

Water Recycling Toolbox Utilisation of stormwater with the aid of “multi-dams” Västervik Municipality



Introduction to the pilot measure **Utilisation of stormwater with the aid of “multi-dams”** Västervik Municipality

15 March 2023





VÄSTERVIKS
KOMMUN

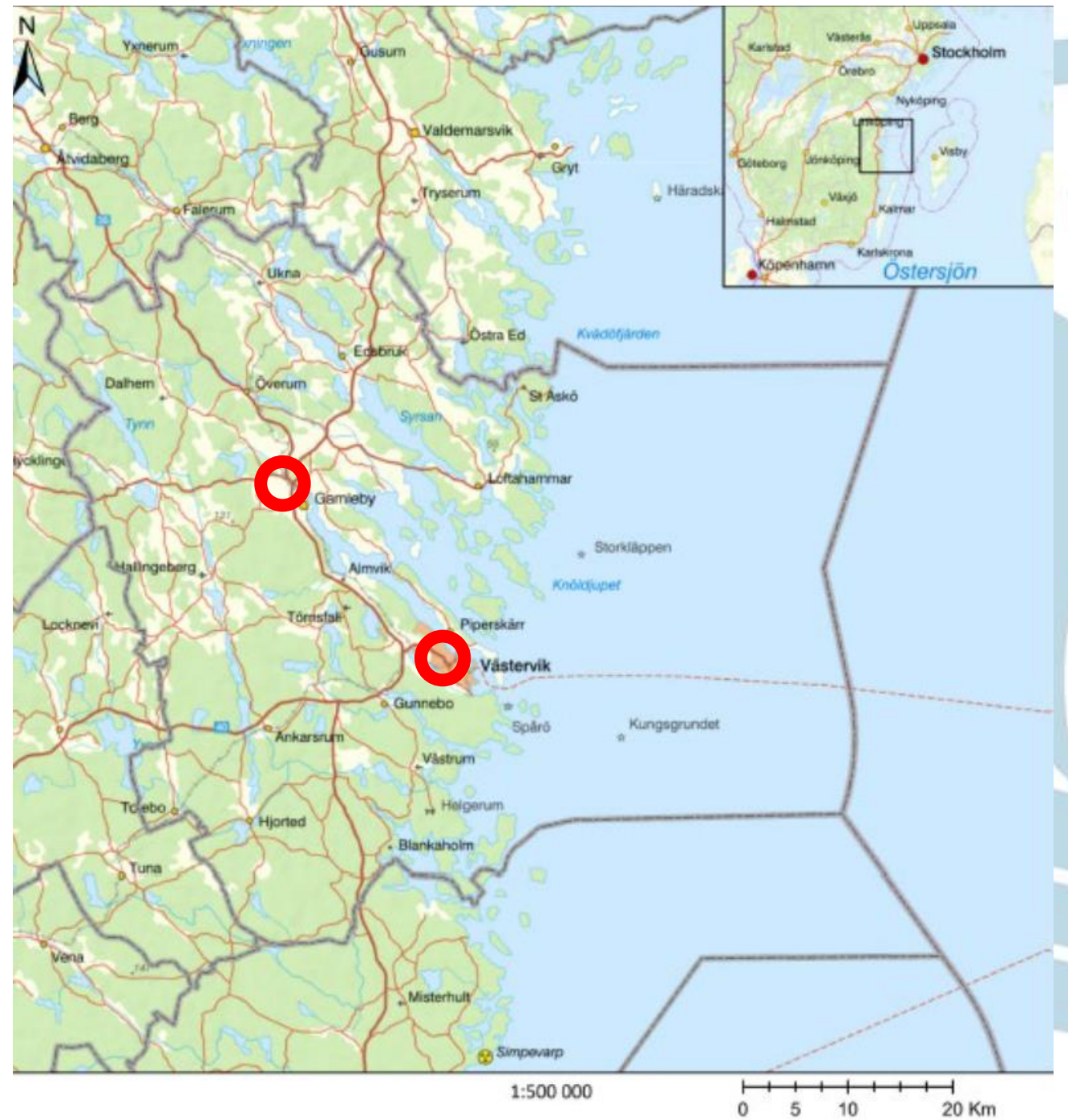
WaterMan

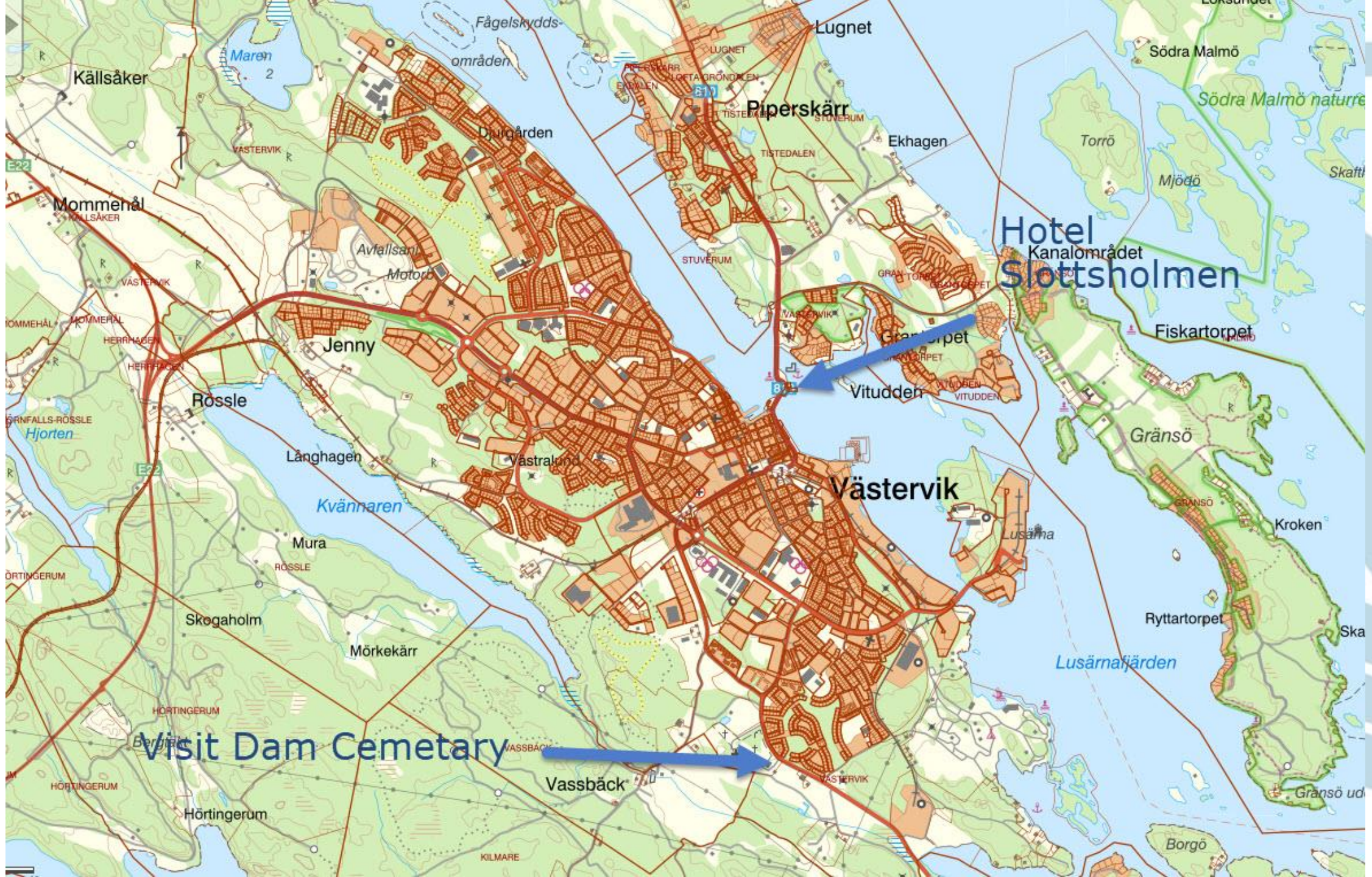
Västervik Municipality

Livskvalitet varje dag

Gun Linberg Strategist sustainable development
Anders Fröberg Water cooperater
Dennis Wiström Project manager

Pilot area(s)





Hotel
Kanalområdet
Slottsholmen

Visit Dam Cemetary

Challenges in the pilot area

Climate changes

>>>>>> Floods and droughts

- Nutrient leakage
- Sensitive archipelago environment
- Quality and quantity of drinking water

Solutions

>>> Climate Change Adaptations

Win- Win



The multi-dam in Gamleby

Since 2020

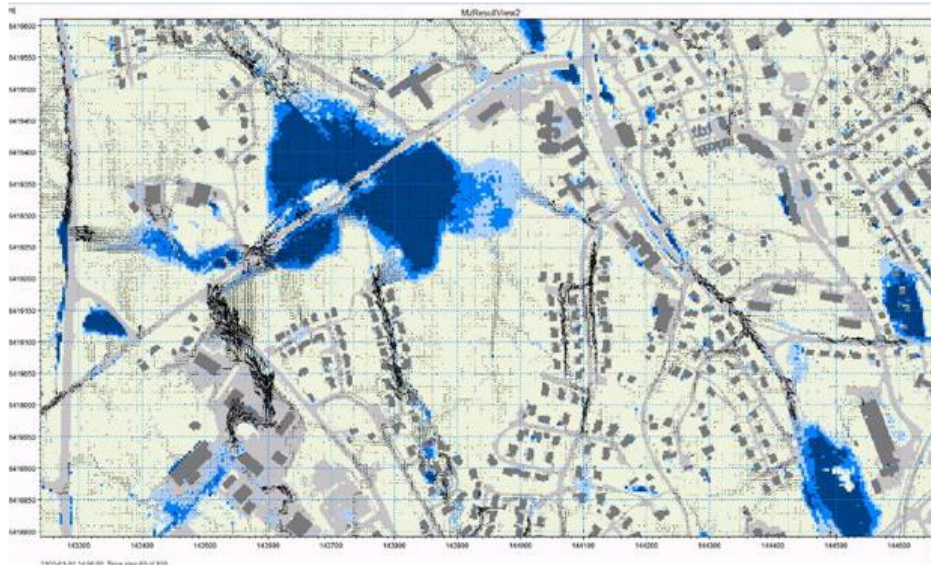
- For water retention
- Reduces Stormwater problems
- For reducing nutrients
- Recirculation in football fields,
For artificial snow
- Recreation for citizens



Use for irrigation and artificiell snow



Planning and construction



Actions planned in Gamleby

Complementary measures to develop the multi-dam in Gamleby for water recirculation

- Use for irrigation in a wider area
- Use in cemetery
- Station for technical water



Actions planned in Västervik

- Analyses to find the right places for multifunctional dams in Västervik
- Pre-study for construction of multi-dam in Västervik for water recirculation
- Development of existing dam (Örserum)
- Station for technical water



Actions in Västervik



Use of stormwater

Sport fields

Arrange stations for technical water from multi-dams in Västervik.

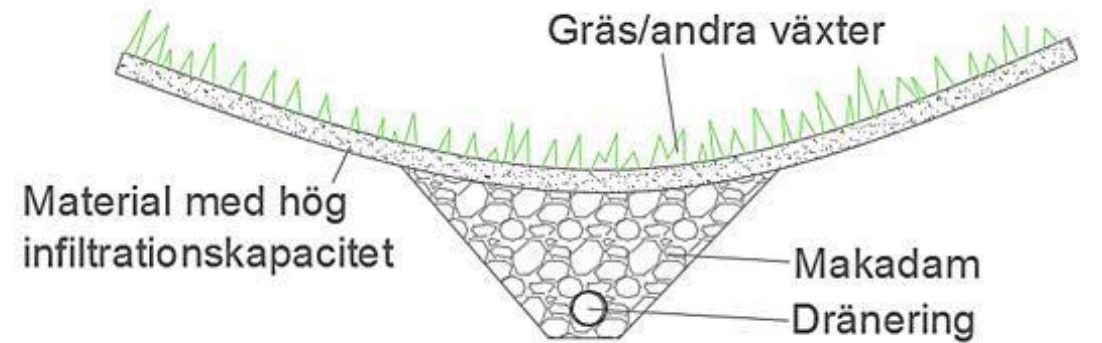
Enable businesses to replenish technical water for use where the requirements for the purity of the water are not so high.

Irrigation, Cleaning (houses roof, facade etc), technical/industrial use



Need for pretreatment

Open stormwater treatment
Ditches, vegetation, filter



Biochar

Biochar filters, pretreatment

- water purification,
- carbon storage
- Water delaying

Installation of biochar filter ditches and use of in parks (tree planting) and recreation areas.



PERENNPLANTERINGAR

REGNBÄDDAR

TRÄDPLANTERINGAR

Gun Linberg Strategist sustainable development
Anders Fröberg Water cooperater
Dennis Wiström Project manager



1st Peer-review session Utilisation of stormwater with the aid of “multi-dams” Västervik Municipality

5 Sept 2023





VÄSTERVIKS
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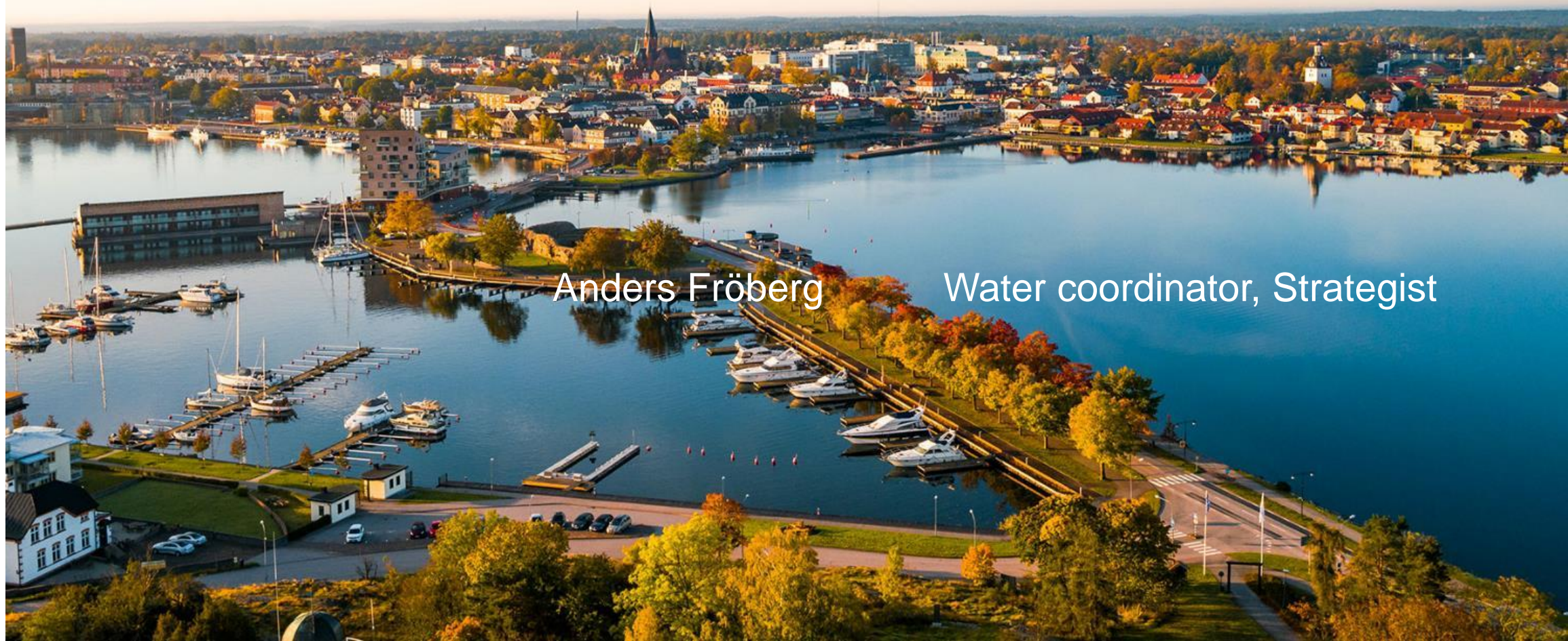
WaterMan

Västervik Municipality

Livskvalitet varje dag

Anders Fröberg

Water coordinator, Strategist



Drought and floods

Waterrestrictions

Almost every summer
2023 Very dry period until juli

Floods in august 2023

VÅDER 25 aug. 2023 17:15

**SMHI-varningar:
Skyfallsliknande regn**



TT

VÅDER 24 aug. 2023 09:00


**MSB utreder sommarens
översvämningar**



TT

VÄSTERVIK 16 juni 2023 11:11 19

**Nu kommer
bevattningsförbudet**




> "Vi behöver alla hjälpas åt att spara på dricksvattnet"

Andreas Johansson Christer Andersson

MILJÖ 9 juni 2023 19:40


**Nu drar kommunerna åt
vattenkranarna**



Tobias Österberg/TT

VÄSTERVIK 21 juli 2023 16:00 13

**Fotbollsplaner bevattnas
med vatten från Kvännaren**




> Kan fortsätta vattna trots förbud ✓ Västerviksbor har undrat

Anna Persdotter

VÄSTERVIK 5 juli 2023 21:00 6

**Så får Carina odlingarna att
leva – trots
bevattningsförbudet**



> Första gurkan skördad: "Det är speciellt att äta det man odlat själv"



Strategy Stormwater and Drinking water

Sustainable and open stormwater treatment

Sustainable supply of drinking water

- Action plan 2020-2030
- Measures in private gardens, streets, parking areas, industrial areas
- Measures in new projects
No drinking water for irrigation (municipality owned)

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Dagvattenstrategi

Dagvattenstrategi för Västerviks kommun med handlingsplan för en långsiktigt hållbar dagvattenhantering

Antagen av kommunfullmäktige 2020-05-20, § 94

Västervik
Häljö Energi Tjänstefastigheter ROSTAJS
BYGGLAGET



The multi-dam in Gamleby

Since 2020

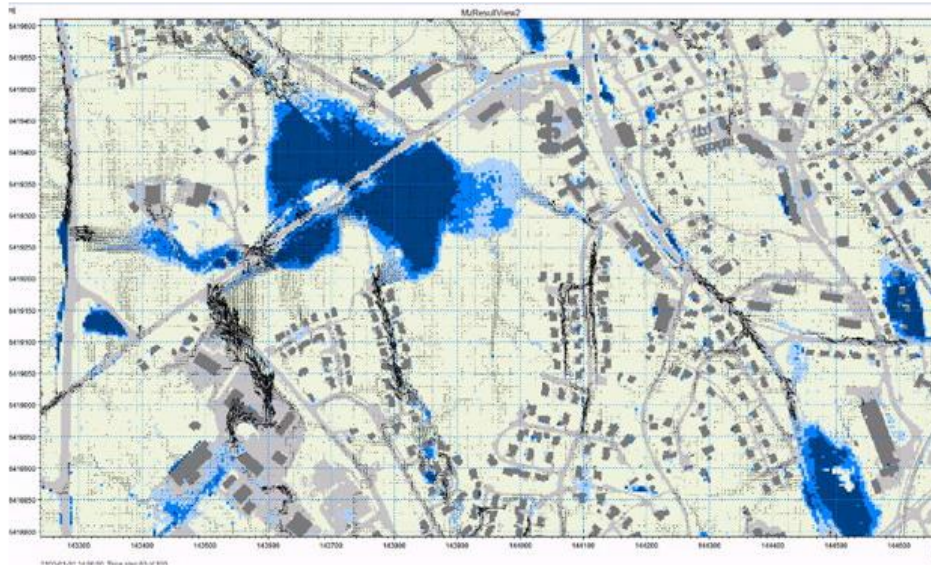
- For water retention
- Reduces Stormwater problems
- For reducing nutrients
- Recirculation in football fields,
For artificial snow
- Recreation for citizens
- No further treatment



Use for irrigation and artificiell snow



Planning and construction



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Complementary measures to develop the multi-dam in Gamleby for water recirculation

- Use for irrigation in a wider area
- Use in cemetery
- Station for technical water



Actions 2023-2024 in Gamleby

- Plan for maintenance
- Pump for circulation
- Use for irrigation in a larger area
- Plantations and trees in city, plantations cemetery



- Station for technical water, tap point

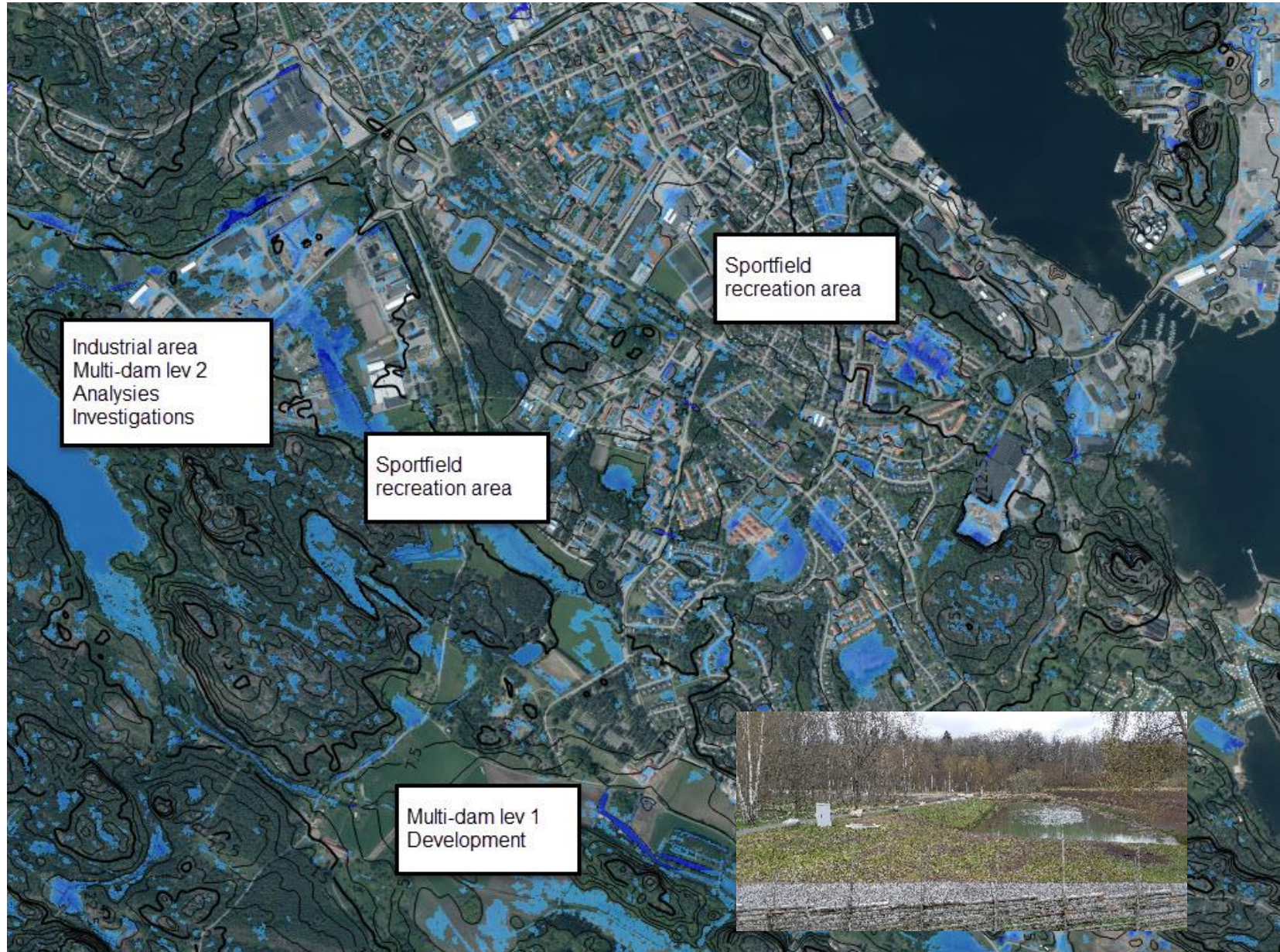


Actions in Västervik

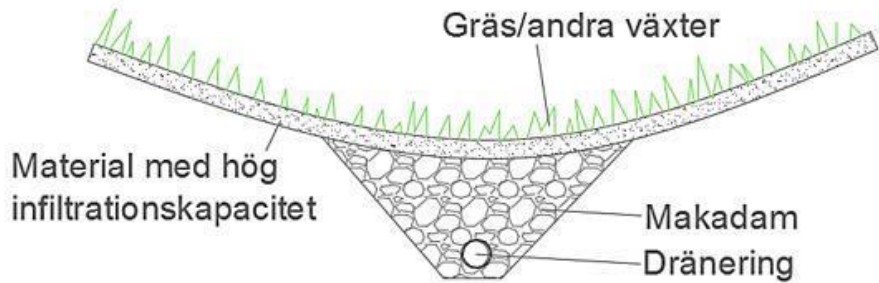
- Analyses of heavy rains in Västervik and to find the right places for multifunctional dams in 2023-2024 procurement 2023
- Prestudy for multi-dam level 2
- Development of existing dam (Örserum) 2024
- Station for technical water, tap point



Actions in Västervik



Pretreatment



Use of contained stormwater

- Not for private cultivation or agriculture
- Not from heavy polluted areas
- We are monitoring pollutants
- If business are interested it should be possible to use for cleaning etc.

Water reuse scheme

- Stormwater to multi-dam
- Natural treatment, sedimentation etc
- Level 1 for irrigation (and snow)
- Level 2 Business for cleaning etc
Extended treatment if necessary



Requirements

- Local environment agency
No requirements
- We are monitoring
Nutrients, bacterias, heavy metals

<i>Analysresultat</i>				
<i>Metodbeteckning</i>	<i>Analys/Undersökning av</i>	<i>Resultat</i>	<i>Mätosäkerhet</i>	<i>Enhet</i>
SS-EN 1484 utg 1	DOC	14	±2.1	mg/l
SS-EN ISO 7887:2012C mod	Färg	40	±4	mg/l Pt
ISO 15923-1:2013 B	Ammoniumkväve, NH4-N	0.026	±0.005	mg/l
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SS028167-2 MF	Koliforma bakterier 35 °C	920		cfu/100ml
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Kvicksilver är uppslutet med HNO3. Analys av metaller: provet är uppslutet med HNO3 (mikrovägsugn) SS EN ISO 15587-2.



Stakeholders

- Municipal Water company Västervik Miljö & Energi
- Municipal housing company Västervik Bostads AB
- Local environment agency
- User of water for irrigation



1st Peer & expert review session: Recommendations & conclusions

- It would be good to check what kind of industries are close to the possible location of the 2nd gen multi-dams in Vastervik, and what pollutants are related to them. You are intending to mix “normal” urban stormwater runoff with industrial runoff. So the types of industries that are in place likely affect the quality of the retained water – and may determine the treatment needs.
- It may be beneficial to check the potential end-users of the water from the 2nd multi-dam in Vastervik and their interests & needs in more depth right at an early stage, in particular with regard to interest in & required quality of “technical water”. This would allow to tailor the water quality of the retained water to their needs, by designing the 2nd gen multi-dams accordingly (e.g. delaying / sedimentation treatment of the water.
- It could be advisable to cross-check in Swedish environmental law / with environmental authorities if you need an environmental impact screening for the new 2nd multi-dams in Vastervik. If its catchment area is larger than 50 ha – it may be required (as it is the case in LT – but maybe that’s only a LT specificity).
- Keep in mind that the evaluation of the pilot measure should focus not only on appraising the effectiveness of water retention (and treatment, if applicable), but also the reuse of the retained water by end-users. This needs to be considered in the work schedule.

Absorption report Utilisation of stormwater with the aid of “multi-dams” Västervik Municipality

07 November 2023





VÄSTERVIKS
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WaterMan Västervik Municipality Bornholm 7-9/11

Livskvalitet varje dag

Anders Fröberg
Akke Karlsson
Ingela Karlsson

Water coordinator, Strategist
Coach Sustainable development
Engineer Municipal Water and Wastewater

Changes after discussions in Ringsted

- Involving stakeholders
Local agency for environment protection, VBAB, VMEAB
- More focus on reuse of stormwater, useable water and what we learned of using stormwater
- Analyses risk of pollutants in the area for multidam level 2
- Checking with regional agency for environment
- More specific plan of actions and measures



Actions in Gamleby and Västervik

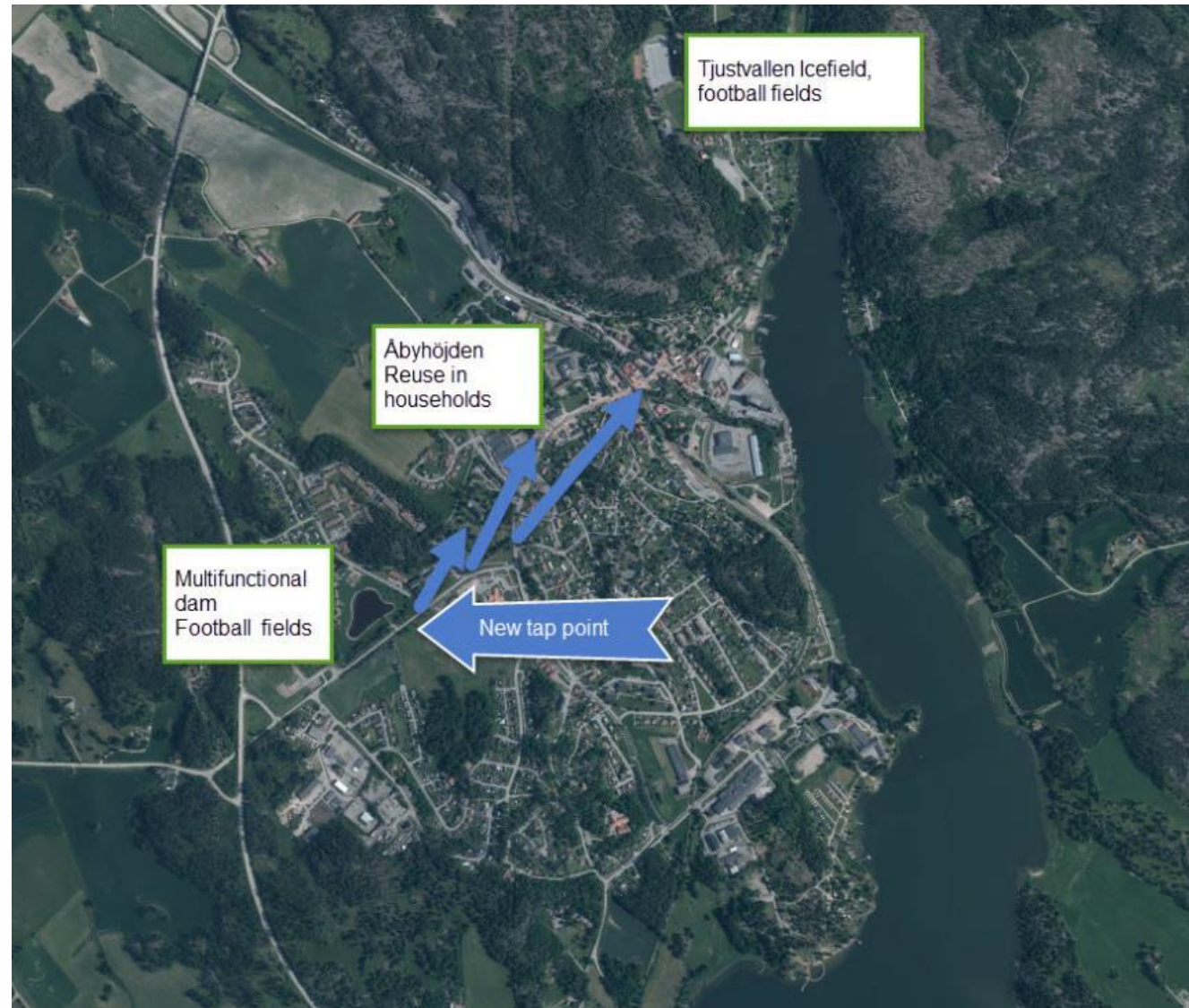


Plans Gamleby

Measure	When	Status	Comments	Costs
Tap point Use in wider area	2023	x		
Follow-up double pipes	2023-2024	Ongoing	Recirculation in residential area	
Analyses waterquality	2023-2025	Ongoing		
Circulation, stormwater	2024-2025		Tjustvallen Irrigation and	

Gamleby

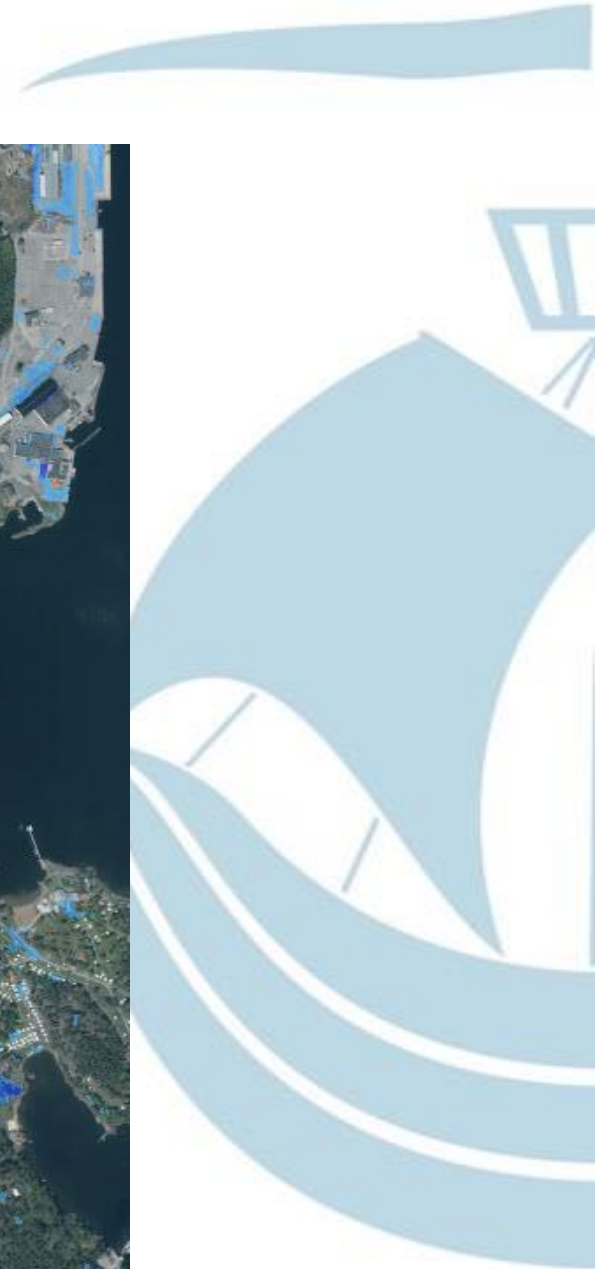
Complementary measures to develop the multi-dam in Gamleby



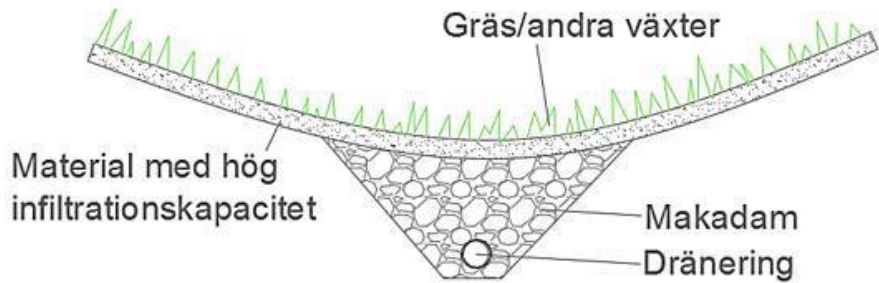
Plans Västervik

Measure	When	Status	Comments	Costs
Tap point Use in wider area	2024	Ongoing	Place located	
Stormwater in to the irrigationsystem	2024			
Pre treatment	2025		Design, procurement 2024	
Analyses Multidam level 2	2024		Where, how	
Interest users?	2024- 2025	Ongoing		
Analyses waterquality	2023- 2025	Ongoing		

Actions in Västervik



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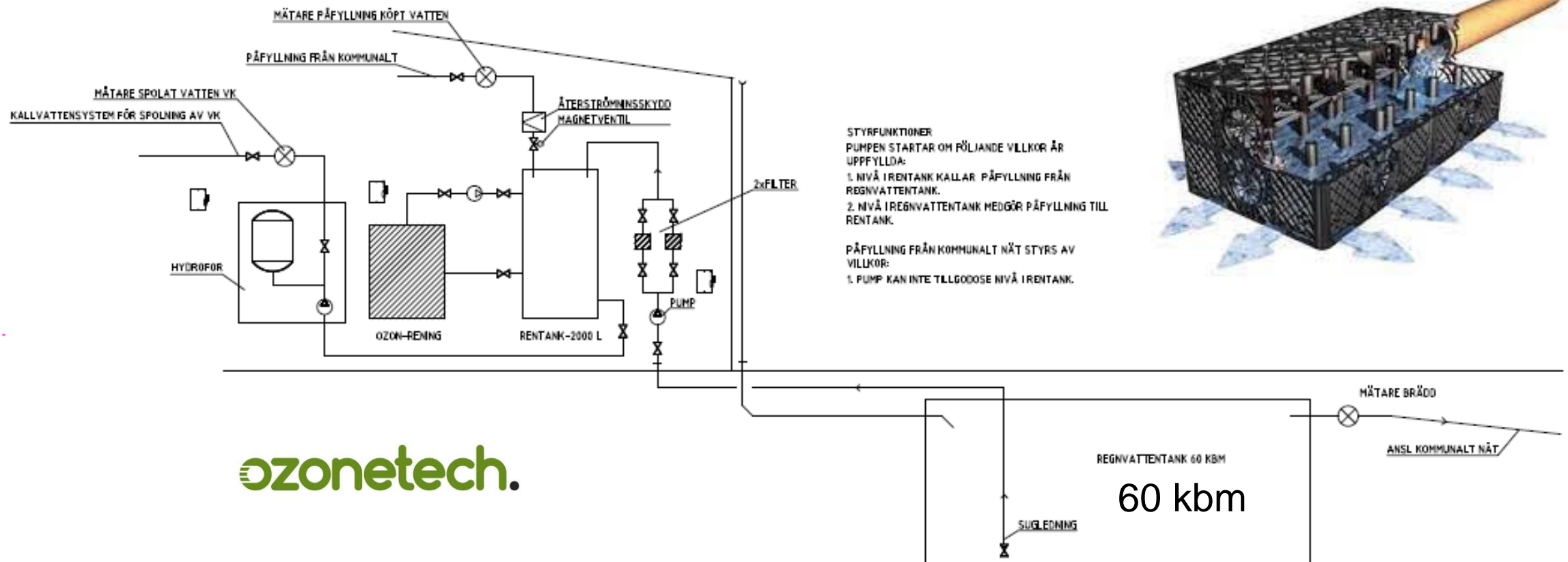
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Reuse of rainwater for flushing

Åbyhöjden



- Tap point for technical water



Reuse of stormwater today



Actions in Västervik

- Analyses to find the right places for multifunctional dam level 2.
- Prestudy

Development of existing dam (Örserum)

- Tap point (station for technical water)
- Stormwater to the irrigation system at the football fields
- Pre treatment Open stormwater treatment



2nd Peer-review session

Utilisation of stormwater with the aid of “multi-dams”

Västervik Municipality

7 November 2024





VÄSTERVIKS
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WaterMan Project Västervik Pilot Reuse of Stormwater

Livskvalitet varje dag

email, meetings

Berlin 5-7 november



Users today

- Irrigation sportfields (and artificiell snow)
Municipality, VBAB, Associations (sport) >10000 kbm
- Irrigation in parks - trees, plantations
Municipality, Entrepreneurs, Cemeteries 1000 kbm
- Privat houses
- Use of collected water for toilet flushing
Public housing company



Methods for involving the users

- Contact with the users
Motivation, Show appreciation
- Interviews
- Advice
- Evaluation
Follow-up document



Meet the users on site



Focus group Irrigation sportfields and parks

- Mostly individual contact
- Spreads information i the group
Municipality, Maintenance parks, public housing company, involved associations (sports)



How does it work

- Evaluation together
- How does it work, problems
- Contacts, how to avoid problems
- Improvements



Evaluation file

Users of contained stormwater										
Västervik och Gamleby										
	2023					2024				
	VBAB (Erneberg)	Kanonaden Ga	AMA Gamleby	VBAB (Erneberg)	Kanonaden Gam	Kyrkan Gamleb	VBAB Åbylund	Kyrkan Västervik		
Contact	Markus R	Jörgen	Jörgen	Markus R	Jörgen	Mathias L	David	Göran		
From tap point kbn	Yes >1000	Yes 16	30	Yes	Yes 16	Yes 8		>1000		
Local collection							Yes			
How is transport from tap point working		Ok			Ok	Ok				
Practical problems tap point		No			No	No				
Function of the used water, problem quality	Ok			Ok		Ok	Ok	Ok		Ok
Practical problems irrigation/etc	No	Sacks mainten		Drainage	Sacks mainten	No				
Improvements suggestions		Drainage can be better			Drainage			First flush filter (pc Aeration		
Other use than irrigation								Toilet flushing		
Comments		First flush			First flush		App fungerar			Drip irrigation proble

So far

- The water is ok
- Transport from tap point is working for parks
- Maintenance is important



How to reach, involve and motivate new users

- **Information**
How to pick up water, offer advice, be open that it is reused stormwater
- **Information in focus groups**
email, meetings
- **More than Onne channel**
Water company, local authority, advicer, business service
- **Demands in building permit**
Stormwater measures (delay)



Potential users

- Use for fire water
Municipality
- Housing companies
Mostly irrigation but also rough cleaning
- Entrepreneurs
Rough cleaning, in/outside, streets, roof, pipes
- Industries? District heating plants?
Process water

Use the dry periods

- Waterrestrictions

VÄSTERVIK 16 juni 2023 11:11 19

Nu kommer bevattningsförbudet

> "Vi behöver alla hjälpas åt att spara på dricksvattnet"

Andreas Johansson Christer Andersson



MILJÖ 9 juni 2023 19:40

Nu drar kommunerna åt vattenkranarna

Tobias Österberg/TT



NATUR 10 aug. 2023 07:00

Risk för vattenbrist – trots Hans

Cecilia Klintö/TT



Grundvattennivåer v 32

• Mindre än normalt
• Över normal
• Normal
• Under normal
• Mindre än under normal

VÄSTERVIK 21 juli 2023 16:00 13

Fotbollsplaner bevattnas med vatten från Kvännaren

> Kan fortsätta vattna trots förbud ✓ Västerviksbor har undrat

Anna Persdotter



VÄSTERVIK 5 juli 2023 21:00 6

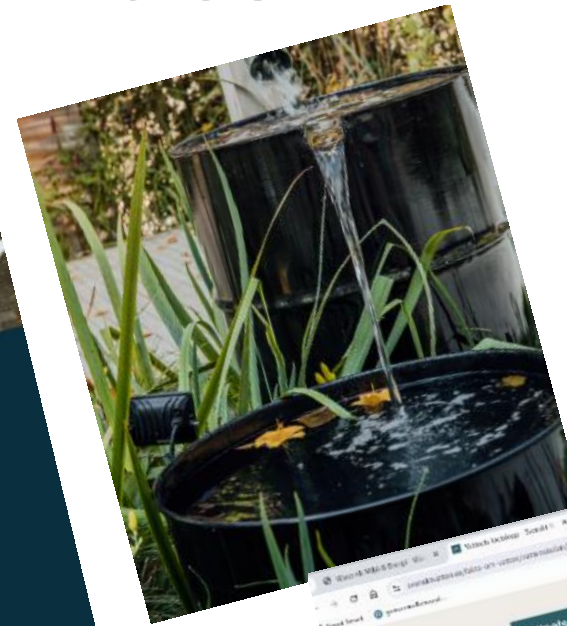
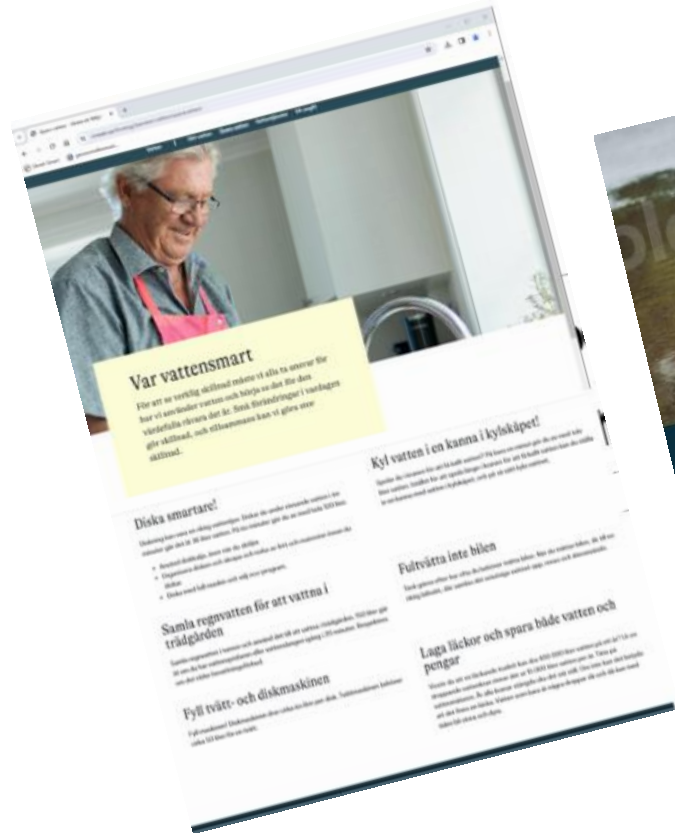
Så får Carina odlingarna att leva – trots bevattningsförbudet

> Första gurkan skördad: "Det är speciellt att äta det man odlat själv"



Information

Encourage/inspire to save and reuse water



Status updates

Utilisation of stormwater with the aid of “multi-dams”

Västervik Municipality

30 April 2025





VÄSTERVIKS
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WaterMan Project Västervik Pilot

Livskvalitet varje dag

Actions nov 2024 to may 2025



Tjustvallen ”minimulti” step 2

- Planning, design
dec 2024
- Procurement
april 2025
- Construction
may 2025



Pumps, plumbing, control



ÖSTORPS BEVATTNING AR	
Hydrostatisk	ON
Hydrostatisk	ON
Färdigställnings	ON
Färdigställnings	ON
Övertryck	6.2 bar
Tryck	7.7 bar
Flöde	0 m³
0 l/s	0 m³
Färdigställ	0.0 l/s
Ström	0.0 A
Energ	0.0 kWh
Datutl	0.0 kWh

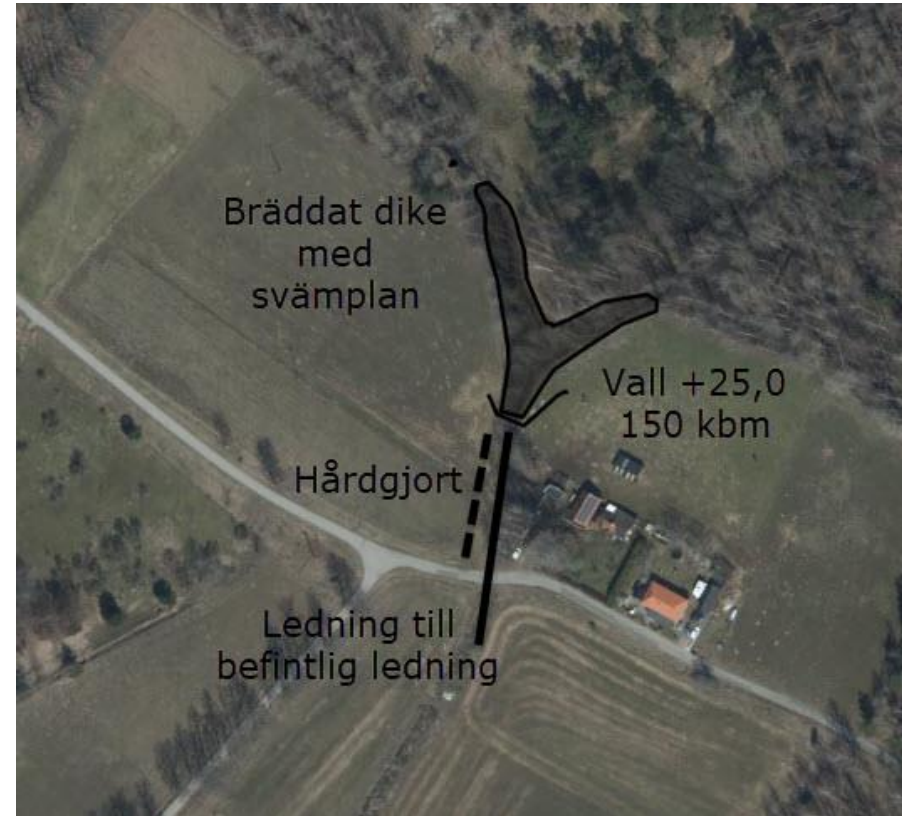
Local show room Municipality hall

- Planning, design
dec 2024
- Procurement april
2025



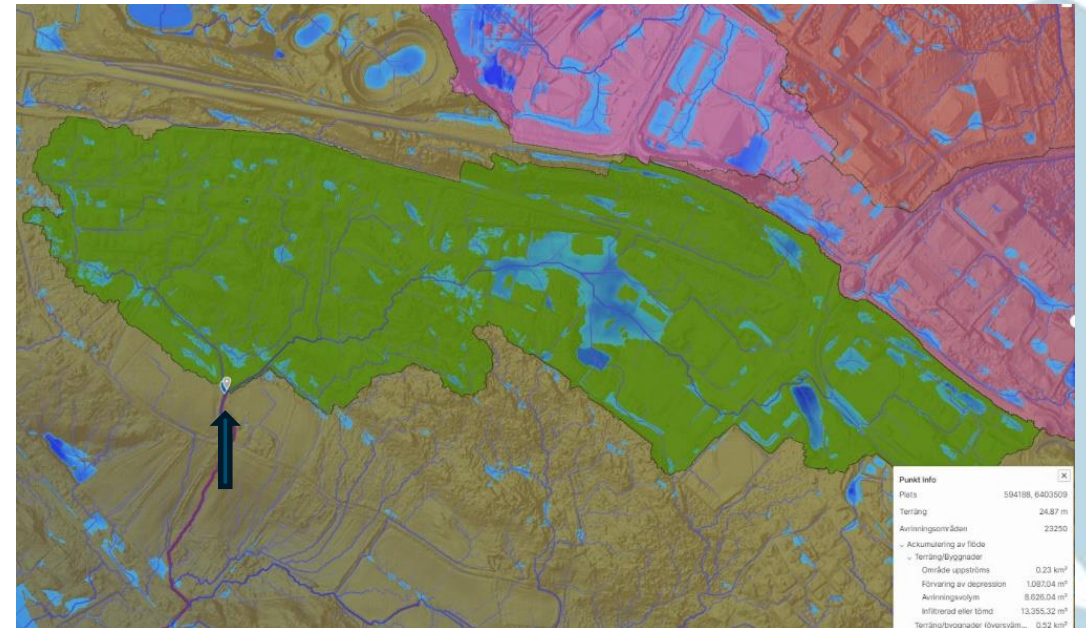
”Minimultidam” in Jenny Västervik

- Preparatory works, design nov-dec 2024
- Procurement dec 2024
- Construction Jan-febr 2025



Climate adaption

- Problems when heavy rains
- Stormwater from 30 ha hardened surface
- Water retention
- Close to user (riding center)



From the construction



- Retention of 1500 kbm

Feasibility studies Karstorp Västervik

- Climate adaption, water retention
 - Better water quality, purification
 - Visible surface water instead of pipes
 - Reuse of water
-
- How to solve many problems at the same time



Problems and possibilities

- Catchment area
200 ha
1/4 of the storm water
city of Västervik
- Floods, problems
with capacity
- Heavily loaded lake
- Nearby users
football fields, fire department,
business/functions



Next step Karstorp

Several solutions

- Prioritization, preparatory works, design
may-june 2025
 - Procurement
aug 2025
 - Construction
sept-oct 2025



Analyses Västervik

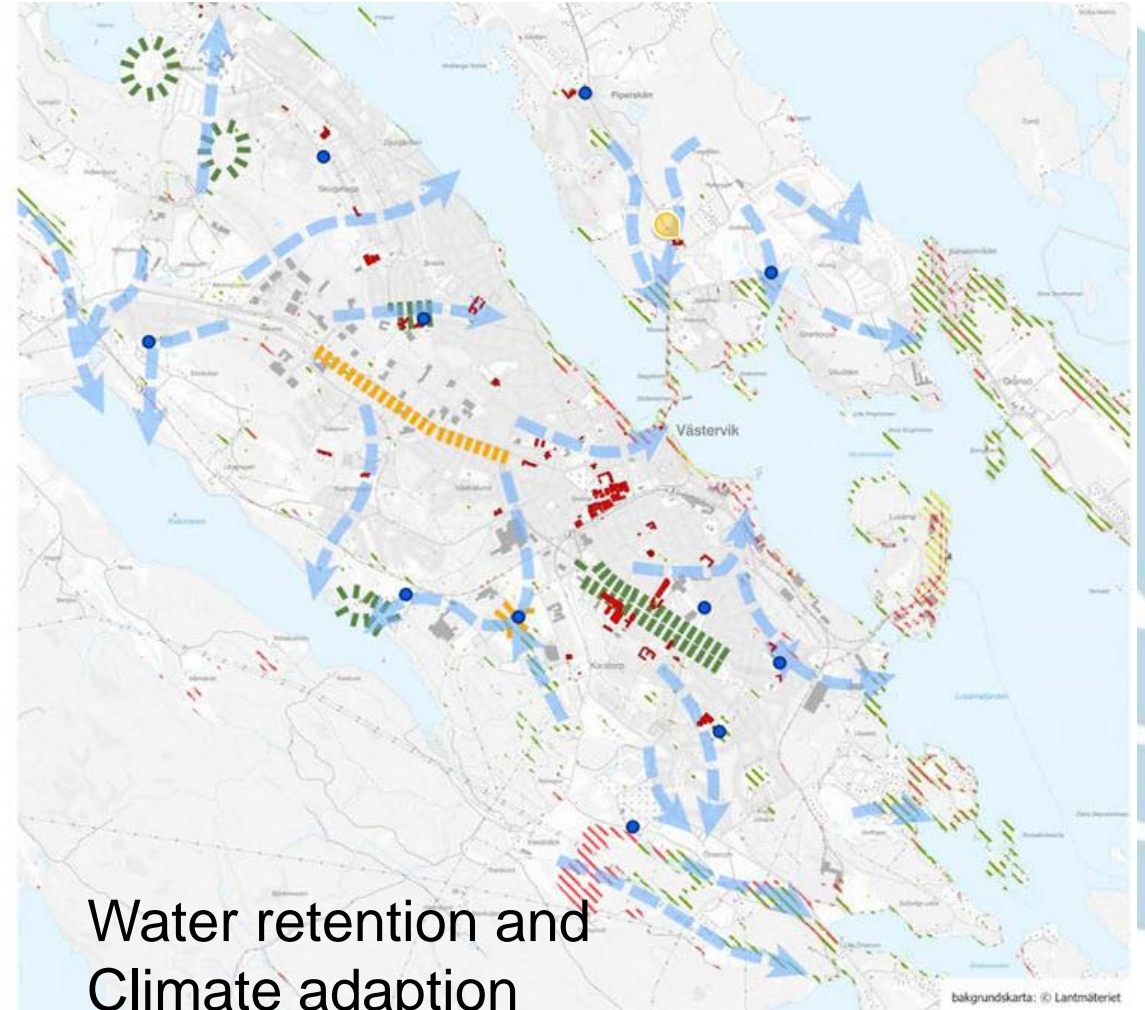
- Analyses heavy rains
- Prioritisation possible areas for retention
- Analyses interested users of storm water



Analyses - Water retention and winwin solutions

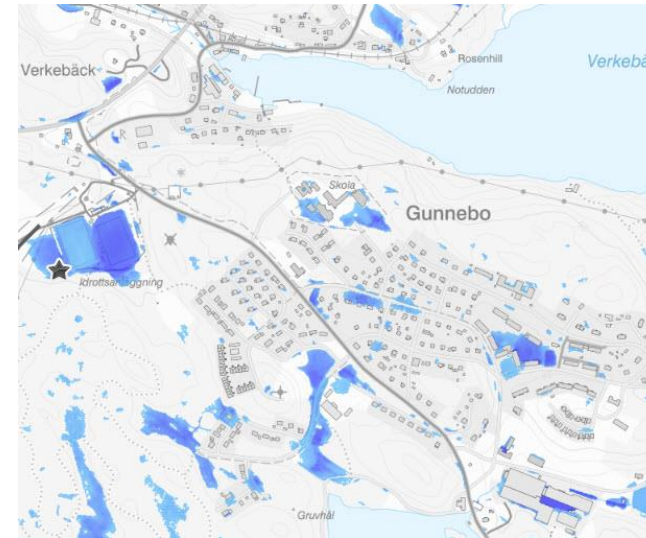
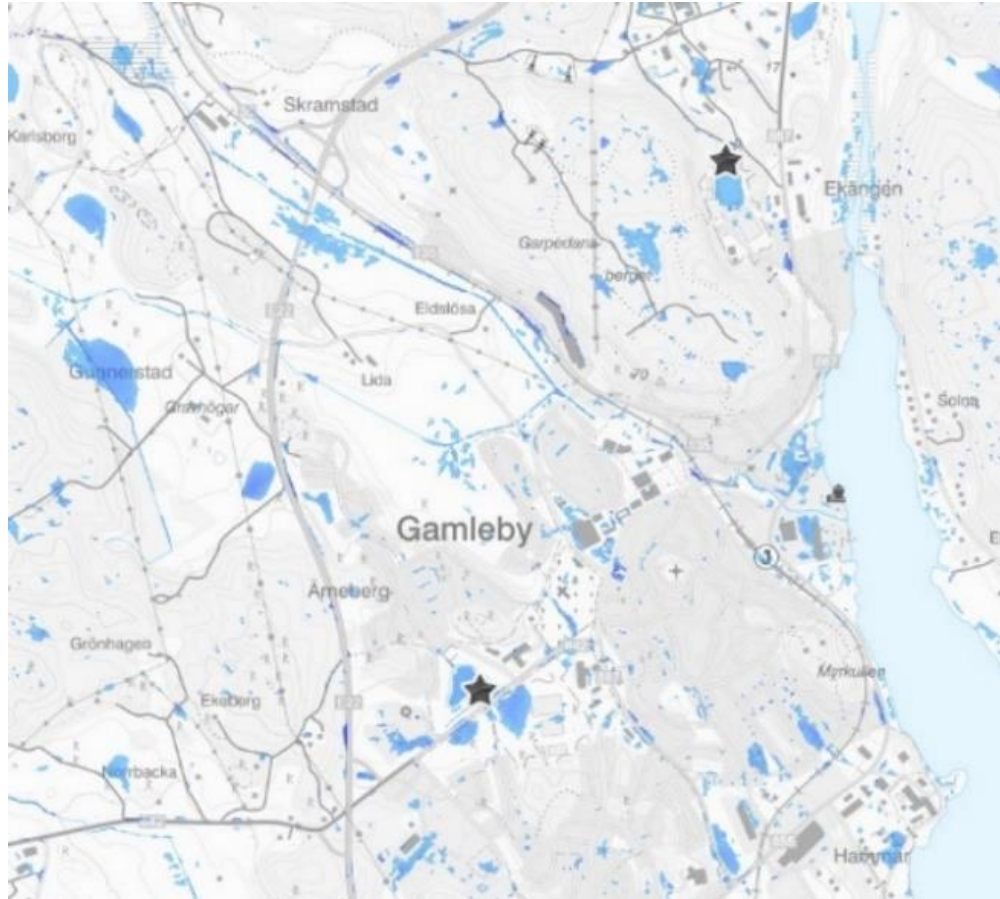


Proposed location Multidam



Water retention and Climate adaption

Gamleby, Gunnebo, Överum



Västervik Pilot The challenge

- Too much and too little of water
Problems with heavy rains and water scarcity in summertime
- Climate change and more hard surfaces
makes the problem worse

From the news - Effects of climate change, too much and too little of water

Mer av både skyfall och torka på jorden



Människor flyr undan vattnet efter ihållande regn i Kulli i den Indiska staten Himachal Pradesh i slutet av augusti i år. Foto: Aqil Khan/AP/TT

Fler kraftiga skyfall och fler perioder med svår torka. Det är vad som väntar världen, slår världsmeteorologiska organisationen WMO fast i en ny rapport.



LARS THELL MARKLUND, FORSKARE RISE

Skyfall och torka ökar – men många kommuner halkar efter i arbetet med klimatanpassning

Sveriges infrastruktur är inte rustad för extremväder. Lars Thell Marklund ser brister i hur kommuner hanterar både skyfall och torka – och menar att det krävs bättre och tydligare ansvar och samarbete för att utveckla

Läs artikeln

Water retention solves many problems

Actual and prioritized issue in Västervik

- Protection from floods
- Climate adaption
- Reduce of nutrients
- Winwin-effects



Storm water can be a resource instead of problem

Climate adaption, recreation,
reuse - irrigation and other use , green
and pleasant surroundings, biodiversity



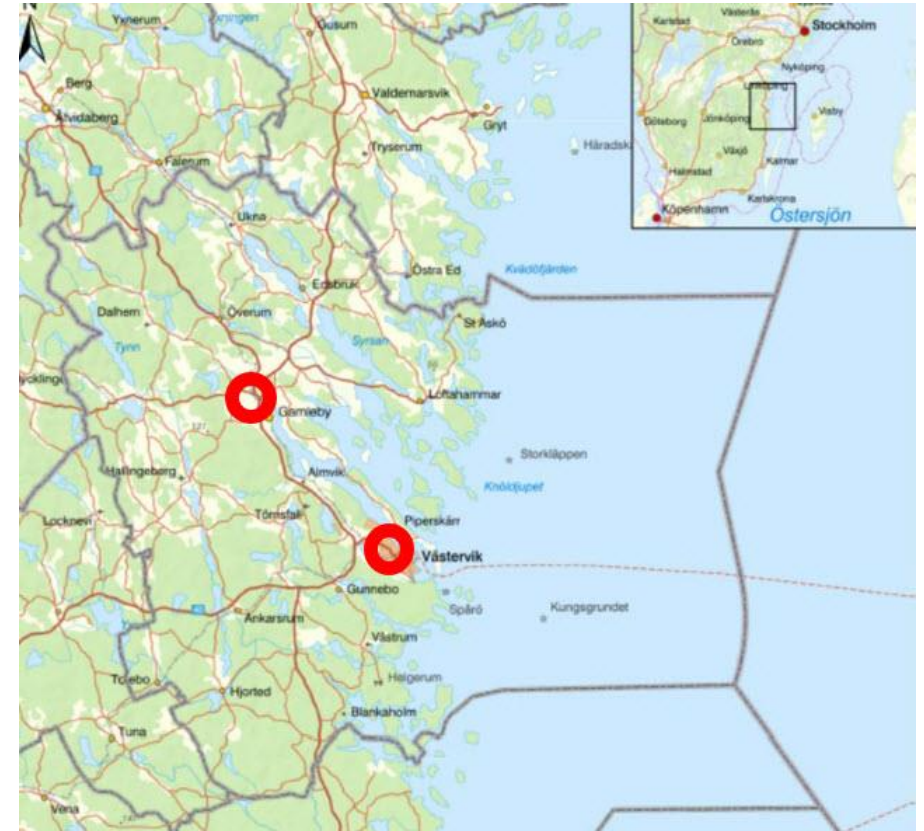
Background and objectives

- The reuse of water from the "multidam" in Gamleby. The water had been used for sportfields for 2 years. It was a winwin solution
- Saving drinking water and water retention are prioritized issues in the Municipality
- The users of the water were satisfied
- We wanted to develop the concept
Wider use, Tap points, More of "multidams"



Pilot measures in Västervik municipality

- Development of the use of storm water as a resource
 - Tap points for wider use in Gamleby and Västervik
- More "multidams" in Gamleby and Västervik



Gamleby



Measures in Gamleby

- Tap point in Erneberg "multidam"
New users: Cemetery, housing areas, plantation/trees citycenter
- Developed drainage system in the sportsfield
- "Minimultidam" in Tjustvallen
Automatic irrigation system, football, tennis, ice skating
- Evaluation of reuse of rainwater for flushing toilets in Åbylund Gamleby
Completion with filter (pollen)
- Suitable transport of collected water

Gamleby

Tap point and drainage works



Gamleby "Minimultidam" Tjustvallen

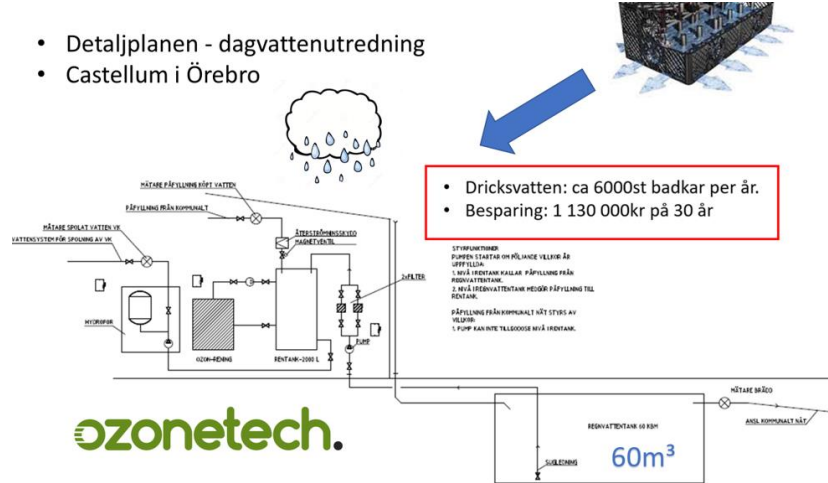


Gamleby Rainwater for flushing toilet

Gamleby Suitible transport



- Detaljplanen - dagvattenutredning
- Castellum i Örebro



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Measures in Västervik

- Tap point in Örserum
New users: Plantations/trees citycenter, housing areas, more of sportfields
- Aeration Örserum Västervik
For less algae in the "multidam"
- "Mini-multies" in Marieberg and Jenny
- Feasability study for climate adaption measures in Karstorp industrial area
- Measures for water retention in Karstorp
Nature based solutions to decrease the problems with heavy rains including "mini-multi" for using water for irrigation
- Show room municipal hall, local use of rainwater



Västervik Tap point



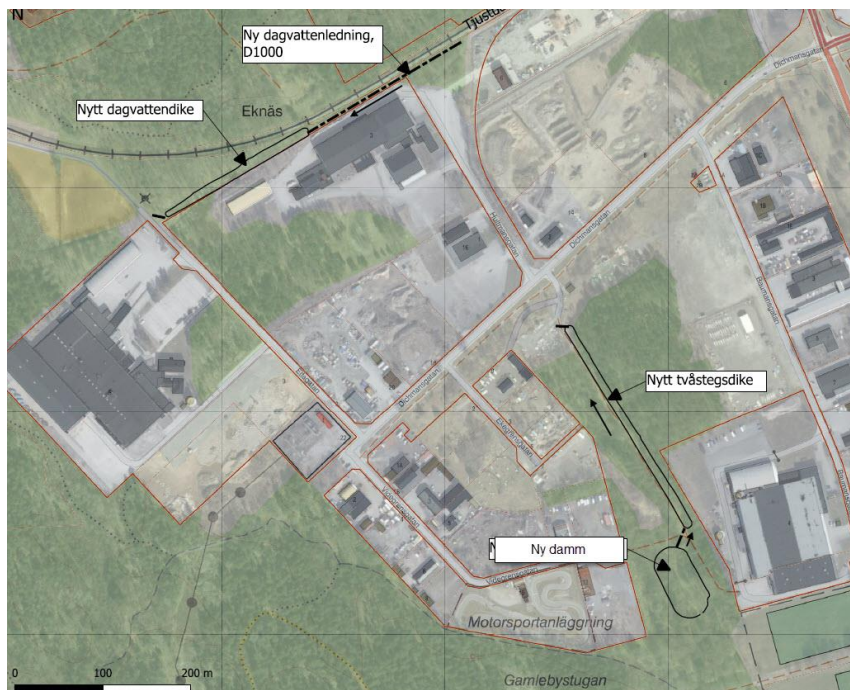
”Minimultidam” Piperskärr



Karstorp Västervik

Room for water, open storm water treatment

Multi functions



Reuse of stormwater

How we are working

- Collecting water at the right place close to the users
- Pipes to the closest users as sportfields
- Tap points for filling water and transporting to use for trees, summer flowers, housing companies etc
- Municipality want to be a good example in sustainability



Development & implementation

- Close contact to the users
- Contact to potential users through Municipality and Water company
- Demands in building process (new houses/renovations)
- Information and peptalk – use the dry summers for understanding



Users and key stakeholders

- Municipality Parkdep, Manager and coordinator, local authority
- Public housing company VBAB, Water company VMEAB
- Sport clubs
- Churches
- Housing companies
- Entrepreneurs (working for Municipality)



Meet the users on site

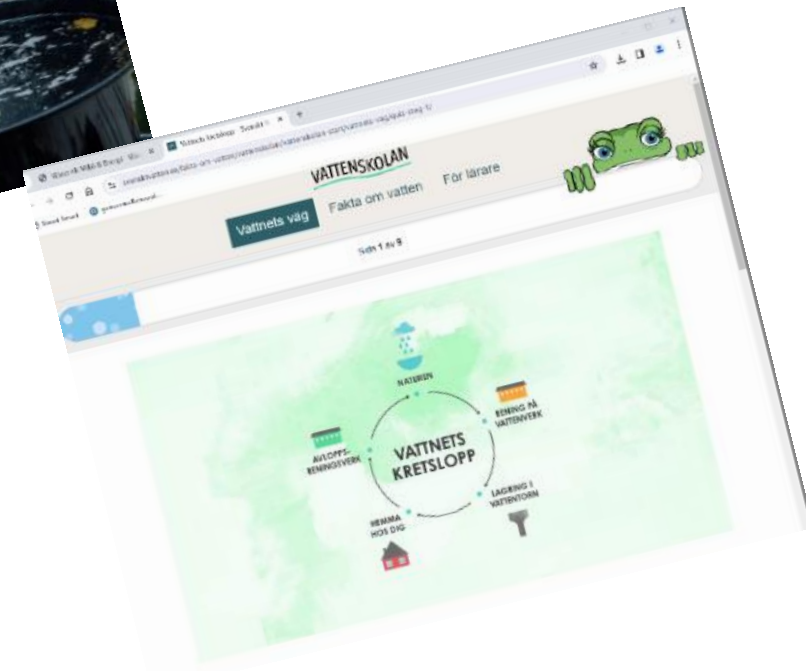
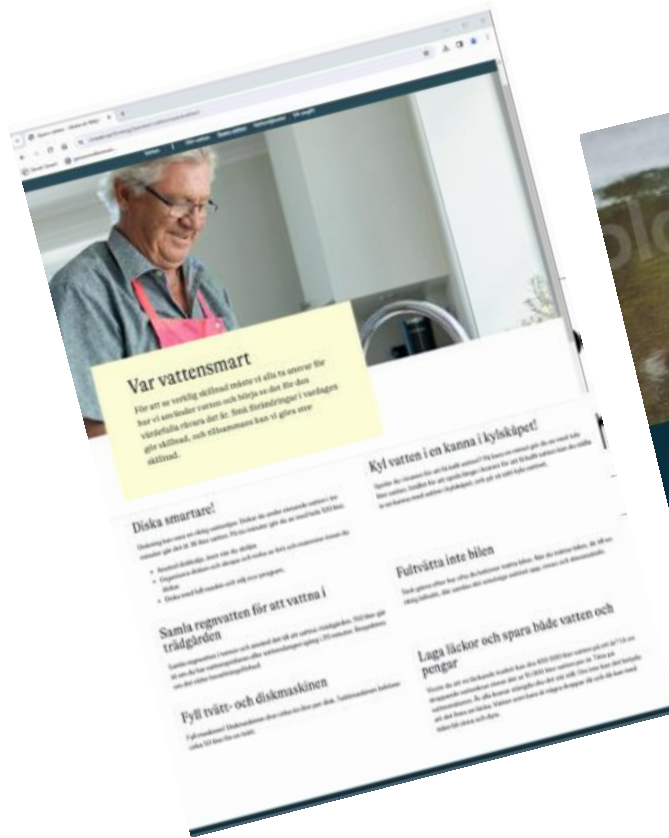


How is it working
Problems, improvements, motivation, appreciation

Evaluation file for improvements

Users of contained stormwater																		
Västervik och Gamleby																		
	2023			2024			2025											
	VBAB (Erneberg)	Kanonaden G	AMA Gamleby	VBAB (Erneberg)	Kanonaden Gar	Kyrkan Gamlet	VBAB Åbylund	Kyrkan Västervik	VBAB (Erneberg)	Kanonaden Ga	AMA Gamleby	Kyrkan Gaml	VBAB Åbyl	Kanonaden Väs	Fotbollsplane	Kyrkan Vä	VBAB Tj	
Contact	Markus R	Jörgen	Jörgen	Markus R	Jörgen	Mathias L	David	Göran	Markus R	Jörgen	Jörgen	Mathias L	David	Jörgen	Frippen VBAB		Markus	
From tap point kbn	Yes >1000	Yes 15		Yes >1000	Yes 15	Yes 50 ?		1 000	>1000		100	100	100 ?	Yes >1000	Yes 500		500	
Local collection							Yes											Yes
Instead of	Drinking water	Drinking wate	Drinking water	Drinking water	Drinking water	Drinking water	Drinking water	Drinking water	Drinking water	Drinking water	Drinking wate	Drinking wat	Drinking v	Drinking water	Lake water	Drinking v	Drinking	
How is transport from tap point working		Ok			Ok	Ok					Ok	Ok	Ok		Ok	Ok		
Practical problems tap point		No			No	No					No	No	No		No	No		
Function of the used water, problem quali	Ok			Ok		Ok	Ok	Ok	Ok	Ok	Ok	Ok		Ok	Ok	Ok	Ok	
Practical proplems irrigation/etc	No	Sacks mainten		Drainage	Sacks maintena	No												
Improvements suggestions		Drainage can be better		Drainage				First flush filter (p	Aeration						First flush filter (pollen)			
Other use than irrigation								Toilet flushing							Toilet flushing			
Comments	First flush			First flush		App fungerar		Drip irrigation problem										
Bevattningsäck 75 l Kan tas upp och skötjas																		

Encourage/inspire to save water



Webpage, brochures, social media, newsletters

Lessons learned and adjustments

- Find the right location to collect the storm water
Close to user, not heavy polluted, where you need water retention, look for winwins
- Its not enough with one solution
More of local solutions – Mini-multi-functional dams
- Suitable transport of collected water is important
Irrigation cart with electric motor, right size and according to work environment regarding noise level in residential area
- For toilet flushing with rainwater there will be a good idea with a pollen filter



Scalability

- Good potential for scalability in the municipality and in the region
- More "mini-multies"
- There are a lot of potential users and a lot of storm water to use
- Possible winwins



Final reflections

Start to use storm
water for irrigation

Winning concept in
saving water, climate
adaption and
biodiversity

Start with water for
irrigation and the big
users of water

Find the right place for
measures

Maintenance and
evaluation is important
(pumps, nozzles,
irrigation sacks etc)

We need to reuse
storm water and
treated wastewater
(different users)

It is not enough with
one “multidam”.



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eurobalt.org/WaterRecyclingToolbox

interreg-baltic.eu/project/waterman

WaterMan promotes a Baltic Sea Region-specific approach to water recycling, which makes use of the alternation of too much and too little water that has become typical for humid areas in the EU to strengthen the resilience of local water supply. Building on this approach, the project supports municipalities and water companies in adapting their water supply strategies.

The contents of „BSR Water Recycling Toolbox” are the sole responsibility of the authors and can in no way be taken to reflect the views of the European Union, the Managing Authority or the Joint Secretariat of the Interreg Baltic Sea Region Programme.

