Rainwise Retrofit Scheme, Northeast England

Figure 1 Rainwater garden at NWG's Boldon House, County Durham

SuDS used

- *Rainwater planters*
- *Rain gardens*
- *Rainwater harvesting*

Benefits

- *Reduction of peak flow to drainage system*
- *Reuse of grey water*
- *Biodiversity*
- *Educational opportunities*

1. Location

Across various Northumbrian Water operational sites in north east England.

Pity Me, County Durham, DH1 5FA; 54°48'28.8"N 1°34'38.3"W

Cramlington, NE23 3AS; 55°06'34.1"N 1°34'51.1"W

Howdon, NE28 0QD; 54°59'23.8"N 1°28'48.4"W

2. Description

Northumbrian Water Group (NWG) have completed a retrofit SuDS scheme across their existing facilities including office locations and treatment works. This project is part of Northumbrian Water's Rainwise initiative, which is aimed to raise awareness, manage rainwater more effectively, and increase resilience. Rainwise encourages customers to make small changes such as the installation of rain gardens, water butts and planters.

Northumbrian Water is determined to lead by example to help customers and employees become more resilient to flooding. In 2017, NWG have installed:

- Rainwater planters at the head office, Boldon House in Pity Me, Durham
- Rain gardens in the car park of Howdon Treatment Works
- Rainwater harvesting tanks at Cramlington Treatment Works

Following these successful implementations, other sites are being considered for additional installations.

3. Main SuDS components used

The main aim of the retrofits and the Rainwise initiative is to reduce the risk of flooding by reducing the amount of surface water directly entering the sewer network and by slowing down the amount of water that does. Additionally, the features are meant to raise awareness of opportunities.

Rainwater Planters

At NWG's head office in Pity Me, County Durham, two planters have been installed very visibly on the front to capture and store rainwater from the roof of the building. Each planter, which was created onsite by NWG's Maintenance team, holds around water within the soil. An image of a planter with an interpretation board is shown in Figure 1.

Rain Gardens

Three rain gardens (an example of one is shown in Figure 2) has been installed in the overflow car park at Howdon Treatment Works site. Surface water run-off from the carpark is directed into and captured in the rain gardens. The rain gardens slow runoff flows and provides treatment by removing silt and sediment from the carpark.

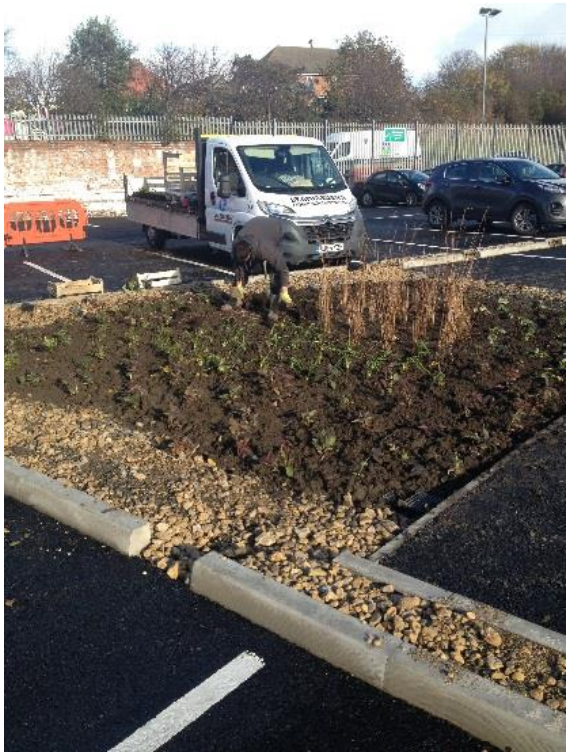

Fig 2 Rain garden at Howdon Treatment Works

Rainwater Harvesting

At Cramlington Treatment Works, rainwater harvesting tanks (as shown in Figure 3) have been installed to capture rainwater runoff from the building roofs. Previously this runoff went directly into the drainage system. NWG's jetting vans are recycling this grey water effectively, using it instead of drinking water, to clean the mains.

Figure 3 Rainwater harvesting tank at Cramlington Treatment Works

4. How it works

The Rainwise initiative has lead to the retrofit installation of SuDS at NWG sites. These SuDS features work independently, but all contribute to the overall goal of reducing the risk of flooding by slowing and reducing the surface water entering the drainage system.

Rainwater Planters

The rainwater planters capture and store rainfall from the roof of the building. The rainwater is diverted into the planter from the roof downpipe and then absorbed by the soil and plants. Each planter can hold around 260 litres of water within the soil, equivalent to around four bathtubs full. An overflow is provided to allow excess rainwater to spill into the drainage system.

Rain Gardens

The rain gardens captures surface water runoff from the car park. The water is directed into one of the three rain gardens or into the gravel channel that connects them all. There are no raised kerbs around the rain gardens, to allow water to enter freely, which is then stored naturally in the soil and absorbed by the plants. Gaps in the kerbs along the gravel channel also allow water to enter freely, before flowing slowly down through the channel and into a pipe which contains holes in it to allow infiltration to the ground. A pipe connects the three rain gardens together, allowing rainwater to flow from one rain garden to another.

The rainwater planters and rain garden help to green the areas, providing potential habitat creation and amenity to the locations. The rainwater planters and rain garden provide local management of surface water, which slows down runoff and helps to reduce pollution. These are examples of intervention early in the SuDS management train.

Rainwater Harvesting

Rainwater harvesting tanks capture and store rainfall from the roofs of the buildings. There are three 2.3 m^3 tanks storing runoff. An overflow is provided to allow excess rainwater to spill into the drainage system. These tanks were previously used as fresh water tanks, but have now been reused as part of the Rainwise initiative. This is an innovative and resourceful means to reuse an existing asset. NWG have additional disused tanks that will be given a new lease of life as rainwater harvesting tanks at other sites.

5. Specific project details

Rainwise is a unique and innovative programme that enables NWG to build resilience and reduce the risk of future flooding. Along with collaborating with partners and the local community, NWG are looking at their own facilities to identify flood risk reduction retrofit opportunities to manage the amount of surface water that enters the sewer network and to use sustainable drainage solutions where possible.

The rain gardens, rainwater planters, and rain water harvesting tanks were developed and progressed by an in-house team of civil engineers, operation and maintenance staff, and ecologists. The team has worked together to identify suitable locations, design, and install suitable SuDS features.

NWG have been able to combine the physical installations with awareness initiatives. Each of the retrofit projects around NWG sites are branded as Rainwise and have an interpretation board in situ. This serves to educate both employees, as well as visitors to the site, about what Rainwise is about, how that particular retrofit project works and what impact it has. A press release was issued about the planters, and a press event is planned to launch the rainwater harvesting tanks at Cramlington, once more are in place at sites across the region.

In December 2017 an event was held for NWG employees to showcase the Rainwise planters at head office and to raise awareness about how they can be Rainwise themselves at home. The executive leadership team attended to show buy in from the top. This was shared on social media and received good engagement figures.

6. Maintenance & operation

The maintenance teams at NWG's facilities are maintaining the new SuDS features as part of their existing gardening and roof drainage maintenance programmes.

7. Monitoring and evaluation

Northumbrian Water employees are the primary audience for the retrofit scheme, in order to raise awareness, empower them to make changes themselves at home, and to act as ambassadors for Rainwise. To evaluate this, questions are included in the employee omnibus survey to measure baseline for awareness of the Rainwise initiative and any resulting behaviour change.

At Cramlington Wastewater Treatment, the grey water use is metered and recorded. To date, over 125m^3 of grey water has been used instead of drinking water by the sewerage maintenance teams. The use of grey water will continue to be monitored and will be reported on an annual basis.

8. Benefits and achievements

Benefits that have been achieved as a result of the SuDS retrofit on NWG's sites include:

- Reduction of peak flow to the drainage system. The quantity of the reduction of flow from these sites is small, but as part of the Rainwise initiative the result of many rain gardens and planters will have an impact.
- Reuse of grey water. Utilising rainwater runoff for sewer cleansing reduces the quantity of drinking water used for this purpose.
- Biodiversity. The rainwater planters and rain garden help to green an area, providing potential habitat creation and amenity to the locations.
- Educational opportunities. All of the SuDS installed have interpretation boards explaining the purpose and encouraging other initiatives that meet the Rainwise goals.

The Rainwise initiative, of which the retrofit scheme is part of, won a special commendation award for Innovation in Sustainability and Society at British Quality Foundation Awards 2018. This award recognises excellent organisations that have a positive impact on the world around them by improving and advancing the economic, environmental and social conditions within the communities they impact or interact with.

9. Lessons learnt

The Rainwise Retrofit Scheme has shown that:

- There are SuDS opportunities everywhere.
- With appropriate advice, SuDS features can be constructed in-house and inexpensively.
- There are opportunities to reuse assets, such as disused fresh water tanks, to provide surface water storage.
- Rainwater harvesting at remote rural sites could provide additional fill locations and save operations teams travel time.
- Planting should be completed in spring / summer with plants resilient to varying water conditions.

10. Interaction with local authority

The Rainwise initiative involves working in collaboration with local authorities to look for opportunities to reduce flood risk from multiple sources, whether that is from a sewer, highway or watercourse. The retrofit scheme is used an example to help encourage similar installations. The planters, which have been installed on NWG sites as part of the retrofit scheme, have also been duplicated and installed on various schools across the north east of England.

11. Project details

Construction completed: 2017

Cost: *< £4000*

Extent: <1 ha across three sites

12. Project team

Funders	• Northumbrian Water Group
Clients	• Northumbrian Water Group
Designers	• Northumbrian Water Group
Contractors	• Northumbrian Water Group