Greenhouse gas emission and sustainability of green roofs and storm water system on a district level– comparisons with a lifecycle perspective

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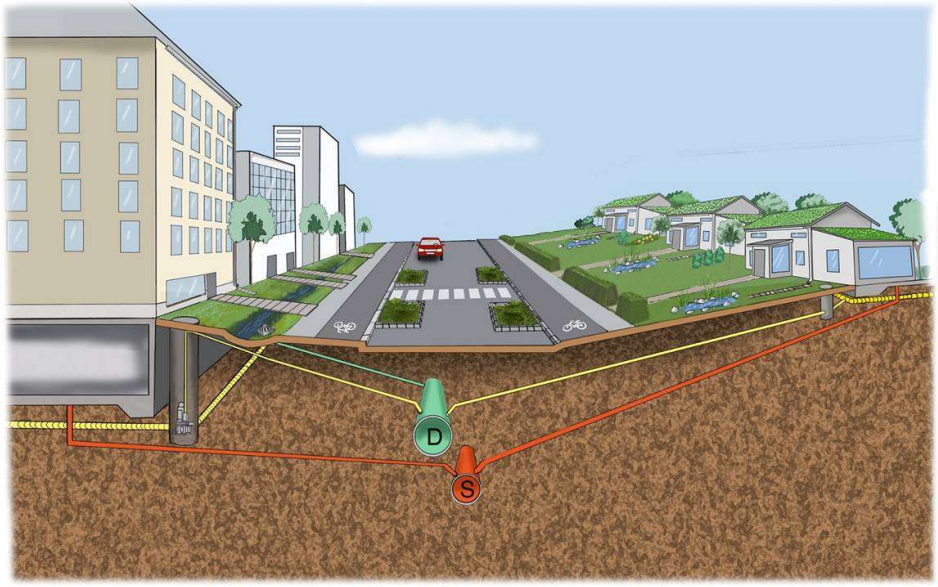
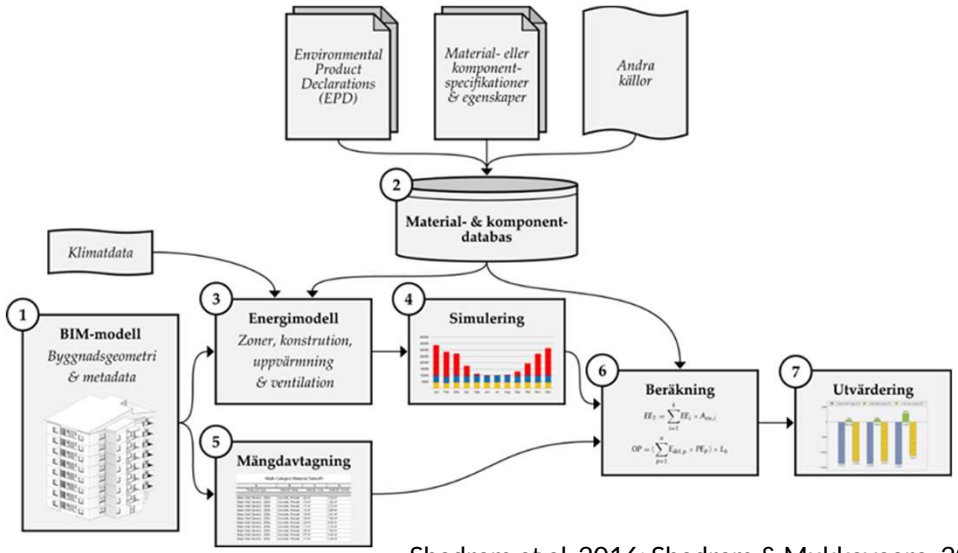
Hypothesis

- Green roof might have a higher impact on GHG due to more material
- Green roofs reduce and retain stormwater
- This might lead to reduced greenhouse gas emission if an upgrade of existing systems is not necessary.



Developed framework for sustainable design

- **BIM model**
  - Quantity takeoff
- **Energy model**
  - Energy simulation
- **Material and components database**
  - EPD, PD, generic database



Shadram et al. 2016; Shadram & Mukkavaara, 2018

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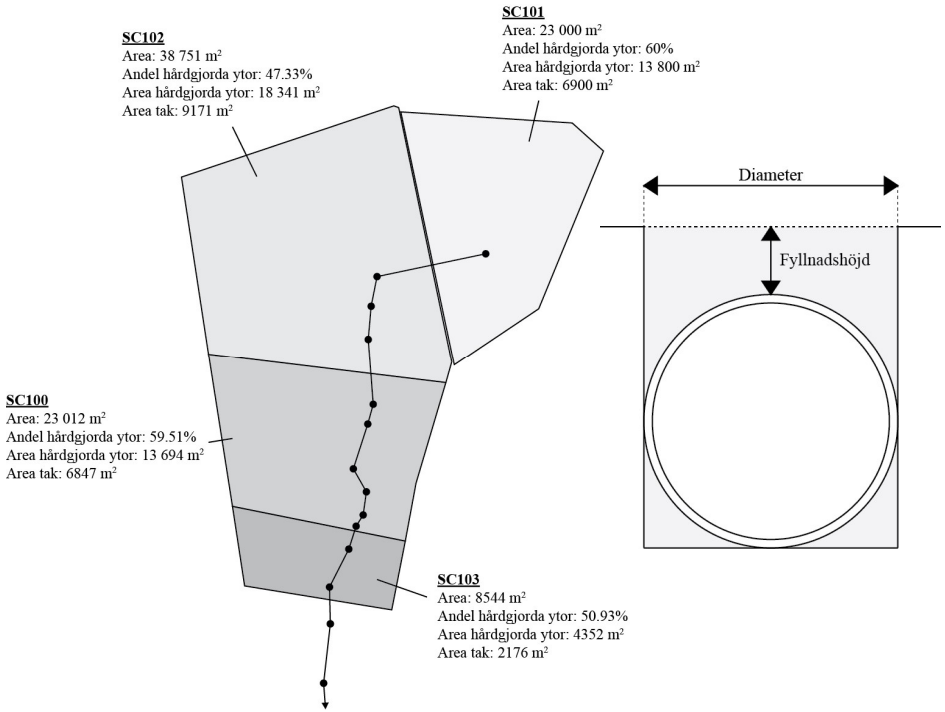
Stormwater model

- Used a hypothetical study
- It was tested if green roof could mitigate higher runoff volumes due to densification
- The results might indicate that green roofs only cannot compensate the higher runoff volumes

Optimization

- Connect Stormwater model with Sustainable design Framework
- Including CO_2 data for pipeline and construction work to expand the stormwater system
- Optimizing with help of an Algorithm
- “NO result”

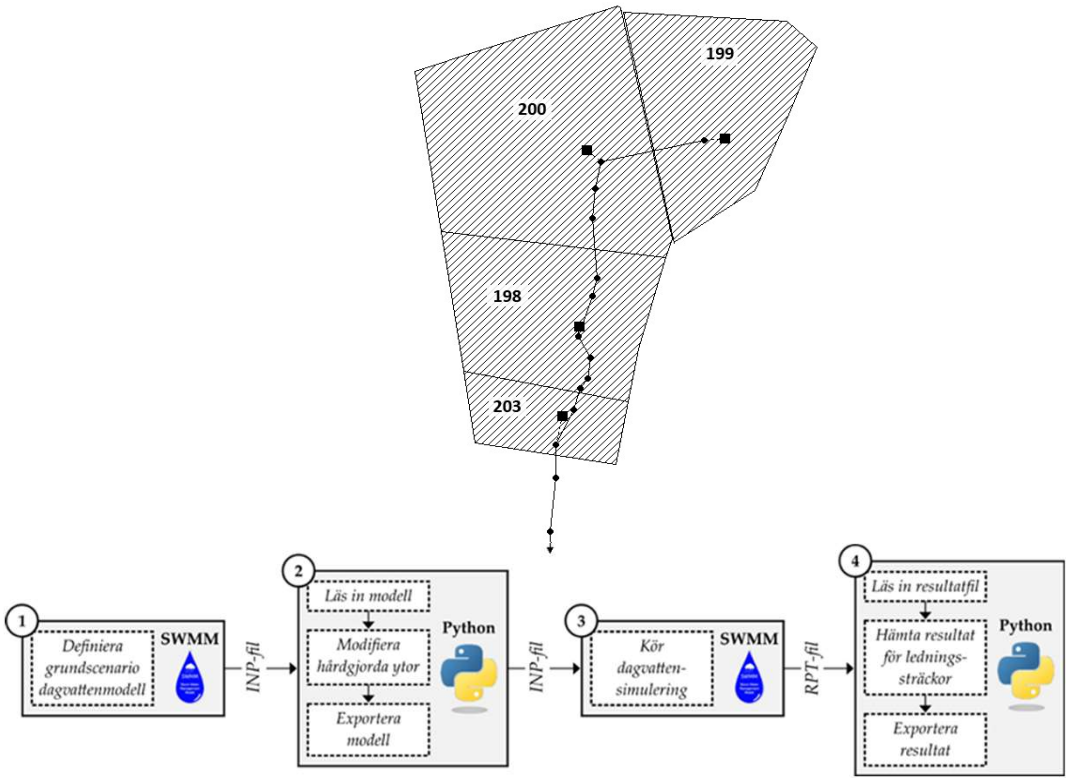


Parameter study

- The parameter study was made in order to test and increase the density in all 4 stormwater areas

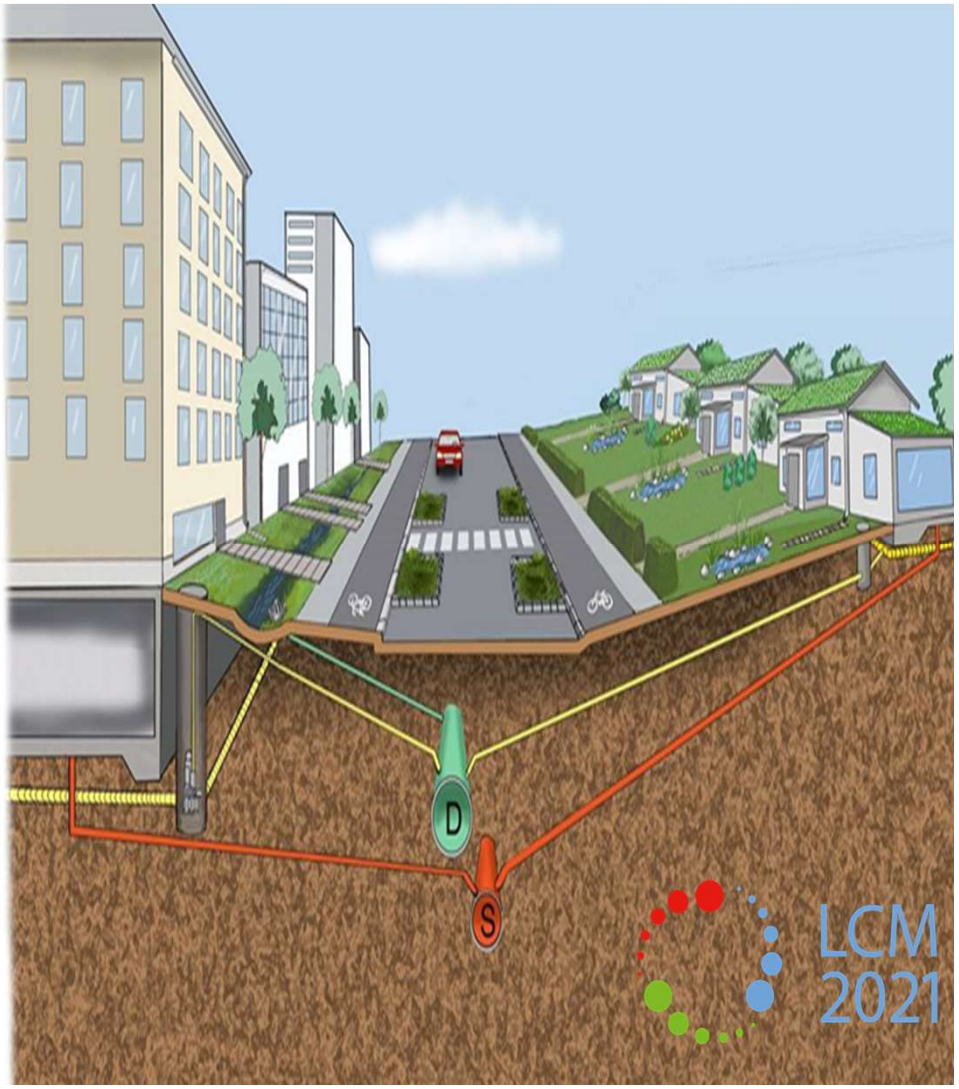
Result :

- Green roof cannot compensate the increased requirement for stormwater management
- Dimensioning and design of the stormwater system need to extended
- Pipes need to be replaced



Result

- Green roof can not compensate higher runoff volumes due to densification
- Green roofs should be not solely implemented for reduce and retain of stormwater and for energy reduction in the Nordic climate.
- Other sustainable benefit such as urban air quality, water run off quality, reducing urban heat island effects and preventing noise pollution.




Tank you!
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