

## Where



County Oak Avenue, Brighton, BN1 8LU

## Description

The playing field at Carden Primary School was of a typical character with a large flat area of short mown amenity grass. Good for playing football and other sports, there was not much of interest for children who have other styles of play and very little biodiversity.

Surrounding roads and housing form part of a large upstream catchment of approximately 2.5 hectares that drains to Carden Hill Road which runs along the northern edge of the site. During rainfall significant volumes of rainwater flow down the Carden Hill and join flows on Carden Avenue. Homes at the bottom of Carden Avenue were experiencing repeated episodes of flooding.

Road run-off is polluted with a variety of chemicals which accumulate on the roads due to our vehicle use. This can get into our aquifer via road gullies and soakaways. The aquifer is the source of water for the city.

The Aquifer Partnership (TAP) partnered with Carden Primary School to create an inspirational rainscape with emphasis on education and play opportunities. Rainscapes, also known as Sustainable Drainage Systems (SuDS) are a way of managing water close to where it falls, keeping it largely at the surface rather than piping it into drains and sewers. SuDS mimic natural drainage and are able to hold

volumes of stormwater, slowing the flow, naturally treating polluted water and encouraging infiltration through the ground to recharge the aquifer.

Carden Primary School was chosen to be part of TAP's SuDS in Schools programme as it is in a source protection zone (an area safeguarded to provide additional protection to drinking water quality), and high in the catchment of an area prone to flooding. It is designed to work alongside Brighton & Hove City Council's [SCAPe project](#) - a roadside rain garden along Carden Avenue which also reduces flooding.

TAP was established to protect and improve the quality of groundwater in the Brighton Chalk Block as a valuable natural resource. See [wearetap.org.uk](http://wearetap.org.uk) for more information.



Figure 1: Site pre-construction

### **Main features**

- Double gully inlet and carriageway resurfacing works along Carden Hill
- Pipe and stilling basin with erosion protection
- Channel conveyance, including swale and weir feature
- 50 m<sup>2</sup> inlet basin
- Permanent pond (lined) with dipping platform
- 200 m<sup>2</sup> infiltration basin
- Bund to provide extra protection to house adjacent to site

## Objectives

- Showcase SuDS in order to promote greater take-up
- Promote sustainable water management to protect the Brighton chalk block aquifer
- Reduce flood risk
- Clean polluted road run-off
- Create a high quality and beautiful outdoor space in the school
- Involve pupils in designing and implementing changes within their school
- Increase opportunities for cross-curricular outdoor education and outdoor play
- Increase biodiversity
- Educate pupils and the wider community about water issues and climate resilience



Figure 2: Site immediately after construction

## How it works

The rainscape takes water from Carden Hill road via a double gully, into a pipe and then a swale which directs the water to a wet basin. Should this basin fill the water will overtop to an infiltration basin. Infiltration rates are high in this catchment with chalk geology.

At the location of the inlet work, Carden Hill Road has a one-way crossfall towards the south, which results in a local catchment area of approximately 750m<sup>2</sup> assuming all upstream gullies and drainage is effective.

Flood mapping (see Figure 3) showed that the proposed works area is located along a significant flow path for surface water flooding events of 1 in 100-year and above. The design includes a raised embankment at the southern end to hold water within the infiltration basin. This embankment acts as an overflow weir in exceedance events allowing water to overtop and continue along the exceedance flow path. A second raised embankment further downstream diverts exceedance flows to the east of the caretaker's house, which is shown to be at risk of flooding in these events.

The design caters primarily for runoff from the local catchment for events up to the 1 in 10-year storm event, however provision of additional capacity for larger storm events (30-year and 100-year) is also considered to provide broader catchment flood benefits. Total attenuation in the system is approximately 60m<sup>3</sup>.



Figure 3: Risk of flooding from surface water (Environment Agency)

### Planting:

A bespoke planting plan was commissioned for the site. Some areas of the site were left with chalk exposed to favour chalk species. The whole site was sown (with the help of pupils) with annual arable, chalk grassland and woodland seed mixes in appropriate locations. Species have been chosen to suit the soil, to be ecologically appropriate and provide foraging for pollinators as well as to be low maintenance. Log piles have been also created with the pupils.

In autumn 2023 shrubs, bulbs and trees will be planted along with pond plants.

All seeds and trees and the majority of plants and bulbs are locally sourced. Baseline ecological surveys have been carried out. These will be repeated to demonstrate biodiversity gain.

### **Benefits**

- Attenuation during rainfall reduces flood risk to school buildings and surrounding area
- Cleansing polluted water and replacing soakaway with sustainable water management
- Provision of an important educational and play resource for the school
- Increase in biodiversity
- An inspirational experience for pupils who were involved in the development of the rainscape from feasibility stage to planting
- Creation of an exemplar rainscape which is used to encourage SuDS take-up in other schools and across the region as part of the climate emergency response
- Raising awareness of SuDS and climate resilience to local community

### **Lessons learned**

- Sites requiring planning permission will require a long lead time, additional collaboration and possibly some degree of re-design
- Planting establishment was delayed due to poor growing season in spring 2023 – cold and then very warm with very little rain. Manage expectations accordingly as this weather pattern is likely to be repeated in future years.
- Plants establish far better in communities. Following seeding the planting established from the outside (adjacent to existing vegetation) inwards with seeds sown in the centre of bare basins taking far longer to grow to maturity and flowering.
- Planting team should be engaged at an early stage to allow maximum opportunities for biodiversity net gain, for example conversations about removing topsoil from this site and leaving chalk exposed to favour chalk species.
- Vegetated headwall systems need additional opening up of material to allow grasses to grow. They can be improved given extra attention in the planting scheme and could be planted with a variety of species to increase interest and biodiversity.
- Additional resource may be needed (staff, external providers etc.) to maximise pupils' interaction with school SuDS.

### **Costs**

Construction cost - £88,445

Total cost including planning, contract management, biodiversity baseline, fencing, planting and 5 year maintenance - £121,564

### **Date of completion**

March 2023

## **Project partners**

Client – [The Aquifer Partnership](#) and Carden Primary School

Designers – [Metis Consultants Ltd](#)

Contractors – [CJ Thorne](#)

Funders – South Downs National Park Authority, Department for Education, Brighton and Hove City Council. Environment Agency