



Malmö





A growing city

- Sweden's third largest city
- Out of just over 313,000 inhabitants, half are under 35
- In 2021, we will have 350,000 inhabitants



A global meeting place

- 31 % of the city's inhabitants are foreign born
- 177 nationalities are represented
- Over 150 different languages are spoken in the city



The engine of an expanding region

- The Öresund region has 3.8 million inhabitants
- 250,000 companies and 1.8 million employees
- 14 universities and 140,000 students
- 11 million people commute by train over the Öresund Bridge every year
- Over 4 million inhabitants in Öresund by 2022



A sustainable urban development

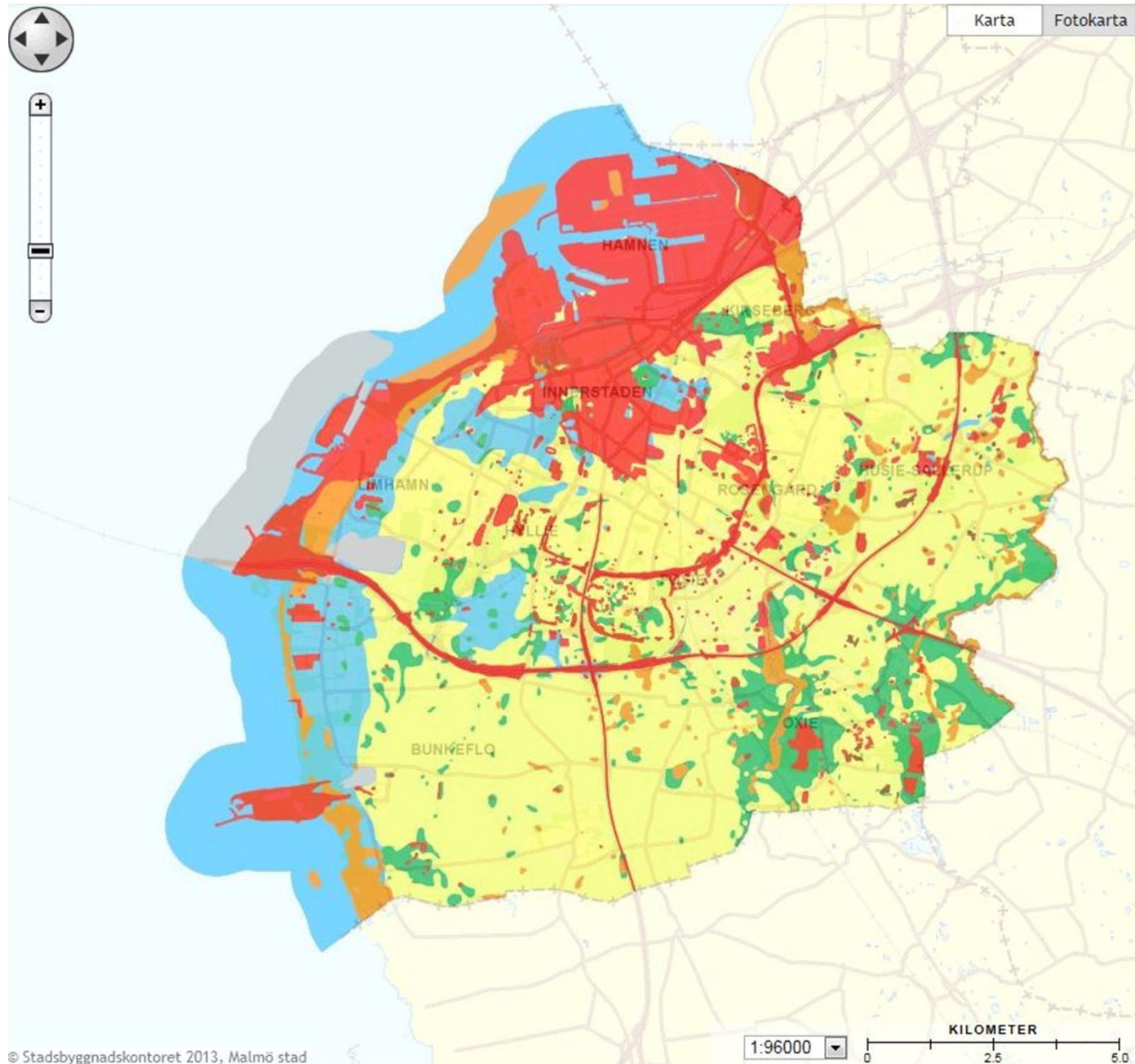
- Hyllie - a global model for sustainable urban development
- The eco-city Augustenborg – a socially, economically and ecologically sustainable residential area
- Västra Hamnen – dense urban development in an environmentally friendly way
- Fairtrade City since 2006
- The plan is to build about 1,000 new homes in Malmö per year between 2014-2019



People in focus

- Moving from an industrial city to a knowledge city has been done – now Malmö is becoming a socially sustainable city
- The overall goal is to reduce the disparities in health amongst people
- Focus on people - more Malmö residents should be able to support themselves through work, more should end up with degrees and more should have a good living situation
- In 2020, Malmö is the world leader in sustainable urban development

Geology of Malmö

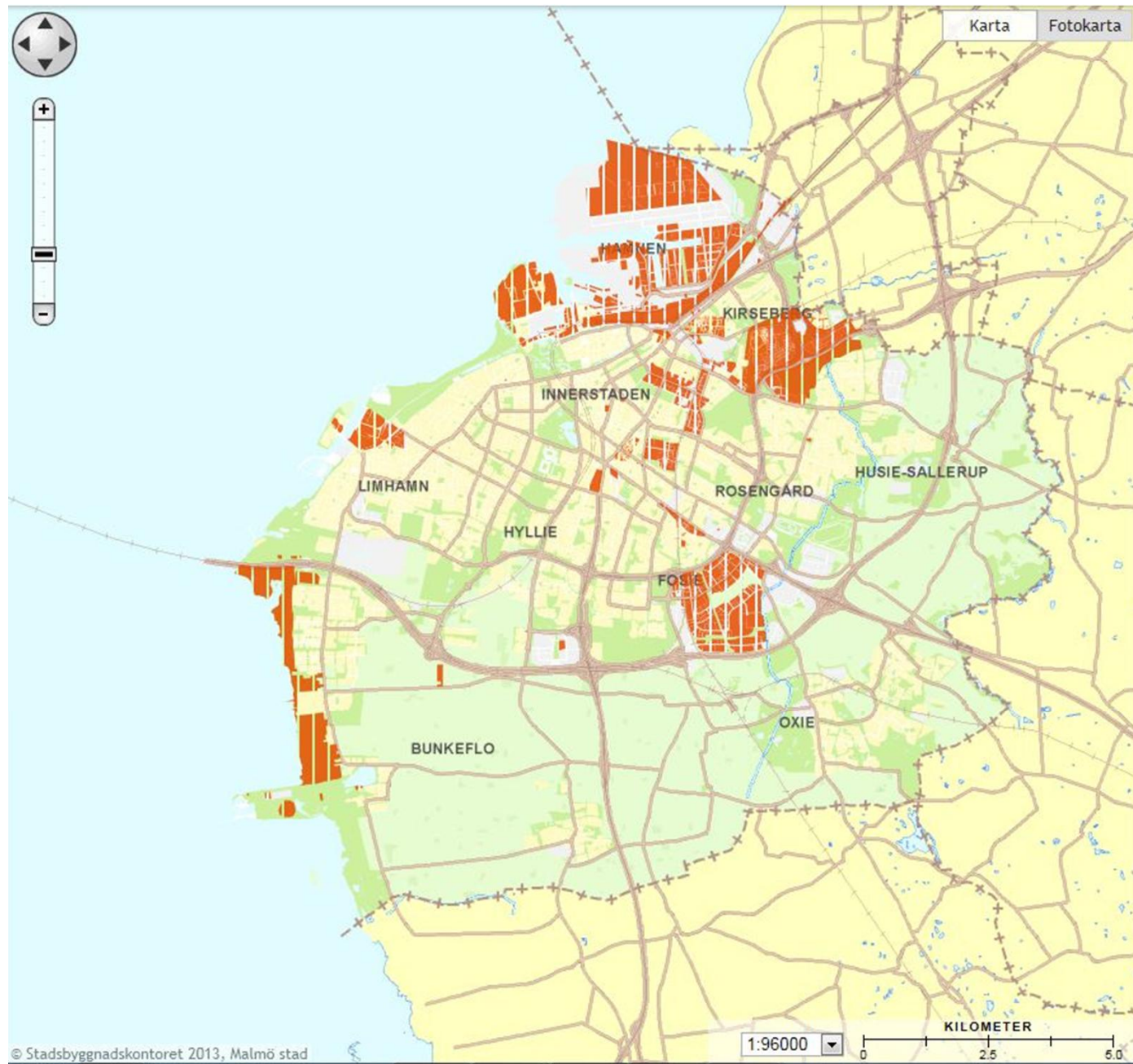


- Filling /Aggregates
- Peat
- Upper sediment
- Upper moraine
- Lower sediment
- Lower moraine
- Rock

Källa: SGU - Sveriges Geologiska Undersök



Probably contaminated land



Some projects and experiences

- Hyllie; Virgin agricultural land
 - Lime stabilization – PEAB SwePave metod
 - Topsoil removed, roller concrete (Vältbetong) mixed into clay
 - Difficult with piping = condition: open stormwater solutions
- Norra hamnen and Västra hamnen; Landfill
 - similar methods

Developers do not trust the stability
Piling preferred "just to be on the safe side".
Part of the culture within construction

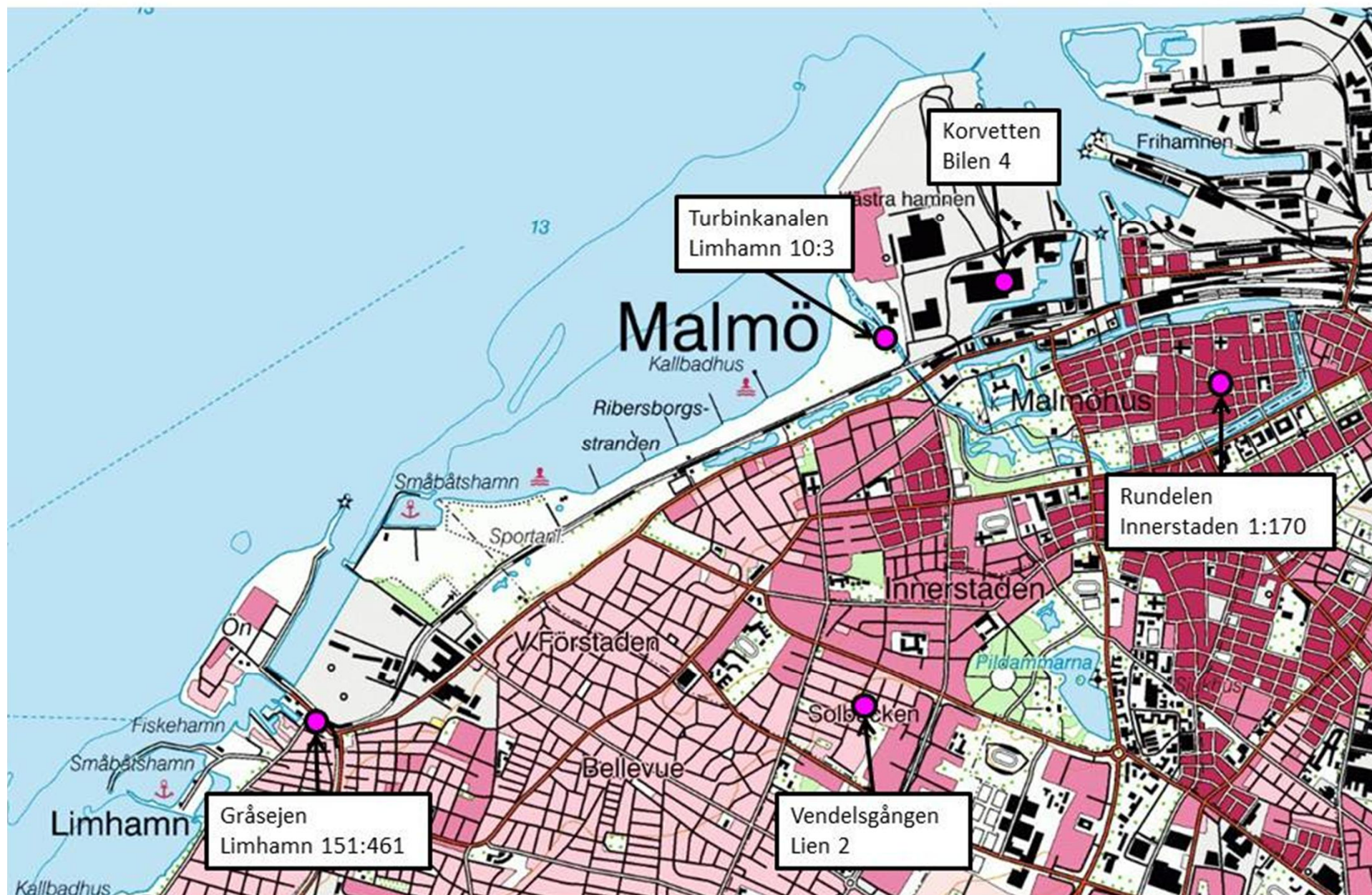
The Soil Environment Project - Markmiljöprojektet

- Environmental control of contaminated land often means measures taken at greater depths
- The Risk assessment should be based on a Cost-benefit analysis
- Si is there something to protect there at greater depths?
- And if so, what is the benefit to protect this environment?

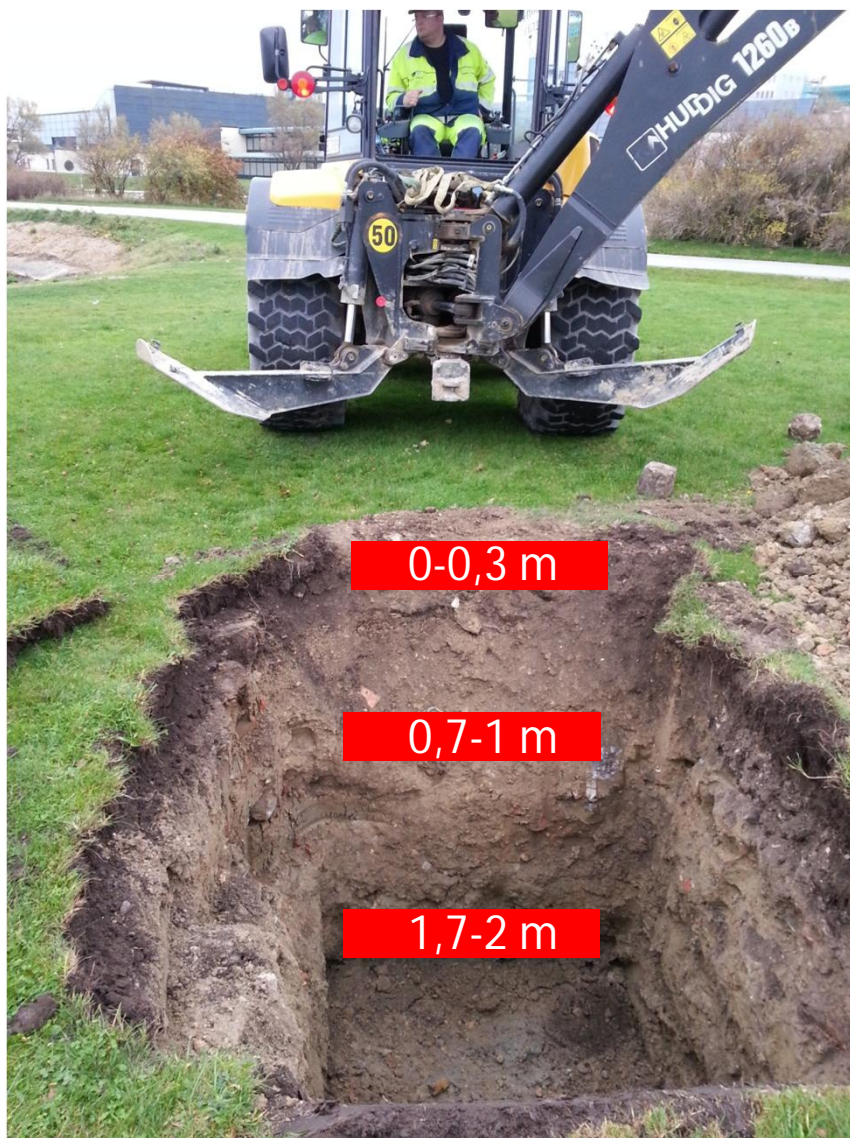


The results are only viable for Malmö

5 sites



— Sampling



Analyses

Chemistry:

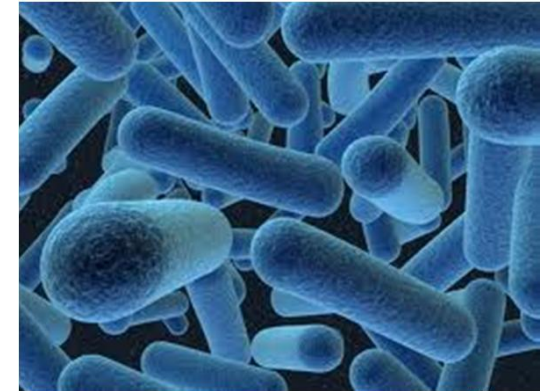
- metals
- oil hydrocarbons
- PAH
- TOC

Organisms:

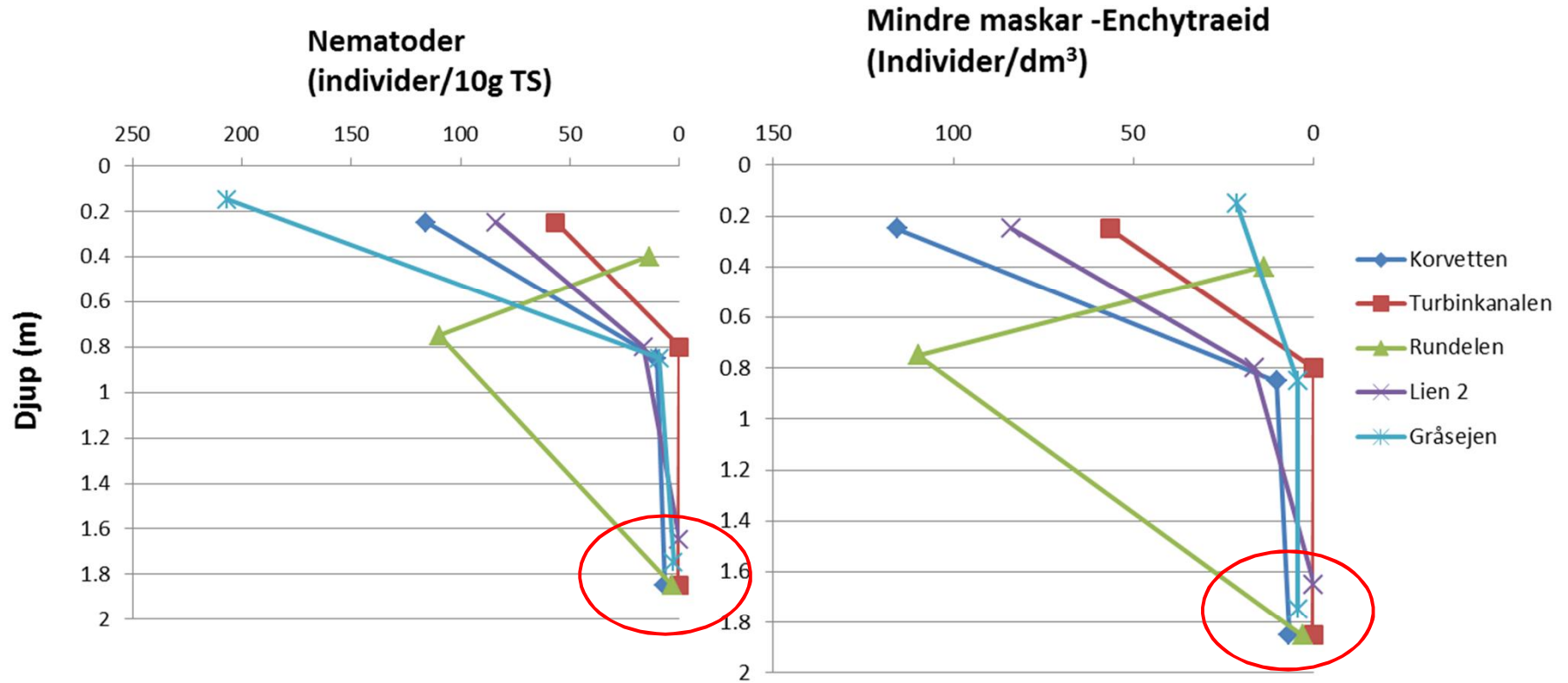
- Earthworms (Oligochaeta)
- Smaller worms (Enchytraediae)
- Springtails (*Collembola*)
- Nematods (*Nematoda*)

Biological soil processes:

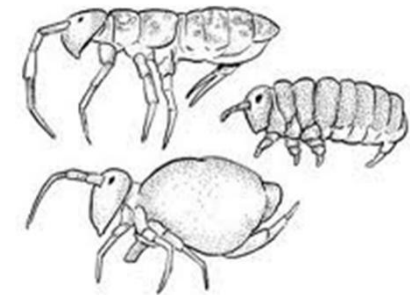
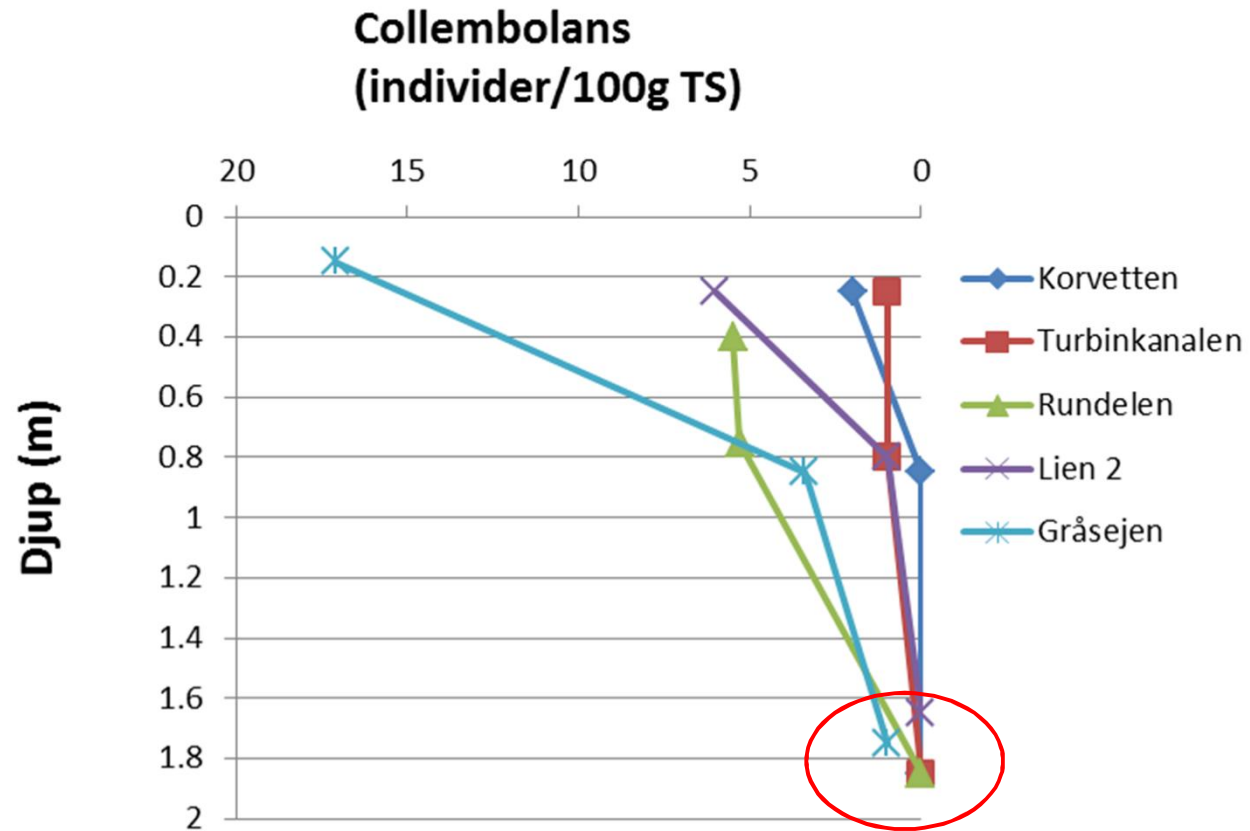
- Nitrification
- Soil Respiration



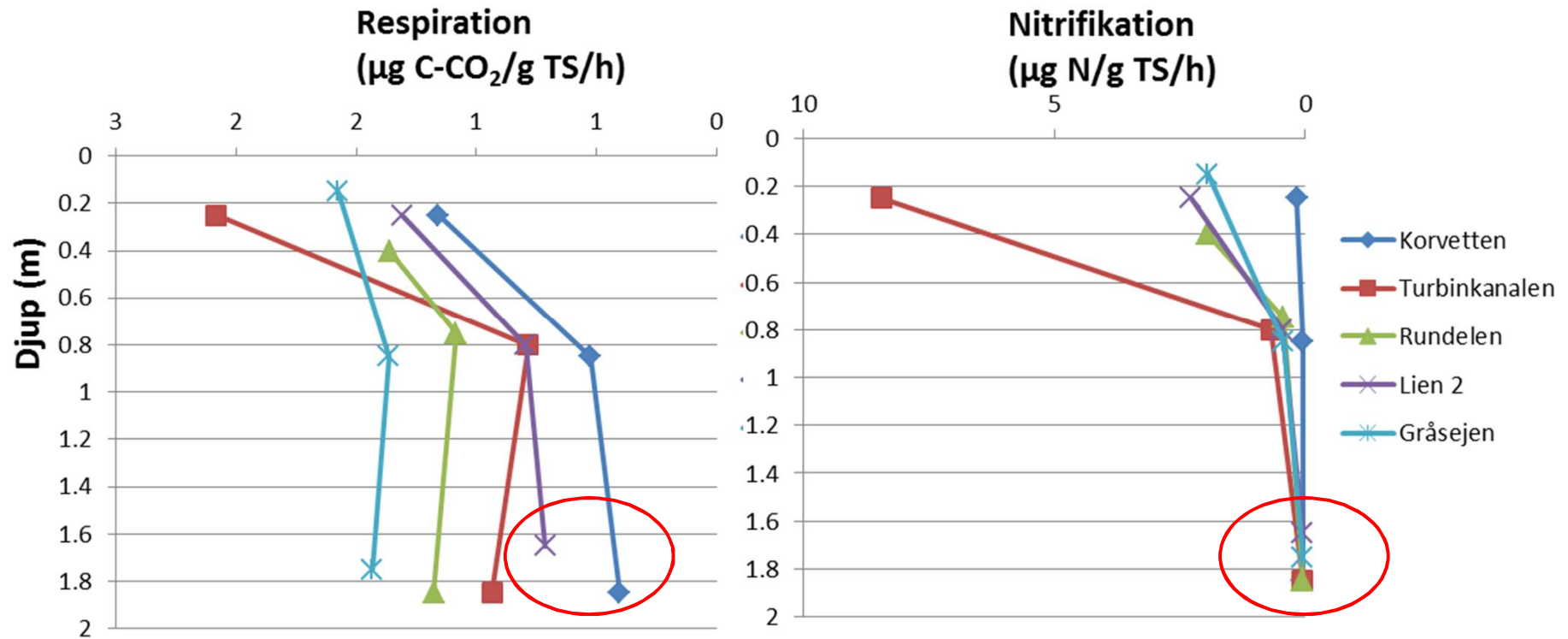
Results organisms



Results organisms



Results soil processes



Respiration / CO₂ is partly a methodological artifact. Samples from greater depths brought up, agitated, gets oxygen and increased temperature which gives growth and microbial respiration even though this activity does not really exist at greater depths in the field

Conclusions

- Number of organisms are most numerous in the top layer, and the number decreases with depth
- None or almost no organisms at depths > 1 m
- No nitrification at depth > 1 m
- Low biodiversity at depth > 1 m



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- Very little / nothing to protect under 1 m
 - Benefit of measures?

Next steps

- More sites needed to confirm results
- Discussion of the results with the Swedish EPA
- Testing of the approach in a real Risk Assessment case



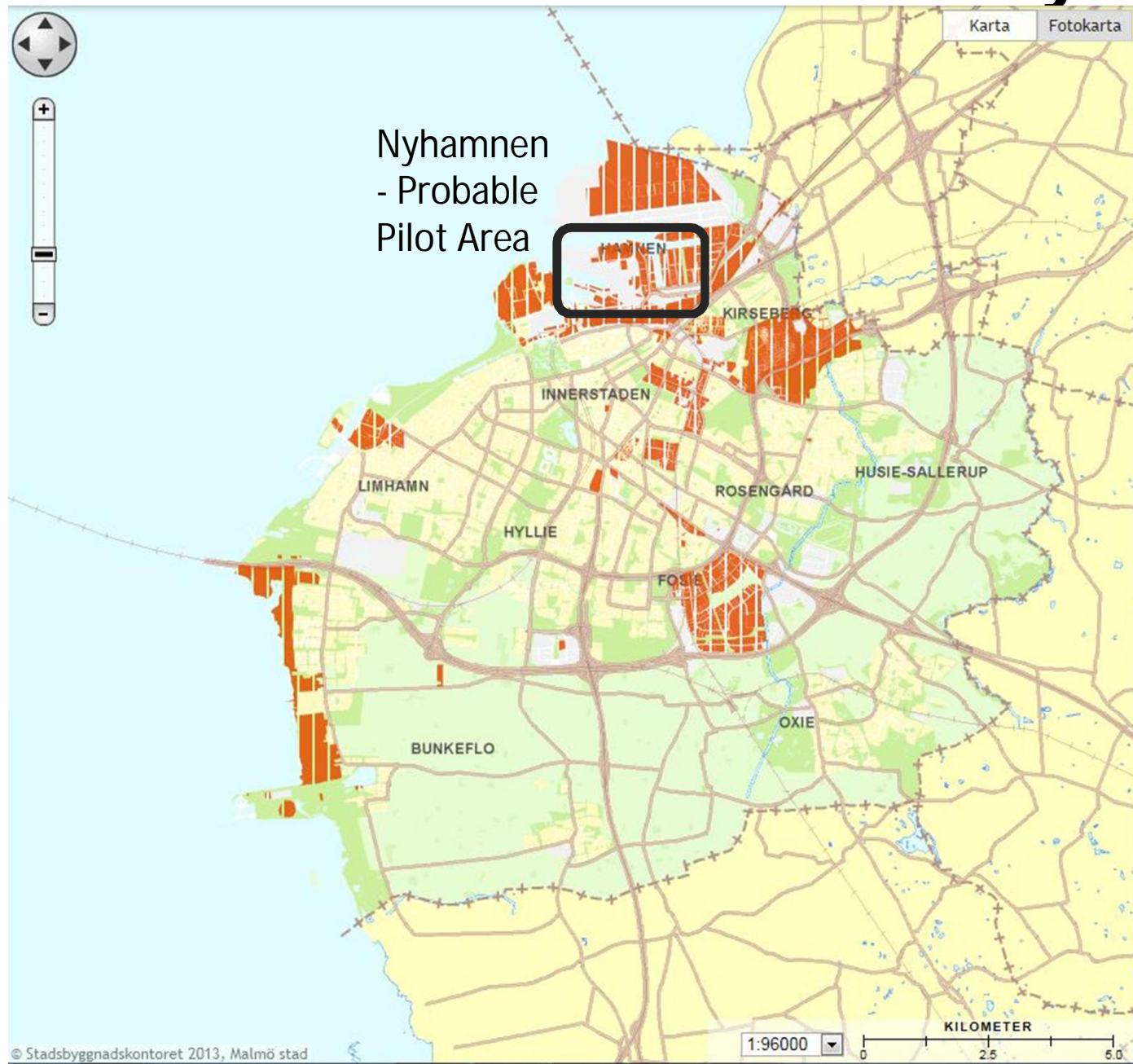
Other interesting Topics

Strategy for sampling and quality assessment "all the way",
i.e. all samples can be used for the next step
(if there is a need for more detailed knowledge)

Socio-Economical Aspects of an optimized, low transport Quality assurance of a development area,
i.e. is there a possibility that it can lead to less segregation, more socio-economically mixed areas? (societal costs, cost of living versus level of profit for developers)

Holistic LCA-based strategy to remediate and stabilize soil AND Climate adapt (esp Sea Levels) in a development area

Potential Pilot Area Nyhamnen



Potential Pilot Area Nyhamnen

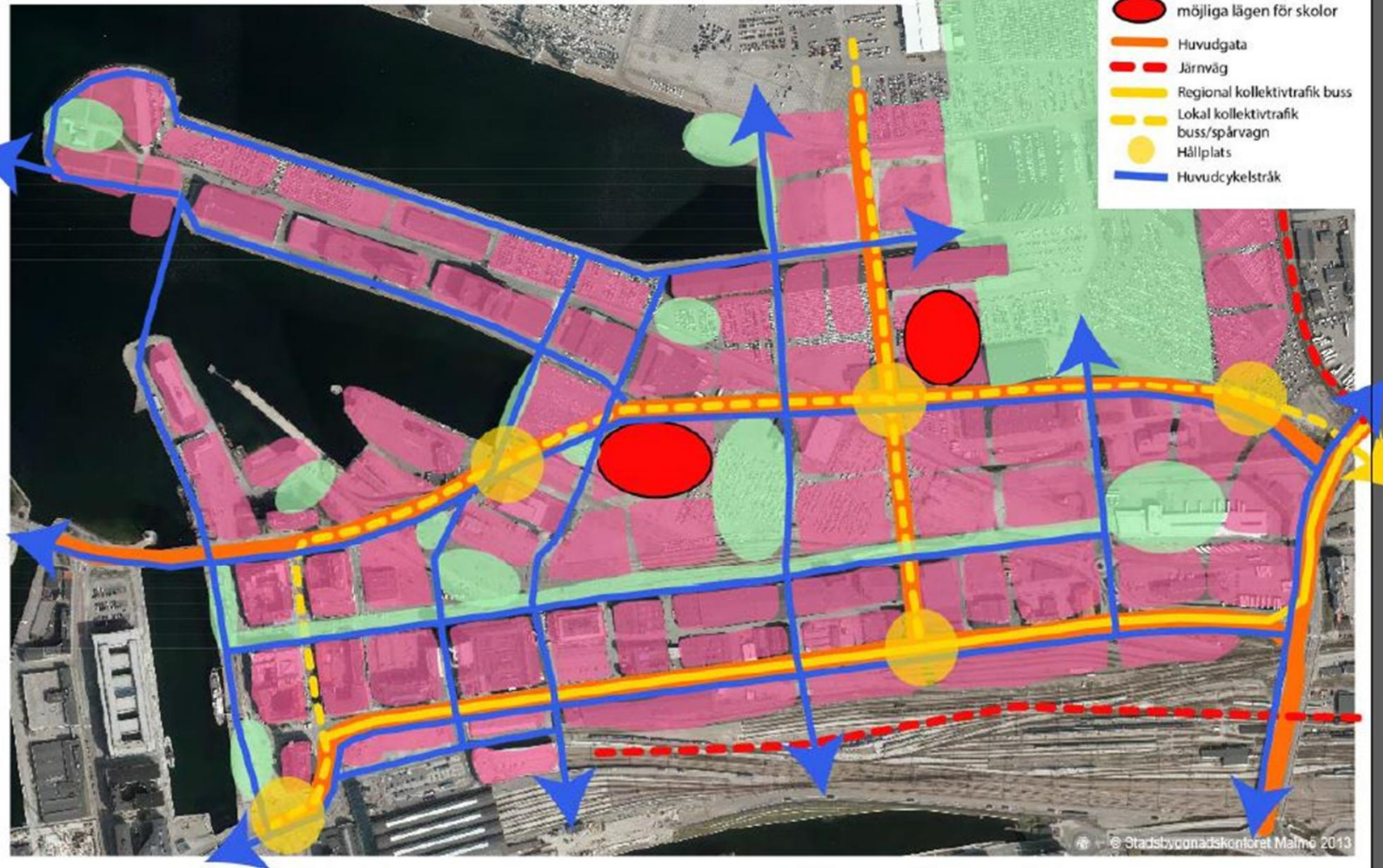


- ca 2,4 km²
- 2-2,5 m above sea level

ÖP2037 Nyhamnen - övergripande Struktur – 2014-09-01

kollektivtrafik – cykel - skolor

- Blandad stadsbebyggelse
- Park, rekreation
- möjliga lägen för skolor
- Huvudgata
- Järnväg
- Regional kollektivtrafik buss
- Lokal kollektivtrafik buss/spårvagn
- Hållplats
- Huvudcykelstråk



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ÖP2037 Nyhamnen - övergripande Struktur – stråk och mötesplatser
2014-09-01





The attractive city

