SuDS at All Saints Primary School, Newmarket, Suffolk

SuDS used

- *Raised attenuating planters (with added fun features)*
- *Tree pit*
- *Rain garden*
- *Soakaways*

Benefits

- *Reduction of downstream flood risk*
- *Provides capacity in the foul network to allow for nearby development*
- *Improved amenity of school*
- *Educational opportunities for children*
- *Planting of various species has increased biodiversity*
- *Surface water is returned to ground*

1. Locations

All Saints Primary School, Newmarket, Suffolk, CB8 8JE

2. Description

All Saints CE Primary School is a single story school situated to the south of Newmarket town centre in a largely residential area. Originally built in 1869, it was rebuilt in 1974 and has been extended several times. Although there are some large stables in close proximity, properties in the area tend to be small terraced houses, often with no front garden. The area is densely populated, and space is limited around the school (including tarmac playground and Multi-Use Games Area (MUGA) on a slight incline dropping from north to south and all drained to the combined sewerage network, with the exception of a small extension draining to soakaway).

The town centre is downstream of the school, and has a history of both fluvial and pluvial flooding.

3. Main SuDS components used

The overall strategy was to remove impermeable surface area draining to the foul network, and infiltrate the rainfall runoff into the ground.

Main SuDS used:

- Raised attenuating planters (with added fun features including watering can downspouts and a water wheel).

  These planters are the primary treatment stage of the SuDS design.

  The addition of fun features to downspouts make the SuDS more engaging to the children and encourage further learning about the water cycle and sustainability.

- Rain garden

  The rain garden provides a treatment stage to roof runoff at one point at the front of the school.

- Tree pit

  The tree pit provides a focal point at the front of the school where the deep cellular storage area below the surface acts as a soakaway allowing surface water to infiltrate into the ground.

- Soakaways

  The soakaways allow for surface water to infiltrate into the ground. By utilising planters as a primary treatment stage, the size if the soakaways could be reduced.

Rain Garden and Tree Pit

4. How it works

The drainage strategy was to disconnect surface water from the foul sewer to reduce downstream flood risk and allow headroom in the sewer system for development in the locality.

The design criteria was to meet a 30 year return period storm event (to deal with a flooding event which would be likely to occur only once in 30 years). This is the standard to which conventional storm drainage is built.

Instead of just using large soakaways, as is a common approach, an additional attenuating treatment stage was included in the design to provide capacity while reducing the amount of groundworks required. This also allowed fun and engaging elements to be added to the design.

The design rationale was as follows:

Surface water runoff from the roof of the school would drain into the attenuating planters around the perimeter of the school, with the exception of one downspout which discharges to a rain garden. Where rainfall is of low intensity and duration the planters will hold all runoff, and the planted species within the planter will take up the runoff though transpiration.

Where rainfall is of high intensity or duration, and the soils in the planter become saturated, surface water is discharged at a controlled rate by the size of the pipe to one of the soakaways – the secondary treatment stage features – where sufficient capacity is provided to store

runoff for the 1 in 30 year event, allowing surface water to infiltrate into the ground. An overflow is included should storage become full.

Where the rain garden becomes saturated or overwhelmed, surface water will enter the adjacent tree pit through a low-level connection, from where surface water can also infiltrate into the ground.

5. Specific project details

Anglian Water have developed a long-term strategy to manage surface water inflows into the foul/combined sewer, and as part of this, an exemplar catchment study was carried out. The aim was to identify opportunities and drivers, and to provide a strategy for surface water management using a mix of sewer capacity enhancement and surface water management, to meet future catchment demands.

In addition, Newmarket was being used by Anglian Water as the 'shop window', which was a real-world test area to trial water related products, services and initiatives offered by organisations such as Universities, Charities, small businesses, and suppliers inside and outside of the water sector.

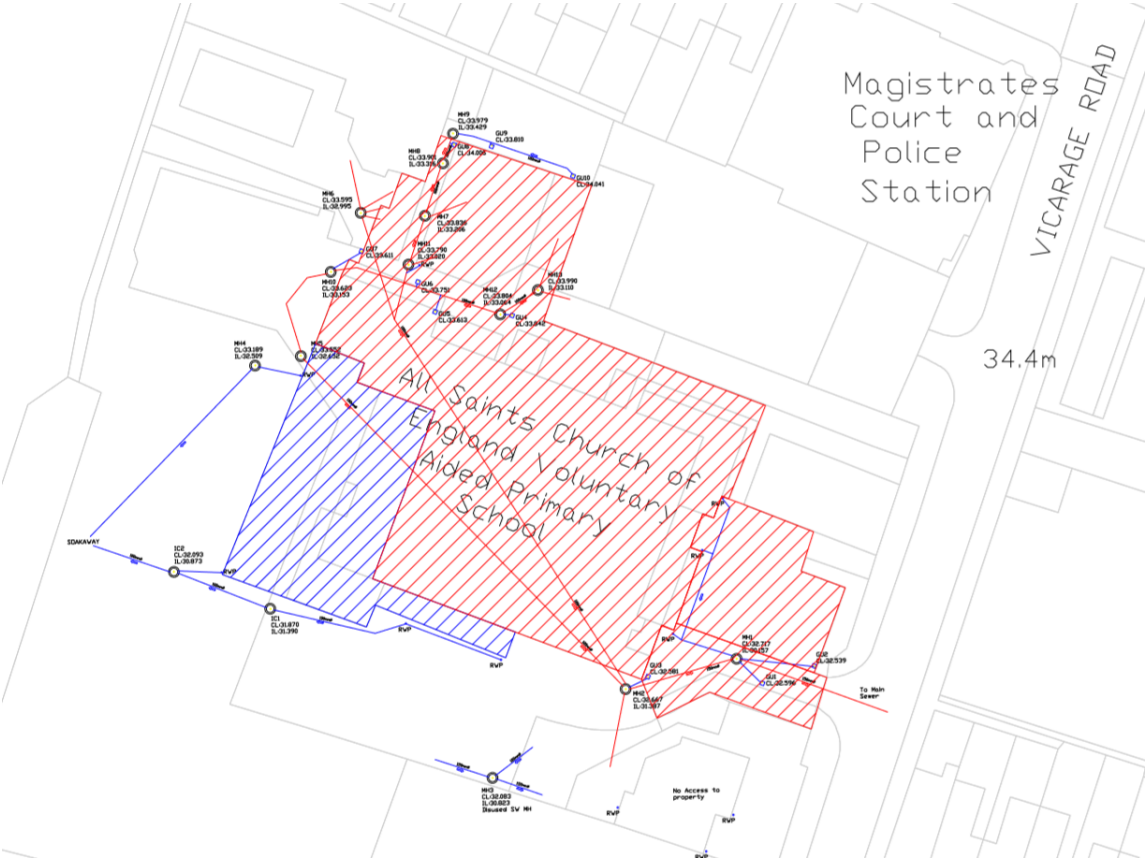
Flow surveys were carried out as part of the model build for the catchment, and when reviewing the model and the flow surveys it was evident that there was a large amount of impermeable area draining into the combined network.

The hydraulic model indicated the upstream area where this impermeable area may be located, but to identify the specific sites or sub-catchments where the impermeable area was, Connected Area Surveys (CAS) were undertaken for the upstream catchment. This was to look for opportunities to disconnect the surface water drainage to the combined sewer network.

These surveys generally focussed on larger sites including several town centre car parks, the local Tattersalls Horse Auction House, and All Saints Primary School.

While small piecemeal areas of impermeable surfaces draining to the foul network were found at most sites, the standout opportunity was All Saints Primary School where over 1400m^2 of impermeable surface – the roof and the car park - was found to be draining to the foul sewer.

Atkins worked with the school and looked at developing a scheme to remove the surface water from the foul sewer on behalf of Anglian Water.



Drainage survey plan. Red hatch – roof area draining to the foul combined network (1400m^2). Blue hatch – new extension draining to a soakaway.

6. Maintenance & operation

The SuDS features have been bestowed upon the school by Anglian Water. Maintenance of the SuDS is minimal, with an annual inspection recommended. General maintenance (grass trimming, leaf sweeping etc.) will be incorporated into the schools existing groundskeeping regime, however upkeep and seasonal planting of the planters and rain garden are to be carried out by the school's students, incorporating planting activities and sustainability into lessons and workshops.

7. Monitoring and evaluation

A full site survey has confirmed 100% of surface water runoff on site now infiltrates into the ground.

Frequent re-visits are undertaken to ensure the systems continue to function as per design.

Due to the low flows and small pipe diameters, flow monitoring is neither practical nor cost-effective. However, the process developed through this scheme will inform the strategy for future similar schemes.

8. Benefits and achievements

In addition to providing the standard SuDS benefits:

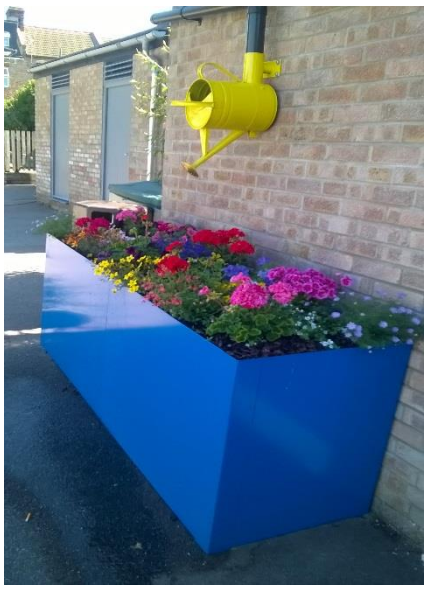
- *Reduction of downstream flood risk*
- *Increased capacity in the foul network for nearby development*
- *Improved amenity and learning opportunity of school*
- *Increasing biodiversity through planting*

There was a clear opportunity for a scheme to have multiple benefits, and meet a number of client ambitions, including:

- Showcasing different product and techniques through the 'shop window' project within Newmarket
- Providing outcomes which bring benefits to customers, and the wider community.
- Enhanced community education through the Schools Programme where Anglian Water have a Community Education team, a group of qualified, experienced teachers who visit schools and give water related lessons and run workshops with children.
- The development of Education Resources for teachers and students including raphics, photos and information pertinent to the design. The resources will help students understand the impacts of growing towns on the local environment, and look at sustainable ways to return rain water back into the water cycle.

  The resource pack was a work in progress, so this offered an opportunity for the Education Team to work with the design team and use the scheme as a case study for the pack, which was to be distributed to schools across the Anglian Water region.





1. Watering Can downspout.
2. Rain garden in the shape of Anglian's logo
3. Watering Can downspout and attenuating planter
4. Water Wheel and planters
5. Outdoor classroom

9. Lessons learnt

The facilitation and co-ordinating role taken on by the design team was the key to a successful delivery. Being the central point of contact for all stakeholders (including the head teacher, the Diocese as landowners, the contractor, Lead Local Flood Authority and local authority) as well as the relative freedom allowed by Anglian Water to resolve issues and get the job done,

meant that problems (eg permissions, timings, sourcing of materials, planning and buiding control requirements etc.) could be resolved very early on.

We are proud of what this project has achieved not only in terms of surface water management and the hydraulic benefits, but more so the additional benefits that the scheme has promoted.

The design, incorporating a rain garden, tree pit, soakaways, planters and an outdoor classroom, and incorporating fun elements (raining clouds, rain slides, water wheel and watering can downspouts), has not only been a hit with the pupils, but it has disconnected an impermeable surface area of 1400m^2 from the foul water network (equivalent to the size of over five tennis courts). This reduces flooding risk and saves over 900m^3 of water from being treated each year.

This initial scheme not only proved that it is a cost-effective way of managing surface water and reducing flood risk, but it is used as a teaching resource to engage and inspire the children through STEM activities and education around sustainability and the water cycle, and provides a much-improved outdoor space for the children to play and learn in.

10. Interaction with local authority

Early stakeholder engagement commenced prior to the catchment level strategy being developed. Although unable to be directly involved, Suffolk County Council were able to give their support to the scheme being progressed.

11. Project details

Key Dates:

Opportunity identified November 2017

Engagement with school, Diocese and LLFA December 2017

Infiltration Test February 2018 (half term)

Main construction phase: April 2018 (Easter break)

Completed: May 2018

Extent: 1400m^2 / 0.14 Ha of impermeable surface removed from the foul/combined network.

12. Project team

Role	Organisation and contact details	Logo
Funders	Anglian Water	

Client	Anglian Water, Anglian House, Ambury Road South, Huntingdon www.anglianwater.co.uk Contact: Andy Bird, Lead Infrastructure Planner Abird2@anglianwater.co.uk	
Designers	Atkins, Woodcote Grove, Epsom www.atkinsglobal.com Contact Neil Kirsopp, Senior Engineer neil.kirsopp@atkinsglobal.com	
Contractors	Dunnella Ltd, Alston Road, Norwich www.dunnella.co.uk Contact John Farley, Director mail@dunnella.co.uk	
School	All Saints Primary School Jane Trampnow, Headteacher	
Diocese	St Edmundsbury and Ipswich Diocese Daniel Jones, Buildings Officer	