# Toolkit

## VOL 1. ŁÓDŹ MEANDERS

ŁDF ŁÓDŹ DESIGN FESTIVAL

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ŁDF ŁÓDŹ DESIGN FESTIVAL

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# Vol. 1 | Łódź Meanders

**Łódź Meanders** were developed in response to challenges in the city's local water cycle, especially in places where heavy rainfall leads to surface pooling, while during dry periods plants quickly lose access to moisture. Within the PALIMPSEST project, our aim was to create solutions that can be implemented on a small scale, without heavy machinery or major reconstruction of the site: solutions that can be co-created with residents, developed step by step, and adapted to real local conditions. It is also worth emphasising that the very idea of the meanders emerged at the intersection of ecology and design, beyond supporting rainwater retention and managing runoff, they also make room for creative practices rooted in gardening and landscape-based art, in the spirit of land art.

In collaboration with Deer Garden. naturally, we developed a set of mobile nature-based solutions. Their core function is to slow down water flow, redirect it to selected areas, and allow it to infiltrate where the soil needs it most. Depending on the site, they can act as buffers against surface runoff, small retention features, or soft filtering structures.

The meander form-modelled on a natural river bend-is intentional. It helps organise water movement in ways that echo natural processes, while remaining easy to install on sites with slight, local slopes. Through participatory workshops, we refined several variants: redirection meanders, retention meanders, and protective meanders, which may help reduce the impact of post-winter salinity on urban greenery.

The prototypes were tested in cooperation with the University of Łódź and the European Regional Centre for Ecohydrology of the Polish Academy of Sciences. The results showed that the selected materials retain water effectively, can influence water quality, and improve soil moisture both within the structure and immediately downstream. This makes the meanders a practical tool for supporting local water retention and biodiversity in small urban areas.

Łódź Meanders can be installed in courtyards, community gardens, on slopes, and across green spaces. They are affordable, multifunctional, and easy to replicate, enabling residents to shape their surroundings together and build an urban landscape that is more resilient to climate change.

# What are Meanders?

**Łódzkie Meanders** are a set of simple, modular forms that can be built and used by individuals, with a neighbourhood group, or as part of school activities. They were designed for places where excess water is most noticeable: where puddles linger long after rainfall, or where urban greenery dries out faster than it should. Meanders are made from natural materials: sawdust, wood chips, coconut coir matte or wool, and soil so they are lightweight, easy to shape, and can be moved if needed.

Because they are easy to make, meanders naturally encourage collaboration. A small group of people, basic tools, and a limited amount of material are enough to create an installation ready for testing in a short time. They also help residents observe water in action: how flow patterns change, how vegetation responds to increased moisture, and how the microclimate of the immediate surroundings shifts. Meanders serve different purposes, but they share one core idea: local retention and improved quality of life in urban conditions. They can protect lawns from erosion, intercept the first wave of runoff from pavements, distribute downspout water across green areas, or store water in their filling material and release it gradually.

Three variants of Łódzkie Meanders were developed: the redirection meander, the retention meander/downspout river, and the protective meander/salt stop. Each has a slightly different role in water management, but most are also intended to support urban greenery—helping it grow more robustly and remain attractive for longer. Planting meanders with species that tolerate variable moisture and sunlight supports biodiversity, improves soil conditions, and visually structures the space.

**Łódź Meanders** are conceived as solutions that can be developed and adapted over time. The prototypes showed that their performance depends on the terrain, the type of filling used, and the choice of vegetation. This Toolkit not only presents ready-made forms, but also suggests how to create your own variants, tailored to local needs and site conditions. Meanders can evolve together with the place where they are installed, and each season can bring new observations and improvements.

# How to Build Meanders

## 1. Redirection Meander

A redirection meander is used to guide water away from places where it accumulates after heavy downpours and towards absorbent ground, such as a lawn or a planting bed. It works well where water runs off a pavement, driveway, or other hardened surface and has little chance to soak into the soil. This type of meander helps organise local runoff, reduce puddling, and direct water to where it can support vegetation. It can also function as a stand-alone planting strip: protecting valuable plants, or separating intensively mown areas from more extensive, low-maintenance greenery.

**Step 1: Location**

Start by observing the site. Notice where water flows after rainfall and decide where you want it to go. Based on this, mark out the line that will become the flow path. If the meander is also meant to retain some water, shape it as a gentle arc, which helps slow the flow and hold water back before it continues further.

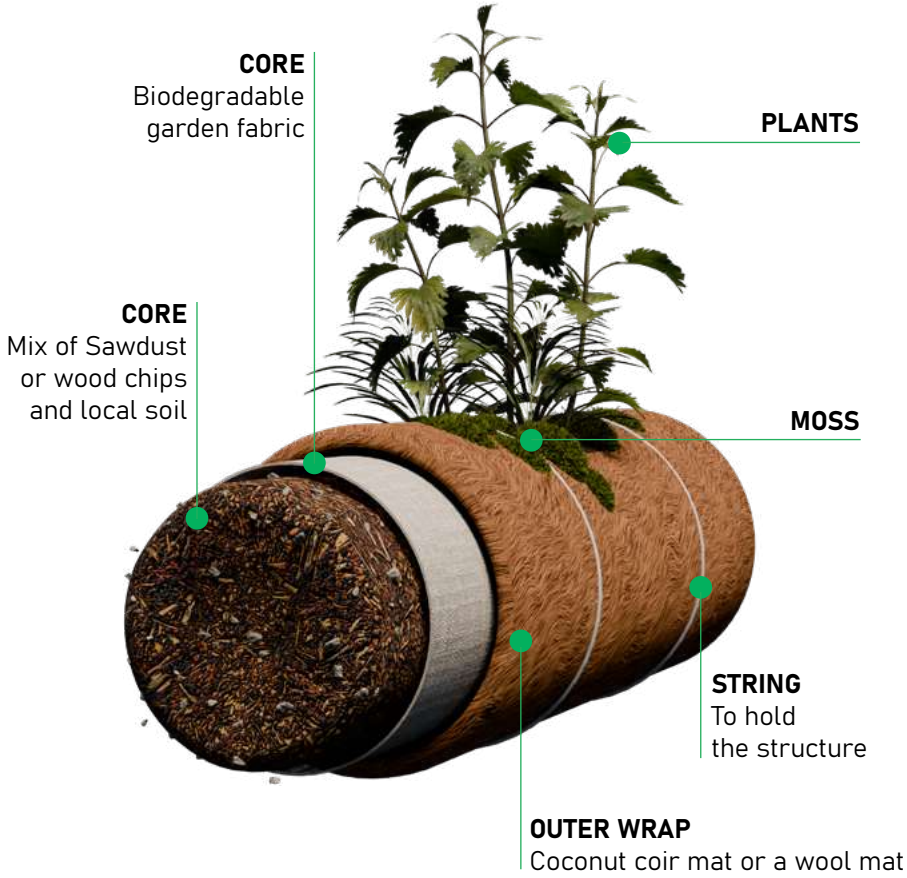
**Step 2:** **Materials**

To make a meander you need natural materials for the outer wrap and for the filling. Most often, a thick coconut coir mat is used; wool mats can be used as a more local, biodegradable alternative. The filling is a mix of local soil, which can be enriched with sawdust, well-aged wood chips, or a small amount of compost (up to 5%). Porous materials that support water retention can also be useful, but soil should make up at least 70% of the mix.

As decorative elements you can add wool fibres, twigs, mosses, or low-demand plants, ideally ground-cover species. Remember: mosses should not be collected from natural habitats. Choose them carefully by comparing site conditions (sun exposure, soil moisture) with the conditions they require. If you decide to take moss from a small patch of pavement, do it only in small, selective spots so the remaining areas can continue to green over time.

**Step 3:** **Building**

Form the outer wrap from a coconut coir mat or a wool mat, arranging it so it securely holds the inner shape. Create the core using a sleeve made from biodegradable garden fabric, then fill it with local soil or wood chips.
The garden fabric allows water to pass through while helping the meander keep its form. Press the structure gently so it settles, but remains permeable. After the first rainfall, check how the meander performs and make small adjustments to its line until the flow becomes stable. line until the flow becomes stable.



## Plants

In our tests, plants that tolerate urban conditions performed well, especially in fully or partly sunny locations and on dry soils. You can plant the meander in two ways. The first is sowing seeds: a useful method is to make a slurry of clay and seeds, spread it over the meander surface, and only then cover the structure with coconut coir or wool. The most commonly used and fastest method, however, is planting established seedlings.

Before choosing plants, check the site conditions carefully—especially sun exposure—and select species accordingly. The following list of native plants can serve as inspiration and a starting point:

- **Helianthemum nummularium** (common rock-rose)
- **Linaria vulgaris** (common toadflax)
- **Thymus serpyllum** (wild thyme)
- **Pilosella officinarum** (mouse-ear hawkweed)
- **Dianthus carthusianorum** (carthusian pink)
- **Humulus lupulus** (common hop)
- **Gypsophila paniculata** (baby's breath)
- **Helichrysum arenarium** (sandy everlasting)
- **Sedum acre and Sedum sexangulare** (stonecrops)
- **Potentilla erecta** (tormentil)
- **Potentilla anserina** (silverweed),
- **Alyssum montanum** (mountain alyssum)
- **Koeleria glauca** (blue hair-grass)
- **Veronica spicata** (spiked speedwell)
- **Potentilla verna** (spring cinquefoil)
- **Dianthus arenarius** (sand pink)

For shaded places:

- **Asplenium trichomanes** (maidenhair spleenwort)

Once the meander is placed in its final location, it should be planted. Make small cuts in the wrap where needed, pull back a little soil to fit the seedling root ball, and plant it. When planting, loosen or spread the roots so they can grow freely inside the meander.

## 2. Retention/Downspout River Meander

A retention meander receives a large volume of water at once, typically rainfall coming from a downspout. Its purpose is to hold part of the runoff and slow the rest. In the downspout version, it functions like a “micro-river”, distributing water along a green strip. This type works best near houses, courtyards, garages, and wherever roof water is discharged in one spot.

**Step 1: Location**

Start by observing the site. Notice where water flows after rainfall and decide where you want it to go. Based on this, mark out the line that will become the flow path. If the meander is also meant to retain some water, shape it as a gentle arc, which helps slow the flow and hold water back before it continues further.

**Step 2:** **Materials and building**

To form the edges, use a coconut coir mat or a wool mat, shaping it like a flowing stream. The core is an elastic hose in which small cuts like perforations are made in both the lower and upper parts. These openings allow water to be retained and released into the outer body of the meander.
Place the hose inside a long sleeve made from elastic material such as old tights or other semi-permeable fabrics that help shape a long form. Between the hose and the thights/sleeve, push in a soil mix similar to the one described earlier (soil with possible additions such as sawdust, aged chips, and up to 5% compost). To make the meander a visually attractive element of the site, plant it using species from the set proposed for the redirection meander.

## 2. Protective Meander (protective meander/salt stop)

A protective meander acts as a soft boundary between a pavement or roadway and adjacent greenery. It intercepts water running off hardened surfaces, protects soil from erosion, and reduces the impact of salting on plants along traffic routes. It is ideal where lawns are flooded after rain or snowmelt, where narrow muddy strips form, or where road salt is used in winter. These are often places with little vegetation and a compacted, bare soil surface.

### Step 1: **Location**

Choose spots where runoff from pavements, roads, parking edges or footpaths regularly spills onto greenery and creates muddy strips or erodes the soil. This meander works best as a soft border placed parallel to the hardened surface, exactly where water enters the green strip.

It is especially useful along routes treated with de-icing salt in winter, where lawns weaken and bare patches appear. On slopes or where water cuts small channels, place it across the flow path and stabilise it by partially burying it and, if needed, anchoring it with stakes.

**Step 2:** **Materials**

A protective meander can be shaped from a coconut coir mat, a wool mat, or sacks filled with natural materials. The core is ideally filled with sawdust from untreated wood or with wood chips, which can retain part of the pollutants carried by runoff. Because the meander is relatively light, it is best to bury it to a depth equal to its height. In this way it forms a soft, fibrous strip along hardened surfaces. On slopes exposed to erosion, it can be used to slow gully erosion; in that case it helps to drive stakes into the ground to prevent the “fur strip” from shifting.


**Step 3:** **Building**

Shape the edge from coconut coir or wool, pressing it lightly into the ground so water does not run underneath. Fill the inside with a permeable mix of sawdust and wood chips that acts as a filter. The meander can be built as one long section or as several shorter segments, depending on the site. After the first rainfall, check whether the material retains water evenly and whether the structure remains stable.

# First implementations

The first experimental meanders were built at Łódź Art Center, in the Księży Młyn area. The installations are tested under real conditions: during rainfall, in dry periods, and in contact with water flowing from downspouts and hardened surfaces. These initial prototypes made it possible to observe how meanders redirect water, how they hold short-term excess, and how they introduce a soft green line into the space helping organise local flow patterns.

Floating Meander in Warsaw

Faculty of Biology and Environmental Protection UL

Floating plant wreaths for water purification in southern Poland

A hillside in a private urban garden