Detention ponds or basins are dry depressions in the ground that can be vegetated or grey. While usually designed to provide only short term storage of water, their pollutant removal efficiency is higher when they are designed to hold water for longer (they are then called extended detention basins). They allow sediment to settle and biological processes to take place that destroy nutrients and other pollutants.

Detention basins act mainly as storage areas and can provide treatment of water from a larger catchment area. Surface water can be stored as part of a routine runoff path ('on-line component') or they can act to capture overflow when the usual train of treatment is insufficient ('off-line'), before it is discharged into the sewer system or further treatment. The intended function influences the design, with on-line components usually being vegetated to provide infiltration and pollutant treatment capacities. To maintain their function, pre-treatment – for example sediment forebays – is necessary. They can be combined with swales, and including small ponds or wetlands can increase treatment performance. In addition, they can provide valuable recreational areas.

Through their impact on reducing and removing surface water runoff, Detention Basins can reduce severity of surface water floods.

While they have not the highest potential to provide habitats for wildlife, management for biodiversity can increase this, for example through planting native shrubs.

As vegetated or even wet areas, Detention Basins can mitigate the Urban Heat Island effect. They also have the potential to store carbon in their soil and vegetation. This does not apply to grey detention basins.

Potentially, pollutants can be adsorbed by vegetation and soil.

Especially sediment can be removed effectively, but also metals and insoluble pollutants.

Depending on design, the aesthetic value can be significant. In highly urbanised areas where grey design is required, this can be enhanced to look appealing and provide multi-functional space.

When they are dry, Detention Basins can provide space for cultural, recreational, and educational activities.

Detention Basins can be used as multifunctional areas and so provide opportunities for recreation and sport.

When they are active, Detention Basins can provide groundwater recharge if infiltration is possible.

Detention Basins may influence fluvial floods downstream by reducing the amount of water discharged into rivers.

Depending on design, NH4 and CH4 can be emitted, more so when storage times are longer. This should be considered when designing the basin and outlet.

Lack of maintenance can lead to swampy areas at the outlet of the basin which can be perceived as dangerous or simply ugly, and can also have an impact on the multi-functionality of the space.

Sediment removal needs to be taken care of if accumulation of metals happens at the bottom of the basin. Otherwise, the soil can become contaminated and high pollution can occur in the outflow of the basin.

WATER QUALITY

CLIMATE REGULATION

AESTHETICS

Lack of maintenance can lead to swampy areas at the outlet of the basin which can be perceived as dangerous or simply ugly, and can also have an impact on the multi-functionality of the space.
CASE STUDIES

Lamb Drove, Cambridgeshire
Lamb Drove is a residential development of 35 homes on a one hectare site. A range of SuDS components were used, including permeable pavements, green roofs, swales and detention basins. When the capacity of source control components (e.g. water butts) are exceeded, water flows through swales and detention basins into a retention pond before being released into a drainage ditch. The overall savings are estimated at £11,000. www.goo.gl/teySj4

SuDS in Scotland
This report provides information on the performance of SuDS in terms of water quality, hydrology and amenity and the factors affectig performance. It investigates mainly source and site control systems. Part B summarises results from specific sites, which include ponds, swales, detention basins, porous paving and filter drains. Results suggest that all systems investigated are producing the hydrological and water quality benefits desired, however social and cultural benefits sometimes have the potential to be improved www.goo.gl/Iyzkzy

Aztec Business Park, Bristol
The site has a series of ponds arranged in series, two retention ponds with permanent water and then a detention pond which remains dry most of the time. The large amenity ponds were fed from road and car park drainage. Instead of costly oil separators to pre-treat runoff, large ornamental fountains were installed to aerate the water and promote breakdown of hydrocarbons. www.goo.gl/4LTuC1

DETENTION BASINS IN THE LANDSCAPE
To provide a comprehensive treatment and management of surface water, detention basins should be seen within the wider landscape.

While they are able to store runoff, it is important to understand that their ability to reduce runoff and infiltrate it is limited. If they are placed in natural runoff paths, they can reduce the risk of fluvial flooding by preventing water from entering the stream immediately.

Detention basins provide control of runoff from a large catchment area, but their storage capacity is limited by their design. Combining them with other interventions like swales can reduce sediment loads before runoff enters the basin and so reduce maintenance requirements. Water can further be lead into retention ponds or wetlands to undergo additional treatment or to be stored over a longer period, or be discharged slowly into sewers or other receiving systems.

Installation costs of 15-55£/m3 can be expected but are dependent on site and context, with a lifetime of up to 50 years. Regular maintenance, such as clearing inlets and outlets, is necessary but can often be factored into general landscaping. 0.3£/m2 to be expected.

Residential, Commercial, Retrofit. Multiple uses are possible and it can therefore be incorporated in existing amenity space and used for recreation.