

Step 1
Geomorphology

- Type 1
- Type 2
- Type 3
- Type 4
- Type 5
- Type 6
- Type 7
- Type 8

Step 3
Placement

- Delta
- Middle
- Headwater

Step 4
Land use

- Agriculture
- Wetlands
- Forest
- Artificial

Step 5
Scale

- Small
- Medium
- Large

Step 2
Branch

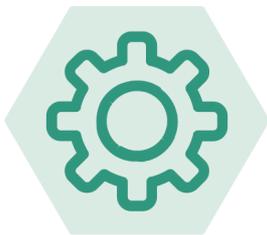
- Main branch
- Tributaries

F01 Forest riparian buffers



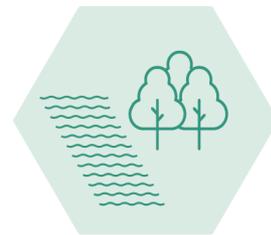
Forest riparian buffers increase the infiltration of water into groundwater and aquifers. When implemented along open water, they help slow down run-off, store water and decrease sediment inputs into the open water. The roots of the trees help with erosion control and increase infiltration rates.

F02 Maintenance of forest cover in headwater areas



Maintenance of forest cover in headwater areas is the management and conservation of forested lands in the upper regions of a river basin. By implementing forest in headwater areas, the soil has a better infiltration capacity and can help regulate water availability. Forest cover in headwater areas can also reduce the risk of floods and droughts downstream.

F03 Afforestation of reservoir catchments



The afforestation of reservoir catchments extends the lifespan of the reservoir and improves water quality. The roots control soil erosion and increase water infiltration rates into the soil. The forest in reservoir catchments should be managed as naturally as possible to prevent water quality from depleting.

F04

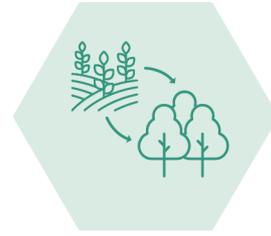
Targeted planting for catching precipitation



The afforestation of reservoir catchments extends the lifespan of the reservoir and improves water quality. The roots control soil erosion and increase water infiltration rates into the soil. The forest in reservoir catchments should be managed naturally to prevent water quality from depleting.

F05

Land-use conversion



Land use conversion as a water retention measure is the implementation of afforestation on a large scale. Afforestation can intensify the water cycle and have a positive effect downstream. But it can cause water shortages locally due to the tree's water needs and higher evaporation rates.

F06

Continuous cover forestry



Continuous cover forestry combines a range of forest management practices. The main principle is the protection of the soil and the creation of a continuous cover. This strategy includes a natural forest hydrological cycle with beneficial hydrological effects. Continuous cover forestry also reduces the impact of run-off.

F07

Water sensitive driving



'Water sensitive' driving is the avoidance of off-road driving and through wet areas. By implementing these driving styles, soil structures will not damage. The measure also avoids the creation of different flow paths that could disrupt water cycles. The benefits of water-sensitive driving are visible on a small scale but can be noticed on larger spatial scales.

F08

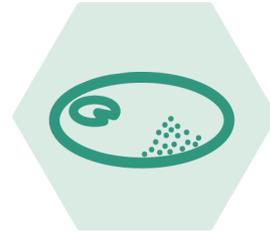
Appropriate design of roads and stream crossings



The design and materials used in the design of roads and stream crossings can strongly impact the erosion risk and water quality of rivers. Poorly designed stream crossings can cause sediment accumulation and change flow patterns.

F09

Sediment capture ponds



Sediment capture ponds are temporary engineered ponds that slow down run-off and capture the suspended materials of the run-off. They ensure that streamflow keeps water streams sediment free and improves the water quality. When properly maintained, sediment capture ponds can maintain their efficiency.

F10

Coarse woody debris



Coarse woody debris is the placement of artificial or naturally occurring woody debris into streamflows. Coarse woody debris in streams has ecological and hydrological benefits. It can slow water flow, reduce flood peaks, facilitate sediment accumulation and improve aquatic biodiversity by retaining food and providing additional habitat.

F11

Urban forest parks



Urban forest parks provide various ecosystem and hydrology-related benefits. They enhance air quality, biodiversity, and recreation and mitigate climate change while improving local microclimates. Forest soil has a higher infiltration capacity than other urban land covers, considerably impacting aquifer recharge.

F12

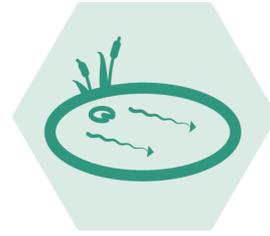
Trees in urban areas



Urban trees provide microclimate regulation and hydrological benefits. They enhance infiltration capacity and rainfall storage. They also serve as biodiversity refuges and intercept precipitation, reducing the amount of precipitation sewer, and water infrastructure have to process.

F13

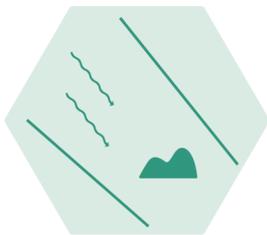
Peak flow control structures



Peak flow control structures are ponds designed to reduce water flow velocity in forest ditch networks, contributing to sediment control and reducing flood peaks. While they have a temporary function due to sediment accumulation, maintenance can be done by removing sediment to maintain efficiency.

F14

Overland flow areas



Overland flow areas are designed to minimise the impact on water quality by removing sediment from ditch maintenance, road building, or harvesting. They are created by building a semi-permeable dam and ditches to divert water. The water slows down, depositing sediment before reaching the receiving water body.

N01

Detention basins and ponds



Detention basins and ponds are designed to store surface run-off. When soil conditions are good, the water can infiltrate into the ground. During dry seasons detention basins are dry and store water during periods of precipitation. Ponds contain water during dry periods.

N02

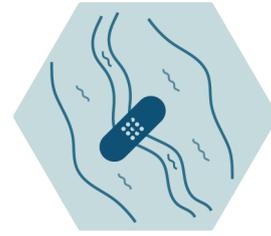
Wetland restoration and management



Wetlands can contribute to flooding prevention, water quality improvement, store water and enhance biodiversity. Wetlands provide water retention, enhance biodiversity and can improve water quality. Wetlands can be restored on a large scale or implemented as a small-scale measure.

N03

Floodplain restoration and management



Floodplains are designed to retain flood and rainwater. However, human activities like urbanisation and land drainage have separated floodplains from the river, losing their retention capacity and ecosystem functions. Restoring floodplains requires removing sediment, modifying channels, creating wetlands and lakes and afforestation.

N04

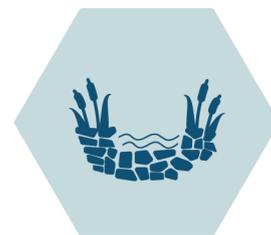
Re-meandering



A river meander is a U-form that slows water velocity. Many rivers in Europe have been straightened and channelised for various reasons. River re-meandering creates new flow structures, gives more space for water, and improves sedimentation and biodiversity. By creating new meandering courses, new habitats for various plant and animal species can be provided.

N05

Streambed re-naturalization



Streambeds have been artificially reconstructed with concrete or large stones, reducing fauna habitat and vegetation diversity. Re-naturalising streambeds involves removing and replacing concrete with vegetation structures to restore biodiversity and stabilise banks using plants. Re-naturalisation also improves the infiltration of water into the soil.

N06

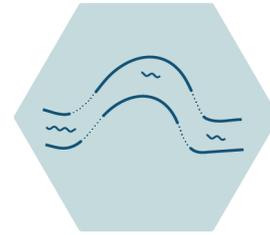
Restoration and reconnection of seasonal streams



Seasonal streams are rivers that dry up during dry periods in the year but are essential for supporting biodiversity. They provide ecosystem services such as flood control and irrigation. Restoring and reconnecting seasonal streams can improve the overall functioning of the river by altering flows, improving infiltration and improving water retention during floods.

N07

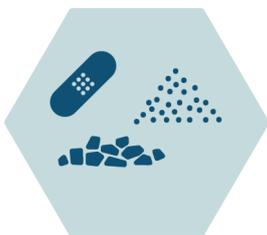
Reconnection of oxbow lakes and similar features



An oxbow lake is a river meander that has been cut off from the main river to straighten the river flow. Reconnecting it to the river involves removing land between the two water bodies, which improves the river's overall functioning by restoring river flow, more potential for infiltration and enhancing water retention during floods.

N08

Riverbed material restoration



Re-naturalising involves restoring the natural structure of the riverbed. Riverbed material is sediment eroded upstream that is deposited on the river floor. With coarse sediment, the riverbed can be levelled. The main objective of riverbed material restoration is erosion control.

N09

Removal of dams and other longitudinal barriers



Dams and other barriers disrupt sediment flow and disturb fauna in rivers. Removing dams and other barriers involves destroying obstacles and restoring the river profile. When this is implemented, ecological and sedimentary continuity needs to be considered.

N10

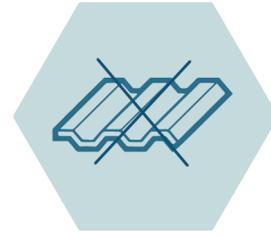
Natural bank stabilisation



Riverbanks can be natural or artificial. Artificial riverbanks often have adverse effects like erosion, increased water flow and decreased biodiversity. Renaturation of riverbanks involves restoring ecological aspects to stabilise banks and allow rivers to flow more freely. Renaturing can reverse damages done to the river structure.

N11

Elimination of riverbank protection



Removing riverbank protection enhances the connection of the river. When removed, it can diversify flows and habitats and lessen floods in mainstreams. The elimination of riverbank protection is a prerequisite for many other measures.

N12

Lake restoration



Lakes are water retention facilities with multiple uses, including flood control and water storage, to provide water for different functions. They also provide habitats for many species. Priority to agricultural services and lack of maintenance have led to siltation or drainage of lakes. Lake restoration aims to enhance old structures and functions where drainage once occurred.

N13

Restoration of natural infiltration to groundwater



Groundwater is a vital water resource for human activities, but landscape modifications have reduced the infiltration capacity of many European soils. Restoring the natural infiltration enhances the quality and availability of water, lowers run-off on land and improves groundwater aquifers.

N14

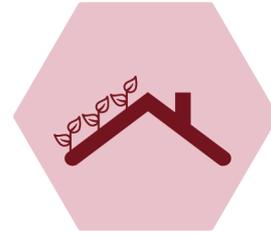
Re-naturalization of polder areas



A polder is a piece of land surrounded by dikes with its own hydrological system. The re-naturalisation of polder areas involves providing more water storage and increasing biodiversity.

U01

Green roofs



Green roofs cover a building's roof with vegetation and a drainage layer. There are two types: extensive, which covers the entire roof with low-maintenance vegetation, and intensive, which requires more maintenance and can include planters, trees, and water features. Green roofs intercept rainfall and reduce flow rates, providing a sustainable drainage system.

U02

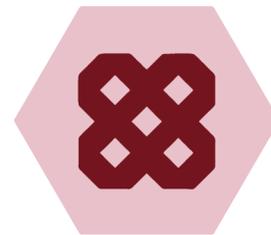
Rainwater harvesting



Rainwater harvesting is collecting and storing rainwater using water butts or larger tanks. Water butts are primarily for small-scale use in households, while tanks can manage stormwater volumes. However, rainwater harvesting is limited during wet periods and should be considered part of a sustainable water management system in combination with other measures.

U03

Permeable paving



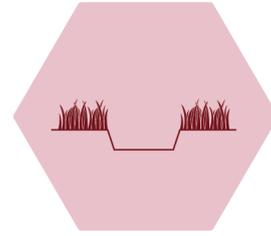
Permeable paving allows rainwater to infiltrate through the surface of paved areas. There are two types: porous pavements and permeable pavements. It can be used in most ground conditions and is commonly used on low-traffic roads and car parks. All kinds of permeable paving provide rainfall infiltration and potentially store run-off from surrounding areas.

U04 Swales



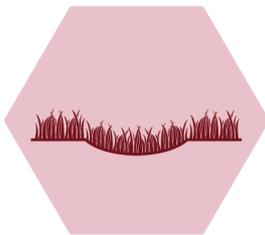
Swales are vegetated channels that store or transport surface water, reducing run-off rates. They can be used to promote infiltration. Swales can improve water quality, and can provide biodiversity. They can be used in a wide range of situations. There are three types: standard conveyance, enhanced dry, and wet swale.

U05 Channels and rills



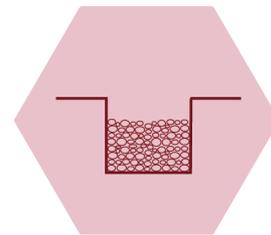
Channels and rills are shallow channels with open surface water that capture and slow run-off. They can collect and store debris, treat pollution, and guide water downstream. They can be designed in different varieties, and the planting can improve water quality.

U06 Filter strips



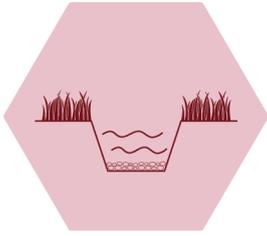
Filter strips are gently sloping strips that treat run-off through vegetative filtering. They intercept sedimentation and let water infiltrate. Filter strips can be used as a pre-treatment technique in small drainage areas. They can serve as buffers between conflicting land uses and help with groundwater recharge.

U07 Soakaways



Soakaways are underground storage that store and allow surface water to soak into the ground. They provide stormwater treatment, recharge groundwater, and have the potential to mitigate low river flows. Soakaways are easy to integrate into sites and do not take up land. They do not have any additional benefits for biodiversity.

U08 Infiltration trenches



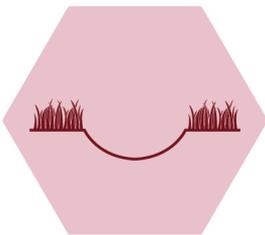
Infiltration trenches are shallow channels filled with rubble or stone. These trenches let water infiltrate into the soil. Infiltration trenches help reduce run-off, recharge groundwater and improve water quality.

U09 Rain gardens



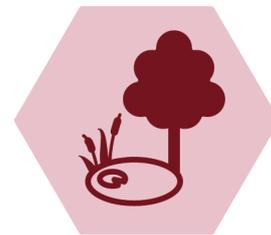
Rain gardens capture and infiltrate precipitation and stormwater run-off. They use different components in the design to increase infiltration and to store run-off. These types of gardens have a flexible layout and should enhance landscaping features.

U10 Detention basins



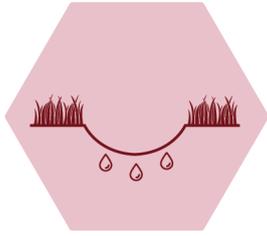
Detention basins are vegetated impressions in the landscape that holds run-off. They allow pollutants and sediments to settle. Detention basins do not allow infiltration, and water is drained into nearby water structures.

U11 Retention ponds



Retention ponds are designed to hold excess run-off and release this water slowly to prevent flooding. They can improve water quality and are shallow zones for ecology. Retention ponds have ecological benefits and can be incorporated into public open spaces.

U12 Infiltration basins



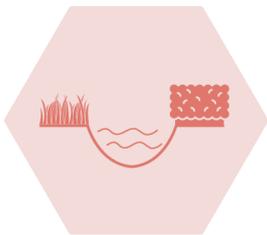
Infiltration basins keep run-off from settling on impermeable surfaces and allow water infiltration into soils and groundwater. They improve water quality and flow control. These basins are dry and only function as infiltration basins during large amounts of precipitation.

A01 Meadows and pastures



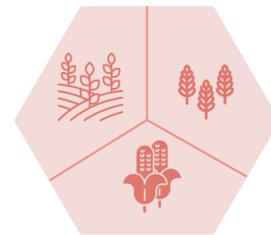
Meadows and pastures improve soils with their roots and make good conditions for the uptake and storage of water. They can function as temporary storage during a flood. They can add increased water retention and recharge groundwater.

A02 Buffer strips and hedges



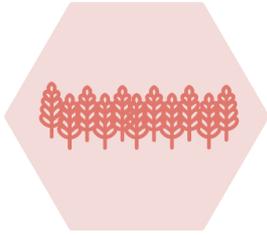
Buffer strips provide effective water infiltration, and they slow surface run-off. Permanent vegetation along buffer strips promotes the natural retention of water. By implementing hedges alongside buffer strips, soil erosion can be reduced and slow surface run-off, especially along sloped areas.

A03 Crop rotation



By practising crop rotation, different crops will be growing in different seasons. Other crops can improve soil structure. The rotation between different root structures can reduce erosion and increase infiltration capacity.

A04 Strip cropping along contours



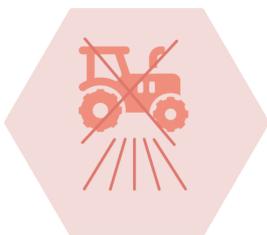
Strip cropping is the practice of using closely sown crops to create natural dams for water to improve soil strength and stop erosion. This practice is used on steep or long slopes.

A05 Intercropping



Intercropping is the practice of growing two or more crops next to each other. By intercropping, greater yield can be produced, and land can be more productively utilised. By using a combination of deep-rooted and shallow-rooted crops, infiltration rates of soil can be improved. By using intercropping, space can be created for other water retention measures.

A06 No till agriculture



Tillage, the mechanical modification of soil, can disturb soil structure and increase soil erosion problems. By altering soil structures, the retention capacity can be decreased. By implementing no till agriculture, water infiltration into the soil will increase and reduce soil erosion.

A07 Low till agriculture



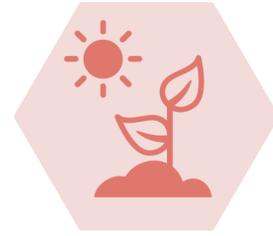
Tillage, the mechanical modification of soil, can disturb soil structure and increase soil erosion problems. By implementing low till agriculture, water movement slows and can lead to more significant infiltration. By altering soil structures, the retention capacity can be decreased.

A08 Green cover



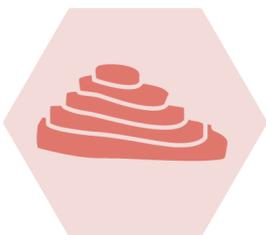
Green cover is the planting of crops in the late summer or autumn. Green cover protects the soil against erosion. Green cover can also improve soil structures and improve the infiltration of soil.

A09 Early sowing



By implementing early sowing, usually up to six weeks earlier than the typical sowing season, winter crops can root and create a more robust green cover for the winter. This green cover protects the soil against erosion. It can also improve soil structures and infiltration rates. Early sowing can also help with the impact of drought during summer, as plants are

A10 Traditional terracing



Traditional terracing is implemented along slopes. These platforms, created in sloped areas, can be sustained by stone walls and support farming. The structure of terracing can reduce soil erosion and slow down surface run-off. Because of the horizontal layout, infiltration is also improved.

A11 Controlled traffic farming



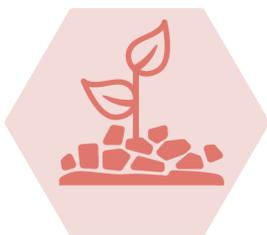
Controlled traffic farming is the principle of reducing the traffic on farmable land to a limited area to decrease heavy traffic's impact on the soil structure. By not going over arable land with heavy traffic, soil infiltration rates stay optimal.

A12 Reduced stocking density



Livestock can have a severely destructive impact on the soil structure. By reducing the density of livestock, the negative effects on the soil are reduced. Water infiltration into the soil gets less impacted, leading to better groundwater recharge and less flood risk.

A13 Mulching



Mulching is the application of adding material to the surface of the existing soil. Preferably the mulch is an organic material. Mulching can improve the capacity of the soil to store water.