

Urban Cloudburst and Storm Water Planning: Climate Adaptation Examples from a fast growing Stockholm



Stockholm – Beauty below water?

1. Critical issues - Risk situation of flooding in Stockholm
2. Lessons are learned in every project - Concrete solutions for climate change adaptation being planned in our projects
3. Ways forward to plan and build better

CRITICAL ISSUES RISK SITUATION OF FLOODING IN STOCKHOLM



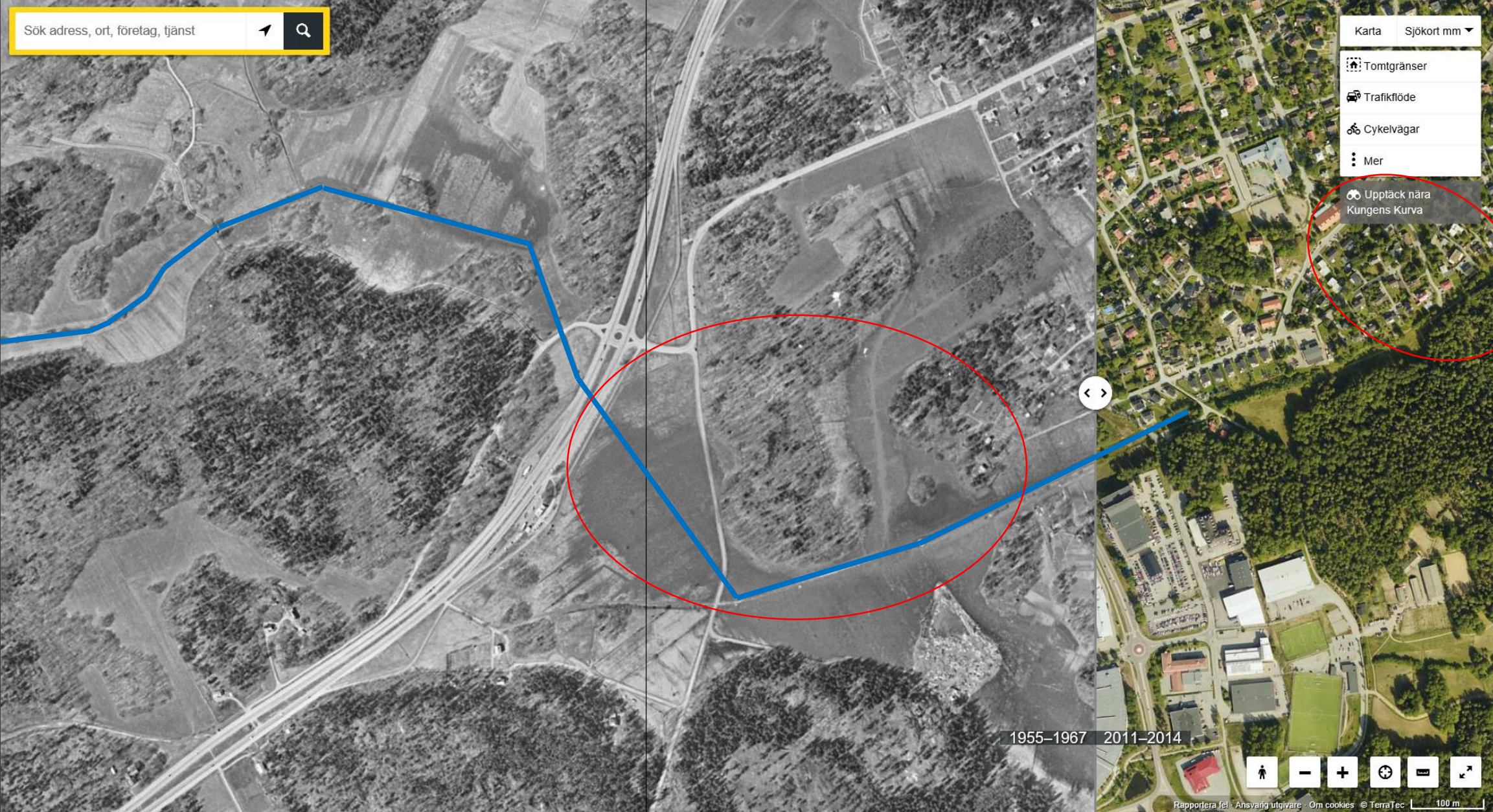
Critical issues

1. The risk of damage by fluvial flooding in Stockholm is not considered as a main issue due to resilience: flat topography leading to slow increase of water level
2. Climate change will make Stockholm (much) warmer and thus contribute to cloudbursts occurring more frequently and with higher intensity
3. An 100-year event in Stockholm will most probably be expensive. The Malmö 100-year rain event of 2014, "Arvid" occurs already today 10 times a year somewhere in Sweden* (Arvids cost: 160 MSEK)
4. Stockholm is expanding with 30 000 inhabitants per year. Densification is considered the sustainable way to cope with this expansion but we have almost only flooding areas left to build on
5. We have decreased the resilience of the city by replacing our natural water courses with closed culvert ditches

Decreased resilience



Sök adress, ort, företag, tjänst

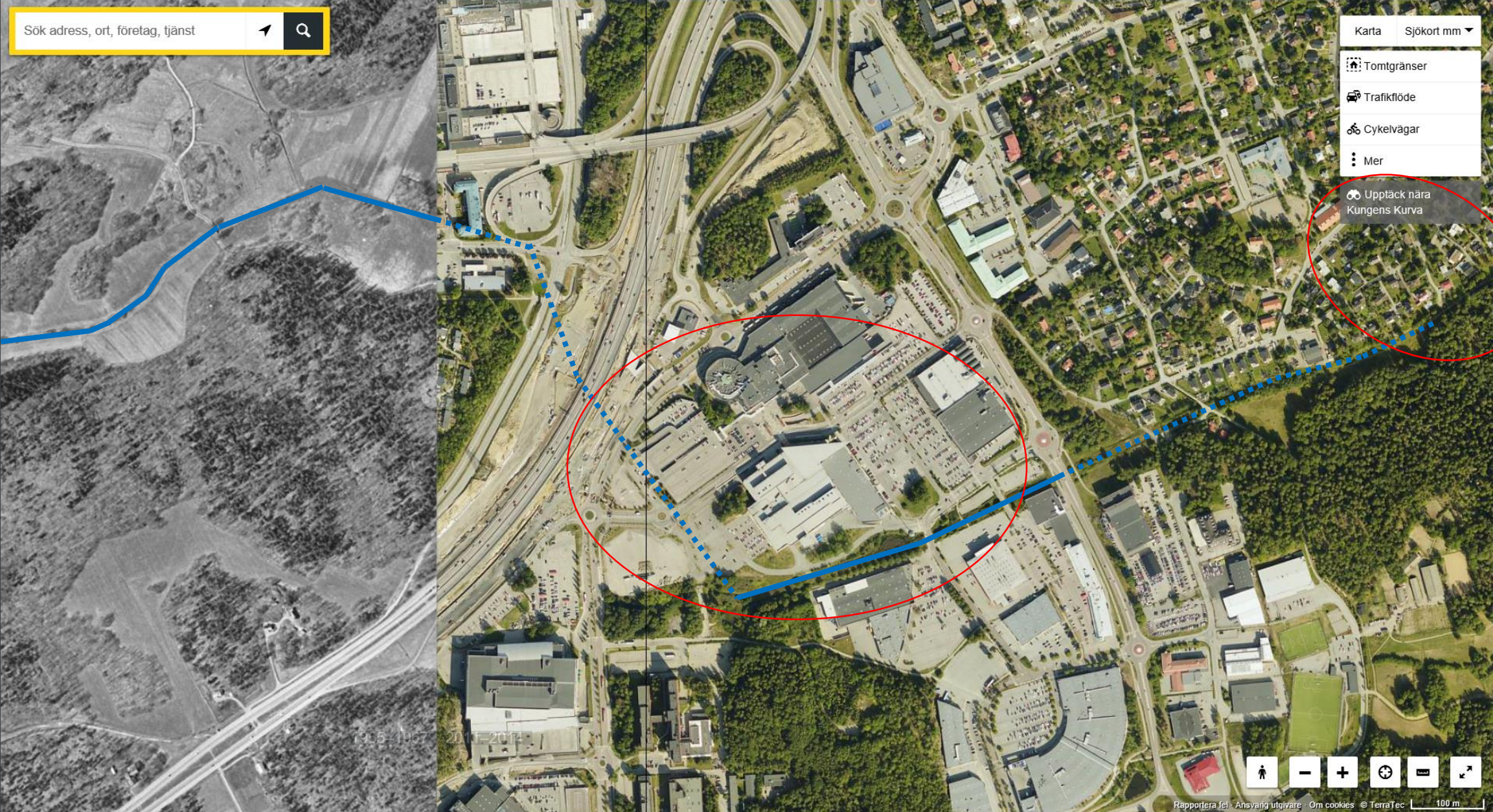


1955-1967 2011-2014

Sök adress, ort, företag, tjänst

- Karta Sjäkort mm
- Tomtgränser
- Trafikflöde
- Cykelvägar
- Mer

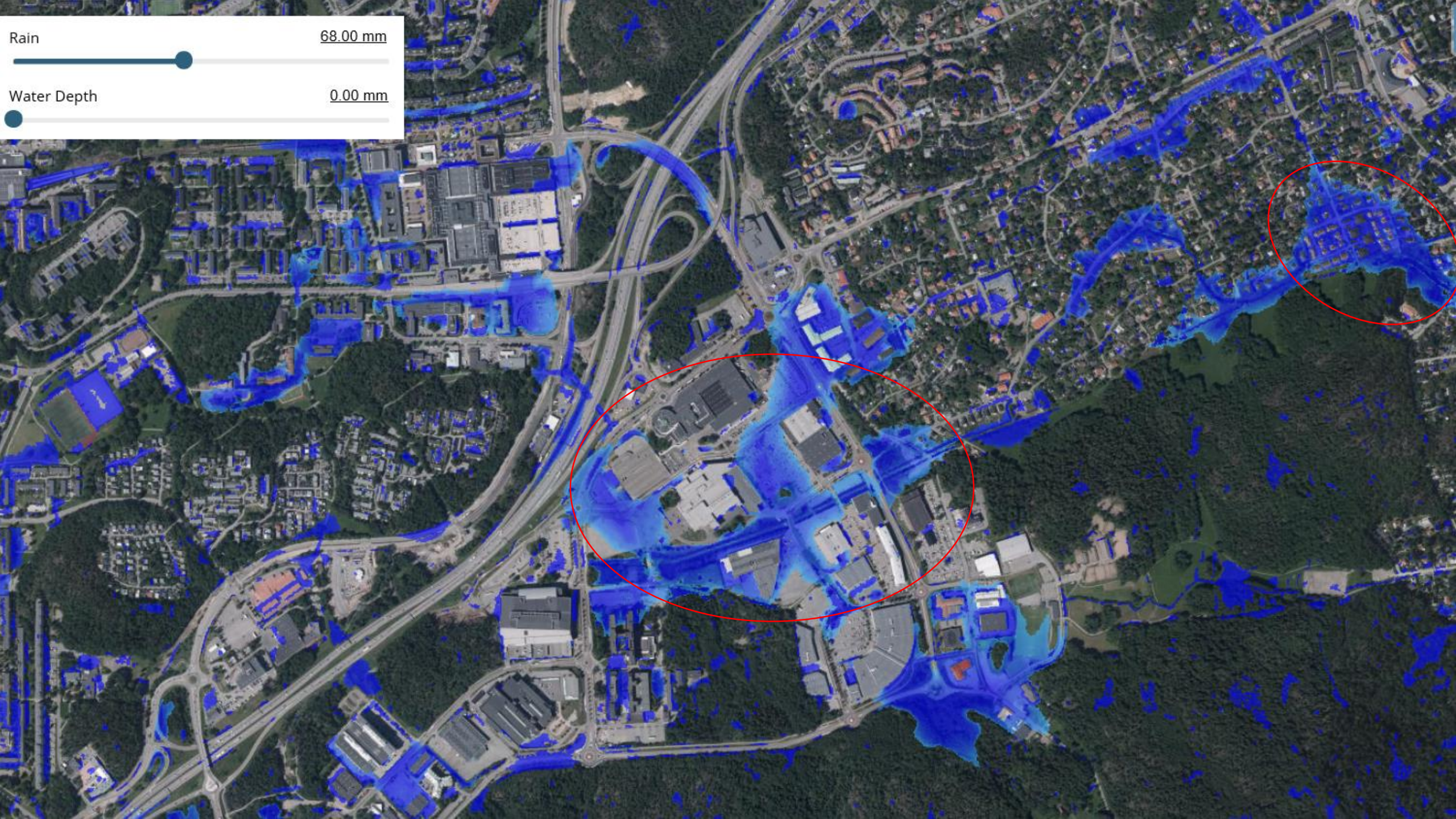
Upptäck nära Kungens Kurva



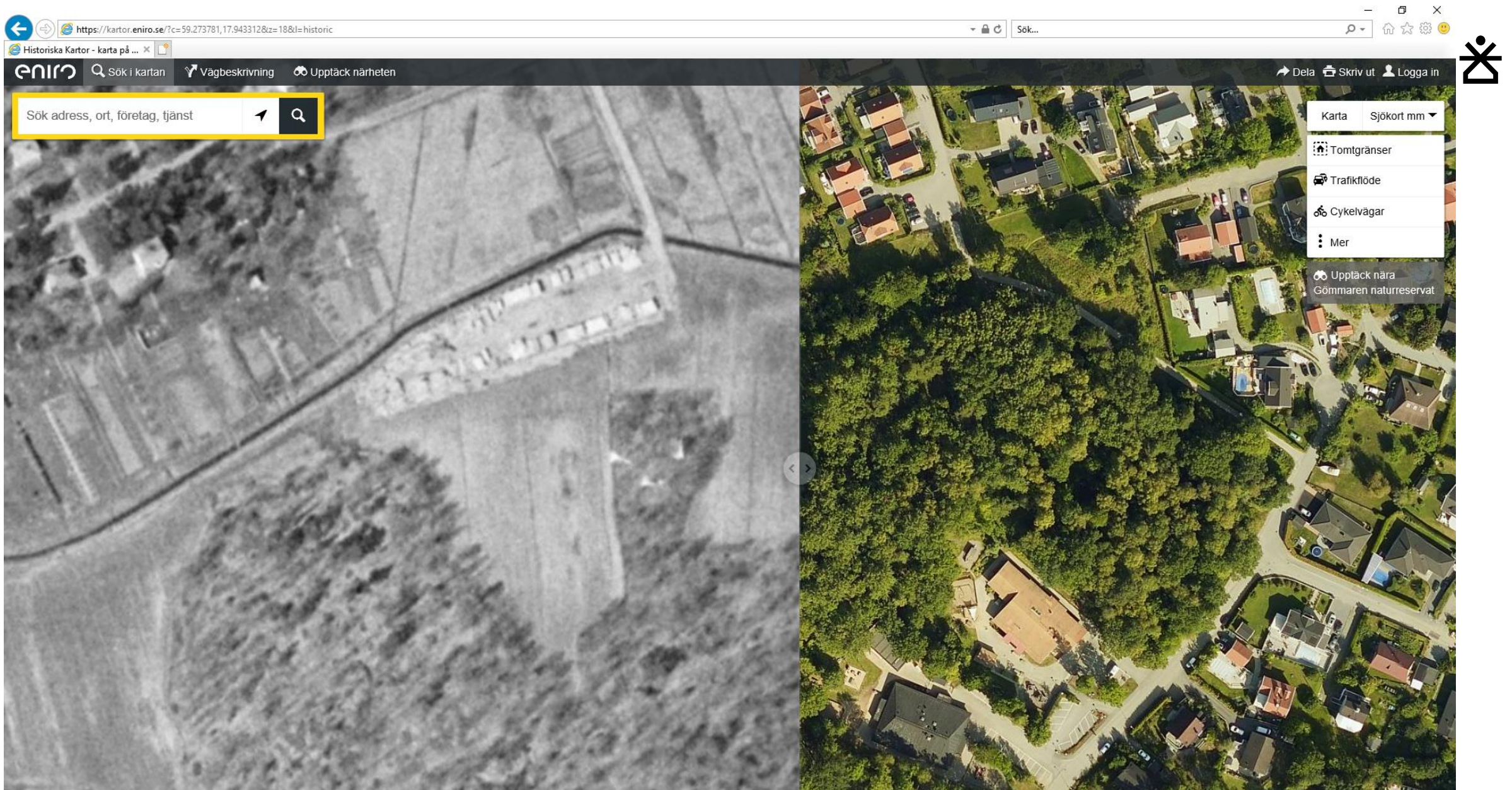
1955-1967 2011-2014

Rain 68.00 mm

Water Depth 0.00 mm



LESSONS LEARNED IN EVERY PROJECT

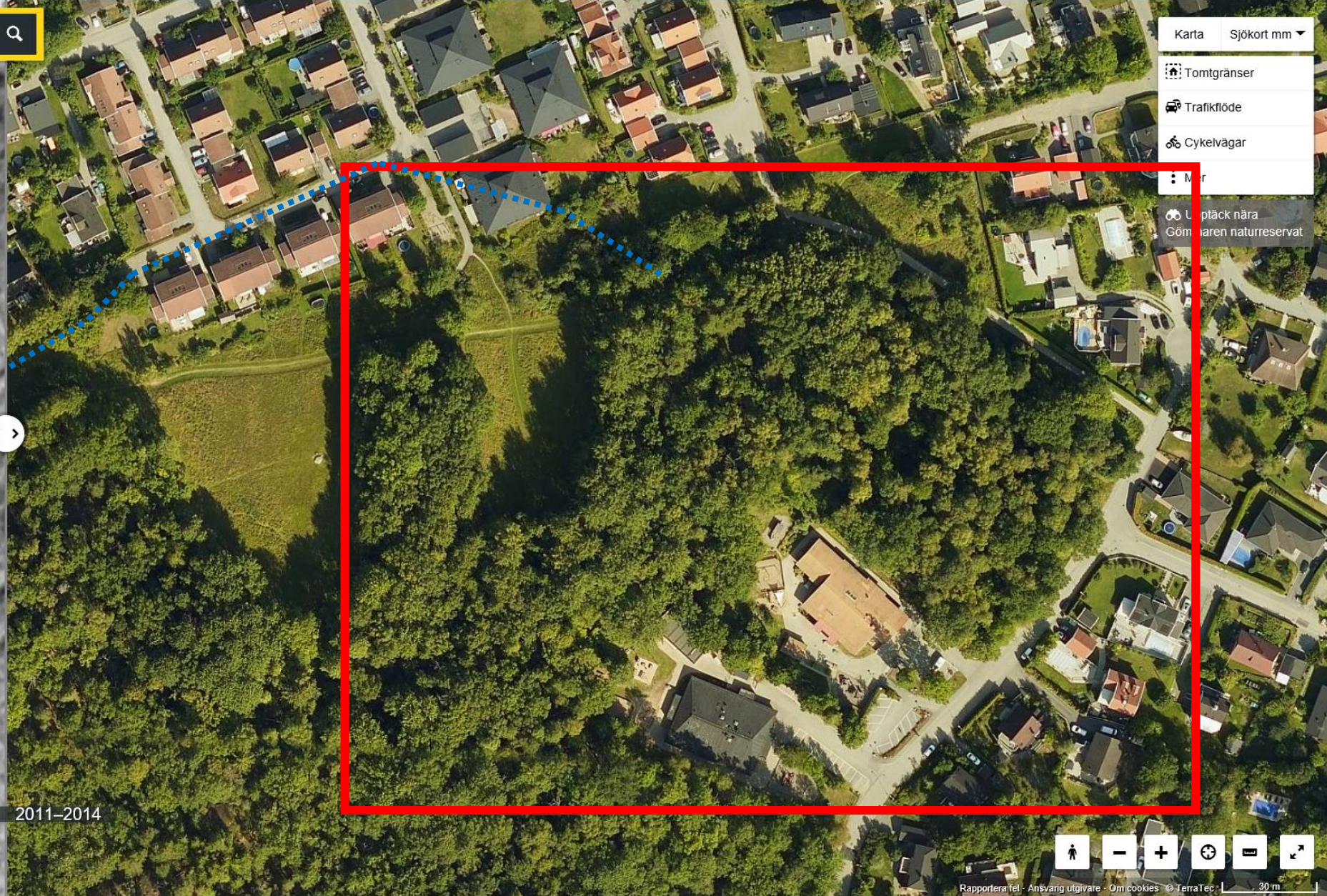


A school is planned in an area needed for flooding mitigation

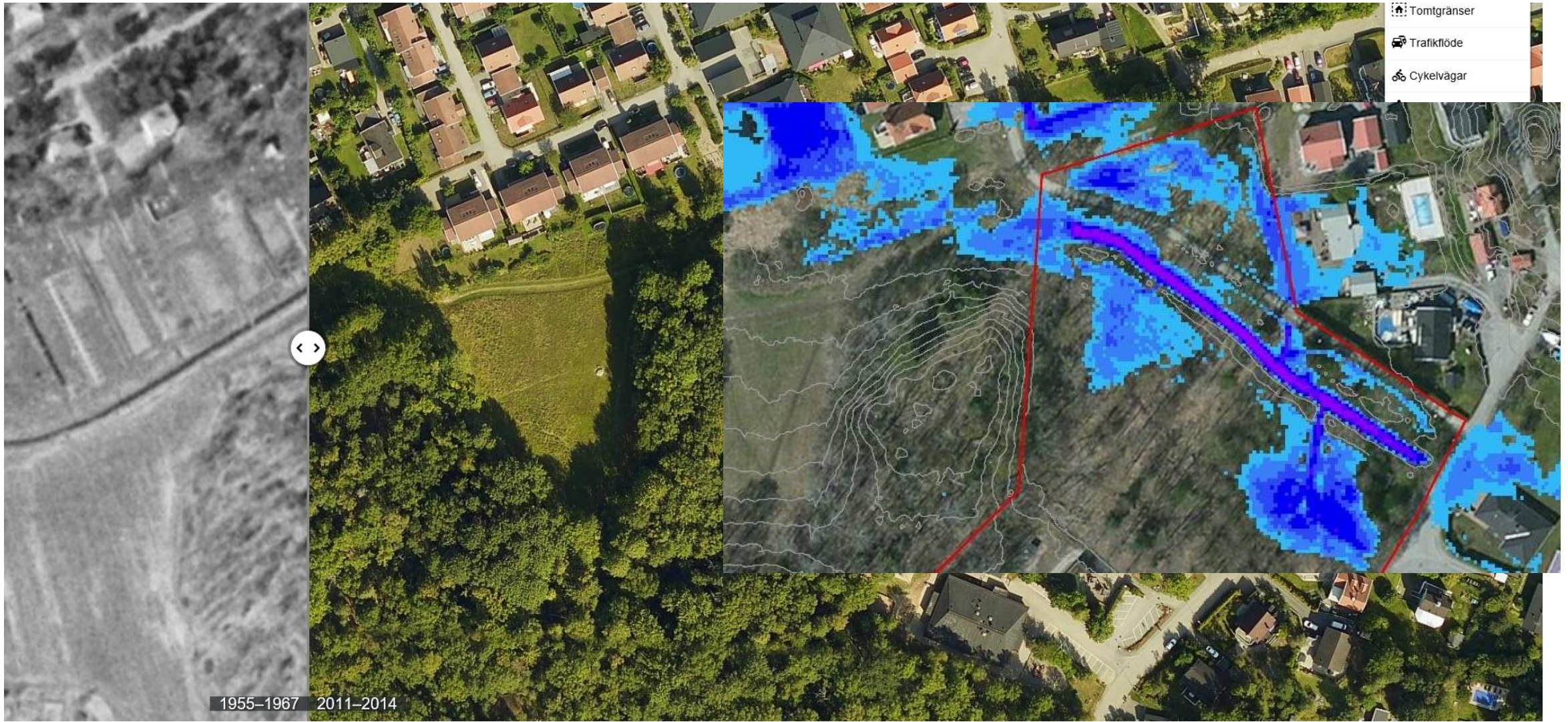
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1955-1967 2011-2014



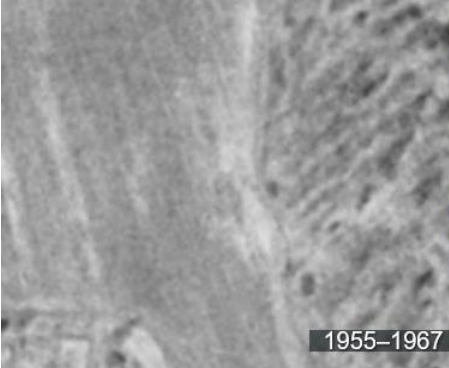
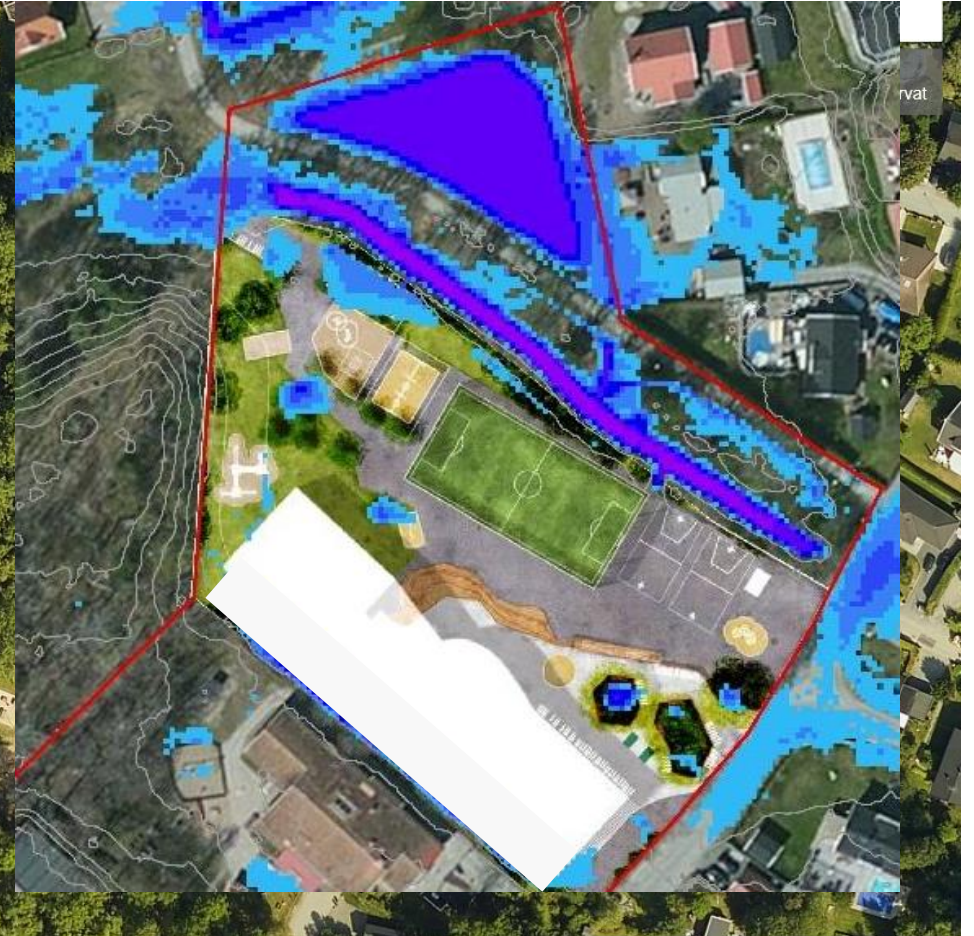
- Karta Sjäskort mm
- Tomtgränser
- Trafikflöde
- Cykelvägar
- Uppptäck nära Gömaren naturreservat



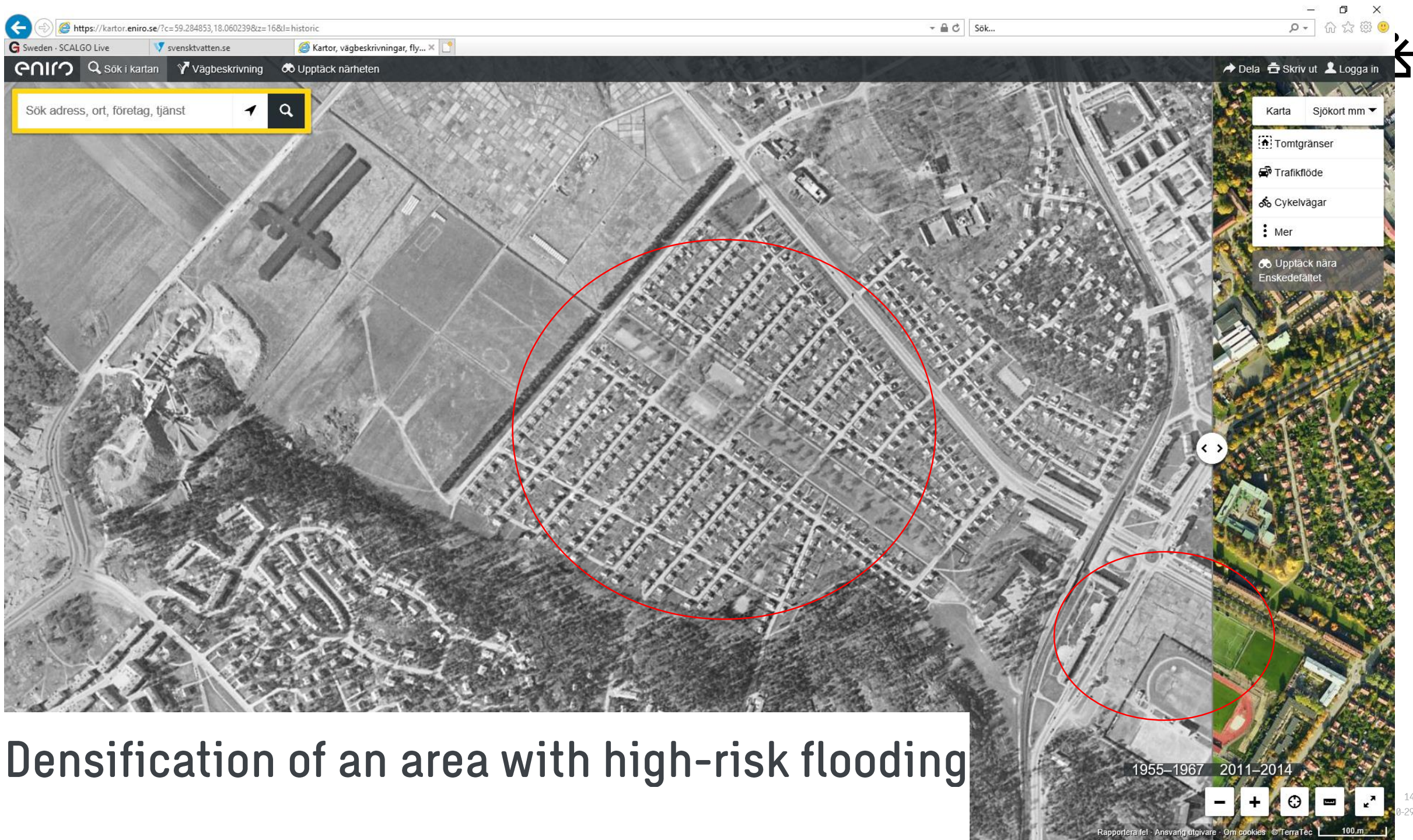
1955–1967 2011–2014

GENDIATUR, QUE REIUNT EXPLABO. UT ASINCTIIS DE
VOLLACCAB ISUNT ET EOS QUATIANDANDI DELLECU LLUPTIIST

Local climate adaptation arrangement: #1 - Frog pond

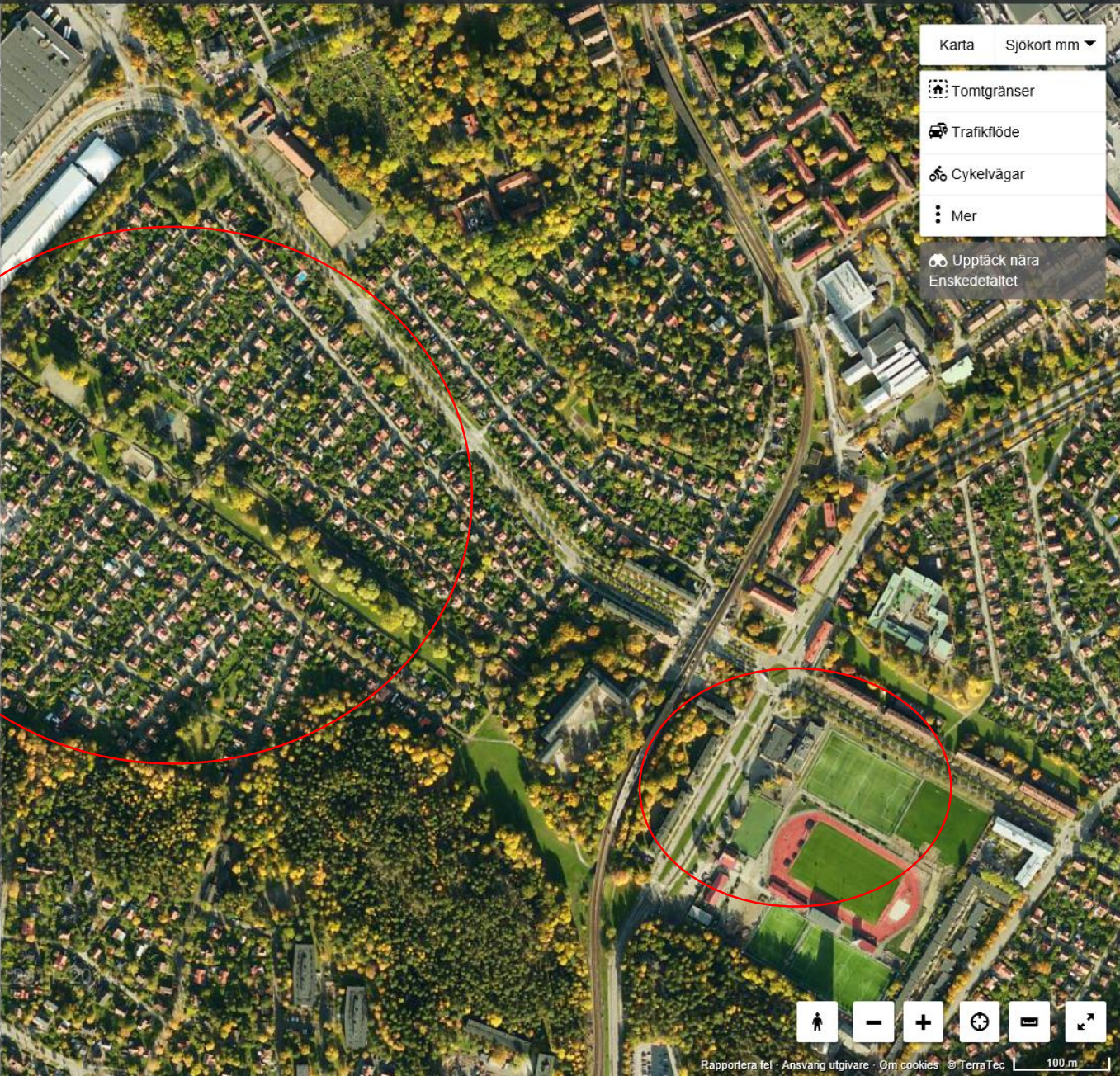


1955–1967 2011–2014



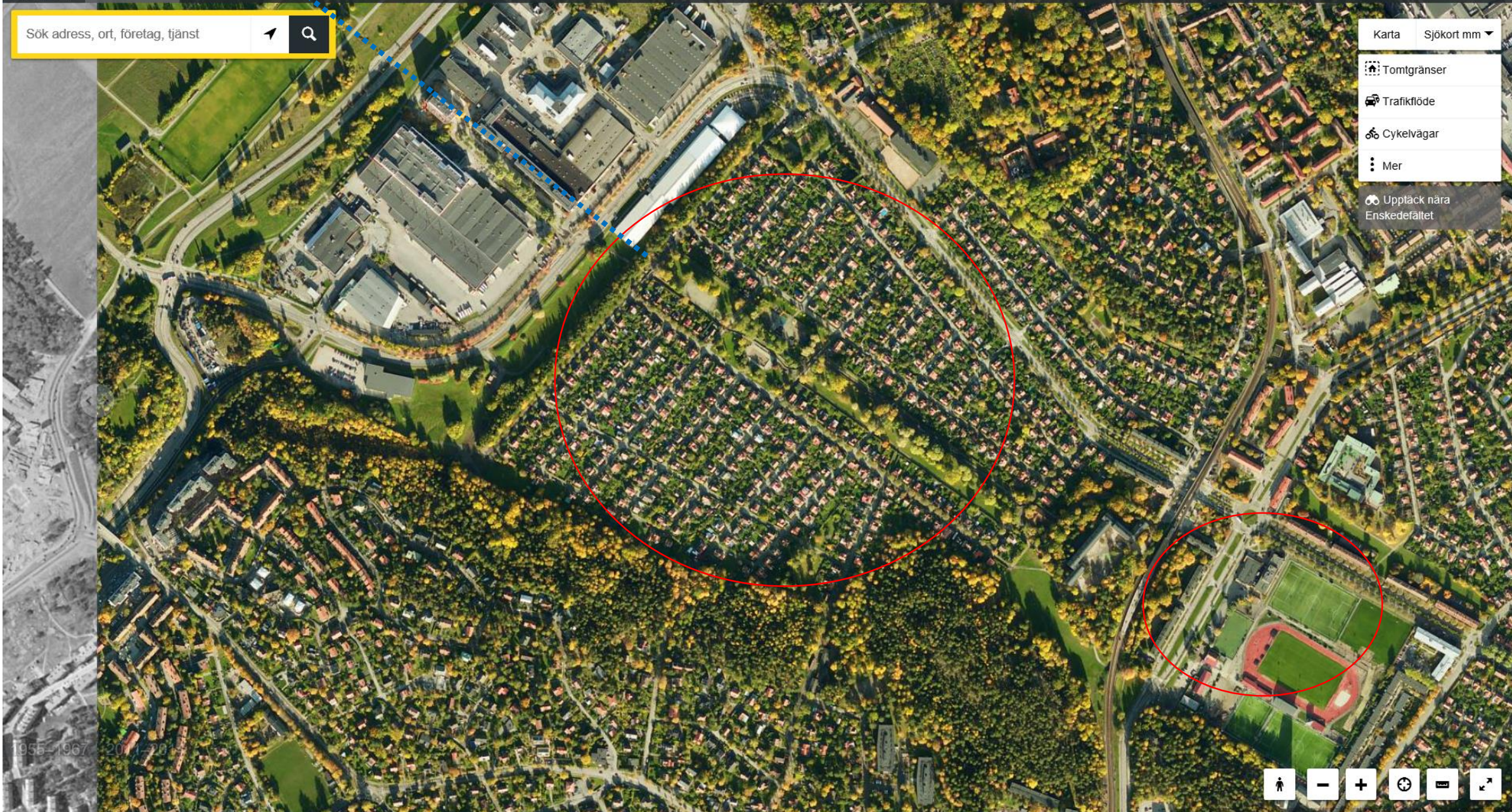
Densification of an area with high-risk flooding

1955-1967 2011-2014



Sök adress, ort, företag, tjänst

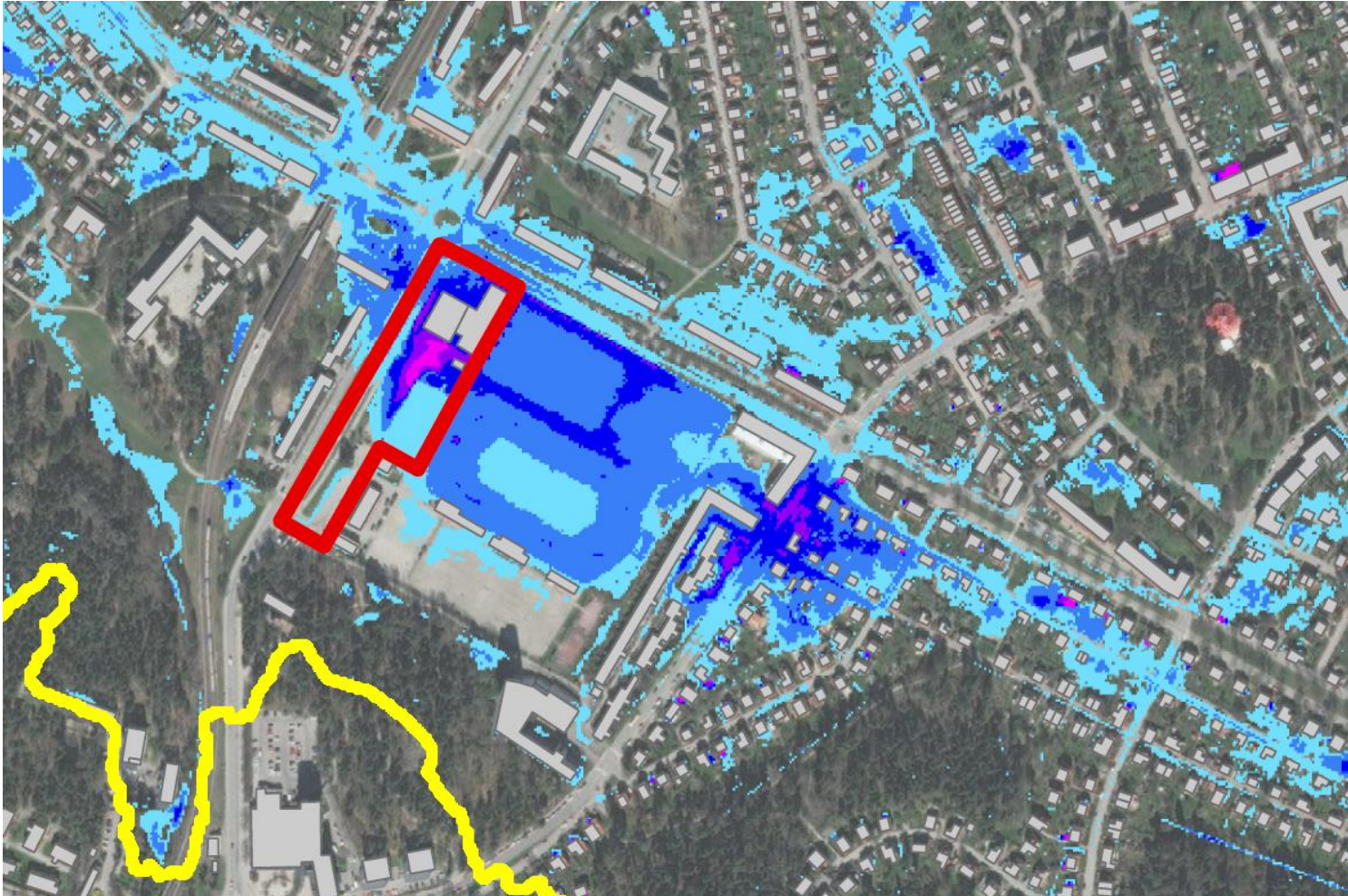
- Karta | Sjökort mm
- Tomtgränser
- Trafikflöde
- Cykelvägar
- Mer
- Upptäck nära Enskedefältet



1956-1967 | 2011-2015



Densification of an area with high-risk flooding -before mitigation



Local climate adaptation: #2 – A one meter high wall with a multifunctional area



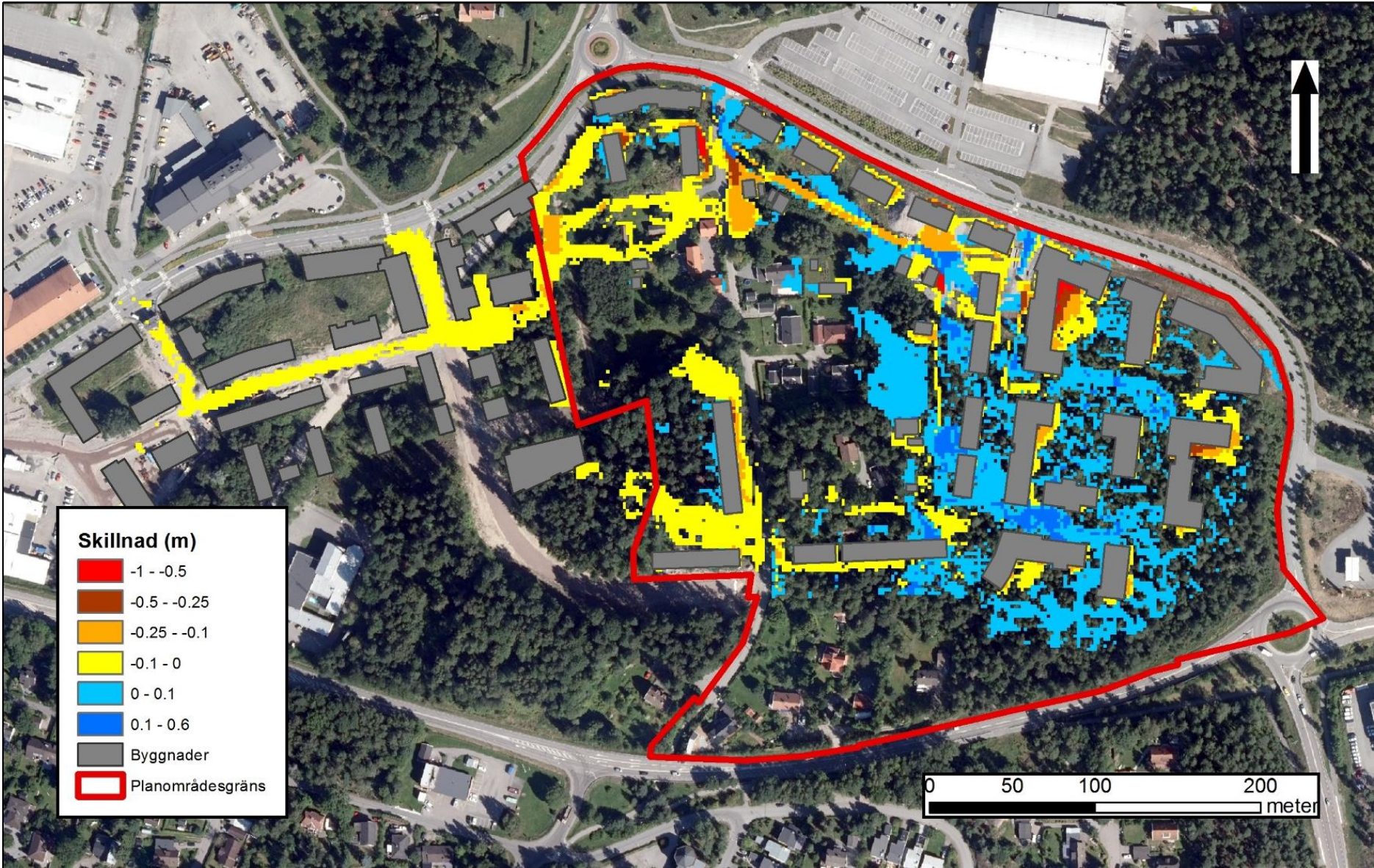
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Local climate adaptation arrangement: #3 – Larger gutters and pipes



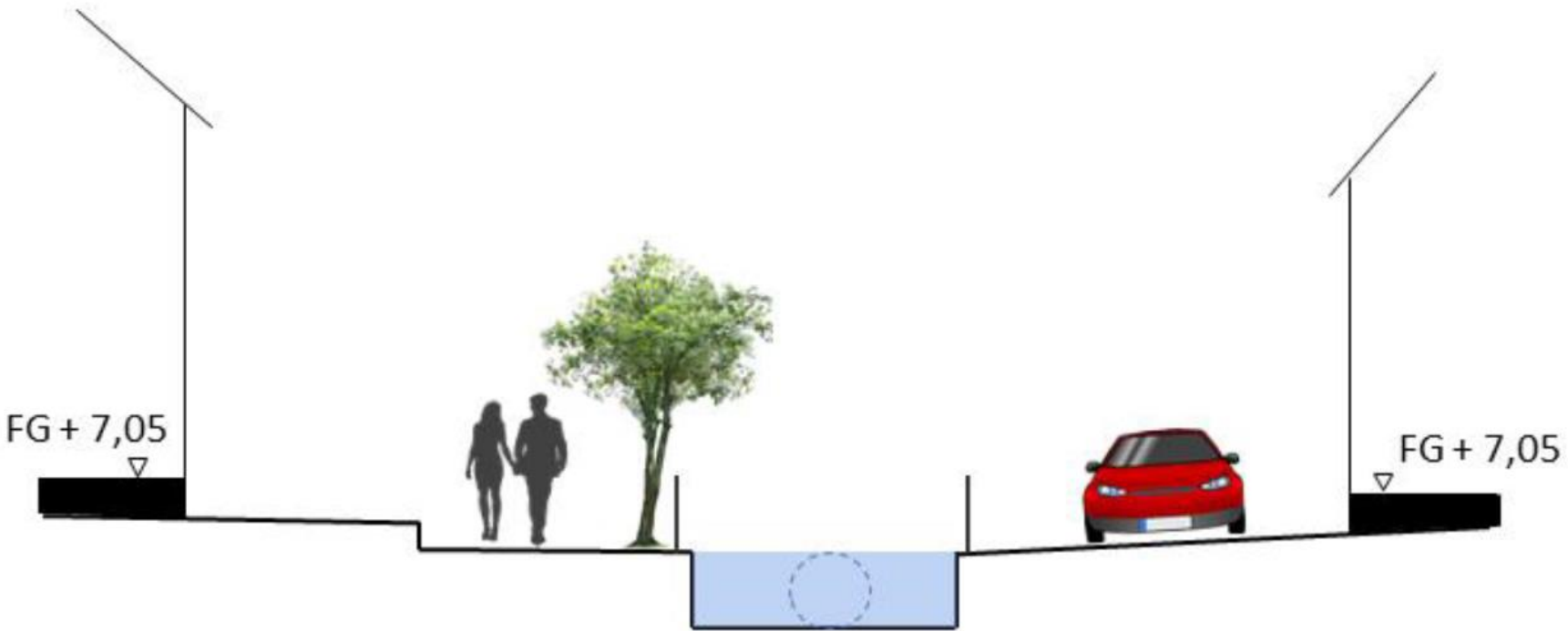
Local climate adaptation arrangement: #4 - Elevated entrances and using the road as a flooding platform <math>< 0,3\text{m}</math>

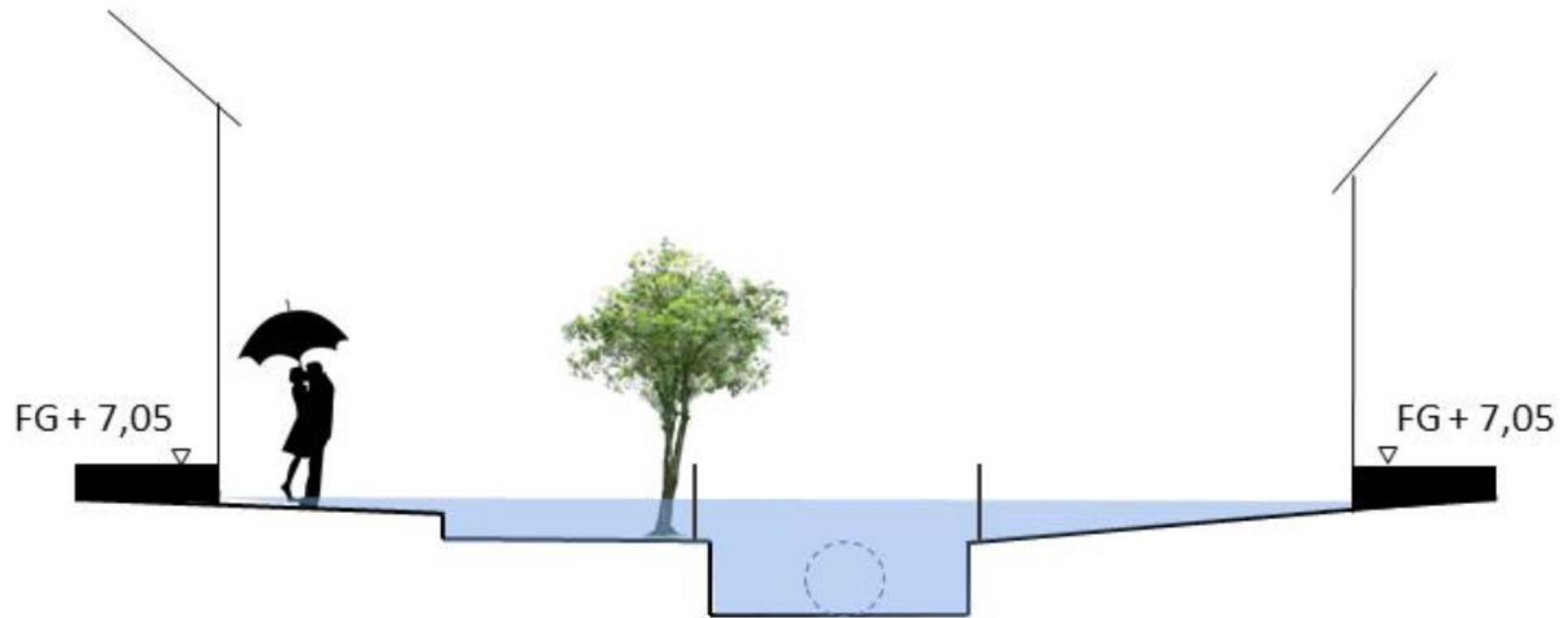




Local climate adaptation arrangement: #5 - "Skyfallsleder" - the old water course in a new urban context









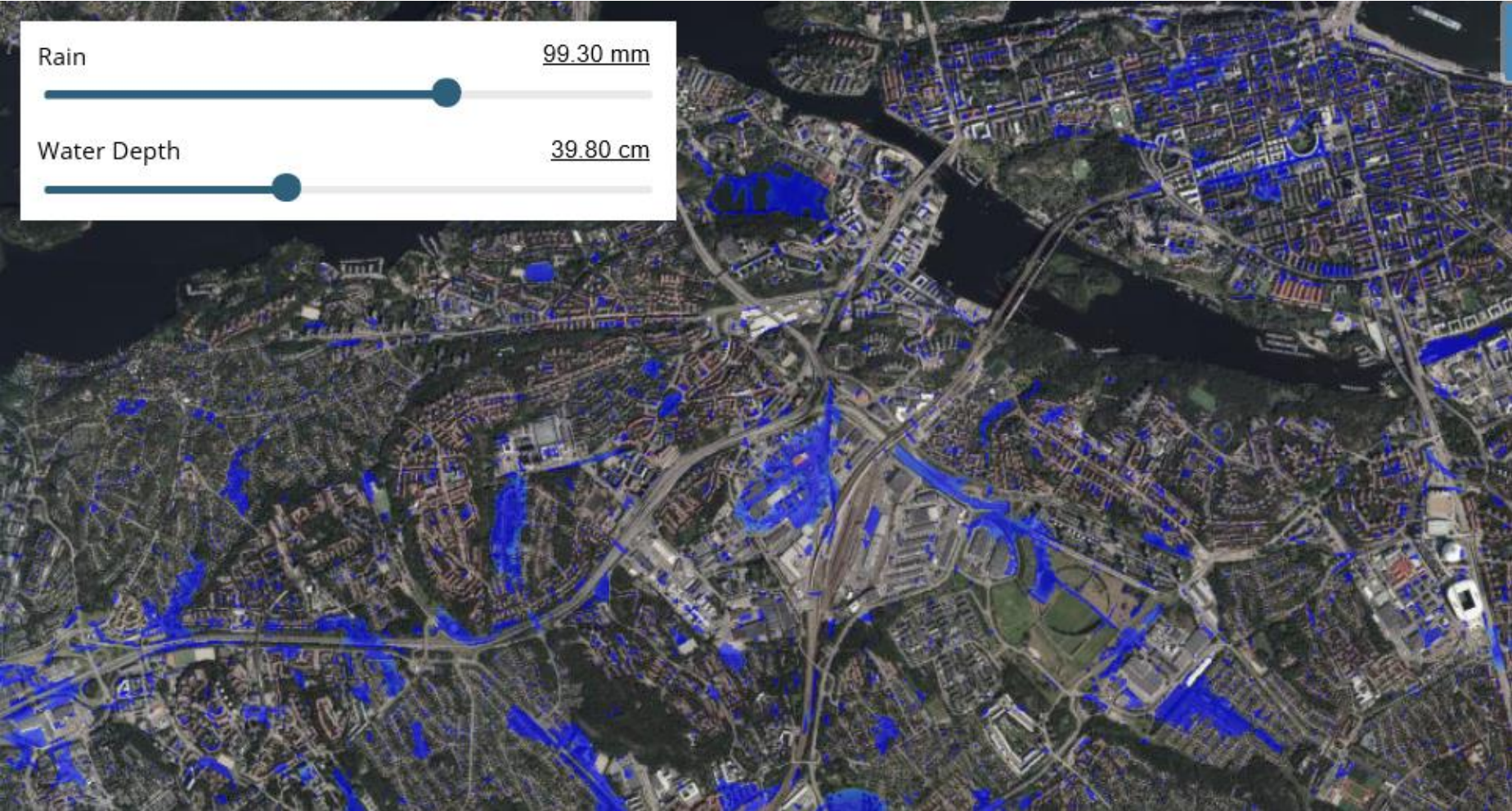
GENDIATUR, QUE REIUNT EXPLABO. UT ASINCTIIS DE
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Local climate adaptation arrangement:
#6 - Create space for new "blue-green" solutions
Find solutions/laws to share investments and maintenance of the
"blue-green" infrastructure





Finally - Local climate adaptation arrangements are expensive –
 Need a unified strategic plan to keep the undeveloped "blue" areas "blue"



WAYS FORWARD

Suggestions for new laws

- Law of duty to map areas with risk of flooding due to cloudburst in municipal master plan (PBL/ÖP)
- Law of good infiltration capacity (PBL)
- Law of shared storm water arrangements (transboundary water management on a small scale)
- Law of renaturalisation of water courses and wetlands

A long bridge spans across the ocean under a dramatic sunset sky with pink, orange, and blue clouds. The bridge has a series of concrete piers and a truss-like structure. The SWECO logo is overlaid in the center of the image.

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