

# Rainwise

## Sustainable Drainage Solutions

Working with communities to  
manage rainwater

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**Shelley Drive, Gateshead**



Drainage in the area is local foul water and surface water sewers along with highway drains, downstream of the site flows merge into a combine public sewer.



Figure 1: Location of Shelley Drive, Gateshead



Figure 2: Shelley Drive Area

The topography is such that the land falls in a north easterly direction towards the River Tyne and generates significant overland flows.

In recent years the residents of Shelley Drive have reported internal and external flooding at 22 properties. Investigations into these incidents identified the cause to be a combination of incapacity within the public sewerage system and overland surface water flows.

In response to these investigations the relevant Risk Management Authorities (RMA) of Northumbrian Water and Gateshead Council determined that the residents would be best served by a collaborative approach to Sustainable Drainage Systems (SuDS) to reduce the risk of further repeat flooding.



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### SuDS used

1. Use of surface features in the highway to provide surface flow pathways and thereby protect downstream property
2. Use of open space to create surface water attenuation areas
3. Upsizing of public sewers and the introduction of flow control measures.

### How it works

The principle challenge was to identify sufficient areas of open space for the attenuation basins to accommodate the 1200m<sup>3</sup> of surface water storage required to provide property protection for up to a 40-year rainfall event. The first option explored considered utilising vacant industrial land to the north of the Tyne & Wear Metro lines to site a single attenuation basin. However it was found to contain unique habitat for the Dingy Skipper butterfly and it had ground contamination issues which would have significantly impacted on both the cost and programme for delivery.

The second option relied on delivering surface water management in the Shelley Drive area itself.

The contribution to the flooding from overland flow comes from Sunderland Road (B1426) which is a main traffic route into Gateshead. During heavy rainfall overland flows from the road and beyond ran into the Shelley Drive area, exacerbating flood risk in the downstream drainage system. Surface features including road humps were proposed across two junctions off Sunderland Road and gully improvements made to divert overland surface water flow from properties in the Shelley Drive area.

Site restrictions and lack of open space availability resulted in two storage basins being constructed to provide the necessary storage. The land also had to accommodate inlet and outlet structures and connections to and from the new sewers all within a narrow strip of public open space between Shelley Drive and the retaining wall of the Metro lines.

The basins are 1000m<sup>3</sup> and 200m<sup>3</sup> respectively and will normally be dry, only coming into operation during the larger storm events when the capacity of the old and new drainage system is exceeded. During these storm events simple overflow chambers divert surface water flows into the two basins. The flows are attenuated in the basins by limiting the downstream discharge rate before draining to an existing sewer crossing under the Tyne and Wear Metro and railway lines. The surface water flows then connect into the combined system though the scheme offers the potential for full separation in the future.

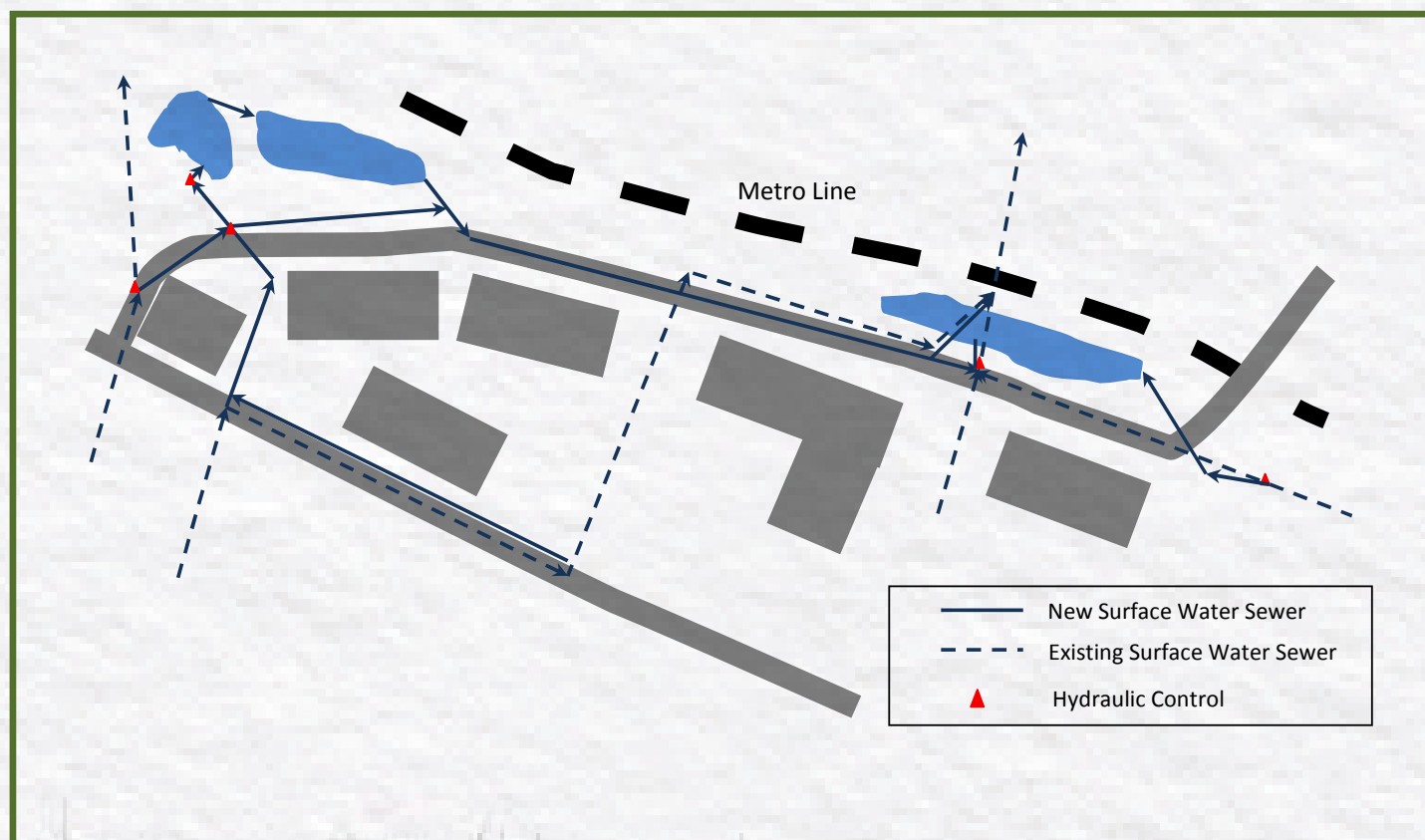


Figure 2: Schematic plan

## Specific project details

The underlying geology of the area is impermeable clay however at this location it was overlain by fill to a depth somewhat greater than the basins.

Due to the close proximity of the Metro lines in cutting and their retaining walls it was essential that the basins were provided with clay liners to prevent water egress.



Figure 3: Detention Basin 1



Figure 4: Detention Basin 1



Figure 5: Detention Basin 2

The detention basins have sides up to 1.7m deep in places but designed for a maximum water depth of 1.0m during heavy rainfall. The base and sides are grass covered with gradients of 1 in 3 to allow safe access for maintenance and grass cutting. Although the separate system that served the area was working satisfactorily, foul pollutants were identified in the surface water sewers. Survey work was carried out to identify the cross connections which were subsequently corrected.



Figure 6: Detention Basin 2

## Community engagement

Engagement with local councillors provided an appropriate vehicle to address resident's concerns about safety and the potential for anti-social behaviour in the dry basins.

Whilst the majority of residents supported the proposals some concerns were raised regarding the size, depth and slopes of the basins however these were overcome by engaging with the residents to explain and clarify the proposals. This demonstrated that public acceptance of SuDS features cannot be taken for granted and a comprehensive stakeholder engagement process is essential.

This project informed thinking of how to present and negotiate on proposals for surface water management including SuDS agreements on ownership and maintenance of assets. Stakeholder engagement was more protracted than for conventional schemes however satisfactory agreements were achieved in regard to the Metro and highway infrastructure.

It is essential to factor in sufficient time for persuasion and negotiation on SuDS proposals where all parties are in a learning process. In terms of challenges and lessons learned it showed that negotiating stakeholder and customer buy-in for long term community benefits are at the heart of sustainable projects.

## Maintenance and operation

The public open space used for the attenuation basins is owned by Gateshead Council. Meetings were held with the Council Highways and Estates Departments and Gateshead Housing Company (GHC), the organisation responsible for the social housing which predominates in the local area. All bodies supported the design principles and this ultimately led to an agreement that Gateshead Council would be responsible for highway re-instatement

and future maintenance of the attenuation basins whilst Northumbrian Water would be responsible for the management and maintenance of the ancillary structures.

It was agreed that the specification for the basin vegetation would be chosen by Gateshead Council. They chose a wild flower grass mix to help promote greater biodiversity and minimise future maintenance liabilities.

## Achievements

In reducing the risk of flooding to the residents of Shelley Drive a functional and unobtrusive storage system has been constructed near to original ground level thereby substantially reducing the excavation required and local disruption.

Previously the site was a little used, self-seeded public open space owned by Gateshead Council apart from a 3m strip at the back of the Metro retaining wall which was owned by the Metro operator Nexus. As the site continues to mature it should prove to be an asset to the locality and we anticipate the community will recognise its benefits.

The storage basins and the new planting which will surround them will create new habitats of around 2200m<sup>2</sup> and 500m<sup>2</sup> at their two locations. The changes to the topography and land use will encourage an improvement in bio-diversity of the area which is the only green space between Shelley Drive and the Metro track.

## Challenges and lessons learnt

A major stakeholder in the project was Nexus, the owner and operator of the Tyne and Wear Metro. The open space containing the storage basins is immediately adjacent to the Metro infrastructure for around 300m of its length. Nexus' principal concerns related to the avoidance of damage to the 4m high retaining wall, increased water pressures on the wall and water ingress onto the track. Nexus also preferred the trees were not replanted as the overhanging bows and leaves in the autumn may cause operational problems. These concerns were allayed by the introduction of a 3m exclusion zone for work near the wall and clay linings to both storage basins.



## **Budget and funding**

The total cost of the project was £1.2M and it was only by aligning the collaborator's resources that the project could progress. This approach extended beyond the purely financial and included option development, change of land use and acceptance of future management and maintenance responsibilities.

## **Project Team**

Risk Management Authorities	Northumbrian Water Gateshead Council Environment Agency
Consultant Engineer	MWH, Newcastle
Contractor	Esh Consturction, Bowburn

## **Status**

Construction commenced in October 2014 and was completed by May 2015.

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