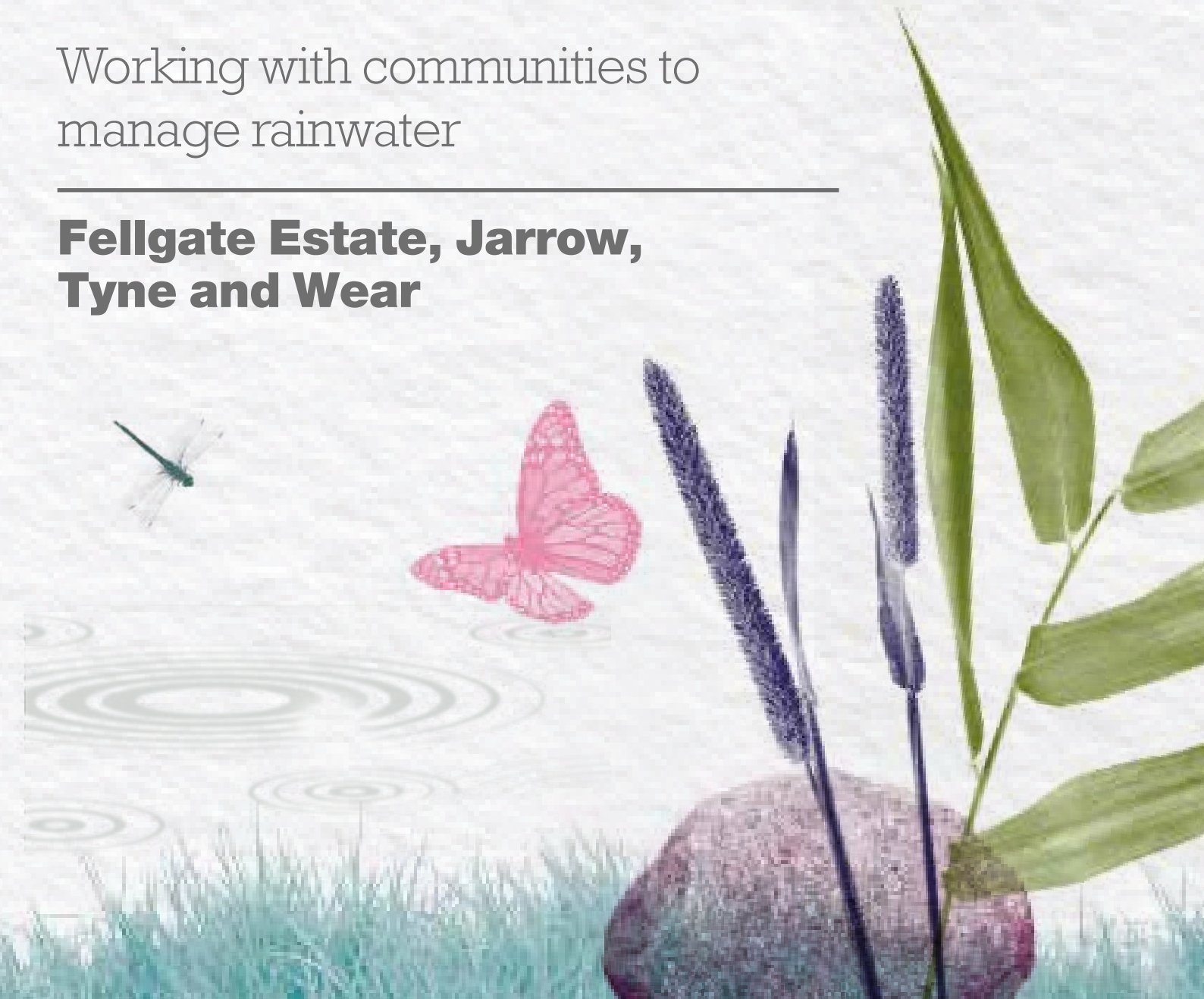
NORTHUMBRIAN WATER *living water*

Rainwise

Sustainable Drainage Solutions

Working with communities to manage rainwater

Fellgate Estate, Jarrow, Tyne and Wear



Fellgate Estate is a large residential area of some 1240 properties located in Jarrow, South Tyneside. The estate is bounded by the Tyne and Wear Metro to the north, the A194 road and Monkton Burn to the west, Calfclose Burn to the east and farmland to the south.

Figure 1: Location of Fellgate

Figure 2: Fellgate Estate Area

The estate also contains two schools which have around 8.5ha of playing fields. There is a SW-NE gradient across the estate as it falls towards the River Don which flows into the River Tyne some 2 miles to the north.

Fellgate Estate had a history of flooding and suffered extensively in 2012, with 175 properties affected by a variety of systems, including sewers, highway drainage, run-off from open land and small localised watercourses and ditches. The project was developed to reduce the risk of property flooding. As the flooding was from multiple sources and involved various landowners the relevant risk management authorities (RMAs) of Northumbrian Water (NW), South Tyneside Council (STC) and Environment Agency (EA) determined that the residents would be best served by a collaborative sustainable approach to reduce the risk of further repeat flooding. This arrangement also provided opportunities for wider benefits for the community and schools in the area.

NW and STC shared their respective flooding records, data and hydraulic analysis and the EA were also consulted in view of the fluvial flooding element and its interaction with the public sewers.

At an early stage the RMA decided to maximise the social, environmental and financial benefits of the scheme by choosing to promote surface water management options rather than a traditional below ground tank storage system.

Key themes in this sustainable approach were:

1. Develop a common understanding of the problem by sharing knowledge and using the latest modelling techniques to understand risk
2. Identifying Sustainable Drainage Systems where feasible over conventional solutions
3. Identifying added value opportunities including biodiversity enhancement, amenity and education
4. Engaging with the community and schools throughout the project.

The area is served by a separate system of drainage and a culverted watercourse which, together with the adjacent farmland and considerable playing fields space at the two schools, presented the opportunity to include SuDS elements in the solution rather than conventional underground structures.

This approach was delivered by:

1. The purchase and use of farmland beyond the estate to create surface water attenuation areas
2. Use of open space within the estate to create surface water attenuation areas, including wet ponds in the schools
3. Upsizing of public sewers and the introduction of flow control measures
4. Disconnection of land drainage and culverted watercourse from the public sewer and redirection to Calfclose Burn.

The SuDS applications used in this project are five surface water storage basins, two detention ponds and a series of conveyance swales.

The partners recognised that separate projects could not deliver successful outcomes in isolation within available budgets due to inevitable duplication of effort and complications in effective delivery. NW and STC agreed that common objectives were necessary, resources should be aligned and also that a single contractor and consultant would be used. This enabled the project to be constructed in two distinct but co-ordinated phases.

The first phase comprised construction of two large surface water detention basins to control run-off from the farmland, the reconstruction of 2.3Km of surface water sewers as well as raising the level of outfalls into the Calfclose Burn.

Figure 3: Schematic of SuDS elements

The second phase included construction of 2 detention ponds within the school playing fields, swales and channels in the estate to intercept run-off, three detention basins and land drainage with filter drains.

The two largest storage basins, constructed in Phase 1, are located in the farmland just south of the estate where they intercept, control and divert flows away from the estate eastwards to the Calfclose Burn. These basins have a total storage of 3500cu m.

Figure 4: Detention Basin 1

Figure 5: Detention Basin 2

Phase 2 works are located in the playing fields of Fellgate Primary School and St. Joseph's Primary School, Hedworth Community Centre and Council owned open space. Swales, filter drains and drains are used to intercept and redirect surface water run-off away from buildings and into storage basins. They will also capture any excess flows which may escape the culverted watercourse in heavy rainfall events.

Figure 6: Rain garden and swale at Fellgate Primary School

The total storage volume is 2400cu m with the two schools requesting permanently wet ponds to help develop the educational curriculum. The schools are also participating in the NE ''SuDS for Schools and Communities'' initiative and have each had rain gardens installed to help mitigate impervious surface run-off and provide permanently accessible learning space.

Figure 7: Detention basin within Fellgate Primary School

Figure 8: Pond within Fellgate Primary School

Figure 9: Basin and pond in St. Joseph's RC School

The project reduces the risk of predicted sewer flooding to the properties in a 40 year event whilst basins 1 and 2 were enlarged to provide 1 in 100 year protection through agreement with STC as Lead Local Flood Authority.

Basin 2 connects to Basin 1 and then into an existing 600mm diameter land drain which bypasses the estate and connects with the Calfclose Burn. The natural geology in the area is clay and therefore there was no need for linings to the storage basins. The basins were designed for a maximum water depth of 1.0m whilst the detention ponds at the schools were designed for a 900mm water depth with 300mm of permanent wet storage.

As well as the introduction of SuDS assets surface water sewers along the northern boundary of the estate were relaid at shallower depth to a new outfall into the Calfclose Burn to improve discharge performance. The burn was cleared of litter and debris by STC and the area added to their inspection and maintenance programme.

The separate sewerage system serving the estate was working satisfactorily however foul pollutants were identified in some surface water sewers and separation of cross connections from around 50 properties is being investigated.

NW's "SuDS for Schools and Communities" initiative will provide both schools with additional amenities to the primary flood defence basins. These include educational initiatives in the classroom to interpret the construction process and benefits for water quality and management as well as the rain gardens.

NW used its framework consultant to deliver feasibility and design of the project and framework contractor for construction of the sewers, manholes and storage basins. The consultant was also appointed to provide engineering analyses and prepare submissions to the EA to help secure their funding support to STC.

The design and funding process for Phase 2 occurred simultaneous to Phase 1 construction and was an excellent example of collaborative working between NW's framework contractors and consultants to provide robust pricing which enabled the two phases to be constructed near sequentially.

CHALLENGES

The collaborative approach developed during this project helped address the following challenges:

Alignment of Resources

The partners' agreement of common objectives led to an innovative project delivery model whereby the various budget sources and project delivery processes were brought together in one scheme. This alignment of resources worked so well that efficiency savings are estimated at 36%.

Partnership

The partnership between NW and STC ensured that ward councillors were well briefed on the project and could support the programme of extensive stakeholder engagement which included three community events. South Tyneside Homes (STH) was also consulted as a stakeholder since the estate contains a significant amount of social housing. STH also made a financial contribution to the Phase 2 works.

Community Engagement

All the residents of the 1240 properties in the estate were affected by the scheme to some degree. Their primary concerns were about safety and anti-social behaviour in the basins and the loss of bus service around the orbital road during construction periods. To mitigate this concern NW arranged for a shuttle bus service to be provided around the estate on a "hail and ride" basis and this proved to be a well used service.

The Community events were key to clarifying to residents how the SuDS elements delivered flood protection and reassuring them they were safe. They also presented opportunities to explain to residents why larger sewers alone would have been unsuccessful due to the interactions with the natural watercourses and the scale of land run-off.

To ensure continuity of stakeholder engagement an NW liaison officer was appointed to the scheme and a monthly newsletter circulated to all residents. This was used update the community as to any changes in the programme which had been circulated by a mailing prior to commencement of the scheme. Individual letter drops were also performed ahead of road closures and paving operations to co-ordinate the removal of cars from the streets.

Land Purchase

NW's partnership agreement with STC was formalised with help of the respective Legal teams. One critical aspect of the partnership was the purchase of farmland for the two large storage basins. This involved negotiations with the landowner a tenant farmer.

Whilst STC led the negotiations for land purchase, NW entered into license agreements with both third parties to occupy and commence construction. To achieve project timescales an innovative approach was agreed whereby NW funded the value of the land on trust and compensated the tenant farmer whilst the land purchase process was ongoing. This allowed the basins to be constructed during the winter and introduced some flexibility to the project programme.

Benefits and Achievements
In reducing the risk of predicted flooding in the Fellgate Estate the partnership of NW and STC carried out extensive construction of public sewers and introduced a series of surface water storage features which reduce the risk of flooding, are sympathetic to the local environment and contain educational elements for the community schools.

The partnership invested considerable time and effort to inform and reassure residents about the nature and benefits of SuDS. There was some reluctance to have SuDS in the area however the partners committed to explain and clarify the proposals to allay their concerns. This demonstrated that public acceptance of SuDS projects cannot be taken for granted and a comprehensive stakeholder engagement process is essential.

Habitat Creation and improved bio-diversity
The SuDS elements provided the opportunity to include biodiversity features including:

1. New trees, hedges and planting around detention basins whose sides and bases were given a wild flora and grass mix
2. Extending an existing woodland area
3. Providing ponds within the two primary schools.

New Learning Opportunities
The two schools within Fellgate Estate were very positive about the opportunities the project presented for them to contribute to flood risk reduction and generate a new educational resource. The two wet ponds will develop habitats that provide long term educational opportunities to both schools for many years.

Specific events during the project included:

1. Education sessions supported by the Wetland and Wildlife Trust
2. A tree planting event
3. Local school workshops on the construction process and the water cycle.

Recognition and Awards
All the partners are proud of the project outcome and residents appreciate that subsequent storm events have been well managed by the SuDS facilities.

The partnership has received considerable praise from residents and two typical comments are reproduced below:

''The meetings are very informative with maps and diagrams and any question you want to ask there is always someone there to answer it and they do take what you say on board and follow it up. We are kept very well informed. They have listened to what we need and taken our comments into consideration.''

''South Tyneside Council and Northumbrian Water have done a great job. The work has progressed very well and the project has been carried out very sympathetically and really looks good. Everybody agrees the work has been fantastic.''

- Further recognition has come from awards in 2016
- Highly commended in the Royal Institute of Chartered Surveyors Project of the Year (Infrastructure Category)
- Runner-up in the Institution of Civil Engineers' Robert Stevenson Awards (projects <£4M)
- Third in the Institution of Water - Innovation category
- Won at the Constructing Excellence Awards Northeast in the category Legacy – Sustainability
- Won the Institute of Water – Northern Area Innovation Award.

Creation of a template for future collaborative working
This project has added to the partners' understanding of how to present and negotiate proposals for sustainable assets including agreements on how they are maintained. The partners went beyond the application of current water industry and land drainage legislation to deliver an integrated scheme which reduces flood risk and utilises a range of SuDS solutions.

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. It is therefore essential to factor in sufficient time for persuasion and negotiation on SuDS proposals.

NW is proud of its contribution to local communities and looks forward to increasing partnerships to achieve common goals. We believe this project is a positive step in this direction and is a comprehensive and sustainable solution.

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Budget and funding
The total cost of project was £5.0M. NW designed and project managed both phases of the scheme and provided the funding for sewer network upgrades. The partners apportioned funding 62% / 38% for the shared (SuDS) features in Phase 1 on the basis of proportional volume. NW also made a contribution to STC for future maintenance of the Phase 1 ponds.

STC fully funded the Phase 2 works, their future maintenance and provided the support of members and officers.

As well as NW and STC funding contributions were also provided by South Tyneside Homes, Flood Defence Grant Aid and the Local Levy.

Project Team

Risk Management Authorities	Northumbrian Water
	South Tyneside Council
	Environment Agency
Consultant Engineer	MWH
Contractor	Esh

Status
Phase 1 commenced in September 2014 with Phase 2 completed in December 2015.

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

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