CASE STUDY: RETROFITTING SuDS AT VAUVERT PRIMARY SCHOOL, GUERNSEY

IMOGEN BERRYMAN, NETWORK MANAGER, GUERNSEY WATER

BACKGROUND

Guernsey Water’s first exemplar SuDS scheme aims to showcase the opportunities to sustainably manage surface water in a retrofit scenario. The school was wishing to resurface a tired and dangerous area of the playground and Guernsey Water became involved in partnership with the Education Department to benefit the downstream sewer network simultaneously. The site is upstream of St Peter Port which can suffer from a surcharged network. Guernsey Water is working to reduce immediate high flows into the system in such events by targeting surface water separation and attenuation projects. The school contributed over 4000m^2 of impermeable surfaces (c.1200m^2 of roof area) into a combined system that feeds into the main foul sewer. This was therefore an ideal area to target.

Figure 1: Before and after construction of SuDS at Vauvert

OBJECTIVES

The aim of the project was to attenuate surface water flows in the downstream combined network whilst showcasing examples of retrofit SuDS and educating the pupils, teachers and parents about sustainable surface water management.

DESIGN AND CONSTRUCTION

Designs were drawn to include a combination of SuDS techniques. 300m^2 of permeable resin-bound surface is laid at a fall of 1:60 to allow permeated water to flow towards a planted storage strip. This is constructed using a 0.75 x 1m trench which runs 60m from one end of the playground at a gentle gradient to the existing connection to the combined sewer system. The cross section (fig. 3A) is comprised of 500mm depth of 10-20mm open graded stone, below 50mm of 2-6mm grit which both provide storage in the void spaces. Layers of hessian prevent the 300mm of top soil which is laid

Figure 2: Planted Swale strip and permeable surface with educational information boards.

above the stone from filtering through. The 160mm perforated pipe is laid 50mm from the base of the trench and connects to a gabion like basket structure (fig. 3B) which provides further storage before discharging to the sewer with a high level overflow divert.

Ten locally constructed recycled plastic rain water planters (fig. 5) allow rainwater pipes to be disconnected from the sewer and diverted through the planter. The water percolates through the soil, voids in the stone and perforated pipe to ultimately discharge back into the gully or permeable surface. These manage approximately $550m^2$ of roof surface area in total. Furthermore, bioretention techniques have been employed when situations arise to allow further percolation (fig.4). Previously, roof drainage naturally ran off towards the tarmacked trees and now percolates into the surrounding soil once the tarmac was removed.

Figure 3: Installation stages of the vegetated swale channel; (A)Excavated trench with 160mm perforated pipe laid to a fall towards (B) the basket which housed inlet, outlet and high level overflow connections to (C) the existing chamber. (D) Shows the completed swale with initial

Figure 4: Removing old tarmac from around trees (left) has allowed for bioretention where rainwater from the white music building runs to naturally and is now used by the trees (right).

Figure 5: Diverting rainwater pipes through the planters has attenuated surface water from approximately 550m^2 roof areas.

4. BENEFITS

4.1 Reducing speed and volume of runoff into the foul sewer: Flow monitors were installed on the connections into the public network to observe differences in the discharge peaks in rainfall events. Three events as the project progressed prove the success (fig. 6);

1. 22nd June 2016: Shows immediate response to rainfall with high flows discharging quickly into the sewer. Discharge of the rain event and return to base flow took 40minutes.
2. 25th September: Swale constructed. High peaks can be seen but are delayed with a 15minute lag time. Discharge of the rain event and return to base flow took just over an hour.
3. 16th October: Swale constructed and planters connected. Discharge into the sewer rises with rainfall but very gradually and Discharge of the rain event and return to base flow took 3 hours.

4.2 Amenity and Educational benefits: Whilst the school has gained more usable space for outdoor learning wildlife such as frogs have been sighted by the school children. Educational posters were fitted to explain how each component worked and assemblies and outdoor classes have built around the concept of SuDS.

4.3. Partnership Working: Guernsey Water has worked with the Education Department, Vauvert School, PTA, local contractors and planning professionals to complete the project.

4.4 Building Awareness of SuDS in the industry and community: The project coincides with the launch of Guernsey Water's Surface water Management Policy and SuDS guidance documents to promote the use and greater supply and choice of sustainable drainage options to large new developments, workplaces and private home owners.

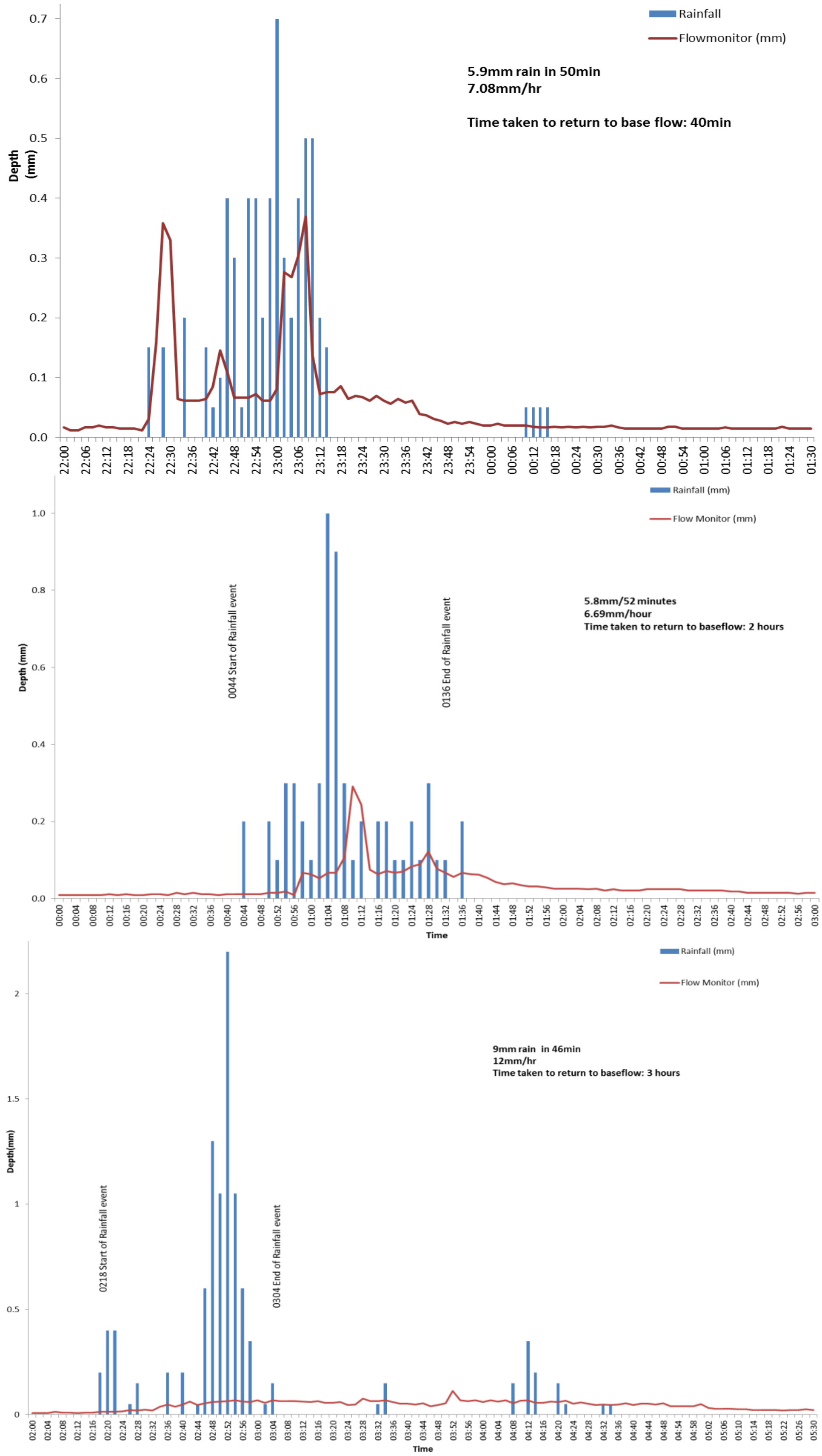

Figure 6: Flow Monitor Discharges with Rainfall events throughout the process of the project showing attenuated surface water into the foul sewer network using SuDS.