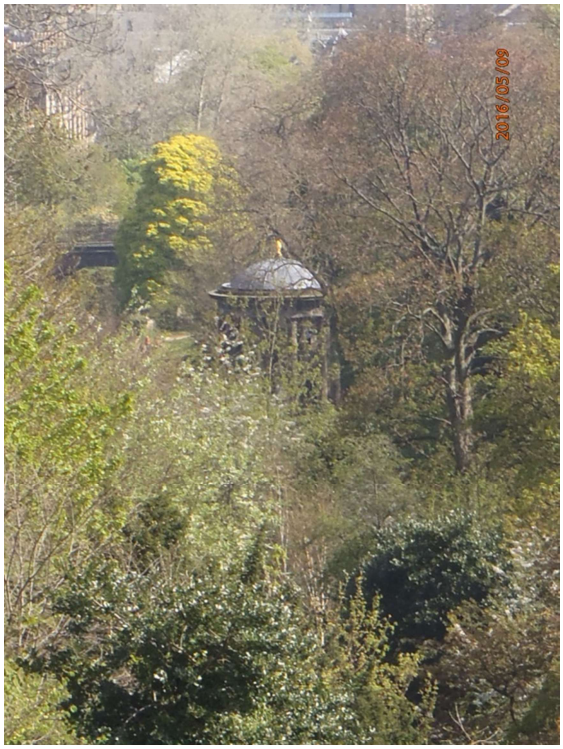

Dean Valley Regeneration

Biodiversity Report

July 2016

By

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Contents

SUMMARY

This report summarises information about the biodiversity features present within the Dean valley. It has been produced for Dean Valley Regeneration Limited to assist in developing proposals and funding applications to renew the environment of the Dean valley Designed landscape in Edinburgh. It draws on existing information about biodiversity resources that have been collected by a variety of individuals and agencies, and new survey work.

The Dean valley lies along the Water of Leith between Dean Village and Stockbridge. The river and associated broadleaved woodland has been identified as a Local Biodiversity Site, a site of local importance for wildlife. Otter and species of bat, which receive high levels of protection as European Protected Species, are present within the valley. The native bluebell, a species receiving special protection has been recorded from the woodland. The valley is also home to fish, bird and plant species that have been identified for priority action within the UK Biodiversity Action Plan, and species that are included within the Scottish Biodiversity List. Woodlands and the Water of Leith have been identified for special actions within the Edinburgh Biodiversity Action Plan.

The report identifies the benefits, opportunities, constraints and threats to biodiversity from the proposals.

Proposals to renew the environment of the Dean valley Designed landscape provide many opportunities to benefit biodiversity. They would act to provide a focus for the development of a management plan, particularly for the woodland areas, which could help to meet policy objectives set out by the Council and other agencies. Woodland management would assist in dealing with challenges presented by the spread of ash dieback within the city. The Dean valley project could also provide local communities with an opportunity to learn more about the wildlife of their area.

The management plan will require careful development to ensure that the statutory and policy requirements for biodiversity are met, whilst maximising the landscape benefits. Some key issues to be addressed will be striking a balance between active management and allowing nature to take its course; tree management; dealing with diseased trees; and management of ivy. Development of a management plan that includes the woodland, will allow for a clear framework for decision-making. Further survey work is likely to be required to inform the plan and suggestions for the scope of the biodiversity surveys are set out in the document.

1. INTRODUCTION

1.1 Background

The Dean valley lies between the settlements of Dean Village and Stockbridge along the Water of Leith in Edinburgh. Views of this stretch of the river are recorded in a variety of media dating from at least the end of the eighteenth century. The area remains popular, forming part of the Water of Leith walkway and the Edinburgh World Heritage Site. A group of local residents has formed Dean Valley Regeneration Limited with the mission statement to renew the environment of the Dean Valley Edinburgh. As part of the initiative the group hopes to seek funding to develop management plans and projects for the river valley. A conservation statement for the designed landscape has been produced to help inform the development of the project (McGowan, 2015).

Although the Dean valley lies in the centre of Scotland's capital city, it is important for the biodiversity that it supports, including several protected species. A management plan for the valley provides the opportunity to benefit biodiversity features as well as enhance the landscape and amenity of the area. Accordingly, Dean Valley Regeneration Limited has commissioned this study to summarise what is known about the biodiversity of the area and identify the opportunities and constraints for future management.

1.2 Purposes of the biodiversity report

The purposes of this biodiversity report are to:

- Summarise the extent of current knowledge about biodiversity features along the land owned by the City of Edinburgh Council within the Dean valley;
- Describe and evaluate the importance of biodiversity features known to be present in the valley;
- Identify any protection afforded to these biodiversity features and the implications of these for management proposals;
- Identify opportunities to enhance biodiversity as part of the management proposals;
- Identify potential threats to or issues for biodiversity features that could arise from the proposals, and identify ways in which these can be avoided or ameliorated;
- Define the scope of ecological surveys or investigations that may be required to help inform the management proposals which are developed.

It has been prepared to accompany the Conservation Statement (McGowan, 2015), and covers part of the same geographic area assessed in the Conservation Statement, i.e. the Council-owned area lying along the Water of Leith Valley between Dean Village and the Stock Bridge (on Kerr Street).

1.3 Approach

This report has been prepared for Dean Valley Regeneration Limited by Sue Bell, a Chartered Ecologist. It will be used by the Regeneration Project to assist in developing detailed proposals for the restoration of the Designed landscape of the Dean valley and in seeking funding for the project.

The report is based on existing survey information, consultation with professionals who have biodiversity interests or responsibilities for the Water of Leith and a walk-over survey comprising a Preliminary Ecological Appraisal. Further details of the methods used are included in Appendix A.

1.4 Structure of report

The report has been divided into the following sections:

Section 2: Biodiversity of the Dean valley – This section brings together existing knowledge about the biodiversity of the Dean valley. It provides a description of the habitats and species known to be present, and provides an overview of how these are protected or are important.

Section 3: Legal and Policy Framework – this section provides an overview of the legal and policy framework relating to biodiversity.

Section 4: Benefits, constraints and issues for biodiversity – this section provides an overview of the likely effects on biodiversity arising from the proposals within the Conservation Statement.

Section 5: Next stages – this section provides an indication of the scope of biodiversity work that will be required during the next stages of developing the project.

The report is supported by a series of Appendices, which cover:

A: The methods that have been used in producing this document;

B: Detailed notes about biodiversity features at particular locations;

C: A list of species seen during the surveys; and

D: Maps showing the major habitats present in the Dean valley, and locations of photographs.

2 BIODIVERSITY OF THE DEAN VALLEY

This section provides a summary of what is known about the biodiversity features along the Dean valley; gaps in knowledge are also highlighted. This section also provides an evaluation of the importance of these biodiversity features including any protection that these features receive. Importance is usually expressed in terms of a geographical scale e.g. important in a national or local context (CIEEM, 2016), and so relies upon appropriate data sets to provide contextual information.

2.1 Overview and introduction

The Water of Leith rises in the Pentland Hills and flows for c. 32 km (SEPA, 2011) passing through the historic villages of Balerno, Currie, Juniper Green, Colinton, Slateford, Roseburn, Dean Village, Stockbridge and Warriston before draining into the Firth of Forth through Leith Docks. The river channel has been modified at various locations in the past, mainly through its historic use for the numerous mills that were located along its length. Some of these features, such as weirs, still remain. Recent modifications include new flood prevention works downstream of the Dean valley at Stockbridge, and upstream at Murrayfield. Although the river is categorised as a Heavily Modified Water Body under the Water Framework Directive, it exhibits many features typical of natural watercourses.

The river valley is an important blue corridor through the centre of the City. A management plan for the river has been produced (Bell, 2010), through the co-ordinating work of The Water of Leith Conservation Trust. The Trust works with statutory and voluntary agencies to achieve common aims and carries out hundreds of hours of practical management tasks along the river valley, including removal of litter and management of vegetation.

2.1.1 Designation and Importance

The biodiversity value of the whole or parts of the Water of Leith river corridor has long been recognised through a series of designations.

International importance

The Water of Leith discharges to the Firth of Forth via Leith Docks. Within the Docks lies Imperial Dock Special Protection Area (SPA). This is a site of European importance for its

colony of nesting common terns. Outside the boundary of the Docks, the coast of the Firth of Forth has also been designated as a SPA for supporting wintering bird populations of European importance. Both these sites are considered beyond the influence of any proposals for the Dean valley.

National importance
Bavelaw Common Site of Special Scientific Interest (SSSI) lies at the upper end of the Bavelaw Burn, a tributary of the Water of Leith. The site has been designated for its moss (bryophyte) species, freshwater loch and associated fen habitats. This site is considered beyond the influence of any proposals for the Dean valley.

In addition to its International designation as an SPA, the Firth of Forth is designated as a SSSI for its coastal and inter-tidal habitats, grassland, fen and plant communities, invertebrate populations, and wintering bird communities. These features are considered beyond the influence of any proposals for the Dean valley.

Local Importance
Local Biodiversity Sites (LBS) are a non-statutory designation, which recognise areas of local importance for their biodiversity (TWIC, 2011). They are replacing Urban Wildlife Sites (UWS) and Sites of Importance for Natural Science (SINCS).

The Dean valley forms part of the Water of Leith - Roseburn to Dean Gardens LBS. The notable habitats are described as Broadleaved semi-natural woodland, and rivers (TWIC, 2015). The Water of Leith downstream of St Bernard's Bridge is a proposed Local Biodiversity Site, but has not yet been formally confirmed. The whole river was previously designated an Urban Wildlife Site (UWS).

The Water of Leith is mentioned for specific actions within the current and previous Edinburgh Local Biodiversity Action Plans (City of Edinburgh Council 2010 & 2016).

2.2 Habitats

2.2.1 Available information

The habitats along the Water of Leith in the Dean valley have been surveyed on a number occasions. Relevant information identified for this study is:

- A Phase 1 survey map produced for City of Edinburgh Council (2011);
- Tree condition data held by the Forestry Department of the City of Edinburgh Council (undated);
- Summary information within the Water of Leith Management Plan Biodiversity topic paper (Bell, 2010); and
- A new survey undertaken for this project.

Full details of the methods used in undertaking the recent surveys are contained in Appendix A. Appendix B contains target notes (including photographs) to accompany the Phase 1 map, which is provided in Appendix C with a separate map showing the location of photographs. Appendix D contains a list of all species recorded during the survey.

2.2.2 Description

The main habitats present along the Dean valley are:

- Broadleaved woodland and scrub;
- Open Water;
- Inundation vegetation; and
- Miscellaneous habitats including amenity grassland and flowerbeds.

Broadleaved woodland
Broadleaved woodland is the main habitat along the Water of Leith between Dean Village and Stockbridge. This woodland forms part of the semi-continuous tree cover that fringes the river from Balerno to Leith.

Historic pictures for the area, included within the Conservation Statement (McGowan, 2015), clearly show woodland and scrub cover along the Moray Bank from at least the 1800s. Scattered tree cover is also apparent on the other bank of the river below Eton Terrace.

Details of the dominant species at different points along the Dean valley are provided in the target notes included in Appendix B.

Tree cover within the gardens contains a mixture of planted and self-seeded native and exotic species. Tree species vary between the gardens, reflecting the influence of historic plantings. The Moray Bank garden has an avenue of mature lime (*Tilia* sp) trees and there is a grove of silver birch (*Betula pendula*) trees near Doune Terrace. Hornbeam (*Carpinus* sp.) is also present and there is much self-sown holly. Yew trees (*Taxus baccata*) are present in Dean Gardens.

A group of cherry trees (*Prunus* sp.) have been planted along India Terrace.

Many tree species have self-seeded within the river corridor and grow at water level or out of the retaining structures and walls. Whilst these mainly comprise native or naturalised species such as elm (*Ulmus* sp.) including Wych elm (*Ulmus glabra*), ash (*Fraxinus excelsior*), sycamore (*Acer pseudoplatanus*), lime (*Tilia* sp.) and poplar (*Populus* spp.) with understorey of holly (*Ilex aquifolium*) and elder (*Sambucus nigra*), there are some exotic species, such as Laburnum (*Laburnum anagyroides*) near the Stock Bridge.

Those trees on Council land that are larger than 20 cm diameter when measured at "breast height" and which are located within falling distance of footpaths or structures are assessed for their condition by the City of Edinburgh Forestry Department. Data are stored in a database: Ezytreev (City of Edinburgh Council, 2014). A total of 62 trees are listed along the Dean valley between Stock Bridge and the footbridge in Dean Village. Ash, sycamore and Wych elm are the most common species listed on the database in this area (see Table 2.1).

Table 2.1: Species listed on the City of Edinburgh Council's register of trees within the Dean valley.

Species	Number
Wych elm (*Ulmus glabra)*	12
Elm sp. (*Ulmus* sp.)	6
English elm (*Ulmus procera)*	2
Sycamore (*Acer pseudoplatanus)*	10
Norway maple (*Acer platanoides*)	1
Plane sp. (*Platanus* sp.)	4
Alder (*Alnus glutinosa)*	2
Ash (*Fraxinus excelsior)*	18
Raywood Ash (*Fraxinus oxycarpa)*	1
Beech (*Fagus sylvatica)*	2
Lime sp. (*Tilia* sp.)	2
Downy birch (*Betula pubescens)*	1
Poplar spp. (*Populus* sp.)	1
TOTAL	62

There are a good number of large, mature tree specimens in the gardens which are not included within Ezytreev.

Many of the trees, particularly along the river valley, are covered in dense growths of ivy (e.g. see photographs 2, 5, 53 in Appendix B). Ivy growth is managed in some areas, principally within trees in Moray Bank Gardens and on structures along the river valley. There are some standing dead trees, or trees with dead wood. Several trees have knot holes, rot holes, splits and cracks, which provide suitable habitat for bats and birds (e.g. see photographs 21, 27, 50, 51 in Appendix B). Dead branches overhanging the Water of Leith channel have potential for use by kingfisher (*Alcedo atthis*) (see photograph 7, Appendix B).

Open Water
The Water of Leith is described by SEPA as a mid-altitude, calcareous watercourse (SEPA, 2014). Its course flows through a steep gorge in the study area. The river bed comprises areas of bedrock, formed in places by sandstones and the quartz dolerite dykes that cut the river bed at St Bernard's Well and St George's Well (Lothian & Borders GeoConservation, 2011) (see photograph 22b in Appendix B).

The river has been modified in the past to supply water for the many mills that were located along its length. A weir remains at Millar Row, which has been identified by SEPA as the first permanently impassable barrier for fish migration (assessed from the seaward end of the catchment) (SEPA, 2011). Mains sewers for Edinburgh were also installed within the course of the river during Victorian times. Despite these historic interventions, the river is developing features typical of more natural rivers including vegetated and un-vegetated mid channel bars, and vegetated and un-vegetated side bars (e.g. see photographs 8, 13, 46 in Appendix B).

The river between the Murray Burn confluence and the Estuary has been assessed by SEPA as of Poor Ecological Potential under the Water Framework Directive (SEPA, 2011) owing to modifications to the morphology of the river (such as weirs); diffuse pollution from sewage and farming; and point source pollution from sewage. There is a target date of 2027 to reach good ecological potential (SEPA, 2011) (see Section 3.3).

Despite its classification of Poor Ecological Potential, the river supports a variety of fish species including brown trout (*Salmo trutta*). Beds of water crowfoot (*Ranunculus* sp.*)* occur along the river between St Bernard's Well and St Bernard's Bridge. Rivers with floating vegetation often dominated by water-crowfoot is a habitat type listed on Annex I of the Habitats Directive, but the Water of Leith is not designated for this feature.

Inundation vegetation
Inundation vegetation describes the plants that have developed on areas that are subject to periodic flooding or wetting along the river channel. It occurs on vegetated mid channel and vegetated side bars. The largest area occurs near the footbridge in Dean Village (see Target Note 28, Appendix B).

Miscellaneous vegetation
There are areas of formal and informal plantings along the water course. These include allotments on India Street, herb beds and shrubs near St Bernard's Well, and flower beds in Moray Bank, Dean, and Belgrave Crescent Gardens. Amenity grassland is also present in these areas.

The river is bordered by a gravel paved footpath near St Bernard's Bridge.

2.2.3 Value of habitats

As noted above, the woodland and wetland habitats along the river contribute to the recognition of the river between Dean Village and St Bernard's Bridge as a Listed Biodiversity Site. This means they have been assessed as of City-wide importance.

2.3 Species

2.3.1 Available information

The assessment of species along the Dean valley is based on records held by Water of Leith Conservation Trust and The Wildlife Information Centre (see Appendix A). Incidental records of species were made during the site visit, and suitability of habitat for protected species was also assessed during the survey. No comprehensive surveys of any species group were identified during this study. Table 2.2 (at end of section) provides a summary of those species recorded from the Dean valley that receive some level of protection or recognition for their importance.

2.3.2 Description and value

Invertebrates

Both terrestrial and aquatic invertebrates along the Dean valley are under-recorded. The Wildlife Information Centre holds a few records for terrestrial species along the Dean valley. A summary of invertebrate populations in the river is provided in "*The Water of Leith*" (de Prato, 1984 quoted by Bell, 2010).

Several of the species that have been recorded from the valley are considered to be rarities within Edinburgh. These include species such as the book louse *Amphigerontia bifasciata*, bark louse *Philotarsus picicornis* and flat Ramshorn snail *Hippeutis complanatus* that are considered to be Local within the Lothians, and species such as the white-lipped Ramshorn snail *Anisus leucostoma*, and the yellow cellar slug *Limacus flavus* which are considered to be Very Local in their distribution.

The Red mason bee *Osmia bicornis* has also been recorded. All bees and pollinators are included within the Fourth edition of the Edinburgh Biodiversity Action Plan (BAP) (City of Edinburgh Council, 2016) and hence are considered to be of city-wide importance.

Amphibians and Reptiles

TWIC hold records for common frog (*Rana temporaria*) for the wider area.

Fish

Eleven species of fish have been recorded from the Water of Leith (Bell, 2010; WoLCT, 2016) including European Eel (*Anguilla Anguilla*) and brown trout (*Salmo trutta*), which have both been recorded from along the Dean valley. European eel have undergone declines in numbers and are included on the IUCN global red list. They are also identified for priority action in the UK Biodiversity Action Plan and are included on the Scottish Biodiversity list.

Birds

Bird records are drawn from lists held by TWIC and the Water of Leith Conservation Trust. Incidental records of bird sightings were also made during the site visits. Thirty-eight species have been recorded from the Dean valley (see Table 2.3), and an additional thirteen species have been recorded from the surrounding area (within 0.5 km). These comprise mainly species associated with gardens and woodland, with a few species associated with waterways. Dipper (*Cinclus cinclus*) and grey wagtail (*Motacilla cinerea*) are commonly seen along this stretch, as they prefer shallow areas of clear water with pebble substrates. Grey heron (*Ardea cinerea*) is commonly seen at various locations along the river. Kingfishers live on the Water of Leith, and there have been several

sightings in the Dean Valley, particularly in 2016, although the known nest sites are not in the valley.

Table 2.3: Bird species recorded from the Dean valley (data from TWIC, Water of Leith Conservation Trust & observed during surveys for this study).

Common name	Scientific name	Common name	Scientific name
Blackbird	*Turdus merula*	Kingfisher	*Alcedo atthis*
Blackcap	*Sylvia atricapilla*	Long-tailed Tit	*Aegithalos caudatus*
Blue Tit	*Cyanistes caeruleus*	Magpie	*Pica pica*
Bullfinch	*Pyrrhula pyrrhula*	Mallard	*Anas platyrhynchos*
Buzzard	*Buteo buteo*	Meadow Pipit	*Anthus pratensis*
Carrion Crow	*Corvus corone*	Moorhen	*Gallinula chloropus*
Chaffinch	*Fringilla coelebs*	Mute Swan	*Cygnus olor*
Coal Tit	*Periparus ater*	Pied Wagtail	*Motacilla alba*
Cormorant	*Phalacrocorax carbo*	Redwing	*Turdus iliacus*
Dipper	*Cinclus cinclus*	Robin	*Erithacus rubecula*
Dunnock	*Prunella modularis*	Siskin	*Spinus spinus*
Feral pigeon/ stock dove	*Columba livia*	Song Thrush	*Turdus philomelos*
Goldfinch	*Carduelis carduelis*	Sparrowhawk	*Accipiter nisus*
Goosander	*Mergus merganser*	Starling	*Sturnus vulgaris*
Great Tit	*Parus major*	Swift	*Apus apus*
Greenfinch	*Carduelis chloris*	Treecreeper	*Certhia familiaris*
Grey Heron	*Ardea cinerea*	Waxwing	*Bombycilla garrulus*
Grey Wagtail	*Motacilla cinerea*	Woodpigeon	*Columba palumbus*
House Sparrow	*Passer domesticus*	Wren	*Troglodytes troglodytes*

The level of protection or importance of particular bird species is shown in Table 2.2. Within the UK bird species are assigned to one of three levels of conservation importance; red, amber; and green. Red listed species are those thought to be the highest priority for action as they have shown large declines in numbers and/or range, with Amber species being the next highest priority.

Three “Red” List bird species have been recorded (House sparrow, redwing, song thrush). These are species associated with the woodland areas. Five “Amber” list bird species (Kingfisher, mallard, meadow pipit, swift, and grey wagtail) have been recorded.

Several of the bird species have been identified for priority action within the Edinburgh BAP. The fourth version of the plan has recently been published (City of Edinburgh Council, 2016), which has made some changes to the species identified for priority action. Bullfinch, kingfisher, and song thrush were all listed as priority species within the third Edinburgh BAP (City of Edinburgh Council, 2010), but are not specifically mentioned within the fourth edition (City of Edinburgh Council, 2016). Specific actions to safeguard sparrowhawk populations are included in the fourth edition of the Edinburgh BAP. Swift is identified as a priority species in both the third and fourth Edinburgh BAPs and buzzard is also identified as a priority species in the fourth Edinburgh BAP (City of Edinburgh Council, 2016).

Mammals

Otter (*Lutra lutra*), mink (*Neovison vision*) and species of bats have been recorded from the Water of Leith between Dean Village and Stockbridge. Grey squirrel (*Sciurus carolinensis*), brown rat (*Rattus norvegicus*), and weasel (*Mustela nivalis*) have also been recorded from the Dean valley.

Otters are frequently recorded from the Water of Leith and have been seen during daylight hours in Dean Village. Otter spraints were recorded from the Water of Leith along the Dean valley during this study.

Otter are European Protected Species, listed on Annex IV of the Habitats Directive, and receive full protection under the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended). Both the animal and their breeding and resting places are protected, whether or not the animal is present. In summary it is illegal to:

- deliberately or recklessly kill, injure or take (capture) an otter;
- deliberately or recklessly disturb or harass an otter;
- damage, destroy or obstruct access to a breeding site or resting place of an otter (i.e. an otter shelter).

Otters are also listed on the IUCN Global red list, have been identified for priority action within the UK BAP and are listed on the Scottish Biodiversity list.

Five species of bat are recorded as occurring within Edinburgh: Daubenton's bat (*Myotis daubentoni*), Natterer's bat (*Myotis nattereri*), common Pipistrelle (*Pipistrellus pipistrellus*), Soprano pipistrelle (*Pipistrellus pygmaeus*), and brown long-eared bat (*Plecotus auritus*) (City of Edinburgh Council, 2016b).

No records for bat sightings along the Water of Leith in the Dean valley were identified during this study. However, there are records for two taxa of bat along other parts of the Water of Leith (mainly in the south of the City), which may also be anticipated to be present in the Dean valley. These are Pipistrelle[1] species (*Pipistrellus* sp.) and Daubenton's bat[2]. As these records arise from interested individuals reporting sightings to the Trust, this may reflect recording effort rather than provide an accurate picture of the distribution of bat species.

The Lothian bat group assess use of bat boxes near the Water of Leith Visitor Centre, where they have recorded species of *Pipistrelle* bat. They do not carry out surveys within the Dean valley, but would anticipate Daubenton's bat and possibly Natterer's bat and brown long-eared bat (*Plecotus auritus*) (N. Terry *pers comm*). Common and soprano pipistrelle bats and Daubenton's bats were recorded in pre-construction surveys for the flood defence works at Warriston (B. Nicholls *pers comm*). Common and soprano pipistrelle, Noctule bat (*Nyctalus noctula*) and brown long-eared bat were recorded in the nearby botanic gardens in 2016 (L. Alexander).

Like otters, all species of bat are European Protected Species (EPS), listed on Annex IV of the Habitats Directive and receive full protection under the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended). This provides protection both for the bats themselves and their breeding and resting places. This means it is an offence to deliberately or recklessly:

- capture, injure or kill a wild bat;
- harass a wild bat or group of bats;
- to disturb a wild bat in a roost (any structure or place it uses for shelter or protection);

[1] The records do not distinguish between the two species of Pipistrelle.
[2] Based on incidental species records held by the Water of Leith Conservation Trust for 2008 – 2016 and information provided by The Wildlife Information Centre.

- to disturb a wild bat while it is rearing or otherwise caring for its young (this would be a 'maternity' roost);
- to obstruct access to a bat roost or to otherwise deny the animal use of the roost;
- to disturb such a wild bat in a manner that is, or in circumstances which are, likely to significantly affect the local distribution or abundance of that species;
- to disturb a wild bat in a manner that is, or in circumstances which are, likely to impair its ability to survive, breed or reproduce, or rear or otherwise care for its young.

It is also an offence to:

- damage or destroy a breeding site or resting place of such an animal;
- keep, transport, sell or exchange or offer for sale or exchange any wild bat or any part or derivative of one (if obtained after 10 June 1994).

Weasel was included for priority action within the third Edinburgh BAP, but no specific actions for this species have been included in the fourth edition of the plan.

Plants

The Wildlife Information Centre and the Water of Leith Conservation Trust hold incidental records of plant species. The survey carried out for this study was not intended to produce a complete species list, but focussed on dominant or notable species.

The plants along the Dean valley are a mixture of self-sown species and formal plantings in gardens and beds, which includes some native species. For example, the Water of Leith Conservation Trust have carried out plantings at St Bernard's Well (see Section 3.2).

The native bluebell *Hyacinthoides nonscripta* has been recorded from the valley. This species has undergone declines in recent years owing to hybridisation with the introduced Spanish bluebell *Hyacinthoides hispanica*. It is listed on Schedule 8 of the Wildlife & Countryside Act (as amended), which means that it is protected from destruction, picking and uprooting.

Bluebell is also included on the Scottish Biodiversity List with creeping thistle *Cirsium arvense*, spear thistle *Cirsium vulgare* and black poplar *Populus nigra*. It was also included for priority action within the third Edinburgh BAP (City of Edinburgh Council, 2010).

Several of the species that have been recorded are considered to have a limited distribution within the Lothians. Black spleenwort *Asplenium adjantumnigrum*, Pendulous sedge *Carex pendula*, wall lettuce *Mycelis muralis*, common bistort *Persicaria bistorta*, and squirrel tail fescue *Vulpia bormoides* are considered "Local" within the Lothians, whilst Stanford screw moss *Hennediella stanfordensis* is considered "Very Local" within the Lothians.

Table 2.2: Species recorded from Dean valley that receive some form of protection or are considered rare at different geographic scales (based on data provided by TWIC). (Key at end)

	Status															
	International & National														Local	
	Bern Convention Appendix	Birds Directive Annex 1	Birds of Conservation Concern		Conservation of Habitats Species Schedule[a]	Convention on Migratory Species Appendix[b]	OSPAR	AEWA Annex 2[c]	Global Red List	Habitats Directive Annex	Wildlife & Countryside Act 1981 Schedule	UK BAP priority species	UK Red List	Scottish Biodiversity List (Schedule)	Edinburgh BAP	Lothians Rarity
Taxa			**Red List**	**Amber List**												
Invertebrates																
Red mason bee *Osmia bicornis*														✓ (4)	E	
White- lipped Ramshorn *Anisus leucostoma*																VL
Flat Ramshorn *Hippeutis complanatus*																L
Yellow cellar slug *Limacus flavus*																VL
Amphigerontia bifasciata	1															
Philotarsus picicornis																L
Amphibians & Reptiles																
Common frog *Rana temporaria*	3									5						
Fish																
European Eel *Anguilla anguilla*							✓		CE			✓		✓		
Birds																
Blue tit *Cyanistes caeruleus*	2															
Bullfinch *Pyrrhula pyrrhula*				✓										✓	A	
Buzzard *Buteo buteo*						2									D	
Cormorant *Phalacrocorax carbo*								✓								
Dipper *Cinclus cinclus*	2															
Dunnock *Prunella modular*	2			✓												

	Status																
	International & National															Local	
	Bern Convention Appendix	Birds Directive Annex 1	Birds of Conservation Concern		Conservation of Habitats Species Schedule[a]	Convention on Migratory Species Appendix[b]	OSPAR	AEWA Annex 2[c]	Global Red List	Habitats Directive Annex	Wildlife & Countryside Act 1981 Schedule	UK BAP priority species	UK Red List	Scottish Biodiversity List (Schedule)	Edinburgh BAP	Lothians Rarity
Taxa			**Red List**	**Amber List**												
Goldfinch *Carduelis carduelis*	2															
Goosander *Mergus merganser*						2		✓								
Great tit *Parus major*	2															
Grey heron *Ardea cinerea*								✓								
Grey wagtail *Motacilla cinerea*	2			✓												
House sparrow *Passer domesticus*			✓									✓				
Kingfisher *Alcedo atthis*	2	✓		✓							1			✓	A	
Mallard *Anas platyrhynchos*				✓		2		✓								
Meadow pipit *Anthus pratensis*	2			✓												
Moorhen *Gallinula chloropus*						2		✓								
Mute swan *Cygnus olor*						2		✓								
Pied wagtail *Motacilla alba*	2															
Redwing *Turdus iliacus*			✓								1			✓ (5)		
Robin *Erithacus rubecula*	2													✓ & ✓ (P)		
Song thrush *Turdus philomelos*			✓											✓	A	
Sparrowhawk *Accipiter nisus*						2									B	
Swift *Apus apus*				✓										✓ (5)	C	
Treecreeper *Certhia familiaris*	2															
Waxwing *Bombycilla garrulus*	2															
Wren *Troglodytes troglodytes*	2															

	Status															
	International & National														Local	
	Bern Convention Appendix	Birds Directive Annex 1	Birds of Conservation Concern		Conservation of Habitats Species Schedule[a]	Convention on Migratory Species Appendix[b]	OSPAR	AEWA Annex 2[c]	Global Red List	Habitats Directive Annex	Wildlife & Countryside Act 1981 Schedule	UK BAP priority species	UK Red List	Scottish Biodiversity List (Schedule)	Edinburgh BAP	Lothians Rarity
Taxa			**Red List**	**Amber List**												
Mammals																
Daubenton's bat *Myotis daubentonii*	2, 3				2	2				4	5			✓	C	
Common and soprano Pipistrelle bats *Pipistrellus* spp.	2, 3				2	2				4	5			✓	C	
Otter *Lutra lutra*	2				Appx 2				NT	2 & 4	5	✓		✓ & ✓ (P)	C	
Weasel *Mustela nivalis*	3														A	
Non-flowering plants																
Black spleenwort *Asplenium adiantumnigrum*																L
Stanford screw moss *Hennediella stanfordensis*																VL
Flowering plants																
Black poplar *Populus nigra*														✓ (4)		
Bluebell *Hyacinthoides nonscripta*											8			✓ & ✓ (P)	A	
Box *Buxus sempervirens*													*			
Common bistort *Persicaria bistorta*																L
Creeping thistle *Cirsium arvense*														✓ (P)		
Oak *Quercus*														✓ & ✓ (P)		

	Status																
	International & National															Local	
	Bern Convention Appendix	Birds Directive Annex 1	Birds of Conservation Concern		Conservation of Habitats Species Schedule[a]	Convention on Migratory Species Appendix[b]	OSPAR	AEWA Annex 2[c]	Global Red List	Habitats Directive Annex	Wildlife & Countryside Act 1981 Schedule	UK BAP priority species	UK Red List	Scottish Biodiversity List (Schedule)	Edinburgh BAP	Lothians Rarity
Taxa			**Red List**	**Amber List**												
Pendulous sedge *Carex pendula*																L
Spear thistle *Cirsium vulgare*														✓ (P)		
Squirrel tail fescue *Vulpia bromoides*																L
Wall lettuce *Mycelis muralis*																L
Welsh poppy *Meconopsis cambrica*																

Notes and Key:

a – The Conservation (Natural Habitats, &c) Regulations 1994 as amended.

b - The Convention on Migratory Species (Bonn Convention), aims to conserve terrestrial, aquatic and avian migratory species throughout their range. Migratory species threatened with extinction are listed on Appendix I; migratory species that need or would significantly benefit from international co-operation are listed in Appendix II.

c - Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA) - developed under the framework of the Convention on Migratory Species (CMS). It brings together countries and the wider international conservation community in an effort to establish coordinated conservation and management of migratory waterbirds throughout their entire migratory range.

* Data Deficient.

Edinburgh BAP: A – actions for this species were included in the Third Edinburgh BAP, but are not specifically mentioned in Fourth Edinburgh BAP; B – priority species in Third Edinburgh BAP, but whilst actions for this species are included in the Fourth Edinburgh BAP it is not specifically identified as a priority species; C – species identified for priority action in both Third and Fourth Edinburgh BAP; D – species identified for priority actions in Fourth Edinburgh BAP; E – all bees identified in actions within the Fourth Edinburgh BAP.

Red List Categories: CE – Critically Endangered; NT – Near Threatened L – Local; VL – Very Local.

Scottish Biodiversity List: ; (P) – Species chosen for value to Scottish public.

3 LEGAL AND POLICY FRAMEWORK

The Conservation Statement for the Dean valley (McGowan, 2015) listed and contained a summary of statutory designations, policies and plans that will influence the management proposals. This section is not intended to repeat that work, but provides a more detailed summary of some of the relevant legislation and policy relating to biodiversity features, which have influenced the proposed scope of biodiversity work for the project. In particular, it refers to the new edition of the Edinburgh BAP (City of Edinburgh Council, 2016), which has been published since the Conservation Statement was produced.

This section is intended to provide a factual summary of relevant policies that have influenced the identification of benefits, constraints and issues, which are considered in Section 4.

3.1 City of Edinburgh Council – Biodiversity Duty

The Nature Conservation (Scotland) Act 2004 places a duty on all public bodies to further the conservation of biodiversity when carrying out their responsibilities. In fulfilment of this duty they must also have regard to the Scottish Biodiversity Strategy. This currently is set out in '*Scotland's Biodiversity: It's in Your Hands*' (2004) and '*2020 Challenge for Scotland's Biodiversity*' (2013).

3.2 Water of Leith Management Plan & Water of Leith Conservation Trust

The management plan was published in 2010 and is intended to cover the ten-year period to 2020 (Bell, 2010). It was prepared in consultation with a wide group of statutory and non-statutory stakeholders through the co-ordination of the Water of Leith Conservation Trust. It includes specific actions for different areas and activities associated with the river. Management is achieved through co-operative working amongst the stakeholders. Quarterly meetings are held by the steering group to monitor progress.

Several of the actions within the plan are currently being implemented along the Dean valley, such as volunteer events, including planting and weeding at St Bernard's Well; educational walks along the river; and active management of invasive non-native species including Giant hogweed (*Heracleum mantegazzianum)*.

Actions within the management plan relevant to the Dean valley, include, but are not limited to:

A50: Introduce woodland management programme to safeguard cultural features at risk.

A52: Develop and implement an ecological management plan, which should include:

- Identification of ecological management compartments along the river valley (to be conducted in conjunction with the survey of woodland along the river that has been conducted);
- Identification of areas where there is the potential for habitat enhancement/creation or the restoration of habitat links;
- Production of detailed ecological objectives and prescriptions for each management compartment. The principle of establishing continuous riparian vegetation is likely to underlie these objectives.

A53: Identify opportunities to improve surface finishes to improve the attractiveness of the route to particular users such as cyclists, without detracting from landscape character, as funding permits.

The Water of Leith Conservation Trust has also identified a number of "Biodiversity Boost" sites. These are areas that are actively managed to improve their biodiversity value. St Bernard's Well Medicinal Herb Garden is one of these sites. The area has been planted with native wildflowers, which also have medicinal benefits (Helen Brown *pes comm*). Continuation of these sites is included as an action within the fourth Edinburgh BAP (City of Edinburgh Council, 2016).

3.3 Water Framework Directive and Scottish Environment Protection Agency (SEPA)

The Water Framework Directive provides a structure for the management and protection of waters. This is achieved through River Basin Management Plans (RBMP). These summarise the current state of water bodies, identify the pressures that are causing a downgrade of their condition, and provide a series of actions to protect or improve the quality of the water environment. Data sheets for specific watercourses are produced to contribute to the RBMP. The current RBMP covers the period 2015- 2027. As noted in section 2.2.2, the Water of Leith is considered a Heavily Modified Water Body owing to the presence of Flood defence measures and is classified as Poor Ecological Potential. By 2027 it is anticipated that it will have reached good ecological potential for fish passage, physical condition and water quality (SEPA website, 2016).

3.4 Trees in the City Action Plan

The Council has legal obligations with respect to trees. This includes a duty of care to maintain its trees in a safe condition. As was noted in section 2.2.2 trees are surveyed on a regular basis to inform management to achieve this duty.

The *Trees in the City Action Plan* sets out Edinburgh Council's approach to managing trees and woodland within the city in response to various policy documents. It highlights the relative importance of trees, noting that the value of trees increases exponentially with age. The document also identifies the importance of the woodland along the Water of Leith. Tree diseases and climate change are noted as particular threats to woodland in the city.

Resources means that survey work is currently focused on those trees providing the greatest hazard and risk. Policies within *Trees in the City* that are likely to have the greatest relevance for the Dean valley are (but may not be limited to):

> Policy 3: The Council will take steps to bring all of its trees under active, appropriate and informed management.
> Policy 9: The Council will not carry out works to trees, or fell them, unless it is necessary to do so. When works are carried out, the reasons for the work will be documented and recorded.
> Policy 11: Management of ivy and trees. The Council will control ivy on trees where it is having a significantly negative effect.
> Policy 14: The Council will undertake measures to make safe unacceptable trip hazards in streets, roads, or the public highway caused by a Council owned tree.
> Policy 40: The Council will endeavour to maintain its tree stock and increase current tree numbers by planting. The Council will look to increase and improve its tree cover within available resources as part of an annual tree planting programme, paying particular attention to historic street tree and park planting.
> Woodland management is approached in a slightly different manner to isolated trees, with the emphasis being on the whole woodland block.

3.5 Edinburgh Local Biodiversity Action Plan (BAP)

The Fourth Edinburgh BAP was published in 2016. The plan promotes the need for a landscape scale approach to achieve improved connectivity of natural places and

enhanced biodiversity, which underpins ecosystem services. Several of the specific actions listed for green and blue networks have particular relevance for the Dean valley project:

- G1 Review the Local Biodiversity Sites network across Edinburgh and identify where positive management, projects or management plans should be implemented, with an initial focus on Council owned sites.
- G2 Identify, develop and support strategic green network and landscape scale partnership projects to restore, create or reconnect habitats.
- G50 Encourage and support Friends of Parks and other community groups to deliver biodiversity improvements in their local greenspace.
- G60 Identify sites or projects with community groups to enhance local urban greenspaces.
- G87 Progress delivery of the Edinburgh and Lothians Forestry and Woodland Strategy action plan and reporting. Identify cross-boundary opportunities where possible.
- G88 Identify key woodland projects and sites to direct Forestry Commission Scotland Woodland In and Around Towns (WIAT) funding.
- G90 Secure WIAT funding for qualifying Council owned woodlands.
- G94 Identify sites or projects which require a woodland management plan and can be funded under Woodlands In and Around Towns (WIAT).
- G95 Identify sites or projects which would benefit from woodland management as part of the WIAT scheme from FCS.
- B18 Identify opportunities for river restoration which can be funded through the Water Environment Fund.
- B23 Management of Water of Leith corridor in partnership with Water of Leith Conservation Trust
- B27 Remove, monitor and prevent the spread of invasive plant species along the Water of Leith. Establish a co-ordinated framework for the management of invasive species with the aim of spraying Giant Hogweed and Japanese Knotweed annually and to continue the programme of volunteers' hand pulling Himalayan balsam.
- B28 Develop and implement an ecological management plan, which should include: Identification of ecological management compartments along the Water of Leith valley (to be conducted in conjunction with the survey of woodland along the river that has been conducted); Identification of areas where there is the potential for habitat enhancement/creation or the restoration of habitat links; Production of detailed ecological objectives and prescriptions for each management compartment.
- B32 Identify sites suitable for riparian woodland creation or enhancement.

There are also several actions linked to identification and control of Invasive Non Native Species on Council-owned sites.

The effects of climate change on biodiversity have also been considered in the BAP.

3.6 Woodland In and Around Towns (WIAT)

This Forestry Commission Scotland initiative aims to bring neglected woodland into management; create new woodlands; and support people to use and enjoy their woods. The scheme is for woodlands that are within 1 km of settlements with a population greater than 2000 people. The scheme offers funding to projects that meet the objectives of WIAT.

3.7 Resilient Edinburgh Climate Change Adaptation Framework

Edinburgh Council has initiated a number of steps to plan for and deal with the likely effects of climate change (Edinburgh Partnership for Sustainable Development, 2014). This includes working in association with other stakeholders, to produce a Climate Change Adaption Framework, which contains a number of high level actions to help adapt to a changing climate. One of these actions is "to review Edinburgh's priority species and habitats to identify those at greatest risk from climate change, and utilise greenspace and ecological services to help mitigate and adapt to future impacts."

The effects of climate change have also been incorporated into the fourth edition of the Edinburgh BAP.

4 BENEFITS, CONSTRAINTS AND ISSUES FOR BIODIVERSITY RELATED TO PROPOSALS FOR THE DEAN VALLEY

This section draws on the preceding text to highlight the implications for biodiversity that may arise from proposals for management of the Dean valley. It considers how management of the area could have positive benefits for biodiversity as well as identifying potential threats to biodiversity features and identifying how biodiversity will influence the development of final proposals for management for visual and landscape purposes.

4.1 Nature of proposals

The Conservation Statement (McGowan, 2015) sets out a vision with accompanying conservation and management objectives, supported by a series of conservation policies and actions for particular locations along the Dean valley. Whilst these will require further work to turn them into specific prescriptions for work on the ground (e.g. number of trees to be removed), it is clear that some of these proposals would have direct effects (both positive and negative) on biodiversity features, whilst others may have indirect effects.

Actions included within the Conservation Statement (McGowan, 2015), which at this stage are assessed as having direct implications for biodiversity are reproduced below. As some of the actions cover a number of topics other than biodiversity, bold text has been used to highlight the elements that have implications for biodiversity.

- Lindsay's Mill public space/ viewpoint – improvement and interpretation proposals to repair and upgrade existing provision and reopen views **including tree work** and wall repairs. The site also has potential for the Dean Weir 2 micro hydro scheme.
- Randolph cliff – **manage to improve species diversity** and views of Dean bridge while maintaining rockfall protection (no public access); **manage ivy** covering geological exposure.
- Upper Dean Terrace riverside – **improve appearance and biodiversity by reduction of elm and restocking with native species; tackle problem of ivy on structures**; retaining walls repairs as necessary based on condition survey; cast-iron railings repairs or replacement.
- Dean Terrace riverside – **improve appearance and biodiversity by reduction of undesirable species (privet, sycamore), reduce percentage of elm, and restocking with native species; tackle problem of ivy on structures;** retaining walls, repairs as necessary based on condition survey; cast-iron railing repairs or replacement.
- Doune Terrace Gardens – consider an improvement programme to reopen the *clairvoie* view, **restructure tree cover to open up canopy, remove sycamores, and diversify species,** improve paths, **remove inappropriate hawthorn hedge** and restore iron railings.

- **Commission a tree and woodland survey and management plan within the potential project area, updating any existing survey data and considering trees and woodland habitat management from the broader perspective of project objectives.**
- **Investigate methods to organise the removal of ivy** from stonework structures, whether by contract, direct labour or volunteers, to continue and extend work by WoLCT volunteers and volunteers at Upper Dean Terrace.

In general terms, if these policies and actions are implemented as stated, the work is likely to require, but may not be limited to:

- Removal of some trees;
- Removal of ivy from walls and other structures;
- Restructuring and replanting of woodland;
- Repairs and repointing of walls and retaining structures;
- Resurfacing of footpaths.

There are also proposals to investigate a micro hydro project.

4.2 Benefits/opportunities

Biodiversity could benefit in the following way through development of a detailed, funded, management plan for the Dean valley, including the Water of Leith:

- Implementation of an integrated management plan that reflects the importance of the Designed landscape and biodiversity will act as a focus for co-ordinated work by all relevant agencies and community groups.
- The project would provide a focus and purpose for carrying out surveys of habitats and species along the river valley. These data would improve understanding of the species that are present and how these species use the area. These data could be used to help in the delivery of several actions within the Edinburgh Local Biodiversity Action Plan (see Section 3.5).
- The project would provide opportunities for local people to become involved in surveys of wildlife (particularly bats) and gain more knowledge and understanding of what is on their doorstep. It would also enable local people to gain new skills.
- The project would act as a focus for creation of a woodland management plan, in line with actions in the Fourth Edinburgh BAP (City of Edinburgh Council, 2016) (Action G94/G95) and Policies within the *Trees in the City Action Plan* (Policy 3 & 9). Currently, limited resources means that efforts are concentrated on those trees that may present a risk to human safety or flood risk, but this project would enable a wider range of trees to be assessed for condition and management for the benefit of the designed landscape and biodiversity
- The management plans for woodland and other features can include measures to improve the quality of habitat for the species that are present, particularly protected species such as bats and otters.
- The woodland management plan provides opportunities to plan successional planting and build-in resilience against diseases and climate change to ensure that woodland cover is maintained and to reflect the designed landscape designation. For example, the woodland includes a large number of ash trees, which are vulnerable to infection by *Chalara* and it may be necessary to allow for introduction of other tree species that are more resistant to disease. This is consistent with Policy 40 of *Trees in the City Action Plan*.
- The Fourth Edinburgh BAP (City of Edinburgh Council, 2016) includes an action for the development and implementation of an ecological management plan for the Water of Leith, which includes identification of ecological management compartments. A plan for sections of river in the Dean valley would contribute to this action.

- The plan could make a contribution to a number of other actions in the Fourth Edinburgh BAP (City of Edinburgh Council, 2016) (see section 3.5).
- The plan could allow for removal of some tree cover and shading to improve habitat quality for fish, and provide more light to enable expansion of the water crowfoot beds.

4.3 Constraints/Threats

Some of the proposed policies and actions within the Conservation Statement will need to be carefully planned and implemented to avoid adverse effects on biodiversity and in particular on "European Protected Species" (otter and bats). A summary of these are provided below; comment on how these can be addressed is provided in the discussion of issues.

Potential threats to bats arise from:

- Changes to/ loss of woodland cover causing changes or losses to bat commuting and foraging habitats.
- Removal of ivy from trees, which could alter the quality of habitat for bat roosts.
- Disturbance of bats from increased noise if management results in changed patterns of use of the walkway e.g. through increasing access to areas that currently receive low usage.
- Changes to the quality of bat roosting habitats or access to them through changes in temperature, humidity, and light regime resulting from removal of trees nearby and/or ivy.
- Modification of habitats through light spill/noise.

To otters arising from –

- Loss of holts or other resting places e.g. amongst the roots of mature trees along the river valley.
- Loss of covering vegetation that allows otters to move unseen along the river corridor.
- Physical disturbance of otters using places of rest along the river bank (if removal of vegetation allows greater public access to the water's edge).

In addition to effects on protected species, there could be effects on other biodiversity features arising from:

- Removal of ivy – this provides important habitat and food source for nesting birds and insects.
- Removal of trees along the edge of the water course. Tree roots form an important function in binding the soil at the edges of the river, and exposed tree roots provide important habitat. If exposed areas of soil are created as a result of tree removal, this could lead to increased erosion of banks during periods of high flow, elevating levels of suspended silt, which will lead to a decline in habitat quality for fish and water crowfoot.
- Removal of trees and cover along the watercourse could reduce the quality of habitat available for kingfisher and other waterway birds.

4.4 Issues and mitigation

To maximise the opportunities for biodiversity and avoid the adverse effects identified above, the project will require biodiversity to be an integral part of the planning process. The biodiversity value of the public space is linked to and enhanced by the existence and current management of the open spaces in the adjoining private gardens, and this relationship needs to be considered in reviews of the biodiversity. As more information is gathered about the presence and distribution of species and habitats along the Dean valley, this can be used to refine and develop the actions included in the Conservation Statement (McGowan, 2015). Many of the effects can be avoided by considering tree

management on a case-by-case basis, and it may be necessary to compromise between widespread clearance of vegetation to open up views, and selective removal of individual trees, which would improve visibility and benefit biodiversity.

Some key issues for biodiversity that will need to be addressed through the development of the project are:

Balance between "neglect" and allowing natural processes.
The Conservation Statement (McGowan, 2015) suggests that there are neglected areas along the valley. Some of these areas which do not receive direct, active management have developed features of importance for wildlife. These include areas of dense cover close to the water course, which are likely to enable safe movement of otters along the river, such as those which occur below road level at Lindsay's Mill. Thus, a balance will need to be struck between clearance and opening up these areas for public access and providing adequate habitat for otters and other species.

The location, extent, and nature of any tree clearance.
The existing woodland along the river valley comprises mainly self-sown trees and does not reflect the Designed landscape. Some of these grow out of retaining walls or in structures, which is undermining their integrity. Others are located on steep slopes, for example above the walkway below Randolph Cliff. These are likely to have shallow roots and may be a hazard. Many trees are growing at the edge of the channel or on the banks of the river. Whilst these may have an effect upon views of the river, some trees will be performing important functions for biodiversity including, providing stability to the banks, providing fish spawning sites amongst exposed roots, providing perching points for kingfisher and other bird species, and providing shade to help regulate water temperature. Some of these trees may also support bat roosts. Thus, a balance will need to be struck between the requirements of safety and stability of banks, views and biodiversity. Decisions are likely to be required on a case by case basis.

The totality and location of tree coverage within the entire area of the Dean Valley also has an important role to play for bat species using the valley. High numbers of insects are often associated with woodlands, which provide food for bats. Also, bats use woodland edges, rivers and other linear features to help them navigate between feeding areas and roost sites. It will be important to ensure that any woodland management does not cause significant changes to these navigation features for bats or a significant reduction in overall woodland cover. A balance will be required between tree removal and providing for successional planting. This balance can be demonstrated through a management plan.

Bringing all the trees into an active management plan would be consistent with Policy 3 of The *Trees in the City Action Plan*. It would provide a clear purpose and aim for woodland management and would meet many of the objectives and aims of the Water of Leith management plan (e.g. A50, A52) and of the Edinburgh Biodiversity Action Plan (e.g. G87, G88, G94, G95) (see sections 3.2, 3.4 and 3.5).

In some areas tree roots are creating raised areas of footpaths. Policy 14 of *Trees in the City Action Plan* allows for making safe unacceptable trip hazards.

Tree diseases and assemblage of tree species
The woodland currently includes large numbers of ash and elm trees, both species that are vulnerable to disease from ash die-back (*Chalara*) and Dutch elm disease respectively.

The Council has calculated an "Importance Value" for tree species, which provides an indication of the relative contribution to ecosystem services that each tree species

provides. Ash has been assessed as one of the top-ten species that contribute to ecosystem services (City of Edinburgh Council, 2014). It is also a tree species particularly favoured by bats for roosts (Bat Conservation Trust, 2016). Large numbers of ash occur within the Dean valley.

Ash die-back is a relatively recent problem in the UK, but has spread rapidly and has recently been recorded from Edinburgh, including the area around the Dean Valley. It has caused high mortality of ash trees, and as ash is one of the ten most common tree species within the City, the disease could cause large-scale changes to tree cover.

Elm is also an important component of the tree flora in Edinburgh. As this species has disappeared from many towns and cities, its continued existence in Edinburgh is a notable feature. Wych elm is also an important tree in terms of ecosystem services in Edinburgh (City of Edinburgh Council, 2014). Dutch elm disease is well-established within the City. The Council has a policy of containing the disease through felling.

Management of ivy
Ivy provides many benefits to wildlife. It provides habitat and shelter for birds, bats and invertebrates. The pollen and berries are food for insects and birds (Woodland Trust, 2016). It does not present an intrinsic risk to tree health, but it can contribute to failure of trees through increased sail effects in high winds or through the weight of trapped snow. Policy 11 of the Council's *Trees in the City Action Plan* means that the usual approach is only to remove ivy from trees where it has a significant negative effect (City of Edinburgh Council, 2014). The management plan will need to consider ivy removal on a case by case basis and clearly identify where this can be carried out.

5 NEXT STAGES

Protected and important biodiversity features have been identified within the Dean valley. Issues relating to the management of these features have been identified in the previous section. In order to allow an assessment of the potential impacts of the proposals on protected species and to identify opportunities to improve habitat quality for these species, more survey work will be required to collect robust data following good practice guidelines.

5.1 Bats

A phased survey strategy is proposed, which is proportionate to the risks to bats. The scope of the later stages of this strategy may need to be amended in the light of data that is collected.

Factors that have influenced the scope of this survey are:

- the species of bats that have been previously recorded along the river,
- the likely nature and scale of proposed activities,
- specific features of the Dean valley, including safety considerations and the extent of public access.

So far, the presence of two species of bat along the Water of Leith in the Dean valley has been identified. Daubenton's bat is often known as the water bat, as its preferred foraging habitat is over water and along rivers (Collins, 2016), although it will also forage in woodland. It tends to be one of the species that emerges later from roosts at sunset. Soprano pipistrelle also prefers riparian habitats, whilst the common pipistrelle tends to prefer deciduous woodland. Both these species tend to be emerge early from roost sites (Davidson-Watts and Jones (2006) and Davidson-Watts *et al* (2006) quoted by Collins, 2016).

The habitat has been assessed as of high potential value to bats for foraging and commuting, and Potential Roost Features (PRF) have been identified in numerous trees and some built structures.

Surveys will aim to identify

- Which bat species are using the Water of Leith along the Dean valley?
- What are the activity levels of bats along the Dean valley?
- How are bats using the habitat along the Water of Leith?
- What is the temporal and spatial distribution of recorded bat activity within the Dean valley?
- How are habitats used on site connected to habitats in the surrounding area?
- Are there bat roosts in any of the trees or features that will be managed?

The survey work has been divided into three main areas, each requiring different survey techniques:

- Surveys to provide more information about the woodland habitat for foraging and commuting. These will be carried out using bat activity surveys;
- Surveys of certain structures to provide more information about their use as roost sites. These will be carried out using Preliminary Roost Assessments;
- Surveys of individual trees to provide more information about their use as roost sites. These will be carried out using Preliminary Ground Level Roost Assessments followed by direct investigation of Potential Roost Features (PRF).

More details about each of these surveys are provided below.

5.1.1 Bat activity survey:

These provide information to assess the effects of activities on habitats that are suitable for bat commuting and foraging. They can involve direct recording of activity by people walking predetermined transect routes or through using automated/static activity recorders, or a combination of the two.

It is proposed to focus on manual bat activity surveys for two main reasons:

- the main emphasis of the survey will be upon areas where there is public access, and so there would be a high risk of automated recorders being damaged or stolen; and
- it provides greater opportunities for local communities to become involved in the survey work and learn new skills.

Surveyors, usually working in pairs, walk at a constant speed along a pre-determined route. Using hand-held bat detectors and recorders, the surveyors record bats flying away from roosts or along the river corridor noting details of the numbers, flight direction, height, behaviour, appearance and speed of all bats observed. All echolocation calls are recorded and analysed later to provide information about the species or genus of bat present.

The precise routes will be identified in advance and are walked in daylight to check for hazards. Each route is usually 3 – 5 km in length. Areas to be covered include the walkway, areas around India Place, along Dean Terrace and Upper Dean Terrace, and (if possible) within the Dean Gardens, Belgrave Gardens and Moray Bank Gardens.

Surveys may be carried out at dawn or dusk only, dawn and dusk only, or between dawn and dusk. The timing of the surveys, both in terms of the time of year and time of the night, will influence the types of activity most likely to be recorded. For example the BCT Guidelines (Collins, 2016) suggest that dusk only surveys are most effective in spring and autumn. It is suggested that the survey may need to be repeated at least 3 times over the summer season.

5.1.2 Structures

The Preliminary Ecological Appraisal identified a number of structures with bat roost potential. These are the retaining wall between the Gardens by St Bernard's Bridge and Mackenzie Place, and within the arched structure in Moray Bank Gardens. Some of these will be unaffected by proposals, as they occur within the private gardens. However, it will be helpful to identify whether any of these support roosts as it will add to the picture of how the valley is used. A preliminary roost assessment will be carried out of the gaps in the wall by St Bernard's Bridge. The arched structure in Moray Bank Gardens should be subjected to a preliminary Ground Level Roost Assessment to assess its suitability for bats, and follow this up with a PRF inspection survey, if appropriate. Further details of these survey techniques are provided in the next section.

5.1.3 Trees

A large number of trees that have bat roost potential were identified during the surveys for this study, but not all trees were examined in detail. The BCT Guidelines (Collins, 2016) notes that identifying a bat roost in a tree is more difficult than identifying a roost in a structure and whilst it is possible to confirm presence of bats, it is very difficult to conclusively confirm absence. This is made harder by the fact that some species, including Daubenton's bat and common pipistrelle, change roosts ("roost switching") every few nights. For these reasons the BCT Guidelines (Collins, 2016) suggest that in order to consider the effects of a proposal, all trees with bat roosting potential should be considered part of the total resource that will be used at some point by tree-roosting bats.

As there are a large number of trees that have potential roost features, survey effort will be focussed on only those trees that will be directly or indirectly affected by the management proposals (e.g. proposals to remove or lop trees or remove ivy).

Trees that will be directly or indirectly affected will be subjected to a preliminary ground level roost assessment. This requires a detailed inspection of the exterior of the tree from the ground to identify any Potential Roost Features (PRF) for bats. PRF include a wide range of features such as rot holes, cracks and splits in the trunk, woodpecker holes, and bat and bird boxes. A full list of features is included in the BCT Guidelines (Collins, 2016) and Andrews, 2013.

The tree is examined from all sides, preferably during the winter months. Each tree with PRF is marked on a plan and details about the tree (e.g. species, size, etc.) are collected. The potential suitability of features is also recorded using a four-point scale: Negligible, Low, Moderate, High as defined in Table 4.1 of the BCT Guidelines (Collins, 2016), which is reproduced in Table A.1 in Appendix A.

Features assessed as Moderate or High suitability will require further investigation, such as a PRF inspection survey. The potential roost feature is examined either using remote methods such as mirrors and an endoscope, or by direct observation using ladders, tree climbing, scaffolding or a cherry picker. The surveyor looks for evidence of bats in order to be able to reclassify sites. For example, some sites that appear suitable from the ground may be found to be unsuitable when examined directly. This more detailed assessment can be carried out at any time of year.

For those trees where it is not possible to gain direct access for examining the PRF, and sites where roost sites are confirmed, it may be necessary to carry out additional presence/absence surveys and surveys to characterise the type of roost. A licence will be required for surveys of bat roosts.

Licences will also be required before any trees that support a roost are managed.

If bat droppings are found during roost inspections of either structures or trees, samples should be collected for DNA analysis.

The proposed approach is summarised in Table 5.1.

Table 5.1: Summary of proposed survey approach for bats

Habitat/Feature/Area	Survey/Assessment
1. All habitats within the Dean valley	Bat activity survey
2. Structures identified through the PEA as having potential roost features (PRF)	Preliminary Ground Level Roost Assessment & PRF Inspection survey – direct investigation of features. Presence/absence surveys and roost characterisation surveys may also be required.
3. Trees identified as potentially being directly or indirectly affected by management proposals	Preliminary Ground Level Roost Assessment – assessment from ground level of presence of potential roost features.
4. Trees identified as potentially being directly or indirectly affected by management proposals AND assessed as having moderate or high suitability for bats (using definitions in Table 4.1 of BCT Guidelines (2016)).	PRF Inspection survey – direct investigation of features. Presence/absence surveys and roost characterisation surveys may also be required.

In planning the surveys it is important to consider the "Zone of Influence" of any works that are proposed, which may not be the same as the study area. The Water of Leith acts as a corridor for movement of a number of species through the city.

5.2 Otter

The purpose of the survey will be to identify how otter are using the Water of Leith through the Dean valley. Standard otter survey techniques will be used (e.g. Chanin), which involve walking along the watercourse and adjacent areas looking for evidence of otters including any existing or potential resting places (also called holts and couches). The information will be considered within the wider context of the Water of Leith, as otter will move into and through the Dean valley.

5.3 Other species

As plans for the management are developed, they will need to consider effects upon the habitats as a whole and other species such as fish, invertebrates and birds. This will include the effects upon species that have shown declines in recent years, are listed in the Edinburgh BAP and/or are important to the local community, such as Kingfisher. At this stage, no particular surveys for these other species are proposed, but this may need to be revised as management plans are developed.

There are no records for water vole (*Arvicola amphibious*) from the Water of Leith, but signs of this species can be looked for during the otter survey.

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APPENDIX A. METHODS

This study has followed the approach set out by CIEEM in "Guidelines for Preliminary Ecological Appraisal" (2013) and has comprised:

- a desk study to identify and review existing survey information;
- a field survey based on Phase 1 habitat survey (JNCC, 2010);
- production of target notes to provide supplementary information about notable features
- consultation with key stakeholders;
- descriptions of habitat features and condition; and
- assessment of the potential suitability of the habitat for protected species such as otters and bats.

The study has focussed upon the area covered by the Dean Valley Regeneration Project; broadly that area along the Water of Leith valley between Dean Village and Stockbridge, with consideration of the adjoining New Town gardens. It is recognised that there are ecological links between features within this area and the river corridor both upstream and downstream of the Dean valley, and through these to other open areas in the City (e.g. Inverleith Park and the Botanic Gardens). These areas have not been surveyed as part of this project, but links between features have been considered.

Desk Study and review of existing survey information

The desk study involved identification and review of existing information about biodiversity resources along the Water of Leith. This included data held by The Wildlife Information Centre, the Water of Leith Conservation Trust, City of Edinburgh Council Natural Heritage Service, and City of Edinburgh Council Forestry Service. In addition published and unpublished information in the public domain was identified including River Basin Management Plan data information sheets compiled by the Scottish Environment Protection Agency (SEPA), Topic Papers supporting the Water of Leith Management Plan (Bell, 2010), and policy documents produced by City of Edinburgh Council such as *Trees in the City* and the Fourth Edinburgh Local Biodiversity Action Plan.

Field Survey

The PEA Guidelines (CIEEM, 2013) recommend the use of Phase 1 habitat survey (JNCC, 2010) or equivalent. There is existing Phase 1 habitat data for the Dean valley (City of Edinburgh Council, 2011), but as this is now some years old, a new walk-over survey was carried out of the area, to check that the degree to which the type and extent of Phase 1 habitats had changed since the previous survey.

Habitats were mapped at a scale of 1:2500 using standard Phase 1 habitat codes. Whilst this is a more detailed scale than is commonly used, it can be useful in urban settings for small sites (JNCC, 2010). To provide further information about biodiversity features at a greater scale, a series of detailed "target notes" were produced. These focussed on features of particular value for protected species such as otter or bats. They also include comments about the condition of habitat features.

Characteristic plant species in each habitat were recorded, but there was no attempt to produce a complete or comprehensive list of species.

The survey was conducted from the Water of Leith walkway and associated public access land between the Stock Bridge and the footbridge to the West of Well Court in Dean Village. It extended along public roads through India Place and along Doune Terrace, and along Upper Dean Terrace. An overview of the site was also made from the Dean Bridge. Visits to Dean Gardens and Moray Bank Gardens were also made. Habitats within Belgrave

Gardens were not visited as it was felt that the land could be adequately assessed from adjoining areas.

The main survey of the walkway and adjacent public streets within the study area was carried out on 11th April 2016. Dean Gardens were visited on 3rd May and Moray Bank Gardens were visited on 10th May. A site visit was made in the company of Helen Brown of the Water of Leith Conservation Trust and Jenny Hargreaves of the City of Edinburgh Council on 4th April 2016.

Further assessments of the suitability of habitat and features for bats were also made.

Bat survey

A Preliminary Ecological Appraisal for bats was also undertaken, following guidance of the Bat Conservation Trust (BCT, 2016). This differs from the PEA for habitats, in that it focuses upon the potential value of the habitat and its features for bats. It comprises a walkover of the area to observe, assess and record any habitats suitable for bats to roost, commute and forage both within the study area and surrounding areas.

The potential suitability of features for foraging and commuting bats has been assessed separately to the suitability of features for roosting purposes. Each feature has been assessed using the four point descriptive scale recommended by the BCT Guidelines (2016) (Table A.1). This is reproduced below. At this stage the emphasis has been upon potential suitability of features; there has been no further exploration of actual use of sites, or characterisation of potential roost sites (i.e. bats use different roost sites for different purposes e.g. daytime roosts, maternity roosts, hibernating roosts etc. See Andrews (2013) for a full description).

Table A.1: Guidelines for assessing the potential suitability of proposed development sites for bats, based on the presence of habitat features within the landscape, to be applied using professional judgement (reproduced from Table 4.1 of BCT, 2016)

Suitability	Roosting habitats	Commuting and foraging habitats
Negligible	Negligible habitat features on site likely to be used by roosting bats.	Negligible habitat features on site likely to be used by commuting or foraging bats.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions[a] and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely to be suitable for maternity or hibernation). A tree of sufficient size and age to contain PRFs but with none seen from the ground or feature seen with only very limited roosting potential[c].	Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or unvegetated stream, but isolated, i.e. not very well connected to the surrounding landscape by other habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
Moderate	A structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions[a] and	Continuous habitat connected to the wider landscape that could be used by bats for commuting such as lines of trees and scrub or linked

	surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only – the assessments in this table are made irrespective of species conservation status, which is established after presence is confirmed).	back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water.
High	A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions[a] and surrounding habitat.	Continuous, high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines of trees and woodland edge. High-quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such as broadleaved woodland, tree-lined watercourses and grazed parkland. Site is close to and connected to known roosts.

Notes: a – for example, in terms of temperature, humidity, height above ground level, light levels or levels of disturbance. b evidence from the Netherlands shows mass swarming events of common pipistrelle bats in the autumn followed by mass hibernation in a diverse range of building types in urban environments (Korsten et al 2015). This phenomenon requires some research in the UK but ecologists should be aware of the potential for larger numbers of this species to be present during the autumn and winter in large buildings in highly urbanised environments. c This system of categorisation aligns with BS8596:2015 surveying for bats in trees and woodland (BSI, 2015).

Consultation

Discussions were held with a variety of organisations and stakeholders to:

- Identify what information they held for the Dean valley; and
- Obtain views on biodiversity importance and features.

A summary of the organisations and individuals contacted during this study and the information provided is set out in Table A.2.

Table A.2: Summary of Consultations undertaken

Organisation	Contact	Information provided
Water of Leith Conservation Trust	Helen Brown	Record of wildlife sightings along the river. Information about current management of the Water of Leith through the Dean valley and Biodiversity hotspots.
City of Edinburgh Council Natural Heritage Service	Jenny Hargreaves Caroline Paterson	Biodiversity records Information about management along the Dean valley Contact for bat group
City of Edinburgh Council Forestry Service	Steven Webley Ruthe Davies	Confirmation of methods used in Tree survey and trees included in tree survey in Dean valley.

		Discussion of Woodland In and Around Towns grants. Discussion of woodland management.
The Wildlife Information Centre	Natalie Harmsworth Steve Hannah	Records of protected species and sites within the study area. Confirmation of status of Water of Leith.
Moray Bank Gardens Committee	Prof. Paul Broda	General discussion about the management of the gardens.
Dean Gardens Committee	Pam Barnes	General discussion about the management of the gardens.
Lothian Bat Group	Nigel Terry	Details of areas surveyed by Bat Group and species found.
Edinburgh Living Landscape	Leonie Alexander, Urban Biodiversity Project Officer	Existence of bat data.
The Wildlife Partnership	Dr Barry Nicholls	Bat information

Limitations of approach

The survey work was carried out during the appropriate season for Phase 1 survey. Parts of the site were visited on at least four occasions during the late spring season, which allowed for some understanding of seasonal variation in features. All the survey work was carried out in good weather, with the exception of the visit to the Moray Bank Gardens, when there were some periods of rain.

The survey work has been designed to provide an indication of likely biodiversity value, and is not meant to represent a complete or comprehensive survey and assessment of all wildlife species present in the valley.

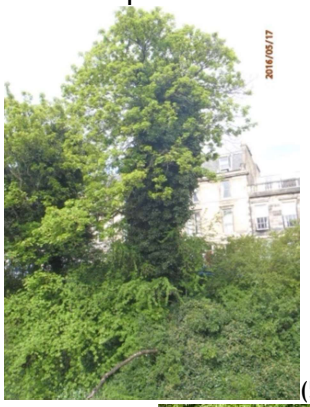
The survey and desk research has focussed upon the area between Dean Village and Stock Bridge. Species records from within a 0.5 km buffer around this area were provided by The Wildlife Information Centre. This distance was chosen as the focus at this stage has been upon identifying species using the study area to scope the extent of further survey or investigative work (including zone of influence) at the next stage.

APPENDIX B. TARGET NOTES

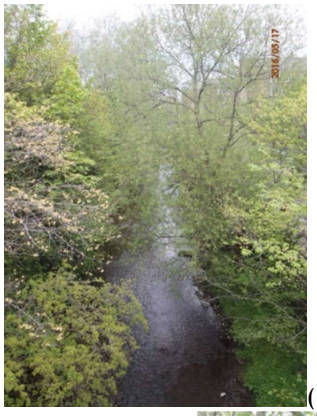
The abbreviations RB and LB are used to indicate right and left bank of the river, defined by facing downstream, with the direction of flow. Numbers in brackets denote the photograph number.

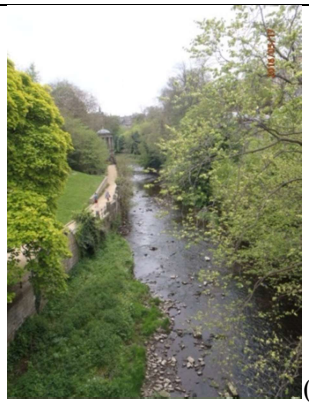
Only common names of species are used in the following descriptions. See Appendix C for scientific names of species mentioned.

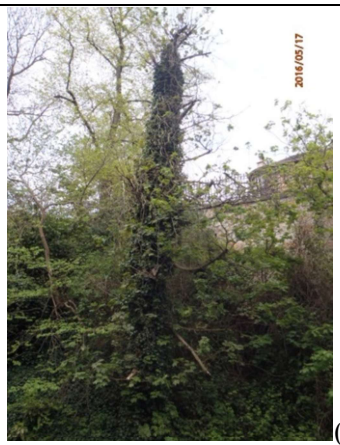
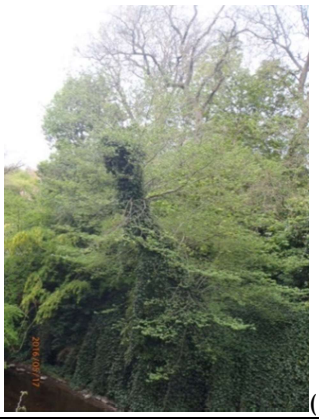
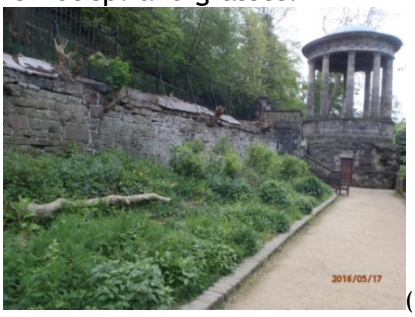
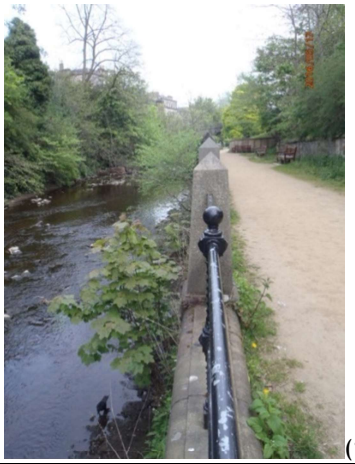
Target Note Number	Location	Description
1	Water of Leith adjacent to Stock Bridge NT24622 74532	Running Water (G2) and Broadleaved woodland (A1.1.1). Vegetation is confined to the area lying between the walls, which border the Water of Leith. There is semi-continuous self-sown tree cover along both banks, which has resulted in an eclectic collection of species. The RB (Saunders Street) has large sycamore at the water's edge and young elm, ash, and an understorey with bramble, few-flowered leek and ramsons. Other species seen further upstream are hogweed, dandelion, Spanish bluebell, comfrey sp. and buddleia. Ivy is present on some of the walls. The LB has large willow, young elm, sycamore, poplar and laburnum with hawthorn and privet. There is also a standing dead tree. The channel has some exposed boulders. Near the bridge, trees overhang the channel from both banks, creating >90% shade.  (1)
2	Saunders St, between Stock Bridge and first block of flats NT2461874499 ±18m	Broadleaved woodland (A1.1.1). RB: Group of Sycamore trees, 4 of which are covered with dense ivy – potential bat roost feature (Low/Moderate) (2, 3, 4).  (2)

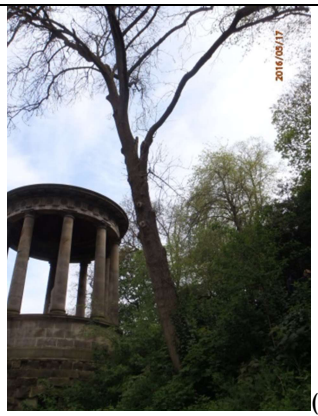
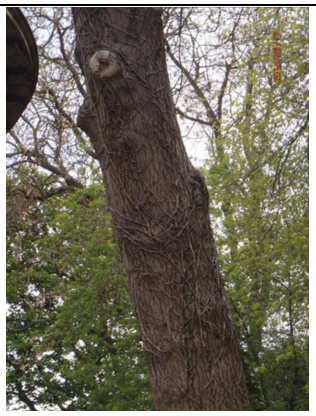
		 (3)  (4)
3	Saunders Street, opposite end of first block of flats NT24591 74489	Broadleaved woodland (A1.1.1) & running water (G2). RB has semi-continuous tree and woody shrub cover, some of which is growing out of the wall itself. Species include elder and buddleia. LB has mature sycamore, some with ivy (5). There is also deadwood, including a dead branch overhanging the channel, potentially suitable for kingfisher (6, 7). The LB also has a vegetated & unvegetated side bar with nettle, dock, Garlic mustard, cow parsley & speedwell sp.  (5)  (6)  (7)
4	Water of Leith, in channel, Saunders Street, opposite second block of flats NT24589 74463	Running water (G2). Channel feature: Vegetated mid-channel bar with speedwell sp. common nettle, broad-leaved dock, grasses, reed canary grass & Giant Hogweed at southern end.

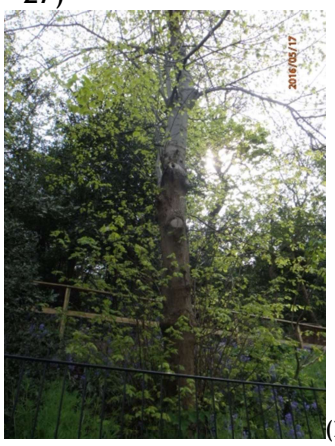
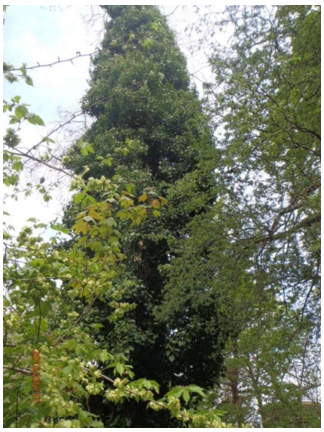
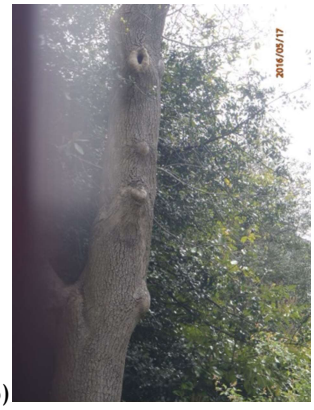
		 (8) RB: elm saplings are growing out of the retaining wall. LB: has elm in the main channel. The bank between the retaining wall and the channel has some mature sycamore with dense ivy growth (Low bat roost potential). There are also standing and recumbent dead trees.
5	Saunders Street. Water of Leith between Blocks 2 – 3 of Flats. NT24577 74448	Broadleaved woodland (A1.1.1) & running water (G2). RB: There are several trees (mainly elm/sycamore) growing out of the retaining wall, or on a narrow ledge at the water's edge. LB: There is a vegetated side bar with Giant hogweed, common nettle, broad-leaved dock, hogweed, reed canary grass, speedwell sp. and young willow sp. Elm is present on the slope above the channel.
6	Saunders Street. Opposite Block 3. NT24548 74431	Running water (G2) & Broadleaved woodland (A1.1.1). RB: There is a side bar with broad-leaved dock, reed canary grass, speedwell sp. and ground-elder. It has been colonised by seedlings of sycamore, elm and willow. There is dense ivy on the wall. LB: This has a small stand of poplars (*Populus alba*?) At the top of the bank, which have dense ivy growth (low bat roost potential) (9).  (9)
7	Dean Terrace NT24535 74413	Broadleaved woodland (A1.1.1) & running water (G2). LB: Horse-chestnut. Structure in channel adjacent to LB – sewer access? RB: Side bar with elm, which overhangs the channel.

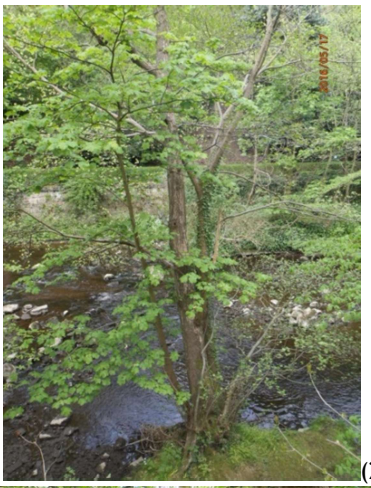
		Marsh marigold. Upstream of this point there is much *Salix* sp. on the LB at water level, which overhangs the channel towards the RB. Cover of the channel is c. 80%. Giant hogweed is present on both banks.
8	Saunders Street close to St Bernard's Bridge. NT24545 74404	Broadleaved woodland (A1.1.1) & running water (G2). RB: The side bar continues along the base of the retaining wall to the bridge (10). Species include common nettle, cow parsley, giant hogweed, reed canary grass, reed sweet grass, hogweed, ramsons, broad-leaved dock, cleavers, and forget-me-not sp. Some willow and elm in wall. Sycamore also present. LB: Dense growth of willow sp. Including tree with potential bat roost features (low/moderate) (NT2452974393) (11, 12).  (10)  (11)  (12)
9	Gardens. NT24510 74338	Broadleaved woodland (A1.1.2) & Amenity grassland & flower beds (J1, J4). Public park comprising areas of amenity grassland with flower beds with shrubs, a network of cinder paths and scattered trees (13). Planting is a mix of native and non-native species including lime and elm. A row of plane trees is present along the boundary wall with Mackenzie Place. These are mature and some have fissured bark (14). This retaining wall has numerous cavities, which are potential bat roost features (low/moderate) (15). There are several mature trees of alder, sycamore that have potential bat roost features (NT2450074315).

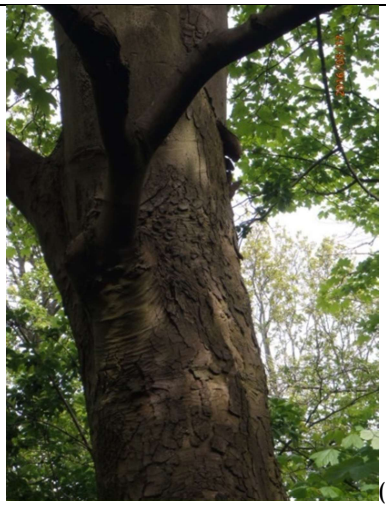
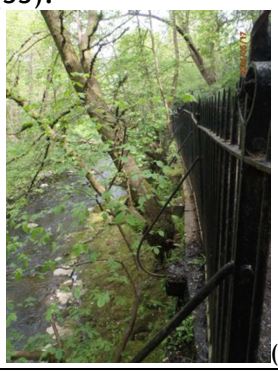
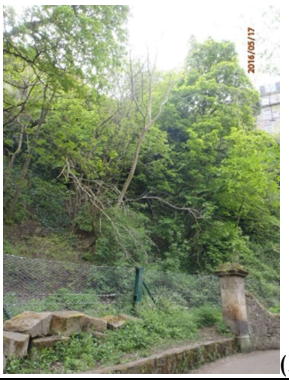
		 (13)  (14)  (15)
10	Gardens. Water of Leith adjacent to St Bernard's Bridge. NT24506 74360	Running water (G2). RB: There is a vegetated side bar with giant hogweed, garlic mustard, cow parsley, Indian balsam, ramsons, few-flowered leek, common nettle, cleavers and elm seedlings (13). LB: This comprises a two-stage bank; there is a vertical wall c. 2 m high, a steep slope to another retaining wall which supports Upper Dean Terrace. There are cavities in the upper retaining wall. The slope supports tree growth, mainly elm. There is ivy growth along the upper retaining wall, although this has been cleared in places.
11	Water of Leith near St Bernard's Bridge. NT24498 74363	Running water (G2). Vegetated mid channel bar with reed canary grass.
12	Water of Leith channel near Upper Dean Terrace. NT24474 74345	Running water (G2) & Broadleaved woodland (A1.1.1). LB: Between St Bernard's Bridge and St Bernard's Well there are trees growing on the slope and also the base of the channel. Species include holly, elm, sycamore, and elder. These create some shading of the channel (up to 40%). RB: there are trees along the edge of the channel and growing in the retaining wall, including specimens of ash, elm and alder. Ground cover species present along the edge of the channel include meadowsweet, ground elder, ramsons.
13	Water of Leith near junction between Upper Dean Terrace and Ann Street. NT24448 74287	Broadleaved woodland (A1.1.1). LB: sycamore trees with dense ivy growth and potential bat roost features (low/moderate) (16, 17).

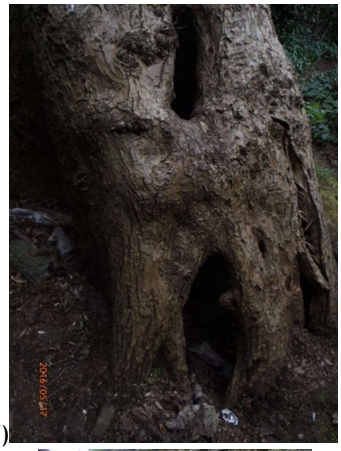
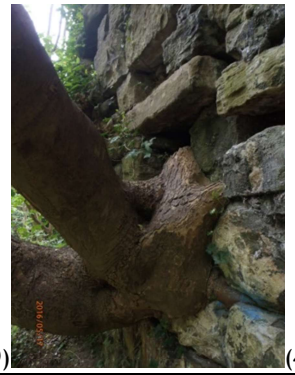
		 (16)  (17)
14	St Bernard's Well. NT24466 74280	Cultivated land (J1) & Running water (G2). Planting by St Bernard's Well (18). Ivy has recently been cleared from retaining wall. RB: there are trees growing out of the channel wall (19). In places these extend across the channel to meet tree cover from the LB. There is a vegetated side bar with broad-leaved dock, dandelion, common nettle, buttercup and forget-me-not sp. and grasses.  (18)  (19)
15	By St Bernard's Well. NT24449 74238	Broadleaved woodland (A1.1.1). Ash tree, with potential bat roost features (low/moderate) (20, 21).

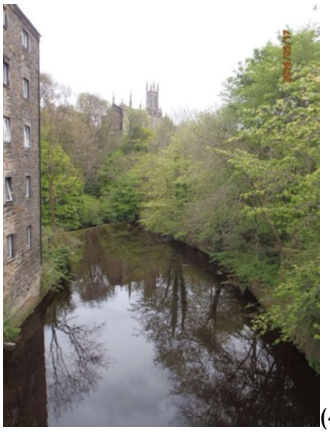
		 (20)  (21)
16	Near St Bernard's Well. NT24415 74171	Running water (G2). LB: Vegetated side bar with Giant hogweed, few flowered leek, cow parsley, broad-leaved dock, hogweed, grasses, reed canary grass, dandelion, buttercup. alder sapling. Close to the wall with Dean Bank Gardens there is also elm, laurel, sycamore and ash (22a). RB and channel: Bedrock channel (22b).  (22a)  (22b)
17	Gardens by retaining wall of St Bernard's Cottage NT2447774281	Broadleaved woodland (A1.1.1). Plane tree by wall in garden with potential bat roost feature (low) (23).

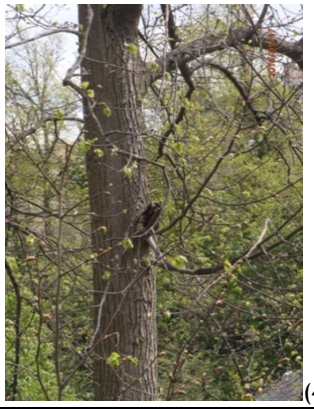
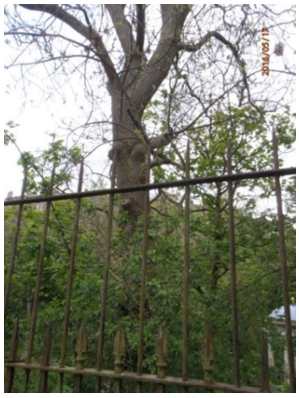
		 (23)
18	Water of Leith walkway between St Bernard's Well and St George's Well. NT24473 74273	<u>Broadleaved woodland (A1.1.1).</u> Moray Bank Gardens adjacent to the Water of Leith walkway comprises mainly broadleaved woodland. There is an open glade dominated by alkanet, cleavers, Spanish bluebell, garlic mustard (26). A variety of mature tree species are present, including lime, ash, sycamore, many with potential bat roost features such as dense ivy coverage, knot holes, cuts, splits and fissured bark (low/moderate) (examples are at NT2444974239; NT2444774206; NT2444574184) (24 – 27)  (24)  (25)  (26)  (27)
19	Water of Leith walkway between St Bernard's Well and St George's Well.	<u>Broadleaved woodland (A1.1.1), Bare ground (J4).</u> The walkway is above the height of the river, and is supported by a wall, which has railings on top. From the wall, the river bank slopes towards the channel and supports broadleaved woodland. This includes several trees that

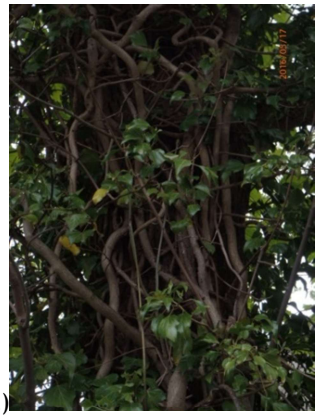
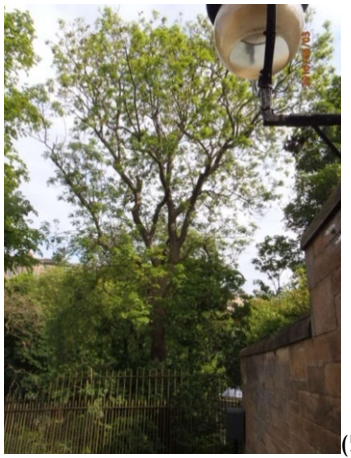
	NT24436 74172	support potential bat roost features (28). Features suitable as potential temporary resting sites/ holts for otter are present in the bank and in the base of trees (29)  (28)  (29)
20	Water of Leith walkway between St Bernard's Well and St George's Well. NT2441774106	<u>Broadleaved woodland (A1.1.1).</u> Ash and elm tree inter-growing (30).  (30)
21	Water of Leith walkway near St George's Well. NT24406 74067	<u>Broadleaved woodland (A1.1.1).</u> Ash growing out of wall, which supports the walkway. The tree has potential bat roost features including lifting bark (low/moderate) (31).

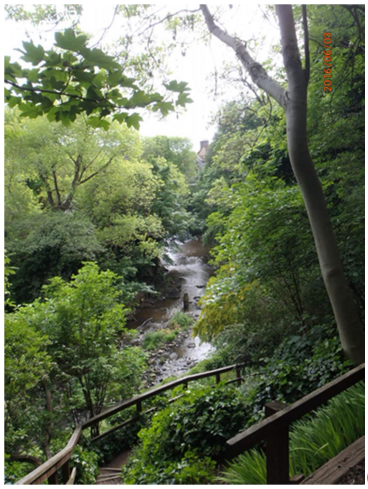
		 (31)
22	Upstream of St George's Well. NT24399 74039	<u>Broadleaved woodland (A1.1.1) & running water (G2).</u> Broadleaved woodland on both the RB and LB overhangs the channel, creating close to 100% cover. There are several trees growing out of the retaining wall for the walkway on the RB (32). The channel comprises bedrock (33).  (32)  (33)
23	Water of Leith walkway, below Randolph Cliff and Dean Bridge. NT24379 73998	<u>Broadleaved woodland (A1.1.1)</u>. There are broadleaved trees on the slopes, rock face and at the base of the cliff including sycamore, ash and elm (34). There are extensive growths of ivy, which obscure the cliff face. There is some hawthorn by the gate posts that mark the edge of the Moray Bank Gardens. Buddleia is also present. A chain-link fence has been installed by the Council to prevent rockfall onto the walkway (34, 35, 36).  (34)  (35)

		 (36)
24	Water of Leith walkway Miller Row/Lindsay's Mill area. NT24187 73986	Broadleaved woodland (A1.1.1). An area of broadleaved woodland lying between the retaining wall marking the edge of the walkway and the river channel. The area covers a vegetated point bar on the river. Broadleaved species include ash, elm and sycamore over an understorey of hawthorn, bramble, hogweed, ivy, cow parsley. There is a large, mature Poplar sp. tree (NT2418573998) (37), which has many cavities, and gaps in the base (38), and potential bat roost features on the trunk (moderate). The tree has features potentially suitable for otter resting places. Part of the tree is supported on another tree (39). There are cavities in the wall, and there are also trees growing out of the wall (40). **Post survey note:** Since the survey was completed this tree has fallen and been removed.  (37)  (38)  (39)  (40)
25	Water of Leith by Lindsay's Mill. NT24177 74003	Running water (G2). Mid-channel. There are a number of individual large boulders within the river channel, below the weir (41) and a vegetated mid-channel bar with associated boulders. The bar has butterbur, giant

		hogweed, ramsons and cow parsley. Several otter spraints were recorded on a boulder (42).  (41)  (42)
26	Water of Leith opposite Lindsay's Mill, Belgrave Gardens. NT24165 74009	<u>Broadleaved woodland (A1.1.1).</u> Broadleaved woodland with sycamore, elm, rowan, and ash. Understorey has bramble, Spanish bluebell, daffodil, hogweed, cow parsley.
27	Bell's Brae Bridge. NT24121 73930	<u>Running water (G2).</u> The width of the river corridor and associated vegetation is narrows upstream and downstream of Bell's Brae Bridge. Downstream of the bridge, there is a narrow row of broadleaved trees on the RB. The LB is formed by buildings. The trees overhang the channel from the RB (43). Upstream of Bell's Brae Bridge the RB has trees overhanging the channel at the bridge, and gardens further upstream. The LB is formed by buildings (44). There are cavities in the wall, used by nesting pigeons (45).  (43)  (44)  (45)
28	Dean Village, downstream of Water of Leith Bridge. NT24034 73867	<u>Running water (G2) & F2.2</u> Both banks are similar, and are subject to inundation. They are colonised by Cow parsley, ramsons, few flowered leek, nettle, ground elder, reed canary grass and some willow, buddleia and bramble. There is a Combined Sewer Overflow near the bridge on the RB. There are exposed boulders in the channel (46).

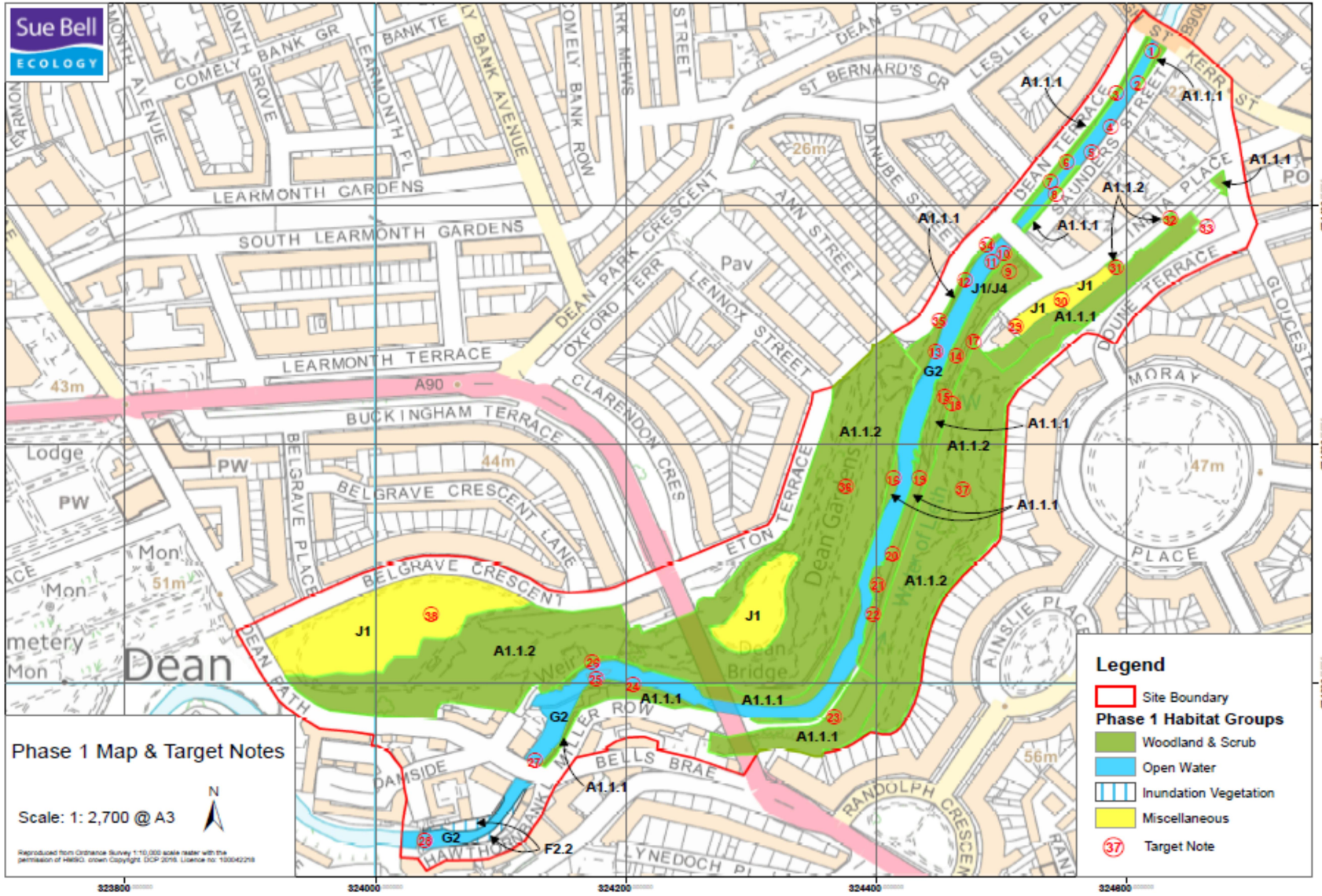
		 (46)
29	Mackenzie Place. NT24519 74283	Other (J1). Amenity grassland/garden area.
30	Mackenzie Place. NT24544 74324	Other (J1.1). Allotments. A planted hawthorn hedge separates the allotments from the road. Other species in the hedge include cherry sp. hazel and field maple.
31	India Place. NT24588 74349	Broadleaved woodland (A1.1.1). Line of cherry sp. trees.
32	India Place. NT24634 74391	Broadleaved woodland (A1.1.2). Block of broadleaved woodland with cherry sp. rose sp., ivy, elder, nettle and variegated yellow archangel.
33	Doune Terrace. NT24691 74378	Broadleaved woodland (A1.1.2) & Other (J1). Gardens lying between Doune Terrace and India Place/ Mackenzie Place. The boundary of the gardens with Doune Terrace comprises a hawthorn hedge with holly. There are areas of broadleaved woodland, which extend down towards India Place. A group of mature elms on the corner of Doune Terrace includes potential bat roost features (low/moderate) (47-51)  (47)  (48)  (49)  (50)

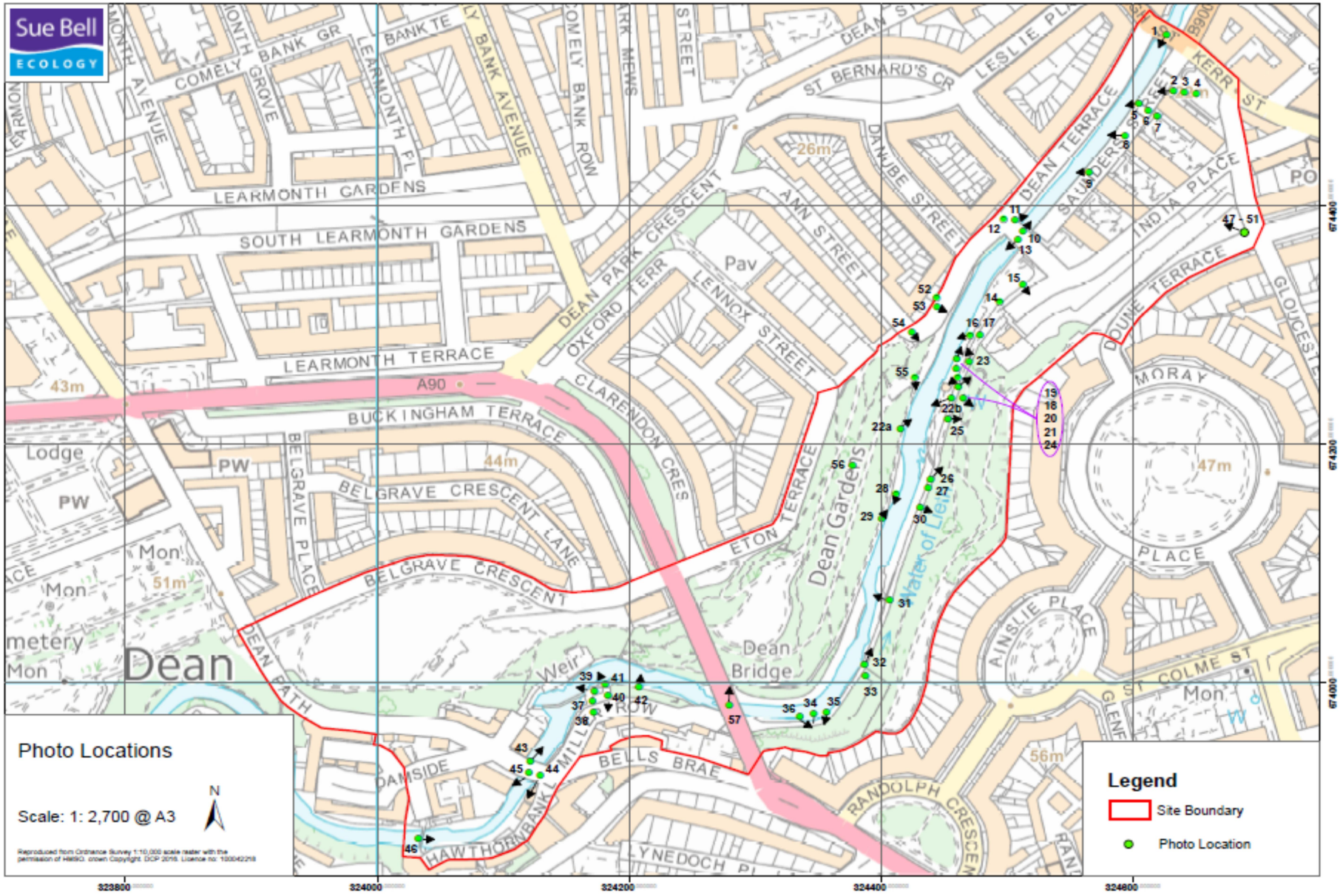
		 (51)
34	Upper Dean Terrace. NT24489 74366	Broadleaved woodland (A1.1.1). Broadleaved woodland between retaining wall and LB of Water of Leith. Includes beech, copper beech, rowan, sycamore, elm, holly. Large beech tree on corner. Some trees are growing out of the wall. Some trees have been felled. Ivy has been pulled from the wall, but has not been removed from the river corridor.
35	Upper Dean Terrace. NT24452 74308	Broadleaved woodland (A1.1.1). "Garden" area adjacent to Upper Dean Terrace, which is extremely difficult to access and manage. Several trees have possible bat roost features, such as tree with dense ivy growth (52, 53) and ash tree with holes, and split branch (low) (NT24429 74281) (54).  (52)  (53)  (54)
36	Dean Bank Gardens NT24361 74100	Broadleaved woodland (A1.1.1) & Cultivated Land (J.1) including flower beds and amenity grassland. This area is

	(mid-point approx.)	an extensive privately owned garden, which is terraced on the slopes above the Water of Leith and extends below the Dean Bridge. The garden was laid out in Victorian times. There are extensive areas of broadleaved woodland comprising a mixture of species including ash, elm, sycamore and cherry, in addition to exotic species such as Monkey puzzle. A boundary wall/fence separates the gardens from the channel of the Water of Leith, but limited access to the river can be gained. The lower slopes of the garden are managed in a naturalistic style (55). There is an area of amenity grassland on the upper slopes. Some of the trees have possible bat roost features (low/moderate) (56). A bat box has been installed on a cherry tree, but there is no information as to whether or not it has been used.  (55)  (56)  (57)
37	Moray Bank Gardens NT24458 74123 (approx. mid point)	<u>Broadleaved woodland (A1.1.1) & Cultivated Land (J.1) including flower beds and amenity grassland.</u> Another area of privately owned garden, built into terraces above the Water of Leith. The area is dominated by a variety of broadleaved tree species including ash, oak, cherry, lime, horse chestnut and sycamore. There are numerous mature hawthorn, which are being managed to rejuvenate them. Holly and privet have self-sown freely around the gardens and are being managed. Several yew trees are also present. There is a notable lime avenue in the mid-gardens, an area of silver birch near Doune Terrace and a hornbeam tree (NT24495 74180). Several of the trees are

		mature and have possible bat roost features (low/moderate). There are some areas of amenity grassland, but these are generally less open than those found in Dean Bank Gardens or Belgrave Crescent Gardens. The upper terraces are supported by a series of arches. The arch at the southern end of the terraces extends back into the cliff for some depth and is fenced off. This has possible bat roost features (moderate/high) (approx. grid ref: NT24433 73884).
38	Belgrave Crescent Gardens NT24023 74040 (mid-point approx.)	Cultivated land (J.1) including amenity grassland and flower beds & Broadleaved woodland (A1.1.1). The third privately owned gardens along the terraces above the Water of Leith. This garden was not visited during the survey.

APPENDIX C. PHASE 1 MAP AND MAP SHOWING LOCATION OF PHOTOGRAPHS




Sue Bell
ECOLOGY
Photo Locations
Scale: 1: 2,700 @ A3
N
Legend
Site Boundary
Photo Location
Dean
Dean Bridge
Dean Gardens
Water of Leith
LEARMONTH GARDENS
SOUTH LEARMONTH GARDENS
LEARMONTH TERRACE
BUCKINGHAM TERRACE
BELGRAVE CRESCENT
BELGRAVE CRESCENT LANE
BELGRAVE PLACE
DEAN PARK CRESCENT
OXFORD TERR
LENNOX STREET
CLARENDON CRES
ETON TERRACE
ANN STREET
DANUBE STREET
ST BERNARD'S CR
LESLIE PL
DEAN TERRACE
INDIA PLACE
QUEEN TERRACE
MORAY PLACE
AINSLIE PLACE
COLME ST
KERR ST
GLOUCESTER
COMELY BANK AVENUE
COMELY BANK GR
COMELY BANK GROVE
COMELY BANK ROW
LEARMONTH AVENUE
LEARMONTH PL
DEAN PATH
DAMSIDE
BELLS BRAE
MILL
HAWTHORNBANK
RANDOLPH CRESCENT
LYNEDOCH PL
A90
Weir
ROW
Pav
PW
Lodge
Mon
metery
43m
44m
51m
26m
47m
56m
323800
324000
324200
324400
324600
674400
674300
674000

APPENDIX D. SPECIES RECORDED DURING SURVEYS

N.B. This is not meant to represent a comprehensive list of all species present within the Dean valley.

Plant species recorded during survey (excludes species planted at St Bernard's Well by Water of Leith Conservation Trust)

Alder	*Alnus glutinosa*
Alkanet	*Anchusa officinalis*
Ash	*Fraxinus excelsior*
Beech	*Fagus sylvatica*
Birch sp.	*Betula* sp.
Bramble	*Rubus fruticosus* agg.
Broad-leaved Dock	*Rumex obtusifolius*
Buddleia	*Buddleia davidii*
Butterbur	*Petasites hybridus*
Buttercup sp.	*Ranunculus* sp.
Cleavers	*Galium aparine*
Common Comfrey	*Symphytum officinale*
Common Nettle	*Urtica dioica*
Copper beech	*Fagus* sp.
Cotoneaster sp.	*Cotoneaster* sp.
Cow parsley	*Anthriscus sylvestris*
Daffodil	*Narcissus* sp.
Dandelion	*Taraxacum officinale*
Elder	*Sambucus nigra*
Elm	*Ulmus* sp.
Feverfew	*Tanacetum parthenium*
Few flowered leek	*Allium paradoxum*
Field maple	*Acer campestre*
Forget-me-not	*Myosotis* sp.
Garlic Mustard	*Alliaria petiolata*
Giant hogweed	*Heracleum mantegazzianum*
Ground-elder	*Aegopodium podagraria*
Hard fern	*Blechnum spicant*
Hawthorn	*Crataegus monogyna*
Hazel	*Corylus avellana*
Hogweed	*Heracleum sphondylium*
Holly	*Ilex aquifolium*
Honesty	*Lunaria annua*
Honeysuckle	*Lonicera periclymenum*
Horse-chestnut	*Aesculus hippocastanum*
Indian balsam	*Impatiens glandulifera*
Ivy	*Hedera helix*
Ivy-leaved toadflax	*Cymbalaria muralis*
Laburnum	*Laburnum anagyroides*
Lilac	*Syringa vulgaris*
Lime	*Tilia* sp.
Marsh-marigold	*Caltha palustris*
Meadowsweet	*Filipendula ulmaria*
Pink purslane	*Claytonia sibirica*
Plane	*Platanus* sp.

Poplar	*Populus* sp.
Privet	*Ligustrum* sp.
Ramsons	*Allium ursinum*
Red campion	*Silene dioica*
Reed canary grass	*Phalaris arundinacea*
Reed sweet grass	*Glyceria maxima*
Rose sp.	*Rosa* sp.
Rowan	*Sorbus aucuparia*
Silver birch	*Betula pendula*
Spanish bluebell	*Hyacinthoides hispanica*
Speedwell sp.	*Veronica* sp.
Sycamore	*Acer pseudoplatanus*
Variegated yellow archangel	*Lamium galeobdolon*
Water crowfoot	*Ranunculus* sp.
White deadnettle	*Lamium album*
Willow sp.	*Salix* sp.
Wych elm	*Ulmus glabra*

Bird species:

Blackbird	Blue tit	Carrion crow	Chaffinch	Dipper
Dunnock	Feral pigeon	Goldfinch	Goosander	Great tit
greenfinch	Grey wagtail	Mallard	Robin	Treecreeper
Wren				