

Viability, valuation and funding of green infrastructure on new development sites



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Preparation of this document on the viability of green infrastructure (GI) has been led by Worcestershire County Council's Strategic Planning and Environmental Policy Team. The document 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), Historic England, 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 sites¹.

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 appeals for appropriate methodologies to be designed in order 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. Considering networks in an integrated way achieves benefits that are far greater than when individual components are considered separately. There are many advantages to be gained from securing a critical mass of GI in a locality – creating a wide range of benefits which meet individual site priorities.

1.6 Delivery of green infrastructure (including viability and funding) 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 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 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:** Local Plans have identified the need for housing and employment growth in Worcestershire to be delivered through a number of small and large developments until 2030. The allocation and delivery of these sites is strictly regulated through the planning process under national (NPPF) and local planning policy (Local Plans). GI requirements, alongside other 'asks', will impact the viability and deliverability of these sites. Funding for these GI projects will predominantly come from direct delivery by the developer, or through contributions (S106 and CIL as described further in this report).
- **Wider 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 and will be delivered through a wider suite of funding mechanisms.

Purpose and scope of this guidance note

1.8 This document aims to provide guidance on the viability, valuing and costing of green infrastructure to support implementation and delivery of GI on new development sites delivered through the planning process. Other GI projects outside the planning process are considered in the separate paper "*Viability and funding of green infrastructure: non-planning projects*".

1.9 This document 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:

- Viability of green infrastructure
- Valuation of green infrastructure
- Funding of green infrastructure

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, other stakeholders and developers. Furthermore, nationwide studies have also played a role in preparing this summary.

2. Viability of green infrastructure

Introduction

- 2.1** Green infrastructure provision can impact on the viability of developments. It can have a positive effect by adding value to the development in the long or short term through, for example, increased sales or rental receipts. However, it can also add to development costs through, for example, the planting of various species, or the lost opportunity value of land dedicated to GI.
- 2.2** Assessing the impact that green infrastructure will make on the overall viability of the site can help stakeholders to:
- Assess the impact of different GI 'asks' on a site;
 - Inform prioritisation of GI assets and networks on a site; and
 - Support negotiations with site developers.

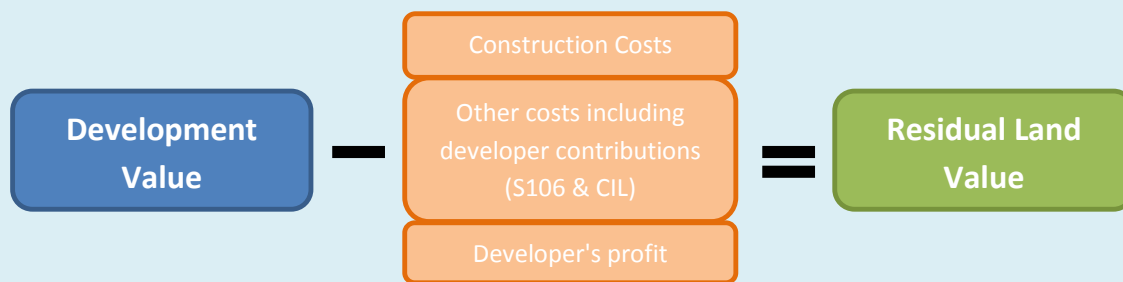
Assessing viability

- 2.3** In order for any housing and employment land development to happen it must be economically viable. Financial viability will affect the amount of developer contributions that can be secured from a particular site. If the burden is too great it can make a site economically unviable. This means the land value drops below that value at which the land owner would be prepared to release the site for development or the development burdens/costs placed on the site are greater than the site can bear, so no profit is available from development or it becomes loss making.
- 2.4** Generally, non-viable sites would not come forward for development. However, sites may gain permission only to become unviable as a result of market changes which may lead to the renegotiation of certain s106 agreements to ensure site viability. Any green infrastructure 'asks' may have to be reconsidered in such circumstances if they continued to threaten viability.
- 2.5** Current national planning policy and guidance emphasises the importance of deliverability of Local Plans and viability of developments specified in these plans. The NPPF states that *"to ensure viability, the costs of any requirements likely to be applied to development, such as requirements for affordable housing, standards, infrastructure contributions or other requirements should, when taking account of the normal cost of development and mitigation, provide competitive returns to a willing land owner and willing developer to enable the development to be deliverable"* (para 173).

VIABILITY CALCULATION METHOD

There are various methods through which the viability of development can be assessed. The method used for the majority of area-wide viability assessments is modelling the Residual Land Value (RLV). The Residual Land Value is the value left after the cost of putting land to a particular use (such as building homes or an office block) is subtracted from the revenue generated from the land when it is in that use. Assessing the value of a piece of land therefore requires estimates of the value of the buildings that can be built on the land and the cost of building them.

The development value will be specific to the site and can be influenced by the following: density of the build, type of housing provided, quality of the site, accessibility of the site, current economic conditions, build costs, and whether the site is brownfield or greenfield. Having taken these costs off the gross development value (GDV), a percentage for the developer's profit should also be deducted. The required margin is typically around 20 per cent. Other costs such as planning application fees, architect fees, stamp duty, marketing and solicitor fees, contributions towards infrastructure and s106 also need to be taken off the GDV. What is left over (the "residual") is the value of the land, the maximum amount a developer will be prepared to pay for a site. Residual Land Value is calculated by:



Worcestershire County Council (2011) Viability of Infrastructure Background Research Paper

Viability on new development sites

- 2.6** Including high quality, sustainable and multifunctional GI in the design and master planning of development sites can not only provide enjoyable and healthy environments for future residents/employees, but can also improve the developer's financial return.
- 2.7** Financial returns from GI can take various forms. There are direct returns from the sale of land. There are also extensive indirect financial benefits such as increases in land and property values or increased rental rates.
- 2.8** Further financial benefits and savings come from the fact that one green infrastructure solution on a single piece of land can provide multiple benefits, such as flood attenuation, biodiversity enhancement, public open spaces, etc. It can reduce the costs of installing so called "grey infrastructure" - conventional infrastructure structures such as pipes and tanks in flood management - whilst still providing for other priorities on the site.

2.9 It is a common perception among developers and businesses that requirements for development sites to protect and enhance biodiversity, protect local landscapes, provide for informal recreation and facilitate sustainable drainage are separate issues, each incurring additional costs. In reality, providing these functions does not mean "doubling up" the costs. By combining these issues together and using a multi-functional approach, developers can reduce their costs, whilst at the same time delivering a high-quality development with a strong sense of place. Applying a green infrastructure approach can be a real money-saving exercise for new developments; well-designed sustainable drainage ditches or ponds can, for example, serve multiple additional functions at minimal or no extra cost.

2.10 Notwithstanding the above, not GI will deliver financial returns and its viability will depend on multiple variables. The size, location, type of employment site or density of housing, and the quality of the natural environment within and beyond the site will have an impact on the type and scale of GI required. This makes it impossible to provide a general figure on the cost of GI provision, and site viability in relation to GI has to be assessed on a site-by-site basis.

2.11 There are some general principles which, if carefully followed, could support the viability of GI:

- Early assessment and incorporation of GI into masterplanning is crucial and can avoid costs of retrofitting at a later stage. At this stage, a careful assessment of the existing assets on a site should be undertaken. It should be considered how these assets can provide various GI functions and deliver integrated benefits. Alternatives to traditional infrastructure and design should be investigated.
- Understanding what types of GI are specifically required for an individual site and its context helps to avoid either over- or under-provision of GI. It can also help in efficient utilisation of space and in avoidance of wasted or unusable land. For example, grass verges placed between dwellings, if carefully and sensitively designed, could become part of the ecological networks, provide drainage and soften the visual impact of a development.
- Long-term management of GI also needs to be considered at an early stage in planning for development to ensure it is taken into account in the viability assessment of the site.
- Timely engagement with bodies responsible for various elements of GI can help to address some of the issues and identify the opportunities to incorporate wider GI networks on the site.
- Viability assessments also need to take into account all the multi-functional characteristics of green infrastructure. Green infrastructure will often be delivered through multiple initiatives not necessarily dedicated solely to GI. For example, a new road introduced on a site will have to deal with run-off, and therefore a sustainable drainage scheme will be introduced as part of this. The sustainable drainage could benefit habitat enhancement through planting road verges with biodiversity-rich grasses. The Planning Policy Guidance states that *"the decision on whether a sustainable drainage system would be inappropriate in relation to a particular development proposal is a matter of judgement for the local planning authority"*.

- Particular care should be taken to avoid costing various GI assets multiple times for each individual function they fulfil. If a particular GI corridor on a single piece of open land delivers benefits to flood risk management, biodiversity enhancements, landscape, etc. this can all be delivered through the same investment.

2.12 The following principles have been agreed by the Worcestershire GI Partnership and should be followed by those involved in masterplanning and delivering green infrastructure in the county:

PRINCIPLES TO ENSURE GI VIABILITY ON DEVELOPMENT SITES

- | | |
|----|--|
| 1. | Early assessment of the GI assets on the site across all GI functions (biodiversity, landscape, blue infrastructure, historic environment and access & recreation) |
| 2. | Early engagement with the bodies responsible for various GI functions |
| 3. | Assessment of the potential benefits/value (financial and social) of the GI to establish what types of GI are specifically required |
| 4. | Consideration of the long-term management of GI |
| 5. | Assessment of the multifunctionality of the GI assets |
| 6. | Prioritisation of GI assets |
| 7. | Preparation of a Green Infrastructure Concept Plan and Masterplan |

Further reading

- Worcestershire County Council (2011) Viability of Infrastructure Background Research Paper
- 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

3. Valuing green infrastructure

Introduction

2.1 This section explores various approaches to calculating the value of green infrastructure and provides examples of calculation methods. This paper aims to signpost readers to important evidence on valuing green infrastructure nationally and internationally, rather than describing each methodology in detail². 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

3.1 Valuing green infrastructure allows the quantitative and qualitative benefits of services and functions provided by different elements of green infrastructure to be understood. This applies not only to their wider impact on society, the economy, and the environment, but also to their local contribution to individual development sites.

3.2 The valuation tools described in more detail in this section allow the value of existing green infrastructure (*baseline benefits*) as well as the value associated with the greater use of the that asset in the future (*marginal benefits*) to be assessed. Whilst the current value of green infrastructure (meaning both the cost of investing in GI, and the financial return gained from GI) could be used to calculate the viability of a development site, it is difficult to establish the value of these functions in the future. A recent study by Mersey Forest and BE Group³, however, proves that the effects of green infrastructure could be quantified and demonstrates how these could be used in viability calculations for new developments.

3.3 Assessing both the qualitative and quantitative benefits could help in planning for GI on development sites and in informing planning decisions. The services and benefits provided by GI can be valued to establish if the amount or type of GI is appropriate for the particular development site, and these services and benefits could be assessed against the costs of provision to ensure site viability is not jeopardised. Savings to developers resulting from GI can include reducing the period from completion of a development to the signing of a tenant, or increased sale values of new homes. These savings could outweigh the costs of greening and landscaping the area.

3.4 Whilst the cost and value of green infrastructure differs from site to site, there are common issues set out in guidance. Putting a value on the benefits of green infrastructure projects can make it easier to compare one development against another and to prioritise between available opportunities.

² In order to undertake valuation or viability assessment further reading of relevant literature will be required (see 'Further Reading' section). It is also recommended to seek advice of a specialist economist when undertaking such assessments.

³ Mersey Forest and BE Group (2014) Green Infrastructure Added Value
http://www.merseyforest.org.uk/BE_group_green_infrastructure.pdf

Valuation techniques

3.5 There is a wide range of valuation methods relating to different types of green infrastructure. In 2013, Natural England commissioned a report⁴ which assessed various valuations available nationally and internationally and advised which techniques are the most robust. This section provides guidance on selecting the most relevant techniques.

TOTAL ECONOMIC VALUE OF GREEN INFRASTRUCTURE

There is no single method of assessing the value of green infrastructure, but rather a number of methods which can be used, depending on its type and what we are trying to achieve. The complex nature of the GI relationships means that specialist techniques are needed. This can be done by assessing 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) or recreational activities (non-consumptive)
 - 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.

Ref: Natural England (2013) Green Infrastructure – Valuation Tools Assessment, NECR126

Green Infrastructure Valuation Toolkit (GIVT)

3.6 The Green Infrastructure Valuation Toolkit (GIVT) was developed by a consortium of organisations with remits for economic development, place-making and protection of the natural environment, led by *Natural Economy Northwest*. The toolkit provides step-by-step guidance to valuation which includes preparation, assessment and reporting. The guidance is supported with an Excel calculator guiding the user through the process of valuation. The spreadsheet can be accessed on the Natural Economy Northwest website www.bit.ly/givaluationtoolkit.

3.7 The principle of this valuation technique is '*an ecosystem services approach*'. The ecosystem approach means recognising that regardless of its current main use, any open area of land has the potential to deliver a very wide range of ecosystem 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.

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

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.

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

- Climate change mitigation and adaptation
- Flood alleviation and water management
- Place and communities
- Health and wellbeing
- Land and property values
- Labour productivity
- Tourism
- Recreation and leisure
- Biodiversity, and
- Land management.

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

COMMERCIAL LAND AND PROPERTY UPLIFT:

Belvedere and the nearby towns of Erith and Thamesmead lie in the London Thames Gateway growth area. They are characterised by a low skill, low wage economy that struggles to sustain a retail and wider amenity offer. In order to attract new businesses a new link road has been planned, with the intention of opening up the area. The Erith Marshes and Belvedere Links project aimed to enhance the environmental quality of the marshland and to improve its accessibility from the surrounding area. In turn, this is expected significantly to increase the attractiveness of the Belvedere employment site to higher value businesses.

The green infrastructure valuation toolkit has been used to evaluate the benefits of this significant investment in the marshes and adjacent area. A three stage process was applied:

1. Preparation: Understanding physical characteristics and beneficiaries

Based on an analysis of the number of households, the number of residents living within 300m and 1200m of the project was estimated to be over 5,000 and around 47,500, respectively. The number of recreational users is predicted to be 237,600 (based upon a likely 10 visits each year, 50% of which are assumed additional to the existing baseline figure).

2. Assessment: Identifying potential benefit areas and applying relevant tools

The different elements of green infrastructure within the project (exact area of canal, wetland, different types of grassland, woodland and length of footpaths and cycleways) have been analysed in the context of the likely beneficiaries. The value of the benefits identified in monetary terms (for those benefits that could be costed), quantitative terms or qualitative terms have been assessed.

3. Reporting: Articulating a strong return on investment case

The scheme was calculated to provide multiple benefits. The total value of the benefits generated by the improvements was estimated to be £53.1 million - £55.8 million (PV). Just over half of this (56%) of this uplift was attributable to the green infrastructure. The other significant benefits included land and property uplift, improved labour productivity from fewer working days lost, enhanced health and well-being, recreation and flood alleviation.

The total cost of capital investment was to be £10.54 million including the road construction and just £1.84 million of this relates to the landscape improvements.

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

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

Mersey Forest and BE Group

3.11 In a recent study, The Mersey Forest and BE Group⁵ provided evidence that green infrastructure does contribute to the financial viability of new employment development. This is supported with an illustrative viability testing model.

3.12 This model assumes that green infrastructure can be one of the factors maximising the rental value and in turn generating increased value for both developers and investors in speculative development. This is because the attraction and retention of business to a developer or property investor is an important consideration when assessing the value of the property as an investment. The elements that play a 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.

3.13 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.

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

⁵ Mersey Forest and BE Group (2014) Green Infrastructure Added Value
http://www.merseyforest.org.uk/BE_group_green_infrastructure.pdf

MERSEY FOREST AND BE GROUP METHOD

(please note this is an indicative assessment 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 ¹	£19,546,000	£19,041,700
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:

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.

Health Economic Assessment Tools (HEAT) for walking and cycling

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

3.16 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.

3.17 The HEAT calculator can be accessed here <http://www.heatwalkingcycling.org/>.

i-Tree Eco

3.18 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.

3.19 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.

3.20 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.

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

2.2 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.

2.3 Other tools include⁶:

- 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](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 United States. <https://www.asca-consultants.org/membersSection/archive/appraisal/pdfokWz8eJI1K.pdf>

⁶ 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](http://www.forestry.gov.uk/pdf/SERG_Street_tree_valuation_systems.pdf/$FILE/SERG_Street_tree_valuation_systems.pdf)

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

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
- Health economic assessment tool (HEAT) for cycling and walking
<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>
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https://www.itreetools.org/resources/reports/Valuing_the_Natural_Capital_of_Area1_UK_Pilot_Report.pdf
- 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](http://www.forestry.gov.uk/pdf/SERG_Street_tree_valuation_systems.pdf/$FILE/SERG_Street_tree_valuation_systems.pdf)

4. Funding green infrastructure

Introduction

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

Green Infrastructure provision

4.2 This section covers funding regimes to secure capital investment in GI. On new development sites green infrastructure can be delivered and funded through both:

- **Delivery through planning conditions:** In this type of delivery mechanism, the GI is provided and financed by the developer. As part of the planning application process the amount, quality and functionality of green infrastructure is negotiated between the Local Planning Authority (LPA), relevant stakeholders and the developer. The applicant is expected to dedicate a certain amount of the site to green infrastructure networks covering different functions. A phased plan for the landscaping and provision of other GI elements is usually submitted with the planning application. In some instances, following the granting of planning permission, the site is divided into phases and sold to other developers to complete. For the best results an agreement would be in place or strategic GI provided for the whole site. Planning conditions are used to secure the delivery of green infrastructure in accordance with approved plans.
- **Developer contributions:** The above mechanism can be combined with (or, exceptionally, wholly replaced by) developer contributions. In particular, this would be relevant to asset management, off-site GI provision, or schemes requiring larger pools of money. Such contributions could be used, for example, for the creation and maintenance of a Sustainable Drainage Scheme. Developer contributions can be used on their own or be matched with other funding sources. There are currently two types of developer contributions which are described in more detail below: **Community Infrastructure Levy** and **Planning Obligations** including **Section 106 contributions**.

4.3 Both of these funding and delivery mechanisms could be used for the **long-term management and maintenance of assets** which is an integral part of green infrastructure provision. This is described in more detail in the next section of this chapter.

Delivery through planning conditions

4.4 Direct on-site delivery of green infrastructure as part of a development is the most cost-effective approach to GI provision. It provides multiple benefits to developers and ensures successful provision of GI networks on a site. It provides:

- Cost-efficiencies – retrofitting GI is generally more expensive than upfront provision;
- Considered integration - GI needs to be well-considered and integrated with other uses on the site in order to be successful;
- Fragmentation prevention – the site design needs to ensure interconnectivity of green corridors on-site and connectivity with wider networks beyond the site; and
- Risk reduction – securing money for GI provision through mechanisms such as S106 or CIL can be increasingly difficult due to other demands on developers, including education, transport infrastructure and affordable housing requirements. Recent changes to S106 agreements prevent LPAs pooling money from more than five obligations for a given infrastructure project or type of infrastructure, further limiting the ability to deliver green infrastructure through these mechanisms (*more detail about S106 and CIL below*).

4.5 A thorough assessment of the quality of the natural environment as well as considered design can affect the cost and determine functionality of green infrastructure. This will help to ensure the benefits to future residents (on housing sites), employees (on employment/retail sites) and visitors (for retail sites) are captured, but can also lead to better economic returns for the developers and land owners.

4.6 This is why the Worcestershire GI Partnership finds it important to work at the site level to influence development at an early stage and ensure the successful delivery of ecosystem services. It prepares Green Infrastructure Concept Plans for strategic development sites which identify the GI principles to be followed in the sites' masterplanning. The GI Partnership collaborates with developers to ensure that site design incorporates sufficient good quality, accessible green infrastructure to protect and enhance the natural environment, as well as to support the local economy and the health and well-being of future residents and/or employees.

Planning Obligations:

Section 106 Agreements (site related green infrastructure)

4.7 Funding for green infrastructure will predominantly come from developer contributions. Planning obligations under Section 106 of the Town and Country Planning Act 1990 are focused on site specific mitigation of the impact of development and would need to be used to fund green infrastructure directly related to the specific development.

4.8 Contributions may be requested for capital works, including land purchase or creation of GI assets, or for services such as maintenance or supervision until facilities become established. Pooling of contributions from a number of developments is likely to be required to develop strategic GI facilities such as a Country Park. This is currently limited by the pooling rule (described below), which means that partial funding for such projects is more likely to come from the Community Infrastructure Levy.

4.9 There are two significant issues for GI delivery linked to S106 funding.

- **Viability of development:** It can be difficult to secure green infrastructure contributions in the context of all the other infrastructure requirements (including education and transport) and affordable housing requirements sought from development. It is critical that the combined contributions do not make the development unviable.
- **S106 tests:** Recent changes to the Community Infrastructure Levy (CIL) Regulations 2010 have limited the situations in which s106 contributions can be used. Legal tests for when a section 106 agreement can be used are set out in Regulation 122 and 123 of the Regulations as amended. The tests are: necessary to make the development acceptable in planning terms; directly related to the development; and fairly and reasonably related in scale and kind to the development.
- **Changes to pooling of S106:** From April 2015 no more than five obligations can be pooled together for one project or type of infrastructure (back-dated to April 2010). This means that it might not be possible to fund some more complex and geographically-wider projects through pooled s106 contributions.

4.10 Green infrastructure can be also secured through **a Unilateral Undertaking**. Unilateral Undertakings are simplified planning obligations entered into by the landowner and any other party with a legal interest in the development site. They can be made without the involvement of the LPA and can assist in ensuring that planning permissions are granted speedily, which benefits both applicants and LPAs.

Community Infrastructure Levy (off-site green infrastructure)

4.11 The Community Infrastructure Levy (CIL) is a mechanism to ensure developer payments for the provision of infrastructure are captured from qualifying new development/refurbishment to support the additional burden new development makes on both local and strategic infrastructure.

4.12 Planning authorities are expected to establish CIL rates for different types of development which can vary by geographic area. The rate should be based on viability and economic growth projections for the area. It needs to be set at a level that balances the requirement for infrastructure to support development against the potential economic impact of imposing the Levy in the area. The rates should be set out in a Preliminary Draft Charging Schedule and subsequent Draft Charging Schedule which is subject to consultation and public examination before CIL can be adopted.

4.13 Planning authorities are also obliged to prepare Infrastructure Delivery Plans to establish the infrastructure needs and funding gap in their authority area. It is very important for these documents to also take stock of green infrastructure provision and need, as well as identifying potential green infrastructure projects.

4.14 The charging authorities will need to prepare a list of the infrastructure themes that CIL will be spent on ("Regulation 123 list"). This list should be consulted on and any change would require a review of the charging schedule due to its viability impacts.

4.15 CIL has the potential to help deliver GI, but there are important considerations to be taken into account if this is to happen:

- Early cooperation between stakeholders (including statutory agencies, the voluntary sector, county and district councils) with an interest in green infrastructure to **identify and promote the priorities** is crucial. The green infrastructure priorities have to be among other infrastructure projects on the '123 list' in order to get any share of CIL contributions. In the current times of economic pressures and financial austerity there is a risk that infrastructure considered crucial to supporting economic growth will be promoted at the cost of green infrastructure. However, green infrastructure as an alternative to grey infrastructure should be seen as delivering savings, not generating costs. The value of green infrastructure to the economic prosperity of the county should be made clear to ensure that these priorities are considered on the CIL 123 list.
- Whilst each CIL Charging Schedule is district-specific and based on the viability and housing market of the district concerned, the spending of CIL requires collaborative working. **Consensus across administrative boundaries** is needed to establish spending priorities amongst various infrastructure strands. This could be a challenging process because of the different needs and pressures faced by the different planning authorities in the county.

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Currently, none of the local planning authorities in Worcestershire have adopted a CIL Charging Schedule. A CIL Charging Schedule is dependent on an up-to-date, adopted Local Plan being in place. Only Wyre Forest has an adopted Local Plan, while the remaining five district authorities in the county are at different stages of the Local Plan examination process.

In 2012 Worcestershire County Council, in liaison with the six district councils, commissioned consultants to undertake an independent **CIL viability analysis** of the county to provide the evidence required to develop Charging Schedules across Worcestershire. This evidence was published in early 2013.

The three **South Worcestershire authorities** (Malvern Hills, Wychavon and Worcester City) prepared **joint Revised Preliminary Draft Charging Schedule**, which was consulted on in March 2015. Following this consultation a Draft Charging Schedule will be prepared and consulted on in spring 2016, followed by a joint public examination in summer 2016. South Worcestershire authorities are due to adopt their respective CIL Charging Schedules in 2017.

Bromsgrove District Council and Redditch Borough Council are proposing to start work on their CIL Charging Schedules once their Local Plans are adopted. Wyre Forest District Council is expected to undertake a review of their Local Plan prior to any further work on CIL.

Management and maintenance of green infrastructure

Sources of funding

4.16 The long-term management and maintenance of green infrastructure assets is critical to ensure that green spaces remain in good condition and well-used by communities. To secure this functionality, revenue funding is necessary. This can come from many sources, some of which have already been described in this section. They include:

- **Section 106** – some of the money secured through these contributions can be directed to set up a fund or transferred to the local authority or other third party which would take responsibility for long-term maintenance of green infrastructure assets. Such expenditure must be directly linked to the new development covered by the contribution.
- **Community Infrastructure Levy** – money secured through this system could contribute to the revenue of large infrastructure schemes, including maintenance of flood defences, parks and green spaces.
- **Hypothecated taxes** refer to the dedication of the revenue from a specific tax for a particular expenditure purpose (for example a sum of money levied on new development). Hypothecated taxes can be successful in funding revenue costs of green infrastructure on small and large development sites.
- **Endowments** could be used to secure long-term income for the management of green infrastructure assets.

Management arrangements

4.17 The long-term success of the GI assets delivered will be dependent upon the establishment of an appropriate management body with sustainable funding and governance mechanisms.

4.18 Management and maintenance of sites can be transferred to the local authority, parish council, voluntary organisation, private management companies or Community Development Trusts. A certain payment would be agreed to finance this activity over the specified number of years.

4.19 A preferred and sustainable option for managing and maintaining green spaces is creating a Community Development Trust (CDT). These not-for-profit organisations aim to respond to local needs and are intended to bring about lasting social, economic and environmental benefits to the local community. The overall aims of a CDT include the ownership, maintenance and effective management of GI and other facilities, encouraging healthy lifestyles, the use of sustainable transport by residents and businesses, and encouragement of community cohesion.

4.20 The funding for CDTs, aside from the funding sources mentioned above, can come from revenues including use charges for facilities (such as car parks and community halls), which are reinvested in some kind of commercial activity.

Small scale solutions

4.21 On a small scale, long-term management solutions can become self-sufficient or even generate revenue for future activities, if they lead to income generation. The

establishment of an appropriate management body such as a charitable trust to manage the assets can help to ensure effective ongoing management. 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
- Willow stands used for craft and forestry products

4.22 It needs to be noted that the level of income generated from these sources is only ever likely to be small-scale.

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

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 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.