

Case study 19. Beam Washlands

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Main driver: Flood risk

Project stage: Constructed 2012



Photo1: Beam Washlands, Dagenham (source: Environment Agency)

Project summary:

This multi-award winning partnership project built on a £4.5 million flood and coastal risk management (FCRM) scheme to improve the integrity and capacity of this flood storage washland, providing better protection to over 570 homes and businesses. The scheme provides a large, wildlife-rich, community parkland in one of east London's most deprived communities ((Map 1). This includes 12.6ha of Biodiversity Action Plan (BAP) habitat, 150m of remeandering on the Wantz Stream, 600m of reprofiling and 300m of in-channel features on the River Beam. The project was completed in 2012; maintenance is funded and delivered by partners.

Key facts:

Increasing the storage capacity of the existing washlands from 433,000m³ to 458,660m³ provides a standard of protection to downstream properties for (approximately) up to a 1 in 25 year flood event. The provision and operation of the pumping stations provides an enhanced standard of protection of up to 1 in 150 years. This reduces the risk of flooding to 570 homes and 90 businesses.

The flood risk regulation benefits of undertaking this project provide a gross asset value of avoided flood damage benefits worth £591,000 per year compared with £193,000 per year before the scheme was constructed.



Map 1: Beam Parklands (source: London Borough of Barking and Dagenham)

1. Contact details

Contact details

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2. Location and catchment description

Catchment summary

National Grid Reference:	TQ5068883769
Town, County, Country:	Dagenham, London, Middlesex, UK
Regional Flood and Coastal Committee (RFCC) region:	Thames
Catchment name(s) and size (km²):	Ravensbourne catchment
River name(s) and typology:	Rom/Beam, lowland urban watercourse
Water Framework Directive water body reference:	GB106037028100

Land use, soil type, geology, mean annual rainfall:

Urban parkland; coarse and fine loamy permeable soils mainly over gravel variably affected by groundwater; clay, silt, sand and gravel

3. Background summary of the catchment

Socioeconomic/historic context

Eftec (2015) states that:

'Beam Parklands is a multi-use community space and flood storage area situated in the south-east of the London Borough of Barking and Dagenham. The site lies on the borough boundary between Dagenham and South Hornchurch. Historically, the land has been used for a variety of different purposes. In the Victorian era, a smallpox isolation hospital was constructed on part of the site. However, for the majority of the 20th century, the site was open space and was eventually designated as part of the Green Belt to protect the openness of the corridor along the Beam River'.

Before the recent flood risk management scheme discussed here, the majority of the land area (Beam Washlands) was owned and managed as a flood storage area by the Environment Agency. A smaller pocket of land was owned by the London Borough of Barking and Dagenham for use as park space. This was largely unmanaged with low levels of accessibility for some nearby communities, contributing to high levels of deprivation in the area, and subject to instances of antisocial behaviour.

Flood risk problem(s)

The River Beam is a tributary of the River Thames, which flows through east London. The river starts in Essex and flows as the Bourne Brook and River Rom before its confluence with the Ravensbourne. From there, the River Beam flows south to the River Thames, joining the Thames at Dagenham. The River Beam forms the boundary between the London Borough of Barking and Dagenham and the London Borough of Havering.

The River Beam catchment is a relatively small area and the river has a 'flashy' (quick) response to heavy rainfall events. The river level will rise relatively quickly, but will also fall quickly if floodwater can drain into the River Thames freely. However, if water levels in the River Thames are high, there is a 'tide-lock' effect on the River Beam, meaning that water is not discharged and the volume of water in the river channel increases.

The lower reaches of the River Beam are heavily urbanised in the south Dagenham and Dagenham Dock areas. The land use is mixed including residential, education, leisure and recreation, retail and industrial property. Beam Parklands (the washlands) provides an upstream flood storage area which protects the south Dagenham and Dagenham Dock areas from fluvial (river) flooding from the River Beam. Downstream of the confluence, the River Beam and Wantz Stream sluices along the A1306 road can be closed during periods of high tide in the River Thames (which prevents discharge from the River Beam via the tide-lock effect). This causes water to spill into the washlands from the River Beam. When the washlands are full, water is returned to the river via a spillway. If the fluvial flow were to top the washlands, pumps are operated at the Beam Tidal and Gores Brook pumping stations.

Other environmental problems

Information not available.

4. Defining the problem(s) and developing the solution

What evidence is there to define the flood risk problem(s) and solution(s)

See section 3.

What was the design rationale?

This project complements a £4.5 million capital scheme to make space for water and reduce the risk of flooding to 570 homes, 90 businesses (including the Ford Dagenham plant), major infrastructure (including Barking power station) and strategic development sites. The project was developed in partnership with Barking and Dagenham Council and the Land (Restoration) Trust, and provides BAP habitat within 53ha of regenerated open space. The local community were consulted on the design and investment came from the European Regional Development Fund, the Thames Gateway Parkland Fund and the Landfill Tax Credit Scheme.

Between 2009 and 2011, the 2 plots of land were redeveloped (see Photo 1) – packaged as a green infrastructure investment – into a single award-winning multi-use parkland and placed under the management of the Land Trust.

The management costs are primarily paid for by interest received from the deposit of an endowment (in the region of £2 million) from the East London Green Grid to be used solely for the purpose of maintaining the parkland in perpetuity. Beam Parklands still acts as a flood storage area, with an increased storage capacity, but also provides additional benefits to the local community with a well-managed park, a variety of different habitats and increased interconnectivity to nearby residential areas.

Before the project began, Beam Parklands was already an ecological haven for a number of protected species such as water voles, great crested newts (the site was once recorded as having the largest population of great crested newts in London) and a wide variety of wetland birds. A successful design approach was needed to integrate these valuable species and their habitats, so it was critical that in-house experts in environmental design at the Environment Agency worked effectively with the project team, project partners and framework consultants.

The early production of a well-developed concept plan for the site was an essential tool for communicating the vision and facilitating engagement. So as to achieve the necessary improvements to floodwater management, and therefore best value for money, the project focused on the floodplain.

Project summary

Area of catchment (km²) or length of river benefitting from the project:	750m length of river benefitting from project
Types of measures/interventions used (Working with Natural Processes and traditional):	Improvements to the pumping station 12ha BAP habitat created (ponds, reedbeds, lowland fen and wet woodland) 150m of Wantz Stream realigned, reprofiling around 600m of the River Beam banks and installation of in-channel features along a 300m stretch 25,660m ³ additional flood storage created.
Numbers of measures/interventions used (Working with Natural Processes and traditional):	See above
Standard of protection for project as a whole:	The washlands provide a 1 in 25 year standard of protection. The provision and operation of the pumping stations (physical capital) provides an enhanced standard of protection of up to 1 in 150 years.
Estimated number of properties protected:	570 homes, 90 businesses (including the Ford Dagenham plant), major infrastructure (including Barking power station) and strategic development sites

How effective has the project been?

The original storage capacity of the washlands was approximately 433,000m³. The redevelopment of the site between 2009 and 2011 increased this capacity by 25,660m³. The process of containing the fluvial flow within the washlands provides a standard of protection to downstream properties for approximately up to a 1 in 25 year flood event. The provision and operation of the pumping stations (physical capital) provides an enhanced standard of protection of up to 1 in 150 years.

Annual avoided damages are calculated based on the 1 in 25 year standard of protection attributed to the washlands. Annual benefits are calculated by estimating the number of properties at risk of a 1 in 25 year flood event and the associated damages. An assessment by Eftec (2015) estimated the flood risk regulation benefits (avoided flood damages) of undertaking this project to provide a gross asset value of avoided flood damage benefits worth £591,000 per year compared with £193,000 per year before the scheme was constructed.

5. Project construction

How were individual measures constructed?

Information not available.

How long were measures designed to last?

Information not available.

Were there any landowner or legal requirements which needed consideration?

Information not available.

6. Funding

Funding summary for Working with Natural Processes (WWNP)/Natural Flood Management (NFM) measures

Year project was undertaken/completed:	2012
How was the project funded:	Environment Agency (£986,000) London Development Agency (European Regional Development Fund) (£1.5 million) Communities and Local Government Parklands Fund (£1.9 million) Landfill Tax Credits Scheme (£250,000) London Borough of Barking and Dagenham (£50,000)
Total cash cost of project (£):	£8.2 million (£4.5 million capital scheme, £3.7 million NFM)
Overall cost and cost breakdown for WWNP/NFM measures (£):	£3.7 million
WWNP/NFM costs as a % of overall project costs:	45% of the total expenditure on the Beam Washlands scheme related to the installation of the NFM features

Unit breakdown of costs for WWNP/NFM measures:	No unit breakdown is available The following features were constructed: <ul style="list-style-type: none"> • 12ha BAP habitat created (ponds, reedbeds, lowland fen and wet woodland) • 150m of Wantz Stream realigned • reprofiling of around 600m of the River Beam banks • installation of in-channel features along a 300m stretch • 25,660m³ additional flood storage created
Cost–benefit ratio (and timescale in years over which it has been estimated):	Information not available.

7. Wider benefits

What wider benefits has the project achieved?

- Connecting and enhancing biodiversity habitats
- Creating opportunities for people to engage with the natural environment
- Promoting opportunities for recreation and play
- Remediating unused landfill sites
- Improving floodwater management
- Adapting to climate change
- Created a large multi-functional green space that will deliver improved flood storage to help adapt to climate change
- Created a safer and better used high quality greenspace on people’s doorsteps
- Existing biodiversity protected and enhanced by adding 12ha of habitat that will benefit great crested newts, water voles and reed buntings among others
- Provided new routes that link fragmented communities across south Dagenham for the first time

How much habitat has been created, improved or restored?

Funding from the Environment Agency was made available for the creation of 12ha of UK BAP priority habitat. A detailed site appraisal by landscape architects, ecologists, geomorphologists, engineers and archaeologists determined what habitat types were appropriate for different locations. This has included ponds, reedbeds, lowland fen and wet woodland within the River Beam floodplain and its tributary, the Wantz Stream (see Photo 2). The economic benefits of the BAP habitat created are estimated at £536,000.

The Wantz Stream was realigned through the floodplain in the open space away from the existing flood embankment. Where space allowed, more natural banks and profile were created along the River Beam. The introduction of meanders and backwaters will increase habitat and add interest to the park for the local community. Some wetlands have recently been created in the area as part of the Washlands Flood Alleviation Scheme.

An area of 12.6ha of BAP habitat was created (Outcome Measure 4) as part of 53ha of fully functioning and accessible parkland.

The Wantz Stream has been straightened and runs towards the edge of the space rather than being the visual focal point. Realignment will provide opportunities for wetland creation. The wetlands created as part of the Washlands Flood Alleviation Scheme will help to inform the creation of any new habitats.



Photo 2: New areas of marshland have been created to provide habitat for water vole (source Peter Neal from Natural England 2013)

In addition, all the excavated material was reused outside the floodplain. By capping the site with site-won low nutrient ballasts, 2ha of acid grassland has been created, as well as 1,000m of hedgerows and 0.5ha of traditional orchards (all UK BAP priority habitat). All of this is set within a design encompassing wildflower meadows, woodland copses, and scattered tree and shrub planting. Some of the historic features of the park have also been innovatively reused, with a Second World War pillbox being converted for a bat roost.

The project has also included remeandering 150m of the Wantz Stream, reprofiling around 600m of the River Beam banks and installing in-channel features along a 300m stretch. A blockstone weir was installed in the Wantz Stream, which has the dual function of encouraging greater colonisation by reeds upstream and generating more gradient downstream for a fast flowing, sinuous watercourse that is attractive for people and with banks designed to encourage water vole. Backwaters have also been created on the rivers to improve their suitability for fish.

8. Maintenance, monitoring and adaptive management

Are maintenance activities planned?

As the Environment Agency had neither the in-house expertise nor the resources to fund the complex management of the floodplain, the Land Trust joined the project and took on the long-term ownership of the site. It successfully secured capital funding from a number of partners to enhance the site's existing green infrastructure, as well as an endowment to manage Beam Parklands as an attractive, multi-functional community asset for the future. The Land Trust subsequently took on the increased liabilities and associated costs for maintaining the park from the London Borough of Barking and Dagenham, while the Environment Agency has retained ownership of all flood risk management infrastructure across the site.

Is the project being monitored?

Monitoring has included:

- collecting pre-project data
- taking fixed point photographs pre- and post-works to enable before and after comparison

Has adaptive management been needed?

Not applicable

9. Lessons learnt

What was learnt and how could it be applied elsewhere?

Gaining operational support for seeking to make better use of the washlands at an early stage and convincing those involved that it was a viable FCRM solution was crucial to the project's success. As was the early establishment of a partnership with the local authority and the Land Trust to explore and realise the opportunity to enhance, as well as protect, local lives, homes and jobs. Developing a large 'additional' project and attracting 75% of the investment needed from external funding sources including 'legacy' funding, for future maintenance were also important.

Environment Agency (2013) includes the following quote from Euan Hall, Chief Executive of the Land Trust:

'The Parkland is managed at a local level by Rangers from London Borough of Barking and Dagenham, a vital part of their role is to engage and involve the community in the running of the park. The key to the success of the park is that the rangers have been very successfully working with local people; over 1000 people have attended community events and over 500 local school children have taken part in educational activities. There was also a very successful volunteer programme. All this has meant that even in such a short space of time people have a real sense of local ownership.'

10. Bibliography

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Project background

This case study relates to project SC150005 'Working with Natural Flood Management: Evidence Directory'. It was commissioned by Defra and the Environment Agency's [Joint Flood and Coastal Erosion Risk Management Research and Development Programme](#).