_1			
Site information	Description	Downstream of Redford Road; adjacent to Colinton Primary School		**Cost estimate**	Estimate (£k)	2.9			
	OS NGR	322844E 668873N to 322885E 668933N			Assumptions	Includes plants, clearance and labour costs. Assumes 10m width on both sides of the burn.			
	Photo reference	Appendix B – Photos 13 to 14		**Further considerations**	Funding mechanism / opportunities	**Fund name**			**Applicability**
	Site access	Via residential streets to the north – Redford Place				Scotland Rural Development Fund	Challenge Funds		✗
	Reach length (m)	95					Rural Development Contracts – Land Manager Options		✗
Pressure	Pressures to be addressed through regulatory means	• Urban diffuse pollution • Morphological					Rural Priorities – Forth Area		✗
	IHN	None – gap in network				Scottish Natural Heritage	Natural Project Grants		✓
	JBA ID	N/A					Community Grants		✓
	Associated data sources	• Fully within fluvial 200 year • Local nature conservation site • Core path adjacent to site					Central Scotland Green Network		✓
Habitat	Type of existing habitat	Broadleaved riparian woodland and broadleaved plantation woodland (left bank). Inundation grassland and broadleaved woodland (right bank)				SEPA Scottish restoration fund			✓
	Extent of existing habitat	Full length of sub reach				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							
	Indicative species mix for restoration	Alder and grey sallow							
	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 for improvements through riparian planting				Ecological habitat survey			✗
	Flood risk benefit?	✓	Planting will increase riparian roughness, reducing flood flow velocities through sub-reach.			Hydrological survey			✗
	Public access (existing or can connect to?)	✓	Adjacent to core path which runs parallel to burn in north/south direction.			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	Planting ideally done between November and February, avoiding frost where possible.		
		Raise awareness of the benefits of healthy water environments	✓			Logistics	N/A		
	Wider environmental benefits	Improvement to riparian habitat	✓		CAR licensing required	N/A			
Ownership	Suggested action owner	The City of Edinburgh Council							
	Land owner	The City of Edinburgh Council							

ISSUE 8: Debris on banks both from upstream sources and illegally dumped there.		**ACTION:** Remove debris; conduct an education programme.			**Unique ID:** Bra_DRe_1, Bra_DRe_2		
Site information	Description	Upstream and downstream of Colinton Mains Drive	**Cost estimate**	Estimate (£k)	16.7 + education costs		
	OS NGR	322861E 669177N to 322897E 669219N – Bra_DRe_1 322997E 669357N – Bra_DRe_2		Assumptions	100% of material to be disposed of off-site. Includes one day site agent time. Will require further assessment to determine extent and costs of education programme.		
	Photo reference	None	**Further considerations**	Funding mechanism / opportunities	**Fund name**		**Applicability**
	Site access	• Via Colinton Mains Drive (downstream) or Colinton Mains Loan (upstream) • Via side road off Oxgangs Road North (to the north of the site)			Scotland Rural Development Fund	Challenge Funds	✖
	Reach length (m)	80				Rural Development Contracts – Land Manager Options	✖
Pressure	Pressures to be addressed through regulatory means	• Urban diffuse pollution • Morphological				Rural Priorities – Forth Area	✖
	IHN	None – gap in network			Scottish Natural Heritage	Natural Project Grants	✓
	JBA ID	N/A				Community Grants	✓
	Associated data sources	• Fully within fluvial 200 year • Within local conservation nature site • Adjacent to core path – runs parallel to burn on south eastern bank (upstream of Colinton Mains Drive) and along north western bank (downstream of Colinton Mains Drive).				Central Scotland Green Network	✓
Habitat	Type of existing habitat	Amenity grassland			SEPA Scottish restoration fund		✖
	Extent of existing habitat	Full length of sub-reaches on both banks			Land developer (ie. of surrounding area)		✖
	Quality of existing habitat	Very low			Other: • Awards for All Scotland • J Paul Getty JR Charitable Trust • The Naturesave Trust • The Ibrahim Foundation • The Woodward Charitable Trust • Community Spaces Sustainability Grant		✓ ✓ ✓ ✓ ✓ ✓
	Sensitivity of existing habitat to land use / habitat change	Negligible					
	Indicative species mix for restoration	Alder, grey sallow, osier					
	Establishment techniques required	Direct planting					
Benefits	Barrier to restoration?	✖		Other surveys required	**Survey Type**		**Required**
	Capacity released – contribution to obtaining GES	None			Ecological habitat survey		✖
	Flood risk benefit?	✖			Hydrological survey		✖
	Public access (existing or can connect to?)	✓	Existing core path provides public access from Colinton Mains Drive and Oxgangs Road North along burn and through conservation reserve.		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 ✓	Consult surrounding landowners.
		Contribute to addressing flood risk	✖			Machinery required ✓	
		Reduce invasive non-native species	✖			Mitigation measures ✓	
		Climate change adaptation	✖		Timing	To be carried out during low flow periods	
		Raise awareness of the benefits of healthy water environments	✓				
	Wider environmental benefits	Aesthetic improvements to waterway area; improved bed and bank habitat quality.	✓				
Ownership	Suggested action owner	The City of Edinburgh Council			Logistics	Multiple surrounding landowners to consult	
	Land owner	The City of Edinburgh Council to the south; Oxgangs Primary School to the north		CAR licensing required	N/A		

ISSUE 9: Low terrace management		**ACTION:** Plant low valley sides and plant terraces				**Unique ID:** Bra_VP_2		
Site information	Description	Between Colinton Mains Drive and Oxgangs Road North		**Cost estimate**	Estimate (£k)	1.1		
	OS NGR	323033E 669390N			Assumptions	Planting on one side of the burn only at a width of 20m.		
	Photo reference	None			Funding mechanism / opportunities	**Fund name**		**Applicability**
	Site access	Via side road off Oxgangs Road North (to the north of the site)				Scotland Rural Development Fund	Challenge Funds	✖
	Reach length (m)	25					Rural Development Contracts – Land Manager Options	✖
Pressure	Pressures to be addressed through regulatory means	• Urban diffuse pollution • Morphological					Rural Priorities – Forth Area	✖
	IHN	None – gap in network				Scottish Natural Heritage	Natural Project Grants	✓
	JBA ID	N/A					Community Grants	✖
	Associated data sources	• Fully within fluvial 200 year • Within local conservation nature site • Core path runs parallel to burn, along north western bank • Groundwater flood hazard area immediately downstream of site					Central Scotland Green Network	✓
Habitat	Type of existing habitat	Amenity grassland on both banks with occasional whip plantings.				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 • J Paul Getty JR Charitable Trust • Tree Council Grants • The Woodward Charitable Trust		✓ ✓ ✓ ✓ ✓ ✓
	Sensitivity of existing habitat to land use / habitat change	Negligible						
	Indicative species mix for restoration	Alder, osier, creeping bent, meadowsweet						
	Establishment techniques required	Direct planting and seeding						
Benefits	Barrier to restoration?	✖		**Further considerations**	Other surveys required	**Survey Type**		**Required**
	Capacity released – contribution to obtaining GES	1252m of low impact channel alignment releases 3.25% capacity. As a proportion, planting of 23m of this sub-reach will release approximately 0.06% capacity.				Ecological habitat survey		✖
	Flood risk benefit?	✓	Planting will increase floodplain roughness, reducing flood flow velocities. Will also help decrease rate of runoff from surrounding land.			Hydrological survey		✖
	Public access (existing or can connect to?)	✓	Existing core path provides public access from Colinton Mains Drive and Oxgangs Road North along burn and through conservation reserve. Also public access through Oxgangs Primary School.			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	Planting ideally done between November and February, avoiding frost where possible.	
		Raise awareness of the benefits of healthy water environments	✓					
	Wider environmental benefits	Improvements to riparian and floodplain habitat quality; potential positive impacts gained from involving school in project.	✓					
Ownership	Suggested action owner	The City of Edinburgh Council or Oxgangs Primary School				Logistics	N/A	
	Land owner	Oxgangs Primary School to the west; private residential owners to the east.			CAR licensing required	N/A		

ISSUE 10: - Morphological development and channel widening; - Debris accumulation; - Degraded riparian vegetation		**ACTIONS:** - Improve in channel morphology by creating transverse bars along reach to encourage sinuosity and naturalisation; - Remove debris and gabion baskets; - Plant low valley sides and terraces			**Unique ID:** - Bra_ChR_1; Bra_DRe_3; Bra_StRe_2; - Bra_TBC_1, Bra_TBC_2, Bra_TBC_3, Bra_TBC_4, Bra_TBC_5; - Bra_VP_3		
Site information	Description	Colinton Mains Park	**Cost estimate**	Estimate (£k) debris removal	120	Estimate (£k) gabion baskets	1.3
				Estimate (£k) channel morphology	3.4	Estimate (£k) planting	0.7
	OS NGR	323169E 669436N to 324028E to 669479N – Bra_ChR_1, Bra_DRe_3 323185E 669430N to 323453E 669472N – Bra_TBC_1 to Bra_TBC_5 323594E 669481N – Bra_StRe_2 323594 669481 – Bra_VP_3	**Further considerations**	Assumptions	100% of redundant material / debris disposed of off-site. Planting costs includes plants, labour and clearance costs. Costs include time for site engineer and agent to undertake investigation and supervision. Assume gabion baskets 0.5m width and 1m height. Planting width of 10m on both sides of the burn.		
	Photo reference	None		Funding mechanism / opportunities	**Fund name**		**Applicability**
	Site access	Colinton Mains Park			Scotland Rural Development Fund	Challenge Funds	✗
	Reach length (m)	910				Rural Development Contracts – Land Manager Options	✗
Pressure	Pressures to be addressed through regulatory means	• Urban diffuse pollution • Morphological				Rural Priorities – Forth Area	✗
	IHN	None – gap in network			Scottish Natural Heritage	Natural Project Grants	✓
	JBA ID	N/A				Community Grants	✗
	Associated data sources	• Fully within fluvial 200 year • Within local conservation nature site • Core path runs parallel to burn, along southern bank • Ground water hazard area				Central Scotland Green Network	✓
Habitat	Type of existing habitat	Amenity grassland (playing fields) and unimproved neutral grassland typical of road verges.			SEPA Scottish restoration fund		✓
	Extent of existing habitat	Full length of sub-reach			Land developer (ie. of surrounding area)		✗
	Quality of existing habitat	Low			Other: • Awards for All Scotland • Community Spaces Scotland • J Paul Getty JR Charitable Trust • The Naturesave Trust • The Ibrahim Foundation • The Woodward Charitable Trust • The Steel Charitable Trust • Tree Council Grants		✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓
	Sensitivity of existing habitat to land use / habitat change	Very low		Other surveys required	**Survey Type**		**Required**
	Indicative species mix for restoration	Meadowsweet, alder, grey sallow, osier, creeping bent, bottle sedge			Ecological habitat survey		✓
	Establishment techniques required	Direct planting and seeding			Hydrological survey		✓
Benefits	Barrier to restoration?	✗			Ground investigation		✓
	Capacity released – contribution to obtaining GES	Low impact channel realignment along 1252m releases 3.25% of capacity. Improvements to approximately 910m of this sub-reach will release a portion of this capacity – about 2.4%.			Topographical survey		✓
	Flood risk benefit?	✓	Improvements to morphology will encourage sinuosity and allow natural flow processes to occur, reducing flood flow velocities. Planting will also increase roughness on a section of the sub-reach, also reducing flood flow velocities.		Water quality monitoring		✗
	Public access (existing or can connect to?)	✓	Public access through Colinton Mains park which connects to core paths running along burn. The reach can also be accessed through Colinton Mains Park.	Construction / restoration costs	Methods	Access required ✓	May need to consult surrounding landowners
	Multiple WFD benefits	**Potential benefit**				Machinery required ✓	
		Opportunity to expand green/ecological network	✓			Mitigation measures ✓	
		Help achieve good ecological status	✓		Timing	• Channel restoration and structure removal to be undertaken during low flow periods • Planting ideally done between November and February, avoiding frost where possible	
		Contribute to addressing flood risk	✓		Logistics	• Some parts of the reach may have constrained access	
		Reduce invasive non-native species	✗				
		Climate change adaptation	✓				
		Raise awareness of the benefits of healthy water environments	✓				
	Wider environmental benefits	Improvements to in-channel biodiversity and riparian habitat quality.	✓				

<table>
<tr><td colspan="3">ISSUE 10:
- Morphological development and channel widening;
- Debris accumulation;
- Degraded riparian vegetation</td><td colspan="4">ACTIONS:
- Improve in channel morphology by creating transverse bars along reach to encourage sinuosity and naturalisation;
- Remove debris and gabion baskets;
- Plant low valley sides and terraces</td><td colspan="6">Unique ID:
- Bra_ChR_1; Bra_DRe_3; Bra_StRe_2;
- Bra_TBC_1, Bra_TBC_2, Bra_TBC_3, Bra_TBC_4, Bra_TBC_5;
- Bra_VP_3</td></tr>
<tr><td rowspan="2">Ownership</td><td>Suggested action owner</td><td colspan="3">The City of Edinburgh Council</td><td></td><td colspan="6">• Multiple landowners to consult</td></tr>
<tr><td>Land owner</td><td colspan="3">St Mark’s RC Primary School (upstream section of the reach); private residential owners; the City of Edinburgh Council.</td><td>CAR licensing required</td><td>Registration</td><td></td><td>Simple licence</td><td>✓</td><td>Complex licence</td><td></td></tr>
<tr><td colspan="6">Channel modification and green bank reinforcement</td></tr>
</table>

ISSUE 11: Degraded riparian vegetation		**ACTION:** Improve riparian strip with planting				**Unique ID:** Bra_VP_4		
Site information	Description	Braidburn Valley		**Cost estimate**	Estimate (£k)	20.8		
	OS NGR	324044E 669476N to 324273E 670171N			Assumptions	Assume 10m width on both sides of the burn, includes plants, clearance and labour costs.		
	Photo reference	Appendix B – Photos 17 and 18		**Further considerations**	Funding mechanism / opportunities	**Fund name**		**Applicability**
	Site access	Via track that runs parallel to burn, can be accessed from either the north or the south.				Scotland Rural Development Fund	Challenge Funds	✗
	Reach length (m)	750					Rural Development Contracts – Land Manager Options	✗
Pressure	Pressures to be addressed through regulatory means	• Urban diffuse pollution • Morphological					Rural Priorities – Forth Area	✗
	IHN	None – gap in network				Scottish Natural Heritage	Natural Project Grants	✓
	JBA ID	N/A					Community Grants	✗
	Associated data sources	• Partially within fluvial 200 year • Within local conservation nature site • Core path runs parallel to burn, along western bank • Partially within ground water hazard area (at the southern end of the reach)					Central Scotland Green Network	✓
Habitat	Type of existing habitat	Amenity grassland, unimproved neutral grassland, semi-natural broadleaved woodland, broadleaved plantation woodland				SEPA Scottish restoration fund		✓
	Extent of existing habitat	Mainly amenity grassland with the other habitats very patchy along the burnside. This habitat mix extends the entire sub-reach of the burn.				Land developer (ie. of surrounding area)		✗
	Quality of existing habitat	Moderate				Other: • Awards for All Scotland • Community Spaces Scotland • J Paul Getty JR Charitable Trust • 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	Alder, grey sallow, osier, meadowsweet, yellow flag iris, branched burr-reed, watercress, common water crowfoot, 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 for improvements through riparian planting				Ecological habitat survey		✗
	Flood risk benefit?	✓	Planting will increase riparian roughness, reducing flood flow velocities through sub-reach.			Hydrological survey		✗
	Public access (existing or can connect to?)	✓	Existing public access to area. The reach is adjacent to vehicle access, a core path and surrounding park land.			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	Planting ideally done between November and February, avoiding frost where possible.	
		Raise awareness of the benefits of healthy water environments	✓			Logistics	N/A	
	Wider environmental benefits	Improvements to riparian habitat quality	✓		CAR licensing required	N/A		
Ownership	Suggested action owner	The City of Edinburgh Council						
	Land owner	The City of Edinburgh Council (Braidburn Valley); private residential owners to the west of the reach.						

ISSUE 12: Constrained flood channel – blockstone wall		**ACTION:** Remove blockstone / masonry walling				**Unique ID:** Bra_StRe_3		
Site information	Description	Hermitage of Braid		**Cost estimate**	Estimate (£k)	251		
	OS NGR	324444E 670226N to 325150E 670310N			Assumptions	Includes 3 days time for site engineer, hydrological model (£3k) and topographical survey (£2k). All redundant material to be disposed of off-site. Assumes width of 1m and depth of 2m.		
	Photo reference	Appendix B – Photos 21 to 24			Funding mechanism / opportunities	**Fund name**		**Applicability**
	Site access	Hermitage of Braid track that runs alongside the southern banks of the burn in this section				Scotland Rural Development Fund	Challenge Funds	✗
	Reach length (m)	750					Rural Development Contracts – Land Manager Options	✗
Pressure	Pressures to be addressed through regulatory means	• Urban diffuse pollution • Morphological					Rural Priorities – Forth Area	✗
	IHN	Neutral grassland				Scottish Natural Heritage	Natural Project Grants	✗
	JBA ID	91_3500_UrbanDP_NG_325601_670271					Community Grants	✗
	Associated data sources	• Partially within fluvial 200 year • Within local conservation nature site • Core path along the Hermitage of Braid track – along the southern banks of the burn.					Central Scotland Green Network	✗
Habitat	Type of existing habitat	Broadleaved semi-natural woodland 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	Very good				Other: • The Naturesave Trust • The Steel Charitable Trust		✓ ✓
	Sensitivity of existing habitat to land use / habitat change	Very high						
	Indicative species mix for restoration	Alder						
	Establishment techniques required	Direct planting						
Benefits	Barrier to restoration?	✗		**Further considerations**	Other surveys required	**Survey Type**		**Required**
	Capacity released – contribution to obtaining GES	None				Ecological habitat survey		✗
	Flood risk benefit?	✓	Improve floodplain connectivity, local floodplain storage, reduce upstream flood risk			Hydrological survey		✓
	Public access (existing or can connect to?)	✓	Existing public access along Hermitage of Braid track.			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 prevent movement of sediment downstream
		Climate change adaptation	✓			Timing	To be carried out during low flow periods.	
		Raise awareness of the benefits of healthy water environments	✓			Logistics	100% of material to be disposed of off-site	
	Wider environmental benefits	Improvements to riparian and bank habitat quality. Reconnection of floodplain.	✓		CAR licensing required	Registration	Simple licence ✓	Complex licence
Ownership	Suggested action owner	The City of Edinburgh Council				Grey bank structure in river ≤ 3m wide.		
	Land owner	The City of Edinburgh Council; private residential owners to the north of the reach.						

ISSUE 13: Lined channel		**ACTION:** Remove lined channel			**Unique ID:** Bra_LCRe_3		
Site information	Description	Hermitage of Braid	**Cost estimate**	Estimate (£k)	13.1		
	OS NGR	324566 670219		Assumptions	All material to be disposed of off-site. Includes time for site engineer. Assumes width of 3m and depth of 1m.		
	Photo reference	Appendix B – Photo 22		Funding mechanism / opportunities	**Fund name**		**Applicability**
	Site access	Hermitage of Braid track that runs alongside the southern banks of the burn in this section			Scotland Rural Development Fund	Challenge Funds	✗
	Reach length (m)	50				Rural Development Contracts – Land Manager Options	✗
Pressure	Pressures to be addressed through regulatory means	• Urban diffuse pollution • Morphological				Rural Priorities – Forth Area	✗
	IHN	None – area of neutral grassland is downstream of site			Scottish Natural Heritage	Natural Project Grants	✗
	JBA ID	N/A				Community Grants	✗
	Associated data sources	• Partially within fluvial 200 year • Within local conservation nature site • Core path along the Hermitage of Braid track – along the southern banks of the burn.				Central Scotland Green Network	✗
Habitat	Type of existing habitat	Broadleaved semi-natural woodland			SEPA Scottish restoration fund		✓
	Extent of existing habitat	Full length of sub-reach on both banks			Land developer (ie. of surrounding area)		✗
	Quality of existing habitat	Very good			Other: • The Naturesave Trust • The Steel Charitable Trust		✓ ✓
	Sensitivity of existing habitat to land use / habitat change	Very high					
	Indicative species mix for restoration	Alder					
	Establishment techniques required	Direct planting					
Benefits	Barrier to restoration?	✗		**Further considerations**	**Survey Type**		**Required**
	Flood risk benefit?	✗			Other surveys required	Ecological habitat survey	✗
	Public access (existing or can connect to?)	✓	Existing public access along Hermitage of Braid track.			Hydrological survey	✗
	Multiple WFD benefits	**Potential benefit**				Ground investigation	✓
		Opportunity to expand green/ecological network	✗			Topographical survey	✗
		Help achieve good ecological status	✓			Water quality monitoring	✗
		Contribute to addressing flood risk	✗		Construction / restoration costs	Methods	Access required ✓
		Reduce invasive non-native species	✗				Machinery required ✓
		Climate change adaptation	✗				Mitigation measures ✓ Sediment control measures to prevent sediment disturbance and movement downstream.
		Raise awareness of the benefits of healthy water environments	✓			Timing	To be carried out during low flow periods
	Wider environmental benefits	Improvement of riparian habitat quality. Restoration of natural gravel / cobble bed and improvements to aquatic habitat.	✓			Logistics	100% of material to be disposed of off-site
Ownership	Suggested action owner	The City of Edinburgh Council			CAR licensing required	Registration	Simple licence ✓ Complex licence
	Land owner	The City of Edinburgh Council; private residential owners to the north of the reach.				In-stream structure in river ≤ 3m wide	

ISSUE 14: Redundant weir and degraded rapids		**ACTION:** Remove weir and restore rapids downstream				**Unique ID:** Bra_WRe_5, Bra_ChR_2		
Site information	Description	Hermitage of Braid		**Cost estimate**	Estimate (£k)	43		
	OS NGR	324834E 670243N to 324920E 670261N			Assumptions	100% redundant material to be disposed of off-site. Includes hydrological model (£3k) and topographical survey (£2k) for both weir removal and rapid restoration together. Includes time for site engineer and agent. Assumes weir excavation width of 5m and depth of 1.3m. Excavation depth of rapids – 3m width and 0.5m depth.		
	Photo reference	Appendix B – Photo 23		**Further considerations**	Funding mechanism / opportunities	**Fund name**		**Applicability**
	Site access	Hermitage of Braid track that runs alongside the southern banks of the burn in this section				Scotland Rural Development Fund	Challenge Funds	✗
	Reach length (m)	90 (total length)					Rural Development Contracts – Land Manager Options	✗
Pressure	Pressures to be addressed through regulatory means	• Urban diffuse pollution • Morphological					Rural Priorities – Forth Area	✗
	IHN	None – area of neutral grassland is downstream of site				Scottish Natural Heritage	Natural Project Grants	✗
	JBA ID	N/A					Community Grants	✗
	Associated data sources	• Partially within fluvial 200 year • Within local conservation nature site • Core path along the Hermitage of Braid track – along the southern banks of the burn.					Central Scotland Green Network	✗
Habitat	Type of existing habitat	Broadleaved semi-natural woodland				SEPA Scottish restoration fund		✓
	Extent of existing habitat	Full length of structure on both banks				Land developer (ie. of surrounding area)		✗
	Quality of existing habitat	Very good				Other: • The Naturesave Trust • The Steel Charitable Trust		✓ ✓
	Sensitivity of existing habitat to land use / habitat change	Very high						
	Indicative species mix for restoration	Alder						
	Establishment techniques required	Direct planting						
Benefits	Barrier to restoration?	✓	Historic weir		Other surveys required	**Survey Type**		**Required**
	Capacity released – contribution to obtaining GES	None				Ecological habitat survey		✗
	Flood risk benefit?	✗				Hydrological survey		✓
	Public access (existing or can connect to?)	✓	Existing public access along Hermitage of Braid track.			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 prevent sediment disturbance and movement downstream.
		Climate change adaptation	✗			Timing	To be carried out during low flow periods	
		Raise awareness of the benefits of healthy water environments	✓			Logistics	100% of redundant material to be disposed of off-site	
	Wider environmental benefits	Improvements to fish passage	✓		CAR licensing required	Registration	Simple licence	✓ Complex licence
Ownership	Suggested action owner	The City of Edinburgh Council				In-stream structure in river ≤ 3m wide		
	Land owner	The City of Edinburgh Council; private residential owners to the north of the reach.						

ISSUE 15: Poor channel morphology in culverted section		**ACTION:** Remove two culverts			**Unique ID:** Bra_CRe_2, Bra_CRe_3
Site information	Description	Hermitage of Braid	**Cost estimate**	Estimate (£k)	41.7
	OS NGR	324944E 670252N to 325020E 670252N		Assumptions	100% of material disposed of off-site. Includes site engineer time, hydrological model (£3k), ecological survey (£2k) and topographical survey (£2k) for both culverts together. Assumes excavation width of 2m and depth of 2m.
	Photo reference	None			
	Site access	Hermitage of Braid track that runs alongside the southern banks of the burn in this section			
	Reach length (m)	77 (total length); one culvert is 77m long and the other 13m long			
Pressure	Pressures to be addressed through regulatory means	• Urban diffuse pollution • Morphological			
	IHN	Neutral grassland			
	JBA ID	91_3500_UrbanDP_NG_325601_670271			
	Associated data sources	• Partially within fluvial 200 year • Within local conservation nature site • Core path along the Hermitage of Braid track – along the southern banks of the burn.			
Habitat	Type of existing habitat	Broadleaved semi-natural woodland			
	Extent of existing habitat	Upstream and downstream of structure. There is a car park and an amenity grassland area on top of the culvert.			
	Quality of existing habitat	Low			
	Sensitivity of existing habitat to land use / habitat change	Very low			
	Indicative species mix for restoration	Creeping bent, alder, grey sallow			
	Establishment techniques required	Direct planting and seeding			
Benefits	Barrier to restoration?	✓	Built heritage		
	Capacity released – contribution to obtaining GES	0.51%			
	Flood risk benefit?	✓	Reduce upstream flood risk		
	Public access (existing or can connect to?)	✓	Existing public access along Hermitage of Braid track.		
	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	Restoration of natural fluvial processes. Improvements to fish passage.	✓		
Ownership	Suggested action owner	The City of Edinburgh Council			
	Land owner	The City of Edinburgh Council; private residential owners to the north of the reach.			

Further considerations						
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 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	✓			
		Machinery required	✓			
		Mitigation measures	✓	Sediment control measures to prevent sediment disturbance and movement downstream.		
	Timing	To be carried out during low flow periods				
	Logistics	100% of redundant material to be disposed of off-site				
CAR licensing required	Registration		Simple licence	✓	Complex licence	
	Culvert used for crossing					

ISSUE 16: Constrained floodplain on both banks with limited opportunity on the left bank to connect floodplain across the golf course.			**ACTION:** Improve floodplain connectivity by scraping and reconnecting post paleo feature on floodplain				**Unique ID:** Bra_Sc_1
Site information	Description	Hermitage of Braid	**Cost estimate**	Estimate (£k)	144	Dimensions	659m length
	OS NGR	325151E 670315N to 325718E 670255N		Assumptions	25% of material to be disposed of off-site. Includes site engineer time.		
	Photo reference	Appendix B – Photo 25, 26, 27		Funding mechanism / opportunities	**Fund name**		**Applicability**
	Site access	Via Blackford Glen Road to the east of the reach			Scotland Rural Development Fund	Challenge Funds	✖
	Reach length (m)	660				Rural Development Contracts – Land Manager Options	✖
Pressure	Pressures to be addressed through regulatory means	• Urban diffuse pollution • Morphological				Rural Priorities – Forth Area	✖
	IHN	Neutral grassland			Scottish Natural Heritage	Natural Project Grants	✖
	JBA ID	91_3500_UrbanDP_NG_325601_670271				Community Grants	✖
	Associated data sources	• Fully within fluvial 200 year • Within local conservation nature site • Core path follows the burn and connects to other paths on Blackford Hill (to the north of the site)				Central Scotland Green Network	✖
Habitat	Type of existing habitat	Amenity grassland (golf course) and hedge on the left bank and grass strip and road on the right bank			SEPA Scottish restoration fund		✓
	Extent of existing habitat	Full length of sub-reach			Land developer (ie. of surrounding area)		✖
	Quality of existing habitat	Poor on left bank. Very poor on right bank.			Other: • Awards for All Scotland • J Paul Getty JR Charitable Trust • Community Spaces Sustainability Grant • 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	Crack willow, grey sallow, alder, reed canary grass, branched burr-reed, bottle sedge, watercress, brooklime					
	Establishment techniques required	Direct planting					
Benefits	Barrier to restoration?	✓	Limited opportunity to connect across adjacent golf course.	**Further considerations**	Other surveys required	**Survey Type**	**Required**
	Capacity released – contribution to obtaining GES	None				Ecological habitat survey	✖
	Flood risk benefit?	✓	Increase in floodplain connectivity			Hydrological survey	✓
	Public access (existing or can connect to?)	✓	Existing public access along Hermitage of Braid track and Blackford Hill.			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 of the floodplain
		Reduce invasive non-native species	✖				Mitigation measures ✓ Machinery to be kept out of the waterway where possible.
		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	Reconnection of floodplain and associated processes	✓		CAR licensing required	Registration	Simple licence ✓ Complex licence
Ownership	Suggested action owner	The City of Edinburgh Council				Realignment on river ≤ 3m wide.	
	Land owner	The City of Edinburgh Council					

ISSUE 17: Sparse floodplain vegetation and degraded habitat		**ACTION:** Plant areas of floodplain on both sides of the channel to improved floodplain habitats			**Unique ID:** Bra_VP_5, Bra_VP_6		
Site information	Description	Hermitage of Braid		**Cost estimate**	Estimate (£k)	15.4	
	OS NGR	325651E 670253N to 325833E 670183N			Assumptions	Includes plants, labour and clearance cost. Assume a width of 50m from the burn.	
	Photo reference	Appendix B – Photo 27				**Fund name**	**Applicability**
	Site access	Via Blackford Glen Road to the east of the reach or through golf course.				Scotland Rural Development Fund – Challenge Funds	✗
	Reach length (m)	375				Scotland Rural Development Fund – Rural Development Contracts – Land Manager Options	✗
Pressure	Pressures to be addressed through regulatory means	• Urban diffuse pollution • Morphological				Scotland Rural Development Fund – Rural Priorities – Forth Area	✗
	IHN	Neutral grassland				Scottish Natural Heritage – Natural Project Grants	✓
	JBA ID	91_3500_UrbanDP_NG_325601_670271				Scottish Natural Heritage – Community Grants	✗
	Associated data sources	• Fully within fluvial 200 year • Partially within local conservation nature site (northern banks and floodplain) • Core path follows the burn and connects to other paths on Blackford Hill (to the north of the site)				Scottish Natural Heritage – Central Scotland Green Network	✓
Habitat	Type of existing habitat	Inundation grassland with scrub patches				SEPA Scottish restoration fund	✓
	Extent of existing habitat	Full extent of sub-reach on either side of the burn				Land developer (ie. of surrounding area)	✗
	Quality of existing habitat	Good				Other: • Awards for All Scotland • Community Spaces Scotland • J Paul Getty JR Charitable Trust • The Naturesave Trust • The Ibrahim Foundation • The Steel Charitable Trust	✓ ✓ ✓ ✓ ✓ ✓
	Sensitivity of existing habitat to land use / habitat change	Medium					
	Indicative species mix for restoration	Grey sallow, crack willow, alder, upright burr-reed, meadowsweet					
	Establishment techniques required	Direct planting					
Benefits	Barrier to restoration?	✓	Golf course to the south of the burn	**Further considerations**	Other surveys required	**Survey Type**	**Required**
	Capacity released – contribution to obtaining GES	None				Ecological habitat survey	✗
	Flood risk benefit?	✓	Reduce flood risk by increasing floodplain roughness thereby reducing flood flow velocities.			Hydrological survey	✗
	Public access (existing or can connect to?)	✓	Existing public access along Hermitage of Braid track and Blackford Hill.			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	✗
		Climate change adaptation	✓			Timing	Planting ideally done between November and February, avoiding frost where possible.
		Raise awareness of the benefits of healthy water environments	✓			Logistics	N/A
	Wider environmental benefits	Improved riparian and floodplain habitat quality. Enhanced neutral grassland habitat.	✓		CAR licensing required	N/A	
Ownership	Suggested action owner	The City of Edinburgh Council / Hermitage Golf Course					
	Land owner	The City of Edinburgh Council (to the north); Hermitage Golf Course (to the south)					

ISSUE 18: Redundant in-channel structure		**ACTION:** Remove in-channel structure			**Unique ID:** Bra_StRe_4			
Site information	Description	Adjacent to Blackford Glen Road	**Cost estimate**	Estimate (£k)	9.3	Dimensions	3m width x 0.5m length x 2m height	
	OS NGR	326072E 670195N		Assumptions	100% of material to be disposed of off-site. Includes hydrological model (£3k) and topographical survey (£2k). Assumes structure dimensions of 0.5m length and 2m height.			
	Photo reference	Appendix B – Photo 29		Funding mechanism / opportunities	**Fund name**			**Applicability**
	Site access	Via Blackford Glen Road			Scotland Rural Development Fund	Challenge Funds		×
	Reach length (m)	3				Rural Development Contracts – Land Manager Options		×
Pressure	Pressures to be addressed through regulatory means	• Urban diffuse pollution • Morphological				Rural Priorities – Forth Area		×
	IHN	None – area of neutral grassland is upstream of site			Scottish Natural Heritage	Natural Project Grants		×
	JBA ID	N/A				Community Grants		×
	Associated data sources	• Fully within fluvial 200 year • Partially within local conservation nature site (northern banks and floodplain) • Core path follows Blackford Glen Road running parallel to the burn				Central Scotland Green Network		×
Habitat	Type of existing habitat	Hedgerow on left bank and unimproved grass margin and road on right bank			SEPA Scottish restoration fund			✓
	Extent of existing habitat	Length of structure			Land developer (ie. of surrounding area)			×
	Quality of existing habitat	Good (left bank), very poor (right bank)			Other: • The Naturesave Trust • The Steel Charitable Trust			✓ ✓
	Sensitivity of existing habitat to land use / habitat change	Low						
	Indicative species mix for restoration	Creeping bent grass						
	Establishment techniques required	Seeding						
	Barrier to restoration?	×		**Further considerations**				
	Capacity released – contribution to obtaining GES	Low impact channel realignment along 510m releases 0.89%, removal of structure would release a small portion of this capacity – as a proportion this is about 0.005%.			**Survey Type**			**Required**
	Flood risk benefit?	×		Other surveys required	Ecological habitat survey			×
	Public access (existing or can connect to?)	✓	Existing public access along Blackford Glen Road		Hydrological survey			✓
Benefits	Multiple WFD benefits	**Potential benefit**			Ground investigation			✓
		Opportunity to expand green/ecological network	×		Topographical survey			✓
		Help achieve good ecological status	✓		Water quality monitoring			×
		Contribute to addressing flood risk	×	Construction / restoration costs	Methods	Access required	✓	
		Reduce invasive non-native species	×			Machinery required	✓	
		Climate change adaptation	×			Mitigation measures	✓	Sediment control measures to prevent sediment disturbance and movement downstream.
		Raise awareness of the benefits of healthy water environments	✓		Timing	To be carried out during low flow periods.		
	Wider environmental benefits	Improved bank habitat quality and strength	✓		Logistics	N/A		
Ownership	Suggested action owner	SEPA?		CAR licensing required	Registration		Simple licence ✓	Complex licence
	Land owner	Craigmillar Park Golf course (to the north); private land (unknown owner) to the south.			In-stream structure in river < 3m wide			

ISSUE 19: Anastomosed wetlands on flood plain		**ACTION:** Riparian development and reconnection of channel with wetland areas				**Unique ID:** Bra_ChRc_1		
Site information	Description	Adjacent to Blackford Glen Road		**Cost estimate**	Estimate (£k)	102		
	OS NGR	366980E 670234N to 327051E 670310N			Assumptions	Includes scraping costs with 25% of material disposed of off-site. Also includes planting of wetland areas – plants and labour. Assumes approximate area of 5000m²		
	Photo reference	None		**Further considerations**	Funding mechanism / opportunities	**Fund name**		**Applicability**
	Site access	Via Blackford Glen Road				Scotland Rural Development Fund	Challenge Funds	✗
	Reach length (m)	110					Rural Development Contracts – Land Manager Options	✗
Pressure	Pressures to be addressed through regulatory means	• Urban diffuse pollution • Morphological					Rural Priorities – Forth Area	✗
	IHN	None – area of neutral grassland is upstream of site				Scottish Natural Heritage	Natural Project Grants	✓
	JBA ID	N/A					Community Grants	✗
	Associated data sources	• Partially within fluvial 200 year • Within local conservation nature site • Core path follows Blackford Glen Road adjacent to the burn					Central Scotland Green Network	✓
Habitat	Type of existing habitat	Amenity grassland (golf course) on both banks				SEPA Scottish restoration fund		✓
	Extent of existing habitat	Full length of proposed works				Land developer (ie. of surrounding area)		✗
	Quality of existing habitat	Poor				Other: • J Paul Getty JR Charitable Trust • Community Spaces Sustainability Grant • 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	Alder, crack willow, osier, branched burr-reed, water sedge, reed canary grass, brooklime, watercress, meadowsweet.						
	Establishment techniques required	Direct planting and seeding						
	Barrier to restoration?	✓	Constricted floodplain with little area to develop		Other surveys required	**Survey Type**		**Required**
	Capacity released – contribution to obtaining GES	None				Ecological habitat survey		✓
	Flood risk benefit?	✓	Reduce flood risk by increasing roughness and reducing flood flow velocities.			Hydrological survey		✓
	Public access (existing or can connect to?)	✓	Existing public access along Blackford Glen Road			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	✓
		Contribute to addressing flood risk	✓				Machinery required	✓
		Reduce invasive non-native species	✗				Mitigation measures	✓ Sediment control measures to prevent sediment disturbance and movement downstream.
		Climate change adaptation	✓			Timing	Any work near the channel to be carried out during low flow periods	
		Raise awareness of the benefits of healthy water environments	✓			Logistics	N/A	
		Enhance channel morphology and improve floodplain habitat quality	✓		CAR licensing required	Registration	Simple licence ✓	Complex licence
Ownership	Suggested action owner	Craigmillar Park Golf Course				Channel modification in rivers < 3m wide		
	Land owner	Craigmillar Park Golf course; private residential owners to the south and private commercial owners to the east.						

ISSUE 20: Degraded riparian and floodplain vegetation		**ACTION:** Planting of floodplain				**Unique ID:** Bra_VP_7			
Site information	Description	Between Liberton Road and Gilmerton Road		**Cost estimate**	Estimate (£k)	0.7			
	OS NGR	327193E 670505N to 327229E 670567N			Assumptions	Planting on both sides of the burn to a width of 5m. Includes plants, clearance and labour costs.			
	Photo reference	None		**Further considerations**	Funding mechanism / opportunities	**Fund name**			**Applicability**
	Site access	Via Mid Liberton off Liberton Road				Scotland Rural Development Fund	Challenge Funds		✗
	Reach length (m)	70					Rural Development Contracts – Land Manager Options		✗
Pressure	Pressures to be addressed through regulatory means	• Urban diffuse pollution • Morphological					Rural Priorities – Forth Area		✗
	IHN	None – area of neutral grassland is upstream of site				Scottish Natural Heritage	Natural Project Grants		✓
	JBA ID	N/A					Community Grants		✗
	Associated data sources	• Fully within fluvial 200 year • Within local conservation nature site					Central Scotland Green Network		✓
Habitat	Type of existing habitat	Narrow strip of unimproved neutral grassland constrained within floodwalls				SEPA Scottish restoration fund			✓
	Extent of existing habitat	Full length of sub-reach on both banks				Land developer (ie. of surrounding area)			✗
	Quality of existing habitat	Poor				Other: • Awards for All Scotland • Community Spaces Scotland • J Paul Getty JR Charitable Trust • 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	Osier, creeping bent, alder, watercress.							
	Establishment techniques required	Direct planting and seeding							
Benefits	Barrier to restoration?	✗				**Survey Type**			**Required**
	Capacity released – contribution to obtaining GES	None			Other surveys required	Ecological habitat survey			✗
	Flood risk benefit?	✓	Reduce flood risk by increasing roughness and reducing flood flow velocities.			Hydrological survey			✗
	Public access (existing or can connect to?)	✓	Existing access to the reach via residential road, but no core path along the waterway as channel is quite constrained in this area.			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	Planting ideally done between November and February, avoiding frost where possible.		
		Raise awareness of the benefits of healthy water environments	✗			Logistics	Multiple landowners to liaise with		
	Wider environmental benefits	Improved floodplain habitat quality	✓		CAR licensing required	N/A			
Ownership	Suggested action owner	The City of Edinburgh Council							
	Land owner	Private residential owners							

ISSUE 21: Anastomosed wetlands on flood plain and redundant gauging weir		**ACTION:** Riparian development and reconnection of channel with wetland areas; remove weir				**Unique ID:** Bra_ChRc_2, Bra_WRe_6			
Site information	Description	Downstream of Gilmerton Road		**Cost estimate**	Estimate (£k) wetland	20.5	Estimate (£k) weir	17.2	
	OS NGR	327288E 670671N to 327260E 670718N			Assumptions	100% of redundant material to be disposed of off-site. Weir cost includes hydrological model (£3k) and topographical survey (£2k), which would be used to survey/model wetland as well. Assumes approx wetland area of 1000m² and weir excavation width of 5m and depth of 1m.			
	Photo reference	Appendix B – Photos 32 and 33			Funding mechanism / opportunities	**Fund name**			**Applicability**
	Site access	Via Mid Liberton off Liberton Road				Scotland Rural Development Fund	Challenge Funds		✖
	Reach length (m)	60					Rural Development Contracts – Land Manager Options		✖
Pressure	Pressures to be addressed through regulatory means	• Urban diffuse pollution • Morphological					Rural Priorities – Forth Area		✖
	IHN	None – area of neutral grassland is upstream of site				Scottish Natural Heritage	Natural Project Grants		✓
	JBA ID	N/A					Community Grants		✖
	Associated data sources	• Partially within fluvial 200 year • Partially within local conservation nature site • Core path not directly adjacent to burn, about 100m to the east separated by buildings.					Central Scotland Green Network		✓
Habitat	Type of existing habitat	Native semi-natural broadleaved woodland (left bank), floodwall (right bank)				SEPA Scottish restoration fund			✓
	Extent of existing habitat	Length of most if sub-reach upstream of Cameron Toll culvert				Land developer (ie. of surrounding area)			✖
	Quality of existing habitat	Good (left bank), negligible (right bank)				Other: • J Paul Getty JR Charitable Trust • Community Spaces Sustainability Grant • The Naturesave Trust • The Ibrahim Foundation • The Steel Charitable Trust			✓ ✓ ✓ ✓ ✓
	Sensitivity of existing habitat to land use / habitat change	High (left bank), none (right bank)							
	Indicative species mix for restoration	Alder		**Further considerations**		**Survey Type**			**Required**
	Establishment techniques required	Direct planting				Other surveys required	Ecological habitat survey		✖
Benefits	Barrier to restoration?	✓	Limited space – constrained by road and surrounding residential properties				Hydrological survey		✓
	Capacity released – contribution to obtaining GES	None					Ground investigation		✓
	Flood risk benefit?	✓	Reduce flood risk by increasing roughness and reducing flood flow velocities. Increase floodplain connectivity.				Topographical survey		✓
	Public access (existing or can connect to?)	✓	No direct public access but could connect with existing path to the east.				Water quality monitoring		✖
	Multiple WFD benefits	**Potential benefit**				Construction / restoration costs	Methods	Access required ✓	
		Opportunity to expand green/ecological network	✓					Machinery required ✓	
		Help achieve good ecological status	✓					Mitigation measures ✓	Sediment control measures to prevent sediment disturbance and movement downstream.
		Contribute to addressing flood risk	✓				Timing	Works near the current channel to be carried out during low flow periods.	
		Reduce invasive non-native species	✖				Logistics	N/A	
		Climate change adaptation	✓			CAR licensing required	Registration	Simple licence ✓	Complex licence
		Raise awareness of the benefits of healthy water environments	✓				Channel modification in rivers < 3m wide		
	Wider environmental benefits	Enhance channel morphology and improve floodplain habitat quality. Improve fish passage.	✓						
Ownership	Suggested action owner	The City of Edinburgh Council							
	Land owner	Private residential owners							

ISSUE 22: Re-meandered reach after discharging from culvert downstream of Cameron Toll Shopping Centre		**ACTION:** Improve meander by scraping; planting to stabilise disturbed sediment				**Unique ID:** Bra_ChR_3		
Site information	Description	Downstream of Cameron Toll Shopping Centre		**Cost estimate**	Estimate (£k)	36.2		
	OS NGR	327535E 671091N to 327625E 671077N			Assumptions	Includes scraping and planting costs. Includes 25% disposal of material off-site, site engineer's time, plants, clearance and labour costs.		
	Photo reference	Appendix B – Photos 35 and 36				**Fund name**		**Applicability**
	Site access	From the north via Sharpdale Loan				Scotland Rural Development Fund	Challenge Funds	✗
	Reach length (m)	95					Rural Development Contracts – Land Manager Options	✗
Pressure	Pressures to be addressed through regulatory means	• Urban diffuse pollution • Morphological					Rural Priorities – Forth Area	✗
	IHN	None – gap in network				Scottish Natural Heritage	Natural Project Grants	✓
	JBA ID	N/A					Community Grants	✗
	Associated data sources	• Within local conservation nature site • No core path directly adjacent to reach, nearest core path is located to the south across Inch Park.					Central Scotland Green Network	✓
Habitat	Type of existing habitat	Inundation grassland, semi-improved grassland and amenity grassland.				SEPA Scottish restoration fund		✓
	Extent of existing habitat	Full length of proposed works				Land developer (ie. of surrounding area)		✓
	Quality of existing habitat	Fairly good in parts				Other: • J Paul Getty JR Charitable Trust • Community Spaces Sustainability Grant • 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	Kingcup, reed canary grass, branched burr-reed, meadowsweet, soft rush, osier, crack willow						
	Establishment techniques required	Direct planting						
Benefits	Barrier to restoration?	✗		**Further considerations**	Funding mechanism / opportunities			
	Capacity released – contribution to obtaining GES	High impact realignment along a 332m reach will release 2.48% capacity. Improving the meander along 93m of this sub-reach will release a portion of this capacity – about 0.7%.						
	Flood risk benefit?	✗						
	Public access (existing or can connect to?)	✓	Public access across Inch Park					
	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	Enhance morphology and improve riparian habitat quality	✓					
Ownership	Suggested action owner	Developer or City of Edinburgh Council						
	Land owner	Private – developer (to the north); the City of Edinburgh (to the south)						

Other surveys required	**Survey Type**				**Required**
	Ecological habitat survey				✓
	Hydrological survey				✗
	Ground investigation				✓
	Topographical survey				✗
	Water quality monitoring				✗
Construction / restoration costs	Methods	Access required	✓		
		Machinery required	✓		
		Mitigation measures	✓	Sediment control measures to prevent sediment disturbance and movement downstream.	
	Timing	To be carried out during low flow periods			
	Logistics	N/A			
CAR licensing required	Registration		Simple licence	✓	Complex licence
	Realignment on rivers ≤ 3m wide				

ISSUE 23: Accumulated urban debris		**ACTION:** Remove debris				**Unique ID:** Bra_DRe_4		
Site information	Description	Upstream of Old Dalkeith Road		**Cost estimate**	Estimate (£k)	11.3		
	OS NGR	327699E 671095N to 327784E 671085N			Assumptions	Includes time for site agent and 100% disposal offsite. Debris to be removed from both side of the burn.		
	Photo reference	Appendix B – Photo 37		**Further considerations**	Funding mechanism / opportunities	**Fund name**		**Applicability**
	Site access	Off Old Dalkeith Road				Scotland Rural Development Fund	Challenge Funds	✖
	Reach length (m)	90					Rural Development Contracts – Land Manager Options	✖
Pressure	Pressures to be addressed through regulatory means	• Urban diffuse pollution • Morphological					Rural Priorities – Forth Area	✖
	IHN	None – gap in network				Scottish Natural Heritage	Natural Project Grants	✓
	JBA ID	N/A					Community Grants	✓
	Associated data sources	• Fully within fluvial 200 year • Within local conservation nature site • No core path directly adjacent to reach, nearest core path is located to the south across Inch Park.					Central Scotland Green Network	✓
Habitat	Type of existing habitat	Wet grassland and amenity grassland				SEPA Scottish restoration fund		✓
	Extent of existing habitat	New wetland area with deposited trash is the site of the proposed works				Land developer (ie. of surrounding area)		✓
	Quality of existing habitat	Moderate				Other: • Awards for All Scotland • J Paul Getty JR Charitable Trust • The Naturesave Trust • The Ibrahim Foundation • Community Spaces Sustainability Grant		✓ ✓ ✓ ✓ ✓
	Sensitivity of existing habitat to land use / habitat change	Low (recently created)						
	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				Ecological habitat survey		✖
	Flood risk benefit?	✖				Hydrological survey		✖
	Public access (existing or can connect to?)	✓	Public access across Inch Park			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	✓ Trucks required to remove debris
		Reduce invasive non-native species	✖				Mitigation measures	✓ Trucks not to enter watercourse
		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	Aesthetic improvements	✓		CAR licensing required	N/A		
Ownership	Suggested action owner	Developer / City of Edinburgh Council						
	Land owner	Private – developer (to the north); the City of Edinburgh (to the south)						

ISSUE 24: Constrained and straightened channel with poor channel morphology		**ACTION:** Improve channel morphology; set back flood banks; create online wetland				**Unique ID:** Bra_ChR_4, Bra_FBR_2, Bra_WC_1					
Site information	Description	Between Old Dalkeith Road and Peffermill Road		**Cost estimate**	Estimate (£k) restore channel	64	Estimate (£k) flood banks	94	Estimate (£k) wetland	93	
	OS NGR	327902E 671172N to 328250E 671598N			Assumptions	Channel restoration costs include scraping, large woody debris and site agent/engineer costs. Flood bank costs include excavation of material and fill to form new embankments at an assumed width of 2m and height of 2m. Assumed 10% of material is unable to be reused and additional fill would need to be imported.					
	Photo reference	Appendix B – Photos 39 and 40									
	Site access	Via adjacent sports fields or Peffermill Road to the north									
	Reach length (m)	550									
Pressure	Pressures to be addressed through regulatory means	• Urban diffuse pollution • Morphological									
	IHN	None – gap in network									
	JBA ID	N/A									
	Associated data sources	• Fully within fluvial 200 year • Within local conservation nature site (channel only) • No core path directly adjacent to reach, nearest core path is located to the east across the playing fields. • Groundwater flood hazard									
Habitat	Type of existing habitat	Amenity grassland and housing upstream of railway bridge. Amenity grassland downstream of railway bridge									
	Extent of existing habitat	Full length of proposed works									
	Quality of existing habitat	Low or very low									
	Sensitivity of existing habitat to land use / habitat change	Very low									
	Indicative species mix for restoration	Alder, grey sallow, creeping bent									
	Establishment techniques required	Direct planting and seeding									
Benefits	Barrier to restoration?	✓	Buildings adjacent to floodwall at southern section of reach								
	Capacity released – contribution to obtaining GES	Low impact channel realignment along a 1232m section of reach will release 3.24% capacity. As a proportion, 550m of channel restoration will release about 1.5% capacity. Removal of embankments with bank protection which in total span 814m (piecemeal on both sides of the burn) releases 8.38%. Setting back 550m of flood banks would release a portion of this capacity – about 5.7%.									
	Flood risk benefit?	✓	Increase in floodplain connectivity								
	Public access (existing or can connect to?)	✓	Existing public access across playing fields								
	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	Reconnection of floodplain processes and habitats.	✓								
Ownership	Suggested action owner	SEPA									
	Land owner	Private residential owners (upstream section); playing fields to the east and west; National Hockey Academy (west); private commercial owners at the downstream end.									
Further considerations	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: • J Paul Getty JR Charitable Trust • The Naturesave Trust • The Ibrahim Foundation								✓ ✓ ✓	
	Other surveys required	**Survey Type**								**Required**	
		Ecological habitat survey								✓	
		Hydrological survey								✓	
		Ground investigation								✓	
		Topographical survey								✓	
		Water quality monitoring								×	
	Construction / restoration costs	Methods	Access required	×							
			Machinery required	✓	Machinery to be stored out of the floodplain						
			Mitigation measures	✓	Machinery to stay out of the waterway where possible						
		Timing	To be carried out during low flow periods								
		Logistics	100% of redundant material to be disposed of off-site								
	CAR licensing required	Registration		Simple licence	✓	Complex licence					
		Floodwall in river ≤ 3m wide									

ISSUE 25: Degraded channel and invasive species (Hogweed) present		**ACTION:** Channel restoration and removal of Hogweed		**Unique ID:** Bra_InRe_1
Site information	Description	Pow Burn, upstream of the confluence with Braid Burn	**Cost estimate**	Estimate (£k)
	OS NGR	327852E 671268N to 328000E 671301N		Requires further assessment for the cost to be estimated. Removal would need to be done by an appropriate removal specialist. May also require site restoration (planting / landscaping) once hogweed has been removed.
	Photo reference	None	**Further considerations**	Funding mechanism / opportunities
	Site access	Via adjacent sports fields		
	Reach length (m)	155		
Pressure	Pressures to be addressed through regulatory means	• Urban diffuse pollution • Morphological		
	IHN	None – gap in network		
	JBA ID	N/A		
	Associated data sources	• Fully within fluvial 200 year • No core path directly adjacent to reach, nearest core path is located to the east across the playing fields. • Groundwater flood hazard		
Habitat	Type of existing habitat	Amenity grassland (left bank) and railway embankment (right bank) of Pow Burn		
	Extent of existing habitat	Full length of sub-reach of Pow Burn		
	Quality of existing habitat	Very low		
	Sensitivity of existing habitat to land use / habitat change	Very low		
	Indicative species mix for restoration	Not applicable		
	Establishment techniques required	Not applicable		
Benefits	Barrier to restoration?	✗		
	Capacity released – contribution to obtaining GES	None – capacity not assessed for removal of invasives		
	Flood risk benefit?	✗		
	Public access (existing or can connect to?)	✓ Existing public access across playing fields		
	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 riparian habitat quality ✓		
Ownership	Suggested action owner	SEPA		
	Land owner	Private residential owners (south); National Hockey Academy (north).		

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 Ibrahim Foundation • The Steel Charitable Trust		✓ ✓ ✓

Survey Type	**Required**
Ecological habitat survey	✗
Hydrological survey	✗
Ground investigation	✓
Topographical survey	✗
Water quality monitoring	✗

Construction / restoration costs	Methods	Access required	✗	
		Machinery required	✓	For removal of Hogweed
		Mitigation measures	✓	Hogweed to be disposed of appropriately
	Timing	Spraying to be done at appropriate time of year.		
	Logistics	N/A		
Code of Practice	Must comply with Code of Practice for using plant protection products in Scotland (Scottish Executive, 2006)			

ISSUE 26: Urban debris surrounding channel		**ACTION:** Remove debris				**Unique ID:** Bra_DRe_5		
Site information	Description	Downstream of Peffermill		**Cost estimate**	Estimate (£k)	30.5		
	OS NGR	328000E to 671301N to 328262E 671617N			Assumptions	100% material to be disposed of offsite. Includes costs for site agent time.		
	Photo reference	Appendix B – Photo 41 and 42		**Further considerations**	Funding mechanism / opportunities	**Fund name**		**Applicability**
	Site access	Via Kings Haugh adjacent to the reach				Scotland Rural Development Fund	Challenge Funds	✖
	Reach length (m)	615					Rural Development Contracts – Land Manager Options	✖
Pressure	Pressures to be addressed through regulatory means	• Urban diffuse pollution • Morphological					Rural Priorities – Forth Area	✖
	IHN	None – gap in network (area of fen, marsh and swamp to the north of the site)				Scottish Natural Heritage	Natural Project Grants	✓
	JBA ID	N/A					Community Grants	✓
	Associated data sources	• Fully within fluvial 200 year • Core path to the north of the reach running from east to west • Groundwater flood hazard • Adjacent to Gardens and Designed Landscape area – Prestonfield House (Priestfield) • Within local nature conservation site • Adjacent to Historic Scotland Scheduled Monument – Holyrood Abbey, Palace Gardens and Park					Central Scotland Green Network	✓
Habitat	Type of existing habitat	Amenity grassland (golf course) on the left bank. Plantation woodland, industrial estate and created wetland area near Forkenford. There is also a narrow grass margin either side of the burn.				SEPA Scottish restoration fund		✖
	Extent of existing habitat	Full length of proposed restoration measures on left bank. Most of right bank is industrial with the woodland and wetland areas at the upstream and downstream ends of the reach respectively				Land developer (ie. of surrounding area)		✖
	Quality of existing habitat	Very low (industrial); low (amenity grassland); medium (plantation woodland and created new wetland)				Other: • Heritage Lottery Fund • Awards for All Scotland • J Paul Getty JR Charitable Trust • The Naturesave Trust • The Ibrahim Foundation • Community Spaces Sustainability Grant		✓ ✓ ✓ ✓ ✓ ✓
	Sensitivity of existing habitat to land use / habitat change	Low or medium (wetland and woodland)						
	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				Ecological habitat survey		✖
	Flood risk benefit?	✖				Hydrological survey		✖
	Public access (existing or can connect to?)	✓	The reach can be accessed through Prestonfield Golf course. Could connect to core path / cycle track to the north 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	✖
		Contribute to addressing flood risk	✖				Machinery required	✓
		Reduce invasive non-native species	✖				Mitigation measures	✖
		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	Aesthetic improvements	✓		CAR licensing required	N/A		
Ownership	Suggested action owner	The City of Edinburgh						
	Land owner	Prestonfield Golf course (west); the City of Edinburgh (east); private industrial (east)						

ISSUE 27: Degraded riparian strip		**ACTION:** Improve riparian strip with planting; remove culvert; re-route path				**Unique ID:** Bra_VP_8; Bra_CRe_4, Bra_RRP_1					
Site information	Description	Adjacent to HolyRood High School and Duddingston Golf Course		**Cost estimate**	Estimate (£k) culvert	14.3	Estimate (£k) planting	6.1	Estimate path (£k)	10.9	
	OS NGR	328756E 672137N to 328946E 672215N – Bra_VP_8 328786E 672145N – Bra_CRe_2 328769E 672103N – Bra_RRP_1			Assumptions	All redundant material to be removed off site. Culvert removal costs include hydrological model (£3k) and topographical survey (£2k) and site engineer time. Planting costs include land clearance, plants and labour costs. Assumes planting width of 20m on both sides of the burn.					
	Photo reference	Appendix B – Photo 43		**Further considerations**	Funding mechanism / opportunities	**Fund name**				**Applicability**	
	Site access	Via road to the west or through school / golf course property.				Scotland Rural Development Fund	Challenge Funds			✗	
	Reach length (m)	210 (total length); culvert length – 18m; new path – 62m					Rural Development Contracts – Land Manager Options			✗	
Pressure	Pressures to be addressed through regulatory means	• Urban diffuse pollution • Morphological					Rural Priorities – Forth Area			✗	
	IHN	None – area of fen, marsh and swamp to the west of the site				Scottish Natural Heritage	Natural Project Grants			✗	
	JBA ID	N/A					Community Grants			✗	
	Associated data sources	• Fully within fluvial 200 year • Core paths adjacent to the reach to the south and west • Within local nature conservation site • Groundwater flood hazard • Within Gardens and Designed Landscape area – Duddingston House • Adjacent to Historic Scotland Scheduled Monument – Holyrood Abbey, Palace Gardens and Park					Central Scotland Green Network			✓	
Habitat	Type of existing habitat	Broadleaved plantation woodland and improved grassland				SEPA Scottish restoration fund				✓	
	Extent of existing habitat	Full extent of structure				Golf course owner				?	
	Quality of existing habitat	Good (woodland) and low (improved grassland)				Other: • Heritage Lottery Fund • J Paul Getty JR Charitable Trust • Community Spaces Sustainability Grant • The Naturesave Trust • The Ibrahim Foundation • The Steel Charitable Trust				✓ ✓ ✓ ✓ ✓ ✓	
	Sensitivity of existing habitat to land use / habitat change	High (woodland) and low (improved grassland)			Other surveys required	**Survey Type**				**Required**	
	Indicative species mix for restoration	Alder, crack willow, osier, creeping bent				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				Topographical survey				✓	
	Flood risk benefit?	✓	Planting will increase riparian roughness, reducing flood flow velocities.			Water quality monitoring				✗	
	Public access (existing or can connect to?)	✓	The reach can be accessed through the high school / golf course and nearby core paths / cycle tracks.		Construction / restoration costs	Methods	Access required	✓			
	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 when removing culvert		
		Help achieve good ecological status	✓			Timing	• Culvert removal to be carried out during low flow periods • Planting ideally undertaken between November and February, avoiding frost where possible.				
		Contribute to addressing flood risk	✓			Logistics	N/A				
		Reduce invasive non-native species	✗		CAR licensing required	Registration		Simple licence	✓	Complex licence	
		Climate change adaptation	✓			Culvert in river ≥ 2m wide					
		Raise awareness of the benefits of healthy water environments	✓								
	Wider environmental benefits	Opportunity to connect / extend nearby fen, marsh and swamp habitat	✓								
Ownership	Suggested action owner	Duddingston Golf Club / Edinburgh Council									
	Land owner	Duddingston Golf Club (south); the City of Edinburgh (north and south)									

ISSUE 28: Poor riparian management in reach adjacent to golf course – issues include failing gabions and erosion in some sections		**ACTION:** Improve riparian management through education; - Create riparian margin along two specific sections			**Unique ID:** Bra_EdRM_1; Bra_RMC_1, Bra_RMC_2		
Site information	Description	Duddingston Golf Course	**Cost estimate**	Estimate (£k)	7.4 + education costs		
	OS NGR	328949E 672214N to 329292E 672873N – Bra_EdRM_1 329502E 672241N to 329361E 672523N – Bra_RMC_1 329275E 672847N to 329272E 672880N – Bra_RMC_2		Assumptions	Assume 10m planting width on both sides of the burn. Requires further investigation to define education programme.		
	Photo reference	Appendix B – Photos 44 to 52	**Further considerations**	Funding mechanism / opportunities	**Fund name**		**Applicability**
	Site access	Via road to the west or through school / golf course property.			Scotland Rural Development Fund	Challenge Funds	×
	Reach length (m)	525				Rural Development Contracts – Land Manager Options	×
Pressure	Pressures to be addressed through regulatory means	• Urban diffuse pollution • Morphological				Rural Priorities – Forth Area	×
	IHN	None – gap in network (area of fen, marsh and swamp to the west of the site)			Scottish Natural Heritage	Natural Project Grants	✓
	JBA ID	N/A				Community Grants	×
	Associated data sources	• Fully within fluvial 200 year • Core paths run around the edge of the golf course to the south and west of the reach • Within local nature conservation site • Groundwater flood hazard area in the southern portion of the reach • Within Gardens and Designed Landscape area – Duddingston House				Central Scotland Green Network	✓
Habitat	Type of existing habitat	Amenity grassland (golf course), broadleaved plantation woodland, semi-natural broadleaved woodland and patches of scrub and ruderal vegetation			SEPA Scottish restoration fund		✓
	Extent of existing habitat	Entire length of sub-reach			Golf course owner		?
	Quality of existing habitat	Low (grassland), medium (woodland and scrub)			Other: • Heritage Lottery Fund • J Paul Getty JR Charitable Trust • Community Spaces Sustainability Grant • The Naturesave Trust • The Ibrahim Foundation • The Steel Charitable Trust		✓ ✓ ✓ ✓ ✓ ✓
	Sensitivity of existing habitat to land use / habitat change	Low (grassland), high (other habitats)					
	Indicative species mix for restoration	Alder, crack willow, white willow, goat willow, watercress, water sedge, reed canary grass (downstream section), brooklime, 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			Ecological habitat survey		×
	Flood risk benefit?	✓	Planting will increase riparian roughness, reducing flood flows through sub-reach		Hydrological survey		×
	Public access (existing or can connect to?)	✓	The reach can be accessed through the golf course and Duddington House property.		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	Planting ideally undertaken between November and February, avoiding frost where possible.	
		Raise awareness of the benefits of healthy water environments	✓				
	Wider environmental benefits	Improvements to riparian habitat quality. Improvements to land management on golf course. Opportunity to connect to nearby fen, marsh and swamp habitat.	✓		Logistics	N/A	
Ownership	Suggested action owner	Duddingston Golf Course / SEPA		CAR licensing required	N/A		
	Land owner	Duddingston Golf Course					

ISSUE 29: Failing / redundant weirs in several locations		**ACTION:** Remove failing / redundant weirs				**Unique ID:** Bra_WRe_7, Bra_WRe_8, Bra_WRe_9, Bra_WRe_10		
Site information	Description	Duddingston Golf Course		**Cost estimate**	Estimate (£k)	42.6		
	OS NGR	328290E 672557N – Bra_WRe_7 329277E 672835N – Bra_WRe_8 329304E 672865N – Bra_WRe_9 329269E 672952N – Bra_WRe_10			Assumptions	Includes hydrological model (£3k) and topographical survey (£4k) for all four weirs. Includes site engineer time. All material to be disposed of off-site.		
	Photo reference	Appendix B – Photos 44 to 53		**Further considerations**	Funding mechanism / opportunities	**Fund name**		**Applicability**
	Site access	Via road to the west or through school / golf course property				Scotland Rural Development Fund	Challenge Funds	✖
	Reach length (m)	450 (total length)					Rural Development Contracts – Land Manager Options	✖
Pressure	Pressures to be addressed through regulatory means	• Urban diffuse pollution • Morphological					Rural Priorities – Forth Area	✖
	IHN	None - gap in network (area of fen, marsh and swamp to the west of the site)				Scottish Natural Heritage	Natural Project Grants	✓
	JBA ID	N/A					Community Grants	✖
	Associated data sources	• Fully within fluvial 200 year • Core paths run around the edge of the golf course to the south and west of the reach • Within local nature conservation site • Groundwater flood hazard area in the southern portion of the reach • Within Gardens and Designed Landscape area – Duddingston House					Central Scotland Green Network	✓
Habitat	Type of existing habitat	Amenity grassland (golf course), broadleaved plantation woodland, semi-natural broadleaved woodland and patches of scrub and ruderal vegetation				SEPA Scottish restoration fund		✓
	Extent of existing habitat	Entire length of sub-reach				Golf course owner		?
	Quality of existing habitat	Low (grassland), medium (woodland and scrub)				Other: • Heritage Lottery Fund • J Paul Getty JR Charitable Trust • The Naturesave Trust • The Ibrahim Foundation • The Steel Charitable Trust		✓ ✓ ✓ ✓ ✓
	Sensitivity of existing habitat to land use / habitat change	Low (grassland), high (other habitats)						
	Indicative species mix for restoration	Alder, crack willow, white willow, goat willow, watercress, water sedge, reed canary grass (downstream section), brooklime, 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				Ecological habitat survey		✖
	Flood risk benefit?	✖				Hydrological survey		✓
	Public access (existing or can connect to?)	✓	The reach can be accessed through the golf course and Duddington House property.			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 of the floodplain
		Reduce invasive non-native species	✖				Mitigation measures ✓	Sediment control measures to minimise sediment disturbance and movement downstream when removing weirs.
		Climate change adaptation	✖			Timing	To be carried out during low flow periods.	
		Raise awareness of the benefits of healthy water environments	✓			Logistics	Liaise with golf course regarding machinery movement through golf course.	
	Wider environmental benefits	Improvements to fish passage through sub-reach	✓		CAR licensing required	Registration	Simple licence ✓	Complex licence
Ownership	Suggested action owner	SEPA				In-stream structure in river ≤ 3m wide.		
	Land owner	Duddingston Golf Course; private residential owners at the downstream end.						

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). 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 for use in other restoration works has been used as a baseline tool to build up costs for each of the options assessed[2]. 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:

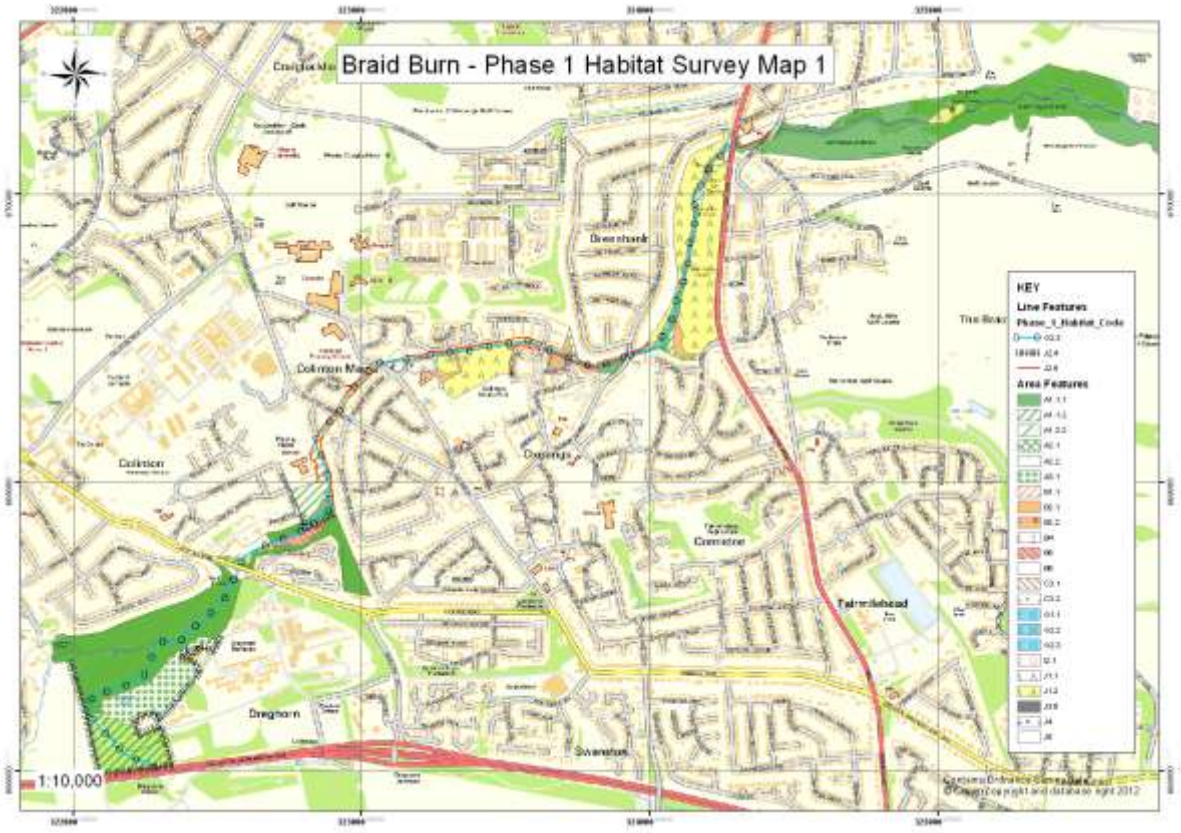
- Capital costs have been assumed. Long term maintenance costs have not been calculated, but are assumed to be minimal. Some additional maintenance or monitoring costs may also be applicable but have not been determined at this stage.
- An optimism bias of 60% has been used. This is appropriate at this 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[3].
- 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.

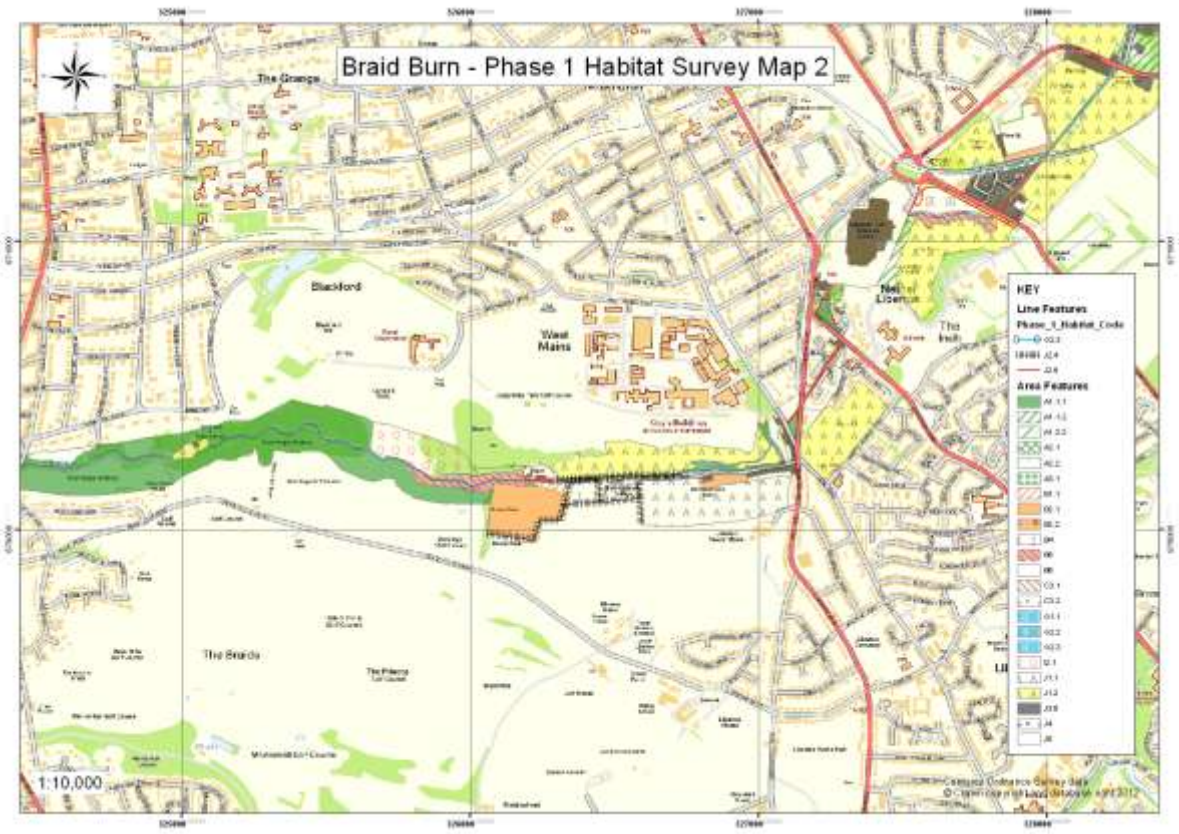
All other assumptions relating to specific calculations for individual proposed restoration measures are included in the explanation tables for each measure.

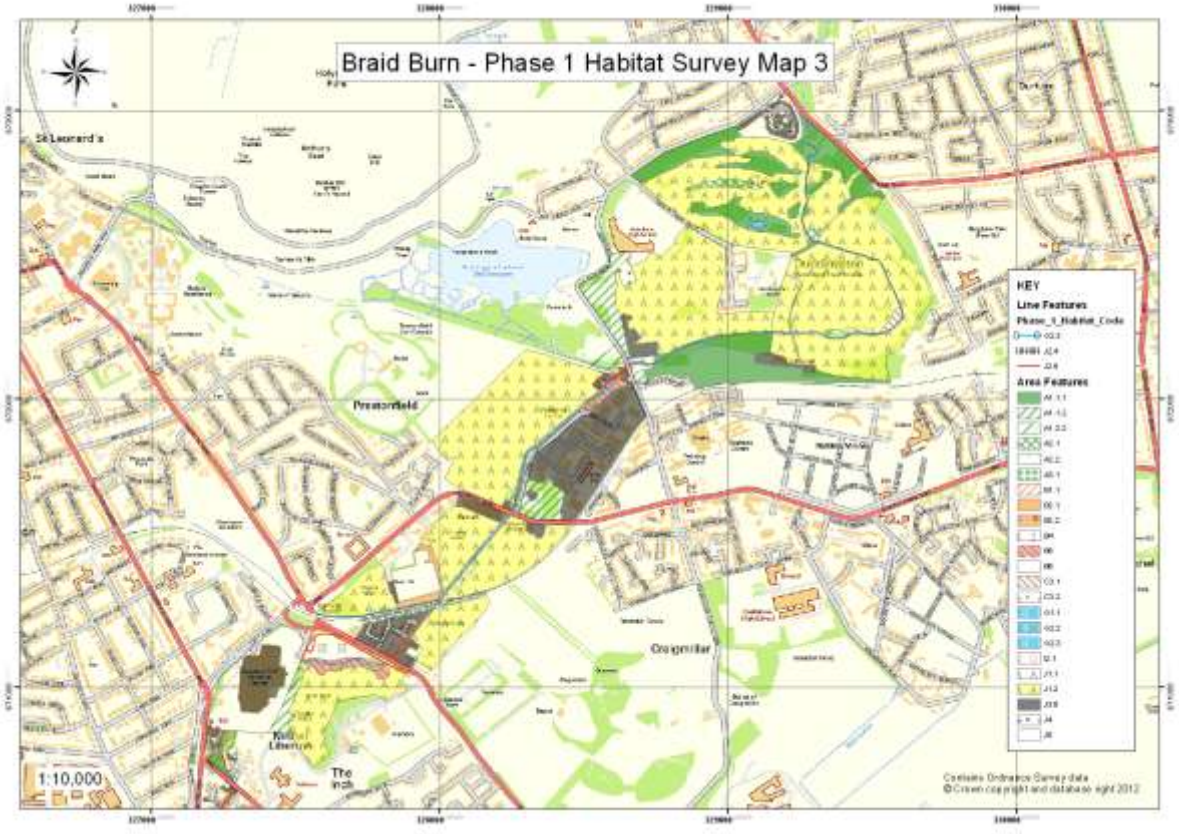
[2] This spreadsheet was used for the 'Estimating costs of delivering the river restoration element of the SSSI PSA target', Final Report January 2008 (Environment Agency).

[3] Treasury Greenbook

E Phase 1 habitat mapping




Braid Burn - Phase 1 Habitat Survey Map 2
The Grange
Blackford
West Mains
The Braids
KEY
Line Features
Area Features
1:10,000


Braid Burn - Phase 1 Habitat Survey Map 3
St Leonard's
Prestonfield
Craigmillar
The Inch
KEY
Line Features
Area Features
1:10,000

F 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

BRAID BURN 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	Rank
5	Bra_StRe_1, Bra_LCRe_2; Bra_WRe_4	Remove structure; remove lined channel; remove weir	> 1km	Neutral	Neutral	Positive	Positive	Positive	Low	Positive	Low	No	Positive	Neutral	Positive	Positive	Present	Unknown	Positive	Neutral	Neutral	Low	1.42	1
29	Bra_WRe_7, Bra_WRe_8, Bra_WRe_9, Bra_WRe_10	Remove weirs	> 1km	Neutral	Low	Positive	Positive	Positive	Low	Positive	Low	No	Positive	Neutral	Neutral	Positive	Not present	Unknown	Positive	Neutral	Neutral	Low	1.42	1
14	Bra_WRe_5, Bra_ChR_2	Remove weir and restore rapids downstream	> 1km	Neutral	Low	Positive	Positive	Positive	Low	Positive	Low	No	Positive	Neutral	Positive	Positive	Present	Unknown	Positive	Neutral	Neutral	Low	1.46	3
2	Bra_WRe_1	Remove weir	> 1km	Neutral	Low	Positive	Positive	Positive	Low	Positive	Low	No	Positive	Neutral	Positive	Positive	Not present	Unknown	Positive	Neutral	Neutral	Low	1.50	4
4	Bra_WRe_2, Bra_WRe_3	Remove weirs	> 1km	Neutral	Low	Positive	Positive	Positive	Low	Positive	Low	No	Positive	Neutral	Positive	Positive	Not present	Unknown	Positive	Neutral	Neutral	Low	1.50	4
28	Bra_EdRM_1; Bra_RMC_1, Bra_RMC_2;	Improve riparian management through education and liaison with golf course; create riparian margin along two specific sections; remove failing / redundant weirs	> 1km	Positive	Low	Positive	Positive	Positive	Neutral	Positive	Low	Yes	Positive	Low	Low	Positive	Present	Unknown	Neutral	Unknown	Positive	Positive	1.54	6
17	Bra_VP_5, Bra_VP_6	Plant areas of floodplain on both sides of the channel	200m - 1km	Positive	Unknown	Positive	Positive	Positive	Neutral	Positive	Low	Yes	Positive	Neutral	Neutral	Positive	Present	Unknown	Neutral	Neutral	Positive	Positive	1.58	7
21	Bra_ChRc_2; Bra_WRe_6	Riparian development and reconnection of channel with wetland areas ; remove weir	> 1km	Positive	Low	Positive	Positive	Positive	Neutral	Positive	Low	Yes	Positive	Positive	Positive	Positive	Present	Unknown	Neutral	Neutral	Neutral	Low	1.63	8
26	Bra_DRe_5	Remove debris	200m - 1km	Neutral	Low	Neutral	Low	Neutral	Low	Neutral	Low	No	Positive	Positive	Positive	Positive	Not present	Unknown	Neutral	Neutral	Neutral	Neutral	1.63	8
3	Bra_CRe_1	Remove culvert	<200m	Positive	Low	Neutral	Positive	Positive	Low	Positive	Low	No	Positive	Neutral	Positive	Positive	Not present	Unknown	Positive	Neutral	Neutral	Low	1.67	10
1	Bra_LCRe_1	Remove lined channel	<200m	Neutral	Low	Neutral	Low	Neutral	Low	Neutral	Low	No	Positive	Neutral	Positive	Positive	Not present	Unknown	Positive	Neutral	Neutral	Low	1.68	11
13	Bra_LCRe_2	Remove lined channel	<200m	Neutral	Low	Neutral	Low	Neutral	Low	Neutral	Low	No	Positive	Neutral	Positive	Positive	Not present	Unknown	Positive	Neutral	Neutral	Low	1.68	11
22	Bra_ChR_3	Improve meander	<200m	Neutral	Neutral	Neutral	Neutral	Neutral	Low	Neutral	Low	No	Positive	Neutral	Positive	Positive	Not present	Unknown	Neutral	Neutral	Neutral	Low	1.68	11
18	Bra_StRe_3	Remove in-channel structure	<200m	Neutral	Neutral	Neutral	Neutral	Neutral	Low	Neutral	Low	No	Positive	Neutral	Positive	Positive	Not present	Unknown	Positive	Positive	Neutral	Low	1.69	14
15	Bra_CRe_1, Bra_CRe_2	Remove two culverts	<200m	Positive	Neutral	Positive	Positive	Positive	Low	Neutral	Low	No	Positive	Neutral	Positive	Positive	Present	Unknown	Positive	Neutral	Neutral	Low	1.75	15
27	Bra_VP_8; Bra_CRe_2	Improve riparian strip with planting; remove culvert	200m - 1km	Positive	Low	Positive	Positive	Positive	Neutral	Positive	Low	Yes	Positive	Neutral	Neutral	Positive	Not present	Unknown	Neutral	Neutral	Neutral	Low	1.75	15
16	Bra_Sc_1	Improve floodplain connectivity by scraping and reconnecting post paleo feature on floodplain	200m - 1km	Positive	Low	Positive	Low	Neutral	Low	Low	Low	No	Positive	Neutral	Positive	Positive	Present	Unknown	Positive	Low	Neutral	Neutral	1.77	17
23	Bra_DRe_4	Remove debris	<200m	Neutral	Low	Neutral	Low	Neutral	Low	Neutral	Low	No	Positive	Neutral	Positive	Positive	Not present	Unknown	Positive	Positive	Neutral	Neutral	1.79	18
8	Bra_DRe_1, Bra_DRe_2	Remove debris; conduct an education programme.	<200m	Neutral	Low	Neutral	Low	Neutral	Low	Neutral	Low	No	Positive	Neutral	Positive	Positive	Not present	Unknown	Low	Unknown	Low	Neutral	1.79	18
6	Bra_BrRp_1; Bra_FRe_1	Replace / widen footbridge; remove fencing	<200m	Positive	Low	Positive	Low	Neutral	Low	Neutral	Low	No	Positive	Low	Low	Positive	Present	Unknown	Positive	Unknown	Neutral	Neutral	1.81	20
11	Bra_VP_4	Improve riparian strip with planting	200m - 1km	Positive	Unknown	Positive	Positive	Positive	Neutral	Positive	Low	Yes	Positive	Neutral	Positive	Positive	Not present	Unknown	Neutral	Neutral	Neutral	Positive	1.82	21
24	Bra_ChR_4, Bra_FBR_2	Improve channel morphology; set back flood banks	200m - 1km	Positive	Positive	Positive	Low	Neutral	Low	Neutral	Low	No	Positive	Neutral	Positive	Positive	Present	Unknown	Positive	Low	Neutral	Low	1.83	22
9	Bra_VP_2	Plant low valley sides and plant terraces	<200m	Positive	Neutral	Positive	Positive	Positive	Neutral	Positive	Low	Yes	Positive	Neutral	Positive	Positive	Not present	Unknown	Neutral	Positive	Positive	Positive	1.86	23
12	Bra_FBR_1	Remove flood banks and floodwalls;	200m - 1km	Positive	Low	Positive	Low	Neutral	Low	Neutral	Low	No	Positive	Neutral	Positive	Positive	Not present	Unknown	Low	Low	Neutral	Low	1.91	24
20	Bra_VP_7	Planting of floodplain	<200m	Positive	Unknown	Positive	Positive	Positive	Neutral	Positive	Low	Yes	Neutral	Neutral	Positive	Positive	Not present	Unknown	Neutral	Positive	Neutral	Positive	1.91	24
7	Bra_VP_1	Planting to improve riparian strip	<200m	Positive	Unknown	Positive	Positive	Positive	Neutral	Positive	Low	Yes	Positive	Neutral	Positive	Positive	Not present	Unknown	Neutral	Positive	Positive	Positive	1.95	26
19	Bra_ChRc_1	Riparian development and reconnection of channel with wetland areas	<200m	Positive	Low	Positive	Positive	Neutral	Low	Neutral	Low	Yes	Positive	Neutral	Neutral	Positive	Present	Unknown	Neutral	Low	Neutral	Neutral	1.96	27
10	Bra_ChR_1; Bra_DRe_3; Bra_TBC_1, Bra_TBC_2, Bra_TBC_3, Bra_TBC_4, Bra_TBC_5;	Improve in channel morphology; remove debris; create transverse bars along reach; remove gabion baskets; plant low valley sides and terraces	200m - 1km	Positive	Positive	Positive	Positive	Positive	Neutral	Positive	Low	Yes	Positive	Neutral	Positive	Positive	Not present	Unknown	Neutral	Low	Neutral	Low	2.00	28
25	Bra_InRe_1	Channel restoration and removal of Hogweed	<200m	Neutral	Unknown	Positive	Positive	Positive	Low	Positive	Positive	Yes	Positive	Neutral	Positive	Positive	Not present	Unknown	Neutral	Unknown	Neutral	Neutral	2.06	29

**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

Offices at

Atherstone
Doncaster
Edinburgh
Haywards Heath
Limerick
Newcastle upon Tyne
Newport
Northallerton
Saltaire
Skipton
Tadcaster
Wallingford
Warrington

Registered Office
South Barn
Broughton Hall
SKIPTON
North Yorkshire
BD23 3AE

t:+44(0)1756 799919
e:info@jbagroup.co.uk

JBA Group Limited
Registered in England 6396638

Visit our website
www.jbagroup.co.uk