

Rainwise

Sustainable Drainage Solutions

Working with communities to manage rainwater

**Brunton Park, Gosforth,
Newcastle**



Brunton Park is a large residential area of some 900 properties in the northern part of Gosforth, within the City of Newcastle. The properties were built from the 1930's onwards and are predominantly in private ownership.

The area is bounded by the A1 to the west, Great North Road to the east and Ouseburn to the south. The land generally falls toward the Ouseburn, one of Newcastle's main rivers, which then flows for a further 1.5km in a south easterly direction until its confluence with the River Tyne in the city centre.

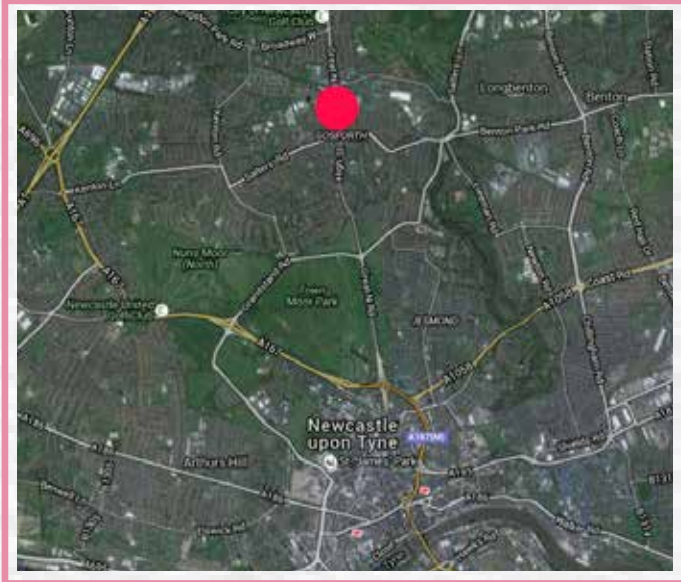


Figure 1: Location of Brunton Park in Newcastle

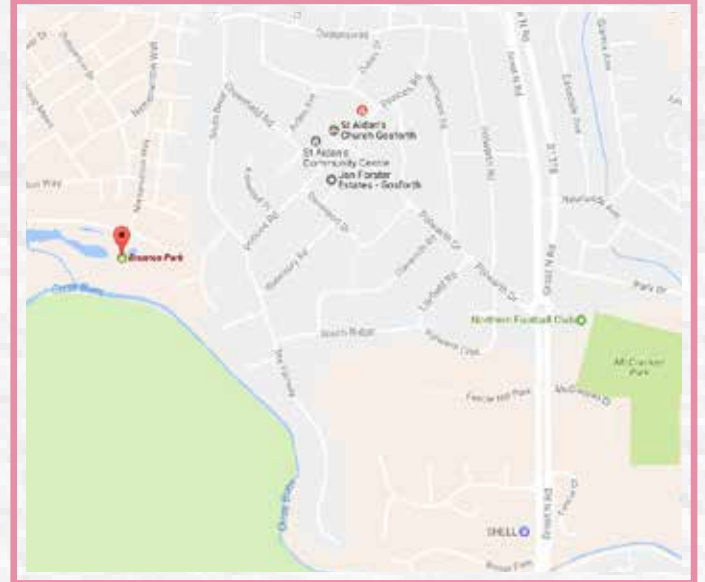


Figure 2: Brunton Park Area

This case study outlines the collaborative and sustainable approach undertaken by Northumbrian Water (NW), the Environment Agency (EA) and Newcastle City Council (NCC) to surface water management and thereby reduce the risk of highway, external and internal property flooding for the residents of Brunton Park, Gosforth.

The Brunton Park area had a history of flooding as a result of urban creep in the local area and developments in the upper parts of the Ouseburn catchment. A total of 62 properties were at risk of sewer flooding whilst 74 properties were located within the EA's Flood Zone 3 area.

NW, EA and NCC shared their respective flooding records and data however separate studies by NW and EA had not been able to deliver justifiable projects in isolation. The opportunity to work together produced a new prospect for the project.



PROJECT DEVELOPMENT

The overall strategic objective for the Brunton Park scheme was to reduce the potential for flooding of adjacent properties from surface water and the Ouseburn, whilst also developing a sustainable, self-maintaining channel which supports a rich variety and abundance of aquatic plants for invertebrates, fish, mammals and birds to thrive.

This project was developed to reduce the risk of property flooding from both public sewers and direct fluvial flooding. The key stakeholders, NW, EA and NCC (the Lead Local Flood Authority) determined that the residents would be best served by a collaborative sustainable approach to reduce the risk of further repeat flooding.

NW and EA entered into a formal partnership to develop and deliver the scheme which was overseen by a project board including representatives from the three key stakeholders.

In order to deliver a sustainable approach to reduce the risk of sewer and fluvial flooding the partners had to address the specific challenges of stakeholder management, programming and new ways of working which were inherent in the project.

A key physical constraint was the location itself with Brunton Park on one side of the Ouseburn being heavily developed whilst on the other side a long established private golf course abuts the river for almost 1.2km.

Brunton Park is served by a separate system of drainage. The foul sewers connect to a combined sewer running parallel to the Ouseburn whilst surface water sewers discharge into the river via 4 outfalls.

The fluvial flood defence element of the scheme design had to cater for the flow characteristics of the Ouseburn. Additional development around the A1 Western By-Pass and the road itself deliver a significant initial response to high intensity short duration rainfall whilst the overall catchment generates high flows from events of longer duration.

Northumbrian Water used their framework consultant to deliver feasibility and design of the project and framework contractor for construction of the river re-alignment, flood protection structures, sewers and manholes. The EA used their consultant to deliver the Project Appraisal Report (PAR) to secure funding with a second consultant employed to carry out the hydraulic analysis.

At an early stage the partners decided to maximise the social, environmental and financial benefits of the scheme by choosing to promote SuDS options for surface water management. The principle elements were a 400m diversion of the Ouseburn channel into the golf course, the creation of a 7500cu m SuDS storage channel and 200m of flood defence wall constructed both upstream and downstream of the diverted channel.

The Ouseburn diversion facilitated the construction of a section of earth embankment which formed a large part of the fluvial flood protection works. This was designed to provide a 1 in 200 year level of protection and reduced the risk of property flooding for up to 74 properties within the EA's Flood Zone 3 area.

In summary the scheme involved the following elements:

- Upsizing and construction of approx 2km of foul and surface water sewers.
- Construction of an off-line pumped return foul sewage storage tank and associated valve chambers and above ground control panel and kiosk.
- Re-alignment of a 400m length of the Ouseburn.
- Modifications to the existing Ouseburn channel to form a 7500cu m SuDS storage channel and associated downstream outfall and flow control chamber.
- Construction of 400m of earth flood defence embankment within the golf course.
- Construction of 250m of reinforced concrete and brick clad flood defence wall within private gardens.
- A temporary bridge across the Ouseburn to allow construction access from the Brunton Park estate onto the golf course.
- Creation of approx 0.5Ha of new water dependant habitat.



Figure 3: Extract of EA flood risk map



DESIGN AND CONSTRUCTION

The scheme was delivered in two phases. Phase 1 comprising the majority of the drainage works, flood walls and the majority of earthworks associated with the construction of the new channel and embankment commenced in October 2014 and was substantially complete in October 2015. Phase 2 which commenced in March 2016 and was completed in July 2016 comprised the completion of the Ouseburn diversion channel, tying in the flood embankment and flood walls, excavation of the SuDS channel and associated outfalls and final landscaping.

Phased commissioning of the new re-aligned Ouseburn channel was required to ensure that the new channel and bank sides were reinstated, planted and established before flows were turned.

The existing bed of the Ouseburn channel was utilised as a "low flow" channel which conveys surface water flow from the Brunton Park estate. Additional SuDS storage was created by excavating a basin between the existing Ouseburn channel and the earth flood embankment to provide the necessary storage volume during larger storm events. Reeds were planted along the margin of the

channel, however, in dry weather the channel is expected to dry out. The base and sides of the basin are grass covered with gradients of 1 in 3 to allow safe maintenance and grass cutting.

The SuDS basin and channel includes wide, flat margins for water dependant species and wetland plants. New habitat has been created as part of the project with the planting of new trees, developing a wet woodland area as well as the provision of kingfisher nests and otter holts.

While NW led and project managed the joint scheme through the design and construction phases the EA retained their own project manager for the financial and technical aspects associated with the fluvial flood defences. A good working relationship was maintained throughout.

NW will retain responsibility for the maintenance of the SuDS channel and basin. The basins will normally be dry and were seeded with a wetland meadow grass mix to minimise future maintenance liabilities.

A temporary bridge was installed over the Ouseburn to form an access to the golf course to carry out the earthworks.



Figure 4a: Plan of river re-alignment

New Ways of Working

The project initiated innovations in ways of working, most notably the integrated use of stakeholder powers for the diversion of the river and drainage assets as well as the SuDS implementation itself. Other important aspects included the joint communications strategy, risk apportionment and management of compensation claims.

The NW team identified project risks and developed strategies to enable them to be managed. Where the works are exclusive to NW or EA the appropriate party was responsible for the associated risks. Risks associated with works in the golf course were allocated to both parties and responsibilities set out within a legal agreement between them. The EA appointed a land agent to proactively manage the compensation process.

NW carried out all discussion and agreement with customers during the design and construction phases with EA signing off the detailed design and any changes which occurred during construction.

Construction

Significant issues arose during the construction phase associated with ground conditions. Despite comprehensive geotechnical investigations the underlying geology of the river basin proved to be variable and along the re-aligned Ouseburn running sands and silts were encountered around formation level. It was necessary to heavily modify the new channel with geotextile membrane and stone reinforcement to stabilise the stream bed. In addition, the excavated material from the new channel was unsuitable for re-use in the earth flood embankment and it was therefore necessary to import suitable material from a separate source.



Flood defence wall and existing Ouseburn



New Ouseburn route and flood bund



Golf course improvements



Maturing new route of Ouseburn

Figure 5: Photo montage



ACHIEVEMENTS

Flood risk reduction

In removing the risk of predicted flooding to over 100 properties in Brunton Park the partners have, by integrated working, delivered a sustainable solution which is functional and complementary to the local landscape, ecology and business.

The project delivered the flood protection benefits via a substantial physical change to the riverside area. As the site matures and the residents become accustomed to the new environment and habitats we believe it will prove to be a significant asset to the locality and anticipate the community will become justly proud of it.

Habitat creation and improved bio-diversity

Habitat creation and the opportunity for improved bio-diversity required specific study and the EA commissioned watercourse and botanical surveys prior to commencement of the project.

The key ecological constraints concerned otters, bats, the loss of mature trees from garden habitats and potential loss of lowland heath. A suite of mitigation measures was developed to reduce the impacts of the project and promote additional measures which would enhance the value of the site.

These included the timing of certain works, providing a variety of water depths and ground slopes along the watercourse to maximise ecological diversity, the planting of new trees, developing a wet woodland area as well as the provision of kingfisher burrows in steep bank sides and space for otter holts.

The SuDS basin and channel also includes wide, flat margins for floodplain species and wetland plants. This provides foraging for insects and therefore for bat species. Rush and reed species planted around the SuDS system will provide spaces for otters.

Improvements made as part of the project will contribute towards the Water Framework goal of achieving Good Ecological Potential by 2027.

Creation of a template for future collaborative working

Local disruption was a significant issue and effective management of the numerous aspects described in this report was a pre-requisite for the success of the project.

In this respect the following successes were critical:

- Working closely with active partners throughout the project
- Selling the vision to the residents and golf club
- Delivering promises made to stakeholders

This ground breaking scheme has added to NW's understanding of how to work with other partners through all phases of project delivery, presenting proposals and negotiating with a variety of stakeholders on sustainable projects.

In advance of the planning application submission NW held a customer information session and issued a joint press release for the media which was picked up by the regional television stations and local written press. Their interest produced more opportunities to publicise the scheme.

The customer information session for residents of the estate and the wider community was held in April 2014. This was well attended and produced a wide range of questions and concerns which were fielded by the project team.

Stakeholder engagement was more protracted than for conventional schemes however satisfactory agreements were achieved with the EA, NCC, golf club and local residents.

Public acceptance of SuDS projects cannot be taken for granted and the case for them must be explained to all stakeholders. Therefore it is essential to factor in sufficient time for presentation and negotiation on SuDS proposals.

Budget and funding

The total cost of the scheme was £7.2M comprising the following funding elements:

Northumbrian Water	£5.742M
Environment Agency	£1.358M
City of Newcastle	£100K



Project Team

Risk Management Authorities

Northumbrian Water
Environment Agency
Newcastle City Council

Consultant Engineer
Contractor

Mott MacDonald
Seymour Civil Engineering, Hartlepool

Status

The scheme was delivered in two phases. Phase 1 commenced in October 2014 and was substantially complete in October 2015. Phase 2 which commenced in March 2016 and was completed in July 2016.

For further information please email [**Rainwise@nwl.co.uk**](mailto:Rainwise@nwl.co.uk).