A Cool Place to Live

A good practice guide to implementing landscape adaptation to climate change for social landlords

neighbourhoods green

London Wildlife Trust

Green desert, almost devoid of structure, Oval © Mathew Frith

A Cool Place to Live

Trust for London
Tackling poverty and inequality

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Front cover: Clapton Park Estate © John Little

Contents

Structural planting by residents, Borough © Mathew Frith

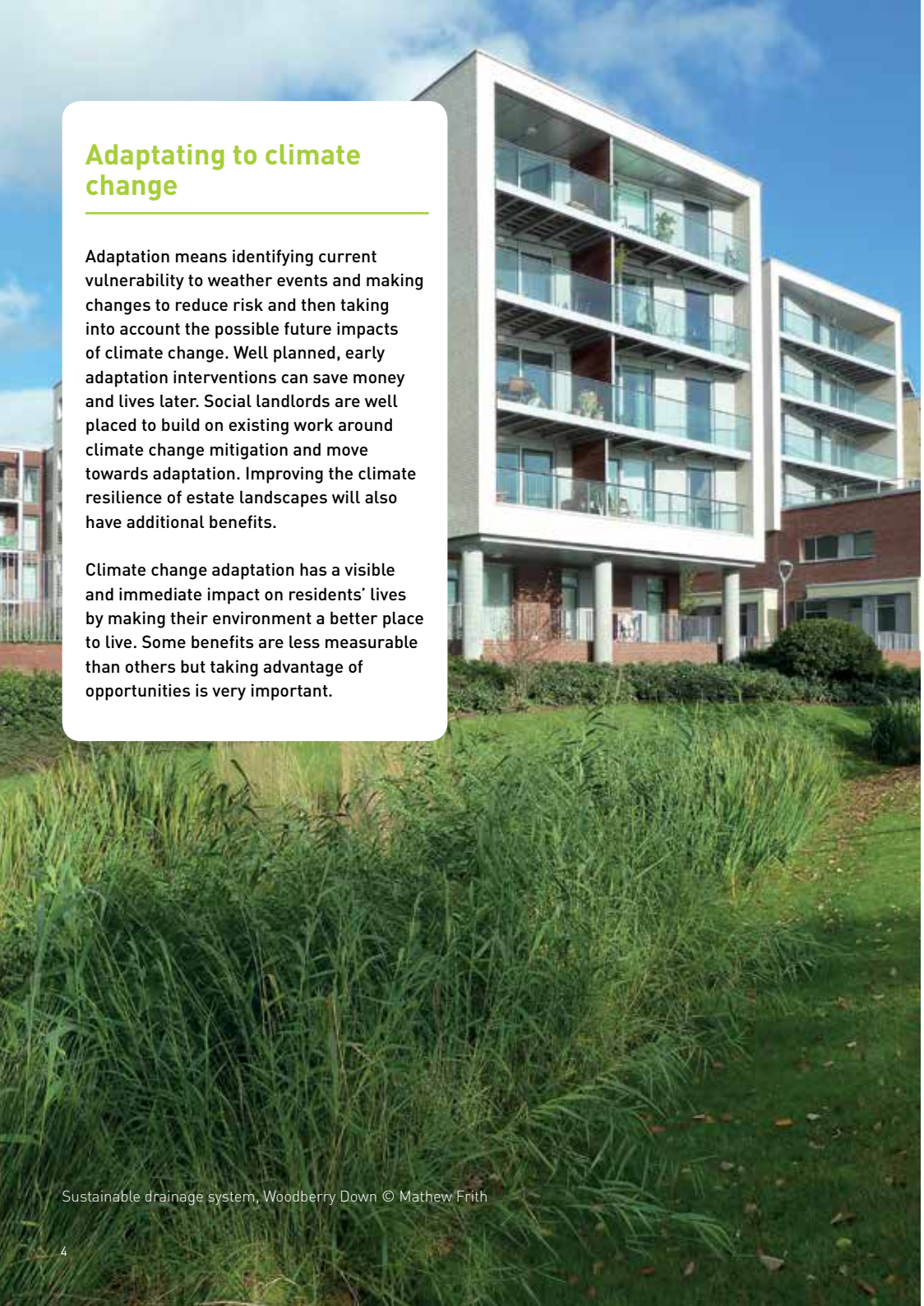
Introduction

Climate change is perhaps the greatest long-term challenge currently facing the world, and it will have a significant impact on housing associations and their residents. Housing associations provide homes and support for some of the most vulnerable people in England and research has shown that it is the most vulnerable who are likely to be most affected by the impacts of climate change, including an increased risk of flooding and overheating.

Housing associations and local authorities have invested significantly in improving the energy efficiency of their homes to create warm, affordable to heat homes for residents and to mitigate the effects of climate change by reducing carbon emissions, and they continue to do so. However, some homes will remain at risk and social landlords increasingly need to make adaptations protect their existing stock from the effects of climate change.

There are already fantastic examples of estates where housing providers have used green infrastructure to protect homes and make their estates fit for the future, making use of green roofs, rain gardens, and green walls to help reduce the risk of flooding and keep homes cool during summer heatwaves. Investing in green spaces to make estates more resilient to the effects of climate change not only protects residents' homes, it can also increase health and wellbeing, enhance community cohesion and reduce anti-social behaviour.

This guidance provides the tools to support social landlords to make adaptations for climate change. We hope it will support them and their resident communities to future proof their housing estates, so they can continue to provide great places to live for future generations.



Adaptating to climate change

Adaptation means identifying current vulnerability to weather events and making changes to reduce risk and then taking into account the possible future impacts of climate change. Well planned, early adaptation interventions can save money and lives later. Social landlords are well placed to build on existing work around climate change mitigation and move towards adaptation. Improving the climate resilience of estate landscapes will also have additional benefits.

Climate change adaptation has a visible and immediate impact on residents' lives by making their environment a better place to live. Some benefits are less measurable than others but taking advantage of opportunities is very important.

Sustainable drainage system, Woodberry Down © Mathew Frith

Climate change

Extreme weather events are already having adverse impacts on people. Social landlords house a high proportion of 'at risk' people; residents who may be more impacted upon and vulnerable to hotter, drier summers and warmer, wetter winters as the effects of climate change become more apparent. The location of many housing estates in inner urban neighbourhoods and the relatively poor quality and low porosity of many existing estates exacerbates this vulnerability.

Impacts of climate change

Climate change impacts, as projected, are generally accepted as: hotter, drier summers; warmer, wetter winters; increased frequency and intensity of extreme weather events; and changes to the behaviour of natural systems (including vegetation). For social landlords this may mean:

- damage to property and assets from surface water flooding and high winds;
- disruption to services, estate management and residents from flooding and other extreme weather events (that are expected to increase in frequency and intensity);
- subsidence to buildings on clay soils which may dry out in summer and autumn;
- reduced comfort for residents due to increased temperatures within dwellings;
- potential increased landscape management costs as growing season extends;
- increased insurance costs.

Surface water flooding

Surface water flooding occurs as a result of high intensity rainfall when water is ponding or flowing over the ground surface before it enters the underground drainage network or watercourse, or cannot enter it because the network is full to capacity. This causes what is known as pluvial flooding. It is an area of climate risk which particularly impacts urban areas because of the lack of permeable surfaces where rainwater can drain away. In London there are estimated to be more than 800,000 properties at risk of surface water flooding.

Who is affected?

Living in a ground floor or basement flat may increase health risks related to flooding. Longer-lasting health impacts may include psychological stress, which can be severe, especially when those affected are displaced from their homes for long periods of time.

Many large cities are already vulnerable to flooding, overheating and drought conditions which can lead to water supply shortfalls. Climate change will increase the probability and severity of these effects through rising sea levels, heavier winter rainfall, higher tidal surges, hotter summers and less summer rainfall. These effects are linked to quality of life, particularly the health and social and economic welfare of vulnerable people.

Getting overheated

The temperature at the centre of a large city can be several degrees higher than in the surrounding countryside; this is known as the Urban Heat Island Effect (UHIE) and is critical to understanding over-heating at the estate or building level. Several factors contribute to the development of this, including: greater absorption and storage of heat from the sun by the urban fabric during the day; surface water being drained away is not retained by green infrastructure and therefore not available for evaporative cooling by vegetation; and heat emissions from vehicles, air-conditioning, and industry.

Hard surfacing also stores more solar energy than vegetated surfaces. This energy is released back into the atmosphere as the air temperature cools.

This contributes to the UHIE, particularly at night during the summer months. In London, the UHIE on night-time temperatures can be up to 10°C. Overheating is projected to rise in London from 18 days per year to between 22 and 51 days by the 2020s.

Individual buildings are at risk of over-heating. This impacts residents, the building fabric and other assets. Several factors which affect indoor summer temperatures in British dwellings include:

- external climate
- location
- dwelling orientation
- room type
- time of day
- building fabric characteristics
- occupant behaviour.

Overheating can therefore vary across estates, within buildings and between dwelling units. The government's Climate Change Adaptation Sub-Committee states that 'Flats and terraced housing – particularly those built before 1920, in the 1960s and post-1990s – tend to be the most prone to overheating'. This is attributed to the low solar thermal protection offered by the top floor of poorly insulated flats. In contrast, concrete ground floors are found to have a significant cooling effect.

Who is affected?

Residents in housing blocks which exhibit the above factors may experience discomfort, and a reduction in quality of life, or worse – overheating. How serious this is depends on the needs of the individual and, in some cases, on how they perceive the issue. In extreme over-heating events it can lead to death or serious impacts on people's long-term health.

The Health Protection Agency identifies high risk groups as the:

- the elderly (especially those living alone)
- individuals with pre-existing illnesses,
- people living in over-crowded accommodation
- socio-economically deprived.

Importance for social landlords

As major stockholders social landlords have been able to take a strategic view on adapting their assets to deal with climate change more effectively than other landlords. Some of their housing stock, due to its age and location, is more likely to be affected by impacts of climate change such as overheating and flooding.

As social landlords house many elderly and 'at risk' people their residents are likely to be more vulnerable to the effects of climate change than the general population would be. Some landlords may own and manage stock in neighbourhoods of 'climate disadvantage.' For example, people on low incomes are less likely to have household contents insurance, and would therefore be less able to recover following a damaging storm or flood. They would be more likely to suffer long-term mental health problems and are likely to be adversely affected by any increase in hot weather. There is also evidence that states a marked increase in opportunistic crime in hot weather and this can exacerbate the issue of overheating because people may not want to open windows at night.

Social landlords also own and manage substantial areas of land which in many cases can be open, relatively devoid of vegetation, and of poor quality. Enhancing these as a means to adapt to climate change can help to manage liabilities, avoid future costs and build climate resilience. They can also help strengthen residents' ability to cope with climate impacts and may further community cohesion.

Policy drivers

Over the last ten years social landlords have led the way in improving the quality of their stock. This includes delivering the Decent Homes programme which aims to reduce residents' fuel bills and fuel poverty. In addition, landlords are responding to broader drivers such as the need to ensure energy security, the liveability agenda, and the need to adapt to climate change.

Retro-fitting against future shock

Two often reported facts are of significance in adapting existing stock to the impacts of climate change:

- Most of today's buildings were designed for the climate that existed when they were built and are not necessarily equipped to cope with current or future climates.
- 80% of 2050's housing stock is already built.

These figures make it clear that adapting existing stock is essential if the impacts of climate change are to be effectively managed. Drivers for adapting this stock must be identified. These include:

- increased risks to assets such as overheating and flooding
- rising insurance and maintenance costs to landlords
- rising costs to residents due to an increase in extreme weather events
- statutory Surface Water Management Plans
- implementation of climate change adaptation or sustainability strategies
- responses to other benefits associated with green spaces such as residents' quality of life, biodiversity, natural play, and food growing
- loss of asset value and resilience
- increased void rates
- increased reputational risk if a large number of residents are affected by climate change impacts

Adapting to climate change impacts is arguably more easily achievable for new development, where regulation and planning requirements act as significant drivers. Retrofitting existing stock is a more critical area to address given the number of properties in existence now.

Green not grey

Incorporating green infrastructure (GI) into developments in the same way that 'grey', or traditional, infrastructure is incorporated is fast becoming the only practical approach to address the impacts of climate change and extreme weather events.

Using elements of GI with multi-functional benefits, such as Sustainable Drainage Systems (SuDS), is such an opportunity. The use of SuDS challenges the idea that water should always be culverted and channelled, and suggests instead that water should be seen as an asset in the landscape rather than a threat to be avoided. Likewise, the introduction of flood risk measures (such as GI) should be used to improve urban environments, avoiding the drawbacks of many traditional responses, which have helped create unappealing and unsafe urban space.

The National Planning Policy Framework (NPPF, paragraph 99, 2012) states that *'care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure.'* At the local level many local planning authorities are already protecting and promoting GI through the adoption of relevant policies and proposals in their development plan documents.


Greenspace redesigned for cars, Stepney © Mathew Frith

The NPPF requires local planning authorities to have a holistic understanding of climate adaptation: *'Local plans should take account of climate change over the longer term, including factors such as flood risk, coastal change, water supply and changes to biodiversity and landscape'* (paragraph 99). Local plans, in which social landlords have a key role, should play a full part in building community resilience to a changing climate.

Sustainable drainage

Through the Flood & Water Management Act 2010 the government aims to *'encourage existing communities to 'retrofit' sustainable drainage in their gardens and neighbourhoods.'*

The London Plan

The London Plan (2011) is the overall strategic development plan for the capital and its accompanying guidance and strategies provide a comprehensive framework for driving adaptation to climate change.

Chapters 2, 5 and 7 set out policies to improve London's environment by tackling climate change, reducing pollution, developing a low carbon economy, enhancing GI, consuming fewer resources and using them more effectively. Key policies include:

- Policy 5.3C, which outlines the standards of sustainable design and construction development proposals should meet to improve the environmental performance of new developments
- Policy 5.9, which aims to reduce the impact of the urban heat island effect in London and encourages the design of places to avoid and reduce overheating
- Policy 5.10, which promotes and supports urban greening, such as new planting in public spaces and multifunctional GI, to help reduce the effects of climate change.

Strategic London Plan policies recognise the importance of GI and a partnership approach to managing and delivering it, together with a requirement that boroughs 'should' undertake audits of 'all forms' of 'green and open space', not just the green space that is publicly accessible or council owned. This policy will assist social landlords in undertaking their own auditing objectives for their own green space, since data should either be collected by the local authority or appropriate partnerships can be developed to gather a comprehensive assessment related to all land holdings upon which a coordinated and optimal GI action plan can follow.

The Mayor's *Supplementary Planning Guidance* 2012 provides the implementation framework for The London Plan. Key policies include:

- Policy 3.5, which states that the design of all new homes should address climate change adaption and mitigation
- Policy 5.4, which supports retrofitting the existing housing stock to mitigate and adapt to climate change.

The Major's Climate Change Adaptation Strategy (2011) addresses these points in more depth, and includes chapters focusing on addressing the risks of flooding, drought and overheating. It also reinforces the message that climate change adaptation provides wider benefits. For example, increasing the amount of greenery in the city to absorb flood water and cool the city will also improve the quality of people's lives, reduce energy use, improve water and energy security, tackle social inequality and boost the 'green' economy.

All London Green Grid (ALGG)

The ALGG (2012) is the GI strategy for London, and sets out its ambitions against the challenges of a growing city. 'For this scale of development to be sustainable, to respond to climate change and to enhance the health and quality of life for Londoners, a step-change in environmental quality and performance is required.'

Many of the ALGG's objectives are relevant to social landlords:

- Mitigate the risk of surface water flooding in Critical Drainage Areas by increasing green cover, including green roofs, pocket parks, and rain gardens, together with the management of existing green space to ensure maximum absorbency;
- Promote London's 'urban forest' and plan for succession planting to ensure a continuity of maturing tree cover that contributes significantly to mitigating the urban heat island effect;
- Promote additional pockets of nature in central London by diversifying management, linking spaces to provide wildlife corridors, and promoting accessibility to the natural environment in parks and on walking routes.

Public Health Policy

Public health is also significant especially to the residents of social landlords. 'Health Effects of Climate Change in the UK: Health Protection Agency' (2012) calls for:

- 'Better understanding of the current and emerging building infrastructure, and its potential associations with climate-sensitive health impacts in indoor environments.
- 'Promote long-term, energy efficient building design interventions to ensure adequate ventilation in increasingly airtight buildings. Vulnerability, health equity and cost-benefit analyses need to be carried out prior to climate change adaption and mitigation interventions in the built and indoor environment. Susceptible population groups need to be identified and supported.'

National Heatwave Plan

This plan (Health Protection Agency, 2011) asks partners to look at GI as part of their long-term planning and to identify cool areas. For social landlords, an estate that has appropriate quality of greenery and shading would constitute a cool refuge. Action by social landlords will meet 'Level 1 action' under the plan.

Gallions Housing
Thamesmead

Description: Developed from the mid-1960s, Thamesmead today is a neighbourhood of 45,000 residents. The area is characterised by housing within an extensive network of green spaces, and a system of canals and lakes.

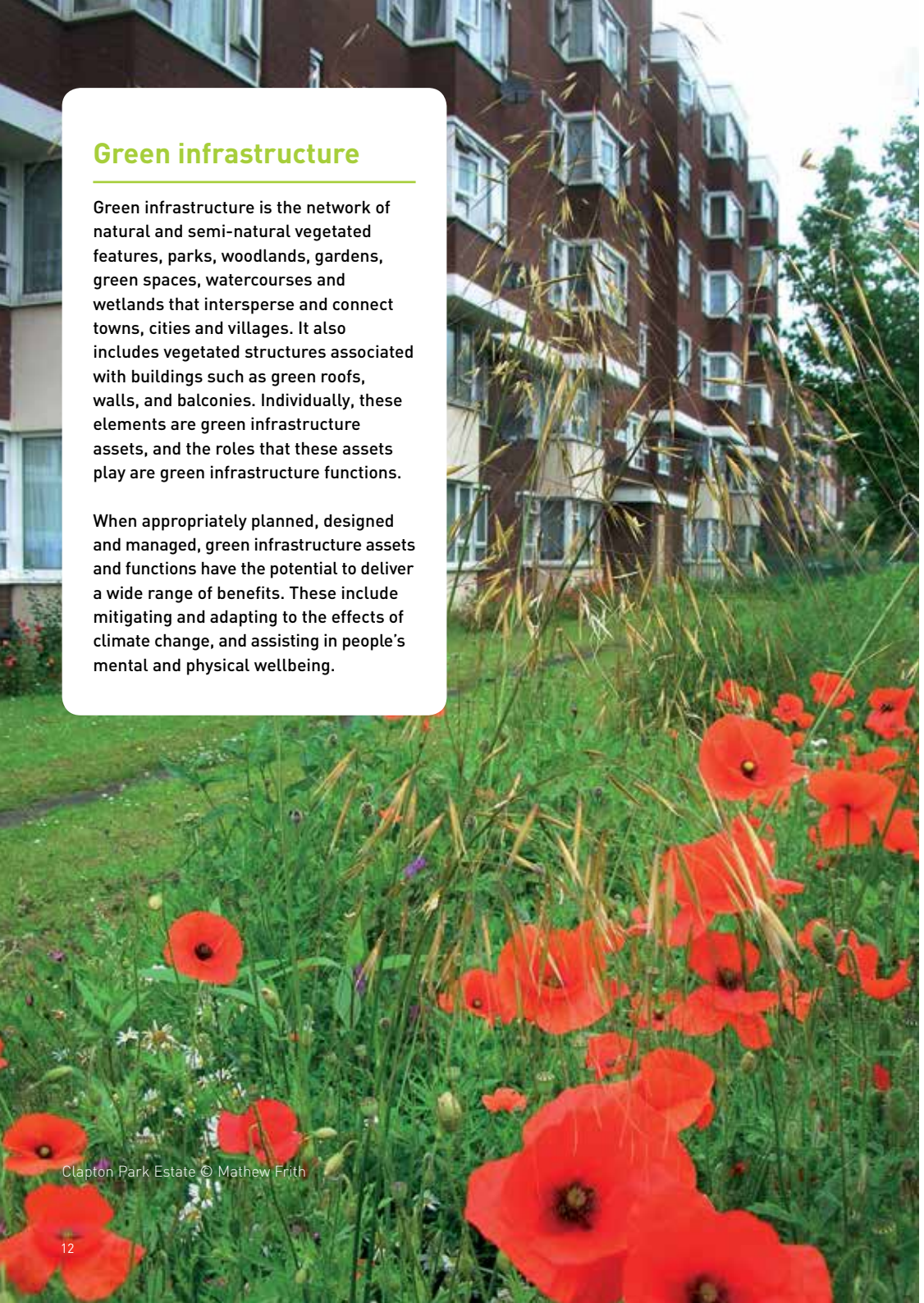
Theme: Involving residents in the delivery of an award-winning rain garden.

Previous landscaping: Flat expanse of typical amenity grassland by Teeswater Court.

Aims: Transference of the Gold Medal-winning Royal Bank of Canada Blue Water Garden from Chelsea Flower Show 2013, involving local residents and Gallions staff, producing a more diverse landscape to help manage surface water run-off.

Outcome: Implementation of SuDS.

Implementation: London Wildlife Trust, Gallions Housing



Green infrastructure

Green infrastructure is the network of natural and semi-natural vegetated features, parks, woodlands, gardens, green spaces, watercourses and wetlands that intersperse and connect towns, cities and villages. It also includes vegetated structures associated with buildings such as green roofs, walls, and balconies. Individually, these elements are green infrastructure assets, and the roles that these assets play are green infrastructure functions.

When appropriately planned, designed and managed, green infrastructure assets and functions have the potential to deliver a wide range of benefits. These include mitigating and adapting to the effects of climate change, and assisting in people's mental and physical wellbeing.

Clapton Park Estate © Mathew Frith

Green infrastructure

A green infrastructure approach enables landscapes to deliver a range of benefits simultaneously, which can sometimes be multiplied through their connection to a wider green space network. In the context of social housing this multi-functionality includes: addressing the impacts of climate change; providing space to grow food; providing habitat for wildlife; making homes more comfortable, liveable and healthy; helping to cleanse air and water; and helping to increase property values and decrease void and anti-social behaviour rates.

Landscapes of social housing

The quality of people's homes is influenced by the spaces around them. There is increasing recognition that well designed, well managed green spaces by and in between housing are crucial to making neighbourhoods liveable, and contribute to people's quality of life.

Social landlords can manage significantly large portfolios of land. Delivering high quality green space not only mitigates climate change it also improves residents' wellbeing, increases asset value, and decreases void rates and anti-social behaviour. Considering existing green space as the foundations from which to develop GI can help to better deliver climate change adaptations.

What can GI do for climate change?

Landscapes

Soft landscapes as a whole, or elements of them, such as lawns, herbaceous beds, shrubs, hedges, trees and water features all play a role in attenuation of surface water. Individually and - more importantly - collectively they act as porous soakaways.

Therefore the presence of soft landscaping is a natural way to attenuate surface flooding - and the more structurally complex it is generally the more effective it is. It may be enhanced or, in the absence of any natural landscaping, replicated by use of SuDS.

Sustainable Drainage Systems (SuDS)

Sustainable drainage is the practice of using vegetation to control surface water runoff as close to its origin as possible, before it is discharged to a watercourse or sewer. Whilst existing landscapes can help address surface water flooding, SuDS are designed to be more effective, and involve moving away from traditional piped drainage. SuDS usually mimic or enhance natural systems to:

- reduce impacts on drainage systems
- reduce surface water run off onto the public realm and around properties and other developments

They can also provide other benefits by creating habitats for wildlife, providing clean water for re-use by local residents and businesses, and creating opportunities for education and play by making the water cycle visible. SuDS should be implemented within the context of the existing landscape, especially if retrofitted.

Living (green) roofs

These may form part of a SuDS or be implemented as a stand-alone approach to addressing surface water impacts. A living roof is a vegetated layer on a roof surface.
An intensive green roof is an effective means of reducing surface water run-off. The amount of rainfall a green roof can retain varies depending on the type of roof and the amount of rainfall. In the summer an intensive green roof can typically

retain between 70 and 80% of the surface water run-off. Living roofs also have other benefits, such as supporting wildlife in urban areas, increasing air quality, and reducing the urban heat island effect.

GI and the Urban Heat Island Effect

There are studies showing the overall effect of GI in reducing the UHIE. For example, a modelling study of Greater Manchester suggested that increasing the current area of green infrastructure by 10% in areas with little or no green cover could result in a cooling of surface temperatures by up to 2.5°C under the high emissions scenarios based on the UK Climate Impacts Programme (UKCIP02) predictions.

A Natural England report (2012) identifies four 'production chains' for GI:

- Shade reduces temperature and ultra violet radiation (sunlight)
- Evapo-transpiration reduces temperatures
- Shelter reduces wind speed, provides shade
- Green roofs can provide insulation, reduce the need for air conditioning, and may therefore lower energy use.

Types of green infrastructure

Multi-functionality vs. specialist - optimising estate opportunities

Green infrastructure can be considered as multi-functional or specialist. Multi-functional GI provides several functions, whereas specialist GI addresses a specific issue, such as surface water flooding, in a particular location of an estate. Multi-functionality is key in an urban context where land is an important asset and there are a range of demands from it.

The use of multi-functional or specialist GI will depend on a number of factors such as: location; existing GI cover; likely impacts of climate change; the size of the estate; and the budget available. However, the overall aim should be to attempt to achieve as many objectives as possible simultaneously from GI.

Mature tree shade, King's Cross © Mathew Frith/Peabody

Potential adaptive green infrastructure in car parking area.

Potential adaptive green infrastructure across a block.

Potential adaptive green infrastructure in new builds, including green roof and more diverse lawns.

Clapton Park TMO

Clapton Park (Poppy) Estate

Description: A large estate in Lower Clapton, mostly built in the 1970s, consisting of a mixture of blocks, private and communal spaces. Typical of an inner-urban neighbourhood with a diverse population of residents with high levels of socioeconomic deprivation. In 1994 the Tenant Management Organisation took on management responsibility.

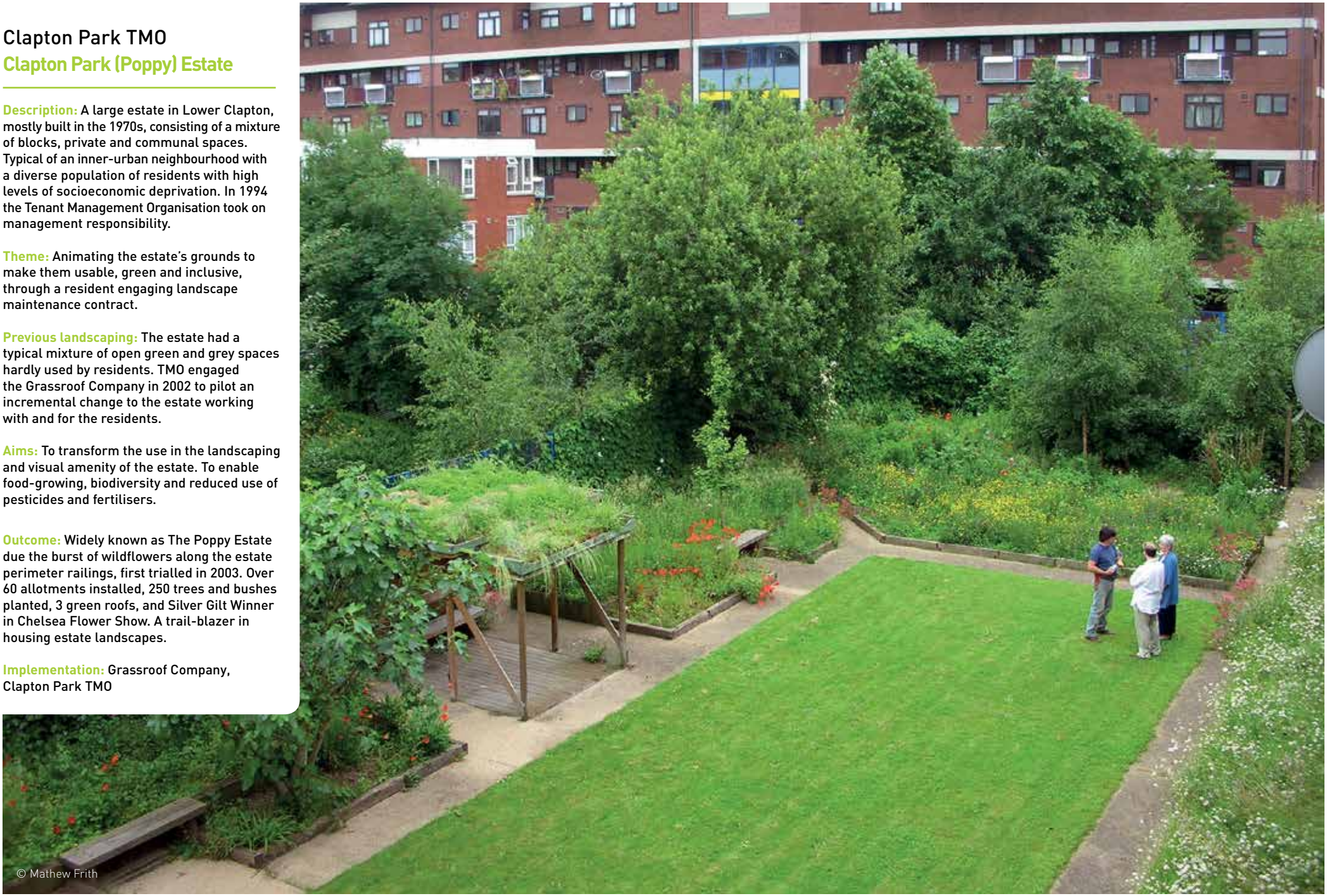
Theme: Animating the estate's grounds to make them usable, green and inclusive, through a resident engaging landscape maintenance contract.

Previous landscaping: The estate had a typical mixture of open green and grey spaces hardly used by residents. TMO engaged the Grassroof Company in 2002 to pilot an incremental change to the estate working with and for the residents.

Aims: To transform the use in the landscaping and visual amenity of the estate. To enable food-growing, biodiversity and reduced use of pesticides and fertilisers.

Outcome: Widely known as The Poppy Estate due the burst of wildflowers along the estate perimeter railings, first trialled in 2003. Over 60 allotments installed, 250 trees and bushes planted, 3 green roofs, and Silver Gilt Winner in Chelsea Flower Show. A trail-blazer in housing estate landscapes.

Implementation: Grassroof Company, Clapton Park TMO



Grosvenor Estate © Mathew Frith/Peabody

Is it worth it? A Social Return on Investment

Social landlords wanting to invest in green space often face challenges in being able to demonstrate its potential value. Investing in green infrastructure to make housing estates more resilient to the effects of climate change will also have a range of additional benefits for residents. These are difficult to measure and will often go unnoticed. A Social Return on Investment (SROI) approach offers a way of measuring and valuing such changes. It is designed to help organisations understand, manage and communicate the social value their work creates in a clear and consistent way. It will ensure that wider social benefits, such as residents' health improvements and skills gained, are recorded and valued. This can be crucial in evaluating the success of projects, improving existing services, and helping to secure funding for future projects. There are a range of tools available to help organisations measure SROI, including the LOGIK toolkit, developed by University College London, with Peabody, referred to in this guidance.

Making the case

It is crucial that social landlords are able to make an effective business case for investing in GI to adapt their estates to climate change. A growing body of evidence shows links between green space and improved social and community outcomes. Enhanced greening helps to: increase social activity; foster social capital; improve community cohesion; improve health; lower crime levels, particularly in deprived communities; and develop a sense of place. There are a number of clear costs and benefits to social landlords who wish to implement GI.

The economic case

The Microeconomic Review *Economic Benefits Investing in the Environment* report helps to set out the functional advantages of GI by getting the most benefit out of what nature is doing for free, and reducing the amount which needs to be done by expensive technology and hard (grey) infrastructure. For example '*Improved flood control leads to reduced costs of flooding and can by extension lead to reduced insurance premiums and increased property values. It is an absolute benefit i.e. the improvement does not have to be based on another area's loss.*'

According to the Environment Agency planned change is more cost effective and less expensive than reactive actions. It has been estimated that every £1 spent on adaptation could save £4 in avoided damages.

Asset Management and Maintenance

Green infrastructure can protect the assets of landlords, namely buildings, internal roads and paths and other infrastructure, in a number of ways:

- SuDS offer easier inspection and maintenance compared to traditional drainage systems;
- less intensive (and frequent) maintenance regimes may arise from installed GI e.g. around a rainwater garden;
- climate change adaptive interventions can marry with those for nature conservation, play, amenity and community safety;
- living roofs can prolong the lifespan of the roof by buffering the weathering effects of external hot and cold temperatures.

Opportunities for savings

Green infrastructure helps alleviate pressure on underground drainage networks and traditional water management infrastructure. It is more flexible and adaptable than traditional drainage systems in the face of future climate change.

If grey infrastructure measures are used to address surface water drainage issues, the lack of multi-functionality means that the measures installed will not assist in reducing overheating impacts. There is growing recognition of the multi-functional benefits of GI measures, such as SuDS.

Analysis comparing the cost of SuDS to that of traditional drainage systems for new development found that the unit cost of SuDS decreases with development size as economies of scale are realised.

In terms of overheating, traditional grey infrastructure solutions could actually make the problem worse. For example, air conditioning pumps heat outside, increasing the external temperature. Green infrastructure solutions can offset the need for air conditioning of indoor dwellings.

Property values and green infrastructure

Research verified by RICS, Policy Exchange, and the International Federation of Parks and Green Space shows that good quality landscapes can provide an 8-12% financial uplift in the sale value of property.

Studies also show that trees can add 15% to 25% to the total value of property, depending on size, condition, location and species rating. Properties can increase in price by an average of 7% in environments landscaped with trees. A Greater London Authority study comparing 'greenness' across the city showed a:

- link between higher percentage open space and higher property values (in terms of the average house price)
- 1% increase in green spaces (in London) was linked to 0.3 - 0.5% increase in house prices

An increase in value of 10-20% of a development is reported by CIRIA from the functional and aesthetics of SuDS. Cost analyses are supportive of creating SuDS, showing that well-designed and maintained SuDS are more cost effective to construct, and cost less to maintain than traditional drainage solutions which are unable to meet the environmental requirements of current legislation.

Designing for thermal insulation and thermal comfort

Insulation of dwellings to improve thermal insulation should be undertaken with overheating considerations in mind. Insulation can help keep homes cool in the summer, though for some buildings it can increase the risk of overheating. If applied appropriately, energy efficiency interventions can be beneficial for the abatement of overheating. There are roles here for implementing green roofs and planting trees to shade dwelling units from the effects of the summer sun. Such measures can help to safeguard the health and comfort of residents.

Refurbishment

Opportunities arise for adaptation measures to be linked to the refurbishment of buildings for other goals such as energy efficiency, ECO, Decent Homes Standard and general estate refurbishment programmes. Early planning, design and integration of aims will produce a better outcome. Savings can be made by delivering improvements simultaneously and combining the costs of the refurbishment work, for example by maximising the use of scaffolding.

Living roofs and Solar Photovoltaics (PV)

Installation of renewable energy such as solar PV has provided a valuable income stream for landlords for producing electrical energy. Unfortunately, there is no income stream from green roofs. However, PVs installed via an A-frame usually perform more effectively when installed on a green roof as the vegetation offers natural cooling to maintain the efficiency of the panels. Furthermore, green roofs have between double and triple the lifespan of traditional roofs reducing replacement and maintenance costs.

Climate change mitigation

Mitigating climate change is equally important to social landlords as they seek to reduce their CO_2 emissions, improve the energy efficiency of their stock and reduce levels of fuel poverty. It is primarily addressed by technological (and commodifiable) interventions, measures which landlords may find easier to adopt into their current business model. However, there are ways in which both climate change objectives can work together for better overall outcomes.

LOGIK Toolkit

LOGIK (London Green Infrastructure Toolkit) is a decision-making tool that can assist social landlords in assessing the financial viability, and wider benefits and value of implementing GI on their estates.


Cowley Estate, Brixton © Rachel Dowse

LOGIK was developed by University College London (UCL), to enable monitoring of the refurbishment of Peabody's Islington Estate. The toolkit has been developed to improve awareness and address perceptions of GI, and provides quantified evidence on both the potential environmental and financial returns of installing GI, encouraging an understanding of sustainable retrofit options on social housing estates. LOGIK undertook Cost Benefit Analysis (CBA) and Social Return On Investment (SROI) for the project.

Running LOGIK for the Peabody plans on the Islington Estate over 2012-13 revealed that some significant benefits are likely to be experienced for management of storm water runoff, biodiversity and social impacts. The SROI for Peabody's plans was found to be high, returning £1.95 for every £1 spent though the CBA returned a negligible figure. This is an indicator that the major impacts of the work at Islington Estate are of a social benefit rather than a cost benefit. However, the limitations of the CBA are an important caveat, as only criteria with financial value can be assessed.

LOGIK requires further development and application; the CBA is likely to have undervalued the financial value of GI in its current prototype. LOGIK is open source and is available for adaptation and application by social landlords through future climate change adaptation projects.

Achieving Building for Life scores

The Building for Life standard is made up of 20 criteria for creating places that are safe, attractive and efficient to sustain. The standards provide a useful tool by which to evaluate new housing developments during the design and planning stages, as well as useful points to consider when planning adaptions to existing estates.

Green infrastructure relates to two of its criteria:

- 01: Community Facilities, including parks
- 05: Reduced environmental impact (makes reference to the impacts of climate change)

For new development, GI must be considered at the start of the design process to make it cheaper and better integrated into overall design.

Lambeth Council

Heron Court, West Dulwich

Description: Bordered by roads on two sides, Heron Court is one of the 10 three-storey blocks on the estate. Built in the 1950s these stand in typically broad expanses of flat amenity greenspace of little structural or species diversity.

Theme: Reducing surface water run-off via storage of rainwater.

Previous landscaping: Flat amenity lawn, mostly unused, and standard whitebeam trees.

Aims: Intercept runoff from roofs, provide visual amenity for the community and create biodiversity opportunities. Rain garden to be used to encourage infiltration of rainwater into the ground to reduce drying out of clay soils.

Outcome: Easy to install SuDS that can be replicated across these kinds of estate landscapes. Generated interest in urban rain gardens as a measure to address surface water flooding and alleviate pressure on drainage networks.

Implementation: London Wildlife Trust, Lambeth Council (Lost Effra project)

Peabody
Islington Estate

Description: Five blocks each with five stories, built in 1865 and now Grade II listed, 173 units in total.

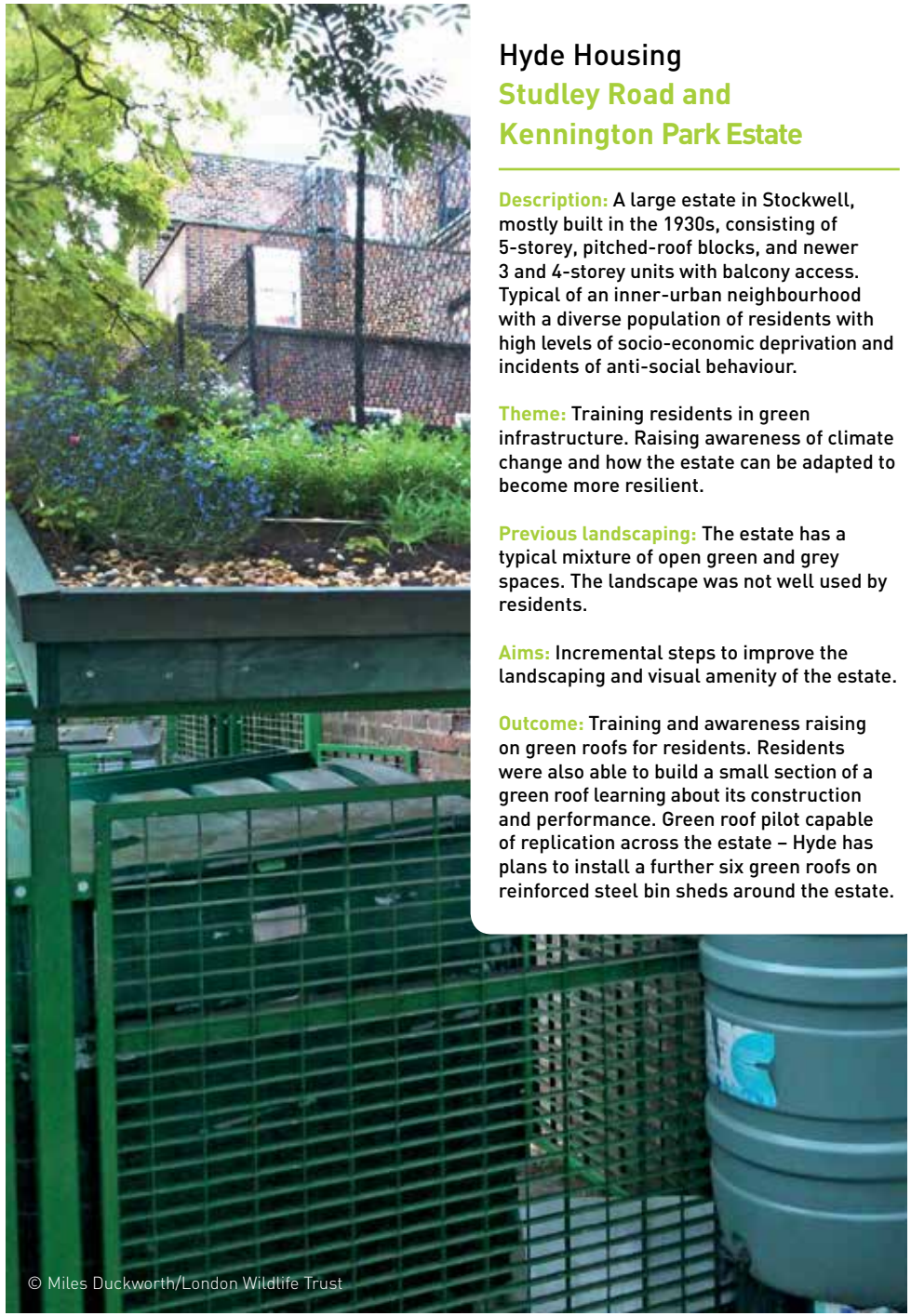
Theme: Integrating climate change adaptation into urban estate landscaping.

Previous landscaping: Mostly hard landscaping non-porous/non-permeable which largely serves as parking and access. One mature tree and monoculture shrubbery.

Aims: Reduce hard surfacing, net increase of vegetation, less surface water flooding, reduction of car-parking

Outcome: SuDS installed under main square and across the estate, extensive new planting, 23 new trees and children's play opportunities. Increase in landscape to 9.4% of estate area, SROI outcome of 1.95.

Implementation: Sprunt, Peabody (Improve programme)



Hyde Housing
Studley Road and Kennington Park Estate

Description: A large estate in Stockwell, mostly built in the 1930s, consisting of 5-storey, pitched-roof blocks, and newer 3 and 4-storey units with balcony access. Typical of an inner-urban neighbourhood with a diverse population of residents with high levels of socio-economic deprivation and incidents of anti-social behaviour.

Theme: Training residents in green infrastructure. Raising awareness of climate change and how the estate can be adapted to become more resilient.

Previous landscaping: The estate has a typical mixture of open green and grey spaces. The landscape was not well used by residents.

Aims: Incremental steps to improve the landscaping and visual amenity of the estate.

Outcome: Training and awareness raising on green roofs for residents. Residents were also able to build a small section of a green roof learning about its construction and performance. Green roof pilot capable of replication across the estate – Hyde has plans to install a further six green roofs on reinforced steel bin sheds around the estate.

Barking Riverside Ltd
Barking Riverside

Description: A development of 10,000 new homes, schools and infrastructure on the north bank of the Thames delivered by Barking Riverside Ltd, a joint venture between Bellway Homes plc and the Greater London Authority. An extensive brownfield site within the Thames floodplain (flood risk classification zones 2 and 3), where the risk is mainly tidal flooding from the Thames.

Theme: Adapting large-scale development sites to the impacts of climate change. Multi-partnership approach to deliver SuDS, green roofs and UHI mitigation measures incorporated into development planning.

Previous landscaping: Once a contaminated post-industrial zone, now area earmarked for mostly residential development.

Aims: Using rainwater gardens, green roofs, balancing ponds and ditches, swales, rainwater harvesting and permeable pathways to manage rainwater and support biodiversity.

Outcome: Implemenation of green spaces designed as SuDS.

Implementation: Bellway Homes, Barking Riverside Ltd

Step by Step Guide

1 Assess impacts of climate change

Landlords can undertake a number of measures to gather more specific data to inform any decision about the implementation of green infrastructure:

- Resident surveys to assess the effects of overheating experienced in residents' home;
- Recording reports of weather incidents such as overheating or surface water flooding;
- Apply online toolkits such as Community Resistance to Extreme Weather, which can predict overheating in different house types: including terraced and purpose-built flats;
- Apply the Chartered Institute of Building Services Engineers 'overheating criterion' to assess whether a building is overheating;
- Assessment under Approved Document L1 (DCLG, 2010), providing guidance for complying with the Building Regulations 2010 energy efficiency requirements;
- Use the Environment Agency's free online mapping tool to identify areas that are particularly at risk of surface water flooding
- Gather information and results from Flood Risk Assessments undertaken by the local authority. Surface Water Management Plans require Risk Assessments to identify flood hotspots and potential mitigation measures;
- Use tenant datato identify residents likely to be vulnerable to the effects of climate change, such as older people.

2 Stock assessment

This process will need to identify the following:

- Incidents and locations of surface water flooding
- Incidents of overheating in dwellings
- Health effects, damage caused and risk of future events.

It should use information and data already held by the landlord on the housing/estate typology such as condition, age, and location of their buildings. It may be available from a number of sources such as: general stock surveys; audits for energy efficiency projects; Capex/Opex expenditure; risk logs; asset management plans, etc. It is important for landlords to have a good understanding of the design of their properties in order to be able to assess which adaptation measures will be most appropriate.

3 Open space / landscape assessment

Social landlords may already have information about the open space land that they own and manage if they have previously commissioned a green space survey of their estate portfolio. Alternatively the data may be available from local authority open space audits, although open space data of housing estate spaces is often not included in these audits. If the information is not currently available the landlord may want to consider undertaking a mapping exercise to identify the external assets they are responsible for. Details about the quality and quantity of open spaces will be important for identifying areas where adaptatins to climate change can be implemented. This information will also be useful for ensuring value for money in landscape management delivery, and improving services for customers.

4 Applying the data

Having undertaken the above steps, landlords should have a database of the impacts of climate change on their estate(s) by specific location, block and dwelling.

Assessments of green space are the basis for identifying where and how GI opportunities can be progressed. These opportunities should be designed, planned and implemented with other estate objectives such as amenity, play, biodiversity, health, community safety, and sense of place.

At this stage application of the LOGIK toolkit (see p19) is useful in assessing the costs and benefits of implementing GI on an estate for climate, water and drainage, biodiversity and social impacts.

5 Engage residents and consult

Residents should be engaged and consulted early in the process. The reasons commonly given by residents for improving the greening an estate relate to children's play, food growing, and wildlife, all of which should be considered as part of a larger GI strategy. Such measures can often provide climate change adaptation elements.

Community involvement in the design and management of green infrastructure can serve to engender social inclusion and can promote stewardship which will lead to reduced management costs over the long term.

6 Training

Where possible the implementation of GI should be linked to training. At Hyde Housing's Stockwell Estate the Green Engineers, a local company, were used to install the green roofs on bin stores. They undertook training with residents to install and maintain the green roofs.

7 Identify potential for green infrastructure at specific locations within estates

The type of GI to be installed will depend on:

- site conditions (geology and sub-surface water movement)
- type of development
- maintenance
- existing landscape structure
- planning.

Using assessments and data, an implementation programme can be drawn up. This may be steered by several factors:

- risks to residents
- risks to assets (link to asset register)
- addressing the impacts of climate change
- meeting multi-functional objectives or specialist GI
- targeting GI – where there is a particular need or a lack of GI
- achievability and impact
- resident demand and need
- resources
- opportunities arising from other estate works or programmes
- initiatives and projects from other stakeholders and partners in the local area.

A prioritised, costed (including maintenance), implementation schedule can then be produced. The 'green infrastructure in action' section of the Landscape Institute's Local Green Infrastructure guidance (2011) provides a useful checklist/ decision list:

- Identify which of the benefits that GI can provide are the most important and achievable for your local area;
- Look at existing local open space with fresh eyes and consider its potential as a community asset;
- Maximise the benefits of GI and create networks by seeing local projects in the context of a wider strategy;
- Ensure Local Plans promote adequate green infrastructure standards, so that new local development enhances the area;
- Partnerships are crucial to sustainable delivery. Local communities and organisations can be a valuable source of knowledge, ideas and aspirations of particular relevance to GI;
- Don't overlook long-term management and maintenance issues;
- Remember the important role of carefully planned green space in reducing the impact of climate change, particularly in controlling flooding and improving the living environment in built-up areas;

- Every place is different. Green infrastructure developments should reflect and enhance the local ecological character of the area.

Monitoring mechanisms should be identified and established for green infrastructure to assess its performance once implemented.

8 Regulations and permissions

Implementing changes to landscape do require consideration of a range of legislative constraints and consents. Depending on the type of measures being designed these can include planning permission, drainage consents, and Tree Preservation Orders. Seek advice from your local authority and/or consultant on the project.

9 Partnership working

Coordinating with external strategies and initiatives may offer scope for optimal implementation and cost efficiencies. For example:

- Opportunity mapping: local authorities may be undertaking opportunity mapping initiatives in relation to Surface Water Management Plans (SWMPs), which should identify green infrastructure as a response to addressing local flooding impacts. SWMPs require a partnership approach in which social landlords should be involved
- Opportunity mapping may also be undertaken in relation to the Local Plan for green/open space or biodiversity objectives e.g. Biodiversity Action Plans.
- Link to, and coordinate with, local green projects such as the installation of SuDS or the green space improvements by local authorities or NGOs;
- Allotment provision;
- Climate Change Adaptation Strategy – where it exists in the respective local authority;
- Regeneration schemes/ master-planning;
- Green infrastructure strategies and partnerships. Internal communication and coordination within the organisation itself is a fundamental starting point since there are a range of staff across different departments and of different functions with an interest and role in GI.

10 Maintenance and management

Consideration of maintenance of GI should be undertaken with asset and estate managers, contractors and residents.

Whilst GI is a solution to the impacts of climate change, there is a susceptibility of the GI itself to the impacts of climate change and a consequential loss of performance such as evaporative cooling. Therefore GI must be suited to changing climactic conditions and maintained accordingly. This might mean taking simple measures such as:

- Planting in accordance with guidance such as Right Place: Right Tree *(http://www.forestry.gov.uk/ltwf)* to ensure tree planting is sustainable.
- Collecting rainwater to use for landscaping etc. in dry periods.

Management may also require consideration and design of specifications for upcoming, or existing, tenders.

Frequently asked questions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1 How best do we adapt?

There is clear evidence of a changing climate, and more importantly a growing instability of climate bringing us more extreme weather events. These are likely to have a disproportionate impact on housing estates especially those within towns and cities.

Undertaking the right work is key to achieving the desired outcome and longevity of the retrofit. In some areas quick wins such as increasing the permeability of parking areas may be clear and easy but undertaking a project to insulate a building may require research to ensure the correct materials are used. By using the correct materials it is possible to allow a building to perform well in summer and winter and this is key to ensuring livability of homes.

2 Where best?

Undertaking an audit of an existing estatae landscape is key to understanding where to adapt because it may be possible to address multiple issues with a well-placed solution. Overheating in upper floors and surface water flooding of lower floors could be reduced by the installation of a livng roof, and this could result in a reduced maintenance cost because of the longevity of green roofs.

3 Who can help?

Adapting to climate change is primarily a process of using existing knowledge and applying it in the appropriate way. Integrating the possible future impacts of climate change into the decision making process is the first step. Understanding that there is a possibility of increased rainfall will ensure that when a retrofitting opportunity arises

not only the current drainage needs are taken into account but the increased needs of the lifespan of the building are also considered.

There are many organisations that specialise in the required areas such as habitat creation, Sustainable Urban Drainage or living roofs but it is important to find the appropriate combination. These may be charities such as Wildlife Trusts, Groundwork, or specialist consultancies that can help.

4 How do I measure success?

The impacts of properly implemented adaptive measures can be hard to quantify, although individual residents may notice a change in their quality of life. It may take a number of organisations working in conjunction with each other to reduce surface water flooding in an area. The key is taking advantage of opportunities to reduce future risks.

Green infrastructure delivers a wide range of benefits, from addressing the impact of climate change to improving the health and well-being of communities. Different tools can be used to capture these wide ranging benefits, and organisations will need to make a decision about which measures to use based on the nature of their project and the benefits they are anticipating. When selecting a tool it is important to consider the following points:

- Is the tool recommended for use in Britain?
- Does the tool cover the GI feature you are assessing?
- Does the tool cover the ecosystem service you need evidence of?
- In what context can the tool be used?

A cost benefit analysis may be useful to measure the success of some projects. This type of analysis will be most suitable where expected benefits have a financial value, but it means that the wider social impact will not be captured.

A Social Return on Investment (SROI) approach can be an effective way to ensure that the wider social impact of a project is measured. Effective use of SROI tools can provide evidence of the return on the investment made. This enables organisations to evaluate the success of their project, demonstrate this to funders, and learn from this to inform future projects.

Heron Court planting © London Wildlife Trust

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www.wildlondon.org.uk
www.neighbourhoodsgreen.org.uk

A Cool Place to Live

A good practice guide to implementing landscape adaptation to climate change for social landlords

De-paved soakaway, Herne Hill © Helen Spring/London Wildlife Trust

Trust for London
Tackling poverty and inequality

London Wildlife Trust

neighbourhoods green
IMPROVING OPEN SPACES WITH SOCIAL LANDLORDS

Trust for London is a charitable organisation that exists to reduce poverty and inequality in London. It does this by funding the voluntary and community sector and others, as well as by using its own expertise and knowledge to support work that tackles poverty and its root causes.

London Wildlife Trust is the only charity dedicated solely to protecting the capital's wildlife and wild spaces, engaging London's diverse communities through access to our nature reserves, campaigning, volunteering and education. It works with a number of social landlords and their resident communities to help enhance their green spaces for wildlife and residents' well-being.

Neighbourhoods Green is a partnership initiative highlighting the importance of open space for residents of social housing and works with social landlords to raise the quality of the design, management and safe use of their landscapes. The project provides guidance, support and tools for housing associations, local authority housing departments, arms-length management organisations, resident associations, community groups and their partners.