

Naturalisation of Spadesbourne Brook, Bromsgrove

Development Brief Report

November 2010



Prepared for



Revision Schedule

**Naturalisation of Spadesbourne Brook, Bromsgrove
Development Brief Report**

November 2010

Rev	Date	Details	Prepared by	Reviewed by	Approved by
01	06/10/10	Draft to Blackwell for comment	Helen Kelleher Senior Environmental Consultant	Vincent Kelleher Associate	Vincent Kelleher Associate
02	08/10/10	Draft to Bromsgrove DC for comment	Helen Kelleher Senior Environmental Consultant	Vincent Kelleher Associate	Vincent Kelleher Associate
03	19/10/10	Final to Bromsgrove DC incorporation BDC comments	Helen Kelleher Senior Environmental Consultant	Vincent Kelleher Associate	Vincent Kelleher Associate
04	15/11/10	Incorporation of EA and HA information	Helen Kelleher Senior Environmental Consultant	Vincent Kelleher Associate	Vincent Kelleher Associate
05	24/11/10	Incorporation of BDC comments	Helen Kelleher Senior Environmental Consultant	Vincent Kelleher Associate	Vincent Kelleher Associate

C A Blackwell
53 Basepoint
Isidore Road
Bromsgrove
B60 3ET

Tel: 01527 888970

www.blackwellgroup.co.uk**URS/Scott Wilson**
15th Floor
McLaren Building
46 Priory Queensway
Birmingham
B4 7LNTel: 0121 212 3035
Fax: 0121 212 1938www.urs-scottwilson.com

This document has been prepared in accordance with the scope of Scott Wilson's appointment with its client and is subject to the terms of that appointment. It is addressed to and for the sole and confidential use and reliance of Scott Wilson's client. Scott Wilson accepts no liability for any use of this document other than by its client and only for the purposes for which it was prepared and provided. No person other than the client may copy (in whole or in part) use or rely on the contents of this document, without the prior written permission of the Company Secretary of Scott Wilson Ltd. Any advice, opinions, or recommendations within this document should be read and relied upon only in the context of the document as a whole. The contents of this document do not provide legal or tax advice or opinion.

Table of Contents

Executive Summary	3
1 Introduction	5
1.1 Background	5
1.2 Purpose of the Study	5
1.3 Approach and Methodology	6
1.4 Report Structure	6
1.5 Limitations	6
1.6 Use of Report	7
2 Development Brief Context	8
2.1 Overview of Influencing Legislation and Policies.....	8
2.2 Consultation.....	14
2.3 Evolving Bromsgrove Town	19
2.4 Hydrological and Hydrogeological overview.....	19
2.5 Protected Species – Water Vole	23
2.6 Other Species.....	25
3 Biodiversity Enhancement	26
3.1 Threats and Requirements	26
3.2 Opportunities for Water Vole Habitat Creation	27
3.3 Feasibility of Water Vole Colonisation.....	31
4 Development of Spadesbourne Brook Naturalisation	32
4.1 Site Location and Description	32
4.2 Water Quality Issues.....	32
4.3 Flood Risk Issues	33
4.4 Crown Close	34
4.5 Hanover Street - Market Place.....	39
5 Next Stages in Development	46
5.1 Bromsgrove Town Centre Area Action Plan.....	46
5.2 Design and Construction.....	47
5.3 Indicative Costs for Naturalisation.....	48
5.4 Funding Options	48
5.5 Legal Issues and Consents Required for Channel Diversion/Naturalisation.....	50
5.6 Next Stages of Scheme Development	51
6 Conclusions.....	53
7 References.....	54

Appendices:

Appendix A: Water Vole Survey plans received from Worcestershire Wildlife Trust.

Appendix B: Site Photographs.

Appendix C: M42 Envis Plan and Aerial Plan.

Appendix D: Engineering Drawings: D134351/SK/01 to 11.

Appendix E: Landscape and Ecology Drawings: D134351-ENV-01 to 04.

Appendix F: Worcestershire County Council letter re paths

Appendix G: Visualisations of proposed naturalisation of Spadesbourne Brook

Executive Summary

Bromsgrove District Council has a vision to improve the town centre by reinstating Spadesbourne Brook as a more natural asset. Opening up the Brook from its enclosed culvert and giving it a more natural form between Church Street and Hanover Street (along Crown Close and across Market Place) would achieve a number of benefits. It would make it more attractive for the people of Bromsgrove and visitors, who would be given greater access to it with a new footpath along it. This footpath would also create an attractive link between the town centre and Sanders Park. An important objective of naturalising the Brook is to provide habitat for water voles. These mammals are protected by Law, but are very scarce in Worcestershire, with only two small populations surviving and these are separated by the culverted section of Spadesbourne Brook. Opening the culvert out and making the brook more suitable for water vole habitation and foraging should encourage the expansion of the population and aid their survival.

In order to determine if the Spadesbourne Brook can successfully be opened out and achieve these aims, Bromsgrove District Council has commissioned a study to consider the implications. This report, the "Naturalisation of Spadesbourne Brook, Bromsgrove, Development Brief" considers:

- How the scheme meets legislation and national and local policies.
- How the scheme meets the town's needs.
- How changing the stream channel might affect adjacent land, such as flooding potential (although this is a detailed subject requiring further consideration).
- What the requirements for encouraging water vole are.
- How to provide a footpath and other features that would make the area attractive to people.
- How the scheme would fit with other development, such as of the Market Place site.

This study has found that Spadesbourne Brook could be successfully naturalised and meet the various needs outlined above. It has shown that:

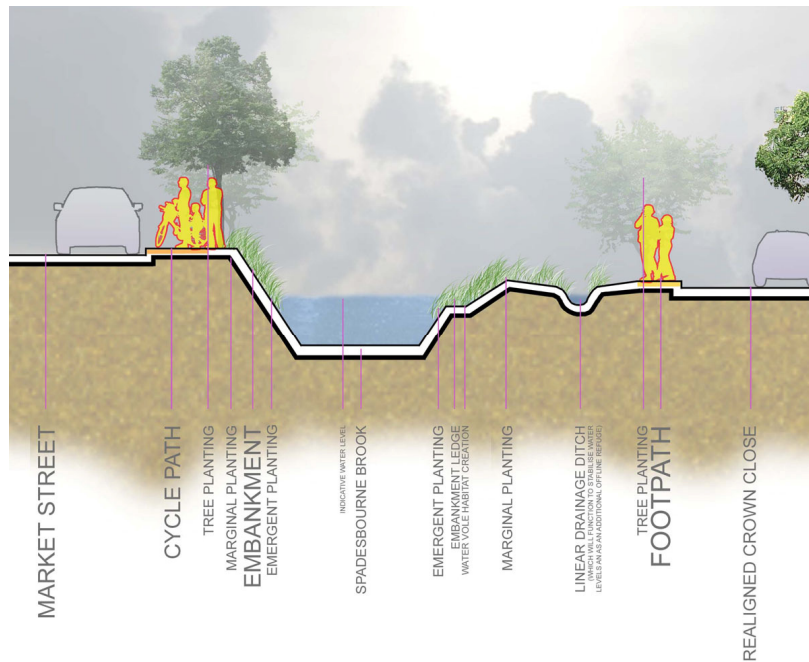
- The scheme meets the requirements of a number of important national and local policies.
- The scheme is supported by the Environment Agency and Worcestershire County Council.
- Making the stream more attractive would assist in successfully developing the Market Place site; one option is that the stream could be re-routed.
- The design of a new channel that could look more attractive would require a small strip of land either side which would be beneficial for planting and habitat creation for water voles, a footpath, seating areas and flood overspill areas.
- It will be important to maintain flow within minimum and maximum levels to keep the Brook attractive and manage flooding, so small weirs may be needed.
- Reducing the amount of enclosed culvert and removing the concrete channel would make the Brook much more attractive to water voles, by encouraging vegetation and allowing the voles to burrow into the banks.
- Only minor utility service diversions will be needed.

Consultation on the Bromsgrove town centre Area Action Plan Issues and Options was undertaken by Bromsgrove District Council in 2008. The findings from the consultation were in support of Spadesbourne Brook being naturalised, both from members of the public and the Environment Agency. For this Development Brief report, data has been collated from the Environment Agency and brief consultation has been undertaken with the Highways Agency regarding a M42 drainage feature that discharges into the Brook. Both statutory bodies have expressed an interest in the naturalisation of Spadesbourne Brook and in the creation of a suitable habitat for water voles.

Two illustrations of how the naturalisation of Spadesbourne Brook could look follow; other illustrations can be found at the end of the Development Brief Report.



Visualisation of Hanover Street/Market Place with Option 1 for naturalisation of Spadesbourne Brook



Cross section of Crown Close (looking north) with naturalisation of Spadesbourne Brook

1 Introduction

1.1 Background

C A Blackwell and URS/Scott Wilson Ltd have been commissioned by Bromsgrove District Council to undertake a development brief for the possibility of relocating and naturalising two sections of the Spadesbourne Brook in Bromsgrove. The two sections of Spadesbourne Brook are Crown Close and Hanover Street car park in Bromsgrove town centre.

The naturalisation of Spadesbourne Brook is part of the Bromsgrove Town Centre Regeneration Project and is also noted in the Bromsgrove Town Centre Area Action Plan: Issues and Options Report (July 2008) and is an attractive feature of the Bromsgrove Town Centre Regeneration Programme which is being run by the following partnership:

- Bromsgrove District Council (BDC);
- Worcestershire County Council (WCC);
- Hereford and Worcester Fire & Rescue;
- West Mercia Police; and
- Primary Care Trust.

The naturalisation of Spadesbourne Brook should achieve three strategic aims of the Regeneration Programme, these are:

- Attractive town centre;
- A thriving and diverse economy; and
- Improved transport infrastructure.

It is anticipated that the successful naturalising of the Brook will act as a catalyst for the regeneration of the town centre and that it will provide the following benefits:

- Creation of a 'green' corridor;
- Water Vole Habitat;
- Enhanced screening;
- Increased footfall;
- Improved accessibility;
- Reduced flooding; and
- Improved air quality.

There is a specific objective of the naturalisation of Spadesbourne Brook to improve the habitat for the Water Vole, which are regionally scarce, but have a small presence in Bromsgrove which needs to be protected.

1.2 Purpose of the Study

The overall objective of this Development Brief is to advise the Bromsgrove Town Centre Area Action Plan whether the options proposed for the naturalisation of Spadesbourne Brook in the area of Crown Close and Hanover Street car park are viable and practical. The key issues that this report will address include the following:

- Amendments to the local highway to facilitate the naturalisation of the Brook and further development and also access to properties.
- Identification of riparian rights.

- Identification and impact of trees that might be lost and replanting proposals to mitigate such removal together with any screening requirements.
- Identification of the extent of restriction of services on the naturalisation of the Brook.
- Consideration of treatment of the existing culvert.
- Water levels, both to maintain minimal flow and also to manage flooding.

The findings of this report will be included within the final Area Action Plan/Core Strategy to ensure that the physical work will be undertaken in a way that best regenerates Bromsgrove town centre and is supported by the Council, the public and other agencies.

1.3 Approach and Methodology

The assessment of the options proposed for the naturalisation of Spadesbourne Brook in the areas of Crown Street and Hanover Street car park have been undertaken by the following:

- A site visit was undertaken on 29 September 2010 by representatives from Worcestershire County Council, Bromsgrove District Council, Blackwell and URS/Scott Wilson. The site visit identified the baseline context of the site and concentrated on the engineering, environmental and buildability aspects of the proposed options for the naturalisation of Spadesbourne Brook.
- Reviewing publically available information for the site including groundwater data, ecological data from the Black Country Biological Records Centre, Environment Agency and the Warwickshire Wildlife Trust, contaminated land data, utility services data, land registry checks and other available information.
- Consultation with relevant officers from Bromsgrove DC and Worcestershire County Council to develop an understanding of local policy, environment, drainage, public paths and highways. Consultation was also held with the Highways Agency as they manage part of the upstream Brook.
- Assessing the three broad options proposed (one for Crown Street and two for Hanover Street car park) for the naturalisation of Spadesbourne Brook.

1.4 Report Structure

The report structure follows the study brief and the tender proposal submitted to Bromsgrove District Council. This Development Brief report covers the following:

- Chapter 1: Background, purpose of the study and methodology.
- Chapter 2: Development Brief Context.
- Chapter 3: Biodiversity Enhancement.
- Chapter 4: Assessment of the two sections of Spadesbourne Brook (Crown Street and Hanover Street car park) for the potential of re-routing and naturalisation.
- Chapter 5: Outline programme and costs for the naturalisation of Spadesbourne Brook.
- Chapter 6: Conclusions.
- Chapter 7: References.

1.5 Limitations

This report is based on currently available information and presents a high level assessment of the options proposed at the time of writing for Crown Close and Hanover Street car park areas of Spadesbourne Brook.

1.6 Use of Report

This report has been prepared solely for the benefit of Bromsgrove District Council for the purpose of including the findings within the final Area Action Plan/Core Strategy. Any other parties relying on the contents of this report do so at their own risk.

2 Development Brief Context

The naturalisation of Spadesbourne Brook meets the requirements of national, county and district policies, as detailed in Section 2.1. Naturalising Spadesbourne Brook is a key part of the regeneration of Bromsgrove Town Centre, in that it will act as a 'green corridor,' will provide an attractive feature for the town centre and will improve biodiversity of the area, in terms of encouraging populations of water voles.

2.1 Overview of Influencing Legislation and Policies

A brief review of relevant legislation and policy documents for Worcestershire County Council and Bromsgrove District Council has been undertaken as part of this Development Brief report.

National Policies

Planning Policy Statement 9 (PPS9) Biodiversity and Geological Conservation

PPS9 states that the Local Authority should take measures to protect the habitats of protected species (in this case Water Vole) from further decline through policies in local development documents. Planning authorities should ensure that these species are protected from the adverse effects of development, where appropriate, by using planning conditions or obligations. Planning authorities should refuse permission where harm to the species or their habitats would result, unless the need for, and benefits of, the development outweigh that harm.

Planning Policy Statement 23 (PPS23) Planning and Pollution Control

PPS23 states that consideration should be given to the redevelopment of former manufacturing sites and the protection of controlled waters. The policy states that it is essential to ensure that potentially contaminated sites are adequately characterised prior to redevelopment as there is the potential for disturbance of contaminants resulting in the remobilisation of contaminants that can leach to groundwater. Consideration should also be given to the remediation of any contamination, selection of appropriate foundation design, appropriate decommissioning of any groundwater boreholes and disposal of drainage. The local authority will need to ensure that a preliminary risk assessment of contaminated land in accordance with the Model Procedures for the Management of Land Contamination (CLR11) will need to be undertaken at a later stage.

Planning Policy Statement 25 (PPS25) Development and Flood Risk

PPS25 states that development will not normally be allowed where i) it is within a floodplain or other area identified as being at risk of flooding, or ii) it will increase the risk of flooding or cause new flooding problems either at the site or elsewhere, or iii) it will jeopardise existing flood defences, flood volumes or the ability to carry out essential maintenance work. Any development will need to demonstrate that adequate flood protection has been incorporated and that effects elsewhere have been fully assessed. This is linked in with the Worcestershire County Council policy CTC8 Flood Risk and Surface Water Drainage.

Section 40 of the Natural Environment and Rural Communities Act 2006

Water vole is listed as a Species of Principal Importance in England. The Natural Environment and Rural Communities Act 2006 (the NERC Act) creates a duty for every public authority to conserve biodiversity. The Act applies to Local Authorities, Local Planning Authorities, Local

Planning Authorities, Government Departments, People Employed by the Crown or Parliament, or through a general public Act and statutory undertakers.

UK Biodiversity Action Plan (UK BAP)

The current action plan objectives and targets are as follows:

- Maintain the current distribution in order to arrest the decline of the species in Britain;
- maintain the current abundance in order to arrest the decline of the species in Britain; and
- restore water voles to their former widespread distribution, using the Vincent Wildlife Trust survey of 1989/90 as a baseline by the year 2010.

Worcestershire County Council (County Level)

Draft Bromsgrove Master Plan

Spadesbourne Brook is mentioned in the Draft Bromsgrove Master Plan under BROM17 Redevelopment of Market Street Area in that the Brook forms the boundary to the east of the redevelopment of the existing Market Hall. The master plan outlines that the site remains a focus for further enhancement.

The naturalisation of the two sections of Spadesbourne Brook as assessed in this Development Brief Report seeks to enhance the town centre's appeal to commercial businesses due to the opening up on the space with the Brook running through the centre.

Bromsgrove Town Centre Area Action Plan Issues and Options Report (July 2008)

Spadesbourne Brook falls within the Environment and Open Spaces category (Issue BR 15) of the Bromsgrove Town Centre Area Action Plan. The Area Action Plan states that Bromsgrove Town Centre has very few open spaces and that the opening up of Spadesbourne Brook in the town centre would improve the environmental quality of the surrounding area.

The naturalisation of Spadesbourne Brook in the vicinity of Crown Street and Hanover Street will promote this desire to create an open space within the town centre and is linked to policy CTC6 Green Spaces and Corridors.

The purpose of the document is to map the proposed future development of Bromsgrove Town Centre and how this can be planned to ensure the correct development occurs in the appropriate location. The relevant objectives with regards to Spadesbourne Brook are:

- To improve pedestrian priority, linkages and mobility within and across the town centre;
- To improve pedestrian and cycle linkages between Bromsgrove Station and the town centre, and promote shuttle bus services;
- Improve pedestrian linkages and accessibility between the High Street and town centre open spaces; and
- To improve and enhance the quality and value of open spaces in the town centre, particularly the Recreation Ground and Spadesbourne Brook.

Worcestershire Biodiversity Action Plan (LBAP)

Please refer to the text under *Policy CTC15 Biodiversity Action Plan*.

Policy CTC6 Green Open Spaces and Corridors

This policy states that:

“Both within and on the periphery of settlements the creation and conservation of green open spaces and green corridors, including watercourses, appropriate to the landscape character of the area will be encouraged. Where possible these should be continuous and linked to the open countryside in order to maximise their ecological, recreational and landscape potential.

Green open spaces and corridors should be identified in the District Local Plans as part of Local Plan review process”.

The naturalisation of Spadesbourne Brook promotes Policy CTC6; the opening up of the Brook will enable the formation of a wildlife corridor and will facilitate the movement of wildlife within an urban area, in particular water voles.

Policy CTC8 Flood Risk and Surface Water Drainage

This policy states that:

“Development will not normally be allowed where:

- (i) it is within a floodplain or other area identified by the Environment Agency as being at risk of flooding;*
- (ii) it will increase the risk of flooding or cause new flooding or cause new flooding problems at the site or elsewhere;*
- (iii) it will jeopardise existing flood defences to carry out essential maintenance work.*

Any development in areas subject to flood risk will need to demonstrate that adequate flood protection has been incorporated and that effects elsewhere have been fully assessed.

Developments should, wherever possible, incorporate sustainable drainage systems to help retain water at its source, helping to prevent flooding, recharging groundwater resources, treating water pollution and enhancing the environment”.

A Level 1 Strategic Flood Risk Assessment has been undertaken (Royal Haskoning, September 2008) to provide an assessment of the extent and nature of the risk of flooding and its implications for land use planning. Spadesbourne Brook was included in this study and is reported to have produced fairly severe flooding in the past. Consideration of flood risk will need to be considered further as part of the naturalisation of Spadesbourne Brook at a later stage.

MWH have been commissioned to undertake a Level 2 Strategic Flood Risk Assessment for the first quarter of 2011.

Policy CTC9 Impact on Watercourses and Aquifers

“Any development proposal will be required to demonstrate that it will not cause water pollution of surface water or groundwater, it will not have an adverse effect on groundwater resources, and it will not cause detriment to the existing regime of a watercourse or its environment.

Development will be expected to incorporate, where appropriate, water treatment to clean the water prior to discharge.”

This policy is applicable to the naturalisation of Spadesbourne Brook in terms of water quality and whether the removal of an impermeable channel lining is opening a pathway into the aquifer. At a later stage, discussion of this policy will need to be clarified by consultation with the Environment Agency.

Policy CTC12 Sites of Regional or Local Wildlife Importance

This policy states that:

“The nature conservation value of Local Nature Reserves, Special Wildlife Sites, Regionally Important Geological/Geomorphological Sites and sites of wildlife importance subject to Section 39 Agreement under the Wildlife and Countryside Act found within the County, ranges from that of local to national significance. Development or land-use change, likely to have an adverse effect on such sites will not be allowed unless there are no reasonable alternative means of meeting the development need and it can be clearly demonstrated that the reasons for the development of land-use change outweigh the intrinsic nature conservation and/or geological value of the site which may be affected by the development.

In all cases where development or land-use change is permitted:

- (i) any damage to the nature conservation and/or geological value of the site will be kept to a minimum; and*
- (ii) adequate and appropriate protection and enhancement of the site’s nature conservation and/or geological interest will be secured, and where necessary, appropriate and adequate compensatory measures will be provided, using conditions and/or planning obligations where necessary”.*

Although Spadesbourne Brook is not a statutorily or locally designated site, the Brook is considered to have significant nature conservation value in terms of supporting the Water Voles which are a protected species. A key objective of the naturalisation of Spadesbourne Brook is the reintroduction of this species for which enhancement features will need to be considered and included in the design for each section.

Policy CTC13 Protection of Species

This policy states that:

“Sites, including buildings, supporting species which are protected by law will be safeguarded from development proposals which would destroy or adversely affect them. Planning permission for the development of such sites will not normally be granted unless there is an overriding need for development. If development is allowed, planning conditions and/or obligations will be imposed, where appropriate to:

- (i) facilitate the survival of individual members of the species;*
- (ii) reduce disturbance to a minimum; and*
- (iii) provide adequate alternative habitats to sustain at least current levels of population”.*

The Environment Agency has confirmed that Bromsgrove is home to Water Voles, and that Spadesbourne Brook currently supports dispersed colonies to the north and south of the town centre. This policy is applicable to the naturalisation of Spadesbourne Brook, as stated above under CTC12; a key aim is to enhance the population size of Water Voles in the area and to enable Water Voles present each side of the current culverted section to merge. Hence,

consideration in the design of Brooks needs to be given, due to the current culverted Brook and non vegetated banks acting as a barrier to the free movement of this protected species.

Policy CTC15 Biodiversity Action Plan

This policy states that:

“When considering development proposals, opportunities should be taken to enhance biodiversity, with particular emphasis placed on the retention and management, and the creation and enhancement of habitats and populations of species identified as priorities in both the Biodiversity Action Plan for Worcestershire and District-wide Biodiversity Action Plans”.

The main target of the Local Worcestershire BAP is to safely maintain all known water vole populations and to maximise the expansion of the water vole population as much as possible. The important threats to the species are as follows:

- Population fragmentation;
- Excessive fluctuations in water levels due to land drainage or flooding;
- Drought conditions which can expose burrows making the water vole more vulnerable to predators; and
- Poisoning such as the use of rodenticides which is a major threat in urban situations.

Policy RST.4 Recreational Walking Routes

This policy states that:

“The development of recreational walking routes will continue to be promoted, based on three recognised categories of:

- (i) National Trail (long distance);*
- (ii) Regional Routes (medium distance); and*
- (iii) Local walks.*

Promoted routes will mostly use the statutory public rights of way network and, where necessary, permissive links. Wherever possible, routes will be aligned along safe attractive corridors (‘greenways’).....”

The naturalisation of Spadesbourne Brook is considered to be a key part of the regeneration of Bromsgrove town centre, in that the area will become a more attractive and amenable place for people to visit. Naturalising Spadesbourne Brook will also generate a “green” corridor through the town centre for both the public and wildlife.

Policy RST.9 Waterways and Open Water Areas

This policy states that:

“Priority will be given to securing improved access to waterways and open water areas, where there is no conflict with other Structural Plan policies.....Opportunities for the recreational use of new water areas which become available.....will be supported in so far as they accord with the Structure Plan’s policies, serve a recognised demand and have regard to the needs of all potential users.....”

The naturalisation of Spadesbourne Brook promotes this policy in that the opening of the Brook within Bromsgrove town centre will create a new water area for leisure and amenity use, as well as providing an attractive feature for the town centre.

Sustainable Community Strategy 2008-13

Section 7 of this document “A Better Environment for Today and Tomorrow” lists one of the priority outcomes as “to enhance Worcestershire’s countryside and urban greenspace and appropriate access to them while protecting the natural and historic environment”.

The naturalisation of Spadesbourne Brook will help achieve this priority outcome in that it will create a green corridor through Bromsgrove town centre and will result in the reintroduction of water vole from both ends of the Brook, which is currently not possible at the moment, due to the unfavourable concreted culverted channels.

Bromsgrove District Council (District Level)

C5 Submission of Landscape Schemes

This policy states that:

“Application for development should be accompanied by satisfactory landscaping schemes where these are judged appropriate by the District Council to complement the proposals at the time of submission of a detailed planning application”.

This policy is applicable to the naturalisation of Spadesbourne Brook and will need to be given full consideration at a later stage when detailed designs of the naturalisation of the two sections of the Brook have been finalised.

C11 Statutorily Protected Species

This policy states that:

“In considering any development or management proposal, due regard will be paid to specific requirements of statutorily protected fauna and flora. English Nature¹ will be consulted if any proposal may result in damage to any area where species listed under Schedule 5 and 8 of the Wildlife and Countryside Act 1981 occurs”.

This policy is applicable to the naturalisation of Spadesbourne Brook due to the known presence of Water Voles in the area, which are listed under Section 5 of the Wildlife & Countryside Act 1981 (as amended). Specific design features to encourage populations of water voles will need to be incorporated into the final design of the two sections of the Brook to be naturalised at a later stage.

C12 Wildlife Corridors

This policy states that:

“The District Council will protect major wildlife corridors wherever possible. Development proposals should minimise the damage to such corridors by careful layout and design retaining the existing overall structural framework or the landscape as far as possible. Adequate new landscaping to maintain existing wildlife corridors will be required. Proposals to enhance or extend corridors will be welcomed.”

¹ English Nature has been known as Natural England since 01 October 2006.

Naturalising of Spadesbourne Brook will create a “green” corridor in the town centre which will encourage the movement of wildlife in an urban area.

C16 Effect of Infrastructure Development on the Landscape

This policy states that:

“Schemes involving transport and related infrastructure should be planned to minimise the impact on landscape and wildlife, in particular avoiding the fragmentation of wildlife sites and the destruction or diminution of important elements in the landscape.”

The proposals to naturalise Spadesbourne Brook (in the areas of Crown Close and Hanover Street car park) will reduce the fragmentation of wildlife sites within Bromsgrove town centre by improving connectivity along this stretch. Although the infrastructure will still largely remain unchanged, the naturalisation of Spadesbourne Brook will enhance the quality of the area as a wildlife site.

Sustainable Community Strategy 2010-13

In accordance with the priority outcome stated in under the Worcestershire County Council Sustainable Community Strategy 2008-13, Bromsgrove’s Sustainability Strategy states the following:

“There is approximately 90% of the District in green belt and we have some beautiful countryside in the District, however, an increasing number of species are under threat, so the County and District Council who have specific responsibilities in this regard, need to work together to protect local habitats and maintain biodiversity.”

The naturalisation of Spadesbourne Brook is being promoted both by Worcestershire County Council and Bromsgrove District Council. Such scheme will help to reduce the threat to the water vole, a protected species in terms of providing a more suitable habitat, thus maintaining and improving biodiversity of the local area.

2.2 Consultation

Consultation undertaken on the naturalisation of Spadesbourne Brook has received support from Statutory Consultees (Environment Agency, Highways Agency, Wildlife Trust) and amongst members of the public. Further details are provided below.

Bromsgrove Town Centre Regeneration Programme Stakeholder Forum

Consultation on the naturalisation of Spadesbourne Brook has been undertaken by the Bromsgrove Town Centre Regeneration Programme Stakeholder Forum on 01 July 2010. Bromsgrove District Council have reported that 100% of consultees were in favour of a naturalised Spadesbourne Brook that would offer a green corridor/waterside walk and that would be a sustainable habitat for Water Voles.

Responses regarding suggestions to improve the proposed scheme included the following:

- More planting to make the scheme more visually attractive.
- Seating area/benches along the waterside.
- Guided walks.

Other comments that were received from the consultees of the forum included the following:

- Implementation of an intelligent and low maintenance planting scheme to keep the area attractive upon completion of the works;
- The scheme would potentially bring more visitors to the area and would make Bromsgrove look attract and more affluent. It would be an opportunity to involve schools and a community payback scheme to help maintain the area;
- The scheme would encourage water voles to the area;
- Flood risk of the scheme would need to be assessed;
- Sustainable funding required; and
- The scheme must be maintained well.

Area Action Plan Issues and Options Consultation

Consultation on the Area Action Plan Issues and Options was undertaken by Bromsgrove District Council between 15 July 2008 and 19 September 2008. The findings from the consultation undertaken revealed that almost 60% of respondents were in favour of Spadesbourne Brook being re-landscaped with additional planting to improve the environmental quality of the area. Only 12% were in favour of Spadesbourne Brook being culverted. Positive feedback in support of enhancing the Brook and making it a feature of Bromsgrove town centre was received from 28 out of 29 references to the Spadesbourne Brook in the additional comments section of the questionnaire used for the consultation.

Environment Agency (EA)

The response received from Hillary Berry from the Environment Agency dated 16 September 2008 on the *Bromsgrove Town Centre Area Action Plan – Issues and Options* and the *Core Strategy – Spatial Vision* was in support of the proposals for to improve and enhance the quality and value of the Spadesbourne Brook throughout Bromsgrove. The EA stated that there would be a need to improve the appearance and condition of Spadesbourne Brook; that the Brook should be a more prominent feature of the town centre and that appropriate consideration should be given to flood risk.

Further consultation has been undertaken by URS/Scott Wilson with the Environment Agency (Matthew Weston) in September 2010 regarding data requests for assessing the proposed options to naturalise Spadesbourne Brook. Presented below is a summary of the information received from the Environment Agency via an e-mail dated 13 October 2010.

Flood Risk Information

The EA do not have any modelled information for Spadesbourne Brook, although it is classified as a main river which is regulated by the EA.

Protected Species

The EA reported that water voles were recorded in the area at the following locations of Spadesbourne Brook:

Date Recorded	National Grid Reference
February 2005	SO 9662 7133
June 2005	SO 9765 7294
July 2005	SO 9764 7283

The EA further reported that a water vole survey commissioned by Bromsgrove District Council (Water Vole Conservation Strategy for Bromsgrove District Council, Worcestershire Wildlife Trust Consultancy November 2001) found positive water vole sites at the following Bromsgrove locations (no national grid references were provided):

- Spadesbourne Brook – Lickey End;
- Spadesbourne Brook – Roman Way;
- Spadesbourne Brook – Market Street;
- Spadesbourne Brook – Watt Close;
- Spadesbourne Brook – Scout Hall; and
- Spadesbourne Brook – Meadow Vale Walk.

Groundwater

There are a few monitored boreholes in the vicinity near to the Spadesbourne Brook and there are some live/licensed abstractions in the area.

Water Quality

The ecological status of Spadesbourne Brook is categorised as moderate. The EA reported that the ecological status of the Brook would be significantly improved by the naturalisation of the water channel.

Water Vole (Worcestershire County Council and Bromsgrove District Council)

Approval to seek a Development Brief regarding the naturalisation and relocation of Spadesbourne Brook has been gained from technical officers at Worcestershire County Council (WCC) and Bromsgrove District Council (BDC) including the Tree & Landscape Officer (Planning & Environmental Services) at Bromsgrove District Council who stated:

“I think that diversion of the brook on the Markey Hall site offers the best opportunity and value for money offering substantial wildlife habitat improvement, flood defence and environmental/aesthetic improvement all in one scheme.”

The BDC officer expressed a view of improving diversity through inclusion of side bars. He would also like to see suitable bank material to allow burrowing for breeding sites and suitable bank vegetation for foraging. He would like to see slower and deeper flows and viewing platforms and brook crossings to encourage public interest and also a reduction in flow immediately before the culvert.

Worcestershire Wildlife Trust

The Water and Wetlands Officer from the Worcestershire Wildlife Trust was consulted and provided information on the Bromsgrove District Council Water Vole survey dated 2001 Drawings showing results the status of Water Voles sites in 2007 in the area of Bromsgrove and a survey of Battlefield Brook for water voles in 2008 are included in Appendix A.

Worcestershire County Council - Highways

Worcestershire County Council Highways are broadly supportive of the scheme. They have identified further detail required during the detailed design stage, but these should not affect the overall viability of the scheme.

This detail relates to fulfilling the statutory processes:

- Riparian rights – the rights and responsibilities of the adjacent land owners to a watercourse. At the moment, this is shared between a number of third parties and Worcestershire County Council. Changes in the alignment would need to be accepted by all parties and also Bromsgrove District Council, who may need to accept the maintenance liability on behalf of the County Council. The status of the existing watercourse line after diversion will need to be clarified. See Sections 4.4 and 4.5 for further details on riparian rights.
- Access to properties, generally along Crown Close for service to properties fronting the High Street, will need to be maintained. This will include ensuring a suitable width and turning radius.
- Traffic Regulation Orders may be needed if alterations to the road layout are required and, if they are necessary, should be started soon to seek understanding by all parties.
- A junction capacity and safety analysis of changes to the road layout should be undertaken during the detailed design of the scheme.
- The opening up of the Brook in close proximity to roads will need to ensure appropriate safety precautions, such as road restraints and bank stability, for road users. This will be determined during detailed design.
- The “desire lines” of routes and other needs of pedestrians and cyclists will be important.
- The proposed scheme must demonstrate no detriment in relation to flooding. This is being assessed through the hydraulic modelling being undertaken (see Section 2.4).
- Proposed planting will need to be appropriate to the location adjacent to a public highway. See Sections 4.4 and 4.5.
- There may be Statutory undertakers plant and equipment within the site that will need to be considered and possibly moved. This is addressed further in Sections 4.4 and 4.5.
- As the work is within the Highway, a Section 278 agreement will be required from the Highway Authority.
- As the scheme develops, it should be integrated and assessed with the local highway proposals included in the Local Transport Plan (LTP3).

These issues will be addressed as the scheme progresses.

Bromsgrove District Council – Drainage Engineer

Bromsgrove DC Drainage Engineer noted that there may be a swallow hole north of the culvert. This is an important feature for a potential naturalised stream, as there is the potential for water loss. During periods of low flow this would have a large impact on the flows remaining in the watercourse.

Worcestershire County Council – Public Path Orders Officer

Worcestershire County Council has provided advice on the requirements to maintain public footpaths.

The key requirement will be to maintain accessibility and safety along public footpaths both during construction and with the finished scheme. Any changes or disturbance would require authorisation from the Council.

In particular, it was noted that any development would need to be in accordance with RST3 of Worcestershire County Council Structure Plan to ensure that it does not reduce the utility, convenience, recreational value, attractiveness and historic significance of a public right of way.

The proposed scheme is intended to include new public access to enhance the attributes listed above. A copy of the letter from Worcestershire County Council is in Appendix F.

Highways Agency

Upstream of Bromsgrove town centre, Spadesbourne Brook passes underneath the M42 motorway, just to the east of its Junction 1, near Lickey End. This is approximately 2.5 km north east of the site. On the south side of the motorway, the Highways Agency maintain an area either side of the Brook to act as a high flow overflow or Balancing Pond. It is shown on their Environmental Information System “EnvIS” as a drainage, landscape and ecology feature (a diagram of the feature and aerial mapping is contained in Appendix B). This feature is therefore important in managing the flows of the Brook within the town centre.

According to the M42 “As Built” plans (from 1986), the motorway in this area drains into the Brook. This includes both carriageway drainage and the adjacent earthworks drainage. In general, these drains discharge into the Brook on the immediate northern side of the motorway. The balancing pond contains a “throttle”, in the form of a bund and restricted diameter pipe, which, when there are high water flows in the stream would cause it to back up and flood the adjacent bowl shaped area to provide some temporary retention (and, therefore, some alleviation downstream). The balancing pond includes an overflow in case of flows in excess of its capacity.

As an executive agency of the Department of Transport, Local Government and the Regions (DTLR), the Highways Agency works within the Government's strategic objective to encourage sustainable development. The Agency is committed to minimising the impact of the trunk road network on both the natural and built environment and to play a full role in implementing the Government's Biodiversity Action Plans (BAP). Consequently, the Highways Agency has developed their own HA BAP to help the Agency achieve its objectives for conserving and, where possible, enhancing biodiversity.

The Highways Agency conducted an extended Phase 1 habitat survey of the M42 balancing pond site in summer 2006 to determine the broad habitat types on site and also undertook a water vole survey. This recorded water vole activity and burrows with the characteristic ‘feeding stations’ and latrines nearby. Other evidence of water vole activity included a network of tunnels and runs at the southern end of the stream in the area of the M42 balancing pond.

Water voles are often present in most areas of the highway network, generally in roadside drains or other waterbodies where roads run alongside existing populations. The aim of the HA BAP for the water vole is to reduce the impact of pollution from existing roads, and to ensure that new road developments avoid or adequately mitigate any potential impacts on the species. The HA BAP includes a specific action to increase the amount of available water vole habitat by removing barriers to dispersal.

A meeting was held with the Highways Agency and their Maintenance Area Contractor (MAC) on 22 October 2010 to discuss the Spadesbourne Brook. They have developed an Ecological Management Plan for the site, which includes actions to:

- Ensure all known protected species sites are recorded, including water vole; and
- Liaise with statutory bodies and local conservation organisations and seek best management alternatives for species and habitats.

Consequently the Highways Agency and MAC are keen to encourage water vole by actively managing the stream bank and edges to enhance the habitat potential.

There is, therefore, a potential to liaise with the Highways Agency and their MAC to mutual benefit through improving water vole habitat, which could increase the viability of the town centre scheme for the Brook.

2.3 Evolving Bromsgrove Town

The Bromsgrove Town Centre Area Action Plan Issues and Options (July 2008) (AAP) recognised Spadesbourne Brook as one of the key natural features within the town centre and it was considered that enhancing the natural habitat and biodiversity could help contribute to the urban renaissance of the town centre. The AAP references Spadesbourne Brook as an issue under the category of Environment and Open space (issue BR15) which has objectives to enhance the value of open space within Bromsgrove. Potential actions include re-landscaping the brook, improving the environmental quality of the surrounding area and restoring the natural habitat as much as possible. The proposed improvements to the Brook are also identified to be relevant to sustainability objectives including:

- Improve equitable access to open spaces (Objective 2);
- Should attempt to reduce crime and anti-social behaviour (Objective 3);
- Encourage pride and social responsibility in the local community (Objective 5);
- Needs to conserve and enhance the historic built environment heritage (Objective 7);
- Protect and enhances the quality of water, soil and air quality (Objective 10); and
- Sustainable use of material assets (Objectives 15).

Additionally, concerns over the poor appearance and condition of Spadesbourne Brook were raised during the consultation on environment and safety as part of the AAP. Suggestions included cleaning the Brook and highlighting it as a prime feature of the town. It was also considered that the redevelopment of Market Hall should incorporate Spadesbourne Brook (Action A of issue BR2 – Road Network and Action C - Close Market Street to through traffic) to include altering the road network to introduce a one-way street, widening of Windsor Street and closing Market Street enabling the potential for new development and significant environmental improvements to Spadesbourne Brook.

2.4 Hydrological and Hydrogeological overview

Spadesbourne Brook Catchment (up and down stream)

Spadesbourne Brook rises south of the Lickey, north of the M42, circa 5km northeast of the sites of interest. This area is known as the Lickey Hills and forms an area of relatively high ground. The Brook flows for 2km before passing under the M42 to the northeast of the village of Lickey End. The first 2km are mainly rural in character; from the aerial maps there are three surface water ponds on this upstream section, with the largest being the most upstream. This could be where the stream rises, as the 500m upstream of this section appears poorly defined. Spadesbourne Brook drops from 230m AOD² approximately 4.5km north east of the site to 86m AOD at the northern end. The Brook then drops a further metre through the site.

South of the M42, and the Highways Agency drainage feature (discussed in Section 2.2), the stream passes into the village of Lickey End, and southwest into Bromsgrove. The stream in this area, noted in the Environment Agency River Basin Management Plan, (please refer to next section) is heavily modified as a result of urbanisation. Southeast of the sites of interest the Spadesbourne Brook flows into Battlefield Brook in Sanders park, this is classified as a Main River by the Environment Agency. From here the Brook becomes the River Salwarpe.

River Basin Management Plan (RBMP) and Environment Agency (EA) Information

² AOD: Above Ordnance Datum

From the Environment Agency River Basin Management Plan (RBMP, December 2009), the Spadesbourne Brook, known as River R17, has a current overall potential classed as moderate. The overall objective for Spadesbourne Brook is to be 'good' by 2027', with 'good ecological potential by 2027'. Under the Water Framework Directive (WFD) the objective is for all watercourses to achieve a 'good' rating by 2015, however, this is not being aimed for with the Spadesbourne Brook as it is recorded as 'disproportionately expensive and technically infeasible' in the RBMP. The hydromorphological designation is 'heavily modified' because of urbanisation.

One of the supporting elements in the RBMP for the classified status is the 'quantity and dynamics of flow'. This is currently rated as 'does not support good', with the certainty levels of 'quite certain'. Its predicted status by 2015 is that this will also be 'does not support good'. Therefore, it appears that water quality and the attainment of any improvement to water quality may be an issue for further review/assessment.

The flow characteristics of the Spadesbourne Brook are not known at the time of writing, information on whether the Brook is ephemeral and the flow characteristics of the stream have been requested from the EA.

Within the wider environment, from the Environment Agency website, the area of Bromsgrove Town Centre is situated in a Zone 2 Groundwater Source Protection Zone, and is on a principal aquifer, with secondary aquifer associated with alluvial sediments associated with the watercourses. From the EA aquifer maps, both sites lie on Secondary aquifer, overlying principal aquifer. Surface water/groundwater interactions are not known in sufficient details at this stage.

Flood Risk

Both sites of Spadesbourne Brook (Crown Close and Hanover Street car park) are shown to be at risk of flooding on the Environment Agency flood maps. Further information on flooding in the area is provided in the Level 1 Strategic Flood Risk Assessment undertaken by Royal Haskoning in September 2008 for Bromsgrove District and Redditch Borough. A summary of the findings is presented below.

- The flows at 1 in 100 year return period are 6.8 cubic metres/second. A rudimentary check carried out using the Flood Studies Report (FSR) reveals a higher flow at 8.2 cubic metres/second. However this does not take into account perturbation of flow effects caused by culverts or other structures through which the watercourse passes.
- Although it has a low profile through Bromsgrove town, the Spadesbourne Brook has produced fairly severe flooding in the past, as shown by the plaque on the wall of the MFG Solicitors building in High Street (dated 1792). However, there are no reports of a repetition of such flooding indicating that the channel generally copes, although the A448 was closed near West Road Junction in July 2007, which may be associated with overtopping of the Brook channel.
- Spadesbourne Brook is restricted at a number of locations through Bromsgrove, most notably a culvert underneath The Strand which has a tendency to become blocked, and two hidden weirs located near Market Street which, if obstructed, will cause flooding at the southern end of the High Street.
- There are no formal flood defences on this watercourse, although it is maintained by the Environment Agency where it is considered Main River (downstream of the confluence with Battlefield Brook). According to the Council Drainage Engineer, the Spadesbourne Brook suffers more from blockages than out of bank flow.

In the above account, the location of the flooding plaque noted on High Street is upstream of the Hanover Street/Market Place location, and The Strand is circa 300m north of the Crown Close area, as are the hidden weirs noted close to Crown Close.

Bromsgrove District Council has recently commissioned MWH to undertake a Level 2 Strategic Flood Risk assessment which will include Spadesbourne Brook. Results from this study are programmed to be available early 2011.

Hydraulic Modelling

Bromsgrove District Council has commissioned Blackwell and their consultants, URS/Scott Wilson, to undertake a hydraulic modelling study and high level hydrological analysis, which is currently being undertaken. The study will be useful to the development of the scheme, as it aims to provide an indication of water levels, flows and velocities for both the existing and proposed options for the two sections of naturalising Spadesbourne Brook and will also inform channel design, habitat assessment, water quality and flood risk. Maintaining a reasonable minimum water level will be important to habitat management (for planting and water voles) and also for an aesthetically pleasing scheme.

The initial stages of the modelling study involved defining the existing (or baseline) scenario for a range of river flows, including both flood scenarios and normal flow scenarios. The baseline scenario has then been altered and modelled to assess the two feasibility options for the Hanover Street/Market Place site and also Crown Close.

Interim modelling results suggest that for the Option 1 scenario, flood risk is reduced to the surrounding area during the 100 year event. There is some overtopping of the banks during this flood event, though to a lesser extent compared to the baseline scenario. During low flow events in the Option 1 scenario, water levels are similar to the baseline scenario in upstream reaches. Conversely, in downstream reaches, low flow water levels are reduced compared to the baseline.

For the Option 2 scenario, interim results suggest that there is unlikely to be overtopping of river banks during the 100 year flood event throughout the whole modelled reach, with flood levels reduced compared to the Option 1 and baseline results. Low flow water levels are similar to those provided by the Option 1 model runs.

It is important to note that hydraulic modelling has not yet been finalised and that these are interim results only. There are numerous limitations to the hydraulic modelling undertaken to date, mainly relating to the lack of data at this early stage in the project. At the detailed design stage, it is imperative that the hydraulic model and the hydrological assessment are improved using additional data.

The results of the hydraulic modelling will be available shortly in a separate report.

Hydrogeology

Borehole logs information was requested and obtained from the British Geological Survey. The logs requested are located in the St Johns Street area, formed in 1984, and the Bromsgrove Western Inner Relief Road, formed in 1972.

The St John Street boreholes appear to have been located in the area of the Spadesbourne Brook itself. The boreholes requested were formed between 5.2m and 10.5m below ground level (bgl). They encountered between 1m to 3m of made ground over deposits which are likely to be alluvial deposits, overlying the sandstone. Table 2.1 provides a summary of the borehole log information for water strikes and water information for St John Street, Bromsgrove.

Table 2.1. Borehole Log Information for St John Street, Bromsgrove

Borehole Reference	BH depth	Summary	Water observations
4	8.7 m bgl	3m made ground 1m silty fine sand and lithorelicts (alluvium?) Completely weathered sandstone, into sandstone	Water entered BH on removal of casing, standing at 4 m bgl Fast inflow
2	5.2 m bgl	2.2m made ground 0.40m alluvial material? Into sandstone	Water strike at 2.4m, standing water level at 2.20 m after 20 minutes
5	10.5 m bgl	1m made ground 1.8m of alluvial Into sandstone	Water strike at 6m bgl, rising after 20 mins, final standing water level 3.70 m
6	8.2 m bgl	2 m made ground Alluvial Sandstone	Damp at 1m bgl Water struck at 2m bgl rising after 20 mins to 1.8 m bgl Water strike at 5.2 m bgl, rising after 20 mins to 2.9 m bgl

The Bromsgrove Western Inner Relief Boreholes were formed towards the southern end of Crown Close. These show standing water at 1-2m bgl in all boreholes, a summary of the borehole logs is presented in Table 2.2.

Table 2.2. Borehole Log Information for Bromsgrove Western Inner Relief Road

Borehole Name	BH depth	Summary	Water observations
E	10.665 m bgl	Made ground 1.21m Sandy silt – soft and wet (alluvium?) Grey/brown clay silt over very stiff lumpy marl grey sand, very dense	Slow water entry at 1.065m bgl Fast water entry at 3.9m bgl Water entered slowly at 3.96m bgl Water level after 24 hours = 1 m bgl
7	21 foot	Made ground ~ 2m Alluvial, Grey dense sst	Water entry very fast at 7 foot – in alluvial layer? Increased to 5 foot bgl after 24 hours

Borehole Name	BH depth	Summary	Water observations
D	10.21m	Made ground 0.455m, over black sandy topsoil, over sandy clay Over grey dense sandstone	Water level after 24 hours 1m bgl
G	9.445m bgl	Made ground to 1.065m over silt sand, soft and wet (alluvial?) Over brown sand – very dense	Slow water entry at 0.9m bgl, water level after 24 hours 1.3m bgl

From the borehole log information received another deep borehole was formed to the northwest of the sites in the Sanders Park area, this borehole was lined with steel casing from surface to 18.5 m bgl into the sandstone, and the rest water level is shown as 0.25m bgl. It is not known how this relates to the above boreholes, but it appears that the principal aquifer is unconfined and the water levels encountered may be those of the principal aquifer.

At the time of writing this Development Brief Report, the distance from tarmac ground level down to the current water level in the brook is not known, but from site visit photographs taken on 29 September 2010, it estimated to be approximately circa 2.5m from the topographical survey undertaken in September 2010. Therefore, although the channel appears to be concrete/brick lined throughout, and no natural material is exposed, the water levels in the channel may reflect the water table in the surrounding area.

However, this would need to be confirmed with installation of water monitoring boreholes and monitoring of perched water levels as any naturalisation with more permeable bed materials would require the local water table to be at similar levels to the stream to avoid the creation of a dry riverbed with no habitat value.

Other Issues

No information on discharges to the Brook was available at the time of writing this Development Brief, although a number of inlets were identified during the site visit undertaken on 29 September 2010. Due to the urbanised nature of the catchment, and if there are any unknown discharges which have been connected into the Spadesbourne Brook, there exists the possibility of faecal contamination in the Brook. This could be from urban runoff and/or from Combined Sewer Overflows, or unauthorised connection to the surface water drainage system. This would have health and safety issues for construction workers, and for site users – as the possibility of pond dipping/paddling by children would be more likely with a naturalised river channel.

2.5 Protected Species – Water Vole

National Status

The water vole is the UK's fastest declining mammal and is a priority UK BAP species. In 1995 the water vole was listed in the UK government's Biodiversity Action Plan as globally threatened and needing urgent conservation action. Furthermore, in 1998, it was added to the annexes of the Wildlife and Countryside Act (1981) which offers it limited legal protection and in

2008 this protection was extended (see below). Once a common and widespread species, water voles have recently suffered a significant decline in numbers and distribution; a trend also reflected in Worcestershire (Worcestershire BAP, 2008). A national survey in 1989-90 failed to find signs of voles in 67% of sites where they were previously recorded and was estimated that this will rise to 94% by the turn of the century, which has proved accurate. A recent population estimate based on the number of latrines found suggested a total UK pre-breeding population of 1,200,000 animals. Current factors causing loss or decline are as follows:

- loss and fragmentation of habitats;
- disturbance of riparian habitats;
- predation by mink; and
- pollution of watercourses and poisoning by rodenticides (UKBAP Tranches 1 and 2 (1995-1999)).

Local Status

The Environment Agency has confirmed that within Bromsgrove the Spadesbourne Brook currently supports dispersed colonies to the north and south of the town centre and the culverted section of brook.

In Worcestershire, a countywide survey was conducted by Worcestershire Wildlife Trust (WWT) in 2000 and water voles were only found in the Bromsgrove District. These are believed to be the last populations of water voles in Worcestershire. In 2002 WWT surveyed 32 sites in Bromsgrove. Eleven sites (approximately 34%) showed positive signs of water vole activity. When compared with the national survey, which only found positive water vole signs on 14% of the surveyed sites nationally, this therefore highlights the importance of the population in Bromsgrove (Worcestershire BAP, 2008). Predominantly these records occur on the Battlefield, Spadesbourne and Sugar Brooks.

The 2002 survey concludes that while water vole colonies continue to exist in Bromsgrove it is also clear that they remain very vulnerable to habitat loss, inappropriate bankside management and predation, primarily by mink. Any of these factors could result in increasing population fragmentation and ultimately the loss of water voles from Bromsgrove. This would have serious repercussions for their continued existence in the county. Other findings include the widespread distribution of brown rat (*Rattus norvegicus*) and lack of mink evidence.

Legal Protection

The water vole received limited legal protection in April 1998 through its inclusion in Schedule 5 of the Wildlife & Countryside Act 1981 (as amended) for some offences. This protection has now been extended (6th April 2008), so the water vole is now fully protected under Section 9.

Legal protection makes it an offence to:

- intentionally kill, injure or take (capture) a water vole;
- possess or control a live or dead water vole, or any part of a water vole;
- intentionally or recklessly damage, destroy or obstruct access to any structure or place which water voles use for shelter or protection or disturb water voles while they are using such as place; and
- sell, offer for sale or advertise for live or dead water voles.

Licences are available to permit activities which would otherwise be offences, for example whilst engaged in research projects, but there are no licences available for destruction of water voles burrows for development purposes. Obviously, it is not the intention of the Act to prevent

all development, but it is incumbent on those involved in managing waterways 'to take reasonable steps' to avoid unnecessary damage and suffering. Early consultation with the Environment Agency is advisable.

Where an impact to water vole is predicted it may be necessary to produce a method statement to minimise damage to water voles. Any method statement needs to be developed in consultation with the Environment Agency, the statutory body responsible for the water vole biodiversity action plan.

2.6 Other Species

Brown Trout (Salmo trutta)

The trout is widespread throughout the UK, Europe and Asia and exists in two forms known as the brown trout (resident and freshwater) and sea trout (migratory). Both forms are recognised as the same species, *Salmo trutta*.

Trout require high levels of dissolved oxygen and cannot tolerate excessive levels of suspended solids in water. Presence of trout is normally a good indicator of a healthy aquatic environment. Trout growth is slowed in water temperatures above 16°C and feeding ceases when above 18°C. The preferred in-stream habitats change with fish age and varied flow type and depth and loose gravel areas are required for healthy trout populations to persist. Many trout populations have been isolated from each other as a result of land changes leading to impassable barriers being formed leaving isolated populations upstream of waterfalls with limited exchange of genetic material.

In terms of local fisheries management the following actions can have an impact on the sustainability and viability of trout populations:

- Ensuring adequate spawning and juvenile habitat is available and access is allowed.
- Maintaining good water quality to ensure high egg survival rates.
- Enhancing natural bankside vegetation to increase cover and food for older fish.
- Protecting the adult population from over-exploitation.
- Protecting the trout population from high levels of predation.
- Protect the locally adapted trout populations from introduction of non-native strains.
- Obstructions to fish reducing access to spawning grounds and impeding migrations (both upstream and downstream).
- Loss and reductions in suitable spawning and rearing grounds resulting from habitat alteration via land-use practices and direct engineering works.
- Localised reductions in water quality and quantity exacerbated and occasionally resulting from land-use practices (e.g. forestry and agriculture).
- Inappropriate fisheries management actions such as stocking.
- Movement, by people, of fish from one river catchment to another.

3 Biodiversity Enhancement

The re-colonisation of the Spadesbourne by water vole at Hanover Street and Crown Close is highly likely if the proposed rehabilitation is undertaken, along with appropriate habitat and pest control measures.

3.1 Threats and Requirements

Threats to Water Vole

Habitat Loss and Degradation

Water vole habitat loss or degradation may occur through inappropriate bankside management such as frequent mowing or strimming; insensitive river or stream management such as canalisation of watercourses, reinforcement of banks with sheet piling or concrete and ill-timed dredging. Increased urbanisation of watercourse involving channel culverting will fragment habitat and lessen the chances of water vole dispersal upstream and downstream.

Water level fluctuations

Rapid rises in water level (characteristic of urban areas) can restrict colonisation because it prevents access to food and shelter. Prolonged flooding will kill animals through burrow inundation and put escaping individuals at risk from predation unless high banks provide a refuge. Conversely, lowered groundwater levels as a result of abstraction also degrades habitat through desiccation and allows more predation. When water supply to streams and wetlands declines then this will normally trigger long-term declines in water vole populations (Strachan & Moorhouse, 2006). Ideally an urban water way needs good adjacent riparian habitat with safe high water refuges that may include the habitat surrounding small ponds or marshland.

Predation

Female mink are small enough to enter borrows and take adult water vole and young. However, where habitats are dense and extensive, opportunities for evading predators increase. Other predators are many and include buzzards, kestrels, pike, heron, stoat, weasel, rats and domestic cats (Strachan & Moorhouse, 2006).

Pollution and Persecution

Persecution by humans is unlikely to affect the success of a healthy colony but incidental poisoning as a result of pest control may occur (Strachan & Moorhouse, 2006). Poor water quality may reduce the variety and quality of water vole feeding areas and indirectly affect the quality of the food resource for water voles.

Habitat Requirements

Key habitats for water voles are the fringe of densely vegetated rivers, streams, canals, ditches, ponds lakes and marshes. Water voles are aquatic mammals that inhabit the banks of rivers, canals, ditches, pools and marshes. They live in a network of burrows within the banks, having territories along the water's edge marked by the presence of latrines. They feed on bankside and marginal vegetation including grasses, sedges, rushes and reeds. These plants also provide cover to protect them from numerous predators such as mink (*Mustela vison*) and

otter (*Lutra lutra*). Breeding occurs from April to August and they can produce up to five litters, each containing three to four young. They prefer steep banks into which they can burrow and waterside vegetation for food. They can, however, successfully breed in above ground nests in the vegetation but these may be more vulnerable to predation and flooding impact, if the water course is urban with a high cat population and subject to flooding.

Linking population pockets is vital to water vole survival. Canalisation of streams and brooks with concrete culverts and stretches of water course without bankside vegetation, as found at Spadesbourne Brook, act as a barrier to free movement. Water voles will spread quickly into enhanced areas next to their habitats and begin breeding.

Water levels should be relatively stable and ponds and brooks should have an overflow to predictable maximum water levels to ensure that water vole burrow systems are not flooded by high waters. Ideally water channel dimensions should be less than 3m wide and up to 1m deep, water should be permanent, but without extensive winter flooding or large fluctuations in water levels. Earth and clay banks which are steep and consolidated are needed for burrowing and nesting above the water table (Graham and Boulderstone, 2002). The provision of tall swamp and marsh habitat within the river corridor will provide above ground nesting opportunities, cover from predators and feeding opportunities.

Bankside with more than 60% ground cover and few trees or shrubs will also be favoured. Urban sites appear to be favoured because they are less attractive to predators and so water voles may use sites which are suboptimal. These sites can easily be improved by the addition of ground cover for food and protection (Graham and Boulderstone 2002). Although high urban cat populations represent a predation risk to water voles.

Water voles are mainly herbivorous although some records exist of individuals taking freshwater molluscs, frogs and even fish although these cases are rare. Research shows that their diet is very varied including at least 227 species of plants (Stracham and Jefferies 1993). During spring and summer typical plants might include willowherb (*Epilobum* spp.), iris (*Iris pseudacorus*) and meadow sweet (*Ulmaria filipendula*) as well as a range of grasses. In autumn and winter they feed on tree roots, bark, fruit, leaves and rhizomes. During the growing season they collect lengths of starchy plant stems such as those of bulrush (*Typha latifolia*) and store them in underground food caches for periods overwinter and periods when above ground feeding, such as in strong storms, presents a risk.

3.2 Opportunities for Water Vole Habitat Creation

The following measures are examples of the types of enhancement measures that are considered appropriate to attract water voles to the Spadesbourne Brook. Not all of the measures described below might be possible, but a combination of these. This assumes measures will be needed to ensure that habitat condition can be made suitable for water voles that the water levels can be adequately stabilised. It is also assumed that the mink populations will remain low.

Capital Works

Online, Offline Ponds and additional ditch channels

Excessive flooding or drying of a site can make it untenable for water voles. Long-term stability of water levels is an important prerequisite for their survival at a site. Excessive abstraction

sometimes results in loss of flow during the summer months. Dried out sites are quickly vacated by the local water vole population.

Water level management along small watercourses may be essential to ensure long-term survival of water voles when they occur. Many small brooks and streams suffer from wild fluctuations in depth in response to rainfall, especially where rapid run-off occurs as a result of urban development.

Water level management is proposed through increased flood storage capacity by way of on-line ponds and additional ditch channels which may alleviate the worst of the flooding as well as providing flood refuge areas for water voles. Periods of low flows and drying out may be addressed through the use of sluices or bunds to create permanent water in ditches and offline ponds when the river levels drop (Strachan & Moorhouse 2006).

A combination of off line, online ponds and ditches will help to create a diversity of wetland features. Offline ponds also have the advantage of providing refuges which are more likely to escape the ravages of mink.

Medium sized ponds (0.1ha – 0.5ha) are usually best for water voles. Small shallow ponds often dry up, small deep ponds will usually have too little vegetation and large ponds are avoided by water voles. In general, a small number of ponds in close proximity set in a mosaic of marsh/swamp are better than a single large pond in the same area.

Shallow water zones should be incorporated into any new ponds. These should feature a shelf (0m – 0.3m deep) section and some steep bank sections (45° to vertical) to allow marginal vegetation establishment to occur and also to provide burrows habitat and escape routes for water voles. Off line ponds and ditches should be linked to the main brook by an area of dense vegetation which will provide a safe corridor by which water voles can travel undercover from predators. The ponds should be kidney shaped with a point bar incorporated in the inside using either a sand or gravel media. Provision should also be made for flat grassy feeding berms.

A sluice gate or other overflow mechanism should be incorporated into the online ponds to enable regulation of water levels.

Marginal Plant Species

Marginal plant species which are considered suitable for water vole habitats include reed canary grass (*Phalaris arundinacea*), common reed (*Phragmites australis*), reed sweet grass (*Glyceria maxima*), hard rush (*Juncus inflexus*), soft rush (*Juncus effuses*), conglomerated rush (*Juncus conglomeratus*), sharp-flowered rush (*Juncus acutiflorus*), jointed rush (*Juncus articulatus*), pendulous sedge (*Carex pendula*), flote grass (*Glyceria fluitans*) and greater pond sedge (*Carex riparia*). Most aquatic plants are best transplanted rather than seeded (Strachan & Moorhouse 2006). This list is not exhaustive and applies to all the water features previously mentioned including the Spadesbourne Brook itself.

Terrestrial Features

The creation of bunds in sporadic locations is recommended up to 1m to 2m above the existing bank height. These should be created directly next to the water course and will provide haul out areas during high flow periods of for water voles to extent their burrows into during spate conditions.

Localised dense shrub planting (within the 3m - 5m from banktop zone) is also recommended to provide extra bank top cover in addition to the marginal plant species. Species such as dog wood (*Cornus sanguinea*) and shrub willow species would adequately provide this cover without growing tall enough to risk significant shading of the channel.

Felled trees can be sectioned and used as in channel log features or to create hibernacula. Hibernacula can be created from sectioned logs, brick rubble or other similar material. These are then top soiled and left with an open face at two ends. These features are beneficial for a variety of species including amphibians, reptiles, invertebrates and small mammals.

Channel and Bank Features

Berms/Shelves

Shallow water zones can be created by profiling the bank to result in a 1.5m to 2m wide shelf at 0 - 0.3m depth of water. To add variation areas of berm (sloping shelf) can also be created. Both features can be planted with species previously mentioned.

Channel Variation

The channel profile should be re-profiled to be as meandering as available space allows. This will allow natural point bars and eroding cliffs to develop over time as the natural deposition and scouring process occurs.

Steep Banks

Some sections of steep (45°) or vertical bank faces should be incorporated within the constructed bank profile. These are to enable and encourage water vole burrowing to take place. In the case of areas where bank erosion is likely, there may be a requirement for suitable geotechnical solutions in order to retain bank stabilisation. These should be soft engineering solutions rather than hard structures such as retaining walls or gabion cages.

Bank Reinforcement

Bank protection may be essential and riverbanks can be stabilised in ways that are sensitive to the needs of water voles. Soft engineering techniques should always be used. Hazel wattle hurdles are ideal on shallow slopes. The hurdles are fixed to the eroding bank, this allows vegetation to develop and bind the bank together. Coir rolls are another example of a suitable soft engineering solution. These are biodegradable, yet it would still be possible for water voles to burrow through and would also allow marginal plant growth.

Creating Riparian Buffer Strips

A buffer strip is a vegetated strip of land between 2-50m wide along a watercourse. Buffer strips provide water voles with a diverse range of food plants as well as affording cover from predators. These buffer strips also protect riverbanks from erosion, reduce agricultural run-off and provide ideal habitat for a range of wildlife. Buffer strips for water voles should not be allowed to totally develop into scrub as water voles dislike shaded conditions (www.durhamwt.co.uk).

Mammal Ledges through Culverts

Relatively short culverts are known to be regularly used by water voles (Strachan & Moorhouse 2006). However, if possible mammal ledges should be added to the culverts which are to be retained to enhance the linkages between the sections of available habitat.

Recommendations for inclusion into a Habitat Management Plan/Landscape Management Plan

General guidelines and generic habitat improvements when working at water vole sites are outlined below. Careful consideration needs to be taken when planning works and care needs to be taken in order to avoid breaching the Wildlife and Countryside Act. Any riparian works in areas where water voles are present could potentially be breaking the law. The following should be considered:

- Survey to establish extent of population of high activity;
- if possible avoid or minimise the work carried out where water voles are present;
- retain as much vegetation as possible and work in sections, don't do all the work none year;
- work from one bank and limit use of heavy machinery;
- work upstream, as dislodged vegetation can re-establish downstream;
- take care over spoil disposal;
- no operations between March and September to protect breeding water voles;
- assess potential for enhancing/restoring/creating habitat further; and
- stop work if a water vole is seen.

Another general consideration would be to control the Himalayan balsam by appropriate means (spot spraying or cutting and removing at the appropriate time of year). According to the Environment Agency, control measures should aim to prevent flowering, and so are best carried out before June for maximum effectiveness (i.e. before seed dispersal).

Chemical control near water can be carried out with herbicides containing glyphosate or 2,4-D amine. Glyphosate will also kill grasses, but 2,4-D amine will kill only broad-leaved weeds; for best effect, use when the plant is small and actively growing, particularly in springtime.

Cutting, strimming or pulling on a regular basis for about three years will be effective and may even eradicate the plant from isolated sites. Plants must be cut below the lowest node to avoid reflowering.

Rat control when water voles are present

Accidental persecution of water voles through pest control can be a threat in urban areas. As brown rat is known to be present in large numbers on the Spadesbourne Brook in close proximity to Hanover Street there is a likelihood that 1) unintentional persecution is occurring and that 2) brown rats are/would affect the water vole population as they are known to predate young water voles. Rat control can therefore benefit water vole but only if undertaken carefully. The following measures should be undertaken to avoid harm to water vole:

- Live capture traps should be used. Traps should be checked twice a day to release animals that are caught unintentionally. Traps should be sited in the open rather than in dense vegetation. The traps should not be sited at the water's edge.
- Break back/snap traps or Rodenator devices should not be used because they are indiscriminate as is the use of poison gas or bait unless managed very carefully.

3.3 Feasibility of Water Vole Colonisation

Water vole populations occur upstream on the Spadesbourne Brook and have also been recorded downstream at Sanders Park on the Battlefield Brook. The Battlefield Brook at Sanders Park has been rehabilitated for water vole following the channel being straightened in the 1960's. A new channel has been created to the south of the old channel. Bank re-profiling was undertaken to create stepped banks, vegetated marginal ledges, pools and a backwater area. Many other habitat features were also created which are similar to those that have been discussed earlier.

Results are not currently available which compare baseline survey data collected prior to the rehabilitation with survey data collected after the rehabilitation. The Bromsgrove District Council Water Vole survey 2001 identified water vole, but no brown rat or mink populations in Sanders Park. Water voles signs were found in good numbers and two animals were recorded (Graham and Boulderstone 2002).

There have also been water vole sightings near to the Spadesbourne the Bus Station (Market Street), which is immediately upstream of Hanover Street, Watt Close (down stream) and Meadow Vale Walk (downstream). These sightings are thought to be of transient individuals as the habitat here is suboptimal with only limited cover and apparently high brown rat activity levels (Graham and Boulderstone 2002). The section above has identified many capital works and habitat management measures that will all assist to encourage, and enable water voles to colonise the newly available stretch of the Spadesbourne Brook. However, it is likely that even if the brook was opened up and suitable bank material (clay or earth banks) made available some colonisation would occur.

If the Spadesbourne Brook were successfully rehabilitated to accommodate water vole, then the success of the water vole population as a whole, is likely to depend on:

- the continued absence of mink;
- the appropriate control of brown rat (as outlined in 3.2 above);
- the cessation of vermin control using poisons (if indeed this is being undertaken);
- the adequate stabilisation of water levels in combination with the provision of new habitat and refuge areas and offline ponds;
- an adequate maintenance regime for pond and ditch management being developed and implemented; and
- an adequate control programme for Himalayan balsam would be beneficial to maintain marginal plant diversity and integral to the overall success of the naturalisation.

The re-colonisation of the Spadesbourne by water vole at Hanover Street and Crown Close is highly likely if the proposed rehabilitation is undertaken along with appropriate habitat and pest control measures.

4 Development of Spadesbourne Brook Naturalisation

The naturalisation of Spadesbourne Brook has required identification and consideration of a range of practical issues. This includes the engineering of a new channel, planting and habitat creation, public access, maintenance, effect on public highways and utilities and legal issues. The significance of these issues is discussed below along with the action need to implement the scheme successfully. Illustrations of how the naturalisation would look are provided in Appendix G.

4.1 Site Location and Description

Spadesbourne Brook rises in the Lickey Hills to the north Bromsgrove, then flows south west and passes through the town of Bromsgrove including the study site. The Brook then, south of the site, joins the Battlefield Brook, which together form the River Salwarpe at the bottom of the town. The OS Grid Reference for the approximate centre of the site area is SO 958707. The area is approximately 10 miles south east of Kidderminster and approximately 15 miles south of Birmingham. The OS grid reference for the centre of the site is SO 958707. The site is situated between the A448 to the west of the site and the A38 to the east of the site.

The two sections of Spadesbourne Brook which are being assessed in this Development Brief report include the following:

(i) Crown Close

This section of Spadesbourne Brook is bounded by St John Street (A448)/Crown Close to the north, Market Place to the west, High Street (B4184) to the south and Church Street to the east. The site currently comprises a grassed area (including an avenue of trees and footpath) between Market Street and Crown Close. To the other side of Crown Close, and largely hidden beneath the car parks/access routes to the High Street properties, is Spadesbourne Brook. This section of the Brook is currently situated in a concrete and brick culvert and is barely visible due to the urbanisation of the area.

(ii) Hanover Street Car Park

This section of Spadesbourne Brook is bounded by St John Street (A448) to the north, Hanover Street to the west, Worcester Road to the south and Market Place/George Street to the east. This section of Spadesbourne Brook currently runs under Market Place Road and then behind Hanover Street car park through a culvert. In this section, there are numerous bridges that provide access to the rear of the properties that face Worcester Road.

Photographs of the two sections being considered as part of the Development Brief are shown in Appendix B. Drawing No. D134351/SK/04 (contained in Appendix D) also shows the detail of the existing watercourse.

4.2 Water Quality Issues

For the naturalisation of a Brook, the aesthetic quality of the water is an important factor, as the Brook needs to look attractive to provide an asset to the landscape. From the site visit undertaken on 29 September 2010, the photographs show the urban nature of the catchment

area with some areas containing fly-tipped material in the form of litter and shopping trolleys. The water column also looks to be very turbid, with a dark colour.

Within the General Quality Assessment (GQA) scheme the four parameters that lead to an aesthetic classification grade include the number of items of litter, percentage of water covered with oil/ scum/ foam/ sewage fungus/ochre, hue and intensity of colour in the water and the type and intensity of odour at the site. The Environment Agency do not monitor this watercourse for water quality; however, discussion of the above aesthetic classification would provide a background for discussion of whether the watercourse within the proposed naturalised channel would be a landscape benefit and provide the required result.

Consultation would need to be carried out with the Environment Agency over whether an urbanised impermeable channel such as this would preferably be lined due to its location in a groundwater Source Protection Zone (SPZ) over a principal aquifer.

Previous communication from the Environment Agency to Bromsgrove District Council dated 18 September 2008 stated that the Environment Agency supported actions to restore and improve the watercourse in the area so that it would become a feature of the town. This was the response received in an earlier consultation exercise on the 'Bromsgrove Town Centre Area Action Plan.'

Environment Agency Data

Data received from the Environment Agency on 13 October 2010 stated that the ecological status of Spadebourne Brook is moderate and that it would be significantly improved by the naturalisation of the water channel, which would have a positive impact on water quality of the Brook. The Environment Agency stated that the best water courses to encourage wildlife are those that exhibit a good variety of natural features, such as riffles, pools etc, a variety of adjacent semi-natural habitats and bank-side conditions, varied flow speed, bed depths and good water quality.

4.3 Flood Risk Issues

The Level 1 Strategic Flood Risk Assessment (Royal Haskoning, September 2008) reported that the Brook is restricted at a number of locations, particularly the culvert underneath The Strand. There is a tendency for blockages in the channel which causes localised flooding. Any proposals for re-naturalisation of the channel and potential culvert redirection underneath Market Place would require detailed flood modelling and Flood Risk Assessment to ensure that any proposals would not cause a worsening of the flood potential in the area, or downstream of the area.

The use of weirs and cascades would allow holding of minimum water levels for water voles, which would also create different habitats and aerate sections of the stream. The proposed new wider "v" shape channel would improve water holding capacity, which would be enhanced by the ledge for planting on one side (this would increase the overall channel capacity. The development of the scheme will include consideration of additional pools, which would also provide additional new habitat (good for water voles as there would be relatively still water) and also give additional capacity. These additional pools could be implemented in the site or elsewhere along the Brook. These would need careful Flood Risk Assessment (FRA) modelling to check that these do not impact badly on flood risk downstream, especially pinch points.

4.4 Crown Close

Site Description

The existing Brook currently runs on an approximately north to south alignment that is adjacent to Crown Close. This comprises a series of culverted sections and short open sections. There are approximately nineteen individual riparian owners along its length, for which agreement would need to be attained. Drawing D134351/SK/04 in Appendix D presents information on the number of structures for this section of Spadesbourne Brook.

Options Considered

One option has been proposed for the naturalisation of Spadebourne Brook in this area. This includes that Spadebourne Brook will be relocated between the existing culvert and the highway, either where the current Crown Close currently runs or within the green area. Such realignment of the Brook is to be confirmed. This would also offer an opportunity to redesign the current access road and footpath layout, thus improving the attractiveness of the area for both the public and wildlife.

Presented below is a high level environmental and engineering assessment of the feasibility of this proposed option.

Environmental Constraints and Opportunities

Contaminated Land

The area south of Crown Close currently comprises the rear of commercial businesses. To the north of Market Street is a commercial area comprising of a supermarket (Asda store).

Historically the area to the south of Crown Close has not changed in that buildings were present along the High Street in 1886, comprising a bank, institute and one building is referred to as "Corn Exchange". To the north adjacent to Market Street is an open area referred to as "Crown Close." Further east along Crown Close with Church Street to the east is a Cattle Market, and a cemetery (disused) and a vicarage is present further west, north of Market Place and St John Street.

In 1903 the area shown previously as "Crown Close" is still present which is shown as a recreational area with a drill hall and fire station along the eastern boundary of the site. The rest of the area in 1903 remained largely unchanged until circa 1980's when there is some development on the land shown as Crown Close.

In general, Bromsgrove was one of the towns in Worcestershire in which cloth was permitted to be manufactured, with a flourishing trade in narrow cloth, continuing until towards the end of the 18th century. The making of nails was started in the 17th century, and was, until the end of the 19th century, the staple trade of the town. There was also a silk button manufactory and a brewery. However, there is no evidence at this stage that these or any other activities have affected the land quality of the site.

The geology of the site is described in Section 2.4.

Based on the available evidence it is assumed that there is a low to moderate risk of encountering soil and or groundwater contamination that would require mitigation. In order to

determine the potential risk fully, a Phase I Contaminated Land Assessment would need to be undertaken to determine any potential significant pollutant linkages.

Vegetation and Habitat

The vegetation of any notability within the Crown Close section of the site is ten lime trees (*Tilia cordata*). The trees are relatively young and form a strong avenue along Crown Close and Market Street. The avenue acts as a visual barrier to screen the rear facades of the buildings along Crown Close, although the avenue is not representative of the surrounding more naturalistic tree planting. Crown Close is within the Bromsgrove Town Centre Conservation Area and trees make a significant contribution to its character. The Council's description of the Conservation Area specifically notes that "mature lime trees line the paths around these buildings adding to the peaceful atmosphere away from the hustle and bustle of the High Street".

The selective removal of some or all of the trees will open up the site, remove the avenue and make way for a tree planting strategy more in keeping with its context. The proposed realignment of the Brook will be a dominant factor when selecting which trees, if any, are to be retained as the proximity of the Brook will define the treatment necessary to retain the stability of the trees. It would be desirable to replant on this side of Market Street to complement the existing trees on the other side. Removal of trees (more than 7.5cm in diameter at a height of 1.5 m above ground) would need to be approved by the Council. Maintaining a reasonable minimum water level will be important to habitat management (for planting and water voles) and also for an aesthetically pleasing scheme.

Public Accessibility

The proposed scheme should adhere to the Disability Discrimination Act (DDA) regulations and as a matter of good practice for pedestrian accessibility. Any footpath should be 2m from the naturalised stream to provide for bankside vegetation and also to keep footpath users away from the bankside. If the space and design allows, it would also be beneficial to incorporate a cycle route that runs parallel to the footpath. This cycle path should link with the wider network of cycle paths and form part of the Bromsgrove strategy for cycle routes.

Drawing D134351-ENV-01 (contained in Appendix E) indicates potential areas for seating opportunities along the Crown Close section. The seating area shown also has the potential to form part of a wider network of public realm spaces that incorporates both the Crown Close and Hanover Street sections.

Drawing D134351-ENV-01 also highlights that renaturalisation of the Brook would potentially entail severance of access to the front of the Indian restaurant and adjoining retail establishment which share access from Market Street. It would be beneficial to bridge or culvert this small stretch to allow for continued pedestrian access to these properties. This could also lead to an opportunity to create a potential space for outdoor eating and drinking adjacent to the Brook and potentially enhances a varied user experience of the scheme.

There is potential opportunity to create a gateway between the High Street and Crown Close. Improving the legibility of Cleggs Entry could potentially draw people into the Bromsgrove town centre from the scheme and vice versa. Using a hard landscape and lighting strategy that continues through Cleggs Entry could potentially improve the footfall through the two spaces.

Noise Screening

The existing hedge and Lime trees that form a strong linear feature along the current Crown Close site gives a strong perceived noise amelioration effect, although vegetation has no acknowledged effect in reducing actual noise levels. If these elements are removed then it would be beneficial for public perception to introduce a planting strategy which uses vegetation as a visual barrier and to offer the perception of a screen for noise.

The ideal place for this type of strategy would be along the realigned Crown Close or along the property boundary of the properties on Crown Close. This would also achieve the objective of screening the unattractive rear facades of the aforementioned buildings.

Due to the relatively confined space between the rear of properties backing onto Crown Close and Market Street, there is very limited scope for the inclusion of noise mitigation within the scheme corridor.

New vegetation within this area may reduce the view of the road from properties backing onto Crown Close. It is possible that this would have an impact on the perception of traffic noise; however it is unlikely that this will provide any measurable reduction in the actual road traffic noise levels experienced at these properties.

If it were considered necessary to include noise mitigation within the scheme, a noise barrier could be located alongside Market Street to reduce noise levels affecting both the area surrounding the new brook and the properties on Crown Close. However, due to the limited space available, and the visual impacts of any such barrier, it is unlikely that this approach would be considered appropriate.

Biodiversity Enhancement

Please refer to Section 3 for biodiversity enhancement considerations.

Engineering Feasibility

Proposed New Channel Option

There is an option for diversion of the existing partly culverted watercourse into the area of land, currently used as a wide verge between Market Street and Crown Close. This is indicated on Drawing No. D134351/SK/01 (contained in Appendix D). In terms of levels to demonstrate that this is a feasible proposal, details are indicated on Drawing No. D134351/SK/07 (contained in Appendix C).

It is envisaged that there will be a short length of new culvert that will cross Church Street, close to the junction with Market Street and this will connect to the existing channelized watercourse to the north. South of the road crossing, the channel will be constructed in open cut and will continue in a southerly direction to a point to be decided near the road junction with High Street and Market Street. From this point there will be a series of short culverted sections. Currently there are two options under consideration and these are shown on Drawing Nos. D134351/SK/01, D134351/SK/02 and D134351/SK/03 (contained in Appendix D). Depending upon which option is carried forward; indicative level details of the culvert proposals are also indicated on Drawing No. D134351/SK/09 and D134351/SK/11 (contained in Appendix D).

The proposed channel will incorporate a steepened side slope on the east side to encourage a suitable habitat for water voles. The channel will have a shelf at the side to accommodate low flows and allow for planting. The watercourse will need to be lined to maintain the stream, avoid undercutting and scour as the local ground conditions are susceptible to this action. The water

course will be an average depth of 1.4m over this length and 5.5m at the widest point. This will vary depending upon the final design adopted. These arrangements are shown indicatively on Drawing No. D134351/SK/06 (contained in Appendix D).

The watercourse will have a series of small weirs along this length to locally impound water, raise water levels and to achieve an overall reduction in velocities. The opened up watercourse will be landscaped with options for developing a waterside amenity feature with dedicated park land and the like.

Long Term Inspection and Maintenance

The open channel and culvert headwalls should undergo regular routine inspections and if required maintenance, to help ensure it is clear of accumulation of sediment, debris, including tippings such as shopping trolleys and other items on approximately a three monthly cycle. Management of the planting in the channel is discussed in Section 3.2 (p30). A buffer strip, 2m wide, of unmown vegetation should be left adjacent to the stream as more natural habitat.

Removal of floatables and sediment from the channel and culverted sections could be by the use of a vacuum pump, taking care not to disturb the landscape planting, wildlife habitat or erosion prevention matting. The personnel should be fully trained in the use of equipment with cleansing hoses, which should be fitted with protective nozzles to avoid damage. This should be carried out on a six monthly basis, or more frequently depending upon the build-up of debris.

It is envisaged that the headwall grille will need replacement at the northern end of Crown Close due to its poor design. After high intensity storms (approximately triennially) these will need inspection and if necessary maintenance to ensure free flow conditions for water.

Landscaped sections will also require maintenance on a regular basis, the frequency of which will be dependent upon the planting regime decided upon. It should be assumed that this will take place on a six monthly or twelve monthly cutting, repair or replacement cycle.

Options for Old Culvert

The existing culverted section is likely to be retained as it falls within the ownership of third parties with associated riparian rights. In addition the existing culverted section is likely to have surface water connections that will either need to be maintained or diverted. The existing partially culverted section will need to be cleaned out and it can act in the future as an overflow outlet and for flood storage. As an alternative, the existing culvert and intermittent watercourse sections can be abandoned and replaced with a piped system on line and filled in. This alternative would be dependent upon negotiations with the current riparian owners or compulsory land purchase, whichever is found to be more feasible.

It is not clear what other drainage outfalls into the Brook and the condition of them, particularly in the covered sections. Further understanding of these will be necessary, particularly if the old culvert could not continue to be used for outfall.

Highways Impacts

To create extra space for the watercourse diversion, there is an option to narrow Crown Close to make it one-way, with the vehicular flows in a southerly direction. There will need to be a new junction formed at the intersection with Market Street. This junction will need to be left turn only with other minor modifications required to Market Street at its junction with St John Street.

There is good visibility at the proposed junction to the right, with a splay of 2.4m X 60m or higher order achieved.

In order to implement the change to Crown Close and change it to a one way street in a North to South direction certain procedures will need to be followed and approvals will need to be granted. It is likely that the change to Crown Close and the junction on to Market Street will need to be done under a Section 278 agreement with the Highway Authority. There is the option to narrow or to move laterally so that it is relocated over the existing watercourse, which will be dependent upon the current riparian owners. Compulsory purchase of the land is likely to be the best option, given that there are nineteen landowners identified and there is limited other scope to try and negotiate with landowners directly. In terms of a timescale, given that there is mixed commercial and residential, there is the likelihood that there will be objections and a consequential need for a public inquiry. Side road orders would also be required to move the road laterally.

Depending on the complexity of the scheme and any requirements that the Highway Authority may have the approval process may take some time to complete, definitive time scales are difficult to state. As the highway authority is effectively the Council, there may be the opportunity for reducing the timescales.

Additionally because there is a proposal to change Crown Close from a two way street to a one way street, a permanent Traffic Regulation Order (TRO) would need to be implemented. TROs are designed to regulate, restrict or prohibit the use of a road or any part of the width of a road by vehicular traffic or pedestrians and can be implemented by County Councils. There are processes and procedures that have to be followed when undertaking a TRO and there is no guarantee that an order will be implemented if reasonable objections are made and upheld. Again timescales for TROs can be difficult to state as it will depend on any potential objections, their nature and whether, in the worst case, a public inquiry becomes necessary. The opening up of the brook course itself may be open to public consultation. The proposal to make Crown Close one way would need further consideration to ensure that all access obligations are met, this may have an impact on a programme for implementation.

Riparian Rights

There are approximately nineteen individual riparian owners located along the watercourse in Crown Close. This is in conjunction with Worcestershire County Council and Bromsgrove District Council who own the land associated with the public highways. There is a small segment of land currently used for informal parking that does not feature on the land registry records. This is thought to be land either in the ownership of Worcestershire County Council or vested to them.

A riparian owner has responsibilities which include the maintenance of the bank and bed of their section of watercourse, in order to avoid any obstruction of flow in the watercourse. Responsibilities as a riparian owner are based on legislation. The principal legislation includes:

- The Public Health Act 1936.
- The Land Drainage Acts of 1991 & 1994.
- Water Resources Act 1991.
- National Rivers Authority (now the Environment Agency) Land Drainage Byelaws 1981.

The most common problems affecting watercourses include the following:

- Failing to keep vegetation growth under control.
- Failing to obtain consent for installing pipes or culverting of watercourses.
- Disposal or storage of garden or domestic rubbish, waste etc, on the banks of watercourses.

Evidence for this can be seen from walkovers and photographs included in Appendix B.

The diversion works must be approved by the Environment Agency and Local Authority and consents secured before going ahead (Section 23, Land Drainage Act 1991). This applies to any modifications which might affect the flow characteristics or capacity and include installation of weirs and channel diversions.

Utility Services

The following utility services and required diversions have been identified:

- Severn Trent surface water sewer (225mm diameter) located in the verge/footway of Market Street, this will need to be diverted into a new channel. To do this will require negotiating a sewer diversion with Severn Trent Water carried out in accordance with Section 185 of the Water Industry Act 1991 (S185) where any public sewer, lateral drain or disposal main is situated in this case the public highway, can by giving notice, require Severn Trent Water (STW) to alter or remove that pipe. Fees will be dependent upon the nature of the works and are currently £529. It is envisaged that this will be carried out under a self-construct agreement with Severn Trent Water with opportunity given for them to inspect.
- Severn Trent foul water sewer (225mm diameter) located within St John Street. This service will not be affected as there will be sufficient clearance beneath to install a possible new route of watercourse diversion. Precautions will need to be made for the protection and support of this service whilst works are undertaken.
- Seven Trent water service (3") located within St John Street will not be affected as there will be sufficient clearance beneath to install a possible new route of watercourse diversion. Precautions will need to be made for the protection and support of this service whilst works are undertaken.
- Central Networks LV electric cables (2 No.) located in a separation island in St John Street will not be affected as there will be sufficient clearance beneath to install possible new route of watercourse diversion. Precautions will need to be made for the protection and support of this service whilst works are undertaken.
- Central Networks LV electric cables and 11 kV HV electric cables are located within the length of Crown Street with a substation to the rear of No. 35 High Street. This utility service would be unaffected by the diversion and road realignment works, provided no deep excavations are carried out in the vicinity.
- British Telecom service located within Crown Close. This is unaffected by diversion and road realignment works provided no deep excavations are carried out in vicinity.
- British Telecom service located within St John Street. Not affected as there will be sufficient clearance beneath to install possible new route of watercourse diversion. Precautions to be made for protection and support of service whilst works are undertaken.

Existing known services are also shown on Drawing No. D134351/SK/05 (contained in Appendix D).

4.5 Hanover Street - Market Place

Site Description

From St John Street the existing watercourse runs in an approximately north south direction. At Market Street southwards towards the former market building (demolished to form parking spaces), it is culverted for a distance of approximately 51m.

Continuing south there is a channel concrete and brickwork channel approximately 3m wide that is bridged intermittently over a length of approximately 75m. Close to the existing electricity substation the channel terminates at a headwall with two parallel galvanised steel Armco pipes (approximately 1.2m diameter) set at slightly different levels.

From the electricity substation area, the watercourse enters a culvert that is approximately 23m long. This then enters a concrete lined channel that is approximately 43m long that is approximately 1.5 metres wide. At Hanover Street, the water course is culverted and emerges in Sanders Park to the South. This existing culvert will be retained.

Drawing D134351/SK/04 in Appendix D presents information on the number of structures for this section of Spadesbourne Brook.

Options Considered

There are two options for naturalisation of the Spadesbourne Brook within the area of Hanover Street car park, these are:

- **Option 1:** Naturalisation of Spadesbourne Brook in its current position adjacent to the rear of the properties located along Worcester Road.
- **Option 2:** the rerouting of the Spadesbourne Brook to run along the south of the site (adjacent to the rear of the properties located along Worcester Road), then north through the middle of the development retail site) before emerging through a redirected culvert at the junction of St John Street with Market Place. This option will assist in the connection of the currently separated up and down stream areas.

Presented below is a high level environmental and engineering assessment of the feasibility of this proposed option.

Environmental Constraints and Opportunities

Contaminated Land

The area around Hanover Street car park currently comprises a car park with some commercial businesses.

Historically, the area in 1884 was largely developed with a malthouse and a brewery building marked on the site. The area to the north of St John Street comprises a cemetery (disused) and a vicarage. The land use of the site remains largely unchanged until the 1970s, Spadesbourne Brook is shown on the OS Map dated 1970 (Scale 1:2,500). There have been several buildings demolished which is shown as a car park and a new building labelled "Market Hall" is located in the north eastern part of the site. The area remained largely unchanged up to 1991, although the Market Hall has since been demolished.

In general, Bromsgrove was one of the towns in Worcestershire in which cloth was permitted to be manufactured, with a flourishing trade in narrow cloth, continuing until towards the end of the 18th century. The making of nails was started in the 17th century, and was, until the end of the 19th century, the staple trade of the town. There was also a silk button manufactory and a brewery. However, there is no evidence at this stage that these or any other activities have

affected the land quality of the site.

The geology of the site is described in Section 2.4.

Based on the available evidence it is assumed that there is a moderate risk of encountering soil and or groundwater contamination that would require mitigation. In order to determine the potential risk fully, a Phase I Contaminated Land Assessment would need to be undertaken to determine any potential significant pollutant linkages.

Vegetation and Habitat

The only notable vegetation along this section of the scheme is two Willow trees (*Salix alba* sp) to the rear of the Dog and Pheasant Public House. It would be preferential to retain these two attractive trees to retain existing character and contribute to the landscape proposals. The Bromsgrove DC Tree & Landscape Officer would prefer to see them retained but accepts that this may not be possible. The site is almost entirely surrounded by the Bromsgrove Town Centre Conservation Area, although the site itself is not generally within it, so removal of trees is not as sensitive an issue as at Crown Close.

As part of the naturalisation it would be a requirement to plant native species local to the area and species associated with river side environments. A well designed planting strategy should be implemented to create an open and light space that contributes to the safety and enjoyment of users. It is noted that the Bromsgrove DC Tree & Landscape Officer has suggested a preference for small-fruit trees to be included in a replanting scheme.

Depending on the types of development that may occur on the two spaces dedicated to future development, a planting strategy should be implemented to either screen or accommodate and integrate any design proposals for these areas.

Maintaining a reasonable minimum water level will be important to habitat management (for planting and water voles) and also for an aesthetically pleasing scheme.

Public Accessibility

Each option of the Market Street section of the proposals should adhere to the DDA regulations as a legal requirement and good practice for pedestrian accessibility. Any footpath should be 2m from the naturalised stream to provide for bankside vegetation and also to keep footpath users away from the bankside. It would be preferential, but not essential if the pedestrian route through this section could cross the Brook at different points to enhance the quality of the user experience. The incorporation of a cycle route should also be considered if space allows to achieve the objective of Bromsgrove Action Plan.

Option 1 on drawing D134351-ENV-01 (contained in Appendix E) shows a strong green corridor that could potentially accommodate numerous points of entry from the proposed development site on Hanover Street car park and that would encourage users to utilise the scheme as a main route into Bromsgrove town centre from the car park. Option 1 also highlights that there are opportunities to improve the permeability of the site along Little Lane and George Street. Improving these pedestrian routes will consequently improve the footfall and usage of the proposals.

Improving the pedestrian route along George Street then lends itself to creating seating opportunities and a public realm space as highlighted on the plan.

The landscape review of Option 2 highlights that there are opportunities for potentially two new public realm spaces within the heart of the site. The proposed winding alignment also opens up a clear link from the High Street through the site and onto the Housman Trail and St. John the Baptist Church, this also connects the town centre to the wider context of green spaces in Bromsgrove contributing to the future success of the site.

The orientation of the built development that may occur in the two highlighted parcels of future development land may have a positive/negative impact on the proposals to the Brook. It will be important to ensure that future development integrates the site into their proposals and does not incorporate elements such as service entrances and unattractive facades along the frontage of the realigned, naturalised Brook.

Improved crossing points on Hanover Street and St Johns Street will aid in connecting the two proposal sites and help in connecting the severed green space to the south and the already naturalised section of the Brook to the north. Option 2 would have the benefit of allowing line of sight of the naturalised stream between Market Place and Crown Close, which would reinforce the continuation of the feature.

Noise Screening

Within the Hanover Street – Market Place section of the scheme, there is potential for the option selected to impact on noise levels affecting both the area of the new brook and properties adjacent to the scheme.

Both options considered include future development sites between some sections of the brook and St John's Street. Any such new buildings will act as an acoustic barrier and may reduce road traffic noise levels impacting on the area surrounding the new brook and properties beyond. As a significant proportion of this space is a car park within Option 1, the reduction experienced at the closest properties beyond the brook is likely to be less for this option than for Option 2 where a greater proportion of the land is allocated for future development.

However, Option 1 locates the new brook further from St. John's Street throughout this segment, and may result in slightly lower noise levels in the immediate vicinity of the brook itself.

Biodiversity Enhancement

Please refer to Section 3 for biodiversity enhancement considerations.

Engineering Feasibility

Proposed New Channel Options

There are two options for naturalisation of the watercourse within this area:

Option 1: Open up the watercourse generally along its current alignment.

The proposed channel will incorporate a steepened side slope on the west side to encourage a habitat for water voles. The channel will have a shelf at the side to direct the low flows into the narrow channel and allow for planting. The watercourse will need to be lined to maintain the stream and avoid undercutting and scour as the local ground conditions are susceptible to this action. The watercourse will follow the existing alignment for much of its length. The proposed watercourse channel in this area will need to be between 1.7m deep at the upstream end and

2.1m deep at the downstream end. The width will vary from approximately 6.1m to 6.7m to accommodate the 1 in 100 year flows. These proposals are shown indicatively on Drawing No. D134351/SK/02 (contained in Appendix D). In terms of levels to demonstrate that this is a feasible proposal, details are indicated on Drawing Nos. D134351/SK/08 and D134351/SK/09 (contained in Appendix C). The arrangements for the proposed channel are also shown indicatively on Drawing No. D134351/SK/06 (contained in Appendix D).

Existing surface water connections will be connected to the proposed new alignment.

Spadesbourne Brook (as per Crown Close) would need a series of small weirs along this length to locally impound water, raise water levels and to achieve an overall reduction in velocities. The opened up Brook will be landscaped with options for developing a waterside amenity feature with a dedicated park land.

Option 2: Divert the watercourse from a point close to the existing electricity substation

The Brook will be culverted along a new alignment at the road junction between St John Street/Market Place heading in a generally southerly direction. A new headwall will be constructed and the watercourse channel will be constructed in open cut and will continue in a south-easterly (diagonally) through the site direction to a point to be decided near the existing electricity substation, to its north. This is to avoid the potential for expensive electricity diversion works. After this point the watercourse will follow the existing alignment for the rest of its length to the existing Hanover Street culvert.

The proposed channel will incorporate a steepened side slope on the west side to encourage a habitat for water voles. The channel will have a shelf at the side to direct the low flows and allow for planting. The watercourse will need to be lined to maintain the stream and avoid undercutting and scour as the local ground conditions are susceptible to this action. The watercourse will follow the existing alignment for much of its length. The proposed watercourse channel in this area will need to be between 2m deep at the upstream end and 2.1m deep at the downstream end. The width will vary from approximately 6.3m to 6.7m to accommodate the 1 in 100 year flows. These proposals are shown indicatively on Drawing No. D134351/SK/03 (contained in Appendix D). In terms of levels to demonstrate that this is a feasible proposal, details are indicated on Drawing Nos. D134351/SK/10 and D134351/SK/11 (contained in Appendix D). The arrangements for the proposed channel are also shown indicatively on Drawing No. D134351/SK/06 (contained in Appendix D).

Long Term Maintenance

This will be an ongoing process. The open channel and culvert headwalls should undergo regular routine inspections and if required maintenance, to help ensure it is clear of accumulation of sediment, debris, including tippings such as shopping trollies and other items on approximately a three monthly cycle. Management of the planting in the channel is discussed in Section 3.2 (p30). A buffer strip, 2m wide, of unmown vegetation should be left adjacent to the stream as more natural habitat.

Removal of floatables and sediment from the channel and culverted sections should be by the use of a vacuum pump, taking care not to disturb the landscape planting, wildlife habitat or erosion prevention matting. The personnel should be fully trained in the use of equipment with cleansing hoses, which are fitted with protective nozzles to avoid damage. This will be carried out on a six monthly basis, or more frequently depending upon the build-up of debris.

Landscaped sections will also require maintenance on a regular basis, the frequency of which will be dependent upon the planting regime decided upon. This should take place on a six monthly or twelve monthly cutting, repair or replacement cycle.

Options for Old Culvert

The existing culverts will be retained where they pass beneath St John Street and Hanover Street.

It is not clear what other drainage outfalls into the Brook and the condition of them, particularly in the covered sections. Further understanding of these will be necessary, particularly if the old culvert could not continue to be used for outfall.

Highways Impacts

The existing separation island at the junction of St John Street and High Street will be modified if Option 2 is decided upon. These proposals are shown indicatively on Drawing No. D134351/SK/03 (contained in Appendix D). It is conjectured that there will be other road improvements as a result of subsequent redevelopment of this site.

Riparian Rights

It is understood that the section of land comprising the existing Hanover Street Car Park and associated public highway is in the ownership of Worcestershire County Council and Bromsgrove District Council, involved owning the land associated with the public highways.

The diversion works must be approved by the Environment Agency and Local Authority and consents secured before going ahead (Section 23, Land Drainage Act 1991). This applies to any modifications which might affect the flow characteristics or capacity and include installation of weirs and channel diversions.

Utility Services

The following utility services and required diversions have been identified:

- Severn Trent surface water sewer (225mm diameter) is located within the access road from Worcester Road; this will need to be diverted into a new channel. To do this will require negotiating a sewer diversion with Severn Trent Water carried out in accordance with the Section 185 of the Water Industry Act 1991 (S185) where any public sewer, lateral drain or disposal main is situated in this case the public highway, can by giving notice, require Severn Trent Water (STW) to alter or remove that pipe. Fees will be dependent upon the nature of the works and are currently £529 for each diversion. It is envisaged that this will be carried out under a self-construct agreement with Severn Trent Water with opportunity given for them to inspect.
- Severn Trent surface water sewer (375mm diameter) is located within Market Place at the north-eastern side of site; this will need to be diverted into a new channel (see above procedures for sewer diversion).
- Severn Trent foul water sewer (225mm diameter) located within St John Street will not be affected as there will be sufficient clearance beneath to install the possible new route of the watercourse diversion where they cross. Precautions will need to be made for protection and support of this service whilst works are undertaken.
- Seven Trent water service (3") located within St John Street will not be affected, as there will be sufficient clearance beneath to install the possible new route of watercourse diversion where they cross. Precautions will need to be made for the protection and support of this service whilst works are undertaken.

- Central Networks 11 kV HV electric cables bisect the site with the substation close to the existing watercourse. This service is unaffected by the diversion works provided no deep excavations are carried out in the vicinity.
- Central Networks LV electric cables run south-west to north-east from the substation crossing the watercourse close to the former Market Hall at Little Lane. There will need to be localised diversion works for either option to open up the watercourse.
- Central Networks LV electric cables run north to south under Market Place to the former Market Hall shown on EON drawing to be decommissioned. This service will not be affected by the diversion works for either option.
- British Telecom service is located within St John Street; the cable enters the site near the car park access and serves the former Market Hall. This service will not be affected as there will be sufficient clearance beneath to install the possible new route of watercourse diversion where they cross. Precautions will need to be made for protection and support of service whilst works are undertaken.
- National Grid gas services will not be affected by works. No services are shown within working area.

Existing known services are also shown on Drawing No. D134351/SK/05 (contained in Appendix D).

5 Next Stages in Development

5.1 Bromsgrove Town Centre Area Action Plan

Area Action Plans have been introduced by the government in PPS12 to assist councils in planning for and controlling future change in a specified area. They are used when it has been identified that a planning framework is required to accomplish significant change or conservation.

Clear aims and objectives can be set within an Area Action Plan, including the type and scope of developments / enhancements to the public realm, the economy, public services and transport initiatives.

An Area Action Plan can assist in highlighting potential land for redevelopment, improve infrastructure, protect important areas and features, enhance / upgrade existing public space, and justify any compulsory purchase of land.

It can also attract investment / jobs and set realistic timescales. Importantly, it ensures that the community will benefit from any developments or enhancement (as opposed to the developers solely benefitting). Lastly, the process guarantees that the community is involved throughout.

An Area Action Plan can stimulate regeneration and focus the delivery of area based initiatives. The implementation of an Area Action Plan in Bromsgrove town centre will act to control future developments, whether they be funded / implemented by the council, another public body, or a private investor (e.g. a major retailer) until 2026.

Once complete, the Area Action Plan forms an essential component of the whole Bromsgrove Local Development Framework.

At the time of writing this report, the Issues and Options regarding improving Bromsgrove town centre have been consulted on. The findings allow the creation of the Draft Area Action Plan Preferred Option, which will detail the enhancements, improvements and additions to the town over the coming years.

This Draft Preferred Option will be finalised at the end of November 2010. Consultation will then be undertaken, and the findings will drive the final Area Action Plan, due for completion in the spring on 2011.

Following this, a procurement process will be undertaken to find a development partner(s) for the delivery of the Area Action Plan proposals. It is anticipated that the appointment of such delivery partner(s) would be achieved by the autumn of 2011.

A phased development and construction programme would then be agreed, with physical works likely to commence in 2012.

In the meantime the Area Action Plan will go through the formal adoption process with the Secretary of State.

5.2 Design and Construction

Following the consultation period and anticipated acceptance that the naturalisation works should proceed Bromsgrove DC should retain a consultant to undertake a full design. We envisage that this process would provide a fully consented and supported tender document for the appointment of a civil engineering contractor. We have presumed that Bromsgrove DC has a preferred list and that an Expression of Interest process is not required.

This process would comprise (all time frames are approximate):

- Preparing Form of Contract (such as an NEC Priced Contract with Activities Schedule): 6 weeks.
- Client review of contract: 4 weeks.
- Issue of tender and tenderers response: 4 weeks.
- Client analysis of tenders and award: 6 weeks.
- Mobilisation: 4 weeks.

With regard to a construction period for the on site works Bromsgrove DC should consider the following prior to tendering the works:

- Timing of the works – consideration should be given to the time of year that the works are undertaken so not to be adversely affected by vole movements and mating seasons, periods of anticipated high water levels or flood risks, vegetation clearance avoiding nesting bird season, and landscaping seasons. It would be preferable to undertake the works starting in Spring, so that most of the works can be carried during low flow on the Brook.
- Phasing of the works – consideration should be given to the extent of works that are undertaken at one time and the impact that this will have on adjacent traders and visitors. We envisage that the works within Crown Close will be more disruptive than those within the Hanover Street Car Park due to the adjacent buildings and access requirements. By undertaking works on both sections of the Brook simultaneously a greater visual impact will be suffered however the programme period would be over a shortened period; however by reducing the impact and phasing the works consecutively, and possibly over consecutive seasons, disruption and impact will be over a much longer period.
- Funding – particular funding drivers may restrict Bromsgrove D.C. in developing the site and these should be considered when tendering the works, i.e. a single tender for all of the works or phased works tendered on a phase by phase basis (the latter being a more expensive option).

At this stage to place a construction period on the naturalisation works would be pure speculation and may mislead Bromsgrove District Council. Greater surety on programme would be achieved through working with the detailed design and understanding the phasing requirements. In particular, any programme would be dependant on Environment Agency approvals and land ownership issues (see Section 5.4 below). However at this stage we would envisage a 6 month construction period; should the works not be constructed simultaneously, we advise consecutive 6 month periods with a break for reasons stated within timing above.

5.3 Indicative Costs for Naturalisation

At this stage it is particularly difficult to place a cost on the naturalisation works for similar reasons stated within Section 5.2; any costs quoted would be pure speculation without an outline design upon which to provide a budget. However the following is offered as an indication of possible construction cost based on the information at hand:

Crown Close	-	£100K - £150K range
Hanover Street Option 1	-	£250K - £300k range
Hanover Street Option 2	-	£300K - £400K range (including new culvert section)

The foregoing costs should be viewed as very outline construction costs excluding design fees and any disbursements (such as costs associated with applying for Traffic Regulation Orders). The costs are based on provision of the naturalisation and associated soft landscaping and footways but exclude any public realm elements.

5.4 Funding Options

At the time of preparing this Development Brief, the funding mechanism for the naturalisation of Spadesbourne Brook is currently unknown. Bromsgrove Town Centre Regeneration Programme Project Initiation Document (July 2010) has identified various funding sources that could be investigated for the regeneration of Bromsgrove town centre, which includes the naturalisation of Spadesbourne Brook, these include:

- County Council funded Shop Frontages Improvement Grant Scheme.
- English Heritage 'PSiCA' Funding.

Other potential funding mechanisms that could be investigated for this project scheme include the following³:

Access to Nature Programme

Access to Nature is run by Natural England on behalf of a consortium of major environmental organisations. It is a £25 million grants programme to encourage people from all backgrounds to understand access and enjoy our natural environment. It aims to encourage more people to enjoy the outdoors, particularly those who face social exclusion or those that currently have little or no contact with the natural environment. It will fund projects in urban, rural and coastal communities across England.

The programme awards grants of between £50,000 and £500,000 to support projects that deliver one or more of the programmes main outcomes. In addition the programme will make a small number of larger grants of over £500,000 for projects which have a national significance or impact.

European Union

³ The information presented above provides a brief summary of potential funding that may be available for this project. However, further consideration and study would need to be allocated to each potential fund to fully investigate the suitability and eligibility of the project for such funds/grants.

The European Commission provides funding to projects and initiatives that promote its policy priorities throughout the European Union and further afield. The Directorate General for Environment makes funding available through two different programmes, these are:

- (i) The LIFE fund: this is the European Unions financial instrument supporting environmental and nature conservation projects throughout the Union.
- (ii) The Eco-Innovation and Competitiveness and Innovation Framework Programme.

Natural England

The Biodiversity Action Fund 2008 – 2011 was launched in May 2008 to help achieve the UK government's commitment to halt the loss of biodiversity by 2010, through supporting the recovery of priority species and habitats in England. It should be noted that funding available to this scheme has not been committed and that Natural England is not accepting any further applications for funding from this source.

SITA Trust

SITA Trust is an ethical funding organisation dedicated to making lasting improvements to the natural environment and community life. Sita Trust support Biodiversity Conservation projects within the UK which is known as the 'Enriching Nature Programme.' This programme supports projects with a focus on a species or habitat that has been identified as a priority by the UK Biodiversity Action planning process. Over the past four years, this programme has committed total funding of £18m.

Big Lottery Fund – Community Wildlife

The Community Wildlife fund is aimed at helping bring local people together to enjoy or protect the wildlife in their local area. The programme will fund between £300 and £10,000 for projects that:

- Improve rural or urban environments for people to enjoy, for example by:
 - Protecting wildlife habitats;
 - Creating a nature trail, woodland walk or wildlife garden for people to enjoy; and;
 - Improving natural community spaces, such as rivers, ponds and woodlands.

The next deadline for applications for the Community Wildlife fund is 24 November 2010.

Big Lottery Fund – Community Spaces

The Community Spaces programme run by Groundwork UK funds community groups who want to improve local green spaces such as parks, wildlife areas, community gardens, play areas. Kick-about areas and pathway improvements. Funds available range between £10,000 to £100,000 for small and medium grants. Deadline for these applications is 07 January 2011.

Heritage Lottery Fund

The Heritage Lottery fund provides grants for heritage projects for all sizes, with grants ranging from £3,000 to over £5 million. The Heritage Lottery Fund consists of many programmes, one called 'Parks for People' may be relevant.

WREN

The WREN Biodiversity Action Fund provides funding of between £75,000 and £250,000 to deliver biodiversity improvement projects. The focus of work must include a conservation or an improvement of an identified site to benefit one or several Biodiversity Action Plan habits. There are three main schemes, these are:

- (i) Small Grant Scheme: this scheme provides funding on small project that can make a real difference to their local communities. Funding ranges between £2,000 and £15,000 with completion of the project within 12 months of the funding decision. For this scheme, projects need to be situated within 10 miles of a Waste Recycling Group landfill.
- (ii) Main Grant Scheme: this scheme provides funding between £15,001 to £50,000 on projects such as the provision, maintenance or improvement of a public park or other public amenity in the vicinity of a landfill site.
- (iii) Biodiversity Action Fund: this scheme delivers projects under Object DA of the Landfill Communities Fund. This fund provides up to £10m spread over 5 years to fund biodiversity enhancements by supporting the expansion, recovery and conservation of habitats that achieve Habitat Action Plan/Species Action Plan targets through specific improvements. Projects must be sited a clearly identified sites within 10 miles of any licensed landfill site in WREN's operation area (including West Midlands). Grants of between £75,000 and £250,000 are available and projects can last up to 5 years.

Veolia Trust

The Veolia Environmental Trust awards grants under the Landfill Communities Fund to community and environmental projects in the UK that area near some of the landfill and facilities operated by Veolia Environmental Services (UK) plc. This project would fall into the Biodiversity Projects (Category DA) funding which awards between £25,000 and £40,000. Examples of previous projects include: species reintroduction programmes to a specific habitat.

Esmée Fairbairn Foundation

The Esmée Fairbairn Foundation established in 1961 aims to improve the quality of life for people and communities within the UK. This foundation allocates funds to specific strands of work, which includes biodiversity which aims to help develop a greater knowledge and understanding of certain habitats and their associated species leading to practical conservation outcomes. Grants for the first phase range between £17,000 to £195,000. Funding through the Biodiversity Strand is available until the end of December 2010, however, applications for the first stage need to be received by the Esmée Fairbairn Foundation by 29 October 2010.

5.5 Legal Issues and Consents Required for Channel Diversion/Naturalisation

Environment Agency

The naturalisation of Spadesbourne Brook will require further consultation with the Environment Agency at a later stage when the preferred option has been designed. Permits are likely to be required from the Environment Agency on the following:

- Flood Risk Management: this is required under the Land Drainage Act 1991 and the Water Resources Act 1991 due to the re-location of the Brook and the potential removal of weir and culverted sections.

- Water Quality Discharge Consent: this is required under the Water Resources Act 1991 and the Groundwater Regulations. Due to the naturalisation of the Brook it will be important to know the water quality of the Brook in particular in areas that are currently culverted. It is currently unknown if there are any discharges into the Brook.
- Consent for working near a watercourse.

Natural England

At present, it is considered that a licence for Water Voles will not be required.

Local Highways Authority

Consultation will need to be undertaken with the relevant Highways Authority should there be any changes to the road infrastructure in the area for the naturalisation of Spadesbourne Brook (such as the potential narrowing of Crown Close and the formation of a new junction with Market Street). This includes road opening notices, road closures, diversion/closure of footpaths and access routes.

It is understood that Market Place culvert is the responsibility of Worcestershire County Council and their permission would need to be sought if improvements are required.

Riparian Land Owners

Consultation will need to be undertaken with riparian landowners to establish ownership for the proposed naturalisation of Spadesbourne Brook. The form of consultation with riparian landowners is yet to be decided by Bromsgrove District Council, but may involve a local meeting, letter drop or house to house consultations. Such consultation will be required especially with the nineteen riparian landowners identified in the Crown Close area of Spadesbourne Brook.

In accordance with the Environment Agency, riparian landowners have the rights to both protect their property from flooding and protect their banks for erosion. Plans showing the proposed options to naturalise the Brook will need to be presented to the riparian landowners along with consultation with the Environment Agency. As stated under Section 23 of the Land and Drainage Act 1991, any modifications that might affect the flow characteristics or capacity of a water course including the installation of weirs, channel diversions and culverting/piping will need to be consulted with both the riparian landowners, Environment Agency and Local Authority to obtain any necessary consents, prior to any works commencing.

5.6 Next Stages of Scheme Development

The following stages will need to be given consideration as the proposals for the naturalisation of Spadesbourne Brook progresses:

- The proposed options for the naturalisation of Spadesbourne Brook need to be considered further in terms of designing a preferred option for each section using the proposed options considered or other options.
- Consultation with the public and stakeholders.
- Consultation with prospective developers interested in developing sections of the site, this is to ensure that the route of the naturalisation of Spadesbourne Brook satisfies the requirements of redeveloping the sites and the regeneration of Bromsgrove town centre.
- Hydraulic modelling (completion of) – this will help to determine the flow levels for the two proposed naturalised sections of Spadesbourne Brook channel width, depth and

gradient. This task has been started and an overview is given in Section 2.4; a report will be available soon.

- Flood risk assessment – a Level 1 Strategic Flood Risk Assessment has already been produced by Royal Haskoning (September 2008). A Level 2 Strategic Flood Risk Assessment has been recently been commissioned by Bromsgrove District Council, results from the assessment are programmed to be available early 2011.
- At this stage it is known from data collated by Bromsgrove District Council in 2002 and 2007 that populations of Water Vole are present in the area. A review of the populations of Water Voles should be undertaken to ensure that the proposed options will result in the connectivity and mixing of Water Vole populations upstream and downstream of Spadesbourne Brook.
- For any potential redevelopment of the site, further consideration will need to be given to the ground conditions and potential presence of contaminants on site, by undertaking a Phase I Contaminated Land desk study. This is required under PPS23 and for the submission of any future planning application for the redevelopment of the site.
- Understanding the existing discharges into Spadesbourne Brook through the Crown Close and Market Street section will be important, particularly given that the drainage system in that part of the town is likely to be old and also because much of the inlets are not visible. It may be that some drainage would have to be maintained. If no other information is available, a CCTV survey would be important.

6 Conclusions

This Development Brief report concludes that it is viable for the two sections of Spadesbourne Brook assessed in this study (Crown Close and Hanover Street car park) to be naturalised, as identified from the high level environmental and engineering study undertaken. The naturalisation of Spadesbourne Brook will create a “green” corridor through the centre of Bromsgrove, thus creating a more accessible area and increasing the attractiveness of the town centre. An attractive feature running through the centre of Bromsgrove would also potentially reduce the potential problem of litter and fly-tipped materials in the Brook.

The opening up of the Brook will improve the linkages between water vole populations and will help to encourage a more permanent breeding population. These measures would also result in a more attractive, open habitat and would enhance the biodiversity generally with the focus on water vole as the flagship species. It is envisaged that the water vole populations which have existing in isolation for many years will finally be connected with this proposal. This will be a great success for urban re-generation and for biodiversity enhancement in the region. The proposal will not only encourage water vole but also a whole suite of other species will benefit.

Careful consideration needs to be given to the flood risk management of the Brook, which is known to have flooded previously. The use of small weirs/cascades would allow certain levels of water to be held (which would encourage water voles) and would also create different habitats and aerate sections of the stream, therefore could potentially increase the water quality of the Brook.

The use of weirs/cascades would allow holding of certain levels of water re water voles, but will also create different habitats and aerate sections of the stream, but these would need careful Flood Risk Assessment (FRA) modelling to check that these do not impact badly on flood risk downstream, especially pinch points.

7 References

Andy, G, C Baulderstone (2002). *A Conservation Strategy for Bromsgrove. Report to Bromsgrove District Council and The Bromsgrove Society.* Worcestershire Wildlife Consultancy. February 2002.

Bromsgrove Town Centre Area Action Plan Issues and Options Report (July 2008).

Bromsgrove Town Centre Regeneration Programme Project Initiation Document (July 2010).

Bruce, B (ed) (1999). *Biodiversity Action Plan Worcestershire.* The Biodiversity Action Plan for Worcestershire partnership.

C5 Submission of Landscape Schemes.

C11 Statutorily Protected Species and Habitats.

C12 Wildlife Corridors.

C16 Effect of Infrastructure Development on the Landscape.

CTC6 Green Open Spaces and Corridors.

CTC8 Flood Risk and Surface Water Drainage.

CTC12 Sites of Regional or Local Wildlife Importance.

CTC13 Protection of Species.

CTC15 Biodiversity Action Plan.

Draft Bromsgrove Master Plan

Elliot, M.J. 1994. *Quantitative Ecology and the Brown Trout.* Oxford Press.

Environment Agency River Basin Management Plan (RBMP, December 2009).

Highways Agency (Sept 2010). Print out from EnvIS showing the water feature north of the M42 (URS/Scott Wilson e-mail correspondence with the Highways Agency).

Highways Agency (Oct 2010). *M42 Little Heath Ecological Management Plan.* Project No. 370571 (produced by AmeyMouchel).

Planning Policy Statement 9: Biodiversity and Geological Conservation.

Planning Policy Statement 23: Planning and Pollution Control.

Planning Policy Statement 25: Development and Flood Risk.

Royal Haskoning (Sept 2008). *Bromsgrove District and Redditch Borough Strategic Flood Risk Assessment – Level 1 Report.* (Draft Report).

RST.4 Recreational Walking Routes.

RST.9 Waterways and Open Water Areas.

Section 40 of the Natural Environmental and Rural Communities Act 2006.

Strachan, R. (1998). *Water Vole conservation handbook*. English Nature, Environment Agency and the Wildlife Conservation Research Unit

The Durham Wildlife Trust www.durhamwt.co.uk

Worcestershire Biodiversity Action Plan (LBAP)

Appendix A: Water Vole Survey Plans

Appendix B: Site Photographs

Appendix C: M42 EnvIS Plan and Aerial Plan

Appendix D: Engineering Drawings

Appendix E: Landscape and Ecology Drawings

Appendix F: Worcestershire County Council letter re: Paths

Appendix G: Visualisations of proposed naturalisation of Spadesbourne Brook