Valuing and funding green infrastructure:

Non-planning related projects

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Preparation of this guidance note on the viability of green infrastructure (GI) has been led by Worcestershire County Council's Strategic Planning and Environmental Policy Team. The paper has been endorsed by the **Worcestershire Green Infrastructure Partnership** (GI Partnership). The GI Partnership includes the DEFRA statutory agencies (Environment Agency, Natural England, Forestry Commission), English Heritage, local authorities, and voluntary sector organisations including Worcestershire Wildlife Trust.

1. Introduction

What is green infrastructure?

1.1 Green infrastructure (GI) is the planned and managed network of green spaces and natural elements (including rivers, streams, canals, woodlands, street trees, parks, rock exposures and semi-natural greenspaces) that intersperse and connect our cities, towns and villages. GI comprises many different elements including biodiversity, the landscape, the historic environment, the water environment (also known as blue infrastructure) and publicly accessible green spaces and informal recreation sites[1].

Why is green infrastructure important?

1.2 Green infrastructure provides multiple benefits. It delivers environmental gains including landscape and habitat protection and enhancements, preservation of the historic environment, water quality improvements, and flood risk reduction. It also delivers benefits directly to local residents, such as new cycle paths, informal recreation areas and welcoming green surroundings.

1.3 The importance of GI is recognised through national planning policy and guidance. The National Planning Policy Framework (2011) states that Local Plans should address climate change, biodiversity and landscape issues through *"planning positively for the creation, protection, enhancement and management of networks of biodiversity and green infrastructure" (para 141)*.

1.4 The Natural Environment White Paper (2011) recognises the economic and social benefits of green infrastructure. It recommends that appropriate methodologies are designed to help retain or develop green infrastructure and assess the value for money of local spending on green infrastructure.

How is green infrastructure delivered?

1.5 Green spaces and natural elements do not exist in isolation. There are many advantages to be gained from securing a critical mass of GI in a locality; considering networks in an integrated way delivers far greater benefits than would be achieved if individual components were considered separately.

1.6 Delivery of green infrastructure (including valuation and funding considerations) is affected by the scale and type of the scheme. In Worcestershire GI is delivered at the following scales:

- **Strategic or county GI:** These are large-scale projects which provide functions and facilities which benefit more than one district or population within the county.
- **District GI:** These are GI schemes providing a range of functions at a district level which benefit the population of the district.

[1] Worcestershire County Council (2013) Worcestershire GI Strategy 2013 - 2018

- **Neighbourhood or local GI:** These are small-scale GI enhancements which would typically be included within a development site.

1.7 The GI delivery process will differ depending on the type and scale of projects, and will impact viability and funding considerations. As such, two broad categories of GI initiatives can be identified:

- **New development sites:** Over the next 20 years a large number of new small scale and strategic developments are expected to come forward in Worcestershire through Local Plan and, where adopted, Neighbourhood Plan allocations. The allocation and delivery of these sites is strictly regulated through the planning process under national (NPPF) and local planning policy. GI requirements, alongside other 'asks', will impact the viability and deliverability of these sites. These GI projects will predominantly be delivered directly by developers, or through third parties using developer contributions.

- **Non-planning GI initiatives:** This category covers a wide range of different schemes such as retrofitting GI on existing sites or wider strategic and rural GI projects. The common theme for these schemes is that they will be less affected by the planning process, with a wider range of funding mechanisms being required to secure delivery.

Purpose and scope of this guidance note

1.8 This document aims to provide guidance on valuing and costing green infrastructure to support implementation and delivery of non-planning GI projects such as creation of parks, flood management, sustainable transport, etc. GI considerations that should be taken into account for new development sites are described in a separate paper "*Viability, valuation and funding of green infrastructure on new development sites".*

1.9 This paper consists of two parts which should be read together: the main document, and a spreadsheet of green infrastructure costs. The main document contains information on:

- Valuation of green infrastructure
- Funding of green infrastructure
- Green infrastructure costs

1.10 The indicative costs of different elements of green infrastructure are summarised in the Indicative GI Costs Spreadsheet. This information has been collated from a number of sources, including the GI Partnership organisations. Nationwide studies have also informed this summary.

2. Valuing green infrastructure

Introduction

2.1 This section explores various approaches to calculating the value of green infrastructure. Extensive methodologies on valuing green infrastructure are available at the national and regional level. This paper aims to direct readers to these calculation methods, rather than describing each of them in detail[2]. The valuation methods included in this paper are a selection of various techniques across different elements of green infrastructure. There may be additional methods which are not covered by this paper.

Context

2.2 The valuation of green infrastructure provides an understanding of the quantitative – and, where that's not possible, the qualitative - benefits of services and functions provided by different elements of green infrastructure to society, the economy, and the environment.

2.3 The valuation tools described in more detail in this section enable assessment of the value of existing green infrastructure (*baseline benefits*) as well as the value associated with greater use of that asset in the future (*marginal benefits*). A recent study by the Mersey Forest and BE Group[3] (described in more detail further in this document) proved that the effects of green infrastructure could be quantified and demonstrated how these could be used in viability calculations.

2.4 The assessment of both current and future benefits could be of assistance when planning and delivering green infrastructure.

Valuation techniques

2.5 There is a wide range of valuation methods which relate to different types of green infrastructure. In 2013, Natural England (NE) commissioned a report[4] which assessed various valuations available nationally and internationally. Following this, NE issued a report on the most robust valuation techniques which they advised practitioners to use. This section provides guidance on selecting the most relevant techniques.

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[2] Please note: In order to undertake valuation or viability assessment, further reading of relevant literature will be required (see 'Further reading' section). It is also recommended that specialist advice is sought when considering or undertaking such assessments.

[3] BE Group is an independent business services group. It aims to help businesses to become more productive, profitable and competitive.

[4] Natural England (2013) Green Infrastructure – Valuation Tools Assessment, NECR126 http://publications.naturalengland.org.uk/publication/6264318517575680

TOTAL ECONOMIC VALUE OF GREEN INFRASTRUCTURE

There is no single method for assessing the value of green infrastructure; different methods may be appropriate depending on the type of GI and what we are trying to achieve. The complex nature of GI relationships means that specialist techniques are needed. One starting point is to assess the *total economic value** (TEV) of the green investment. Total economic value can include:

- *Use value* - relating to current or future uses of a good or service.
  - Direct use values such as timber (consumptive value[5]) or recreational activities (*nonconsumptive value*[6])
  - Indirect use values such as flood protection.
- *Option value* - associated with retaining the option to use a resource in the future.
- *Non-use values derive from:*
  - Existence value - the knowledge that environmental resources continue to exist
  - Altruistic value – are available to others to use now
  - Bequest value – are available for use in the future.

Costs and benefits related to market goods and services are estimated using market prices. For wider social and environmental costs and benefits for which no market price is available, specialised non-market valuation techniques should be applied.

Green Infrastructure Valuation Toolkit (GIVT)

2.6 The Green Infrastructure Valuation Toolkit (GIVT) has been developed by a consortium of organisations with remits for economic development, place-making and natural environment protection, led by Natural Economy Northwest. The toolkit provides step-by-step guidance on valuation, including preparation, assessment and reporting. The guidance is supported by a software calculator which guides users through the valuation process. The spreadsheet can be accessed on the Natural Economy Northwest website: www.bit.ly/givaluationtoolkit.

2.7 The principle of this valuation technique is '*an ecosystem services approach'*. The ecosystem approach means recognising that, regardless of its current main use, any area of land has the potential to deliver a very wide range of services (such as flood management, biodiversity, or recreation) and it is important that the diversity of these services is recognised in policy and decision making. There may, however, be a limit to the extent to which multifunctionality can be pursued without impairing the delivery of one or more of the services involved. For example, there may be trade-offs to be made between archaeology and diversity of wildlife or flood management.

2.8 The toolkit contains useful guidance on the assessment of green infrastructure benefits including quantifying and monetising of the services it provides. This is spread across different GI elements and the functions they perform:

- Climate change mitigation and adaptation
- Flood alleviation and water management

[5] Consumptive value refers to non-market value of resources such as firewood, game meat, etc. Such resources are consumed directly, without passing through a market.

[6] Non-consumptive value - refers to all of the "functions" or "services" of natural systems.

- Place and communities
- Health and wellbeing
- Land and property values
- Labour productivity
- Tourism
- Recreation and leisure
- Biodiversity, and
- Land management.

2.9 Below is an example of how GIVT works in practice:

LANDSCAPE AND VISUAL AMENITY:

QUANTIFYING

Landscape and visual amenity value is generally expressed as a willingness to pay* for a view, and varies according to landscape type. The values provided include a basket of benefits, including recreation. It does not take account of local context - including green space nearby, the quality of the asset, the accessibility of the asset and so on. It can, however, provide an estimate of the level of benefits.

A 2003 study for the Forestry Commission[1] focused on the number of urban fringe households with a woodland view, which was found using 1991 Census classification of wards. It estimated the value of woodland views from properties to generate the willingness to pay figures. These numbers can be used together with the number of households within 450 metres of the green asset.

MONETISING

Work by Eftec[2] for the Department for Communities and Local Government brought together 47 studies on the externalities associated with undeveloped land. The study does not systematically isolate landscape from other benefits - such as recreation, ecology and tranquillity - for each of the land types considered, but it does have some useful values:

- £54,000 per hectare per year for an urban park
- £2,700 per hectare per year for urban fringe forestry
- £889 per hectare per year for urban fringe - greenbelt.

These figures include recreation benefits, but explicitly exclude 'functional' benefits – climate control, water management and so on. This is due to the choice of their economic assessment method (willingness to pay) which cannot capture avoided damage costs of flooding climate change and others.

A study for the Forestry Commission looked at a range of 'non-market' benefits including recreation, landscape amenity, biodiversity, carbon sequestration, pollution absorption, water supply and quality. For landscape amenity, a survey of over 400 residents was done across England, Scotland and Wales to estimate the value of woodland views from properties and on journeys - based on willingness to pay. It explored the value of woodlands and fringe - and found that clear preferences for woodland/forest views were really only to be found in urban fringe settings.

The study estimated an annual willingness to pay of £268.79 amounting to a capitalised (note: in perpetuity) value of £7,680 per urban fringe property with a

woodland view. This approach provides values significantly higher than the Eftec work.

*__Willingness to pay__ is the maximum amount an individual is willing to sacrifice to procure a good or avoid something undesirable.

[1] Willis, Garrod et al, The social and environmental benefits of forests in Great Britain, 2003

[2] Eftec, Valuing the external benefits of undeveloped land, 2005

2.10 *Please note that for meaningful results this toolkit should only be used with the assistance of an expert economist.*

Health Economic Assessment Tools (HEAT) for walking and cycling

2.11 The Health Economic Assessment Tools (HEAT) for walking and cycling have been developed by the World Health Organisation Regional Office for Europe. They assess improved health as a result of increased recreation activities, with benefits measured through reduced mortality.

2.12 HEAT can be applied in many situations, for example:

- to plan a new piece of cycling or walking infrastructure: it models the impact of different levels of cycling or walking, and attaches a value to the estimated level when the new infrastructure is in place;
- to value the mortality benefits from current levels of cycling or walking, such as benefits from cycling or walking to a specific workplace, across a city or in a country;
- to provide input into more comprehensive cost–benefit analyses, or prospective health impact assessments: for instance, to estimate the mortality benefits from achieving national targets to increase cycling or walking, or to illustrate potential cost consequences of a decline in current levels of cycling or walking.

2.13 The calculator uses the European standard value of statistical life (VSL[7]) for measuring reduction in mortality risks. This figure should be changed to reflect the UK figures – currently estimated by the Department of Transport at £1.6 million.

2.14 The HEAT calculator can be accessed here: http://www.heatwalkingcycling.org/.

i-Tree Eco

2.15 i-Tree is a software suite from the United States Department of Agriculture's Forest Service that provides urban forestry analysis and benefits assessment tools. i-Tree Tools are intended to help communities of all sizes to strengthen their urban forest management and advocacy efforts by quantifying the species, age and size of trees in the community and the ecosystem services that trees provide.

[7] The value of a statistical life (VSL) is the value that an individual places on a marginal change in their likelihood of death. Note that the VSL is very different from the value of an actual life. It is the value placed on changes in the likelihood of death, not the price someone would pay to avoid certain death.

Highways Agency – green infrastructure valuation

The Highways England (formerly Highways Agency) network nationwide is split into a number of 'Areas'. Area 1 consists of the A30 and A38 trunk roads to the west of Junction 31 on the M5 near Exeter, and in total contains 289km of trunk road. Within this network, there are 972 ha of "soft estate" such as verges, grasslands, shrubs and trees.

In 2014 the Highways Agency commissioned a study to assess the scale of benefits provided by the natural capital and the economic value of the green infrastructure of "Area 1" using the existing and new field data and the i-Tree Eco model.

The data collected from 72 randomly selected field plots across the network were analysed. The field survey data included:

- Plot information: Land use type; percent tree cover; percent shrub cover; percent plantable space; percent ground cover type,
- Tree information: species; stem diameter; total height; height to crown base; crown width; percent foliage missing, percent dieback; crown light exposure.

This assessment was supplemented by a desktop study to evaluate the major benefits of grassland. The findings of the study are available in the table below:

Area 1 Headline Figures Baseline Facts		
Total Number of trees	303,000	
Tree cover	34.9%	
Most common species	Ash, Field maple and Sycamore	
Replacement cost (trees)	£91,400,000	
Values		
Pollution removal (trees)	29 tonnes p/yr	£611,000 p/yr
Carbon storage (for trees in year of study (2014))	22,200 tonnes	£1,260,000
Carbon sequestration (trees)	1980 tonnes p/yr	£113,000 p/yr
Avoided Runoff (trees)	75,753.48 cu m p/yr	£40,020 p/yr
Amenity Valuation (trees)	£40,161,044	
Total Annual Benefits	£764,020	
Per hectare Benefits (trees)	£1528.04	
Screening Valuation (trees)	£64,000,000	

More detail about the calculation method and outputs of this study can be found in the pilot study.

Source: Highways Agency (2014) Valuing the Natural Capital of Area 1. A pilot study, https://www.itreetools.org/resources/reports/Valuing_the_Natural_Capital_of_Area1_UK_Pilot_Report.pdf

2.16 i-Tree Eco is one of these tools which provides a broad picture of the entire urban forest. It is designed to identify air pollution and meteorological data to quantify urban forest structure, environmental effects and values to communities.

2.17 Using this project tool requires installation of the i-Tree Eco software. A series of inventories would need to be undertaken on trees across the project area. The data then would need to be imported into the programme to populate the results. The i-Tree Eco User's Manual contains a step by step guide on the use of the i-Tree software.

2.18 The i-Tree Eco tool can be found here http://www.itreetools.org/eco/index.php.

2.19 Whilst the i-Tree Eco tool has been presented in this paper as the most comprehensive tool in terms of its green infrastructure focus, flexibility and wide range of benefits covered, it is only one of various tree and woodland valuation tools.

2.20 Other tools include[8]:

- The Helliwell System focuses on visual amenity value. It is based on expert judgment as opposed to high field data collection and entry. It is the most effective for a single tree and small-scale community evaluations. http://www.forestry.gov.uk/pdf/SERG_Street_tree_valuation_systems.pdf/$FILE/SERG_Street_tree_valuation_systems.pdf

- CAVAT (Capital Asset Value for Amenity Trees) – focusing on wider benefits of trees to communities. This tool is simpler to use when only limited data is available. www.ltoa.org.uk/docs/CAVAT-rev-May2008.pdf

- The CTLA system uses valuation methods from the Council of Tree and Landscape Appraisers in the US. https://www.asca-consultants.org/membersSection/archive/appraisal/pdfokWz8eJI1K.pdf

Mersey Forest and BE Group

2.21 Larger green infrastructure projects can be a part of the wider regeneration or economic enhancement of an area for which issues such as improved property prices or rentals will be important considerations when deciding on the success of a particular scheme. A recent study by the Mersey Forest and BE Group[9] could help to inform these calculations.

2.22 Through an illustrative viability testing model, the study proves that green infrastructure plays an important role and contributes to the financial viability of new employment developments.

2.23 This model assumes that green infrastructure is one of the factors which maximises rental value and in turn generates increased value for both developers

[8] Forest Research (nd) Street tree valuation systems http://www.forestry.gov.uk/pdf/SERG_Street_tree_valuation_systems.pdf/$FILE/SERG_Street_tree_valuation_systems.pdf

[9] Mersey Forest and BE Group (2014) Green Infrastructure Added Value http://www.merseyforest.org.uk/BE_group_green_infrastructure.pdf

and investors. This is because the attraction and retention of businesses is an important consideration for developers and property investors when assessing the investment value of a property. The elements that play role here include:

- Reduction of the initial period from completion of speculative development to signing a tenant;
- Minimising the level of incentive required for a new tenant to take the lease; and
- Increasing the desirability of the property and area and as a result increasing rental income.

2.24 In this case, the potential purchaser of this speculative commercial development would have a high level of confidence that new or replacement tenants would be secured for their investment property. For that reason, the investor would be prepared to pay a higher price to purchase the property. The study suggests that the quality of the environment - including green infrastructure - can reduce investment risk.

2.25 The viability calculation method suggested by Mersey Forest and BE Group is portrayed in the case study below:

MERSEY FOREST AND BE GROUP METHOD

Assumptions:

- An office development of 85,000 sqft
- A market rent of £16.00/sqft, with uplift to £17.00/sqft with green infrastructure – this represents a 5-6% increase in value with green infrastructure investment
- A rent free period of either 12 months or 6 months
- An initial void of either 18 months or 12 months
- An additional cost of £200,000 to pay for the green infrastructure

Element	Without Green Infrastructure	With Green Infrastructure
Development Value	£18,758,600	£20,494,000
Development Cost	£19,546,000	£19,041,700[1]
Residual Land Value (Loss)	**-£810.000**	**£1,454,300**

Results:

- £200,000 investment in green infrastructure will be recovered
- Additional net uplift value of £1.5 million

[1]Costs without green infrastructure are minus the £200,000 investment in that element. However, those costs are still higher because they assume that a scheme of lower environmental quality will take longer to let/sell than one with green infrastructure. For the purpose of this study an extra six months of vacancy have been assumed. Thus the costs of financing the development, before income comes in to start repaying that borrowing, will be higher as the borrowing period will need to be longer.

Note that green infrastructure is just one of several factors that will result in that uplift, and a more complex sensitivity analysis can change a wider range of variables to reflect development viability.

Further reading

- Natural England (2013) Green Infrastructure – Valuation Tools Assessment, NECR126 http://publications.naturalengland.org.uk/publication/6264318517575680

- Mersey Forest and BE Group (2014) Green Infrastructure Added Value http://www.merseyforest.org.uk/BE_group_green_infrastructure.pdf

- Natural Economy Northwest (2008) Building natural value for sustainable economic development; The green infrastructure valuation toolkit user guide www.bit.ly/givaluationtoolkit

- http://www.euro.who.int/en/health-topics/environment-and-health/Transport-and-health/activities/guidance-and-tools/health-economic-assessment-tool-heat-for-cycling-and-walking

- World Health Organisation (2011) Health economic assessment tools (HEAT) for walking and for cycling. Methodology and user guide. Economic assessment of transport infrastructure and policies. 2014 Update, http://www.euro.who.int/__data/assets/pdf_file/0010/256168/ECONOMIC-ASSESSMENT-OF-TRANSPORT-INFRASTRUCTURE-AND-POLICIES.pdf?ua=1

- Woodland Trust (2015) The Economic Benefits of Woodland A report for the Woodland Trust prepared by Europe Economics Northern Way/Ecotec (2006) City region green infrastructure strategic planning: raising the quality of the north's city regions http://www.woodlandtrust.org.uk/mediafile/100572682/rr-wt-010515-economic-benefits-woodland.pdf?cb=e797c17c9758410897fe16bcc0924f97

- Forest Research (nd) Street tree valuation systems http://www.forestry.gov.uk/pdf/SERG_Street_tree_valuation_systems.pdf/$FILE/SERG_Street_tree_valuation_systems.pdf

- Ecotec (2008) The economic benefits of green infrastructure, sponsored by Natural Economy Northwest

- Defra (2007) An introductory guide to valuing ecosystem services

- Natural England (2009) No charge? Valuing the natural environment

- The value of public space, Cabe Space 2005

- Urban Green Spaces Taskforce (2002) Greenspaces, better places

- Eftec (2005) Valuing the external benefits of undeveloped land

- Willis, Garrod et al (2003) The social and environmental benefits of forests in Great Britain

3. Funding of green infrastructure

Introduction

4.1 Different green infrastructure proposals will require different funding mechanisms. Green infrastructure not only needs capital investment to successfully deliver schemes, but also long-lasting funding streams to finance ongoing management and maintenance of the assets. Both the revenue and capital funding opportunities are explored in this section.

4.2 Please note that the funding sources described here are not exhaustive and there might be other ways of financing green infrastructure.

4.3 The approach to delivery, funding and valuation of green infrastructure will depend on the type, scale and location of the project. Green infrastructure projects delivered outside the planning system can include:

Community projects

4.4 Where there are no strategic projects in place, green infrastructure improvements can be undertaken by local communities themselves; either on their own or in partnership with local authorities or voluntary organisations. Local residents could get together to improve their environment by planting new trees, setting up allotments or greening open spaces.

4.5 There are multiple funding opportunities available to communities and small-scale initiatives. They include:

- **The National Lottery: Big Lottery** - This funding is for community projects including acquisition and establishment of public open space. It could be used to fund both asset creation and long-term maintenance. More information about these funding opportunities can be found on the Big Lottery Fund web pages: https://www.biglotteryfund.org.uk/funding/funding-finder?area=UK-wide#.

- **The National Lottery: Heritage Fund -** The Heritage Lottery Fund operates a number of funds for both capital and revenue activities. This fund is to be used to conserve and enhance heritage assets, including nature reserves and parkland. The grant programmes offered through the Heritage Lottery Fund have budgets from £3,000 to £5 million. Examples of funds include Parks for People (funding to help conserve historic public parks and cemeteries) and Landscape Partnerships grant scheme (to conserve areas of distinctive landscape character such as mountains, coastline and open countryside). More information about these funding opportunities can be found on the Heritage Lottery Fund website: http://www.hlf.org.uk/looking-funding/our-grant-programmes.

- **Defra** agencies can provide **match-funding** for specific community projects such as orchard or woodland planting. This funding varies according to the organisations' focus and resource availability at the time. Usually there are

specific criteria for qualifying projects. This money would predominantly be for capital investment in assets and would not include future maintenance.

4.6 Community groups could maintain green spaces on a volunteer basis. On a small scale, they could also develop innovative solutions to secure long-term management of GI assets or even generate revenue for future activities. Revenue from green infrastructure assets could arise from, for example:

- Orchards – fruit or products produced from fruit could be sold;
- Biomass energy from woodfuel, coppicing or arboricultural trimmings and grass cuttings; and
- Willow stands could be used for craft and forestry products.

GI improvements on existing sites

4.7 New development offers an important opportunity to secure green infrastructure and good design. Early consideration of these solutions and getting it right the first time brings significant benefits and is the best value-for-money option when delivering GI.

4.8 However, new development forms only a small part of the whole built environment. Whilst a more expensive option, there is potential to retrofit green infrastructure into the existing built environment. This could take the form of small on-site improvements or wider replacement or regeneration of the building stock, as well as other solutions including greening of the area, installing sustainable drainage, or installing green urban design measures.

4.9 **Funding** of this sort of project would have to come from outside the developer contributions system (applicable to new developments). A lot of these projects can be initiated by community groups and therefore funding options could include schemes described in the section above, including **The National Lottery: Big Lottery**, **The National Lottery: Heritage Fund, and Defra agencies' funding programmes.**

4.10 Other financial incentives such as **utilities subsidies** to encourage retrofitting of green infrastructure are possible, but are not currently available in Worcestershire. For example, Unites Utilities in the North West region offer a 50% discount on surface water drainage charges for buildings with green roofs. There is the potential to develop similar schemes with utility providers within the county.

Land management and rural GI

4.11 Worcestershire is predominantly a rural county which means that securing green infrastructure through land management is an important part of wider GI delivery. Changes to land management offer opportunities to include a number of green infrastructure solutions, such as planting trees to enhance water quality in nearby watercourses, provision of informal recreation opportunities, or enhancing biodiversity through planting or maintaining hedgerows.

4.12 The major funding opportunities for land management come from Countryside Stewardship. Countryside Stewardship is a part of the Rural Development Programme for England (RDPE) and can be secured by landowners and managers for changes to the management of land which benefit the natural environment, including infrastructure works to help reduce water pollution from agriculture or woodland management and creation. These are predominantly capital grants. It

should be noted, however, that due to the high level of competition for this funding, there is no guarantee that any particular application for GI project funding will be successful.

4.13 The RDPE 2014-2020, through the **LEADER** programme, offers £138 million to farmers, foresters, land managers and communities to undertake actions leading to job creation and economic growth in rural areas. This funding is not directly related to improving green infrastructure functionality, however there are opportunities for indirect contributions to green infrastructure priorities through increasing farm and forestry productivity, farm diversification or cultural and heritage activity linked to this programme.

Infrastructure projects

4.14 GI can be delivered through various infrastructure projects such as flood alleviation and management, renewable energy and transport infrastructure.

4.15 Capital funding for these projects will be a part of wider infrastructure funding. Flood defences, for example, could be designed in a naturalistic way to provide multiple green infrastructure benefits, but without the need for GI-specific funding. Similarly, provision of transport and sustainable transport routes could create green infrastructure networks as part of the whole transport improvement scheme.

4.16 The long-term maintenance and management of GI could be also be funded or part-funded from existing funds for highways, buildings and renewable energy projects.

Minerals sites

4.17 Minerals operations can deliver benefits to GI. Once the minerals have been extracted, the land must be 'restored' to a beneficial after-use. In some cases this can involve restoring the land to its previous use, but restoration of mineral workings can also provide significant opportunities for habitat creation, climate change mitigation and blue infrastructure enhancements and can include elements of public access for recreation. The restoration could take the shape of parklands, sustainable drainage and other multifunctional green space whilst still respecting landscape character, and it even has the potential to enhance the setting of heritage assets.

4.18 Restoration schemes are required as part of applications for planning permission and, if permission is granted, are imposed by planning condition. Restoration schemes are expected to be fully funded as an integral part of the life of the mineral development. There is also a statutory requirement for maintenance of the restored land for a number of years after the minerals extraction finishes, in what is known as the "after-care period". The period of aftercare is imposed by condition and is usually for a minimum of 5 years but, where justifiable, much longer periods can be imposed. Responsibility for implementing the aftercare scheme lies with the landowner.

4.19 Once the after-care period has expired, the future of the site is dependent on the landowner who might or might not choose to continue with the current site use. Although any change of use is likely to require further planning permission, this might be a serious threat to maintaining green infrastructure related uses and preserving significant benefits it offers. Incorporating policies to protect and enhance the post-

restoration GI assets within Local Plans could provide some certainty and control over these uses.

Further reading

- Town & Country Planning Association and The Wildlife Trusts (2012) Planning for a healthy environment – good practice guidance for green infrastructure http://www.tcpa.org.uk/data/files/TCPA_TWT_GI-Biodiversity-Guide.pdf

- DEFRA (2015) The new Common Agricultural Policy schemes in England: February 2015 update https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/406212/CAPLF005v10_WEB.pdf

- United Utilities website http://www.unitedutilities.com/documents/Non-household_charges_2013-2014_-_at_a_glance.pdf

5. Green infrastructure costs

5.1 As identified in the above sections, green infrastructure will differ from site to site according to the type and size of schemes and their cost. For the purpose of this paper, the costs of various green infrastructure solutions have been collated through a literature review and from real-world information provided by our partners and other stakeholders. However, it needs to be noted that these costs are only indicative and the actual green infrastructure costs of various developments should be considered and valued on a site-by-site basis.

5.2 This information has been collated in a spreadsheet which can be found on the Worcestershire County Council website www.worcestershire.gov.uk/GI. The extent of this information is limited due to its availability. Once more robust information becomes available, the spreadsheet will be updated.