

Andre Street Rain Garden, London



SuDS used

- *Rain garden*

Benefits

- *Amenity- new quality space for residents*
- *Reduction in surface water runoff to combined sewer*
- *Improved water quality of highway runoff*
- *Increased biodiversity*
- *Increased community engagement with SuDS*

1. Location

Andre Street, London Borough of Hackney. London. E8 2HZ.

2. Description

The site is a triangular island bounded by Andre Street to the east, south and west, with Downs Park Road to the north. The railway line is located to the east and residential properties to the south beyond Andre Street.

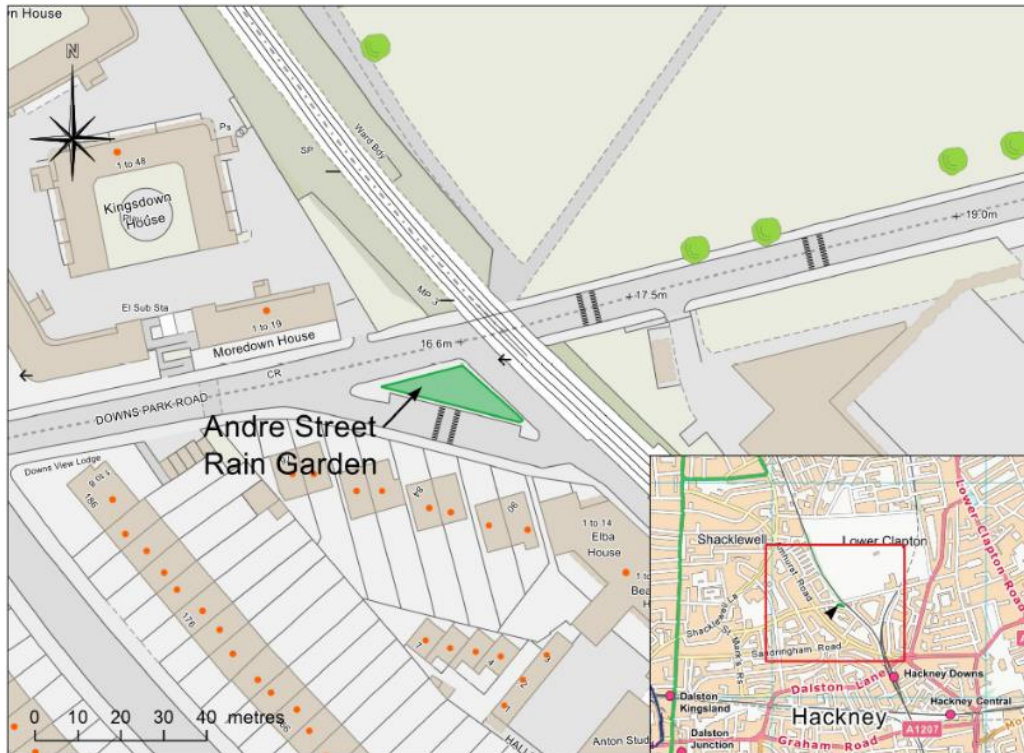


Figure 1: Location Map. Contains OS data © Crown copyright and database right 2017.

The site has a number of mature cherry trees lined to the north and east of the island and further bounded by a footway. The trees are mature in size but went largely unnoticed due to the ground condition of the island. Cherry trees have a tendency to root at quite a high level which can lead to serious ground disruption without root protection which occurred on this site. This had led to severe deformation and cracking of the slabs covering the island surface creating an uninviting space with trip hazards. The island was unattractive and had limited amenity value despite the presence of the mature trees.

The site was first brought to the attention of the SuDS team by Hackney's arboricultural officer in regard to the condition of the island. The area would have to be repaved to address the trip hazard but consideration was given to investigate whether it was an option to depave the entire area for the benefit of the existing trees.



Figure 2: pre-developed condition of the island

The location was not initially considered as being suitable for SuDS as the island sits approximately 300mm above the adjacent carriageway level, which makes it difficult to direct runoff from the carriageway into the island. Further investigation and design consideration concluded that an innovative design could overcome this challenge.



Figure 3: Level difference between island and adjacent carriageway

The construction of a rain garden at the location was welcomed by the arboricultural officer and local users. This was a much-needed improvement to the public space and was able to provide an attractive amenity space for local residents. Furthermore, the rain garden would be able to reduce the volume of carriageway run-off into the sewers and therefore decrease the subsequent risk of surface water flooding in an area shown to have a 'high' risk of surface water flooding.

3. Main SuDS components used

- Kerb inlets
- Rain garden

4. How it works

The area in the island that was to be depaved has a surface area of 150m² and contains seven mature cherry trees.

As the island is raised above its surrounding area, runoff from the carriageway would therefore need to enter the rain garden at 300mm below the island surface. In order to overcome this level difference, the lower kerb of the island was cut in four locations to provide 200mm wide gaps to allow run-off to enter the rain garden but also ensure that soil within the rain garden did not wash back out into the carriageway. This was achieved by using a small (300x300x300mm) gabion basket filled with 50mm pebbles secured behind each inlet. Hessians were used to separate the soil from the gabion basket, apart from the side facing the inlet to allow surface water to flow in unimpeded.

This design feature was simple, cost effective and made use of widely available construction materials.



Figure 4: Gabion basket kerb inlets

Due to the existing trees and their extensive root system it was not possible to fully excavate the site and backfill with an even soil depth across the entire rain garden. The depth of aggregate and soil therefore vary across the site, with the depth of aggregates and soil varying between 100mm-200mm and 200mm-400mm, respectively.

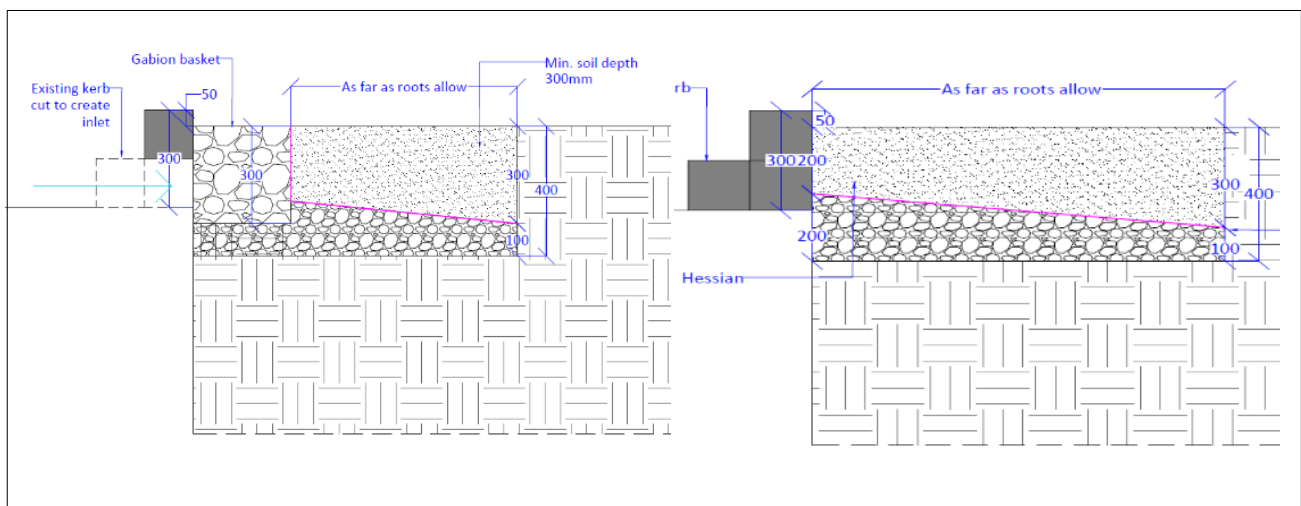


Figure 5: cross sections of rain garden

The rain garden provides source control for run-off from the carriageway and footway and particularly manages the first flush (first 5mm rainfall) from the carriageway to reduce loading on the combined sewer system. The rain garden has resulted in the following benefits:

- Prevention: the traffic island has been de-paved which increases the permeable area by 150m²
- Source control: carriageway run-off diverted to the rain garden through inlet features
- Evapotranspiration: the biodiverse plants and the mature trees in the garden encourages evapotranspiration

The scheme was designed to allow surface water to slowly infiltrate into the ground with an exceedance route to an existing highway gully.



Figure 6: rain garden during construction. Crushed aggregate sub base overlain by hessian and soil.

Design Criteria

The rain garden has a surface area of 150m² and a drainage catchment area of 550m². Calculation shows that the rain garden could manage a rainfall event in excess of 1 in 5 year. Interception losses and infiltration have not been included in the calculation despite the closest borehole (BGS records), 125m from the rain garden, indicates that the site is underlain by gravel and sand, which tends to have a good infiltrate rate. The rain garden therefore has a greater storage and infiltration capacity than shown by the calculations and likely to be able to accommodate a greater storm event. Any overflow from the rain garden would follow an exceedance flow route and overflow into a nearby gully.

The rain garden treats the first flush from the highway by allowing run-off through the pebble filled gabions, slowing the flow and encouraging deposition of suspended soils and improving the water quality before runoff infiltrates into the ground within the rain garden.

As with many small retrofit SuDS interventions in Hackney, the scheme was intended to complement and reduce the load on the existing public sewerage system and therefore providing betterment by reducing the volume of surface water runoff into the gullies. To encourage the use of SuDS, particularly those with multiple benefits in unconventional locations, we avoid setting arbitrary return period thresholds.

5. Specific project details

The project was funded by the Lead Local Flood Authority's capital budget.

The site was highlighted to the arboricultural team by residents due to ongoing maintenance issues and the poor amenity value of the space. This created a project with a focus on delivering amenity in addition to SuDS. The residents were notified in advance of the project and engaged during construction. Residents were enthusiastic about the scheme and contributed to some of the planting. Continued positive feedback has been received from residents.

The scheme is designed to benefit from blossoming flowers the whole year round, from daffodils and primroses in spring, to the late flowering heavily scented eleagnus. The cyclamen provide blossom through the winter, keeping their beautiful blooms for four whole months, right through the storms and frosts. As early as the beginning of March bumble bees had been visiting the site. With year round blooms the rain garden is clearly a haven for pollinators. Also, the plants used are diverse, which by dint of their placement should all prosper together and support each other as they grow.

The rain garden encourages multi-functionality and amenity by appearing foremost as a community space which has revived a drab, poorly maintained area of paving. The wealth of planting makes the area inviting and colourful, and encourages residents to dwell longer in the area. The rain garden includes an informal play and seating feature to increase amenity value but avoid encouraging anti-social behaviour as they are not comfortable to sit on for an extended period of time.



Figure 7: Informal play and seating feature

The soil type for the scheme was a challenging aspect of the project due to the soil delivered to site containing too much clay. The landscape architect was able to improve the soil with organic material and soil has been a key learning area for other SuDS site going forward.

Timeline:

August 2019- civil design and internal consultation. Residents notified.

September 2019- Civil construction works undertaken. Local landscape architect engaged and landscape design developed.

October 2019- Planting and landscaping completed. Further engagement with residents.

6. Maintenance & operation

The rain garden was commissioned by the Highways team at London Borough of Hackney and forms part of the public highway. It is therefore adopted by the local highway authority and the civils aspects will be maintained within this arrangement. The design allows for simple maintenance of the rain garden, the inlets can be swept to remove leaves and other highway debris.

The maintenance of the flowers and plants is initially being undertaken by the landscape architect along with residents who live in proximity to the scheme. This maintenance includes pruning, litter picking and any plant replacement that may be necessary whilst the rain garden establishes. Once

the site is established, the site will be added to the Hackney Parks team maintenance schedule while the residents continue to contribute to everyday maintenance.

7. Monitoring and evaluation

As the scheme has only been in place for a number of months extensive monitoring or evaluation has yet to take place. We look to carry out a survey on how local residents are responding to SuDS schemes and the increased greening we are providing across the borough. The general feedback so far has been very positive.

The site is monitored by the landscape architect who designed the planting, highway inspectors and civil works contractors. Residents are able to report any issues with the scheme online to the highways team.

8. Benefits and achievements

Key benefits/achievement:

- The rain garden has provided greatly improved amenity with a new quality space for residents and a more attractive street scene
- Reduction in surface water runoff to the combined sewer, reducing the risk of surface water flooding on the carriageway
- Improved water quality of highway runoff where infiltration occurs
- Increased biodiversity from varied range of planting provided in the rain garden
- Increased community engagement in relation to SuDS, including residents involved in maintenance and increased positive perception of rain gardens. Provides a platform for wider dissemination of SuDS education and engagement.
- Greater uptake of SuDS across the highways department.

9. Lessons learnt

The following aspects where key challenges of the project and details are provided of how they were overcome:

- Initial perceived unsuitability of the site for SuDS retrofit. Creativity and working with existing features into the design instead of 'fighting' them, resulted in an effective rain garden which encouraged further highway retrofit in the borough.
- Lack of internal expertise on planting design and lack of planting contractor as part of the highways framework contract. Working with a local landscape architect had tendering challenges but resulted in a very high quality scheme which was rapidly delivered and resulted in increased community engagement and wider investment (non-financial) in the maintenance of the rain garden.
- When designing a scheme and particularly a new inlet feature it is important to consider what materials are readily available to the highway contractor as this can substantially reduce construction lead times. If the contractor is not a SuDS specialist, a design that uses

familiar highway construction process will result in a better quality scheme delivered in a timely manner.

10. Interaction with local authority

The client for this scheme was the Hackney LLFA in conjunction with the Highways Team.





11. Project details

Construction completed: Construction works completed 25th September 2019, *Planting completed 14th November 2019*

Cost: Civil construction works: £35,000; Landscape design, planting and landscape management: £9,000

Extent: 150m²

12. Project team

Funders	<ul style="list-style-type: none"> London Borough of Hackney (LLFA) 	
Clients	<ul style="list-style-type: none"> London Borough of Hackney (Streetscene) 	
Designers	<ul style="list-style-type: none"> London Borough of Hackney (LLFA) Hillman Gardens 	 
Contractors	<ul style="list-style-type: none"> AJ O'Connors Hillman Gardens Jack Sully Landscape Construction 	