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[1] 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.

[1] CIRIA (2015) Benefits of SuDS Tool
http://www.susdrain.org/resources/best.html

Approach

This is a live scheme aiming to secure funding from Northumbrian Water, the Environment Agency (through FCRM GiA) and North Tyneside Council. As discussions with stakeholders and 3rd parties progress, the proposed solutions evolve. Current proposals include 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.

Based on the screening questions, the following benefit categories were assessed using BeST:

- Amenity
- Biodiversity and ecology
- Education
- Enabling development
- Flood risk
- Recreation
- Treating wastewater
- Water quality
- User defined (loss of crops)
- User defined (noise / disruption)

Most of the benefit categories were assessed using information within the tool and guidance. The exceptions to this were ‘flood risk’, which was assessed using depth damage results from an integrated sewer/watercourse/overland flow drainage model

and the multi-coloured handbook. The present value costs of the options as of July 2015 were approximately £7.5M.

Results

A summary of the results exported from BeST are shown in Table 1. The estimated benefits of the option are greater than the costs both pre and post confidence. The central estimate after confidence is applied gives a benefit cost ratio of 5.1. This is 2.8 under low and 8.0 under high sensitivity respectively using the approach adopted within the tool. Figures 1, 2 and 3 show the breakdown of benefits (before and after confidence applied). The majority of benefits are associated with flood risk reduction. Other potentially important benefits are recreation, water quality and amenity. Figure 4 shows the total benefits present values for different conditions and net present values.

Table 1: Summary of results

Present Value Assessment Stage	Total PV Benefits	Total PV Costs	Net Present Value	Benefit Cost Ratio
Present Value before confidence applied	£39,522,478	£7,500,000	£32,022,478	5.3
Present Value after confidence applied	£38,034,636	£7,500,000	£30,534,636	5.1
Present Value sensitivity - low	£21,141,086	£7,500,000	£13,641,086	2.8
Present Value sensitivity - high	£59,901,375	£7,500,000	£52,401,375	8.0

Figure 1: Breakdown of benefits per category pre (left) and post (right) confidence

Figure 2: Distribution of benefits pre (left) and post (right) confidence

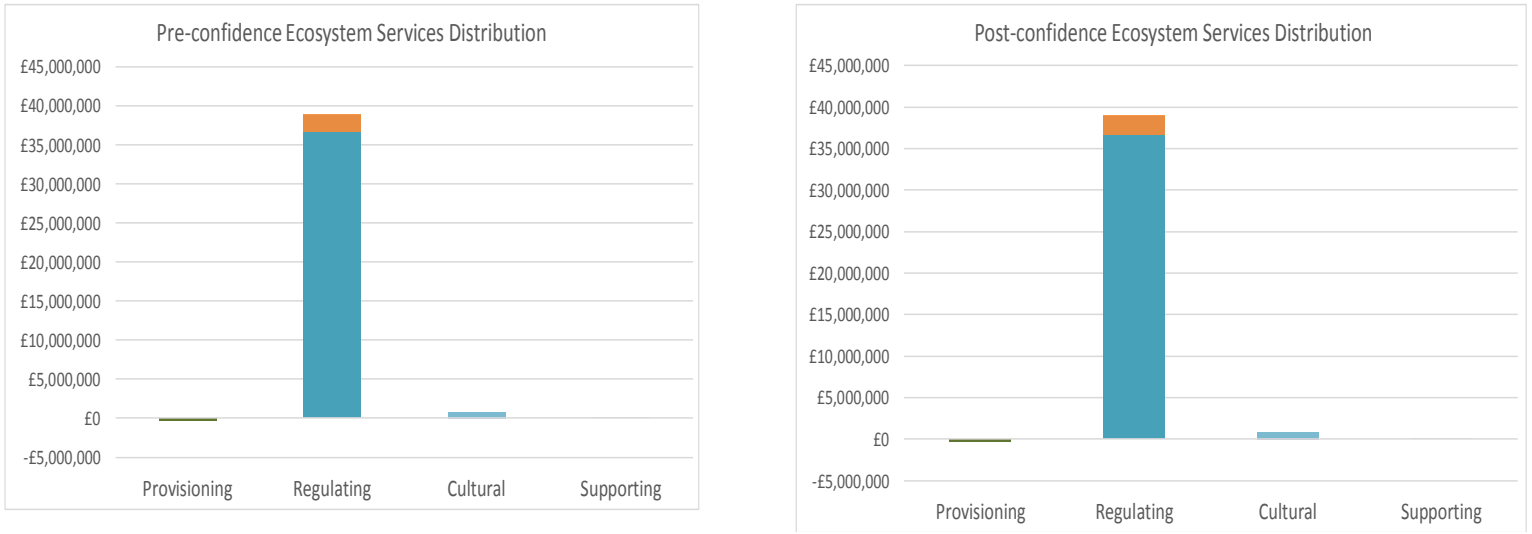

Figure 3: Breakdown of benefits under ecosystem services categories pre (left) and post (right) confidence

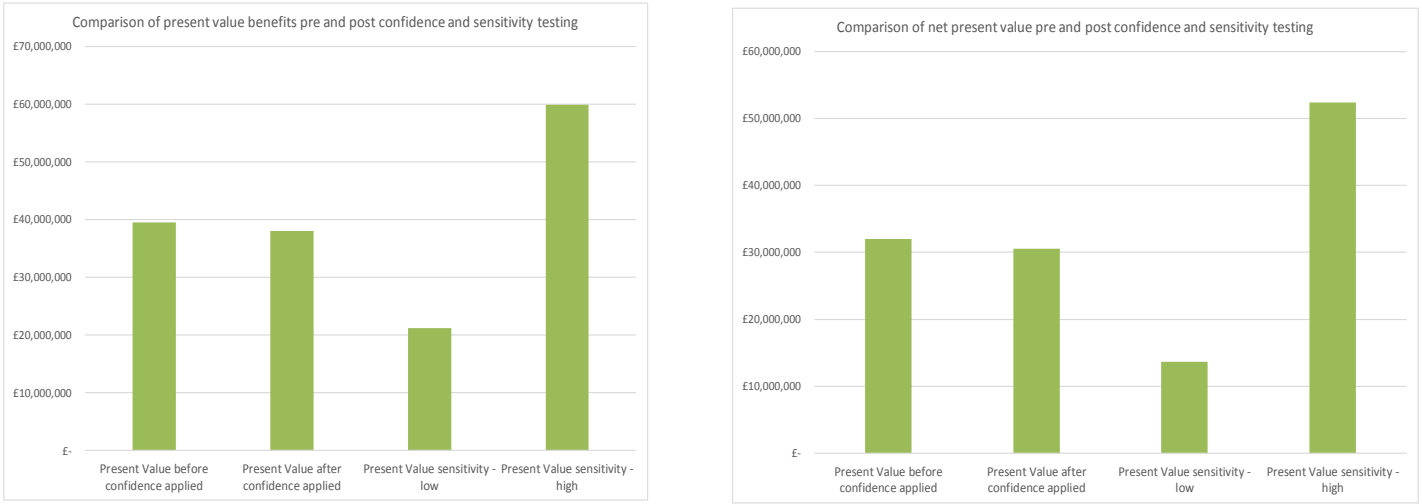

Figure 4: Comparison of benefits present value (left) and net present value (right) for pre and post confidence and sensitivity testing.