

FINAL REPORT

City of Mechelen



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CONTENTS

List of acronyms	5
REPORT	7
1. Mechelen as a partner in Water4All	7
2. Contribution to Pillar D: WP4 coordination and deliverables (D2.3, D2.5)	7
3. Public space transformation: Onze-Lieve-Vrouwestraat (second half)	8
3.1 What changed on the ground	9
3.2 Citizen and shop-owner engagement	10
4. Reopening a historic waterway: the Sint-Katelijnestraat vliet	13
4.1 Citizen engagement: guided walks rather than street disruption	14
4.2 Heat-stress monitoring: before/after analysis	15
Measurement approach	15
Results	15
Heat-stress conditions	16
Interpretation and limitations	16
4.3 Biodiversity impact mapping	16
5. Communication and citizen engagement	18
6. Recognitions	20
7. Dissemination: presentations and events	20

List of acronyms

ACRONYM	FULL TITLE
ADB	African Development Bank
AFD	French Development Agency (Agence française de développement)
CDP	Carbon Disclosure Project
CIS	Common Implementation Strategy
EC	European Commission
EIB	European Investment Bank
GWP	Global Water Partnership
NIB	Nordic Investment Bank
OCDE	Organisation for Economic Co-operation and Development
SDC	Swiss Agency for Development and Cooperation
SEB	Skandinaviska Enskilda Banken
SRIA	Strategic Research and Innovation Agenda (SRIA)
UN Water	United Nations Water
WB	World Bank
WFD	Water Framework Directive
WOLLs	Water-Oriented Living Labs
KMI	Royal Meteorological Institute of Belgium (Koninklijk Meteorologisch Instituut)
NbS	Nature-based Solution(s)
WBGT	Wet Bulb Globe Temperature (heat-stress index)

ABSTRACT / SUMMARY

This report gives an overview of the activities carried out by the City of Mechelen as a demonstration partner within the Water4All partnership, covering the period June 2022 - May 2026. It brings together two nature-based infrastructure projects delivered under the umbrella of Mechelen's Water-Oriented Living Lab (WOLL) - the redesign of the Onze-Lieve-Vrouwestraat and the re-opening of a historic waterway ('vliet') in the Sint-Katelijnestraat - together with the citizen engagement, monitoring and dissemination activities that accompanied them.

REPORT

1. MECHELEN AS A PARTNER IN WATER4ALL

Mechelen joined the Water4All partnership as a demonstration city with a clear ambition: not only to design climate-adaptive measures on paper, but to actually build, test and adjust them in real streets, with real residents. As a mid-sized, densely built historic city with the typical paved public space and a strong tradition of citizen participation, Mechelen has the scale and the experience to try things out - and to learn quickly when something needs adjusting along the way.

Over the reporting period, this 'doing' approach has been formalised under Mechelen's recognition as a Water-Oriented Living Lab (WOLL). The WOLL label is not a single project: it is the common umbrella under which the city's separate nature-based solutions (NbS), climate-adaptation measures together with citizen-engagement actions are now understood to belong together. Being part of the Water4All network has reinforced this: it has provided a platform to share results (see section 5, Dissemination), and, importantly, the confidence to frame small, local interventions - a reopened waterway here, a redesigned shopping street there - as part of one coherent climate-adaptation story rather than a list of unrelated public-works projects.

Citizen engagement runs through everything described in this report: residents and shop-owners were consulted before, during and after construction; new residents are welcomed with an invitation to discover the city's water and green infrastructure on foot; and the city's own sensor and survey data are used - imperfect but pragmatic - to check whether the measures are actually doing what they were designed to do.

2. CONTRIBUTION TO PILLAR D: WP4 COORDINATION AND DELIVERABLES (D2.3, D2.5)

Alongside running its own demonstration activities, Mechelen also acted as an active partner within Pillar D itself, rather than purely as a demonstrator city. In that capacity, Mechelen was responsible for two specific deliverables, D2.3 and D2.5, and contributed three supporting documents under that framework:

- A pragmatic literature study on citizen engagement in the context of climate adaptation and Water-Oriented Living Labs.
- A toolbox of citizen engagement techniques, intended to be reusable by other partners and future WOLLs.
- A start-up guide for setting up a Water-Oriented Living Lab, ranging from the primary information about what WOLLs are to the first steps they need to take to start the journey of becoming one.

Beyond producing these documents, Mechelen took an active part in the wider coordination of Pillar D: joining discussions and meetings with the other subtask leaders and the pillar lead on how to move the pillar's activities forward and what a workable common approach across partners should look like. This coordination role sits alongside, and feeds into, the demonstration work described in the following sections - the literature study, toolbox and start-up guide were informed directly by the experience from Mechelen and also the findings and expertise of the other subtask leaders and active pillar D partners.

3. PUBLIC SPACE TRANSFORMATION: ONZE-LIEVE-VROUWESTRAAT (SECOND HALF)

The second half of the redesign of the Onze-Lieve-Vrouwestraat - one of the connecting streets in Mechelen's shopping triangle, between the Vijfhoek and the Korenmarkt - was carried out within the framework of Water4All. Works ran from March to October 2023 (utility relocation started 9 January 2023), delivered by contractor Houwelyckx Wegenbouw, with Pidpa responsible for the separated sewer system and Atelier Ruimtelijk Advies (ARA) and OKRA as design team.



Design impression of the redesigned street, with the bee- and butterfly-friendly herb and perennial planting selected for the project.

3.1 What changed on the ground

- Full separation of the sewage system: rainwater and wastewater now run in separate pipes, reducing pressure on the combined sewage network and improving water quality in the Dijle.
- 20 new trees, plus perennials, herbs and ornamental grasses selected to be bee- and butterfly-friendly, with staggered flowering times so the street has colour for most of the year.
- 12 wide benches and 9 benches with back- and armrests, and 48 bicycle racks providing parking for 96 bicycles, spread along the street.
- A road surface matched to the neighbouring Bruul street, to visually connect the redesigned street to the rest of the shopping area, and additional attention to rainwater infiltration in the new design.
- Total investment by the City of Mechelen and Pidpa (water and sewage utility) together: close to €3.8 million, a large part of which went into the new separated sewage system.



HERAANLEG ONZE-LIEVE-VROUWESTRAAT – FASE 2



Construction progress (top) and the almost finished street (bottom).



The finished Onze-Lieve-Vrouwestraat

3.2 Citizen and shop-owner engagement

Engagement started well before construction: an information session for shop-owners was held in November 2019 during the design stage, followed by a resident information meeting in December 2022 shortly before works began, and further shop-owner briefings (e.g. November 2022) as the works schedule firmed up. Residents and shop-owners received regular letters at key milestones (start of works, utility connections, phase transitions), a dedicated newsletter, and a hindrance coordinator was appointed as a direct point of contact throughout the works. A weekly site meeting was open to a resident/shop-owner representative every Wednesday morning. Shop-owners affected by the works could also apply for the Flemish hindrance fee and closure fee, and the city ran two dedicated workshops for local shop-owners on maintaining footfall and on logistics support (a CityDepot-style delivery scheme, as used successfully in the first half).

Alongside this, a citizen-science component was rolled out throughout the whole city in the framework of the Life project Wetlands4cities. 300 residents could subscribe to receive a garden sensor measuring soil and air temperature, including soil moisture levels.

HERAANLEG ONZE-LIEVE-VROUWESTRAAT – FASE 2



Pidpa: from a combined sewer system (left) to a separated system for rainwater and wastewater (right).

HERAANLEG ONZE-LIEVE-VROUWESTRAAT – FASE 2

(XS)



Hoeveelheid planten:

VASTE PLANTEN
WINTERGRAS
BIETGRAS
KLIPLANT

KEUZE UIT 4 PLANTEN (HANGT AF VAN DE STANDPLAATS)

ZON / HALFSCHADUW

HALFSCHADUW / SCHADUW



KLIPLANT
Clematis montana 'Wool'
Baanwijdte
Baanwijdte: 5m
Baanwijdte: 5m
Standplaats: halfschaduw,
schaduw, zon
Inclusief klimopstap



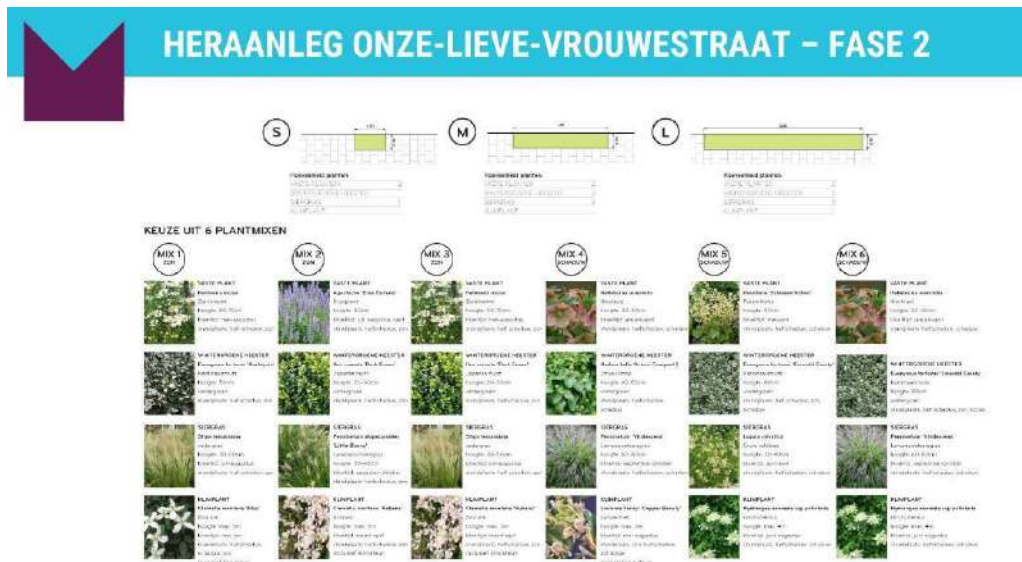
KLIPLANT
Clematis montana 'R'
Baanwijdte
Baanwijdte: 5m
Baanwijdte: 5m
Standplaats: halfschaduw,
schaduw, zon
Inclusief klimopstap



KLIPLANT
Lonicera Henryi 'Copper Beauty'
Baanwijdte
Baanwijdte: 5m
Baanwijdte: 5m
Standplaats: zon, halfschaduw,
schaduw
Inclusief klimopstap



KLIPLANT
Hydrangea anomala ssp. paniculata
Baanwijdte
Baanwijdte: 4m
Baanwijdte: 4m
Standplaats: halfschaduw, schaduw



Pollinator-friendly planting palette offered to residents for the accompanying tile gardens in front of their houses ('tegeltuintjes') scheme along the street.

4. REOPENING A HISTORIC WATERWAY: THE SINT-KATELIJNESTRAAT VLIET

Mechelen's 'vlieten' are the small historic waterways that, since before the 14th century, drained excess water from the marshy city towards the Dijle and doubled as an early sewage system. Most were culverted or paved over from the 19th century onwards as the city grew. Since 2006, the city has been progressively reopening them as part of its climate-adaptation strategy. The stretch reopened in the Sint-Katelijnestraat, between house numbers 18-20, is an offshoot of the Nieuwe Melaan and is the eighth vliet the city has brought back to the surface, thanks to Water4all.

Works started on 8 January 2025 but were paused after the contractor (Houwelyckx) uncovered an 18th-century stone footbridge (the Hoornbrug) during excavation. The design was revised so that the historic bridge remains visible to the public, alongside the reopened water and a helophyte filter (a reed-bed style filter that uses marsh plants to purify the water). Works resumed on 10 June 2025 and were completed on 26 September 2025.



Resident information flyer announcing the works and the accompanying guided walks (Dienst Klimaat, City of Mechelen).



The reopened 'Vliet', awaiting the installation of water plants.



The reopened 'Vliet' with waterplants just installed.

4.1 Citizen engagement: guided walks rather than street disruption

Unlike the Onze-Lieve-Vrouwestraat, this intervention does not materially change the street scene or daily life for residents - the visible footprint is small. Precisely because of that, the emphasis in communication was on explaining why the city is doing this at all, rather than on managing construction hindrance or

involving citizens in the design of the Vliet. Local residents were invited, by letter, to a series of free guided city walks on water and nature in Mechelen ('Water in de straten' and 'Water en natuur in Mechelen'), that ran on several Saturdays in February and March.

4.2 Heat-stress monitoring: before/after analysis

To assess whether reopening the Vliet has affected the local microclimate, the City of Mechelen conducted heat-stress measurements before and after the intervention. Measurements were taken on 19 September 2024, before the Vliet was reopened, and on 15 September 2026, after completion of the works.

The measurements provide an initial indication of how local temperature conditions may have changed following the intervention. As the analysis is based on a limited number of measurement campaigns, the results should be interpreted as indicative rather than as proof of a causal effect.

Measurement approach

A Kestrel weather meter was used to measure conditions at approximately 1.1 m above ground at fixed locations in full sun and shade. The measurements included:

- air temperature;
- globe temperature;
- Wet Bulb Globe Temperature (WBGT);
- heat index;
- relative humidity and other meteorological parameters.

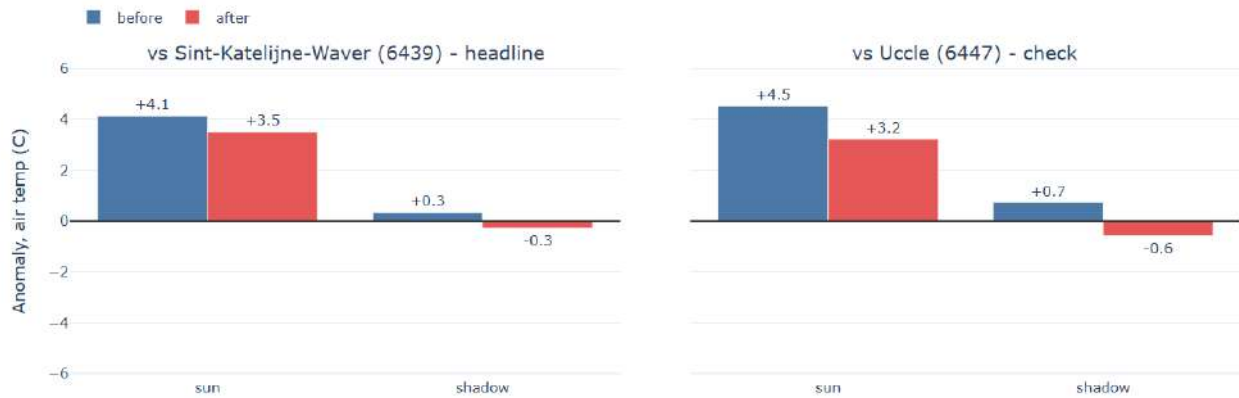
Each measurement session lasted approximately 15 minutes. The street-level measurements were compared with simultaneous data from two KMI reference stations: Sint-Katelijne-Waver and Uccle. Because weather conditions naturally vary between measurement days, the analysis focuses on the difference between the street measurement and the regional KMI reference, rather than comparing absolute temperatures directly.

Results

The September-to-September comparison shows a consistent relative decrease in street temperature after the Vliet was reopened. Using Sint-Katelijne-Waver as the reference station, the street temperature was approximately 0.62°C lower relative to the regional reference in September 2026 than in September 2024. This difference was observed both in full sun and in shade.

Using Uccle as the reference produces a larger relative difference of approximately 1.31°C, again for both sun and shade measurements.

Reference station	Full sun	Shade
Sint-Katelijne-Waver	-0.62°C	-0.62°C
Uccle	-1.31°C	-1.31°C



Left: street temperature in shade and sun, before and after the works, compared to the nearest official weather station in Sint-Katelijne-Waver. Right: street temperature in shade and sun, before and after the works, compared to the official weather station at the weather institute KMI in Uccle.

The result can therefore be summarised as an indicative relative cooling of approximately 0.6-1.3°C compared with the regional reference conditions.

Heat-stress conditions

The measurements also show the difference between sun-exposed and shaded conditions within the street itself. In September 2026, air temperature was approximately 29.1°C in full sun and 25.3°C in shade, while WBGT was approximately 27.6°C in sun and 21.5°C in shade.

Globe temperature showed an even stronger contrast, reaching approximately 40°C in full sun, compared with 25.6°C in shade. This illustrates the importance of shading and radiation exposure for local heat stress, alongside air temperature itself. These indicators are useful for describing the thermal conditions experienced at street level, but differences in WBGT or globe temperature between the two campaigns should not be interpreted independently as an intervention effect.

Interpretation and limitations

The September-to-September comparison provides a promising first indication of a local microclimate change following the reopening of the Vliet. The relative temperature difference is particularly relevant because it accounts for the broader weather conditions recorded at the KMI reference stations.

However, the evidence remains limited. The analysis is based on one pre-intervention and one post-intervention campaign, without statistical testing. Other local factors, including vegetation, wind, radiation and surrounding surfaces, may also influence the measurements. In addition, Kestrel measurements at street level are not directly equivalent to measurements from a standard meteorological station.

The results should therefore be understood as an indicative signal rather than proof that the reopened Vliet caused the observed cooling.

4.3 Biodiversity impact mapping

To get an initial read on how the reopened waterway affects local biodiversity, a short incidental species survey was carried out at the same location as the heat-stress measurements, before and after the works: a 30-minute observation on 19 September 2024, prior to construction, and a matching 30-minute observation on 15 September 2026, after completion. Both surveys were carried out under comparable sunny and warm conditions which, unlike the heat-stress comparison, also has the benefit of nearly matching calendar dates

(19 September vs. 15 September), removing most of the seasonal confound that affected the temperature readings.

	Date	Conditions	Species recorded
Before	19/09/2024	Sunny, warm	Liancalus virens (a long-legged fly); Pieris rapae (small white butterfly)
After	15/09/2026	Sunny, warm	Sympetrum sp. (darter dragonfly, 3 individuals); Cicadella viridis (green leafhopper)

Read individually, these are common, unremarkable species; none is rare or a formal indicator species in Flanders. But read as a pair, the shift in what turned up is a reasonable early signal that the reopened water and its helophyte (reed and marsh-plant) filter are already having an effect on the immediate surroundings:

Liancalus virens, the species recorded before the works, is itself water-associated, but tied specifically to wet vertical surfaces and seepages (walls, fountains, waterfalls) rather than to open water or marsh vegetation. Pieris rapae is a habitat generalist found almost anywhere with a suitable host plant, and carries no water-habitat signal at all.

Sympetrum dragonflies breed in still or slow-moving water; adults are frequently seen away from the water itself, but their presence still points to a nearby breeding habitat. Cicadella viridis is a stronger and more specific signal: it is closely tied to damp grassland, marshes and reedy or rushy vegetation, feeding on plants such as Juncus and Carex, precisely the kind of vegetation a helophyte filter is designed to establish.

In other words, the "after" survey turned up a small pair of species that both point toward marsh/open-water habitat, where the "before" survey turned up a generalist and a species tied to a different kind of wet microhabitat (seeping walls) rather than the marsh vegetation now present. That is consistent with the reopened vliet doing what it was designed to do, and can be read as a promising first signal for biodiversity gain.



Left: cicadella viridis – Right: helofyte filter in the 'Vliet'.

5. COMMUNICATION AND CITIZEN ENGAGEMENT

Green Pearls video: a short showcase film highlighting a range of large and small nature-based solutions across Mechelen, used to give residents and visitors a single, accessible overview of what the city is doing on climate adaptation, together with their residents:

<https://www.youtube.com/watch?v=OnQ6KFN0X9o>.



Video of Green pearls in Mechelen, realised for and by citizens.

Seed bombs for new residents: everyone moving to Mechelen receives a small seed-bomb gift together with an invitation to the free guided walk on water and nature in Mechelen - a light-touch way of introducing new Mechelaars to the city's climate-adaptation efforts from day one.



Seed bomb "Here you go, a flower bouquet"

Buurtboost campaign: building on the city's existing collective-renovation scheme (which targets two neighbourhoods at a time to support and encourage home renovation), Buurtboost adds a 'green boost':

participants can combine the collective renovation offer with discounted plants and trees, rain barrels and other small-scale NbS measures for their own homes.



Buurtboost poster campaign: Not only the birds enjoy nature // Cooler streets, warmer neighbours // You don't need a forest for a "wow" feeling

6. RECOGNITIONS

- 2024 - Mechelen recognised as a Water-Oriented Living Lab (WOLL).
- 2025 - Mechelen became the first Ramsar Wetland City in the Benelux (awarded 2 February 2025, World Wetlands Day), recognising the city's work on wetland restoration and protection together with Natuurpunt and the Flemish Environment Agency (VMM).
- 2025 - Mechelen won the Public Green Award for one of their climate adaptive streets.
- 2026 - Mechelen received the Flemish bee-friendly city label.

7. DISSEMINATION: PRESENTATIONS AND EVENTS

Over the reporting period, Mechelen presented its Water4All demonstration work - and its wider experience as a WOLL - at the following events, conferences and expert sessions:

Date	Event / presentation
25/04/2023	Enabel International Water Climate Conference - Urban Resilience
05/10/2023	Green Leaf Tallinn
26/04/2024	Climate Congress Mechelen
15/05/2024	Bilateral visit from Horst-aan-de-Maas
22/05/2024	EU Mission Adaptation delegation visit to Mechelen
06/06/2024	BWaterSmart conference
26/08/2024	SIWI World Water Week
23/01/2025	AquaFlanders visit to Mechelen
03/06/2025	EUI WATSUPS expert session
06/06/2025	Esopro master programme, guest speaker
11/09/2025	WOLL network presentation
30/09/2025	British Water
09/10/2025	Nature4Business event
18/11/2025	WOLL network event, Banyuls-sur-Mer
26/03/2026	Pidpa - Blauwgroene koppelkansen
09/04/2026	Green Deal Climate-robust Environment launch, sponge label
29/05/2026	Water Europe expert group on Nature-based Solutions

Presentation slides and other guiding materials for each of the events above are available on request from the City of Mechelen (contact details in the output summary on the cover page).



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