

iWater assessment criteria

The following checklist has been created to help assess the quality of multifunctional storm water solutions. The main users of the checklist would be the authorities and experts in the iWater partner cities when seeking appropriate stormwater management solutions for the pilot sites.

What is “innovative”?

In the context of the EU policy for the Urban Innovative Actions (a part of Urban Agenda 2020), a standard definition of innovation is provided by OECD – Oslo Manual (2005): “An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations”. However, other definitions of innovation can be considered. For example, “the successful implementation of new ideas” (BIS), “change that creates a new dimension of performance” (Peter Drucker), “new ideas that work” (Nesta), and “fresh thinking that creates added value” (Richard Lyons).

For an urban authority to innovate implies a very sharp understanding of reality, a high degree of creativity and willingness to take risks, understanding how things work, how they can be improved and what is actually missing (not yet in existence). To be innovative means applying creativity and imagination to design, prototype, test and, eventually, scale up novelties, which citizens and users would perceive as

possessing an added value; thereby providing them with a wider, if not completely new, market. Uncertainty is a built-in attribute in innovation, thus there should be a greater tolerance for shortcomings when piloting new innovations, as risk is part of the process.

Thus, innovation can be defined to be the application of better solutions that meet new requirements or unarticulated needs: the introduction of something new, such as a new idea, method, or device; something original and more effective and, as a consequence, something that “breaks into” society.

The checklist offers six different categories with which to evaluate the innovativeness of any solution. All these aspects should be taken into consideration. There might not be explicit answers (yes or no) to all questions, but it is reasonable to investigate them all. Discussion with other experts might also be useful.

POINT 1
SPATIAL
PLANNING

POINT 2
TECHNICAL
OPTIMI-
ZATION

POINT 3
DAY-TO-DAY
VALUES



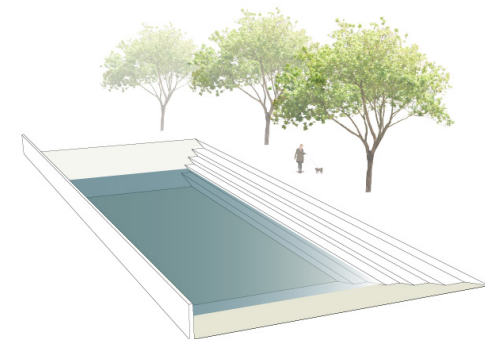
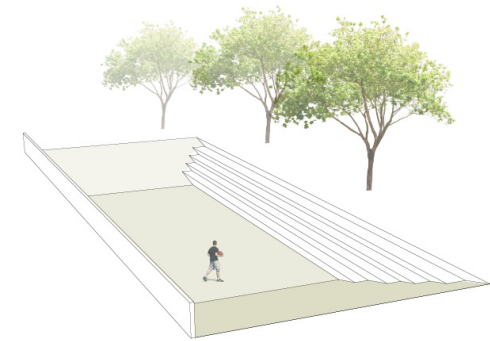
What is “multifunctional”?

By mimicking sites' natural hydrology, sustainable stormwater solutions can be part of the urban Green Infrastructure (GI) network that provides ecosystem services. Ecosystem services are services provided by nature, such as water regulation that benefits both the environment and humans. In addition to ecosystem services, sustainable stormwater structures can also provide other benefits. According to the EU Commission, one of the key attractions of GI is its multifunctionality, i.e. its ability to perform several functions and provide several benefits in the same spatial area. These functions can be environmental, such as conserving biodiversity or adapting to climate change; social, such as providing water drainage or green space; and economic, such as supplying jobs and raising property prices.

All these qualities can be attached to innovative and multifunctional sustainable stormwater solutions. Instead of being designed to perform only one function, such as mere drainage in conventional stormwater systems, multifunctionality refers to the ability of stormwater solutions to simultaneously produce multiple benefits in a broader environmental, social and economic context. Sustainable stormwater solutions can potentially improve the quality of life in

many ways, as well as fulfil the needs of a variety of stakeholder groups.

Good examples of this are the multifunctional detention pools in Gladsaxe, a city close to Copenhagen. The three main pools flood during heavy rainfalls but during drier periods with small amounts of rain, the pools act as a paddle tennis court, a skate park and recreational area.



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Appropriateness to the site

There are several different kinds of examples of sustainable stormwater management structures. The one that is chosen to be used should suit the site and reflect its qualities. Accordingly, the first task would be to analyse the site and examine what it is like:

- ☐ What is the main land use on the site?
- ☐ What kind of natural environments are on the site?
- ☐ What are the typical run-off factors of the site?
- ☐ What kind of stormwater management is needed in the area (quantitative /quali-tative)?
- ☐ How much space is available for stormwater management?
- ☐ How much stormwater forms on the site during a typical rainfall (1/ year, 1/ 2 years, 1/ 10 years)?

Appropriateness of the solution to the site is a summary of features analysed with the help of the whole checklist, but in the beginning, one question can be asked:

- ☐ Does the solution manage to tackle the exact stormwater-related challenges on the pilot site or is it merely a copy of a solution more appropriate to another place?

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Visual quality

Sustainable stormwater structures are often more than just technical structures. As they are connected to urban space, aesthetical quality should also be empha-sised. It may not be easy or even possible to find absolute indicators for the aes-thetical values of the solution, but the following viewpoints help to evaluate its aes-thetical features.

The solution itself

- ☐ Does the solution have design quality or is it merely a pure technical solution?
- ☐ Do the different parts of the solution match and form an entity?
- ☐ How would the solution or its materials age?
- ☐ How will the solution appear when there is more and larger vegetation?

Surroundings

- ☐ Does the solution take into consideration the surrounding environments and elements?
- ☐ Does the solution suit its surroundings, materials and urban functions?
- ☐ Does the solution and its surroundings have the same level of urbanity?
- ☐ Does the solution embrace the possible heritage value of the surroundings?
- ☐ Does the solution increase the aesthetical value of the area?

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Technical and economical feasibility

Innovations often require new techniques or a new type of distribution of responsibilities. Thus, if a solution is really innovative in nature, some extra trouble or costs are likely to occur during the commissioning phase. A cost-benefit analysis can be a good tool when evaluating the feasibility of the solutions. Moreover, a mere listing of the gained benefits can help to justify the use of the sustainable solution.

Technical quality of the solution:

- ☐ Does the solution manage the quality and/or the quantity of the storm water?
- ☐ Are the proposed techniques purposeful to tackle the stormwater related challenges on the site?
- ☐ What is the capacity of the solution? How much stormwater is it able to manage?
- ☐ What sort of pollution is the solution able to handle (solid contaminants, phosphorous or nitrogen load, heavy metals, hydrocarbons)?
- ☐ Are the proposed techniques available or can those be created?
- ☐ What kind of risks are included in the realisation of the solution?

Maintenance:

- ☐ How often would the solution require maintenance?
- ☐ Does the maintenance of the solution require special skills or gadgets?
- ☐ Does the maintenance of the solution require a new division of responsibilities between, for example, the park and drainage departments?

Economical aspects:

- ☐ What are the building expenses of the solution compared to the conventional stormwater management solutions?
- ☐ What are the maintenance expenses of the solution compared to the conventional stormwater management solutions?
- ☐ Does the maintenance create educational expenses for the organisation responsible?

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Suitability to users' needs

Users are a very important aspect of the solution. One essential part of the idea of sustainable urban drainage systems is to make the stormwater and urban hydrological cycle visible. One of the aims of the iWater project is to turn stormwater-related problems into resources for better living quality in urban areas. Successful solutions should respond to the needs of existing or potential users of the site. It is also important to create possibilities for users to participate in the design, building and maintenance processes, because this will increase local commitment.

- ☐ Is visible and recognisable stormwater management wanted on the site?
- ☐ Is it easy to recognise the connection between the solution and stormwater management?
- ☐ Can people, e.g. residents of the area, use the solution somehow (see, hear or touch the water, reuse the water, play with the water)? Would they do it and how?
- ☐ Does the solution create opportunities for recreation or inspiration?
- ☐ Does the solution create opportunities for education?
- ☐ Does the solution create opportunities for tourism?
- ☐ Does the solution provide raw materials or possibility for urban farming?

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Ecological features and ecosystem services

Ecosystem services are the benefits humankind receive from nature. A multifunctional stormwater solution can also deliver other benefits than just the management of the quality or quantity of stormwater. This happens through multiple functions.

Cultural and provisioning ecosystem services were covered in the previous category, but stormwater solutions provide potentially many regulating services. For example, trees and green space lower the temperature in cities. Air quality may be improved through filtration and/or absorption of particulates, NOx, and other air contaminants by vegetation and soils. Stormwater solutions may maintain a more favourable microclimate through direct shading and/or evapo-transpirative heat dissipation. Vegetation cover also provides vital regulating services by preventing soil erosion and removing atmospheric CO2, which is subsequently re-released through microbial respiration or stored through burial and sediment accretion.

- ☐ Does the solution maintain the ecological functions of the surroundings (such as hydrological cycle or ecological corridors)?
- ☐ Does the solution provide habitats for vegetation? What kind of vegetation? Is this type of vegetation wanted on the site?
- ☐ Does the solution provide habitats for animals? For what animals?
- ☐ Does the solution provide shading vegetation?
- ☐ Does the solution provide vegetation that attracts pollinators?
- ☐ Does the solution prevent local soil erosion and degradation?

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Climate change adaptation

Climate change will probably increase the amount and frequency of precipitation. The problems related to the conventional drainage systems are: limited capacity, poor water quality management, and inflexibility. The natural hydrology of the site is often changed. Multifunctional and innovative sustainable stormwater management has the potential to increase the resiliency of the site.

- ☐ What is the space requirement for the solution?
- ☐ Does the solution limit other urban functions?
- ☐ Does the solution allow natural hydrological fluctuation?
- ☐ Does the solution function in different circumstances (dry season, normal rain event, rainstorm)?
- ☐ Does the solution provide opportunities for flexibility and adaptation in different circumstances and possibly increasing precipitation?
- ☐ Is the solution potentially resilient? What kind of rainfall event can be handled by the solution and does a backup system need to be organized?