NORTHUMBRIAN WATER *living water*

Rainwise

Sustainable Drainage Solutions

Working with communities to manage rainwater

SuDS For Schools and Communities

This overview outlines the collaborative and sustainable approach undertaken by Northumbrian Water (NW) with schools and communities in the region.

The overarching objective of this initiative is to move from a reactive incident based approach to a proactive community based approach to the management of surface water. The foundations of this change were provided by an:

- Engagement strategy
- Education programme
- Installation of sustainable drainage features within school grounds to demonstrate their use within the domestic and community environment.

To deliver this initiative Northumbrian Water (NW) collaborated with the Wildfowl & Wetlands Trust (WWT) and the Environment Agency (EA) and in January 2014 launched the pilot project ''SuDS for Schools and Communities''. Other stakeholders included community representatives and local authorities.

INNOVATION

Schools often have SuDS potential due to their considerable roof and hard landscape areas as well as significant green space suitable for the installation of SuDS features. They also have a unique place in the community with common aspirations and regular dialogue.

This initiative develops proactive community lead interventions at locations that have not suffered flooding but would provide benefit to those that had. These locations act as focal points to show how SuDS can be built, operated and maintained in a cost effective way so that the approach can be replicated on a wider scale in the longer term.

Students, teachers and parents were involved in developing the initiative from a concept into design, delivery and operation. Once fully engaged the schools took leadership of their projects and actively promoted sustainable water use, biodiversity, conservation and sustainable development in the community.

The WWT role in the partnership was to carry out educational awareness aligned with the national curriculum, detail the SuDS philosophy for the site and recommend the planting selection. WWT delivered most of the engagement with the teachers and pupils of the school where their experience in the water cycle, habitats and learning processes were particularly valuable.

The WWT approach to education on SuDS is set out in their website which covers the engagement of volunteers and the wider community, planting, design involvement and support post construction.

The perceived dangers of storing water on the surface, management and maintenance of SuDS have been used as obstacles to prevent their use. We overcame those issues to demonstrate that features such as ponds can be safely created and managed within a community environment.

CHALLENGES

Partnership and Community Engagement

By early 2014 the schools were on board with the project in principle and the partners were ready to start full engagement with stakeholders.

WWT project manager committed two days per week to the project, initially focussing on the engagement process with pupils and teachers to describe the SuDS approach. This subsequently broadened out to include the water cycle, sewerage systems, habitats and an initial framework.

BENEFITS

The headline benefit is improved service at affordable prices as flooding is less likely and the project costs are only a fraction of reactive approaches. It is however the added value of future benefits associated with education and behaviours that really make this project different.

Flood Risk Reduction

NW is delivering a range of strategic initiatives to understand flood risk and reduce it across its operational area. This initiative demonstrated how the introduction of SuDS can make a significant contribution to flood risk reduction and surface water management as well as delivering wider benefits to the local community.

Positive Feedback

The schools and WWT were very supportive of the scheme from the outset and the partnership arrangement proved to be a success. Discussion and negotiation convinced all the other stakeholders that the approach was an innovative and valuable community initiative.

Habitat Creation and Bio-diversity

In reducing the risk of predicted flooding in the area near the school the partners have introduced surface water separation and storage which provided opportunities for the inclusion of new habitats and bio-diverse features. The new habitats and features are located within the school grounds and therefore they are relatively secure from development risks and third party damage.

New learning opportunities

Pupils and teachers were involved in the project from its early stages and in doing so were invigorated by the process. It provides new environments within the confines of the school and the variety of SuDS features provides many opportunities for pupil study and enjoyment.

Proving the approach can be replicated on a wider scale in the longer term.

This project was two pilot schemes where NW set out to work with schools and local communities to demonstrate how the introduction of SuDS can make a significant contribution to flood risk reduction and surface water management as well as delivering wider benefits to the local community.

It furthered our thinking of how to present and negotiate on proposals for sustainable drainage assets, particularly the engagement of a wide variety of stakeholders. It showed that negotiating stakeholder and customer buy-in for long term community benefits are at the heart of sustainable projects.

We successfully demonstrated the wide range of benefits delivered by a sustainable approach actually enhanced the community life in areas such as co-operation, wellbeing and education whilst still providing the desired flood risk reduction.

The education package supporting the project aligns with the national curriculum by considering sustainable water management and not just flooding. Using the SuDS features as a focal point enhances the learning experience for current and future students.

Feedback has been very positive with enthused children, teachers and parents wanting to know more. "Eco Warriors" are now championing an environmentally sustainable future and schools are working towards Green Flag accreditation.

ADOPTION

In delivering this initiative we have provided a working template to share with others for them to adopt and adapt to their own particular circumstances. Response to the works had been very encouraging with one school, Woodhouse Primary, being commended as part of the 2015 Durham County Council Environmental Awards.

The schools have hosted visits from other schools, local authorities (flood risk and resilience officers) and also the chair of the Consumer Council for Water (CCW). NW has been contacted by other water and sewerage companies as well as commercial and NGO representatives to discuss how the initiative could work for them.

The positive outcomes of the projects have led to the following:

- Schools are taking ownership of the SuDS and promoting "eco-networking" between themselves to share experiences and learning.
- NW and the 13 Lead Local Flood Authorities across the area are working together to progress schemes including SuDS as community assets.
- "SuDS for Schools & Communities" is now incorporated into "Rainwise" and will be delivering schemes within further areas over the next few years.

The total cost of the project to date is £238k. NW sponsored the project, managed the scheme and provided the funding. The school provided the land for the swale(s) and pond and future maintenance of the SuDS features. WWT carried out topographical surveys, educational awareness, and the SuDS philosophy for the site and recommended the planting selection.

COLLINGWOOD PRIMARY SCHOOL, NORTH SHIELDS

Figure 1: Location of North Shields

Figure 2: Location of Collingwood Primary School, North Shields

INTRODUCTION

Collingwood Primary School is situated in the conurbation of North Shields in Tyneside. The school is located on land with a N-S gradient as it falls towards the River Tyne some 2km distant. Drainage in the area is predominantly via combined sewers with very little separation of foul and surface water flows.

ISSUES

The school is on a rectangular shaped site that is landlocked by residential properties. As part of its regional flood studies NW identified the drainage area containing the school as being at risk of property flooding.
NW entered into a partnership with the school and WWT to develop the scheme. Other stakeholders included community representatives and the local authority, North Tyneside Council (NTC).

PROJECT DEVELOPMENT

The school is not one of the properties at risk of flooding as it is situated upstream of most of the trouble spots in the combined system. It also had available land in the site providing an opportunity for the introduction of SuDS to ameliorate flows from its roofs and hard paved areas.
The head and staff were very positive about participating and further discussions with school governors and the education authority, (NTC), took place to obtain stakeholder commitment. Once this was achieved NW was then able to engage the larger stakeholder group. Engaging the wider community was also important to the project's success. Other schools, local residents and businesses were invited to participate to raise awareness of SuDS, generate a sense of shared responsibility for the management of water and facilitate the participation of a larger audience.

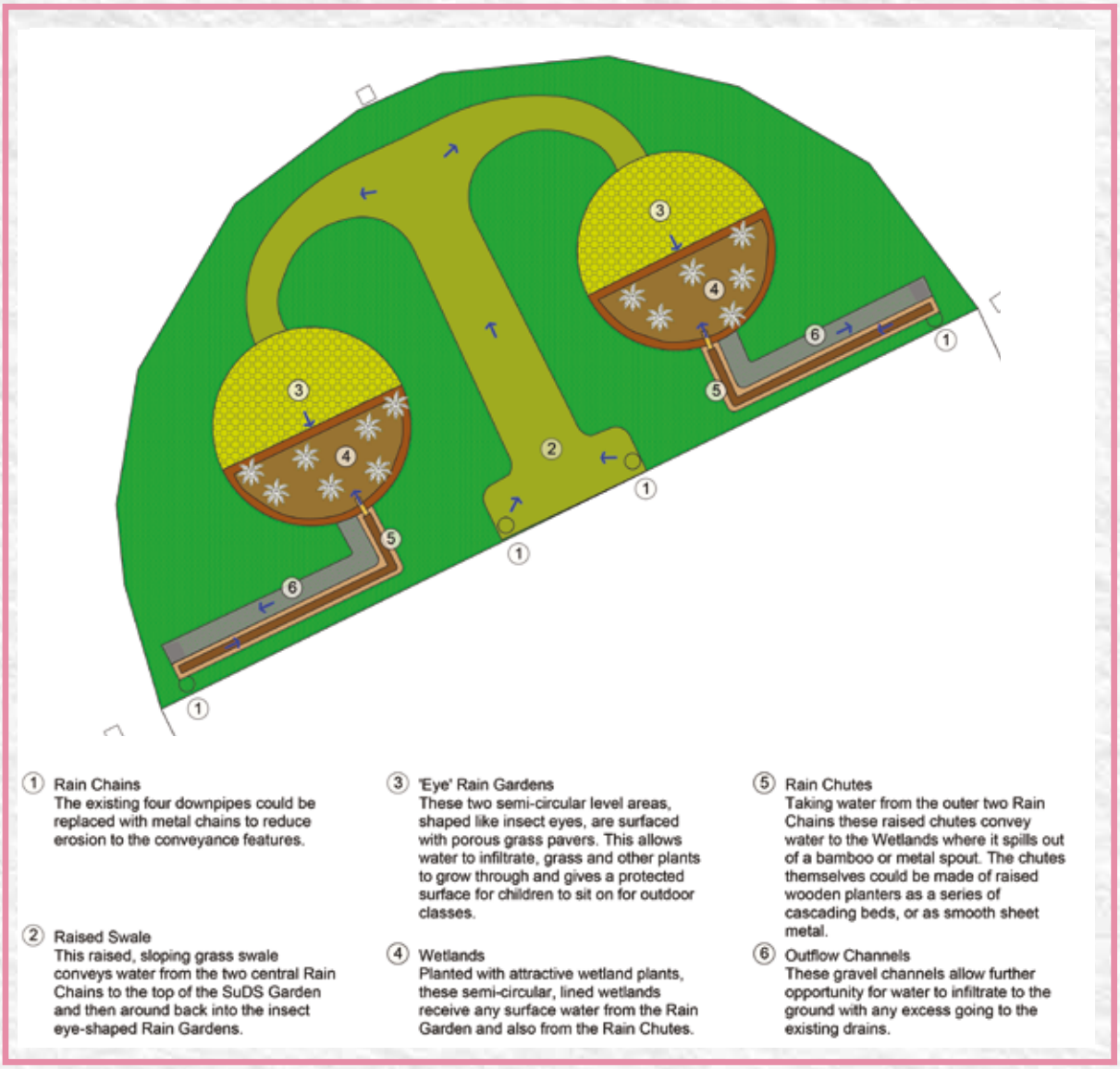


Figure 3: Schematic of the operational principles of the scheme

The partners agreed that no legal agreements would be prepared however a Memorandum of Understanding was developed to set out the process and the responsibilities on completion.

The project involved the construction of SuDS features to divert and store surface water which enters the combined sewers serving the area. The SuDS features used in the project were a swale, rain gardens and wetlands. An innovative feature was the introduction of rain chains and chutes on the building. Downpipes were disconnected and 40mm diameter chains hung down the holes in the guttering at four locations. Rain cascades into the swale directly or via chutes which were introduced at two of the locations.

The swale was located in a grassed area immediately outside the southern elevation of the school. At around 80m long and 300mm deep the swale meanders along its west-east alignment with 9 rainwater downpipe connections at regular intervals.

There are two rain gardens, each 6 sq m in area, within a semi-circular fence located behind the westernmost block. Flat pads were initially created at agreed locations and overlaid by geotextile, 200mm of coarse aggregate, another geotextile, 50mm compost sand mix and finally pavers filled with compost/sand and grass seed mix.

The wetlands were constructed within timber edging and lined with LDPE below final soil level. The soil itself was 60% imported organics. Stones were provided below the rain chains to dissipate the downflow and the outflows were short bamboo spouts discharging to the outflow channel.

Figures 4 & 5: Swale and detention wetland

Figures 6 & 7 : SuDS garden

Approximately 650sq m of roofs were connected to the SuDS system together with around 180sq m of paved area.

The separation of storm flows from the combined system not only contributes to achieving the flood risk objectives but also reduces discharges to the environment and the amount of surface water reaching Howdon Wastewater Treatment Works which serves the Tyneside conurbation.

The project commenced in October 2014 and completed in April 2015. Planting was carried out in two stages, in late 2014 and spring 2015.

WOODHOUSE COMMUNITY PRIMARY SCHOOL, BISHOP AUCKLAND

Figure 8: Location of Bishop Auckland

Figure 9: Location of Woodhouse School In Bishop Auckland

INTRODUCTION

Bishop Auckland is in the southern part of County Durham with the school located near the south west extremity of the town. Drainage in the area is predominantly via combined sewers with very little separation of foul and surface water flows. The topography is such that the land has a gentle N-S gradient as it falls towards the River Gaunless, a tributary of the River Wear.

ISSUES

The school is on a rectangular shaped site that is landlocked by residential properties and allotment gardens. As part of its regional flood studies NW identified the drainage area containing the school as being at risk of property flooding.

NW entered into a partnership with the school and WWT to develop the scheme. Other stakeholders included community representatives, the local authority, EA and Durham County Council (DCC).

PROJECT DEVELOPMENT

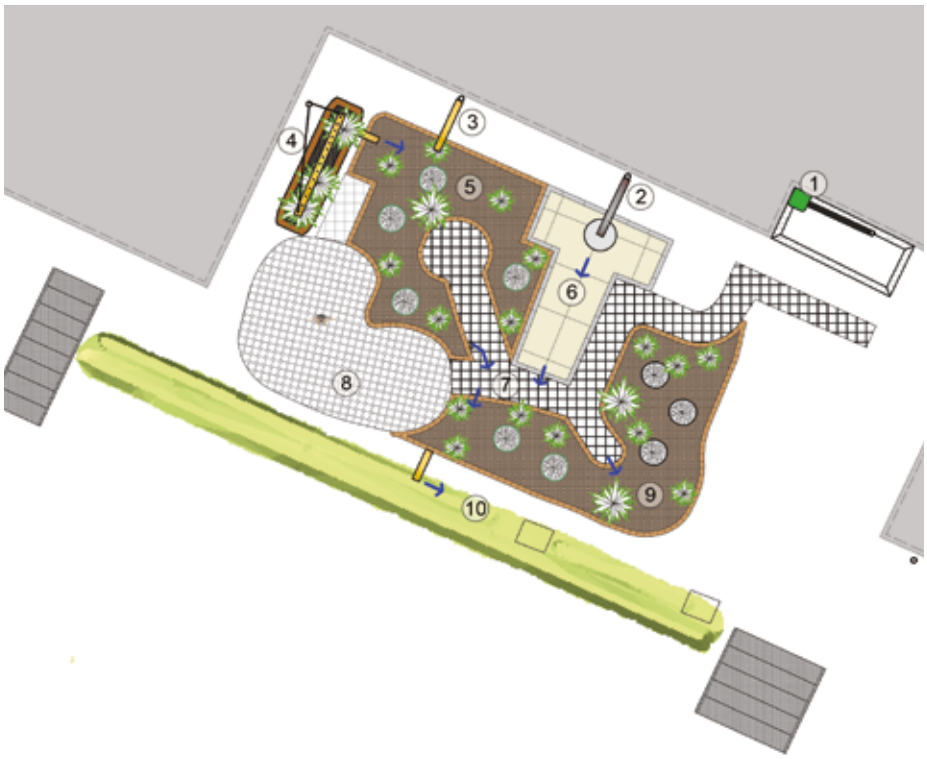
The school is not one of the properties at risk of flooding as it is situated upstream of most of the trouble spots in the combined system. It also has available land in the site providing an opportunity for the introduction of SuDS to ameliorate flows from its roofs and hard paved areas.

NW initially approached the Head Teacher to discuss the potential inclusion of the school in the project. The head was very positive about participating and further discussions with school governors and the education authority, DCC, took place to obtain stakeholder commitment. Once this was achieved NW was then able to engage the larger stakeholder group.

Engaging the wider community was also important to the project's success. Other schools, local residents and businesses were invited to participate to raise awareness of SuDS, generate a sense of shared responsibility for the management of water and facilitate the participation of a larger audience.

The partners agreed that no legal agreements would be prepared however a Memorandum of Understanding was developed to set out the process and the responsibilities on completion.

The project involved the construction of SuDS features to divert and store surface water from the site which otherwise fully drained into the local combined sewers serving the area.



1. Water Butt
2. Metal Water Chute
3. Bamboo Water Chute
4. 'Skinny wetland'
   Chains convey water from the downpipe to a perforated bamboo gutter anchored over a raised wooden planter 600mm high. This would be lined and is planted with wetland plants in shallow water. A mesh across the surface would be included for safety. The level is set by a bamboo overflow to the next feature.
5. Raised wetland
   This wetland receives water from the 'skinny wetland' and from a downpipe via the Bamboo Water Chute.
   The 300mm high bed is lined to create a 'perched' water table enabling wetland plants to grow. The wetland walls are made from round wooden stakes to create an organic shape and overflows via a bamboo pipe.
6. Urban surface
   Water from the Metal Water Chute cascades into a bird bath and splashes out over a paved area. The paved area slopes into a central gully so water flows quickly off and onto the path.
7. SuDS Path
   Composed of reclaimed stones set in porous concrete this path is hard wearing, decorative and allows water to both infiltrate and move between features. The path surface would be set flush with the ground.
8. Rain Garden
   This level surface composed of porous grass pavers is shaped like a lily pad and provides a seating area for teaching, whilst allowing plants to grow through and rain to infiltrate.
9. Raised wetland
   This feature is similar to feature 5. The lined wetland is flush with the base of the path but raised relative to the ground at it's edges. Water flows from the path to support the wetland plants and overflows via a bamboo pipe into the Swale.
10. Swale
    A simple furrow, flanked below by a ridge, acts to convey excess water to the main drain at this level.

Figure 10: Schematic of the operational principles of the scheme

The SuDS features used in the project were sleeping policemen, swale, wildlife pond and marsh and a separate SuDS garden. The highest part of the site was at the entrance and car park and two sleeping policemen were laid to define areas to be drained.

The sleeping policemen are 16 and 3 metres long, 750mm wide and 60mm high. Their purpose was to capture and deflect surface water flows into the head of the swale which was constructed of concrete with cobbles inset into it.

The swale itself is shallow, generally 200mm deep, varying in width and following the random contours of the site over a total length of 60m, terminating at the wildlife pond. The wildlife pond and marsh comprise an area of some 190sq m. The location was initially overdug by 200mm and a series of sand, geotextile and soil imported above it. The margin was reinforced with turf and WWT planted plugs to establish plant species.

Figure 11: Head of Swale

Figure 12: Alignment of Swale

In addition a 2sq m pond dipping platform was constructed using wooden sleepers to give further educational opportunities to the school.

Around the southernmost block of the school rainwater pipes, chains and bamboo channels direct roof drainage into the SuDS garden and other soft features. The SuDS garden has irregular shapes and channels to add interest.

Figure 13: Pond & Marsh

Figure 14: SuDS Garden

Approximately 650sq m of the car park and 500sq m of roof area connected to the SuDS system.

The project also includes the use of a camera to provide a series of photographs which will produce a time-lapse video of the SuDS garden.

The separation of storm flows from the combined system not only contributes to achieving the flood risk objectives but also reduces discharges to the environment and the amount of surface water reaching Vinovium Wastewater Treatment Works which serves the Bishop Auckland area.

ACHIEVEMENTS

The official opening of the scheme took place in July 2015 and was conducted by the Mayor of Bishop Auckland together with representatives of the school and DCC with the press also in attendance.

The project commenced in October 2014 and completed in April 2015. Planting was carried out in two stages, in late 2014 and spring 2015.

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For further information please email **Rainwise@nwl.co.uk**.

www.nwl.co.uk/rainwise
www.nwlcommunityportal.co.uk