

White Hart Lane Public Realm



SuDS used

- *Bioretention raingardens*
- *Structural tree pits integrated into a permeable paved adopted highway*
- *Permeable Paving*
- *De-paving around asphalt-locked Plane tree*

Benefits

- *Reduced Surface Water Flooding*
- *Improved Water Quality*
- *Biodiversity & Urban Greening*
- *Amenity Through Improved Public Realm & Inclusive Access*
- *Education About & Awareness Of Moselle River & Suds*

1. Location

White Hart Lane, Tottenham, N17 8HH

2. Description

The project was commissioned to contribute to the wider regeneration of North Tottenham and deliver a more attractive, accessible, economically successful and better-quality public realm.

The designed aimed to do this by promoting modal change, shifting the priority from making space for vehicles to making space for people and delivering environmental improvements through the blue green infrastructure of sustainable drainage and street greening.

A material streetscape palette and SuDS strategy was established which acts as a best practice design guidance for the wider regeneration schemes.

3. Main SuDS components used

Bioretention raingardens managing highway runoff.

Permeable paving throughout pedestrian areas - mention bespoke gauge? Now a new product.

Structural tree pits integrated into a permeable paved adopted highway.

De-paving around asphalt-locked Plane tree - also invaluable gas exchange in the tree's root zone is enabled by the permeable paving that surround the new planter around the tree.

4. How it works

Bioretention raingardens.

Polluted highway runoff enters the raingardens through 80mm gaps in large granite feature kerbs, dropping onto a concrete shelf that dissipates erosive energy and then over the soil surface within the raingarden.

The soil is a special manufactured soil blend developed with Bourne Amenity called RBA SuDS Soil, mixed with 10% PAS100 compost. This is free draining but retains both moisture and nutrients, unlike the standard sand-based bioretention soils such as specified in the CIRIA manual. Retention of moisture and nutrients in clay particles in the soil is critical for the plant species we wanted to include and to increase resilience to drought periods. The result is a soil with a lower percolation rate but healthier and more vigorous plant growth and associated benefits. It is also likely that the soil will have a healthier biofilm and enhanced pollution removal although this is yet to be analysed. Most rainfall events and the most polluted 'first flush' of rainfall events will be managed by this soil profile, with 100mm depth attention over the surface, 25% void within the 450mm depth RBA SuDS Soil and further storage within grit and gravel filtration and drainage layers beneath the soil.

If runoff input becomes too intense for the percolation capacity of the soil, once the first flush has been managed by the soil layer, 'infiltration tubes' come into play. These are stainless steel tubes projecting 100mm above the soil surface and connecting to the grit and gravel storage layers at the base of the raingarden construction. They are filled with filtering 4-20mm gravel topped with 50mm depth 2-6.3mm grit ensuring that ongoing runoff, carrying increasingly diluted pollution load, is taken more quickly to the storage and infiltration layers at the base of the construction.

This two-tier approach is an innovation in bioretention design responding to the pollution hierarchy of smaller rainfall events and the first flush of larger events, whilst ensuring healthy and resilient plant growth suitable for demanding urban environments.

The raingardens were designed to work in both infiltrating soils as well as non-infiltrating soils, with the latter requiring a simple orifice flow controlled discharge from the gravel base of the raingarden.

Permeable paving

Permeable flag paving was employed throughout pedestrian areas to the south side of the street, including within the small pocket park. The infiltration ability of the underlying soils allowed structural CGA sub-base to vary in-depth to accommodate existing utility constraints creating a blanket infiltration zone capable of receiving runoff from areas where significant CGA sub-base depths were not achievable such as above very shallow services.

Structural tree pits integrated into a permeable paved adopted highway.

A block paved permeable adopted highway adorns Love Lane which runs perpendicular to White Hart Lane. At two points, structural tree pits span the full road width, connecting road-narrowing tree planters on each side of the road. Beneath the road surface, the deep structural soil zones, comprising compacted stone and RBA SuDS Soil, form sumps which are hydraulically connected to the CGA subbase of the permeable paving. This means that in heavy or prolonged rain, once percolated runoff begins to move laterally along the interface between the subbase and subgrade, it moves toward the structural tree pits where it begins to be attenuated. Once the pits fill to the level of the base of the road subbase, the attenuation and infiltration spread out over the whole road surface. This pattern of flow and attenuation means that the trees benefit from rainwater collected from an extended catchment making them healthier and more resilient to drought. The tree planters are awaiting tree planting following the construction of the new Tottenham Hotspur station - a landmark building constructed off the finished permeable highway.

5. Specific project details

We began the project with extensive local research and distillation of existing policies at LBH through which we established 7 key tenets which should guide the proposals for White Hart Lane and the surrounding areas.

1. The Value of Uneven Spend

The streetscape as a simple background setting for the everyday and as a route to the large scale destinations and landmark buildings. SuDs and street planting to provide a playable and social landscape.

2. A Local Host to Match Days

Balance investment in the needs and pleasures of the everyday and for match days, so the public realm is a good host all the time.

3. Big Up the Canopies

Value diversity and large specie trees as a living heritage that articulates the city landscape and provides continuity as development comes and goes, preserve and enhance the conditions of existing mature trees.

4. Re-balance the Street

WHL and surrounding streets must shift the priority from traffic to people and be safe, vibrant community spaces, not wholly focussed on movement of traffic.

5. Slow the Flow

Make space below ground for SuDs and urban forestry to mitigate pollution and climate change, and above ground for street activity to prioritise pedestrians.

6. Look Back to Look Forward

Celebrate the qualities of the existing fabric and historic grain to build an inclusive future and mitigate the errors of the past.

7. Meanwhile Uses for the Here and Now

Every temporary use should lead to a long term identified long benefit.

During a site visit early in the design process it became clear that the Moselle River was highly polluted with visible sewage fugus from further up the catchmet and so daylighting wasn't appropriate - yet. Raingardens mark the line of the river and protect it from highway runoff - microplastics, urban heat, heavy metals, hydrocarbons, litter and silts. Raising awareness of the Moselle through the design and consultation has been key to a wider aim of fixing misconnections in the river catchment.

6. Maintenance & operation

Details of the design of the scheme were developed in tandem with converstations with the maintenance and operation team at LBH, the scheme as built could not represent a marked increase in the maintenance regieme for the area. Specific challenges, for example using a suction road sweeper were discussed and precedents for past projects a different boroughs employed to develop the O&Ms for the project. Since the projects completion anxieties about the rain gardens becoming litter traps have not come to pass and litter picking teams report that they pick less rubbish from planted areas than from areas of hard standing.

7. Monitoring and evaluation

Surface water flooding, even during heavy rainfall events has ceased completely along the length of White Hart Lane. In response to ongoing inquiry from local residents and users the design team produced some educational signage explaining how the SuDs features in the project function and the path of the Moselle River. The response on social media has contributed monitoring use and the success of the project.

8. Benefits and achievements

The before and after photographs of this scheme and the improvements to pedestrian, cyclist and public transport user experience that they demonstrate is striking.

This is an example of a fully-integrated design process where SuDS sat at the heart of multiple design considerations that the project had to consider in such an intense urban environment.

The project is an exemplar for the proposed surrounding High Road West development and beyond.

The project features one of the first adopted permeable highways in London - this is important to address the barriers to the use of permeable highways becoming more widespread.

It also includes one of the first adopted highways over a structural tree pit - again, the use and adoption by pioneering councils is important to provide real life experience and assurance to lead the way for wider uptake.

The contractor was nervous about installing the structural tree pits as it wasn't something they were familiar with. We provided support and advice to the contractor regarding their installation and, now complete, they are comfortable installing elsewhere. In fact they have just installed another structural tree pit of a similar construction at a project in Wood Green, connecting a tree pit with a bioretention raingarden.

Innovative bioretention raingarden design ensuring healthy resilient planting and maximum pollution removal - challenging the low-nutrient, sand-based soil systems, allowed us to design raingardens that support plant typologies suitable for a busy urban street and deliver the multiple benefits that vigorous planting offers.

The project was a pilot project for the TfL Healthy Streets Scheme and was one of the first to use the Healthy Streets Indicator as a metric.

9. Lessons learnt

Arranging contract growing plants early in the process would ensure that large plants are available at the time of planting to achieve maximum day-one impact.

Street maintenance staff found that, contrary to the belief that SuDS collect increased amounts of litter, they pick up more litter from the pavement areas than they do from the raingardens.

Support for contractors tackling construction methods associated with SuDS for the first time is very valuable - contractors required support and encouragement at first, but subsequently found the process of installing the structural tree pits less onerous than they feared and are now comfortable installing on other projects in the borough.

10. Interaction with local authority

London Borough of Haringey acted in the client role with an excellent client team led by Peter Watson. Weekly meetings were held alongside consultation with other LBH departments including highways, maintenance, regeneration etc.









11. Project details

Construction completed: July 2019

Cost: £3.5m

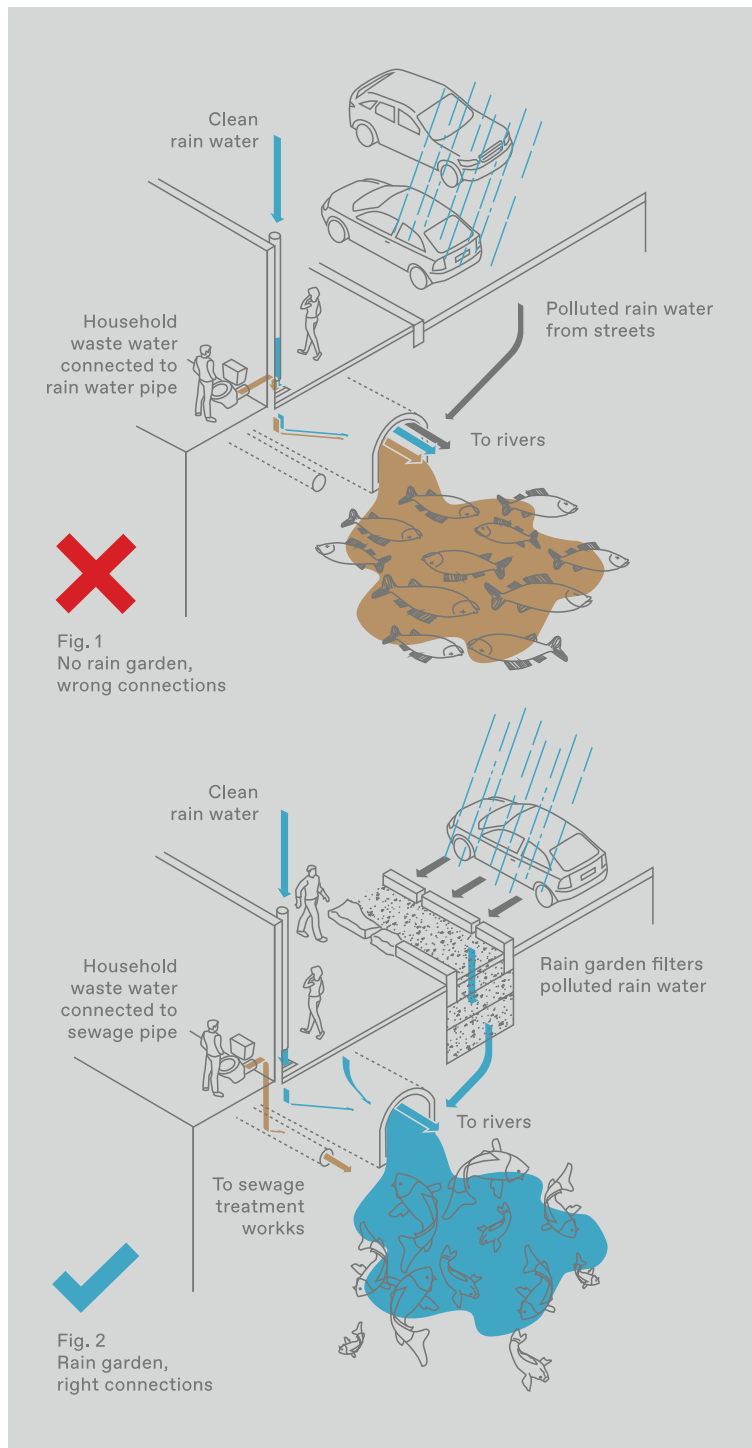
Extent: 10,300 msq of public realm and associated carriageway

12. Project team

Funders	<ul style="list-style-type: none"> GLA TFL 	 
Clients	<ul style="list-style-type: none"> London Borough of Haringey 	
Designers	<ul style="list-style-type: none"> muf architecture/ art Robert Bray Associates Civic Engineers Studio Dekka Objectif 	   
Contractors	<ul style="list-style-type: none"> Marlborough 	



Overall Plan showing Extent of White Hart Lane Public Realm Improvement Project



Extract of Signage showing relationship between the river, SuDs and misconnections

Image: muf, Objectif



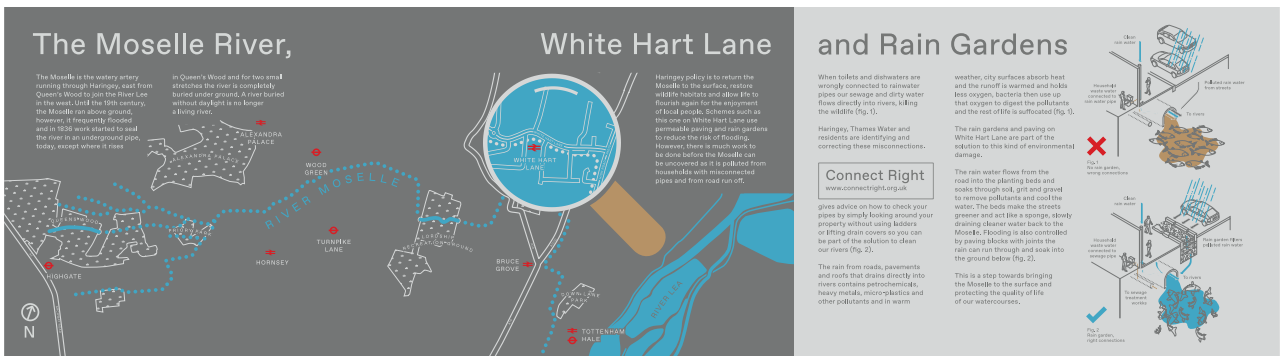
Roadside raingardens with established planting

Image Robert Bray Associates



Newly created park with tree planting and seating

Image: RBA Associates



The Moselle River,

The Moselle is the watery artery running through Harrogate, east from Queen's Wood to join the River Lee in the west. Until the 19th century, the Moselle ran above ground, however, it frequently flooded and in 1830 work started to seal the river in an underground pipe, today, except where it rises in Queen's Wood and for two small stretches the river is completely buried under ground. A river buried without daylight is no longer a living river.

White Hart Lane

Harrogate policy is to return the Moselle to the surface, restore wildlife habitats and allow it to flourish again for the enjoyment of local people. Schemes such as this one on White Hart Lane use permeable paving and rain gardens to reduce the risk of flooding. However, there is much work to be done before the Moselle can be uncovered as it is polluted from households with misconnected pipes and from road run off.

When toilets and dishwashers are wrongly connected to rainwater pipes our sewage and dirty water flows directly into rivers, killing the wildlife (Fig. 1).

Harrogate, Thames Water and residents are identifying and correcting these misconnections.

Connect Right
www.connectright.org.uk

gives advice on how to check your pipes by simply looking around your property without using bobbers or lifting drain covers so you can be part of the solution to clean our rivers (Fig. 2).

The rain from roads, pavements and roofs that drains directly into rivers contains petrochemicals, heavy metals, micro-plastics and other pollutants and is warm weather, city surfaces absorb heat and the runoff is warmed and holds less oxygen, bacteria then use up that oxygen to digest the pollutants and the rest of life is suffocated (Fig. 3).

The rain gardens and paving on White Hart Lane are part of the solution to this kind of environmental damage.

The rain water flows from the road into the planting beds and soaks through soil, grit and gravel to remove pollutants and cool the water. The beds make the streets greener and act like a sponge, slowly draining clean water back to the Moselle. Flooding is also controlled by grating blocks with joints that rain can run through and soak into the ground below (Fig. 2).

This is a step towards bringing the Moselle to the surface and protecting the quality of life of our watercourses.

Educational signage explaining river Moselle and benefits of SuDs installed on site



Modal change through narrowing the road and adding roadside raingardens and planting

Image: RBA Associates



Simple material palette of sustainably sourced European granite and Scottish Caithness stone
Image Robert Bray Associates



Playable SuDs with Raingarden stepping stones (before planting established)

Image muf