Urban Densification for Liveable Cities: A Case Study in Zurich

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BACKGROUND

Densification has become a legally binding policy objective for developing housing and job positions within existing urban boundaries in Switzerland. It triggers the challenge of future urban development: to accommodate the population growth (around 23%) without compromising the high quality of living. This study investigated the urban densification of Altstetten and Albisrieden Zurich, a real case representing the city's social and geographic situation and has excellent potential for hosting population growth.
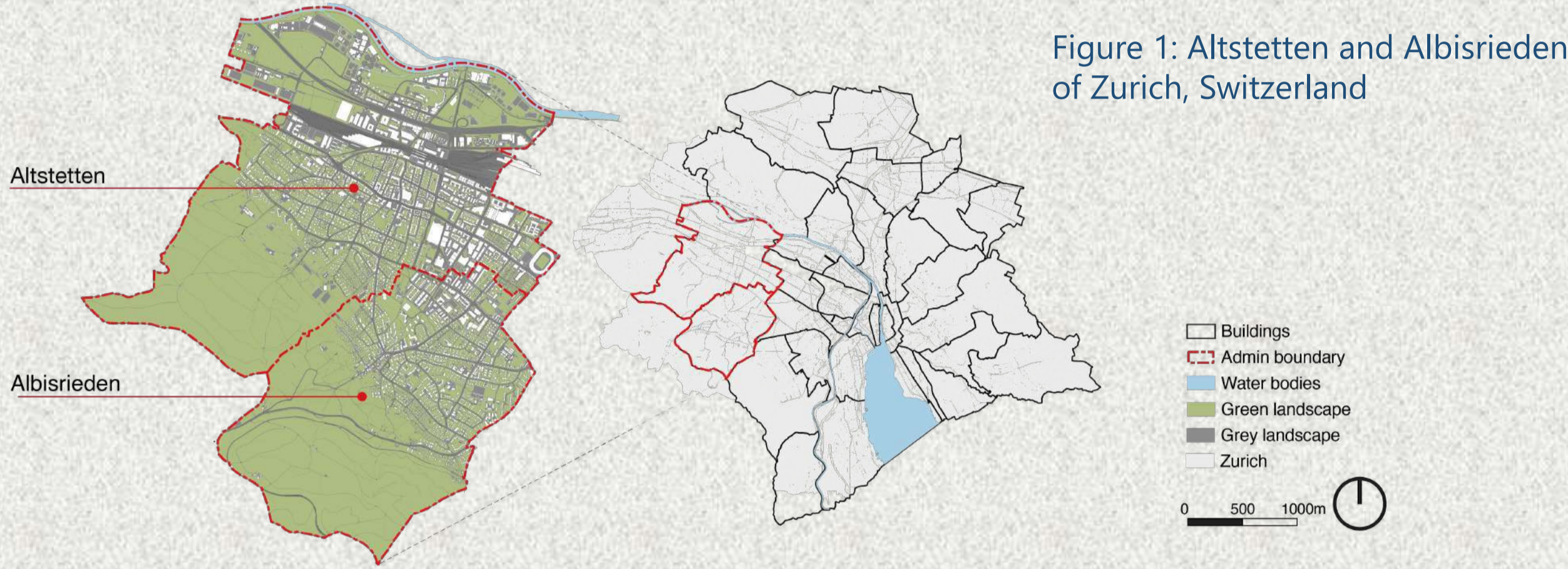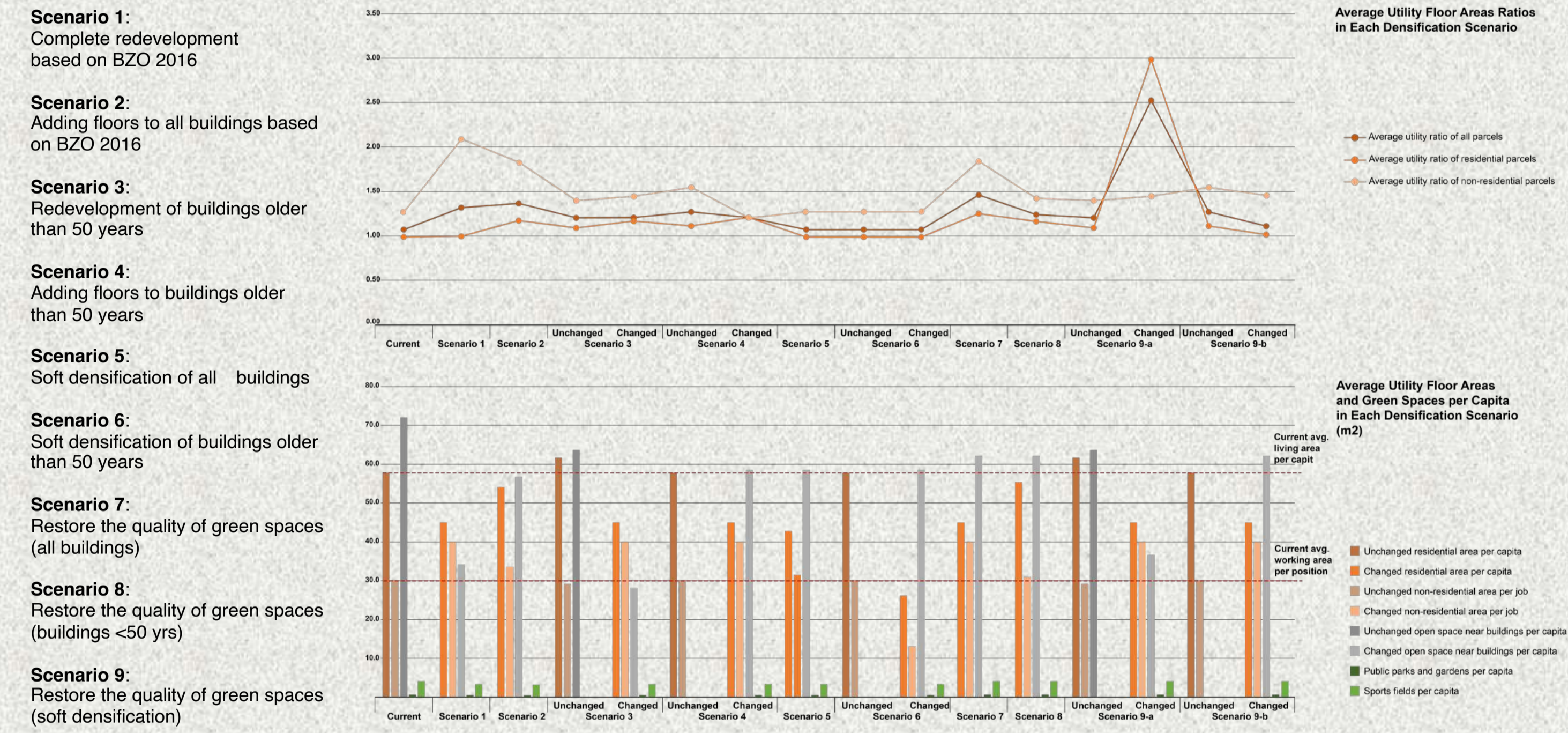

Figure 1: Altstetten and Albisrieden of Zurich, Switzerland

Legend: Buildings; Admin boundary; Water bodies; Green landscape; Grey landscape; Zurich. 0 500 1000m

AIM

This study aims to examine different urban densification measures and their impacts on the urban environment in Altstetten-Albisrieden, discuss urban development challenges, and suggest strategies accordingly for future transformation in the context of Zurich.

METHODS

- The study first identified the existing urban densification measures in Zurich through a literature review and case studies, including:
  - Complete redevelopment: Rebuilding buildings of a parcel (Figure 2)
  - Partial redevelopment: rebuilding a part of a land parcel (Figure 3)
  - Adding floors: adding extra floors on existing buildings (Figure 4)
  - Soft densification: retrofitting building layout and reducing living or working space to accommodate more residents and job positions.

Figure 2: Example of complete redevelopment: Freilager Albisrieden

Figure 3: Example of partial redevelopment: Hellmutstrasse 86

Figure 4: Example of adding floors: a detached single-family house

- Nine densification scenarios were generated through the decision-making process below (Figure 5). These scenarios covered the identified measures above in different situations responding to the local population growth and job position increase.

Figure 5: Decision-making process of the nine densification scenarios

- The study further selected a 400-meter-radius area of Lindenplatz as a subsite case to evaluate the impact of densification scenarios on the urban environment, more specifically, sky view factors and yearly average solar irradiance through Urban Multi-scale Environment Predictor (UMEP) tool in QGIS. All geographic information on buildings, topography and meteorological data were extracted from the open-source data of the City of Zurich.

FINDINGS

- With different densification measures, the average building intensity (Utility floor area ratio) and average areas per capita for living and job positions varied, as shown in Figure 6.

Scenario 1: Complete redevelopment based on BZO 2016

Scenario 2: Adding floors to all buildings based on BZO 2016

Scenario 3: Redevelopment of buildings older than 50 years

Scenario 4: Adding floors to buildings older than 50 years

Scenario 5: Soft densification of all buildings

Scenario 6: Soft densification of buildings older than 50 years

Scenario 7: Restore the quality of green spaces (all buildings)

Scenario 8: Restore the quality of green spaces (buildings <50 yrs)

Scenario 9: Restore the quality of green spaces (soft densification)

Figure 6: Average Utility floor area ratio and per capita areas for living and job positions in the nine scenarios

- The simulated average yearly roof irradiance shows the impact of three selected densification scenarios on the urban environment.
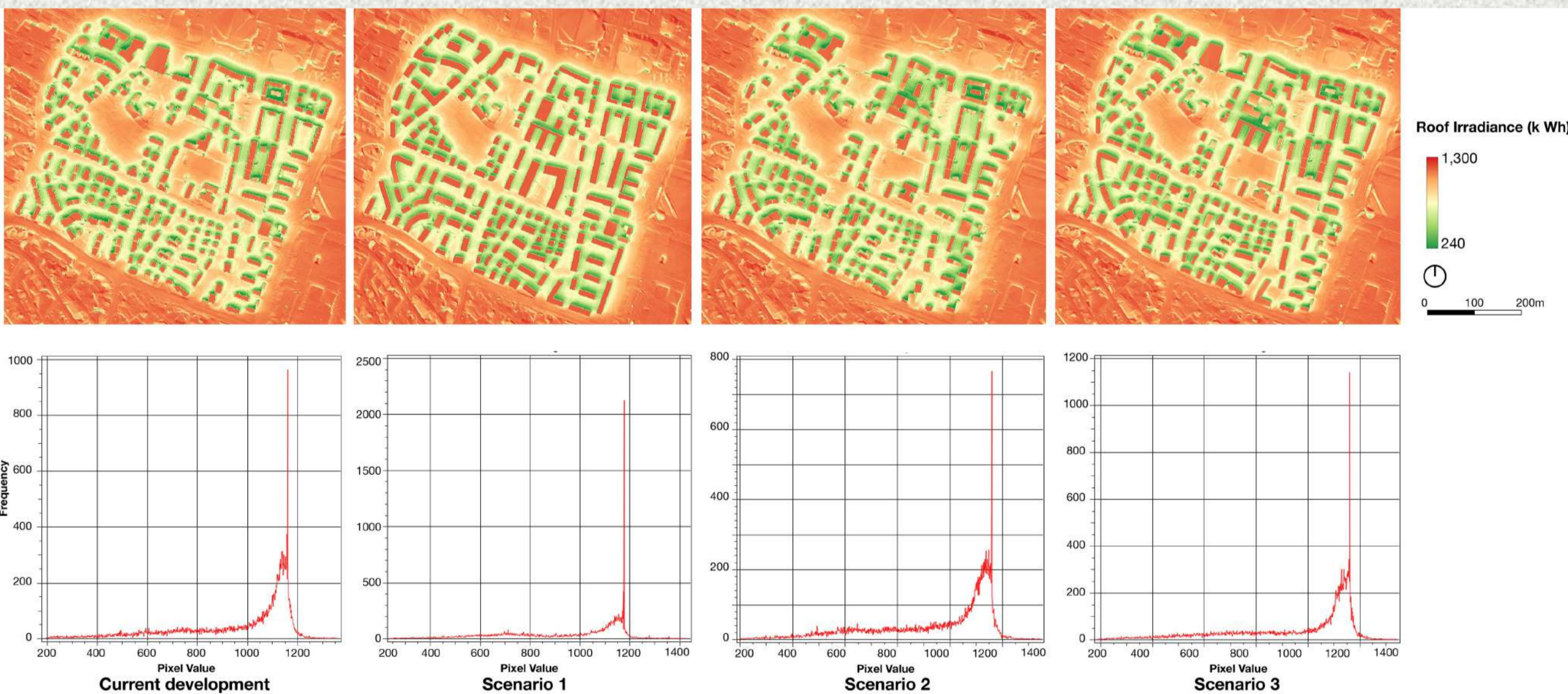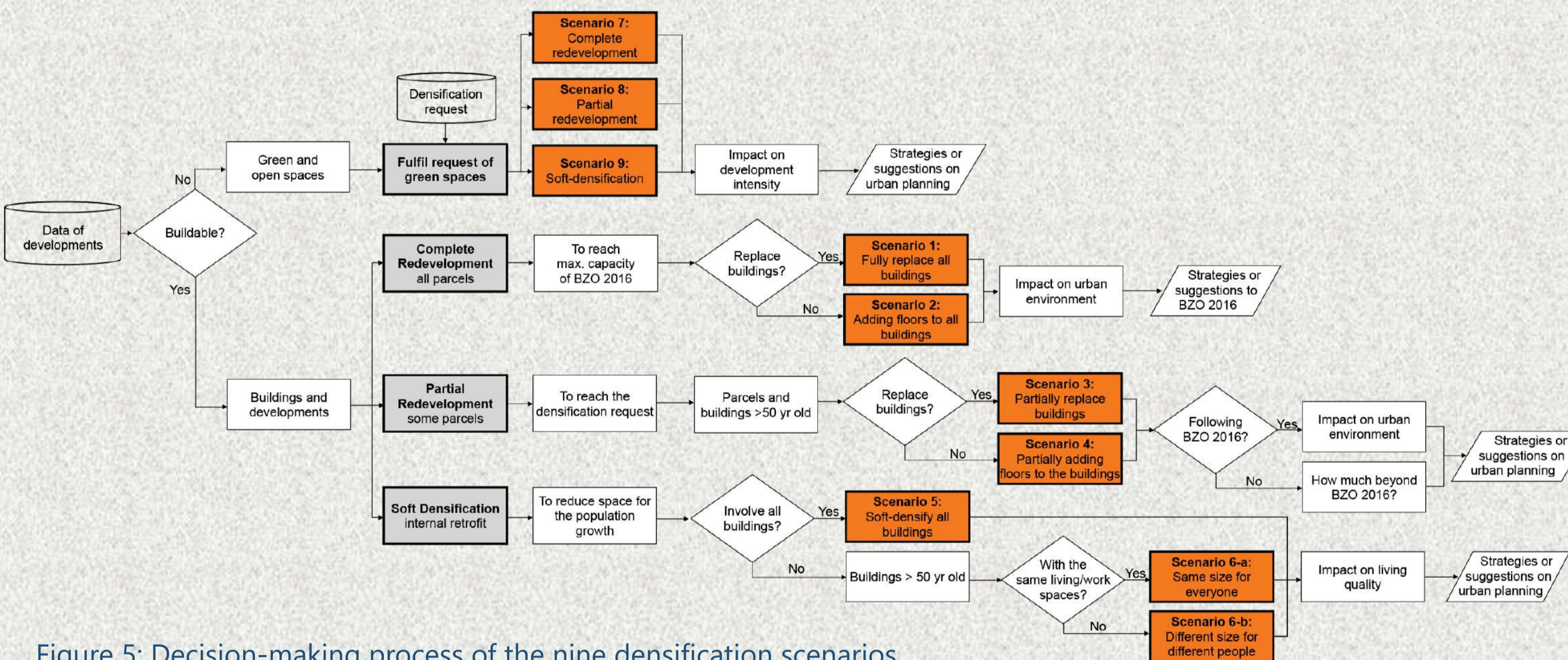

Figure 7: Simulated average yearly roof irradiance of the Lindenplatz subsite in the current situation and the three scenarios

CONCLUSIONS

- Scenarios 3 and 4 (partial redevelopment or adding floors) are comparatively better than the other scenarios when combining the influences on living quality and living/workspaces. The critical issue is the balance between living and working spaces, as their influence on building intensity differs.
- Loss of green spaces near buildings occurred in Scenarios 1-6, while restoring the number of green spaces (Scenarios 7-9) might lead to a huge rise in average building intensity.

Future development

- The difference in the yearly roof irradiance in the selected scenarios indicates the impacts of densification strategies on the urban environment. The study will further examine building typologies within the scenarios to understand urban densification at building and neighbourhood scales.
- Future studies may also consider the implications and influence of greenery on urban densification. By combining green space organisation and greenery provision, the study may provide more comprehensive strategies at district and city scales.