Early evaluation of sustainable drainage design in parks

Introduction & Background

This method has been developed as a tool to help community groups and stakeholders at the beginning of a sustainable drainage project. The process was developed as it was found that current available tools such as B£ST and the London SuDS (sustainable drainage solutions) Opportunity Map were useful only to projects that were already well defined and where specific engineering knowledge was available. The aim of this process is to bridge the gap between early community engagement and detailed engineering design.

Process

The process consists of six steps, shown in Figure 1 below.

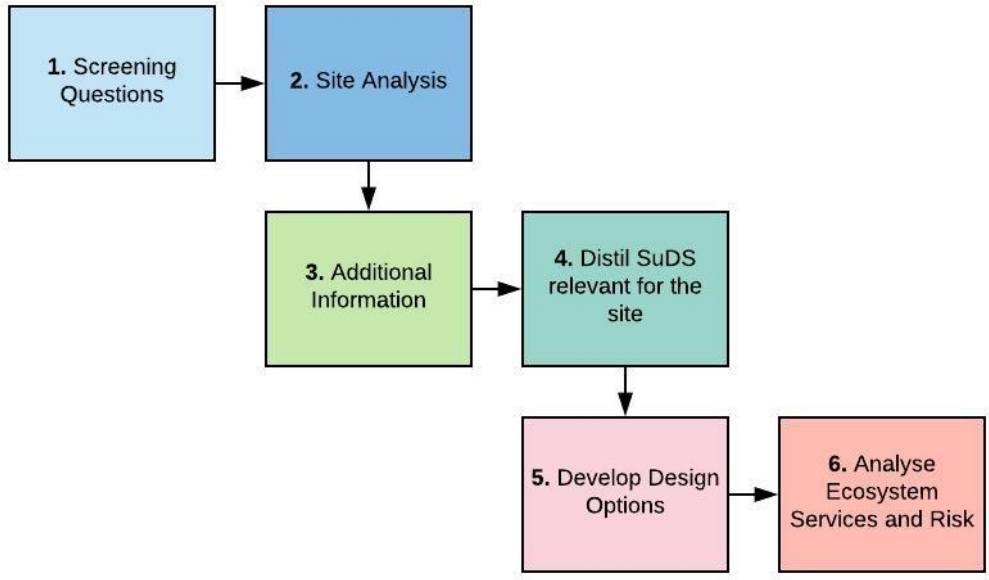

Figure 1 - Six step process

1 – Screening Questions

The questions are set out to gain an overview of site. These questions are designed to make whoever answers them think about the site, while the information provided will be helpful for the engineers who will be involved at a later stage.

1. Is flooding an issue in the park or nearby dwellings? *(Yes/ No)*
2. What does the soil feel like? *(Sand/ Clay/ Mixture)*
3. Do you know of any natural watercourses that once ran through or near the park (for example brooks, rivers, ponds)? *(Yes/ No)*
4. If the park was redeveloped to include natural water management, would you expect more visitors? *(Yes/ No)*
5. If the park was redeveloped to include natural water management, would you expect more educational visits (from local schools for example)? *(Yes/ No)*

6. Does much wildlife currently live in the park? *(Yes/ No)*
7. Does the park currently contain a working drainage solution? *(Yes/ No)*
8. Which activities typically take place in the park? (For example – football, walking, dog walking, picnics, sun bathing, running, outdoor gym sessions, playground activities)

2 – Site Analysis

For this step, a simple site plan should be developed based on local knowledge. In order to provide a plan where the all relevant information is marked out, the following steps should be followed:

1. Obtain a satellite photo of the park (for example on google maps satellite screenshot)
2. Mark out the lowest lying areas (may be found from walking around the park or a local contour map)
3. Mark out any natural watercourses that have previously run through the park (local archives may have this information)
4. Mark out any known culverts/ drainage solutions
5. Mark out any wildlife areas that should be protected during redevelopment

3 – Carry out research to check for additional site-specific information

Information about the history of the site can be relevant for learning about the past uses of the site, such as hidden drains or past wetlands. If possible, obtaining existing site analysis such as flood risk maps can help to understand the areas requiring special attention.

A good place to seek additional information would be in the local archives or by speaking to residents that have lived in the area for a long time. While the local council or the Environment Agency are most likely not involved at this early stage, it may be possible to obtain data if the site has previously been investigated for projects.

4 – Assess available SuDS options to decide which are relevant to site

Based on the information gathered in steps 1-4, the characteristics and uses of the site should now be highlighted to be able to assess which solutions from Table 1 are suitable for the site. Each SuDS should be considered in terms of which benefits or trade-offs this would provide to the site. Table 1 was developed based on CIRIA SuDS Manual (Woods Ballard *et al.*, 2015).

Table 1 - Step 4: SuDS Options

SuDS	Properties	Site Suitability
Soakaways	Stores water in excavation among rubble or geotextile and allows for natural infiltration discharge into ground. Water must be clean, so groundwater is not polluted.	Residential/ smaller sites.
Trench	Similar to soakaways but the design is linear. They are shallow and can distribute water over a larger area.	Residential/ smaller sites.
Infiltration basins	Depressions in landscapes – over ground storage that allows infiltration at natural rate.	Larger area with planted shrubs.
Infiltration blankets	Shallow soakaway systems consisting of large area of gravel to allow infiltration over larger area.	Larger underground areas.
Filter strips	Sloping grass strips leading and treating water away from impermeable surfaces. Some infiltration takes place, remaining water is transported to another SuDS measure at slow velocity.	Longer large sites transporting water.

Filter drain	Gravel filled linear trenches that store before allowing it to infiltrate the ground or release into drainage pipework.	Should follow on from filter strip (pre-treated). Residential and non-residential.
Swales	Shallow grassy/vegetated channels that transport and treat water at a suitable rate. Dry swales include an underdrain to provide treatment and higher capacity. Wet swales provide wet land/marsh area at bottom of swale. Potential sediment is visible/treatable.	Long areas (parallel to road/paths).
Bio-retention/ Rain gardens	Landscape shallow depressions to provide attractive landscape planting and biodiversity. Water collected at surface level and transferred into an underdrain or ground.	Diverse range of applications.
Detention basins	Landscape depressions for more extreme weather events, can incorporate small permanent pool and vegetation.	Large areas, typically non-residential.
Ponds/ Wetlands	Permanent open water on site, rises at times of flooding, may include water plants.	Large areas.

5 – Distil information to produce three options of varying capacity

After evaluating the available SuDS options, solutions should be developed in a creative manner. Users of the parks or areas assessed should think about what would function well, fit in and add interest and value to the users of the park. The SuDS presented in Table 1 should be combined to produce three different options each with varying water capacity. By developing three options, different benefits can be identified and discussed.

6 – Assess options in relation to ecosystem services and risk

Once the options have been formed, it may be helpful to read about ecosystem services. This will help to assess the value of each option to decide which option is best suited to the park. The Millennium Ecosystem Assessment (MA, 2005) is a helpful resource in understanding ecosystem services. At the same time, it should also be considered whether the chosen options may result in any form of risk. Examples of this may be loss of wildlife habitat, potentially contaminated waterways or user dissatisfaction.

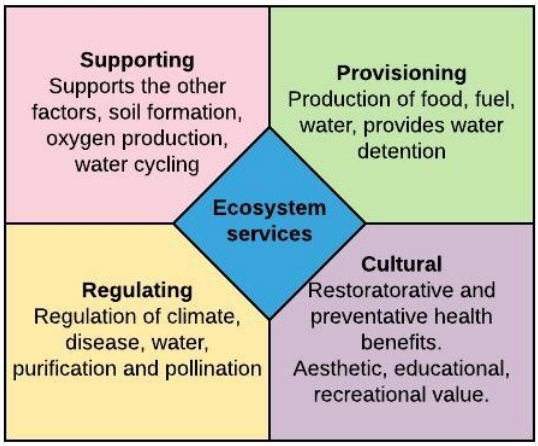

Figure 2 Ecosystem services

References

MA. (2005) 'Chapter 2: Ecosystems and Their Services', in *Ecosystems and Human Well-being: A Framework for Assessment.* Available at: https://www.millenniumassessment.org/documents/document.300.aspx.pdf (Accessed: 16 May 2019).

Woods Ballard, B. *et al.* (2015) *The SUDS Manual*, *CIRIA*. Available at: http://www.persona.uk.com/A47postwick/deposit-docs/DD-181.pdf.