

## **BEST Case Study**

### **Managing flood risk in Killingworth and Longbenton**

#### **Background**

In 2010 Northumbrian Water commenced a series of Sustainable Sewerage Studies to understand flood risk across a number of catchments. One such study assessed the Ouseburn catchment, to the north of Newcastle upon Tyne. To support the project, Northumbrian Water formed a steering group with partners from other agencies including North Tyneside Council and the Environment Agency.

The first stage of the study indicated there were substantial benefits from reducing combined sewer overflow spills and providing future headroom to facilitate growth and accommodate climate change by reducing the amount of surface water entering the sewers. The study also demonstrated that there was significant flood risk across the area from a number of sources and that this risk could be reduced.

The work identified a number of sustainable solutions to reduce the overall flood risk, including managing surface water and disconnecting watercourses that enter the drainage network. It was clear though at the end of this stage that the various benefits accrued to different partners.

The next stage, a concept study, commenced in 2013 to evaluate and monetise the identified benefits, making use of and enhancing an integrated drainage model. The assessment of the wider benefits is based on BEST and followed an ecosystem services approach. The case study presented here uses the estimated and modelled values from recent work in this study as part of developing the business case and project viability.

The original case study has been updated using the 2019 version of BEST. Values therefore differ from earlier versions of the case study due to inflation.

#### **Approach**

This scheme included funding from Northumbrian Water, the Environment Agency (through FCRM GiA) and North Tyneside Council. The scheme includes disconnecting the Longbenton Letch from the combined sewer and diverting it to the Forest Hall Letch. To provide capacity and prevent the transfer of flooding, there are detention and exceedance basins on the watercourse including some within school grounds.

Other elements to the work include removing discharges from Killingworth Lake to the combined sewer and diverting it to a surface water sewer and adjacent watercourse.

#### **Results summary**

The main results table from BEST is shown below. The option provides a total present value (PV) benefit of £38.4mn (before confidence) and £37.5mn (post confidence). The benefit cost ratio (post confidence) is 5.0 (range of 0.3 to 8.1).

Present Value Assessment Stage	Total PV Benefits	Total PV Costs	Net Present Value	Benefit Cost Ratio	Benefit distribution score
Present Value before confidence applied	£38,419,475	£7,500,000	£30,919,475	5.1	F
Present Value after confidence applied	£37,466,071	£7,500,000	£29,966,071	5.0	F
Present Value sensitivity - low	£2,008,398	£7,500,000	-£5,491,602	0.3	F
Present Value sensitivity - high	£60,423,250	£7,500,000	£52,923,250	8.1	F

The export report from the assessment is included below. This report includes the following outputs from B£ST.

- Project details
- B£ST Results Dashboard
- Written evidence

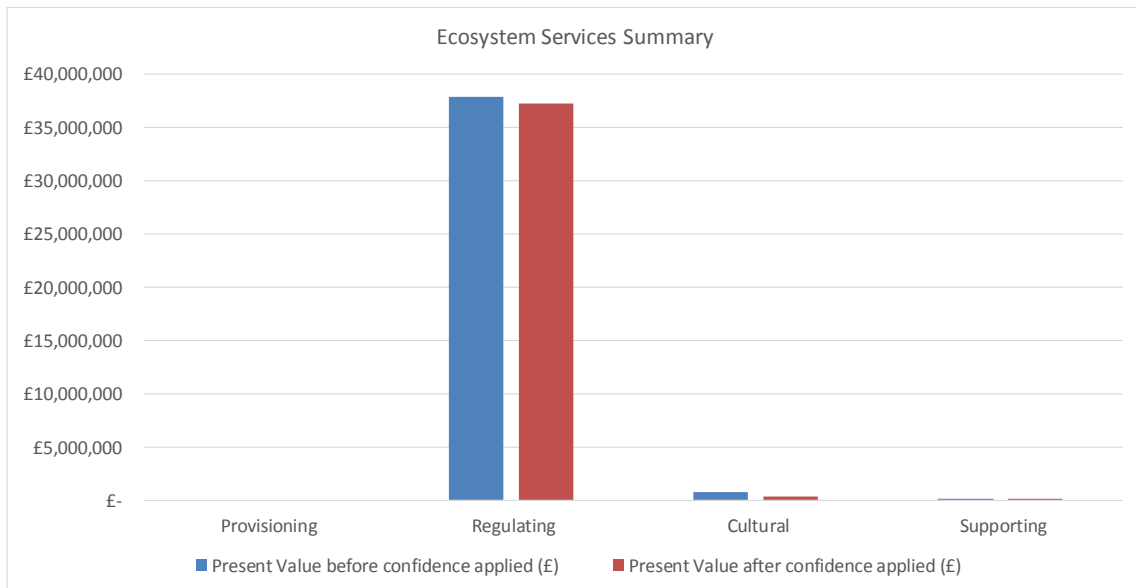
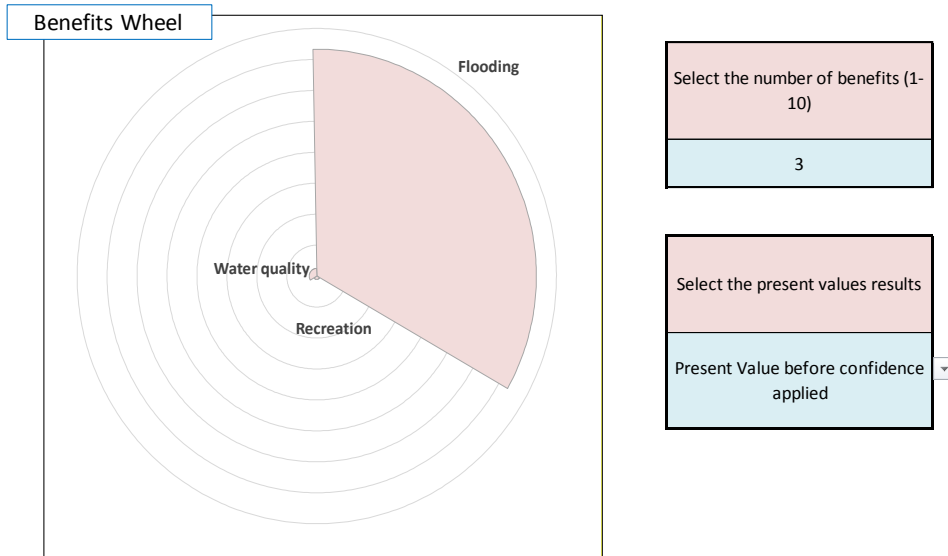
# B£ST Export Report

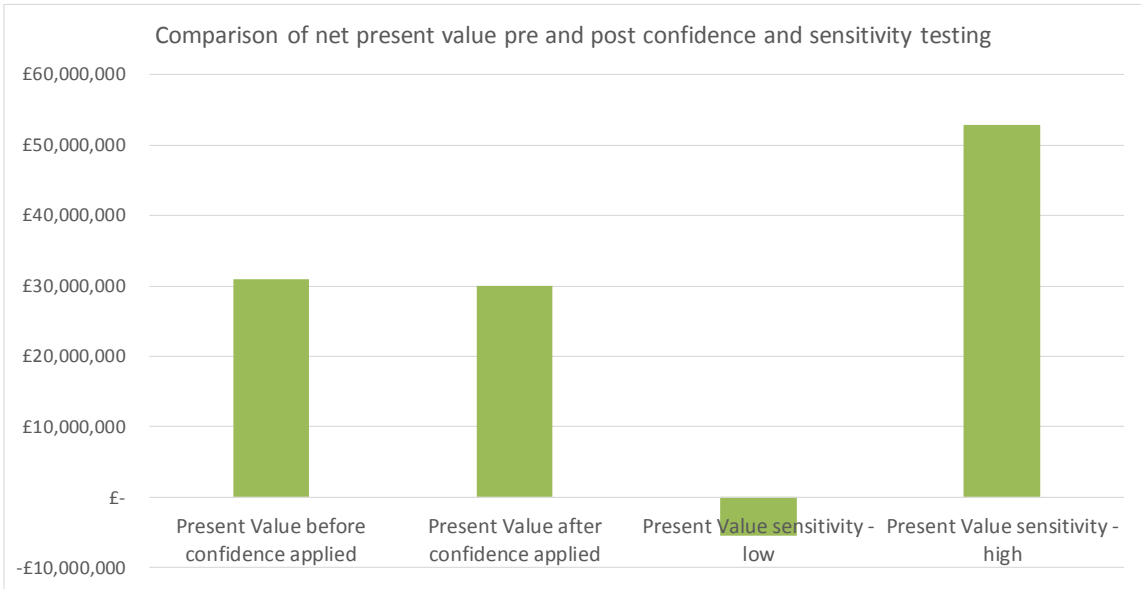
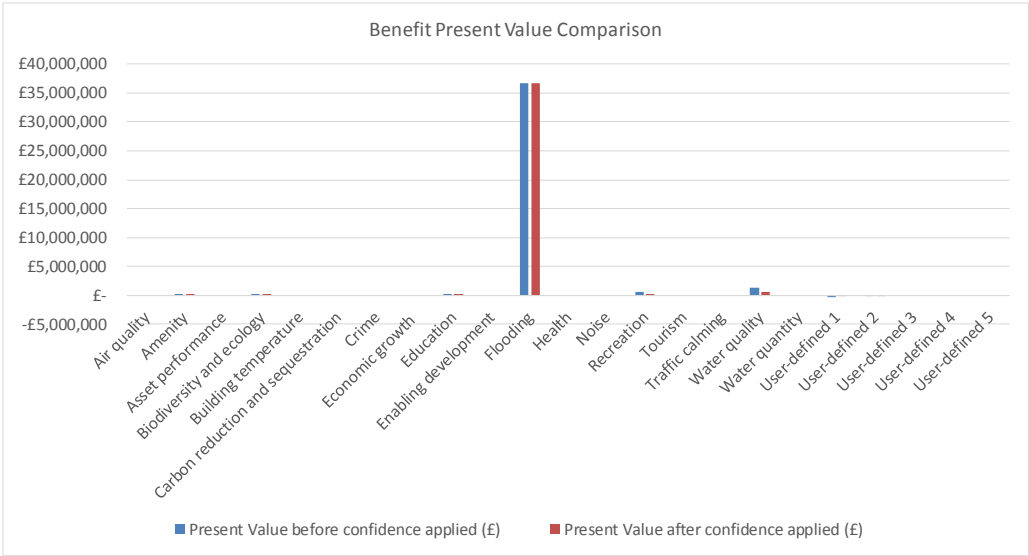
B£ST: Version: 4.1., February-2019, 12 Feb 2019, 09:19:34

Author	J McMullan
Date	01/02/2019
Project Name	Killingworth and Longbenton
Project Reference Number	41519918
Assessment version	1
Location name	Killingworth and Longbenton
Summarise baseline option	No change
Summarise proposed option	Separate surface water from Longbenton Letch and Killingworth Lake

Author	J McMullan
Baseline option Present Value Cost (if applicable)	£0
Proposed option Present Value Cost	£7,500,000
Scheme supporters	Environment Agency, Local Authority, Water and Sewerage Company
Scheme funders	Environment Agency, Local Authority, Water and Sewerage Company
Discount rate to apply	3.5%

## Results Dashboard





## PV Assessment

Present Value Assessment Stage	Total PV Benefits	Total PV Costs	Net Present Value	Benefit Cost Ratio	Benefit distribution score
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## Benefit Category

Benefit category	Present Value before confidence applied (£)	Present Value after confidence applied (£)	Present Value sensitivity - low (£)	Present Value sensitivity - high (£)
Air quality	£0	£0	£0	£0
Amenity	£197,681	£111,196	£12,355	£308,877
Asset performance	£0	£0	£0	£0
Biodiversity and ecology	£1,284	£722	£80	£2,006
Building temperature	£0	£0	£0	£0
Carbon reduction and sequestration	£0	£0	£0	£0
Crime	£0	£0	£0	£0
Economic growth	£0	£0	£0	£0
Education	£33,789	£19,006	£2,112	£52,795
Enabling development	£0	£0	£0	£0

<b>Benefit category</b>	<b>Present Value before confidence applied (£)</b>	<b>Present Value after confidence applied (£)</b>	<b>Present Value sensitivity - low (£)</b>	<b>Present Value sensitivity - high (£)</b>
Flooding	£36,651,863	£36,651,863	£2,290,741	£57,268,536
Health	£0	£0	£0	£0
Noise	£0	£0	£0	£0
Recreation	£542,223	£203,334	£33,889	£847,223
Tourism	£0	£0	£0	£0
Traffic calming	£0	£0	£0	£0
Water quality	£1,254,515	£627,257	£78,407	£1,960,179
Water quantity	£0	£0	£0	£0
User-defined 1	-£228,728	-£128,659	-£357,387	-£14,295
User-defined 2	-£33,152	-£18,648	-£51,799	-£2,072
User-defined 3	£0	£0	£0	£0
User-defined 4	£0	£0	£0	£0
User-defined 5	£0	£0	£0	£0

## EcoSystem Service

<b>Ecosystem service</b>	<b>Present Value before confidence applied (£)</b>	<b>Present Value after confidence applied (£)</b>	<b>Present Value sensitivity - low (£)</b>	<b>Present Value sensitivity - high (£)</b>
Provisioning	£0	£0	£0	£0
Regulating	£37,906,378	£37,279,121	£2,369,149	£59,228,716
Cultural	£773,693	£333,535	£48,356	£1,208,895
Supporting	£1,284	£722	£80	£2,006
<b>TOTAL</b>	<b>£38,681,355</b>	<b>£37,613,378</b>	<b>£2,417,585</b>	<b>£60,439,617</b>



## Evidence Summary

### Evidence from Am - Amenity page

- 1: Improved water quality and new attenuation areas will increase amenity value of individual properties and improve appearance of general area.
- 2: Average value of properties is £155,000 and there will be approx. 300 less than 450m from the park

### Evidence from BE - Biodiversity & Ecology page

- 1: Significant opportunity to create improved wildlife habitat along Forest Hall and Longbenton Letches in attenuation areas. In addition, there is a possible improvement to Gosforth Park Nature Reserve SSSI, as a result of additional flow from Killingworth Lake.
- 2: Approx. area of improvement 1.7ha

### Evidence from Edu - Education page

- 1: There are a number of schools in the vicinity of the scheme
- 2: Simple estimate of the number of children benefitting.

### Evidence from F - Flooding page

- 1: Flood risk in catchment would decrease, with benefits to nearby properties and potentially transport/congestion, with reduced flood risk at Westmoor roundabout.
- 2: Provision of additional storage area will reduce flood risk to properties and roads around Killingworth Lake/West Moor roundabout, as well as reducing peak flows in the downstream sewer and drainage systems.
- 3: The feasibility study for the site used the multi-coloured manual to generate an expected benefit arising from reduced flood risk of £32,400,000 (NPV).
- 4: Estimate of 300 hours as a result of traffic disruption from flooding at local roundabout.
- 5: Assessment based on feasibility study and further detailed modelling. Therefore, confidence level of 100% selected for both property flood risk benefits and reduced travel disruption.

### Evidence from R - Recreation page

- 1: Reduced CSOs and improved water quality in Letches, West Moor tributary and further downstream in Jesmond Dene, along with new detention areas, will make area more attractive for walkers and other users, as well as reducing odour, increasing local recreational opportunities.

### Evidence from WQ - Water quality page

- 1: Improved water quality in letches and potentially in Ouseburn due to reduced number, frequency and volume of CSO spills.
- 2: Along the upstream portion of the Forest Hall Letch approximately 900 m of letch will be improved. At the downstream end of Longbenton Letch, 50-100 m of new watercourse will be created / daylighted. In addition, around 5km of Ouseburn (all the way down to the Tyne) will improve due to reduced CSO spills. Impacts from new wetlands not included to avoid possible double counting with 'Biodiversity' category.
- 3: Current water quality in letches and Ouseburn is 'moderate', which could move to good if CSO issues are resolved
- 4: Confidence level for quantitative estimate is 50% (as water quality also impacted by other issues), and for monetary value is 100% (based on EA national survey)

### Evidence from User-defined benefits page

1: UD1 - loss of crops / revenue. Amount of land currently around Forest Hall Letch used for crops to form 2-stage channel at upper end and attenuation storage at lower end near Quorum: Area 1 – Palmersville west (north of Woodlands Grange) ~3,000m<sup>2</sup>; Area 2 – Palmersville (north of Palmers Green) ~ 1,700m<sup>2</sup>; Area 3 – Palmersville (north of Laurel Avenue) ~ 4,500m<sup>2</sup>. Total = 9,200m<sup>2</sup>. For monetary value, use value of unequipped arable land per hectare in Northumberland (£12,227 per ha) (Government Valuation Office, 2011 Property Market Report [http://www.voa.gov.uk/dvs/\\_downloads/pmr\\_2011.pdf](http://www.voa.gov.uk/dvs/_downloads/pmr_2011.pdf)). This is annual cost occurring from 2017 until 2055

2: UD2 - Disruption from the construction work. Assume 300 (same as amenity category) of the 20,000 properties in the area experience an increase in disruption. For monetary value, use £58.17 per household per year (Department of Transport, 2012, The Noise Sub-Objective, [http://www.dft.gov.uk/webtag/documents/expert/pdf/unit3\\_3\\_2-noise-05-12.pdf](http://www.dft.gov.uk/webtag/documents/expert/pdf/unit3_3_2-noise-05-12.pdf)). This is one-off cost during construction