

# Northwich Business Improvement District Green Infrastructure Plan

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## Introduction

There are more than 200 Business Improvement Districts (BIDs) operating across the UK. A BID is a business-led and business funded body formed to improve a defined commercial area.

BIDs are voted on by local businesses and are funded through the BID levy, which is a small percentage of a business's rateable value. The majority of BIDs charge 1% of rateable value; however there are some that have opted for higher levies, particularly in smaller locations with lower rateable values, and industrial areas.

In 2014, Northwich businesses voted to become a BID. The Northwich BID prospectus<sup>1</sup> sets out four priorities for the town.

- A Vibrant and Co-ordinated town
- A Supported Environment for Business
- Safe & Secure
- Greener and Cleaner Northwich

*The BID area is represented by the roads in yellow and the orange shaded area.*



*Chester Way (Partial to Leicester Street Roundabout). London Road (Partial to the railway line). Church Road (Partial). Castle Street (Partial).*

<sup>1</sup> [http://www.visitnorthwich.co.uk/wp-content/uploads/2015/06/northwich\\_bid\\_lr.pdf](http://www.visitnorthwich.co.uk/wp-content/uploads/2015/06/northwich_bid_lr.pdf)

To support a “Greener and Cleaner Northwich,” a “Green Infrastructure Audit” was proposed in the BID Prospectus.

Several BIDs in the UK have either already developed their green infrastructure plans or are currently looking at similar audits. The Victoria BID<sup>2</sup> in London, while not typical of BIDs, was the first to carry out an audit and this has led to significant interest and investment in environmental improvements in the area. More recently 14 other London BIDs have completed their audits, and the two Liverpool BIDs have also carried out their audit and are due to publish their Green Infrastructure Prospectus in summer 2016.

## Why a Green Infrastructure approach?

The green infrastructure approach aims to provide information that can assist management of existing environmental assets and plan for investment in new green infrastructure. The approach focusses on the needs of an area, and what green infrastructure can do to help address these needs as part of the wider plan for improvements that the BID will have.

A lot of the work in the development of a green infrastructure plan goes into identifying how green infrastructure is meeting specific need in an area.

For example, the approach may look at the need to improve the image of an area, the need to reduce air pollution levels, to manage risk, improve connectivity. Figure 1 provides a quick overview of the types of benefits that can be provided by good quality green infrastructure planning, delivery and management.

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<sup>2</sup> [http://www.victoriabid.co.uk/wp-content/uploads/2015/02/Victoria-GI-Tech-Report\\_digital\\_Oct-2010.pdf](http://www.victoriabid.co.uk/wp-content/uploads/2015/02/Victoria-GI-Tech-Report_digital_Oct-2010.pdf) and <http://www.victoriabid.co.uk/our-work/clean-green/>



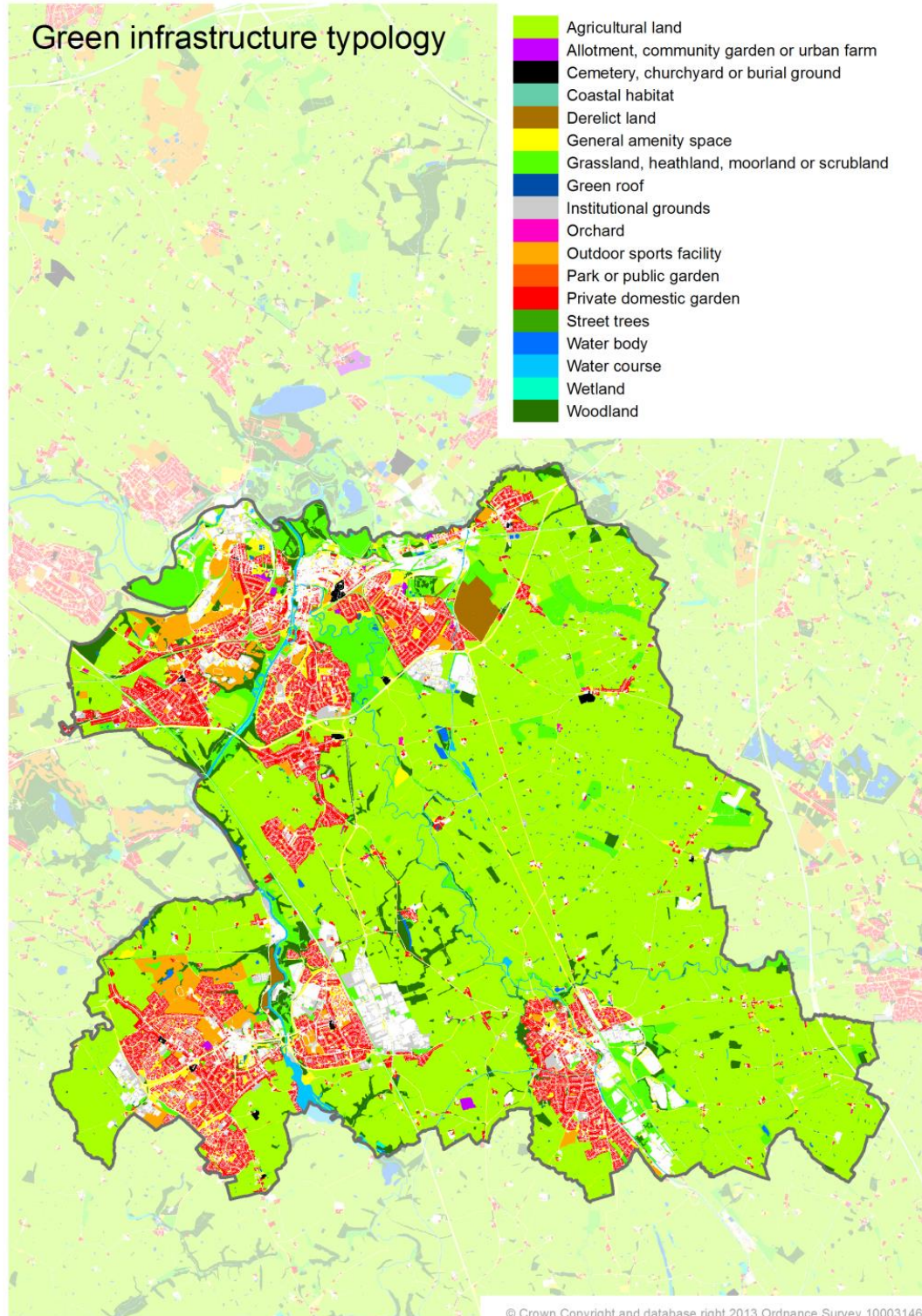


A green infrastructure approach, leading to a plan such as this one, also looks to connect the town to the wider countryside, beyond the boundary of the BID, maximising the benefits to people, businesses and nature.

Finally, green infrastructure planning is based on a solid and developing evidence base. The extensive use of Geographic Information System data, research and local information helps to produce a robust plan for projects to deliver the main objectives of the BID. In particular, to create a more attractive Northwich for residents and visitors and encourage more footfall in the main commercial areas, with increased local spend too.

## Green Infrastructure in and around Northwich

Northwich is the major town in the Weaver Valley, with a population of around 50,000. It is home to around 1,500 businesses. The town sits within a matrix of green infrastructure along the valley.



In the wider Weaver Valley, over 85% of the area can be identified as green infrastructure.

Focussing in on the Northwich BID area, 44% of the BID area is green infrastructure, with general amenity space the predominant type of green infrastructure, followed by gardens and water courses, including the Weaver.

Type	Area (ha)	Percentage of BID area	Percentage of green infrastructure
Cemetery, churchyard or burial ground	0.21	0.32%	0.94%
Derelict land	0.38	0.57%	1.68%
General amenity space	6.71	10.10%	29.66%
Grassland, heathland, moorland or scrubland	2.05	3.08%	9.05%
Institutional grounds	4.15	6.25%	18.35%
Not green infrastructure	43.82	65.95%	
Outdoor sports facility	0.06	0.09%	0.26%
Park or public garden	0.00	0.00%	0.01%
Private domestic garden	4.70	7.07%	20.76%
Water body	0.03	0.05%	0.14%
Water course	2.90	4.37%	12.83%
Woodland	1.43	2.16%	6.33%



Work has also been carried out to look at land ownership in the Northwich area to help in the development and delivery of green infrastructure projects and programmes. The data requires some updating, but is still a good source of information. This may be a useful tool in the BID's delivery of its "Greener and Cleaner" priority.

<http://www.merseyforest.org.uk/northwich/>



## Green Infrastructure SWOT Analysis for Northwich BID

**S**

### Strengths

Significant investment over past 30 years to reduce levels of derelict land

'Rectangle' of important attractions, with Northwich Woodlands as a key link between these

High levels of local use of existing sites and support for community involvement

Public support for the green infrastructure

Green infrastructure affects perception of Northwich, decisions to move to the area or stay in the area

Northwich Woodlands delivers more than £18m of value to the local town

Wide range of partners supporting improved green infrastructure

High quality natural environment in places

**W**

### Weaknesses

Funding cuts for many organizations

No clear marketing message for green spaces in and around Northwich as part of the town's offer

An array of visitor information that is not coordinated

Link between business and the natural environment is lacking

Poor signage and interpretation of green infrastructure

Silo working between and within organisations, partly due to time and budget pressures, that means that investment is not joined up to make the most of opportunities available

**O**

### Opportunities

Improve image of the town

Increase visitor numbers and spend

Increase length of stay in Northwich area – turn half day visits into full days

Access a range of funds to increase gearing of BID funds

Promotion of BID green credentials

Use green infrastructure to link existing assets

New Local Plan – S106 opportunities

Link to health – through Natural Health Service

Link to education

Support from private sector to link business and natural environment

More events that link business and environment

**T**

### Threats

Decline in environmental quality affecting visits

Continued reduction in resources affects ability to deliver objectives

Coordination reliant on a few organisations

Silo working

## Supporting the BID Priority for a Greener and Cleaner Northwich

Green infrastructure planning and delivery of specific projects can help to support the aspiration for a Greener and Cleaner Northwich. The objective is to increase footfall in the town, increase spending, attract new business and investment, and bring more visitors to the town.

Based on the mapping of green infrastructure in the town and on the SWOT analysis, the key issues to address are:

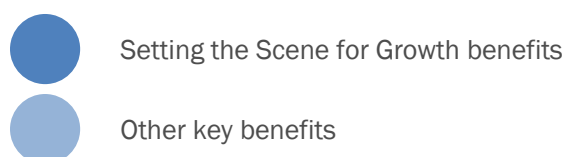
- Quality of Place
- Tourism
- Economic Growth
- Labour Productivity
- Land and Property Values

We have termed these collectively as actions that are **“Setting the Scene for Growth”** in Northwich.

We suggest that helping to reduce flood risk and improving health and wellbeing are also important issues for Northwich that can support the main priorities for the BID.



Figure 1 Northwich BID Green Infrastructure Priorities



## What is the evidence?

Please see Appendix 1

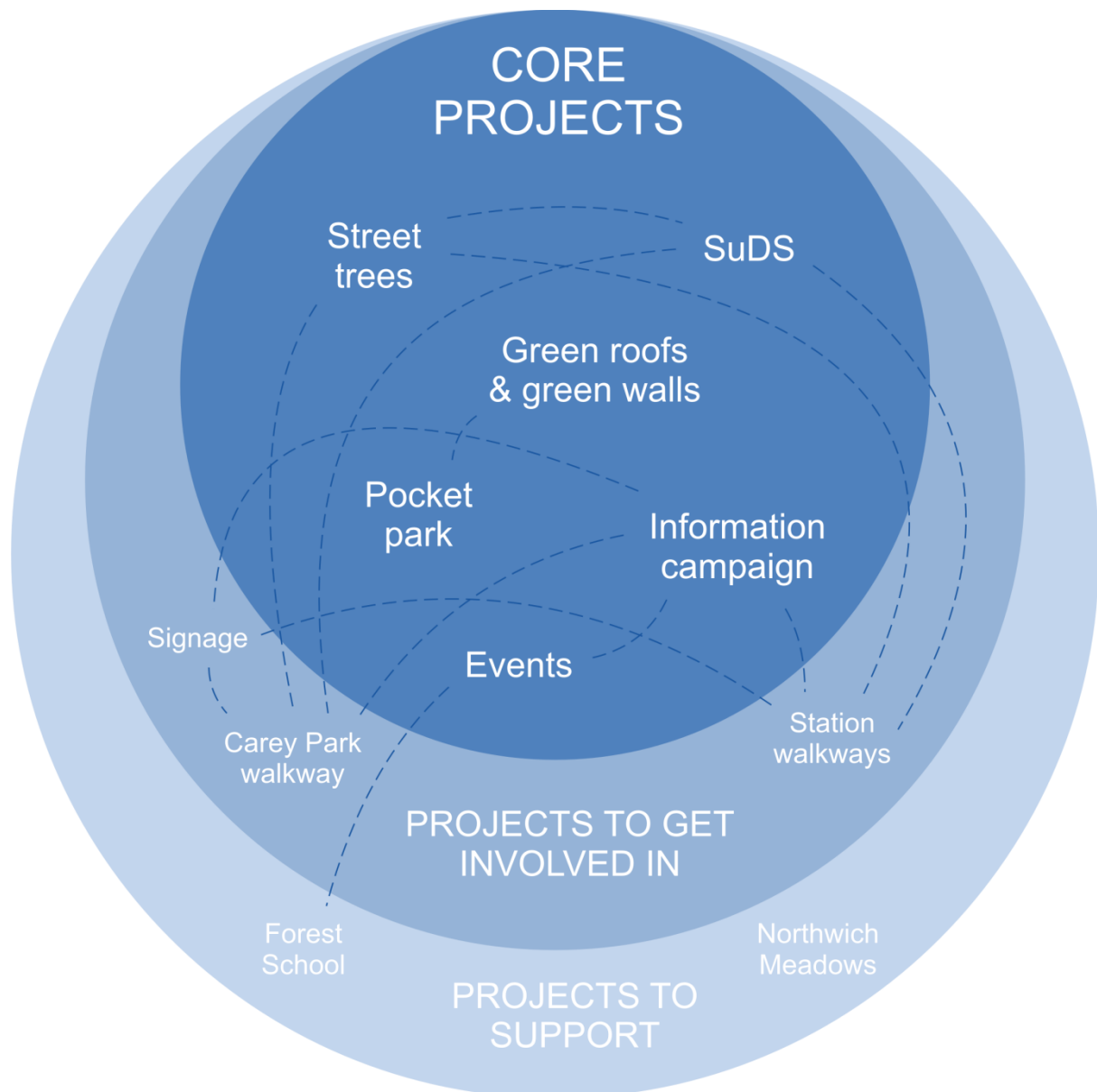
## Local policies and strategies to be aware of

The following documents should be consulted when implementing the green infrastructure action plan. Please note that this list is not exhaustive.

- [Cheshire West and Chester Local Plan](#) (forthcoming)
- [Northwich Urban Design & Public Realm Strategy](#)
- Northwich Town Centre Signage Strategy (forthcoming)
- Northwich Cycle Strategy
- [Cheshire West and Chester Cycling Strategy](#)
- Cheshire West and Chester Waterways Strategy

## Action Plan

The following diagram shows the suggested projects, which range from quick wins to more ambitious longer term ideas, and how they link to each other.



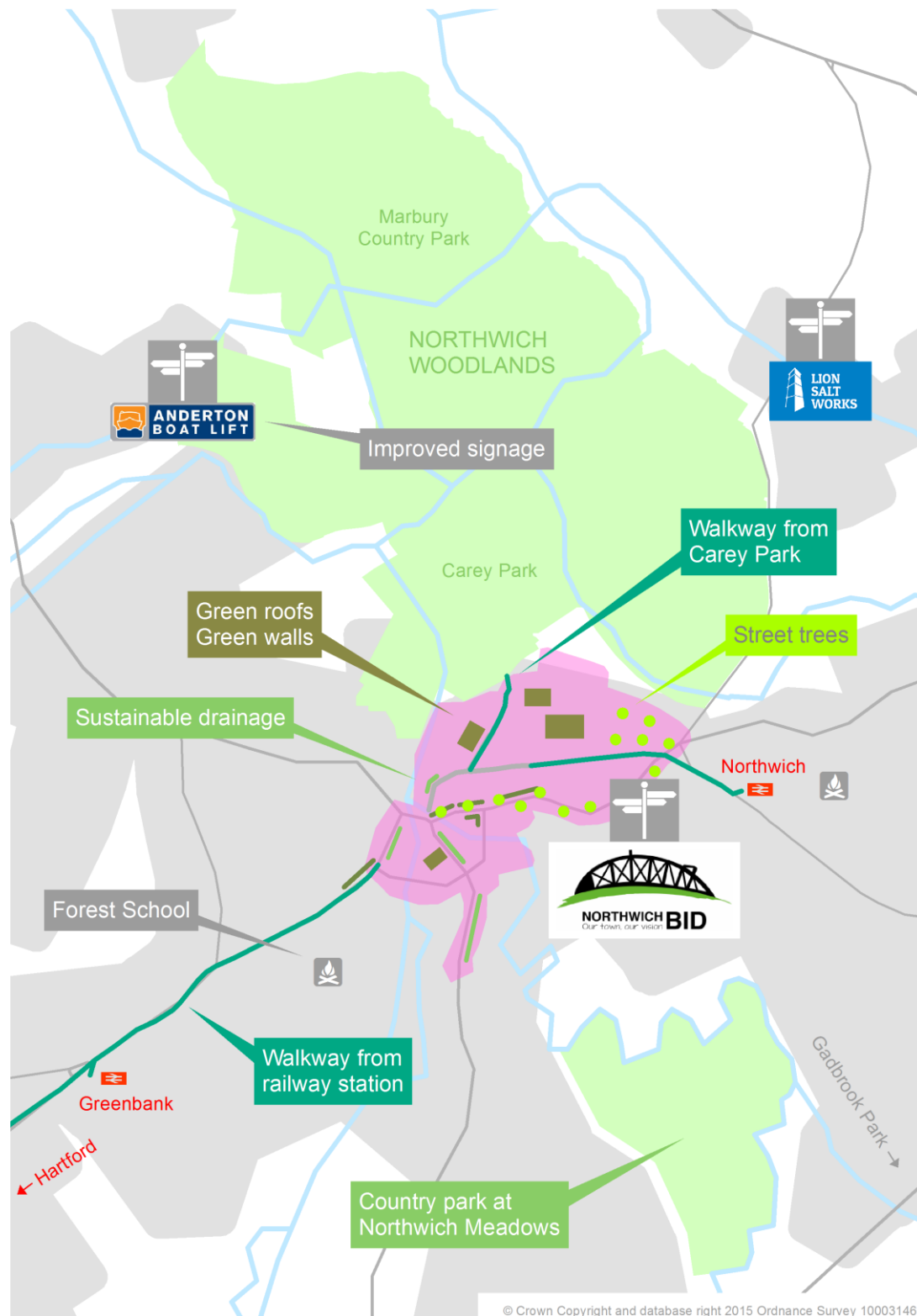
**Core projects** are those that the BID might want to lead. However, it is important that other stakeholders are also involved. Funding could come from the BID's core budget, grants applied for by the BID, and/or contributions from other key stakeholders.

**Projects to get involved in** may not be led by the BID, but the BID's involvement is important. The BID may also choose to contribute to the funding, either from the BID budget or from grants, potentially to kick-start the project.

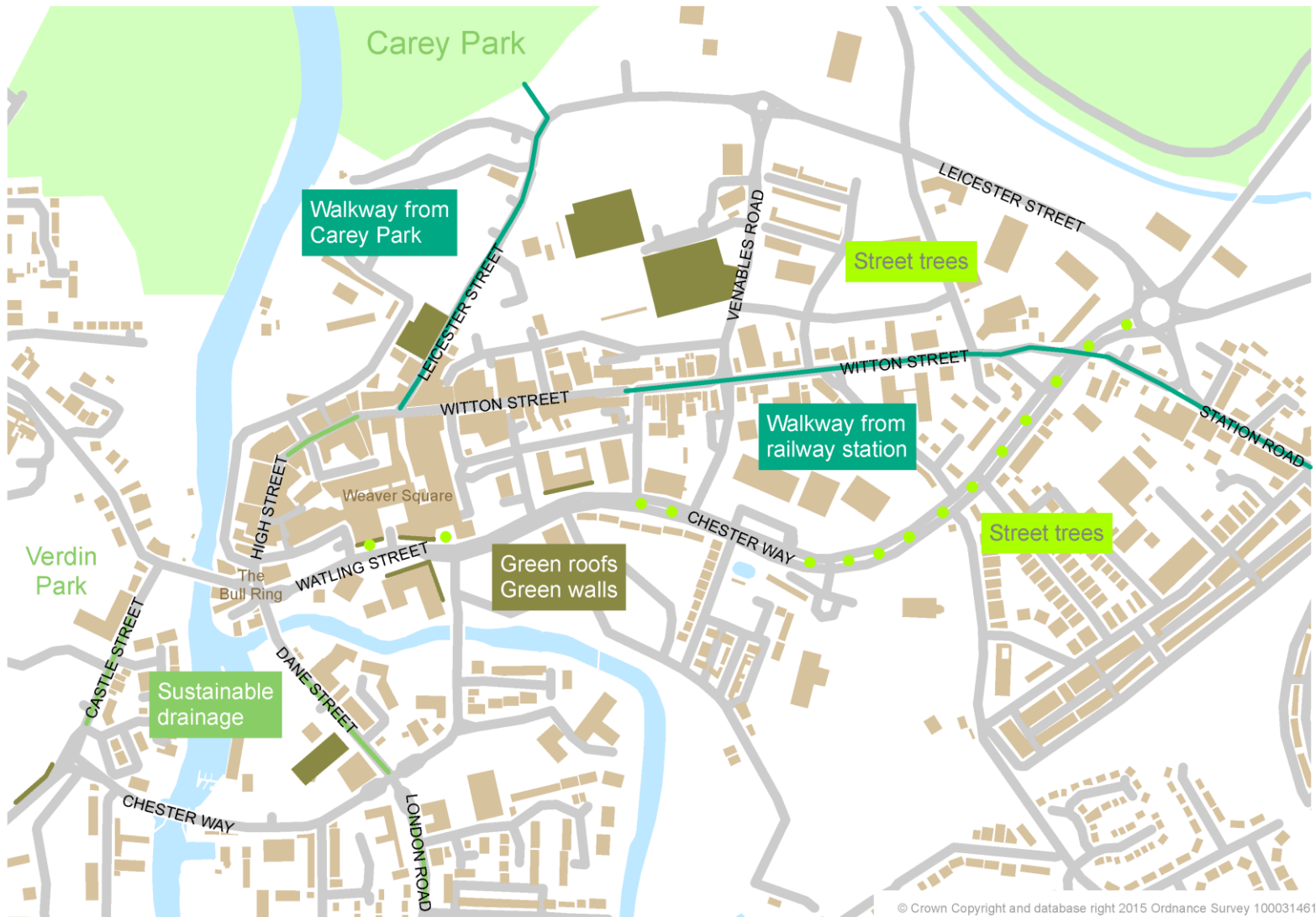


**Projects to support** will not be led by the BID, and the BID's involvement may be minimal. It is unlikely that the BID will choose to contribute funding, but the BID's verbal support and input could still be vital to ensure that the project gets off the ground and continues to impact positively on the town.

*The following map gives some of the key potential locations for interventions*



*This map shows some of the town centre locations mentioned in the report*



## Action Plan Details

### CORE PROJECTS

*Core projects are those that the BID might want to lead. However, it is important that other stakeholders are also involved. Funding could come from the BID's core budget, grants applied for by the BID, and/or contributions from other key stakeholders.*

#### Street trees

##### *Street tree planting in the town centre*

*Key benefits: increased footfall, improved image of the town*

Cheshire West and Chester Council have led on recent public realm improvements to Witton Street, and will shortly be extending these to High Street and Leicester Street. In response to their consultation in preparation for these schemes, people asked for trees to be included. These requests have not gone unheeded. Meanwhile, there are other opportunities for street tree planting to make a difference elsewhere in the town centre. Any future schemes should also be guided by the [Northwich Urban Design & Public Realm Strategy](#).

Suggested locations:

- Chester Way central reservation between the police station and the Station Road roundabout – a boulevard effect could be created on this key gateway into the town, complemented by Christmas lights in season and potentially flags promoting local events. There are also opportunities for trees in grass verges in places.
- Outside Market Hall and the tourist information centre on Watling Street – if this is compatible with the forthcoming redevelopment of Weaver Square. These are very prominent and somewhat unattractive frontages that could be improved by the addition of trees.
- The light industrial/commercial quarter bounded by Venables Road, Leicester Street and Witton Street – this area is quite bare and has plenty of space for street trees.

This list could be extended by asking businesses, community groups and the public to name 'grot spots' where they would like to see trees planted. This approach has produced a wealth of ideas for The Mersey Forest – see the 'specific locations' on the map at <http://www.merseyforest.org.uk/plan#map>. One recommended avenue would be to include this as a question in the annual business survey.

*The kind of boulevard effect that could be created along Chester Way*



## SuDS

### *Sustainable drainage systems in the town centre*

#### *Key benefits: water management, demonstration of the town's green credentials*

A great deal of work has already been carried out by the Environment Agency to reduce flood risk from the River Weaver in Northwich.

As well as flooding from the river, there can also be localised flooding from rainfall runoff in the town. Urbanisation causes increased runoff and peak flow during rainfall events leading to rapid and often extensive surface water flooding. Built-up areas need to be drained to remove this runoff. Traditionally, this has been achieved by using underground pipe systems designed for managing water quantity (flows and volumes), to prevent flooding locally by conveying the water away as quickly as possible.

In recent years, the use of trees and specifically designed tree pits has been used to provide smaller scale local solution to this type of flooding. These can be combined with other green elements, such as swales, filter drains, pervious pavements, ponds and wetlands, to create sustainable drainage systems.

Trees in urban catchments reduce the amount of rainfall that becomes runoff and slow down the peak flow in a number of different ways, such as interception (rainfall that does not reach the ground, but is intercepted by leaves and branches), evapotranspiration (water taken up by trees which then evaporates from the leaves), infiltration (increasing the amount of water that soaks into the soil, which can be increased by tree root systems), and moisture storage in leaves and branches on the ground (leaf litter).

Water quality issues are often associated with wet weather as pollutants are flushed from urban areas into rivers or intermittent spills as sewers and drains are unable to cope with the volume of water. Traditional solutions to managing water quality often involve storing water during storm events.

Some tree species have the ability to break down certain pollutants found in urban soils, such as pesticides, metals and solvents, by binding them into the organic matter of the leaf litter and its underlying soils.

Targeted, well designed tree planting can therefore contribute to both reducing flood risk and helping to ensure a clean River Weaver. In Northwich the key areas to investigate this approach further are:

- Castle Street
- London Road and the junction with Chester Way
- 62 – 108 Chester Way
- Witton Street
- Carey Park car park



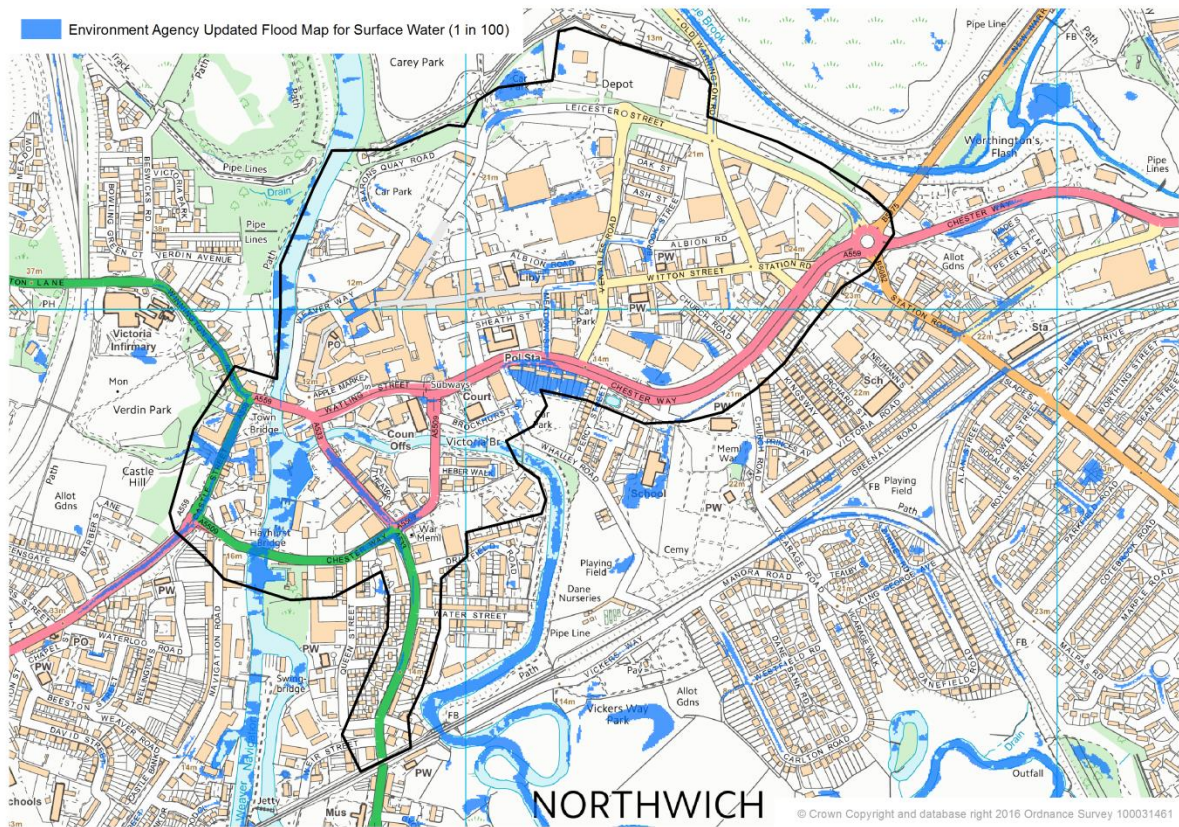
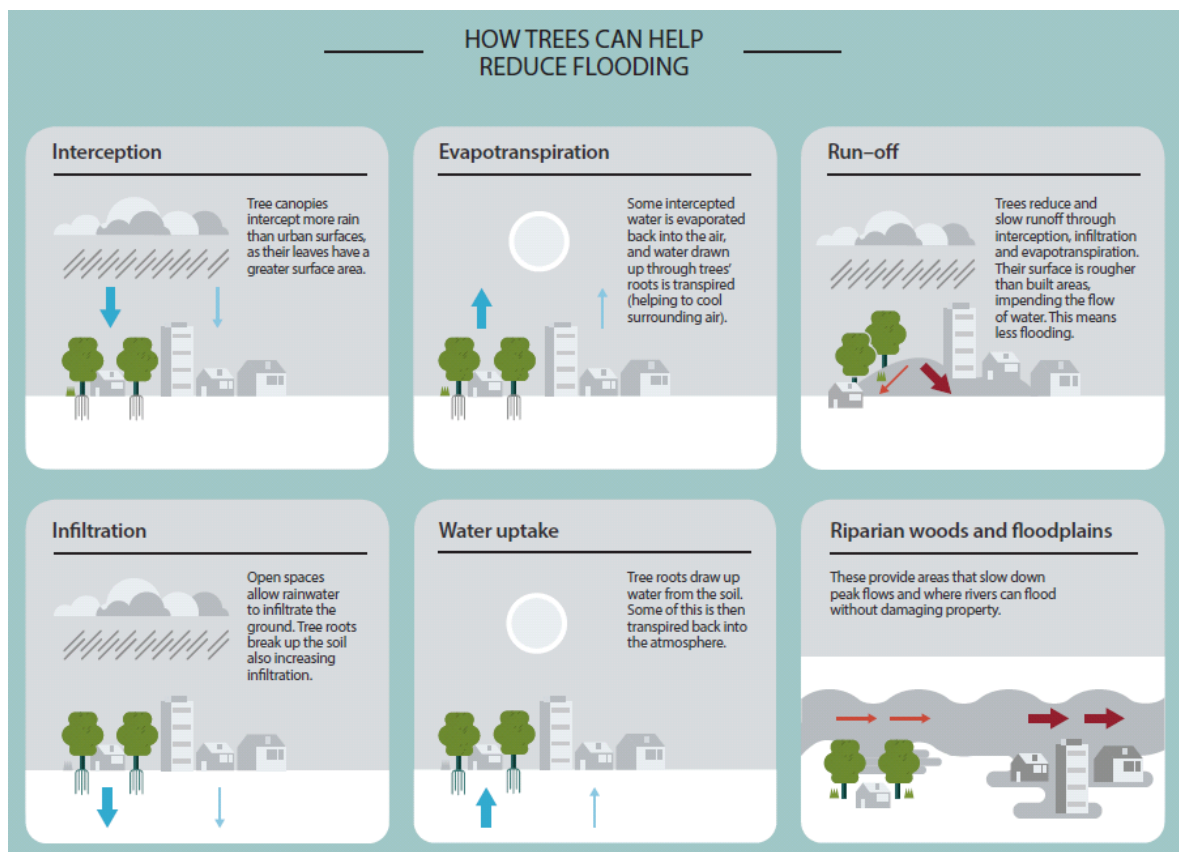


Figure 2 From The Mersey Forest Plan (2014) [www.merseyforest.org.uk/plan](http://www.merseyforest.org.uk/plan)



## Green roofs & green walls

*Key benefits:* energy efficiency, demonstration of the town's green credentials, improved image of the town

Green roofs and green walls are ways to add green infrastructure to Northwich without the need for digging up roads or pavements in and around the town centre.

Green roofs and walls can provide a broad range of benefits including improving quality of place, providing cooling on very hot days, and helping to reduce water runoff. A green wall is proposed as part of the Baron's Quay development, but more green roofs and walls (perhaps in more prominent locations) would have a big impact on the town's image.

Green roof designs fall into two main categories:

- Intensive roofs – with a deep layer of soil to support a variety of plants, including trees. These roofs require regular maintenance.
- Extensive roofs – are lightweight, with shallower growing material and a more restricted range of plants. These roofs often require minimal levels of maintenance if well planned and installed.



However, green roofs can be expensive to retrofit to buildings and require careful design and implementation to ensure that the existing building structure is not compromised by the addition of the green roof. Consideration of green roofs in new build and refurbishment projects is likely to be the best way to increase the number of green roofs.

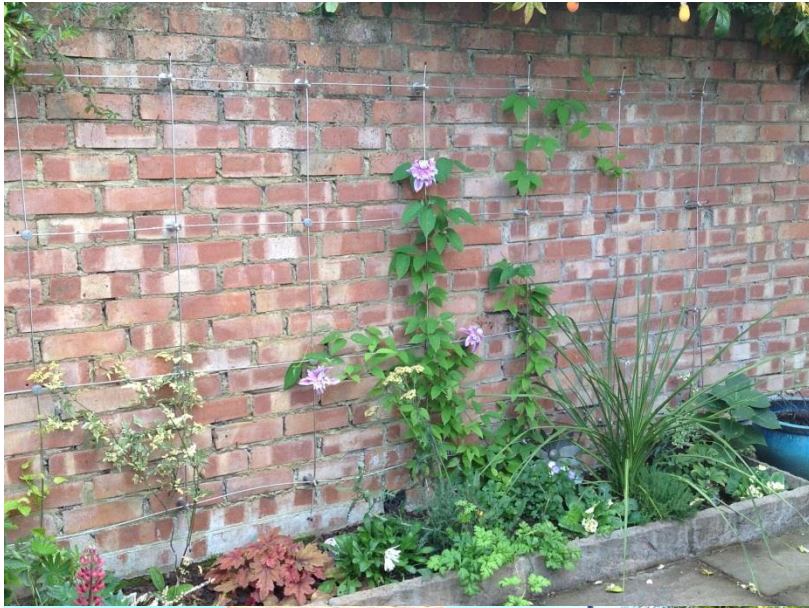
Green walls can also be considered in new build and refurbishment projects, but are possibly less onerous in engineering terms to implement on existing buildings. There are now a broad range of green wall systems, varying in size and using a variety of structures, which can be specified for town centre buildings and public realm. An example of a very small yet impactful green wall can be found at McDonald's in Winsford, whereas a much larger and more prominent system can be seen at Marks and Spencer at Cheshire Oaks.

We contacted two green wall companies to obtain illustrative quotes.

ANS Global (<https://www.ansgroupglobal.com/>) offer a Living Wall System that effectively consists of a matrix of specially-designed plant pots attached to the wall, together with a waterproof membrane to protect the wall and an irrigation system. The company also offers suitable plants and an installation service. They emphasized that each of their projects is bespoke, so it is difficult to give an accurate illustrative quote, and that the larger the living wall, the lower the cost per square metre. However, based on a fairly typical sized retrofit wall (perhaps 6m wide by 2m high), a typical cost would be around £550/m<sup>2</sup> (which for the dimensions mentioned would come to £6,600). This cost includes all design, supply, installation and the irrigation system, so the complete package. A series of graphics illustrating the system can be seen in Appendix 2.

MMA Architectural Systems (<http://www.green-walls.co.uk/>) offer a trellis system that consists of a lattice of lightweight steel wires strung across the façade. Climbing plants grow in planters or beds at the base and climb up the lattice, or different species can be cascaded down from the top. The company also offers installation and maintenance services and an irrigation system if needed. Indicative quotes were provided for two locations in Northwich. Photos depicting examples of the company's previous work are shown below.







### Castle Street



This long stretch of unsightly concrete wall is prominent at a key gateway into the town. The pavement tapers off and is therefore not used by pedestrians. Covering the whole length with a green wall system would be expensive, but a short stretch would be more affordable and could have a big impact.

MMA's quote for a 5m stretch came to about **£7,850**, including planters and installation, but not including an irrigation system (which would not necessarily be needed) or taking into account access (which might be difficult as it is a busy road).

### Market Hall, Watling Street



This tall brick frontage, in a very prominent position in the town centre, is very unsightly. A green wall system would have to avoid the windows, phone boxes etc, but could do a lot to improve its appearance. MMA quoted about **£12,150**, including plants, installation and a basic irrigation system, but not taking into account access.

Other possible locations for green walls include the picket fence around the proposed pocket park (see below), the police station on Chester Way, and the council offices at the corner of Watling Street and Chester Way.

Possible locations for green roofs include Sainsbury's, Matalan, Marks & Spencer, Waitrose, and the redeveloped Weaver Square.

As well as direct support with advice for businesses and property owners on possible green roof and green wall solutions, the emerging Cheshire West and Chester Local Plan may have policy recommendations on green walls and roofs.

## Pocket park

*Key benefits:* increased footfall

A pocket park has been created opposite the Bull Ring in the town centre, on a small piece of ground that was previously derelict. This improves the image of the town centre, quite possible attracting increased footfall. The project was delivered by the BID using external grant funding. The park includes trees, and could potentially be augmented in future by adding a green wall.





## Information campaign

### Information campaign to raise awareness of improved sustainable travel routes

#### Key benefits: increased footfall in the town centre

A quick, high impact action would be to produce a map leaflet linking sustainable travel routes and attractions to business locations and offers. The map should also highlight the town's green spaces and heritage assets, and promote attractions along the River Weaver. It should include links from Winsford and Gadbrook Park.

It is important that any interventions dovetail with other organisations' efforts. For example, Anderton Boat Lift and Lion Salt Works are currently looking at cross-marketing and how this relates to Northwich Woodlands.

There are many examples of these types of map, both printed and web based. Below is a selection of examples that may inform the BID's implementation of this action.

1. Bold Forest Park – paper based map. Bold Forest Park attracts over 300,000 people each year, but like Northwich, links to local businesses are poor. The Bold Forest Park is developing the links between business and these green infrastructure assets. A map was produced that promoted access routes, green infrastructure assets and local businesses.



An example of a map leaflet linking sustainable travel routes and attractions to businesses

2. Nene Valley Park - <http://www.neneparktrust.org.uk/map> - Nene Valley Park is seen as an innovative country park that generates all of its operating income from events and operation of the visitor attractions. The interactive map provides information on things to do and places to visit nearby.

3. Discover the Mersey Forest – <http://www.discoverthemerseyforest.co.uk> – a similar approach has been adopted by The Mersey Forest Team. The Discover website provides information for visitors on walks and cycle routes and also links to the Cheshire Destination Management System to provide information on nearby businesses. The website, now being updated, receives visits from about 10,000 users each year.
4. Northwich Woodlands - an Explorer Guide already exists for Northwich Woodlands. However, it could be improved by highlighting the links to the town more clearly and potentially promoting local business in the same way as the Bold Forest Park map.





## Events

### *Programme of events celebrating Northwich's green infrastructure*

*Key benefits:* perception of the town as an integrated, green destination, community engagement

This should link in to the existing events programmes – although there is an unfilled niche for green infrastructure-focused events.

There is already a range of activity underway. As with other actions, coordination and effective promotion could increase the number of people taking part in these events.

In 2016, the BID is supporting the following events:

- Northwich Teenage Market – February, May and July
- Easter Extravaganza
- Summer Extravaganza
- Christmas Extravaganza

These or other events could potentially include a bushcraft, nature craft or Forest School-style element, to promote the natural environment and its link to the town.

Potential locations include the town centre, Northwich Woodlands and Vickersway Park. However, it is important to ensure that people are not drawn away from the BID area on key event days.

Examples of previous successful events including a green infrastructure element or focus include:

- Risley Moss Green Safari, Warrington – an annual event that attracts many people and has featured a tree climbing and zip wire experience, archery, birds of prey, guided walks, wildlife displays including snakes and lizards, face painting, crafts, and Forest School



- [The Elf and Fairy Fair, St Helens](#)



- [Mab's Magical Fair, Liverpool](#)
- #DreamInBold brought the flavour of Bold Forest Park into St Helens town centre, featuring trees, a horse, model making with natural materials, and face painting





## PROJECTS TO GET INVOLVED IN

*Projects to get involved in may not be led by the BID, but the BID's involvement is important. The BID may also choose to contribute to the funding, either from the core budget or from grants, potentially to kick-start the project.*

### Carey Park walkway

*A safe, attractive, prominent and well-signposted walkway linking Northwich Woodlands to the High Street*

*Key benefits: increased footfall in the town centre*

Over 100,000 people visit Northwich Woodlands each year. Creating attractive and well signposted routes from Northwich Woodlands into the town can help to encourage more visitors to make use of the facilities in the town. The key link to the town centre is the entrance to Carey Park.



With the opening of the Lion Salt Works, the improvement to facilities at Marbury and the planned improvements at Anderton Boat Lift we can identify a rectangle of visitor attractions that can be cross-marketed – all of which can focus visits to the town.

Looking from the town's perspective, good links to these attractions provides a base for visitors who may spend time in the town, walk or cycle to the boat lift or the salt works (each about 40 minutes walking or 10 minutes cycling) and then return to the town and spend more time in the shops, creating a day long trip rather than half day visits.

There are many people who visit Northwich Woodlands by boat. Many of these people are not aware of either the wider attractions or the proximity of the town centre. Improved signage can help to attract more of these visitors to the town and also, perhaps, encourage a longer stay in the area.

This action will be partly implemented as part of the Baron's Quay development by Cheshire West and Chester Council, and will be taken further as part of the High Street/Leicester Street public realm improvements, with reference to the forthcoming town centre Signage Strategy that the council is

commissioning. The BID's involvement in this strategy is important to ensure that the members' needs are met.

This project is clearly very closely related to the more general signage project below.





## Key components

- Safe: pedestrians and cyclists should be separated from motor vehicles, and from each other, as far as possible, through the use of lanes, barriers, designated crossing points, etc.
- Attractive: greenery (potentially including street trees, shrubs, planters, green walls), attractive materials, and visually appealing signage should be used.
- Prominent: people should not have to search for the walkway – it should be obvious that it is there and where it leads. The photo above gives an excellent example of how this can be achieved in one situation. Another method is the use of prominent signposts with large lettering.
- Well-signposted: signs should be attractive, clear and unambiguous, and legible from a distance. They should be located and designed so that they achieve the needs of the BID and of the public, e.g. to guide people from Carey Park to the town centre and vice versa.

## Examples of similar previous projects

These projects integrated sustainable transport improvements, such as cycle lanes and pedestrian crossings, with green infrastructure interventions such as street trees.

- [Knowsley](#)



- [St Helens](#)
- [Liverpool](#)



## Station walkways

*Safe, attractive, prominent and well-signposted walking and cycling routes linking the railway stations to the town centre*

*Key benefits:* increased footfall in the town centre

This is a longer term, more ambitious objective. Again, the forthcoming town centre Signage Strategy should be referred to, although these routes will extend out of its scope. In addition, the Town Council's cycling strategy for Northwich and the [Cheshire West and Chester Council-wide strategy](#) should be consulted.

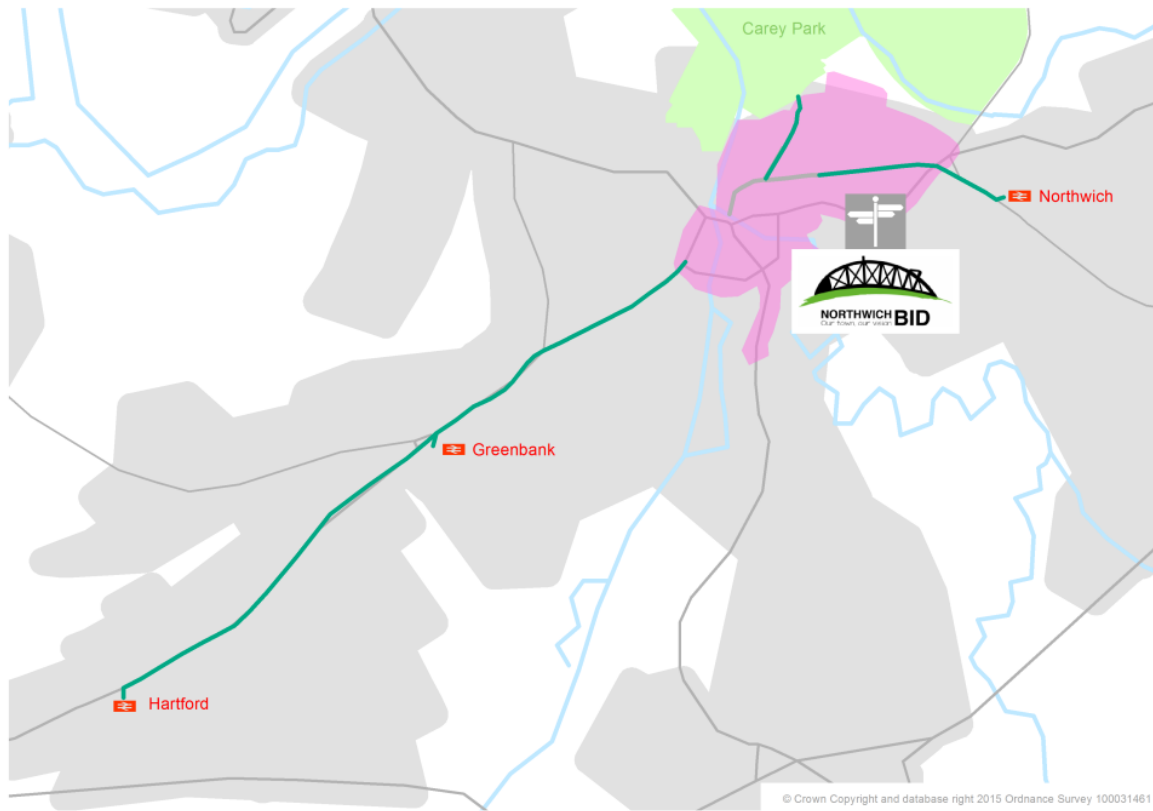
The railways stations are key gateways to Northwich. Providing attractive and well signposted routes to the town centre creates a positive image for the area. In other areas, it has been shown that green routes also encourage more active travel, walking and cycling.

Green routes also provide natural signposting to and from the town.



Key components – see Carey Park walkway project above

Possible routes



## Signage

### *Improved signage linking key attractions to the town centre*

*Key benefits:* perception of the town as an integrated destination, increased footfall in the town centre

This will be partly implemented as part of the Baron's Quay development by Cheshire West and Chester Council, and will be taken further as part of the High Street/Leicester Street public realm improvements, with reference to the forthcoming town centre Signage Strategy that the council is commissioning. However, a lot more work, adhering to a unified approach, is needed.

The design and style of signage from Baron's Quay should be used throughout Northwich Woodlands and the town. At present there are a range of signage types and designs. The new and developing attractions in the area provide an opportunity to assess signage for:

- Road users
- Parking locations
- Pedestrian routes
- Cycleways
- Bridleways

Improved signage and interpretation can help to improve the visitor experience and direct more people to the town.

There are two main landowners in Northwich Woodlands, Cheshire West and Chester Council Green Space and Forestry Commission, and their engagement in the development of the town centre signage strategy can help to ensure that the same design and style is used across both the town and Northwich Woodlands.

Key locations for signage include Vickersway Park, Anderton Boat Lift, Marbury Country Park, Lion Salt Works, Verdin Park, key town centre locations (e.g. The Bull Ring), and along the routes from Carey Park and the railways stations, as per the projects above.

Some good examples of the kind of unified approach needed are given below.

- [University of Manchester](#)
- [Merseyside Local Sustainable Transport Fund Signage Design Guide \(St.Helens\)](#), which includes Bold Forest Park

## PROJECTS TO SUPPORT

*Project to support will not be led by the BID, and the BID's involvement may be minimal. It is unlikely that the BID will choose to contribute funding, but the BID's verbal support and input could still be vital to ensure that the project gets off the ground and continues to impact positively on the town.*

### Forest School

**Key benefits:** improved health and well-being of children, ultimately leading to a more prosperous town

Learning in the outdoor environment can have huge benefits in terms of children's health and well-being. Whilst the benefits to Northwich's businesses are indirect and difficult to quantify, they are very real.

Forest School is already active in many local schools and community groups. The BID's role is simply to be supportive of its continuing provision and improvement.

Some Forest School-style activities can also be incorporated into events.



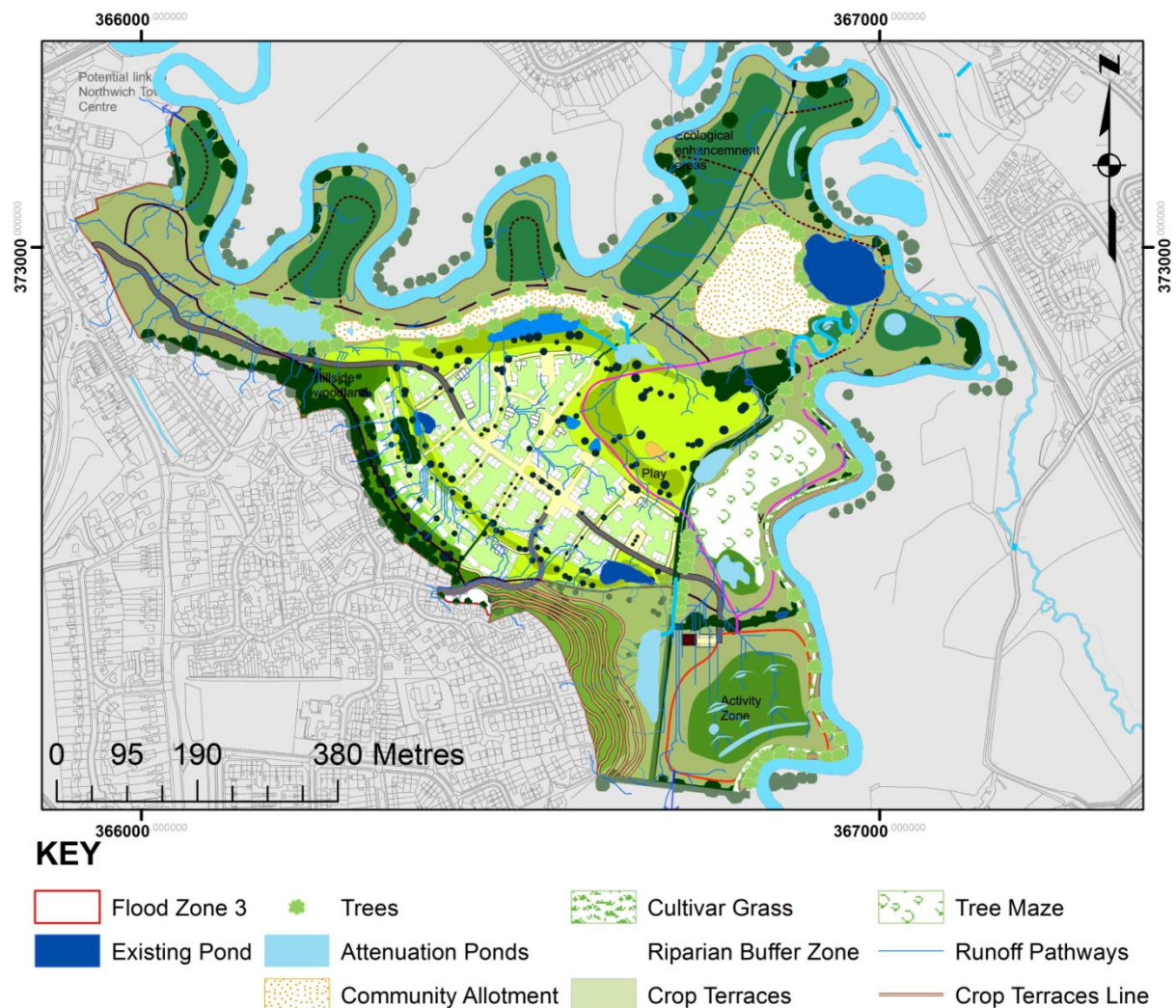


## Northwich Meadows

### Country park at Northwich Meadows

**Key benefits:** health and well-being of residents, increased attractiveness as a visitor destination, flood risk alleviation

A planned housing development at Northwich Meadows may or may not go ahead. If it does, the country park should be created as part of that project, although there will be scope to influence its specification. This should include sustainable drainage systems to ensure that the runoff from the new development does not have a negative impact on the town centre. If the housing development does not go ahead, the land could potentially become available to create the country park anyway. Gadbrook Park BID may also wish to be involved, since the country park would also be close to their area, and should include sustainable routes between Gadbrook Park and other parts of the town.



*An enhanced masterplan for the country park by Mike Norbury from the University of Liverpool*

*This timeline gives an idea of when each suggested intervention might be feasible. It is only indicative but could be used to guide action.*

	Short term			Mid term			Long term		
Street trees									
SuDS									
Green roofs & green walls									
Pocket park									
Information campaign									
Events									
Carey Park walkway									
Station walkways									
Signage									
Northwich Meadows									
Forest School									

## Cost-benefit analysis

The table below gives both a **low and a high indicative cost** for each suggested intervention. These reflect the flexibility within each intervention in terms of ambition levels and responding to opportunities. An indication of annual maintenance costs is also provided.

Please note that **none of the interventions are likely to be solely funded by the BID**. All of them should be partnership projects involving all relevant stakeholders. Funding will come from key stakeholders as well as (in some cases) the core BID budget and grants to the BID.

The costs for two interventions cannot straightforwardly be added together either, because savings would be made if certain interventions were carried out together.

	Cost		
	Low	High	Annual maintenance
Street trees	£75,000	£250,000	£1,000
SuDS	£120,000	£200,000	£1,500
Green roofs & green walls	£100,000	£1,400,000	£50
Information campaign	£10,000	£40,000	£8,000
Events	£22,000	£52,000	£12,000
Carey Park walkway	£5,000	£18,000	£500
Station walkways	£92,500	£102,500	£500
Signage	£25,000	£65,000	£500
Northwich Meadows	£1,500,000	£3,000,000	£0
Forest School	£12,000	£86,000	£0

The Green Infrastructure Valuation Toolkit has been used to put **an economic value on some of the benefits** that would be provided by the suggested green infrastructure interventions. These results are available from The Mersey Forest.

Examples of the findings of studies elsewhere that have measured the economic value of the benefits of green infrastructure can be found in Appendix 1.

The Green Infrastructure Valuation Toolkit also estimates some of the non-monetary quantities associated with the benefits from green infrastructure interventions. The table below gives these figures for the suggested projects in Northwich. The input values for the toolkit are of course just estimates of what could be included in the intervention and the impact it could have (for example, in terms of tourism). The values used, together with the completed copies of the toolkit calculator, are available from The Mersey Forest.



	Reduced building energy consumption for heating (kWh/yr)	Avoided carbon emissions from building energy saving for heating (kgCO <sub>2</sub> /yr)	Reduced building energy consumption for cooling (kWh/yr)	Avoided carbon emissions from building energy saving for cooling (kgCO <sub>2</sub> /yr)	Carbon sequestered in woodland and forests (kgCO <sub>2</sub> /yr)	Water diverted from sewers (l/yr)	Lives saved per year from increased walking and cycling	Carbon monoxide removed from the air (kg/yr)	Sulfur dioxide removed from the air (kg/yr)	Nitrogen dioxide removed from the air (kg/yr)	PM10 removed from the air (kg/yr)	Ozone removed from the air (kg/yr)	Days off work avoided per year	Increased tourism (visitor days)	Additional FTE jobs supported by tourism	Increased local outdoor recreation (visitor days)	Additional FTE jobs supported by land management
Street trees	4,800	974				4,050	0.02						Between 25 and 132	1,000	0.41	2,000	0.10
SuDS						2,020								1,000	0.41	1,000	0.10
Green roofs & green walls			273,000	146,000			0.01							1,000	0.41	1,000	0.10
Information campaign							0.03						Between 50 and 264	1,000	0.41	10,000	0.10
Events						2,020								1,000	0.41	2,000	0.10
Carey Park walkway						2,020	0.02						Between 25 and 132	2,000	0.82	10,000	0.10
Station walkways						2,020	0.03						Between 50 and 264	2,000	0.82	10,000	0.10
Signage							0.02						Between 25 and 132	10,000	4.10	20,000	0.10
Northwich Meadows					19,200	202,000	0.02	10	30	30	60	70	Between 25 and 132	1,000	0.41	10,000	0.50
Forest School							0.01										0.50

## Funding plan

Here we offer some initial ideas for sources of external funding.

Funding source	Timescale for applications	Indicative scale	Risk	Capital/ revenue	Longevity	What can be funded	Criteria	Timeline from application to decision
Tesco Bags of Help Scheme	Application windows publicised	Up to £12k	Medium	Capital & revenue	1-12 months	The money raised by Tesco customers paying 5p for bags will be used to pay for a large number of local projects to improve green spaces in communities	Programme coordinated by Groundwork who can provide details	1-3 months
Waitrose Community matters	Always open	Up to £1000	Low	Capital & revenue	1-12 months	Local projects, a wide range of good causes	Project needs to be local and supported by Waitrose shoppers	1-3 months
Sainsburys Community Grants						Charitable groups in the local community, is funded by sales of Bags for Life.	Local charities, community and environment projects	1-6 months
Interreg	September 2016 and at other times up to 2020	£50k - £1m	high	Revenue	3 years	General green infrastructure projects and programmes	This is a competitive EU fund. Partners in at least 2 other EU countries are required to develop a proposal. There is good local experience of this funding stream.	6 months
Countryside Stewardship	continuous	£10k - £100k	medium	Capital	3 years	Landscape management and improvements to access.	Applies principally to agricultural landowners, but can be for other landowners too	6 months

Landfill Tax Credit Scheme	continuous	£1k - £50k	medium	Capital	3 years	This fund can provide money for improvements to parks and open spaces and/or for the conservation of wildlife habitats.	Project within 10 miles of a landfill site, funding applied for through an Environmental Body such as Local Authority, Groundwork or Mersey Forest 10% match funding required.	1-6 months
Lottery Funds – Reaching Communities	continuous	£500k	medium	Capital & revenue	5 years	The lottery operates a range of community and heritage programmes that are currently open. There are elements of the BID GI programme that would be eligible to apply for these funds.	Engaging communities, safeguarding and celebrating heritage (including natural heritage)	6 months
Trusts	variable	£250 £50k	medium	Capital & revenue	1 year	Trusts vary enormously in what they will fund, from environmental improvements to community engagement, innovative products to cultural events	Each trust has different rules and criteria.	1-6 months
Section 106/Community Infrastructure Levy	variable	£5k-£50K +	medium	Capital & revenue	1 year	Contributions can be sought from developers towards the costs of providing community and social infrastructure, the need for which has arisen as a result of a new development taking place.	Close working with Cheshire West and Chester Planners	Up to 1 year depending on the complexity of the scheme

LEADER	Open in 2016	£5K- £50k	medium	Capital	1 year	The programme can fund farmers, growers, foresters, other local rural businesses and rural community organisations to help: create jobs; develop rural businesses; support the rural economy	To be successful, applications must demonstrate sustainability and contribute to one or more of six priorities for LEADER	3-6 months
EU Structural and Investment Funds	variable	£20k- £100K	high	Capital & revenue	5 years	The European Structural and Investment Funds (ESIF) are the EU's main funding programmes for supporting growth and jobs across the EU. There is funding for business support and development of low carbon projects for which GI businesses or projects could be eligible	This is not an easy fund to access, and administration of the funding can be offputting. However, developing businesses and job creation are important outputs for the programme, as well as reducing greenhouse gas emissions and so there may be scope for the BID to be involved in a proposal	Up to 1 year

The table provides a snapshot of the funding opportunities and attempts to consider the range of funds that could be accessed. In many instances the funds may need to be applied for through a partner organisation working closely with Northwich BID.

Once specific projects have been identified and agreed, it is then possible to identify possible funding streams with more precision.



## Community engagement

*Here we will emphasize the value of community engagement, and suggest some ideas*

Effective community engagement could have many benefits for Northwich's businesses, including:

- Increased awareness of business locations and offers
- Increased understanding of the community's needs and consumer demand for products and services
- Increased attractiveness of the town as a place to live, work and visit

These benefits could be achieved through a variety of means:

- Contact with local community groups such as the [Friends of Anderton and Marbury](#), the [Friends of Owley Wood](#), Church Wood Conservation Group and Marshall's Arm Management Group
- Contact with local schools (potentially including Forest School – intervention 8 above)
- A programme of events along the lines of intervention 10 above (especially events involving physical site improvements such as tree planting – potentially in partnership with local community groups and/or schools)
- An information campaign along the lines of intervention 9 above
- Sympathetic consultation through surveys and similar
- Engagement in social media
- Northwich BID being seen to bring about the interventions that people want to see!

## Consultation

The Mersey Forest routinely works closely with the main green infrastructure stakeholders in the area, such as Cheshire West and Chester Council and the Environment Agency. As part of this study we have supplemented the understanding gained from this day-to-day working by specifically consulting Northwich Town Council and key Cheshire West and Chester Council officers, as well as a specially-convened green infrastructure sub-group of the Business Improvement District board.

Furthermore, we have commissioned a survey of local residents, focusing on Northwich Woodlands, that has unearthed some very interesting trends and comments. Some relevant highlights are given here.

- 99% of respondents were aware of Marbury Country Park, but only 29% were aware of the Northwich Woodlands 'umbrella' brand (after prompting)
- One in seven suggested more organised events
- Respondents shop in the town centre on average 2.3 times per week, and socialise there once a week
- Just under half consider getting involved in contributing to Northwich Woodlands' future to be very appealing, appealing, or quite appealing
- 40% of those who have moved to their current address within the last two years considered the open spaces they are familiar with influenced their decision to move there
- Improved signage and awareness were identified as ways to enhance access to the Woodlands

## Appendix 1: What is the evidence?

### Setting the scene for growth

**High quality gateways to the city:** Visual amenity of green space can create attractive gateway to the city, which is often a key first impression for investors. Pleasant journeys to and from work also contribute to a higher quality of life of residents<sup>3</sup>. In the US, drivers' preference is for roadsides with increased vegetation and greater height and density of trees, in particular those that screen adjacent commercial land uses<sup>4,5</sup>. Commercial developments alongside major roads leading to the city that contain trees are generally preferred to both developments without trees and undeveloped agricultural land without trees<sup>6</sup>. In the UK, green commuting routes are preferred: the willingness to pay for woodland views on journeys to and from home has been estimated at £226.56 per annum per household (2003 prices)<sup>7</sup>.

**Attracting investment and increasing employment:** The presence of high quality green space can improve the 'investability' of an area and its competitiveness as a business location<sup>8</sup>. A survey of real estate developers and consultants across Europe found that 95% of respondents believe that open space adds value to commercial property and would be willing to pay at least 3% more to be in close proximity to open space<sup>9</sup>. An example of returned investment in green infrastructure can be seen in Riverside Park Industrial Estate in Middlesbrough, where extensive planting of trees helped to create a setting for stimulating business growth, which attracted new, high profile, occupants; increased occupancy from 40% to 78%; levered over £1m of private investment; and saw 28 new businesses and more than 60 new jobs created<sup>10</sup>. Landscaping improvements in Portland Basin, Tameside and Winsford, Cheshire yielded respectively over 16% and 13% of net growth in employment<sup>11</sup>. Furthermore, green infrastructure could help to make the town more attractive for further investment, and increase the profitability of businesses by increasing staff productivity. A number of studies have demonstrated this latter effect<sup>12</sup>, which operates through improved health, stress alleviation, and attracting and retaining motivated people.

**Green environment for retail:** Green infrastructure can play a role in creating a pleasant environment in city centres, which increases footfall and revenue in retail areas. In an US study, presence of trees in central business districts was tied to more positive consumer experiences and a willingness to pay higher prices for goods and services (by ~11%)<sup>13</sup>.

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<sup>3</sup> Regeneris Consulting (2009). *The economic contribution of the Mersey Forest's objective one-funded investments*. Regeneris Consulting. Available at: <http://www.merseyforest.org.uk/pages/displayDocuments.asp?iDocumentID=246>.

<sup>4</sup> Wolf KL (2003) Freeway roadside management: the urban forest beyond the white line. *Journal of Arboriculture* 29(3): 127-136.

<sup>5</sup> Sullivan WC & Lovell ST (2006) Improving the visual quality of commercial development at the rural-urban fringe. *Landscape and Urban Planning* 77: 152-166.

<sup>6</sup> See 3.

<sup>7</sup> Garrod GD (2003) *Landscape Values of Forests. Social & Environmental Benefits of Forestry Phase 2, Report to the Forestry Commission, Edinburgh. Centre for Research in Environmental Appraisal and Management, University of Newcastle upon Tyne.*

<sup>8</sup> CABE (2004) *The Value of Public Open Spaces*. Commission for Architecture and the Built Environment, London.

<sup>9</sup> Gensler and Urban Land Institute (2011) *Open Space: an asset without a champion?* Available at:

[http://www.gensler.com/uploads/documents/Open\\_Space\\_03\\_08\\_2011.pdf](http://www.gensler.com/uploads/documents/Open_Space_03_08_2011.pdf)

<sup>10</sup> CLES POLICY ADVICE. 2007. *The Contribution of the Local Environment to the Local Economy* presented to Groundwork UK.

<sup>11</sup> See 8.

<sup>12</sup> Effectiveness and economic impact of worksite interventions to promote physical activity and healthy diet, World Health Organisation, 2008; *Windows and Offices: A Study of Office Worker Performance and the Indoor Environment*, California Energy Commission, 2003

<sup>13</sup> Wolf KL (2003) Public response to the urban forest in inner-city business district. *Journal of Arboriculture* 29(3): 117-126.

**Attracting and retaining skilled and productive workforce:** Quality of life is becoming an increasingly important consideration in modern business location decisions, in particular in the high-tech and knowledge industries, and cities with attractive parks and natural surroundings are more likely to attract knowledge workers<sup>14</sup>. In particular for small businesses and individuals on high salaries, the quality of life becomes more important than remuneration<sup>15</sup>. Greener settings not only attract but also help to retain workers: businesses located next to the just-regenerated Glasgow Green recorded improved staff morale and staff retention rates due to the attractiveness of the location<sup>16</sup>. Green infrastructure also improves productivity: office workers who enjoyed a natural view out of the window reported fewer physical ailments and greater job satisfaction compared to those workers without a view<sup>17</sup>. Even the presence of office plants may increase the speed of completing tasks, lower levels of stress and improve attention<sup>18</sup>.

**Higher property prices in greener areas:** In North West England, a view of a natural landscape added up to 18% to property value, and residents in peri-urban settings are willing to pay £7,680 per household for views of broadleaved woods<sup>19</sup>. The development of a community woodland on the former Bold Colliery site in St Helens have enhanced existing property values in the surrounding area by £15 million<sup>20</sup>. In Aberdeen, properties next to a park can attract a premium of 0.4%-19% compared to a property located 450m away from a park<sup>21</sup>. Trees have been reported to add between 4% and 25% to the total value of property, depending on their size, condition, location and species<sup>22,23</sup>. Another study found that high quality green infrastructure can boost property values by up to 20%<sup>24</sup>.

This is likely due to the multiple benefits that trees provide: they make an area more visually attractive, but also reduce air pollution and provide a variety of microclimates that can make an area more comfortable (especially shade in summer).

Green infrastructure and associated signage, paths etc will be particularly important in Northwich to channel and encourage people from Northwich Woodlands and other attractions into the town centre. As well as providing attractive physical connections between places, these improvements could be used to help unify their identity.

### Reducing flood risk

The level of flood risk in Northwich is high. The risk comes primarily from the two rivers flowing into the town, the Weaver and the Dane, and has the potential to disastrously affect central retail areas. In 2012, part of the town centre had to be cordoned off due to severe flooding.

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<sup>14</sup> Crompton JL (2007) Competitiveness: Parks and Open Space as Factors Shaping a Location's Success in Attracting Companies, Labor Supplies, and Retirees in de Brun C (Ed.) The economic benefits of land conservation. The Trust for Public Land, pp.48-54.

<sup>15</sup> See 11.

<sup>16</sup> Gen Consulting (2006) Glasgow Green Renewal Benefits Analysis. A report to Glasgow City Council. Gen Consulting, Glasgow.

<sup>17</sup> Kaplan R (1993) The role of nature in the context of the workplace. Landscape and Urban Planning 26: 193-201.

<sup>18</sup> Lohr VI, Pearson-Mimms CH & Goodwin GK (1996) Interior plants may improve worker productivity and reduce stress in a windowless environment. Journal of Environmental Horticulture 14: 97-100.

<sup>19</sup> Cousins and Land Use Consultants (2009). Economic contribution of green networks: current evidence and action. North West Development Agency, Manchester.

<sup>20</sup> Forestry Commission (no date) Bold Colliery Community Woodland. District Valuer's report on Property Values. Forestry Commission

<sup>21</sup> Dunse N, White M & Dehring C (2007) Urban parks, open space and residential property values. RICS Research Paper Series. RICS, London.

<sup>22</sup> Regeneris Consulting (2009) The economic contribution of the Mersey Forest's objective one-funded investments. Regeneris Consulting. Available at: <http://www.merseyforest.org.uk/pages/displayDocuments.asp?iDocumentID=246>.

<sup>23</sup> CTLA (2003) Summary of tree valuation based on CTLA approach. Council of Tree and Landscape Appraisers.

<sup>24</sup> BE Group (2014) Green Infrastructure – Added Value. Available at: [http://www.merseyforest.org.uk/BE\\_group\\_green\\_infrastructure.pdf](http://www.merseyforest.org.uk/BE_group_green_infrastructure.pdf)



Work is underway on engineering solutions that will reduce this risk – but green infrastructure can also play a part, especially in dealing with the increased risk likely to be caused by climate change. By encouraging green areas upstream of the town centre to flood when necessary, the amount of water descending upon critical locations at one time can be reduced. Green areas can also allow excess water to drain into the ground, where the soil is suitable, unlike areas of impermeable paving.

In addition to relatively large-scale interventions upstream, sustainable drainage systems (SuDS) within the town could help to deal with more localised flooding, whilst also improving the appearance of streets, providing a habitat for wildlife and visibly demonstrating the town's green credentials.

### Improving health

**Space for exercise:** A study in the UK<sup>25</sup> found that a higher proportion of green space in an area was generally associated with better population health. Living closer to parks is linked to increased physical activity<sup>26,27</sup>, such as walking and cycling<sup>28</sup>. Whilst the majority of the exercise in parks tends to be gentle (over 56% of park users in London simply walk or stroll)<sup>29</sup>, it still has a positive impact on people's health. A study in Tokyo shows that presence of walkable green space increases the longevity of the elderly<sup>30</sup>. In England, people who live furthest from public parks are 27% more likely to be overweight or obese, and children able to play in natural green space gain 2.5 kg less per year than children who do not have such opportunities<sup>31</sup>.

**Better mental health:** Contact with nature in green space reduces stress and improves attention<sup>32</sup>, whilst unsatisfactory access to green space had been found to be related to mental ill-health by a study in Greenwich, London<sup>33</sup>. A study of Swedish town dwellers found that the more often a person visits urban open green spaces, the less often he or she will experience stress related illnesses<sup>34</sup>. Playing in green spaces and living in greener areas can have a beneficial impact on concentration and the ability to focus attention in children<sup>35,36</sup>, thereby improving their performance at school. Lower levels of stress associated with the use of green space enable people do cope better with major life issues, such as the effects of poverty<sup>37</sup>. There is also an evidence for synergistic physical and mental health improvements related to contact with nature. For example, patients recovering from a surgical procedure were found to heal much quicker and require less painkillers if they had a view of nature out of their window compared to those without such a view<sup>38</sup>.

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<sup>25</sup> Mitchell R & Popham F (2007) Green space, urbanity and health: relationships in England. *Journal of Epidemiology and Community Health* 61: 681-683.

<sup>26</sup> Kaczynski A & Henderson KA (2007) Environmental correlates of physical activity: A review of evidence about parks and recreation. *Leisure Sciences* 29: 315-354.

<sup>27</sup> Coombes E, Jones A & Hillsdon M (2010) The relationship of physical activity and overweight to objectively measured green space accessibility and use. *Social Science and Medicine* 70: 816-822.

<sup>28</sup> Zlot AI & Schmid TL (2005) Relationships among community characteristics and walking and bicycling for transportation or recreation. *American Journal of Health Promotion* 19: 314-7.

<sup>29</sup> Synovate (2009) The Royal Parks in-park research report 2009 – All parks combined. The Royal Parks, London.

<sup>30</sup> Takano T, Nakamura K & Watanabe M (2002) Urban residential environments and senior citizens' longevity in megacity areas: the importance of walkable green spaces. *Journal of Epidemiology and Community Health* 56: 913-918.

<sup>31</sup> Natural England (2009) Green Space Access, Green Space Use, physical activity and overweight: a research summary.

<sup>32</sup> Kaplan R & Kaplan S (1989) *The experience of nature: A psychological perspective*, Cambridge University Press.

<sup>33</sup> Guite HF, Clark C & Ackrill G (2006) The impact of the physical and urban environment on mental well-being. *Public Health* 120, 1117-1126.

<sup>34</sup> Grahn P & Stigdotter UA (2003) Landscape planning and stress. *Urban Forestry and Urban Greening* 2: 1-18.

<sup>35</sup> Taylor AF, Kuo FE & Sullivan WC (2001) Coping with ADD: The surprising connection to greenplay settings. *Environment and Behavior* 33: 54-77.

<sup>36</sup> Wells NM (2000) At home with nature: effects of "greenness" on children's cognitive functioning. *Environment and Behavior* 32: 775-795.

<sup>37</sup> Kuo F E (2001) Coping with poverty: impacts of environment and attention in the inner city. *Environment and Behaviour* 33, 5-34.

<sup>38</sup> Ulrich RS (1984) View through a window may influence recovery from surgery. *Science* 224: 420-421.

**Social well-being:** The relationships between residents in the same area develop mainly through outdoor contact, and vegetation attracts people to use open spaces<sup>39</sup>; in neighbourhood open spaces in Chicago, 83% more individuals engaged in social activity in green spaces than in barren spaces<sup>40</sup>. The use of green spaces can positively influence the quantity and strength of social relationships of diverse groups, including older adults<sup>41</sup>, teenagers from different ethnic backgrounds<sup>42</sup>, and female residents of social housing<sup>43</sup>.

**Space to grow food:** Participation in food growing projects offers an opportunity to increase physical activity and increase consumption of fresh fruit and vegetables. Moreover, psychological benefits are possible, due to contact with nature, increased serotonin through sunlight exposure, sense of achievement, and enhanced social networks<sup>44</sup>.

**Improving air quality:** Trees are very effective at removing some pollutants that are harmful to human health from the atmosphere. They absorb gases such as ozone, nitrogen dioxide, sulfur dioxide and help to deposit pollutant particles smaller than 10 microns in diameter (PM<sub>10</sub>)<sup>45</sup>. Up to 70% of air pollution in cities can be filtered out using street trees<sup>46</sup>. Doubling the number of trees in the West Midlands would reduce excess deaths due to particulate pollution by up to 140 per year<sup>47</sup>; just 5% of green space including trees within a 10 x 10km square of East London could significantly reduce particulate pollution, with an estimated effect of two deaths and two hospital emissions avoided per year<sup>48</sup>.

**Reducing noise:** The effectiveness of vegetation in reflecting and absorbing noise depends on the density, height, length and width of planting. Dense shrubs combined with trees are the most effective; up to 10 decibels per 20 metres width can be achieved<sup>49</sup>. In less dense settings, every 33m width of forest can achieve 7 decibels noise reduction<sup>50</sup>. In heavily built up areas, where tree planting is impractical, green roofs also help to reduce air and noise pollution<sup>51</sup>.

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<sup>39</sup> Coley RL, Kuo FE & Sullivan, WC (1997) Where does community grow? The social context created by nature in public housing. *Environment and Behavior* 29: 468-494.

<sup>40</sup> Sullivan WC, Kuo FE & DePooter SF (2004) The fruit of urban nature. *Vital neighbourhood spaces*. *Environment and Behavior* 36: 678-700.

<sup>41</sup> Kweon B-S, Sullivan WC & Wiley AR (1998) Green common spaces and the social integration of inner-city older adults. *Environment and Behavior* 30: 832-858.

<sup>42</sup> Seeland K, Duebendorfer S & Hansmann R (2008) Making friends in Zurich's urban forests and parks: The role of public green space for social inclusion of youths from different cultures. *Forest Policy Economics* 11: 10-17.

<sup>43</sup> Kuo FE, Sullivan WC, Coley RL & Brunson L (1998) Fertile ground for community: Inner-city neighbourhood common spaces. *American Journal of Community Psychology* 26: 823-851.

<sup>44</sup> Leake JR, Adam-Bradford A & Rigby JE (2009) Health benefits of 'grow your own' food in urban areas: implications for contaminated land risk assessment and risk management? *Environmental Health* 8 (Suppl 1): S6.

<sup>45</sup> Nowak DJ (1994) Air pollution removal by Chicago's urban forest, Chicago's urban forest ecosystem: results of the Chicago urban forest climate project. United States Department of Agriculture.

<sup>46</sup> Bernatzky A (1983) The effects of trees on the urban climate. In: *Trees in the 21st century*. Academic Publishers, Berkhamsted, 59-76. Based on the first International Arboricultural Conference.

<sup>47</sup> Centre for Ecology and Hydrology (no date) Trees and sustainable urban air quality. CEH, Lancaster. Available at: <http://www.es.lancs.ac.uk/people/cnh/docs/UrbanTrees.htm>

<sup>48</sup> Tiwary A, Sinnett D, Peachey C, Chalabi Z, Vardoulakis S, Fletcher T, Leonardi G, Grundy C, Azapagic A & Hutchings TR (2009) An integrated tool to assess the role of new planting in PM<sub>10</sub> capture and the human health benefits: A case study in London. *Environmental Pollution* 157: 2645-2653.

<sup>49</sup> Fang C-F & Ling D-L (2003) Investigation of the noise reduction provided by tree belts. *Landscape and urban Planning* 63: 187-195.

<sup>50</sup> Coder RD (1996) Identified Benefits of Community Trees and Forests, University of Georgia Cooperative Extension Service - Forest Resources Publication FOR96-39.

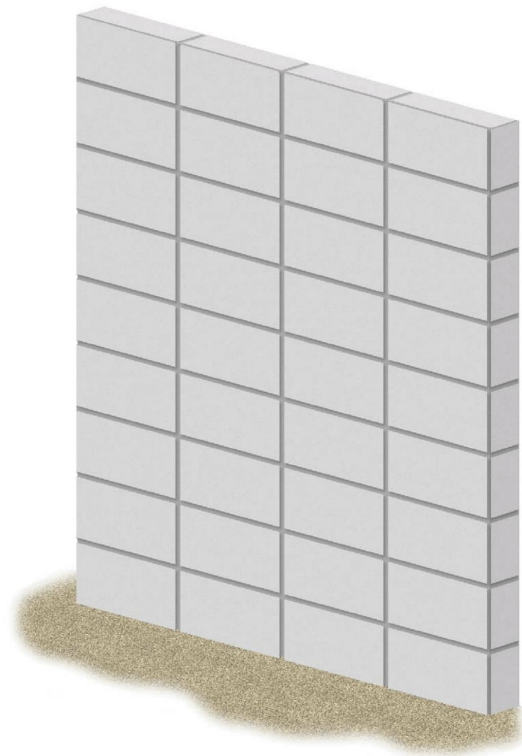
<sup>51</sup> Goode D (2006) *Green infrastructure report to the Royal Commission on Environmental Pollution*. Royal Commission on Environmental Pollution, London.

## Appendix 2: ANS Global Living Wall System

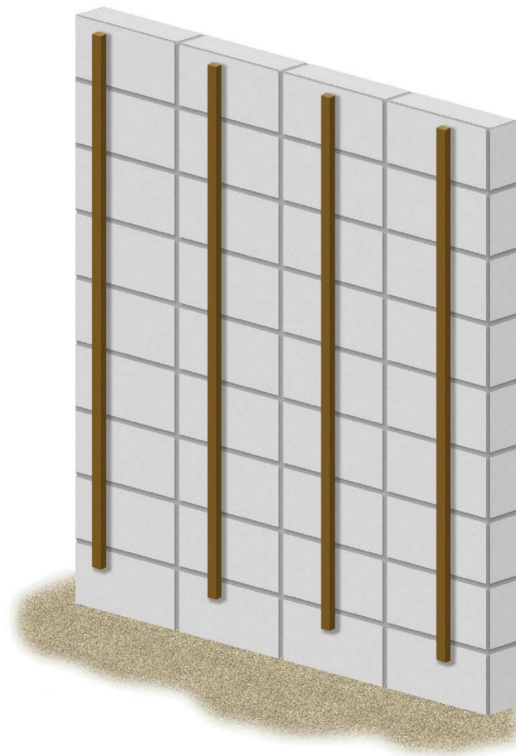


**ans**livingwalls

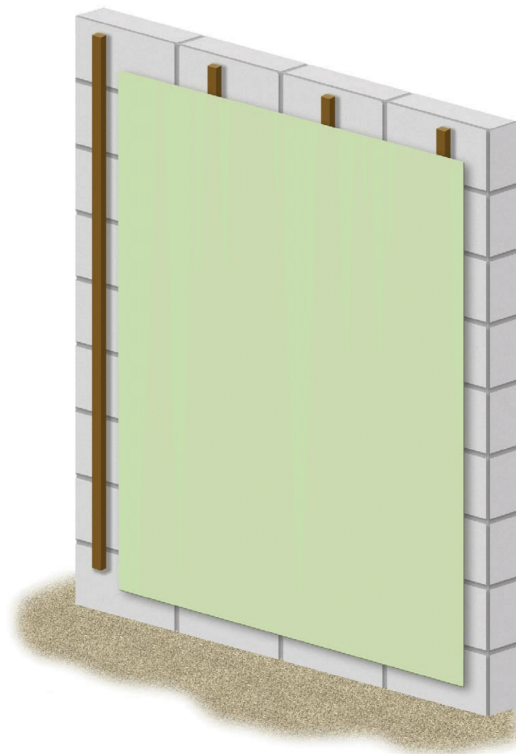
Indicative existing structure



FSC pressure treated  
softwood battens  
fixed to existing structure  
at 250mm centres



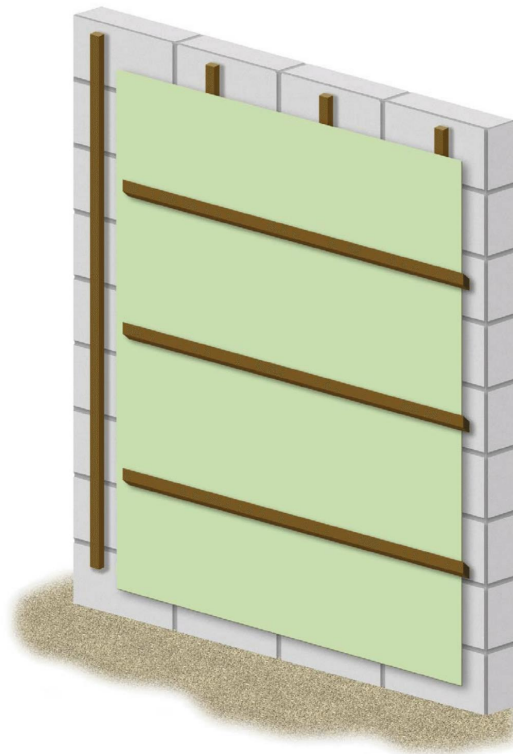
Waterproof membrane





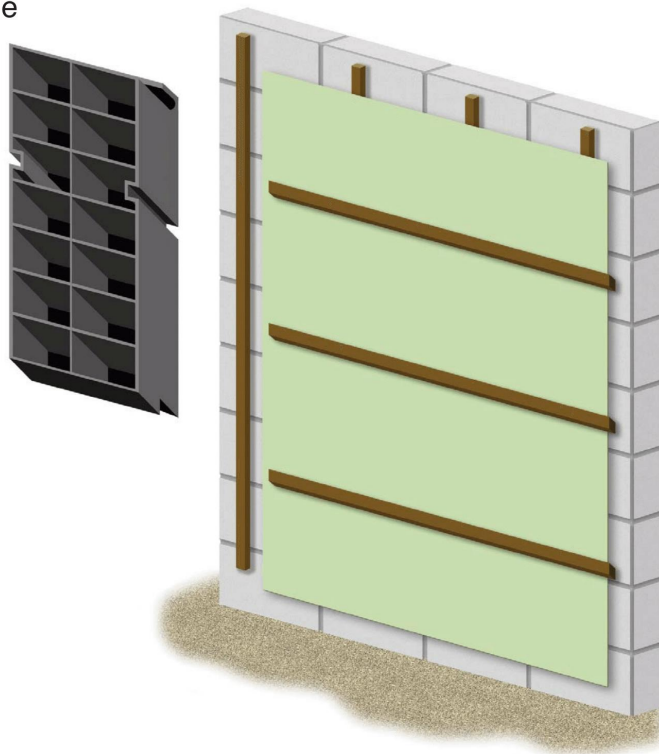
### ANS fixing rails

48mm x 12mm fixed to surfaces  
at 500mm centres with  
countersunk stainless steel screws

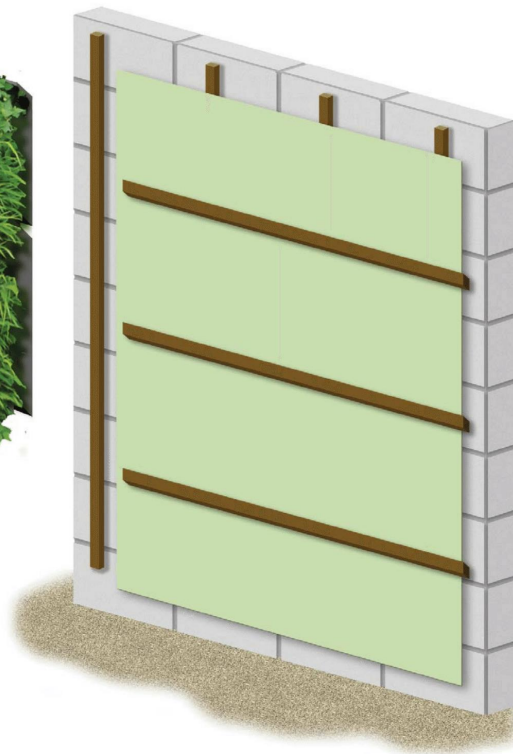


### ANS living wall module

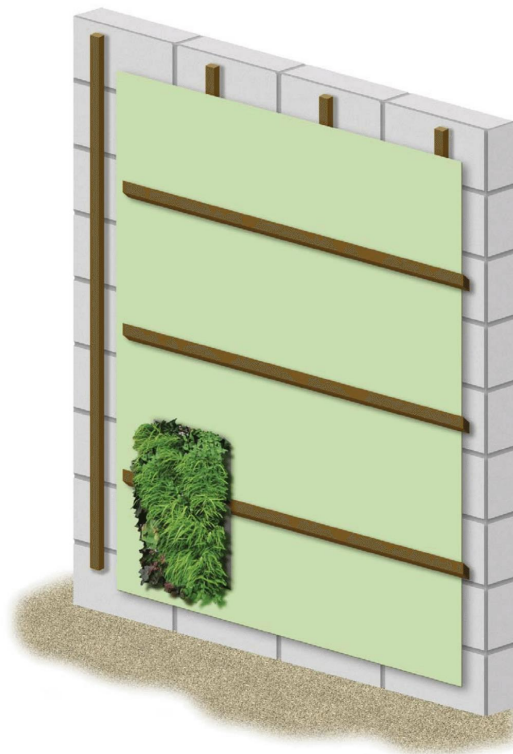
500x250x100mm



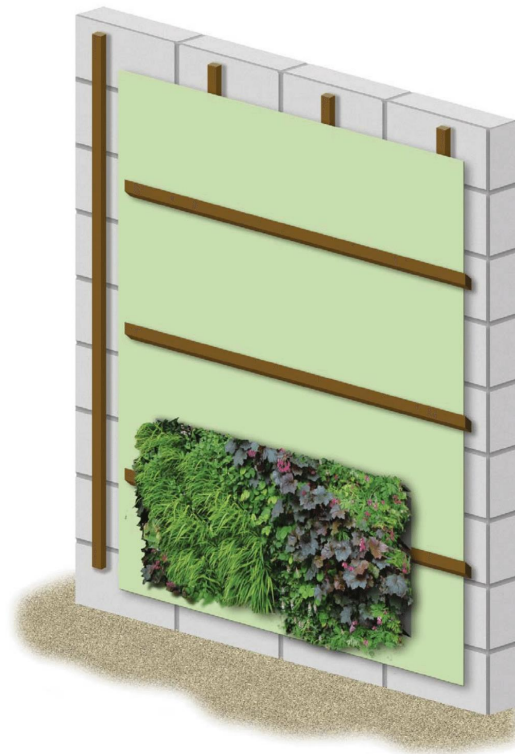
ANS living wall module  
pre-planted  
before installation



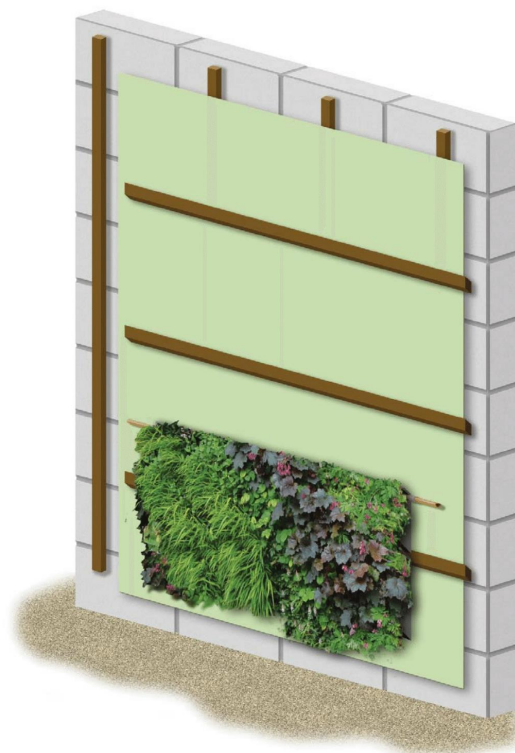
ANS living wall module  
fitted to fixing rails



**ANS living wall module**  
fitted to fixing rails



**16mm diam. pipework**  
with inline pressure compensated  
emitters at 125mm centres



ANS living wall module  
build up



ANS living wall module  
build up





## Drainage channel

specifier's choice of material



## Appendix 3: Inspiration from Victoria BID

Victoria BID's [Green Infrastructure Audit](#), published in 2010, and the associated [Best Practice Guide](#), published in 2013, have led to several projects that have had a real impact on the area. You can read more about these projects on Victoria BID's [website](#).

### Living wall at The Rubens at the Palace Hotel



Photo © Red Carnation Hotels

One of London's largest green walls, featuring pollinator-friendly plant species and a rainwater collection system that is used to irrigate the plants. Amongst other benefits, the living wall has been shown to significantly cool the building in summer.

*"The living wall was a project we bought in to from the very beginning and has been brought to fruition significantly enhanced from the original concept."*

Jonathan Raggett, Managing Director Red Carnation Hotels

### The John Lewis Rain Garden

This attractive feature is designed to allow excess rainwater to soak into the ground, feeding the plants and helping to reduce local flooding.



## The Diamond Garden



Photo © Victoria BID/Mickey Lee

A striking design that also helps to alleviate surface water flooding through water interception and infiltration.

*“Victoria BID and the designer, Professor Nigel Dunnett have created a garden bathed in light that the public can enjoy.”*

Sir David Walker, former Master of the Household, Buckingham Palace