Spatial Analysis: Applying Green Roofs for Climate Resilience

The Challenge

Climate predictions for Rotterdam state that Urban Heat Island (UHI) effect and stormwater flooding will increase in frequency and severity in the near future. This is a concern due to the economic and health impacts they can carry. UHI effect, whereby areas of the city suffer from higher temperatures than occur in nearby rural areas, can have negative impacts on human health. Stormwater flooding can lead to economic damage and hamper local access and mobility.

Could the adaptation measures that are being implemented by Rotterdam be enhanced or optimized using the practices and methods of Industrial Ecology?

The Approach

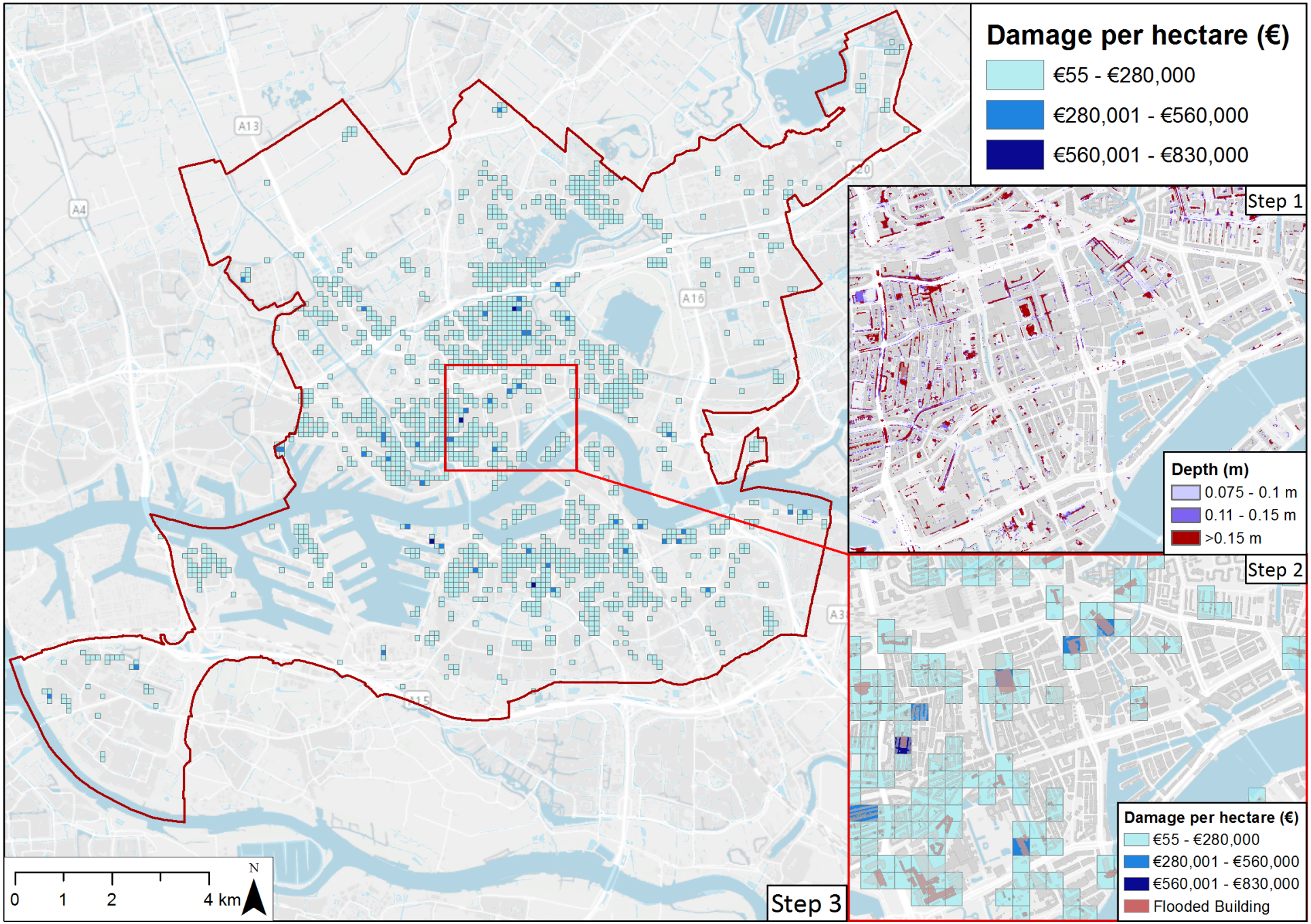
I decided to investigate the implementation and effectiveness of green roofs in Rotterdam. Green roofs are a nature-based solution for both UHI effect and stormwater flooding due to their ability to cool the air and store rainwater. Currently, green roofs are being subsidized by the municipal government. By using spatial analysis, the city can be analyzed according to where green roofs are most needed to mitigate UHI effect and stormwater flooding. Geographic indicators were created to reveal where green roofs could help prevent productivity loss from heat stress and mortality amongst elderly, as well as economic damage from building and roadway flooding.

The Outcome

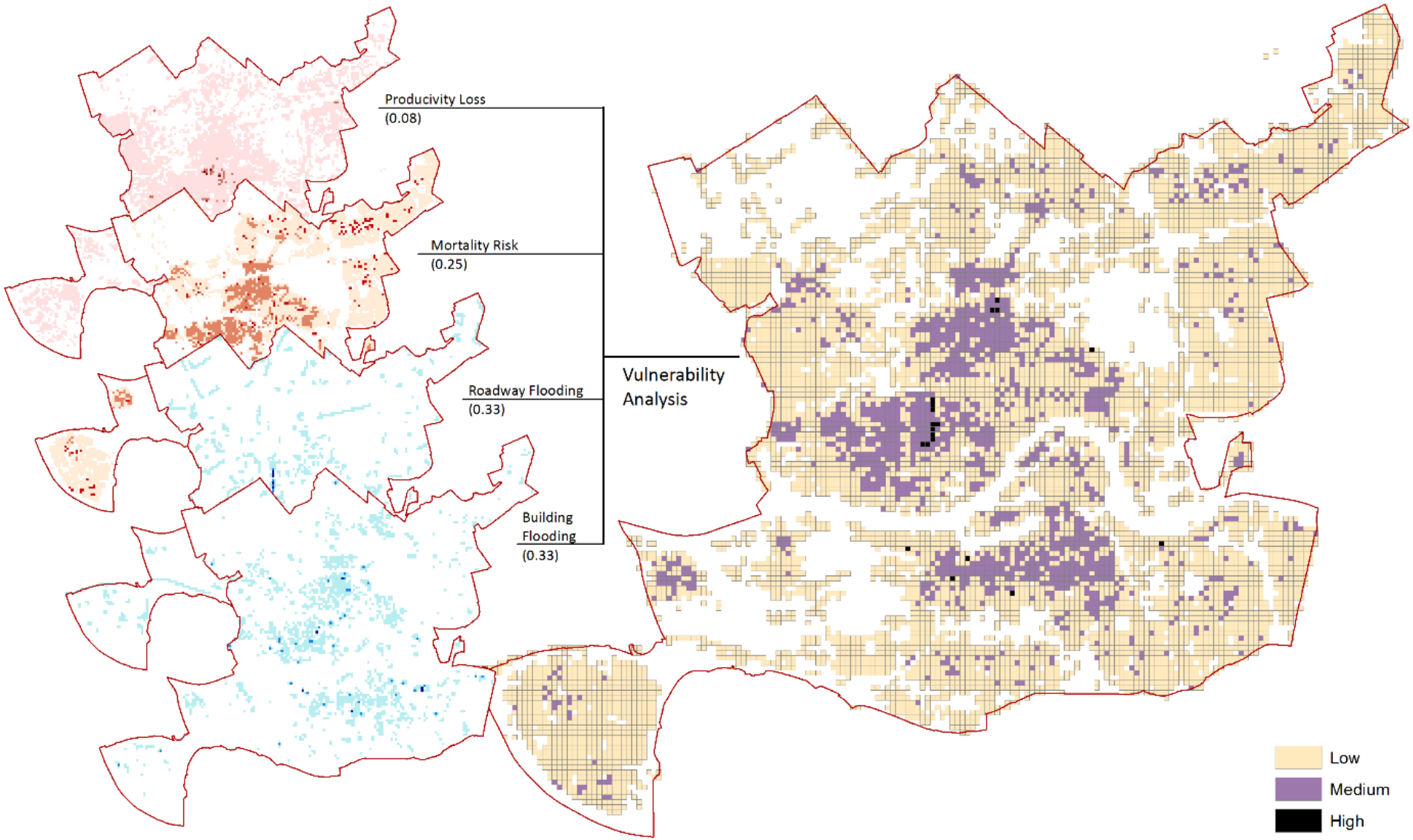
Major hotspots were identified in Ijsselmonde, Prins Alexander, and Central districts as the most suitable for the implementation of green roofs. Focusing subsidy money to these areas will ensure that the money will provide the greatest benefits to the city and its citizens. The continuation of the current subsidy program will result in money going towards green roofs in areas that do not face considerable threat from UHI effect or stormwater flooding. The knowledge and insight of the results can be used to produce more effective strategies for implementing green roofs.

Want to learn more?

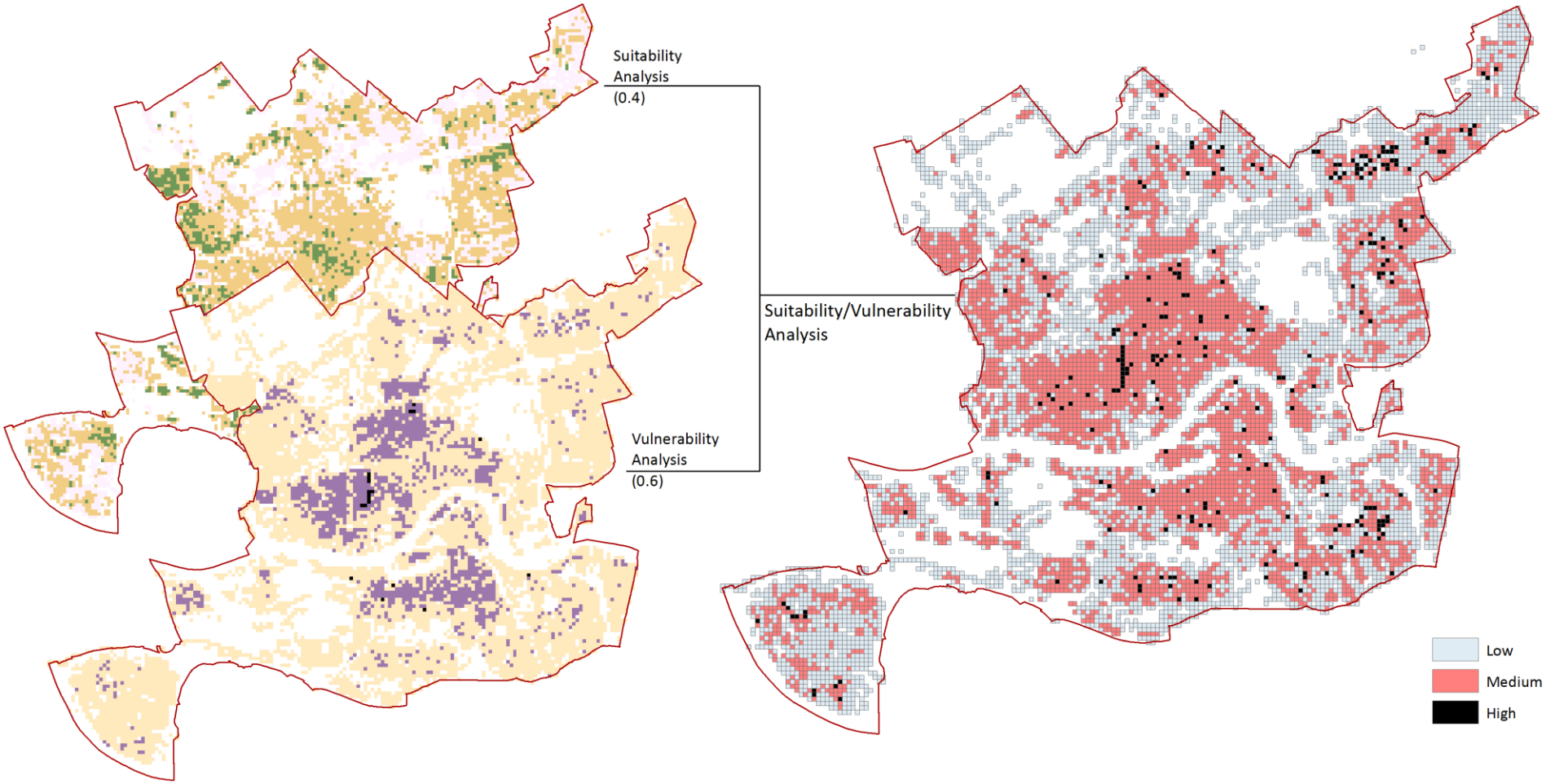
The entire thesis report can be downloaded from my Linked-in profile:
www.linkedin.com/in/larszwaanenburg/



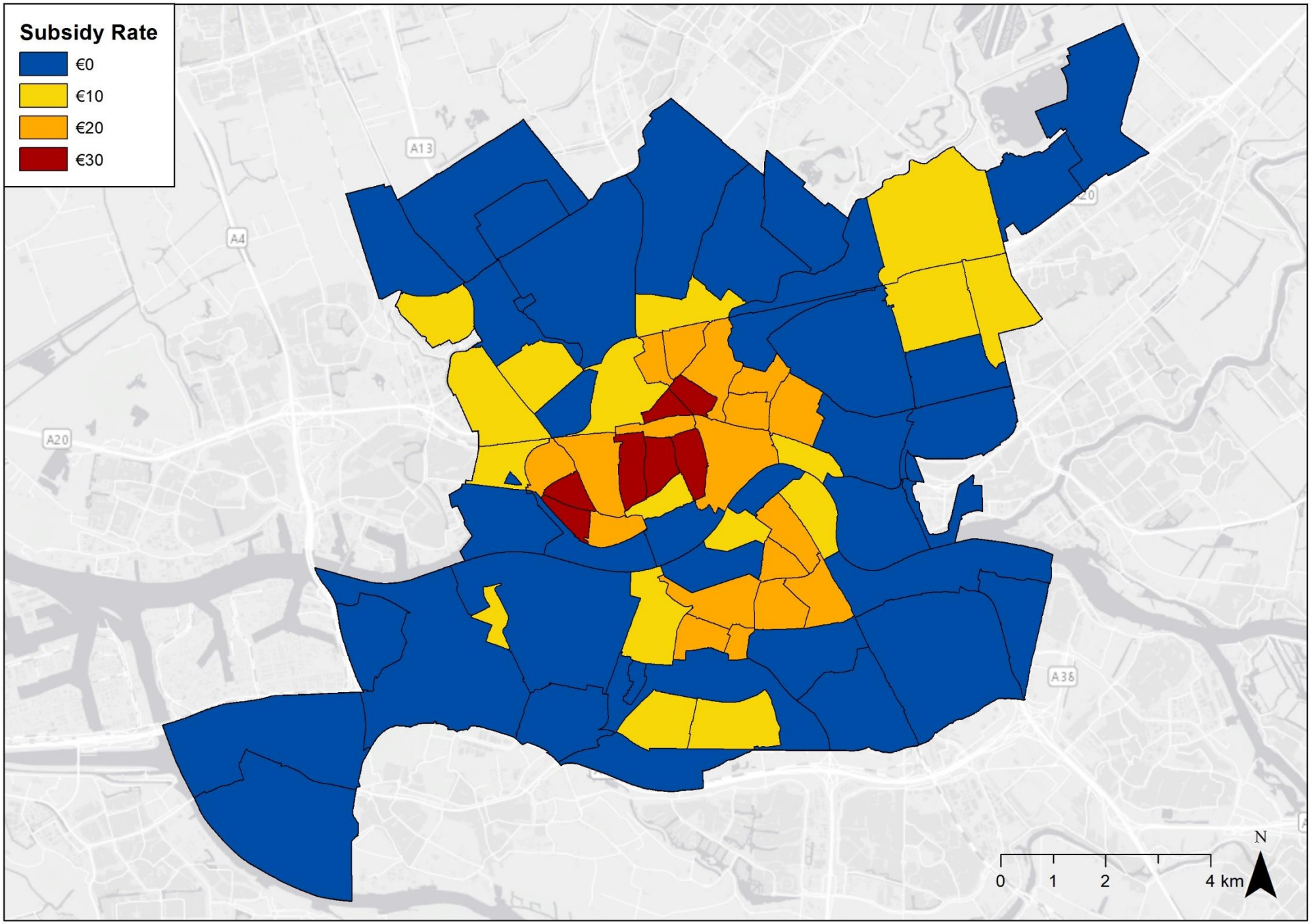
Citywide building flooding damage per hectare



Vulnerability analysis creation



Final vulnerability and suitability analysis showing where green roofs are needed in addition to where they can be built



Proposed subsidy policy based for future green roofs based on need and availability to implement green roofs within each neighborhood