Case Study: Manchester City Green Roofs Retrofit for Microclimate

Description
A green roof strategy was developed for Greater Manchester authorities which highlighted the benefits green roofs could bring in terms of climate change adaptation. A concurrent project, SCORCHIO, which was being taken forward by Manchester University produced an Urban Heat Island map which showed the areas of the city that are likely to suffer from elevated temperatures that will only be exacerbated by climate change. The most affected areas were in the centre of the city where, due to underground utilities and space constraints, street trees and other natural microclimate interventions were not suitable. Accordingly, an intensification in the use of green roofs was proposed as a local microclimatic control. Public buildings have been identified as pilot projects, and green roofs are currently being retrofitted to those roofs. Bee habitats were identified as a biodiversity priority which would simultaneously be productive and low maintenance.

Key Delivery Drivers
- A spatial understanding of urban heat island effect and heat risk across the area was developed which drove climate change adaptation measures.
- Green infrastructure interventions were favoured instead of mechanical or structural adaptation measures due to the multiple benefits of green infrastructure.
- Appropriate green infrastructure measures (green roofs) were selected due to the character and spatial constraints associated with the area.
- Funding was obtained for pilot projects which will be monitored by the city’s universities and demonstrate the microclimatic benefits of the projects.

Case Study: Bilston Urban Village SUDS for Climate Change Adaptation

Description
In 1998, Wolverhampton Metropolitan Borough Council and English Partnerships commissioned a draft masterplan for a large mixed use development on old industrial, derelict and under used land south of the Black Country Route in Bilston. Wolverhampton City Council worked with Advantage West Midlands (AWM) and partners to build climate resilience into this new development – Bilston Urban Village. Climate change adaptation was considered in the design and early layout and remediation of the site, primarily through sustainable drainage features and attention to detailing of the contouring of the new landform. The SUDS pathways naturally create new green corridors through the development.

The 41 hectare site was vulnerable to flooding – a brook runs through the centre of the area, and impermeable surfaces over 34 hectares of the site made it more vulnerable to surface water flooding. The impacts of this had the potential to be extended beyond the site boundaries. The design aims to solve these issues.

Key Delivery Drivers
• Development of a £200m project provided a trigger for intervention on a brownfield site in Bilston.
• Local commitment to tackle climate change (Nottingham Declaration equivalent signed by Wolverhampton City Council).
• Enthusiastic Sustainability Officer at the City Council.

The Situation in the Black Country
Climate change will have significant consequences for the Black Country. Climate change is likely to bring higher summer peak temperatures, lower summer rainfall, and increased winter precipitation. These changes in climate may lead to serious issues associated with heat waves, water shortages, flooding and air quality deterioration.

Climate Change Projections in the Black Country
Climate projections for the whole of the UK were released in October 2009. UKCP09 reports long term climatic variations in probabilistic terms, qualifying the projections based on the relative strength of the supporting evidence. The structure of the information available is shown in the figure below.

UKCP09 describes key climate change variables for the West Midlands set against the underlying regional climate (based on 1961-1990 averages), identifying changes in patterns as well as annual means. UKCP09 provides both temperature and rainfall data along with a wider range of more technical variables.

Each set of probabilistic projections is reported according to a range of future emissions scenarios. The three scenarios – high, medium and low – reflect the uncertainty regarding the global emissions trajectory towards a future low carbon society. UKCP09 allows us to understand the likelihood of projected changes over three time slices (where 2020s is 2010-2039, 2050s is 2040-2069 and 2080s is 2070-2099) at particular locations for a given emissions scenario. The figures below are summaries of the projected changes for the East Midlands. The results presented are from the medium emissions scenario, with the central probability estimates placed in the context of the confidence interval, with the variable ‘very likely’ to be within this range. Results reported as means indicate the change in overall trend while average daily maximums indicate changes over the 24 hour period and not the hottest part of the day.

Expected Changes in Temperature
Summer temperatures are expected to increase over the coming decades, with mean increases of 2.6°C likely in 2050. The average daily maximum temperature in summer gives an indication of the severity of future heatwaves. Temperatures on the hottest day are likely to be 3.6 °C higher and not more than 6.5 °C more in 2050.
### Table: Summer mean temperatures in the West Midlands in the medium emissions scenario

<table>
<thead>
<tr>
<th>Year</th>
<th>Lower Estimate</th>
<th>Central Estimate</th>
<th>Higher Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020</td>
<td>0.5°C</td>
<td>1.5°C</td>
<td>2.6°C</td>
</tr>
<tr>
<td>2050</td>
<td>1.2°C</td>
<td>2.6°C</td>
<td>4.4°C</td>
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<tr>
<td>2080</td>
<td>2.0°C</td>
<td>3.7°C</td>
<td>6.1°C</td>
</tr>
</tbody>
</table>

### Table: Summer mean rainfall in the medium emissions scenario

<table>
<thead>
<tr>
<th>Year</th>
<th>Lower Estimate</th>
<th>Central Estimate</th>
<th>Higher Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020</td>
<td>-23%</td>
<td>-7%</td>
<td>12%</td>
</tr>
<tr>
<td>2050</td>
<td>-37%</td>
<td>-17%</td>
<td>6%</td>
</tr>
<tr>
<td>2080</td>
<td>-44%</td>
<td>-20%</td>
<td>6%</td>
</tr>
</tbody>
</table>

### Table: Winter mean rainfall in the medium emissions scenario

<table>
<thead>
<tr>
<th>Year</th>
<th>Lower Estimate</th>
<th>Central Estimate</th>
<th>Higher Estimate</th>
</tr>
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<tbody>
<tr>
<td>2020</td>
<td>-3%</td>
<td>5%</td>
<td>14%</td>
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<tr>
<td>2050</td>
<td>2%</td>
<td>13%</td>
<td>27%</td>
</tr>
<tr>
<td>2080</td>
<td>3%</td>
<td>17%</td>
<td>38%</td>
</tr>
</tbody>
</table>

### Expected Changes in Rainfall

Mean annual rainfall is expected to remain within the range of natural variation. However, changes in temperature feed through to the hydrological cycle, changing the distribution of rainfall over the year.

Summer rainfall is expected to decrease. The central estimate points towards a 20% reduction in mean precipitation in the 2080s. The central estimate for winter precipitation is a 19% increase.

### Expected Changes in Temperature

- **2020**: Lower estimate -0.5°C, Central estimate 1.5°C, Higher estimate 2.6°C
- **2050**: Lower estimate 1.2°C, Central estimate 2.6°C, Higher estimate 4.4°C
- **2080**: Lower estimate 2.0°C, Central estimate 3.7°C, Higher estimate 6.1°C

Figure 39: Predicted (50% probability) change in annual mean temperature in the West Midlands (UKCP09)
Figure 40: Predicted (50% probability) change in summer precipitation in the West Midlands (UKCP09)

Figure 41: Predicted (50% probability) change in winter precipitation in the West Midlands (UKCP09)
Understanding Climate Impacts in the Black Country

Walsall Council and Dudley Council have undertaken Local Climate Impacts Profiles (LCLIP), which consider the impact of previous climate events in the area. The LCLIPs identified a number of flooding and heavy rainfall events which had direct economic consequences. The LCLIP recommends that the Black Country as a whole undertakes an LCLIP to understand sub-regional issues, but this is yet to be undertaken. The various possible impacts of climate change in the Black Country are discussed below.

Increased flooding

A number of rivers flow through the Black Country including the River Tame (including the Oldbury and Wolverhampton arms), the River Stour, and the Smestow and Ford Brooks; however the area is characterised by a long history of development and industrialisation during which many of the local rivers and brooks were culverted. Although floodplains within the Black Country are not extensive, the built-up nature of the area means that a number of properties in the Black Country are at risk of flooding. In May 2009, the Environment Agency identified 8020 properties in Flood Zone 3 (≥1% chance of flooding) and 3080 properties in Flood Zone 2 (1%-0.1% chance of flooding). In the absence of measures to reduce the risk, these figures are expected to get worse with climate change. Local authorities are developing Surface Water Management Plans (due in 2011) and these are expected to recommend de-culverting of watercourses (amongst other measures). The Environment Agency has developed a strategy for the River Tame (a main river). This strategy, and other river management and catchment management strategies will be integrated into the overall strategy for Black Country Environmental Infrastructure.

As well as the threat of fluvial flooding, the heavily urbanised nature of the sub-region, and steep sided valleys, creates a high susceptibility to localised surface water flooding during periods of intense rainfall – a problem that is predicted to worsen with climate change. The preponderance of urban land uses also has the effect of reducing water quality (the Environment Agency reports that many of the water bodies in the Black Country fail to meet standards required by the Water Framework Directive). Areas with reported local flooding issues are shown in the figure below, which demonstrates that this risk exists across the sub-region. There is also a potential risk of groundwater flooding within the Black Country, particularly within the City of Wolverhampton, and the area along the boundary of the Sandwell and Dudley Boroughs. Introduction of environmental infrastructure in accordance with Environment Agency management for individual rivers and the catchments, will play a key role in reducing the risk of surface water flooding by increasing permeability and attenuating surface flows in urban areas.

Infiltration in green areas and open space should be maximised for large development areas where the soil and geology is sufficiently permeable to make it a feasible option. Infiltration can also be encouraged via managed SUDS techniques such as soakaways, swales or infiltration trenches. Given that permeable geology underlays parts of the study area, infiltration is a key consideration for new development in Black Country.

Despite this, the Sherwood Sandstone Aquifer underlying the Black Country is considered a Major Aquifer used for public supply. Therefore, due regard needs to be paid to protection of groundwater from pollution pathways that can be created by poorly managed or badly located infiltration SUDS, and as such, there may be restrictions on the types of infiltration SUDS systems permitted within developments. Reviewing soil type and geology via groundwater vulnerability maps considers the determination of infiltration sensitive areas and catchment areas, both of which feed public water supply sources via Source Protection Zone mapping. The Water Cycle Study for the Black Country provides information on the suitability of different types of SUDS to be used in order to protect groundwater supplies.
Permeability

Legend
- Black Country Boroughs
- Inland Water/ Cloud/ Shadow
- Artificial
- Mainly Artificial
- Mixed Artificial / Bare
- Mixed Bare / Sparsely Vegetated
- Vegetated
- Densely Vegetated
- Major Roads

Figure 42: Permeability of land in the Black Country

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Figure 42: Permeability of land in the Black Country.
Figure 43: Flood prone areas and surface protection areas

Legend
- Black Country Boroughs
- Reported Local Flood Issues
- Overland Flow Path
- SP1 Inner Zone
- SP2 Outer Zone

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Figure 43: Flood prone areas and surface protection areas

Reduced water availability and quality

Water supply challenges are discussed in the previous chapter. Climate change poses a number of threats to water supply, particular surface water supplies as they are susceptible to water pollution. Low summer flows reduce a river’s ability to dilute effluent and to support riparian wildlife. As a result, existing pollutant levels will be concentrated, reducing water quality and increasing the risk of eutrophication and associated algal blooms. Winter flooding increases the risk of contamination to surface water resources. Flooding events can cause sewage from combined sewers and from treatment plants to overflow and combine with the surface water resource.

The urban heat island effect

The Black Country is very urban in nature. As we experience increased temperatures due to climate change, the urban heat island effect will further increase the temperatures felt in urban areas. This is the phenomenon whereby an urban area experiences significantly warmer temperatures than its surrounding countryside. Solar radiation is absorbed by dense materials like concrete and asphalt in the built environment during the day and this is re-radiated at night, causing an increase in temperature. The UHI effect is exacerbated by the typology and character of the urban environment, with dense cities and tall buildings having high impact. However, smaller town centres and industrial areas may also experience an effect if they have a preponderance of sealed surfaces.

The urban heat island effect can cause overheating in buildings and on transport networks, with implications for human comfort. A common response is to increase levels of mechanical cooling, with the waste heat adding to the local warming effect. This is known as a maladaptation, as it reduces the problem for the immediate user but does not consider the wider picture. It also contributes to a rise in carbon emissions.

In extreme circumstances, abnormally high local temperatures have increased mortality rates. In 2003 a heat wave caused an estimated 2,000 premature deaths in the UK, increasing emergency hospital admission rates by 6%. In London, urban areas were 9°C hotter than adjacent countryside during the heatwave, up from the usual 4°C.

The figure below is a thermal map of the Black Country, produced from infrared mapping data, which indicates the likely temperature difference across the area due to the urban heat island effect. The map identifies ‘hot spots’ of highly impermeable areas with a lack of vegetation where temperatures are likely to be most extreme (as much as 6-8°C above the temperature in the surrounding countryside).

---

Urban Heat Island

Legend
- Black Country Boroughs
- Satellite derived thermal emission pattern
- Relative surface temperature
  - Hot
  - Cool
  - Major Roads

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Figure 44: Urban heat islands in the Black Country
Some sectors of the population are likely to be more vulnerable to increased temperatures. Generally, the elderly, the very young and those in poor health are more likely to be adversely affected by a heatwave. The figure below shows the distribution of populations of a vulnerable age across the Black Country. Areas where high concentrations of at risk populations coincide with areas of intense urban heat island effects should be the first priority for urban cooling initiatives such as the greening and an increase in permeable areas.
Opportunities for Environmental Infrastructure in Response to the Objective

The Black Country is subject to a range of risks associated with climate change. The analysis above has identified a number of objectives and consequential opportunities where environmental infrastructure could be used to help local communities and ecosystems adapt to climate change:

• Increased precipitation will heighten the risk of fluvial and surface water flooding, which is already significant in the Black Country due to the highly urbanised nature of the landscape. The integration of river restoration plans with Sustainable Drainage Systems (SUDS) to attenuate and treat surface water runoff is needed in both new and existing areas. The types of SUDS selected will need to consider the urban landscape, geology and contamination issues;

• Drought will also increase pressures on water supply (as discussed in the previous chapter);

• The presence of large areas of impermeable surfaces also increases the urban heat island effect, which could have serious health effects as well as increasing demand for air-conditioning systems and therefore energy. Areas where the urban heat island effect will be most intense would benefit from the integration of natural systems that act to cool the local microclimate; and

• The population profile of the area also indicates particularly vulnerable populations to heat waves which could be used to prioritise delivery of natural microclimate interventions.

The figure below shows the combined public benefit map for the climate change adaptation objective. It combines spatially identified needs for local flood management, microclimate control to reduce the urban heat island effect, and prioritisation according to population vulnerability.
EIG Principles

Climate change will cause longer, hotter and dryer summers, with wetter winters. This will threaten vulnerable infrastructure and people. Environmental infrastructure should be used to build resilience to temperature and flood risk:

- Urban greening, using open space, street trees, green roofs, green walls and rain gardens will help reduce the urban heat island effect and should be incorporated into all development and public realm.
- Urban wetlands and rain gardens as well as other SUDS solutions should be utilised to manage, cleanse and store surface water.
IDENTIFYING PRIORITY AREAS
Multiple Benefit Priority Areas
As outlined above, indicators underpinning each of the eight objectives were drawn together and mapped to highlight areas where environmental infrastructure would deliver support achieving that objective. Combining this information, as in the map below, highlights areas where environmental infrastructure can deliver against several of the objectives and provide multiple benefits. These areas are where environmental infrastructure interventions and initiatives should be prioritised.

Figure 47: Environmental Infrastructure Benefit priority areas

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Overlaying all the existing green space within the Black Country onto the multiple benefits map shows that areas that could benefit from environmental infrastructure are where there is a green space deficiency. As green space is only one of around 35 different indicators used in the multiple benefits analysis, this also reinforces the evidence that green space and environmental infrastructure has wide reaching socio economic advantages.

Figure 48: Environmental Infrastructure Benefit Priority Areas in relation to green infrastructure and water
Also supporting the assertion that environmental infrastructure can support the areas most at need is the significant correlation with the regeneration corridors. These delineations represent the areas of transformative change that will underpin regeneration; providing high quality housing and upgrading the employment offer. As such, they offer great opportunities to establish a range of ecosystem services through a network of environmental interventions. A clear strategy, robust policy and attentive coordination will be key in these areas.

Figure 49: Environmental Infrastructure Benefit Priority Areas in relation to employment and housing led regeneration.
Derelict sites offer significant potential to initiate environmental infrastructure projects. The map below shows that there is a substantial amount of derelict land in areas where multiple benefits could be derived from environmental infrastructure projects. These should be prioritised as opportunity areas.

Figure 50: Environmental Infrastructure Benefit Priority Areas in relation to derelict land
Introduction

The following categories of intervention are recommended as a complementary package that in combination will make the conurbation more permeable to people and wildlife and deliver ecosystem services with multiple socio-economic benefits. There is a strong emphasis on a more sensitive approach to water and the multi-functionality of most of the interventions means that biodiversity and climate change adaptation are also addressed. Importantly it is recognised that, in challenging times, environmental infrastructure needs to be targeted in strategic centres and regeneration corridors where it can support economic growth and promote healthy lifestyles.

Green Roofs in Urban Heat Island Risk Areas

Green (or living) roofs are deliberately vegetated roofs. They vary from roof gardens (sometimes classified as intensive green roofs), which tend to have deep soils and to be irrigated and intensively managed, to relatively lightweight extensive green roofs, which receive little management and have low growing self-sustaining vegetation. The modern green roof industry dates back to the 1970s in Germany and Switzerland. Green roofs are mandatory on commercial buildings in many German and Swiss cities.

Figure 50: Environmental Infrastructure Benefit Priority Areas in relation to derelict land
Green roofs are a source control technique in sustainable drainage systems (SUDS). A typical (100mm substrate depth) extensive green roof reduces annual rainfall runoff by 50%. Green roofs prevent solar radiation from reaching the building fabric (shade) and the rainfall that is evaporated and transpired from green roofs provides evaporative cooling, which can reduce roof temperatures. The surface temperature of a conventional roof may exceed 70°C on a day when the ambient temperature is 30°C. The surface temperature of a green roof remains at the ambient temperature and the temperature within a building with a green roof can be several degrees cooler than a conventional building on hot summer days, helping to maintain comfort and saving energy, which might otherwise be expended in air conditioning. During heat waves, green roofs can save lives. The urban heat island occurs where there is a preponderance of sealed surfaces in city centres and industrial areas. These areas can be 5°C warmer than the surrounding countryside and this problem is predicted to be exacerbated by climate change. Green infrastructure, including green roofs, has been shown to be an effective way of tackling the problem. Another important benefit of green roofs is that they can provide valuable habitat that can boost biodiversity in areas that would otherwise be deficient.

Invertebrates (including bees, spiders and beetles) and birds have been shown to benefit. Finally green roofs can increase amenity value, providing an attractive place to relax or may improve the view, reducing stress and increasing well-being.

Green roofs can be installed on all new and some existing buildings. There is potential to retrofit green roofs onto many commercial buildings and residential blocks. It would be advisable to require, as a planning policy, that roofs be greened on all new buildings in districts that are at risk from the effects of the urban heat island. In districts where microclimate modelling predicts that summer temperatures will exceed 30°C, it is recommended that all new buildings with a roof area of 1000m² or more be greened.

Similarly, in districts where flash flooding caused by urban runoff is a problem, green roofs should form a component of the sustainable urban drainage management train. Roof greening will come about gradually in areas that are vulnerable to urban heat islands or flash flooding through changes to local planning policy and where building owners seek higher standards of environmental accreditation for buildings (eg BREEAM or LEED).

Multiple Benefits

• Supporting Investment: Installing green roofs helps to support the growth of green industry in the Black Country
• Fostering High Quality Neighbourhoods: Roof gardens and extensive green roofs will help to green districts that might otherwise be perceived as harsh environments
• Creating Sustainable Links: Green roofs can act as stepping stones in ecological networks
• Protecting and Enhancing Biodiversity: Extensive green roofs can be designed to benefit birds and rare invertebrates, including spiders, beetles and bees. Bees pollinate about 25% of our food crops.
• Celebrating a Sense of Place: Green roofs can bring a new attractive look to otherwise generic ‘anyplace’ buildings.
• Supporting Healthy Living: Green roofs can bring psychological benefits for those who overlook or use them. Roof gardens can be used to produce local food
• Managing Resources Efficiently: Green roofs conserve energy and prolong the life of the waterproofing on a roof. They also help to maintain water and air quality.
• Building Resilience to Climate Change: Green roofs help to reduce the urban heat island effect and are part of sustainable drainage systems.
Natural Industry – Phytoremediation and Biomass for Energy on Industrial Sites

The Black Country has a number of unused or underused industrial sites where crops can be grown as a fuel for combined heat and power (CHP) plants or electricity generation. It is estimated that there are derelict sites covering 700ha which could be used to grow biomass which could fuel 10,000 homes. The Black Country is also surrounded by farmland where biomass crops could be grown within easy access of CHP plants located within the conurbation. There are also a number of vacant industrial sites that may be suitable for the storage and processing of biomass. Where large new low or zero-carbon developments are planned, CHP plants will be considered and it may be that some of the fuel for such plants could be grown locally.

Where biomass is grown as short-rotation coppice (SRC) - usually willow - it has the advantage that it can be fertilised with sewage sludge and irrigated with wastewater (grey water or industrial waste water). In Sweden 10% of all sewage sludge is used to fertilise SRC and there are 25 SRC facilities that are irrigated with landfill leachate, which has the advantage that more biomass is produced and leachate is cleaned. Willow in the form of SRC can produce 270kg/m² of high density fibre per annum and be ready for harvest 2 years after establishment. SRC sites can also be available for public recreation and can support woodland wildlife. Biomass electricity generation plants can also burn green waste collected from streets and municipal parks. Short-rotation coppice facilities may be sited close to sewage treatment plants (in order to take advantage of the availability of sludge for fertilisation), close to places where there is an abundance of waste water or on contaminated sites, where biomass production can be part of the remediation effort.

Multiple Benefits

- Supporting Investment: Woodland, SRC and CHP would create jobs and help to develop green industry in the Black Country.
- Fostering High Quality Neighbourhoods: Woodland and SRC provides a green and attractive outlook.
- Creating Sustainable Links: Woodland and SRC sites can be part of the wider ecological network.
- Protecting and Enhancing Biodiversity: Woodland, SRC and phytoremediation sites are valuable wildlife habitat, left to grow during the summer to provide nesting sites for birds and cover for other wildlife. Willows and poplars support insects which attract aerial feeders like bats, swallows and swift.
- Celebrating a Sense of Place: Woodland and SRC will become a welcome addition to the cityscape. CHP plants could be celebrated as part of the local industrial tradition.
- Supporting Healthy Living: Access can be provided along tracks that cross woodland and SRC sites for recreation and exercise.
- Managing Resources Efficiently: Woodland and SRC will make a contribution towards creating a low carbon future.
- Building Resilience to Climate Change: Woodland and SRC will be part of the wider environmental infrastructure network reducing urban heat islands and attenuating surface water run-off.

Government support is available to support the establishment of biomass energy plants or to help landowners to grow energy crops.

Urban Wetlands and Street Rain Gardens

A number of new wetlands can be located in strategic locations where urban runoff and grey water can be collected, treated and stored for re-use in irrigation or cleaned before discharge to watercourses. These wetland features can be useful in improving the quality of river corridors and strengthening the ‘blue infrastructure’ network, improving river quality, reducing flood risk, reducing urban heat islands, increasing biodiversity and providing amenity. They can be integrated into parks, industrial areas or the public realm in city centre locations. Interventions of this nature may be helpful anywhere in the catchment and therefore wherever green or blue infrastructure is planned or improved careful consideration should be given to this possibility. This approach is part of the Water Sensitive Urban Design philosophy pioneered in Australia.92

In locations where localised surface water flooding is known to be a problem urban wetlands should be considered as part of masterplans for new development, urban renewal and open space provision. This approach will result in incremental change to surface drainage and microclimate as a number of new urban wetlands are created in the coming years. Urban wetland creation is a valuable climate change adaptation strategy, helps to conserve water and clean watercourses. Planting with native wetland species, including willows, alder, yellow flag, purple loosestrife and reed will increase biodiversity, providing valuable habitat for aquatic invertebrates like dragonflies and foraging habitat for aerial feeders like bats and swifts.

A method of traffic calming in residential streets or close to schools involves the narrowing of the carriageway so that vehicles can only pass in a single direction at any one time. This provides an opportunity to remove asphalt and paving and replace it with shallow depressions that are designed to receive road surface runoff which supports vegetation, including trees if appropriate (features known as rain gardens – a component of a sustainable drainage system). Such rain gardens reduce surface water runoff volumes, improve water quality (thereby protecting local watercourses), improve microclimate and green the streetscape. Traffic calming also encourages cycling. Street rain gardens have been successfully pioneered in Portland, Oregon, where local residents frequently request them in their street after seeing them elsewhere in the City.35

**Multiple Benefits**

- **Supporting Investment:** Urban wetlands and rain gardens will be a special feature of the Black Country, fostering a forward-thinking image for the area.

- **Fostering High Quality Neighbourhoods:** Urban wetlands and rain gardens will be natural and aesthetically pleasing features that soften the grounds of public buildings as well as residential, industrial and commercial landscapes.

- **Building Resilience to Climate Change:** Urban wetlands and rain gardens and modified street tree pits will help to manage the increased risk of flooding but will also help reduce the urban heat island effect.

- **Managing Resources Efficiently:** Urban wetlands and rain gardens help to manage surface water runoff, preventing flooding, but also storing and treating water locally to allow reuse.

- **Celebrating a Sense of Place:** The Black Country has a strong industrial and canal heritage. A number of historic canals have now silted over, but the reintroduction of functional water features can be designed to celebrate these features and to support heritage projects.

- **Protecting and Enhancing Biodiversity:** Urban wetlands will provide valuable habitat in industrialised areas, and also can be designed near canals and waterways to link similar habitat types. Street rain gardens and associated street trees can increase urban biodiversity and improve ecological connectivity.

- **Creating Sustainable Links:** Rain gardens and street trees will help make routes more pleasant for walking, and can also be integrated with traffic calming measures.
Space for food
There is a growing realisation that locally grown food can reduce carbon dioxide emissions by reducing transportation but it can also encourage people to exercise more, cook more and enjoy a healthier and more varied diet. There is a growing demand for conventional local authority allotments, however there are interesting examples of local food cultivation in schools and on housing estates. In the latter case, for example at the Wenlock Barn Estate in the London Borough of Hackney, otherwise underused incidental open spaces of grasslands or flower beds have been turned into popular vegetable gardens.

Where new development is planned, some space should be put aside for allotments. Consultation should be undertaken with residents on existing estates to explore the possibility of converting existing incidental open spaces into secure plots that can be used as vegetable gardens.

Multiple Benefits
• Celebrating a Sense of Place: community allotments can promote community cohesion and become the centre of community activity
• Supporting Healthy Living: encouraging the growth of vegetables and fruit can help engender healthy eating
• Managing Resources Efficiently: allotments are a good way of making under-utilised land more productive and can promote active temporary use of vacant sites.
• Building Resilience to Climate Change: Locally grown produce reduces the need to transport good and for packaging.

Reinforcing Ecological Networks

Wildlife habitat in the Black Country is fragmented by industrial and residential development and roads. This limits the biodiversity of sites and makes it more difficult for some wildlife to migrate through the sub-region and to recolonise sites as they are restored. Some sites may be too small to support some species. Isolated sites are also less accessible for people. The creation of ecological networks involves the identification of core areas (usually designated nature conservation sites), where possible the extension and buffering of core areas and the connection of these sites with corridors or ‘stepping stones.’

Ecological networks are not only about nature conservation – they can be multi-functional, combining the provision of wildlife habitat with sustainable drainage systems, biomass plantations, cycle ways and footpaths and recreational facilities. Watercourses, canals and railways may also provide useful links within the network.

The Birmingham and Black Country Biodiversity Partnership has recently adopted (July 2010) a Local Biodiversity Action Plan (LBAP) which sets regional habitat targets and spatial priorities, The LBAP should be referred to in the development of all initiatives promoted as part the Environmental Infrastructure strategy, with special attention paid to the potential to extend and strengthen the sub-regional and regional ecological network. Although the creation of a regional ecological network is a long-term project, a preliminary ecological network has been identified as part of the Black Country Environmental Infrastructure Phase 1 study. Further more detailed mapping and analysis will be required at a local level in order to identify opportunities to build the network. An example of how an ecological connection could be improved at the local level is illustrated in the case of Stafford Road, Wolverhampton, which envisages habitat creation and habitat enhancement in order to strengthen ecological connectivity. In order to maximize ecological connectivity in the area, redevelopment sites (eg the Goodyear site) should include north-south or perimeter habitat links.

Figure 5.1: Building an Ecological Network

Figure 5.1: Ideas for creating linear coherence in the Stafford Road area
Multiple Benefits

• **Creating Sustainable Links:** The ecological network is part of a wider network of routes for boaters, cyclists and pedestrians.

• **Protecting and Enhancing Biodiversity:** The ecological network is comprised of retained, enhanced and created wildlife habitat managed for wildlife. This should be guided by the local biodiversity action plan.

• **Celebrating a Sense of Place:** Habitats in the ecological network are the most appropriate landscapes for each locality.

• **Supporting Healthy Living:** Access could be provided in and around water bodies for recreation.

• **Managing Resources Efficiently:** Cuttings and thinning from the expanded network will be used to provide energy in biomass furnaces.

• **Building Resilience to Climate Change:** Vegetation will help reduce flooding and help control micro-climate.

• **Supporting Investment:** Green cities attract more investment. People are more likely to want to live and work in a green environment and are more likely to settle down.

• **Fostering High Quality Neighbourhoods:** By permeating every part of the Black Country and expanded ecological network provides a green and attractive outlook for more people.
Open Space for Health

There are many wards within the Black Country conurbation which are deficient in natural greenspace (defined as less than 2.4ha of natural greenspace per 1000 people).

Many of these areas also have poor air quality, have a higher proportion of residents with poor health and have relatively high populations of vulnerable people, including children and the elderly. Studies have found that people living in neighbourhoods more than a mile from accessible greenspace have a 27% chance of being overweight or obese. In the most deprived wards only 40% of adults regularly participate in moderately vigorous exercise. The National Institute for Health and Clinical Excellence (NICE) has also recognised that there is a link between good mental health and accessible green space. NICE has recommended that patients with mild depression should follow a structured and supervised exercise programme. Such programmes are usually provided in the form of supervised walks in parks, woodland or along green routes like canal towpaths.

Therefore improving the health of disadvantaged and vulnerable people should involve the provision on new parks close to where these people live. As well as providing accessible green space close to areas of deficiency efforts should be made to encourage greater use of existing greenspace and other environmental infrastructure elements like the canal networks. New greenspace should be provided in areas of deficiency as larger new sites are released for development, a process that will continue. It is recommended that discussions are held between the health authorities and Black Country consortium to explore options for encouraging people to visit local green spaces and participate in physical activity including sport, walking, volunteer work (eg conservation management) and cultivation of food.

Multiple Benefits

- **Supporting Investment:**
  CABE have produced evidence that property values are boosted by up to 8% through proximity to green space.

- **Fostering High Quality Neighbourhoods:**
  Access to quality green space is, according to CABE, one of the main considerations in community perceptions of Council performance. High quality open space can change perceptions about an area and given a feeling of space in densely developed neighbourhoods.

- **Protecting and Enhancing Biodiversity:**
  Open space provides excellent opportunities to create and enhance habitats. Having numerous pockets of greenspace can build into a large ecological network that can support higher levels of biodiversity.

- **Protecting, enhancing and creating new geological or geodiversity features:**
  Open space provides an opportunity to work with geology to foster local character and distinctiveness.

- **Celebrating a Sense of Place:**
  Open space plays an important role in defining place; frequently the local park can be the heart of an area.

- **Supporting Healthy Living:**
  Open spaces provide great opportunities for formal and informal sport, recreation and play. They provide a relaxing environment and can help improve air quality. Wild food can be collected and people can grow their own food.

- **Building Resilience to Climate Change:**
  Greenspace will help reduce the urban heat island effect and provide opportunities to manage surface water more naturally, both problems exacerbated by climate change.
Making the Most of the Canal Network

The Black Country boasts an impressive network of canals. They are more than a visible link with the industrial past, providing green (and blue) corridors in what are often predominantly urban landscapes. They are often designated as open spaces and provide valuable wildlife habitat and walking and cycling routes.

There are perceived problems with the canals, however, including an association with anti-social behaviour and the poor condition or some of the boundaries and sites that adjoin the canal.

There are some historic sections of the network that have fallen into disuse which could be restored (eg The Lapal Canal) and other features like tramroads that were once connected with the canals and could be restored or re-created. 46% of undeveloped canalside land in the Black Country falls within the Regeneration Corridors, therefore there are opportunities to make more of the canals as brownfield sites in these areas are redeveloped. Development should open up views of the canals and make them more welcoming to visitors. There may be opportunities to strengthen the ecological network by creating new habitat some of which could be wetlands that complement the canals and form part of sustainable drainage schemes. New canalside developments should open up the canals and respect and where possible enhance their role as part of the Environmental Infrastructure network.

Multiple Benefits

- **Supporting Investment:**
  The canal network played an important economic role in the Black Country’s past and can evolve to be central to a tourism offer to support it’s future

- **Fostering High Quality Neighbourhoods:**
  By providing an attractive and interesting living environment

- **Creating Sustainable Links:**
  The canal and towpaths provide opportunities for more sustainable movement, including cycle routes and pedestrian links.

- **Protecting and Enhancing Biodiversity:**
  The canals and their corridors can support a wide variety of flora and fauna and the canals forms links and corridors in the wider ecological network.

- **Protecting and Enhancing Geodiversity:**
  The canals were established to transport minerals – conserving them helps to maintain the link between heritage and geodiversity.

- **Celebrating a Sense of Place:**
  Canal heritage is integral to the Black Country and the canals link numerous heritage sites

- **Supporting Healthy Living:**
  The towpaths and canals provide excellent recreational opportunities. They encourage leisure boating and other activities.
Cycling and Walking Routes

The Black Country is crossed by two national cycle routes, namely Route 5 which links West Bromwich with Walsall before heading north and Route 81 which links West Bromwich with Wolverhampton. The National Cycle Network is aimed at people who do not currently cycle and it is expected to provide high quality direct and attractive routes that minimise dangers for cyclists, pedestrians and other users. There is also a network of existing interconnected Black Country cycle routes and a much more extensive network of planned cycle routes. The towpaths of the canal network make another network of footpaths, which are road traffic-free.

The promotion of cycling and walking is essential because it reduces road traffic (and thereby reduces the production of greenhouse gases and other air pollutants) and improves health. Work needs to continue on extending the cycle network to include planned routes but also to ensure that all new developments and public realm improvements make adequate provision for cyclists and pedestrians as well as seeking to make new links which will encourage cycling and improve access to the wider environmental infrastructure network. Wherever possible cycle routes should separate cyclists from vehicular traffic and as part of redevelopment projects there will be opportunities to combine new cycle ways with sustainable drainage features that may also be components of the extended ecological network.

Multiple Benefits

- **Supporting Investment:**
  Cycle and walking network helps people to get to and from work and can reduce the cost of moving about the Black Country

- **Fostering High Quality Neighbourhoods:**
  Good routes connect important social infrastructure

- **Creating Sustainable Links:**
  Provide opportunities for more carbon efficient movement

- **Protecting and Enhancing Biodiversity:**
  The networks can provide important ecological links for animals and birds to move along

- **Supporting Healthy Living:**
  By encouraging more cycling and walking for both transport and leisure health will be improved
Quality Places: Public Realm Improvements – Housing and Employment

Attitudes towards both residential and employment zones can be transformed by relatively simple improvements to the public realm. CABE advise that the quality of public spaces is how people perceive the performance of their local authority, particularly in deprived areas. High quality public realm reduces crime and can promote local distinctiveness. In the recent past, there has often an emphasis placed on the renewal of paving and street furniture in public realm improvements. This may be necessary and desirable in some cases, however there is an increasing interest in greening and introducing features that will be useful in climate change adaptation. This may include tree planting, rain gardens and water features. Even in places where space is extremely limited it may be possible to bring about dramatic changes with the use of climbing plants or living walls. Another complementary approach is the removal of unnecessary street furniture and signs, which improves the appearance of streets but also improves road safety, an evidence-based approach pioneered in Denmark and Royal Borough of Kensington and Chelsea in the UK. As the public realm is renewed, these issues and innovations must be considered in order to bring about incremental but lasting improvements.

In industrial sites and business parks cost-effective transformation is possible through the planting of trees and hedges, which can be low maintenance but can rapidly change public perceptions and also bring about improvements in air quality, a reduction in noise, an increase in biodiversity and the overall attractiveness of an area. Industrial areas, which often have large areas of hardstanding, do contribute towards the incidence of localised flash flooding, therefore special effort should be made to the introduction of sustainable drainage schemes, including rain gardens in industrial areas, to be complemented by tree planting and other greening initiatives.


The living wall, Westfield Shopping Centre
Multiple Benefits

- **Supporting Investment:** Improving the public realm creates an environment that is more conducive for potential investment. CABE’s publication ‘Paved with Gold’ articulates the economic benefits of good street design.

- **Fostering High Quality Neighbourhoods:** The sense of place and perception of an area is heavily influenced by the quality of the public realm. A high quality, green public realm can help create distinctiveness, engender civic pride and support community cohesion.

- **Creating Sustainable Links:** Public realm is often closely linked with the movement, and offer potential for integrating linear features, such as green walls and drainage systems.

- **Protecting and Enhancing Biodiversity:** Introducing environmental infrastructure as part of public realm improvements can support ecological networks, bringing flora and fauna into urban areas.

- **Protecting and Enhancing Geodiversity:** Conserving geological features and using natural stone helps to create local distinctiveness.

- **Celebrating a Sense of Place:** Environmental infrastructure can be a the centre piece feature of public realm improvements, such as a large green wall, or provide smaller scale incremental elements, such as street trees or rain gardens. Both will help to define an area.

- **Building Resilience to Climate Change:** Integrating environmental infrastructure into public realm features is an important way to make spaces more resilient to climate change, providing opportunities to manage, clean and treat surface water and using vegetation and water helping to cool areas.

Making an Impression: Improvement of Economic Gateways

Economic gateways in the Black Country include railway stations and town centre and town edge road junctions. They often provide the first impression for visitors and are therefore important in terms of overall perception of the area. Consideration should be given to promoting local distinctiveness following a thorough analysis of the local heritage and environment and an effort to create a better sense of arrival. A generic approach to public realm improvement should be avoided, especially in the economic gateways. Public art, celebration and promotion of sustainable transport initiatives, cycle ways, canals and industrial heritage features, tree planting, living walls and water features may all play a role in improving economic gateways.

Multiple Benefits

- **Supporting Investment:** Improving economic gateways is all about creating identity and sense of place which is conducive to investment.

- **Protecting and Enhancing Biodiversity:** Green gateways could support local biodiversity action plans by creating ecological stepping stones through the urban areas.

- **Protecting and Enhancing Geodiversity:** Conserving geological features and using natural stone or boulders helps to create local distinctiveness.

- **Celebrating a Sense of Place:** The sense of ‘place’, the genus loci, can be greatly enhanced by the sense of arrival though a distinct gateway. This demarcation can also help create a positive perception of an area.

- **Building Resilience to Climate Change:** High impact schemes could be designed to demonstrate best practice in adapting to climate change.
Natural Learning: Climate Change Adaptation for Schools

Schools are at the heart of the community and lessons learned on the value of environmental infrastructure at school will equip future citizens with the knowledge they will need to adapt to climate change. In 2010 the NASUWT teacher’s union called for an upper limit of 30°C in classrooms.\(^9^7\) Overheating in schools is already a problem and is prediction to become worse with climate change. Such changes will be even more of a problem in city centre locations where the urban heat island increases temperatures by 4-5°C when compared to the open countryside.

Schools can help to address this problem by establishing shaded outdoor teaching facilities, planting trees in strategic locations to provide summer shade, building and planting pergolas and creating rain gardens and vegetable patches to provide evaporative cooling.\(^9^8\) In some cases green roofs can be retrofitted to buildings. New schools should include green roofs and living walls. Rainwater harvesting is a useful way of collecting water for irrigation and cooling and can be undertaken relatively easily by modifying downpipes and installing water butts. Such initiatives can involve students through study and practical involvement and the message will spread through the community through parent and governor engagement.

Multiple Benefits

**Supporting Investment:**
Planting trees, pergolas, building rain gardens, installing green roofs helps to support the growth of green industry in the Black Country

**Fostering High Quality Neighbourhoods:**
Natural interventions will help to green schools that might otherwise be perceived as harsh environments. This can foster a sense of pride in the area for parents and students. Improving environmental quality will encourage learning and stimulate educational projects and provide tools for teaching.

**Creating Sustainable Links:**
School grounds act as links and stepping stones in ecological networks

**Protecting and Enhancing Biodiversity:**
Plantings, swales, extensive green roofs can be designed to benefit birds and rare invertebrates, including bees, which are responsible for pollinating many of our food crops.

**Celebrating a Sense of Place:**
Natural interventions can bring a new attractive look to otherwise generic ‘anyplace’ school buildings. It is important that designs are site specific to encourage local distinctiveness.

**Supporting Healthy Living:**
Interventions will encourage outdoor exercise and play. Students can get involved with growing locally produced food.

**Managing Resources Efficiently:**
Reductions in the production of green house gases and energy savings can be made by reducing use of cooling fans and air conditioning.

**Building Resilience to Climate Change:**
The main purpose of this initiative.

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98. http://www.sustainableschools.dgs.ca.gov/SustainableSchools/sustainabledesign/energy/reductionofheatislands.html
ENVIRONMENTAL INFRASTRUCTURE GUIDANCE – MAIN REPORT

WORKING TOWARDS DELIVERY
EIG Principles

The EIG demonstrates how Environmental Infrastructure can contribute to a range of social, economic and environmental objectives. These EIG objectives, derived from the Black Country Core Strategy Objectives and Sustainability Principles These can be translated into a range of overarching EIG Principles.

Although environmental infrastructure should be encouraged across the Black Country, prioritising action is important to focus attention, time and resources. For each of the eight EIG objectives, a range of spatial indicators and supporting evidence has been used to demonstrate where environmental interventions will best support that objective.

<table>
<thead>
<tr>
<th>EIG OBJECTIVES</th>
<th>EIG PRINCIPLES</th>
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<tbody>
<tr>
<td>SUPPORTING INVESTMENT 1. Focusing environmental infrastructure in areas where it can support investment within strategic centres and regeneration corridors for sustainable economic growth</td>
<td>High quality environmental infrastructure has been shown to support economic development by leaving inward investment and improving productivity, as such:   • Economic development priority areas and public realm improvements should demonstrate consideration of high quality and multifunctional environmental infrastructure.  • Environmental infrastructure, temporary or permanent, should be used to improve the quality of vacant or underutilised land. This may be particularly relevant in areas where there is a lot of hard standing.  • Use environmental interventions to denote gateways</td>
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<td>FOSTERING HIGH QUALITY NEIGHBOURHOODS 2. Identifying opportunities for environmental infrastructure to assist in protecting and improving high quality residential areas in sustainable locations</td>
<td>Areas with well maintained green space are more likely to have high approval ratings. Green space also helps to improve the values of buildings and contributes to community cohesion, as such:   • Multifunctional environmental infrastructure should be a central consideration early in master planning stage of development</td>
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<td>CREATING SUSTAINABLE LINKS 3. Ensuring that communities are well served through sustainable links to residential services and employment opportunities</td>
<td>Sustainable transport links and the network of environmental infrastructure assets go hand in hand:   • Opportunities should be sought to utilise and improve walking and cycling routes along the canal, river and former rail routes.  • New development should make a demonstrable contribution towards developing a wider cycle and walking network across the Black Country that link live / work areas and existing environmental infrastructure assets such as the Black Country Beacons</td>
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<td>EIG OBJECTIVES</td>
<td>EIG PRINCIPLES</td>
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<tr>
<td>PROTECTING AND ENHANCING BIODIVERSITY</td>
<td>1. High quality environment respecting, protecting and enhancing water, soil, air, biodiversity and geodiversity</td>
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<td>Environmental infrastructure supports a wide range of habitats and species that help to restore the quality of water and air, as well as protecting geodiversity assets.</td>
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<td>• In addition to providing dedicated areas of biodiversity value, new development should demonstrate consideration of environmental infrastructure to support the creation of functional ecological networks that utilise native habitats and support Biodiversity Action Plan priority species and link existing environmental infrastructure assets including the Beacons, and nature conservation designations.</td>
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<td></td>
<td>• Development and environmental initiatives should contribute to overarching urban greening. Redevelopment of vacant and underutilised sites needs to recognise that they might be playing an important environmental function.</td>
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<td>• Natural systems such as rain gardens and swales should be used to control, cleanse and store storm water. Where possible, this should be used as a source of non potable water.</td>
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<td>• Geodiversity assets should be respected and celebrated.</td>
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<td>CELEBRATING A SENSE OF PLACE</td>
<td>2. Enhance character, amenity and quality of place building on the Black Countries historic, landscape and cultural assets to support attractive, district centres and housing renewal</td>
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<td>Environmental infrastructure should be used to enhance the built and heritage environment:</td>
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<td>• Ensuring development recognises local historic and landscape character and assets, so that heritage and regeneration initiatives work in tandem.</td>
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<td>• Identifying where derelict sites already contribute key environmental functions, so that these functions can be preserved and enhanced.</td>
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<td></td>
<td>• The canal tramroads and former canals have been identified as possible sites in the area that could be restored for heritage, access and ecological value.</td>
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<td>SUPPORTING HEALTHY LIVING</td>
<td>3. Supporting community services to promote learning, healthy lifestyles, recreation and sport</td>
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<td>Access to environmental infrastructure can play an important role in supporting healthy lifestyles; reducing the burden on the health authorities:</td>
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<td>• Development should demonstrate good access to green space suitable for recreation.</td>
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<td>• Small scale urban greening should be ubiquitous throughout developments</td>
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<td>MANAGING RESOURCES EFFICIENTLY</td>
<td>4. Make efficient use of resources, including water, soil, land, air, waste, minerals and opportunities to mitigate climate change</td>
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<td>The resources and functions that environmental assets support should be supported:</td>
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<td>• Opportunities should be sought to utilise environmental interventions, such as rain water gardens and swales manage water resources.</td>
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<td></td>
<td>• Vacant and underutilised land can offer should be used to generate resources. These uses may be permanent or temporary and could include:</td>
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<td>• Food growing through urban farming and allotments</td>
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<td>• Supporting the creation of a biomass and wood fuel market by growing short rotation coppice</td>
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<td>• Utilising natural remediation processes, such as phytoremediation</td>
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<td>BUILDING RESILIENCE TO CLIMATE CHANGE</td>
<td>5. Support climate change adaptation measures - including flood risk and urban heat islands.</td>
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<td>Climate change will cause longer, hotter and dryer summers, with wetter winters. This will threaten vulnerable infrastructure and people.</td>
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<td>Environmental infrastructure should be used to build resilience to temperature and flood risk:</td>
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<td>• Urban greening, using open space, street trees, green roofs, green walls and rain gardens will help reduce the urban heat island effect and should be incorporated into all development and public realm</td>
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<td>• Urban wetlands and rain gardens as well as other SUDS solutions should be utilised to manage, cleanse and store surface water.</td>
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EIG Prioritisation

Drawing these indicators into a composite map, we are able to demonstrate where environmental interventions will have contributed to several objectives, delivering multiple benefits. The map below therefore shows the Environmental Infrastructure Priority areas.
Tool Kit of Environmental Interventions

The EIG also sets out a range of potential environmental interventions that could be utilised to the EIG objectives. The table below summarises the different types of intervention and highlights the objectives to which they contribute. It should be noted that this list is not exhaustive and there may be more locally appropriate solutions that come to light when looking at specific sites in detail.

The EIG Design Guidance document that supports this EIG provides additional detail and advice for developers and planners on delivering high quality interventions.

<table>
<thead>
<tr>
<th>ENVIRONMENTAL INTERVENTIONS</th>
<th>OBJECTIVES CONTRIBUTED TO</th>
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<td>Green Roofs</td>
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<td>Biomass and Phyto-remediation</td>
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<td>Urban Wetlands/ Street Rain Gardens</td>
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<td>Space for Food</td>
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<td>Ecological Networks</td>
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<td>Open Space and Health</td>
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<td>Cycle and Pedestrian Routes</td>
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<td>Quality Places: Public Realm Improvements</td>
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<td>Economic Gateways</td>
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<td>Adaptation for Schools</td>
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Action Plans

Four action plans, one for each Black Country Authority has been developed which sets out locally specific environmental interventions, defined through stakeholder engagement. These projects, in addition to the overarching EIG Principles, provide a focus for initiating the environmental transformation desired. These list are not however exhaustive and opportunities should be sought to deliver environmental infrastructure where the potential arises. For the locally identified interventions, the Action Plans draw on the below to set out potential delivery mechanisms, funding opportunities and partners.

Delivery Co-ordination

One of the overarching messages from resulting from the EIG is that collaborative partnerships will be key to delivering the multifunctional environmental infrastructure required. These will vary in their make up from place to place. As environmental infrastructure can play a role in meeting a wide range of social, economic and environmental objectives, it should be considered across all LA services and in collaboration with a wide range of stakeholders. This does, however, require a considerable degree of strategic organisation and integration. To be effective, two roles should be assumed:

- Ringmaster – The ringmaster is responsible for organisation and performance of projects. The ringmaster acts as the interface with developers, agencies and other partners and develops the protocols for which service providers are to adhere.
- Banker – The banker’s role is to identify, raise and manage funds for projects. The banker acts for an accountable body and accepts liability.

Across the Black Country, it is proposed that the Black Country Core Strategy Environment Focus Group will perform the role of the ‘ringmaster’. This group is made up of planning officers from the four Black Country Authorities and representatives from Natural England, the Environment Agency and the Forestry Commission. This group’s overarching role is two-fold. In the first instance it is to co-ordinate the sub-regional efforts of the Black Country Advisory group in meeting the vision of environmental transformation. Secondly, members of the group need to take this vision back in to each of their respective individual authorities to ensure that locally appropriate environmental infrastructure interventions, such as those outlined above, are organised, maintain momentum and ultimately are delivered. This role will cross the forward planning of a number of authority services and partner objectives. As such, it is important that the group works closely with the Black Country Consortium, its sub-groups and the four LSPs (or future variations of - see below) to ensure that EI consideration is appropriately aligned to build a collective head of steam.

The significant reduction in regeneration budgets through the Comprehensive Spending Review and the devolution and localism agenda outlined in the Localism Bill (2010) will have a profound impact of the way in which LA services, including environmental infrastructure, are delivered. The reduction in centralised funds will constrain projects; however, localism opens up opportunities for communities to take more control over local assets and service delivery. As such, early in the development of EI initiatives, community partnership arrangements should be defined. It will be important for the evidence provided by the EIG to be articulated to community groups to ensure the overarching objectives are retained. This will be particularly important with the introduction of ‘neighbourhood plans’ in which parish councils or ‘neighbourhood forums’ can make decisions on a range of land use issues including what green space to protect. With communities having a greater role, the LA will need to play a supportive and shaping role. This will help ensure community groups are well informed and support the formation of community management/ local social enterprise groups to develop and look after environmental improvement activities.

Delivery Mechanisms

The changing nature of local governance, compounded by funding restriction, will however mean that environmental infrastructure projects will be brought forward through a range of routes, and the Black Country Local Authorities need to be flexible in their approach to delivery. Important mechanisms for delivery include:

Planning and Regeneration - The Black Country Core Strategy sets out the framework for planning across the sub-region, and strongly supports the need for environmental transformation in economic regeneration. It includes a suite of eight Environmental Infrastructure policies pointing towards delivery of the EIG and its objectives, as well the overarching vision and supporting policies that will also need to have regard to the EIG. The implementation of these policies locally will remain the responsibility of the individual local planning authorities.

Within the authority’s development control responsibility it will be important for planners to ensure that individual developments are fitting into the wider plan, each playing a small but incrementally building part of the environmental infrastructure network. This is particularly important for initiatives that are most effectively applied cross boundary such as SuDS, cycle routes and habitat creation. There is also potential scope for developing more stringent development control policies to ensure higher environmental performance on individual development sites. In the meantime, development control officers should work with developers to encourage the inclusion of site based environmental infrastructure.

PPG17 and Planning for a Healthy Environment - Traditionally, green infrastructure delivery has been closely aligned to open space standards. Natural England’s guidance on providing natural greenspace (ANGST) has added the important dimension of accessibility but the essential ingredient that will differentiate environmental infrastructure provision from greenspace or open space is multi-functionality and sustainability – the ecosystem services approach. It is important in the development of any standards that not only is the quality and location of assets considered, but also the multiple benefits provided. Sandwell’s 2006 Green Space Audit, set out requirements for greenspace as defined by the PPG17 typologies. This has driven the development of a Green Space Strategy 2010-2020 for Sandwell. This document sets out the vision and objectives for more formal greenspace in the authority’s management and, although the EIG extends much wider than open space, it is important that in implementing the Green Space Strategy, the multiple benefit objectives articulated by the EIG are incorporated. As such, the first task set out within the strategy
is to ‘make connections’ with the EIG and its proposed projects.

**Local Strategic Partnerships** - With environmental infrastructure providing benefits that work towards meeting objectives across local authority and partner services, it is important that, although driven by planning, the EIG and the projects outlined above are integrated with other service plans. Integration and co-ordination of the EIG objectives and projects, articulating their economic and social benefits, should be incorporated into LSP activities. However, with the abolition of the Comprehensive Area Assessment (CAA), Public Service Agreements (PSAs) and, Local Area Agreements (LAAs), along with the demise of the National Indicator Set, the focus of LSPs has dramatically changed in a short space of time. Although the reduction in reporting burdens has been welcomed, and there is a general direction of greater autonomy and more freedoms that move away from bureaucratic to a clearer and more practical focus on what needs to be done, there is a great deal of uncertainty as to how future partnership agreements will be structured. What is clear, however, is that multi-agency working will be increasingly important, with the LA taking a co-ordinating role but perhaps stepping back from delivery and funding.

**Highways** - A large amount of open space forms part of the road and highway network. Roundabouts, verges and central reservations offer great potential to provide additional benefits. In addition, a number of the environmental projects, such as street trees and rain gardens, need co-ordination with highways services. As such it is important that consideration of environmental infrastructure is appropriately recognised in the Local Transport Plan and management plans. In the past, there has been articulation of conflict between the incorporation of green infrastructure and highways functions resulting in the removal of green space and trees. These can, however, be overcome by working closely at a corporate level to recognise the importance of environmental infrastructure and by providing focused training and updating management plans.

**Government Agencies and Public Concern Organisations** - There are a number of important Government Agencies, such as Natural England, the Environment Agency, the Forestry Commission and British Waterways, who play an important co-ordination and management roles across the Black Country. All these organisation have been involved in the development of the EIG and action plans. It is important that they continue to play a role in shaping the EIG and take responsibility for actioning interventions.

**Charitable Organisations** - In addition to the government agencies, there are several charitable environmental organisations, such as the Birmingham and Black Country Wildlife Trust, who have responsibility for managing natural assets. These partnerships should continue and the Black Country Authorities should support these organisation in increasing their management responsibilities.

**Local Enterprise Partnership (LEP)** - The Black Country LEP application was approved by the Government on 13 December 2010. These new bodies will be based on a private/public sector partnership model, with the board chaired by and geared up to meeting the needs of the private sector. The Black Country LEP is made up of five important businesses and the Chief Executives of each of the Black Country Authorities. Within the LEP application submission to government, the importance of the environment to future economic success was highlighted. The link between environmental quality and economic performance should, however, be drawn out further, with local authority chief executives articulating the evidence for the value of environmental transformation in board meetings and action planning. As such, assembling and developing that evidence through the EIG is a vital role for the group(s) with an overarching role for EI leadership in the BC to articulate its importance. Although the LEP does not come with its own funding source, it will be influential in convincing government for investment. It is essential that the economic benefits do the following: increase inward investment, increased productivity, cost savings, and is incorporated into the package of projects that the LEP will be developing as their priorities. In addition, the LEP is the vehicle through which innovative funding/development mechanisms drive major change and secure investment. As such, the LEP seeks responsibilities for holding, distributing and managing funds and directing the use of assets, including those currently held by Advantage West Midlands (Regional Development Agency), only in accordance with defined priorities. The EIG should also be used as evidence to prioritise new/enhanced open space provision in the areas identified as having the greatest deficiency and/or poor accessibility to open space.

**Business Improvement Districts (BIDs)** - BIDs bring together the businesses within a defined area to co-ordinate activities for mutual benefit, such economic uplift or preventative savings delivered by environmental infrastructure improvements. BIDs have traditionally been used in town centres, but could also be applied to other commercial areas. BIDs can also act as a source of funding as additional taxes can be levied on the businesses to pay for the collective improvements within the BID boundary. This could be a good way of ensuring that, for example, the Eagle Street Recovery Transfer Hub and Bagnall Street comes forward with the right mix of complimentary services and incorporates sustainable management of the site. Sandwell has already demonstrated the opportunities derived from BIDs through the Albion BID.
Opportunities to learn and extend this BID to develop the objectives of the EIG should be explored.

The role of BIDs, and similar accelerated development zones, were articulated in the Black Country LEP submission. Less formal collective management arrangements may be more reasonable for some areas. In these instances, the authority should be proactive in co-ordinating and maintaining momentum.

**Big Society and Community Involvement** - The localism agenda will mean that community responsibility, management and ownership of assets and services will become increasingly important in delivering environmental infrastructure. The Black Country local authorities and Third Sector bodies should be proactive in encouraging local responsibility for environmental improvements; articulating the social and economic benefits from having a healthy, attractive environment and robust, well-functioning ecosystems.

**Funding opportunities**

These different delivery mechanisms present a wide variety of funding opportunities:

**Developer Contributions – Section 106 (S106) and Community Infrastructure Levy** – Developer contributions are likely to play a major role in delivering important infrastructure within the wider community. This is particular important for environmental infrastructure which is often required in locations away from the development itself. Although CIL will take over from S106, scope and appropriate tariffs will need to be worked out. Initially discussions revolved around a regional pricing schedule to avoid regional completion for development, however with the abolition of the Regions, this has stalled. The Planning Obligations SPD will help to clarify the situation in Sandwell prior to the anticipated introduction of the CIL.

**European Regional Development Funding (ERDF)** - The ERDF is a funding stream allocated to regions by the European Union to stimulate regional economies. The West Midlands has been allocated 400 million euros to invest in projects which will support regional businesses and create jobs, with a particular focus on the knowledge economy. However, with the planned abolition of RDAs it is currently unclear who will distribute European funding. ERDF funding has been used in Sandwell for canal improvements, and could provide funding for future similar initiatives.

**Government Environmental Agencies** – The Government’s environmental bodies have a range of funding pots that could be drawn upon. Natural England’s Higher Level Stewardship scheme provides funding to landowners with the aim of delivering significant environmental benefits in high priority situations and areas, such as those prioritised by the EIG. Similarly the Forestry Commissions English woodland Grant Scheme offers funding under six themes, including ‘Woodland management Grant’ and ‘Woodland Regeneration Grant’. Together, these could incentivise land owners to better manage the existing natural assets and pockets of trees and woodland that emerge across the Black Country. In relation to the canal network, the Government has backed British Waterway’s ambition to move its waterways in England and Wales out of direct state control and into a new independent charity. While this move opens up new opportunities for charitable fundraising and tax relief benefit, this does alter BW’s position in regard to delivery and funding which should be recognised within the EIG.

**Regional Growth Fund** - Launched in 2010, the new Regional Growth Fund to which enables businesses and local communities bid for money to help boost private sector growth in areas currently over dependent on the public sector. This may therefore be a source of revenue for the development and management of environmental infrastructure that supports job development and business growth, such as parks management and Business Improvement Districts.

**Landfill Communities Fund (LCF)** - The LCF encourages and enables Landfill Operators (LOs) to support a wide range of environmental projects by giving them a 90 percent tax credit against their donations to Environmental Bodies (EBs). A very wide range of organisations may register as EBs and receive LCF money. In addition, many organisations benefit from LCF funding without enrolling as EBs, choosing instead to work with Distributive Environmental Bodies (DEBs). There a number of Environmental Bodies working across the Black Country and a comprehensive list can be sourced through the ENTRUST website. In particular, large businesses such as SITA Cory, CEMex and Veolia, who all have a presence in the Black Country, have environmental trusts that act as EBs which can fund projects.

**Lottery** – The Heritage Lottery Fund provides funding for site/topic related initiatives that help to sustain and transform our heritage, such as park restoration. There are a number of local social, economic and environmental criteria need to be met, but crucially both capital work and revenue activities will be supported. In addition, The Big Lottery Fund will provide funding of £300 to over £500,000 for projects that bring social, community and environmental benefits.

**Big Society Bank** – The Government has committed to setting up a Big Society Bank to give social enterprises, charities and voluntary organisations access to greater resources. It will be set up using money from dormant bank accounts (those untouched for 15 years or more and available for spending in England) and will encourage investment in social change. These ideas are currently being tested but could provide a mechanism for change in the near future.

**Community First** - ‘Community First’ is a new fund that will encourage social action through new and existing neighbourhood groups. The fund will empower people in areas with high levels of deprivation and enable them to take more responsibility for their communities.
**Green Investment Bank** - In October 2010, as part of the Spending Review, the Government confirmed its commitment to set up a Green Investment Bank (GIB). Led by the Department of Business, Innovation and Skills (BIS), but with significant contributions from other government departments: HMT, IUK, DECC, Defra, DfT and CLG. The first phase of work made high-level proposals for the scope and objectives of the GIB, the range of potential financial interventions, and alternative working models and potential funding sources. BIS has now been tasked to lead the next phase of detailed planning for a GIB, aiming to complete design and testing work by spring 2011. While it is almost certain that monies raised through the GIB will be available to support GI the structuring processes required to access funding are yet to be finalised.

**Urban Challenge Fund (UCF)** – The UCF will replace the Transport Innovation Fund (TIF), a central Government transport improvement funding mechanism. The TIF fund targeted two key priorities i) tackling congestion and ii) improving productivity and as such has application in improving the cycling and walking network. The West Midlands was one of seven areas to benefit from TIF and, although this has now gone, UCF is likely to takeover where TIF left off.

**Income generating opportunities** – Funding from the private sector and users can be generated through licensing, franchising, sponsorship, entry fees and fines. These could be used to supplement the running and management costs environmental infrastructure.

**Environmental Charities** – Charitable organisation with a vested interest in the links between environmental quality and social deprivation, such as Ground Work, will play an increasing role in supporting communities with making small scale environmental improvements. The Black Country Urban Forest’s ‘Millennium Forest’ and ‘Treeways’ projects, are demonstrable examples of where local government and voluntary organisation in the Black Country have worked together for environmental improvements. This structure may provide a valuable starting point for implementing the EIG.