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Risk Analysis of Backahill's Properties in Ängelholm and Båstad

Photo: Backahill

Elin Hilling

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Department of
Physical Geography and Ecosystem Science
Lund University
Sölvegatan 12
S-223 62 Lund
Sweden

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Elin Hilling

Bachelor thesis, 15 credits, in Physical Geography and Ecosystem Science

Supervisor:

Cecilia Akselsson
Department of Physical Geography and Ecosystem Science,
Lund University

Exam committee:

Andreas Persson,
Helena Elvén Eriksson
Department of Physical Geography and Ecosystem Science,
Lund University

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Abstract

Climate change is an issue affecting societies worldwide. As temperatures, precipitation patterns, and sea levels change, our buildings and properties are in danger. Therefore, it is crucial for real estate companies to adapt their properties to the effects of climate change as they will be impacted. To help companies make environmentally sustainable economic activities, the European Union has implemented the Taxonomy Regulation. This legislative act provides directives for the companies to implement in their operations and choices.

In this study, a methodology by Fastighetsägarna et al. (2023) was used as guidance when implementing the directives of Taxonomy Regulation to the real estate company Backahill. By identifying climate-related risk in the study area, conducting a risk analysis of the properties, deciding on classification thresholds, and classifying the properties, in accordance with the methodology, a risk classification was derived. The risk analysis is based on 12 different risks and was conducted using geographical information systems (GIS). Data for ten of the risks was downloaded into GIS, while the remaining two risks were studied by using interactive maps.

The properties were divided into three risk classes: RC 1, RC 2, and RC 3. The results showed that none of the properties in Ängelholm and Båstad were subjected to the highest risk class, RC 3, 26% of the properties were classified as RC 2, and the remaining 74% belonged to RC 1, the lowest risk class. There was a clear spatial pattern in the distribution of risks, depending on the closeness to a water body and on the closeness to an urban area. This is an initial risk analysis of Backahill's properties and serves as a solid foundation for further studies on their properties. It may also aid the company in developing climate adaptation strategies.

Keywords: *Taxonomy Regulation (TR), Climate Change, Fastighetsägarna & Byggföretagen, Properties, Backahill, Ängelholm, Båstad*

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1 Introduction

Climate change greatly impacts the buildings we live and work in today. As temperatures increase, sea levels rise, and precipitation patterns change, buildings and properties are threatened (IPCC, 2022). The way they are managed, operated, and designed needs to be adapted to the future climate. To assist businesses in making environmentally sustainable decisions and investments, the European Union (EU) has implemented a Taxonomy Regulation (TR) with several objectives to be addressed (European Commission, 2023b). Identifying relevant climate risks, conducting risk analyses, establishing classification thresholds, and classifying buildings are the general steps when implementing the TR (European Commission, 2023b). The TR lists 28 climate-related risks divided into temperature, precipitation, mass, or wind-related. When identifying the climate-related risks in each study area, these lay the foundation.

This report will assist the family-owned company Backahill in implementing the above-mentioned steps of the TR. The company operates in Sweden and the rest of the Nordics and manages, owns, and develops properties, with offices in Ängelholm, Båstad, and Stockholm (Ernst & Young, 2023). Backahill strives to work towards an environmentally sustainable future with the aid of the Paris Agreement's 1.5-degree target and the sustainable development goals (SDGs). Their work is divided into three business areas: property development, destination development, and invest (Ernst & Young, 2023). This study will focus on the area of property development.

Fastighetsägarna et al. (2023) have provided guidelines for businesses to use when implementing the EU TR. Upon request from Backahill, these guidelines will be used when conducting this risk analysis. The results of this study may provide Backahill with valuable insights on how the company should navigate climate change adaptation and sustainability efforts. Such insights may not only benefit Backahill but also other real estate companies in Ängelholm and Båstad working with similar topics. These companies can utilize the results of this study to protect already existing buildings and construct new ones sustainably, contributing to the overall sustainability work in the region.

1.1 Aim

This study aims to assist Backahill in implementing directives of the Taxonomy Regulation by conducting a risk analysis of the company's properties in Ängelholm and Båstad, based on the effects of future temperature, precipitation, and sea level changes.
The objectives of this study are to:

1. Identify the relevant climate-related risks in the study area.
2. Conduct a risk analysis to determine what risks each property will be threatened by.
3. Decide on suitable classifications thresholds for the categorization of the properties.
4. Categorize the properties into risk class (RC) 1, RC 2, and RC 3 based on the number of risks they are exposed to.

2 Background

2.1 Study Area

The Backahill properties are located in Ängelholm and Båstad, two municipalities in North Western Scania, Sweden (Figure 1). Both municipalities border Kattegat, resulting in a climate influenced by the ocean with strong winds and limited temperature variations (Persson et al., 2012). According to the Swedish Meteorological and Hydrological Institute (SMHI, 2024c), the average annual temperature for Ängelholm and Båstad in 2023 was 9°C. The study area has four seasons with an average annual precipitation of roughly 900 mm/yr (SMHI, 2024c). As the climate of the study area is the same, the general description of soil types and landforms between the two differ.

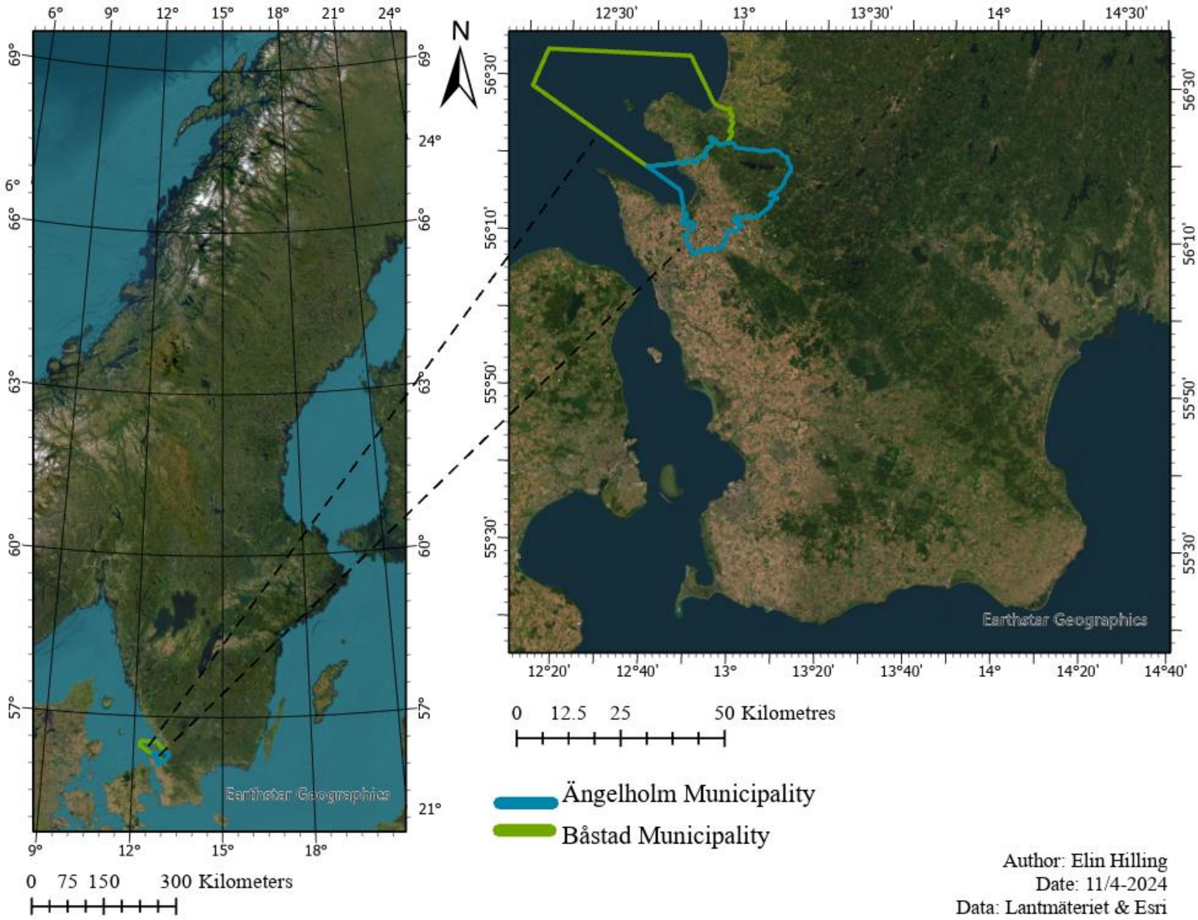

Figure 1. Map of the study area where the blue outlines Ängelholm municipality and green Båstad municipality.

According to Länsstyrelsen Skåne (n.d.), the prevailing soil type in Western Ängelholm is clay soils whilst the areas closer to the coast are dominated by sand. The Ängelholm-plain (Ängelholmslätten) is a landform that covers not only Ängelholm but also a larger region South of the municipality. Here, glacial clay was deposited when the ice from the Ice Age retreated (Germundsson & Schlyter, 1999). Therefore, there are large areas of clay in the plain. Another notable feature of Ängelholm is Rönne Å river, one of Scania's major rivers that stretches from Ringsjön to Skälderviken, passing through the municipality (Germundsson & Schlyter, 1999).

The dominating soil types in Båstad are post glacial sand with a combination of sandy till. Eastern Båstad has a similar type of landform as the Ängelholm-plain, just with a different name, the Laholm-plain (Laholmsslätten). The rest of Båstad, i.e. the South, West, and North, consists of, and is surrounded by, a bedrock terrain and the horst Hallandsåsen (Germundsson & Schlyter, 1999).

The majority of Backahill's properties are situated in, or close to, the city centers of each corresponding municipality, and the area around them is therefore urban. All 72 properties owned by Backahill in Ängelholm and Båstad are covered by the risk analysis. The 38 properties found in Ängelholm are located further inland (Figure A1) compared to Båstad, where the remaining 34 properties are located, near the coastline (Figure A2).

2.2 Taxonomy Regulation and its Implementation in Backahill

The Taxonomy Regulation is a legislative act by the European Union that was implemented in 2020 and is used to determine when economic activity is to be considered environmentally sustainable (European Commission, 2023b). As briefly mentioned in the introduction, the TR forms the basis of this project as Backahill intends to follow its directives towards sustainability. The TR is a transparency tool (European Commission, 2022) that provides a classification system to help investors and businesses make environmentally sustainable investments and decisions. The TR is made up of six environmental objectives, where objective 2 will be assessed in this study: Climate change adaptation

The objectives are connected to the EU's climate and environmental goals and are used when determining if investments are environmentally sustainable (Papari et al., 2024). To follow the TR, investments need to either make a significant contribution to ≥1 of the objectives, avoid significant harm to the other objectives, as well as meet certain compulsory sustainability requirements (European Commission, 2023a). The goal of the TR is that investments will become environmentally sustainable, reduce market fragmentation, increase environmental transparency by limiting e.g. greenwashing, and to aid Europe in reaching the set environmental goals (Papari et al., 2024).

In Backahill, the intention is to assess the objective Climate change adaptation by identifying climate-related risks and classifying properties accordingly, so that environmentally sustainable investments and decisions can be made. Adapting not only current, but also future properties, will benefit the company in the long run, with the accelerating effects of climate change. Backahill wants to use a method by Fastighetsägarna and Bostadsbolagen (2023) as a basis for a risk analysis of their properties. Fastighetsägarna et al. (2023) have provided a method for companies to utilize when implementing the TR. The documentation primarily targets companies that manage properties but can also be applied in other situations when evaluation of buildings is needed. As the methodology gives suggestions on how to implement the TR, it should not be considered to grantee the possibility of reaching the requirements of the TR.

The method presents implementation of the TR in three steps as it is suggested to perform both a risk analysis, vulnerability analysis, and implement adaption strategies. Specific processes on how to follow these steps are explained in the methodology. This report is only based on a risk analysis and will therefore solely focus on the methodology of that procedure. Fastighetsägarna et al. (2023) offer advice on how to identify climate-related risks, receive necessary data, conduct the risk analysis, and classify properties. However, the method does not include guidance on establishing the classification thresholds, though encourage performers to decide upon these themselves.

2.3 Climate-related Risks

The first step in implementing the TR is to identify the climate-related risks of the study area. These risks may threaten the properties; therefore, they need to be identified before doing the risk analysis. The risks were identified through a literature study on Ängelholm, Båstad, and future climates. Anthropogenic emissions of greenhouse gases cause global warming, also known as climate change (IPCC, 2023a). Between 2010 and 2019, the emissions continued to increase, causing ongoing threats to global atmospheric and oceanic temperatures. Unsustainable energy use, land use, land use change, and lifestyle patterns across nations and individuals, are some of the factors causing these emissions. Today, extreme weather has intensified and multiplied as an effect of climate change and will most likely keep on doing so (Deng et al., 2024; IPCC, 2023a). This has resulted in damage to various aspects of society in affected areas, such as the economy, water and food supply, infrastructure, and human health (IPCC, 2023a).

The AR6 Synthesis Report: Climate Change 2023 by (2023a) states that heat extremes, or heatwaves, will occur more often and become more intense due to climate change. Heat extremes are more intense in cities and impact the function of urban infrastructure and buildings (IPCC, 2023a). According to SMHI (2023f), a heatwave is defined as "a continuous period where the highest temperature of the day is at least 25.0°C for at least five continuous days". Another temperature-related phenomenon, called surface urban heat islands (SUHI), is used to describe the overall warmer temperatures in cities. SUHI are caused by the interactions between the surface, atmosphere, and human activities, resulting in high surface temperatures (Deng et al., 2024). In this case, that includes regions with larger areas of asphalt, big buildings, and dark rooftops, as all these surfaces absorb sunlight (Ahrens & Henson, 2021). Heat extremes may also cause compound flooding and forest fires (IPCC, 2023a).

Downpours and extreme precipitation are also effects of climate change where flooding events will increase and intensify, especially around rivers, lakes, and other sources of water (IPCC, 2023). Settlements that are low-lying or near the coastline are especially vulnerable to this (IPCC, 2023). Downpour is defined by SMHI (2023d) as a rain event with ≥50 mm rain/h, or 1 mm rain/min. Extreme precipitation, on the other hand, is an event with ≥90 mm rain/24h (SMHI, 2023a). Although both municipalities are threatened by downpours and extreme precipitation, Ängelholm is more prone to flooding as Rönne Å may increase and intensify these events.

Sea level rise is yet another cause of climate change as warmer temperatures shrinks the Arctic Sea ice (IPCC, 2023a). The mean sea level (MSL) rise is measured and has continuously increased over the last century. In 1901, the MSL rise was estimated to be 1.3 mm/yr and in 2018, it had increased to 3.7 mm/yr (IPCC, 2023a). Sea level rise is irreversible (IPCC, 2023a) and since Ängelholm and Båstad are situated close to the ocean, it is considered as one of the climate risks that may affect the properties in the study area.

The ocean will cause other threats to the study area as well. Coastal Vulnerability Index (CVI) is a classification system that provides information on coastal erosion and vulnerability risks of buildings and infrastructure (SGI & SGU, 2022). The CVI is based on several parameters: erosion sensitivity, soil geology, slope, distance to water, and topography. The erosion is caused by both short-and long-term effects (SGI & SGU, 2022). Coastal erosion is a relevant threat to Båstad but not Ängelholm. This is because several of the properties in Båstad lie near the coast whilst the ones in Ängelholm do not. Aside from coastal erosion, land erosion and landslides will also affect Ängelholm and Båstad. The soil types in the municipalities make them prone to these effects along with water's effect on erosion (Zuo et al., 2024; Eekhout & Vente, 2022).

According to SMHI, winds with an average speed of 24,5 m/s are defined as storms (SMHI, 2022). The Swedish National Board of Housing, Building, and Planning, also known as Boverket, has produced the map *Vindlastzoner* (wind load zones) across Sweden. Wind load zones indicate that wind speed, that on average, recurs once every 50 years (Boverket, n.d.). Ängelholm and Båstad have an average value of 25 m/s. SMHI has conducted studies on how wind patterns and extreme wind events will be affected by climate change in the future. The results showed no significant change in future wind trends (SMHI, 2023e). Wind patterns are influenced by several complex factors, making it difficult to predict how they may change (SMHI, 2023e). For this reason, a change in wind patterns and extreme wind events will not be considered in the risk analysis. The climate-related risks mentioned in this section are summarized in Table 1 and divided by long-and short-term effects, i.e. chronicle and urgent.

Table 1. Climate-related risks in Ängelholm and Båstad divided by their effect and what causes them. Based on a template by Fastighetsägarna et al. (2023).

	Temperature Related	**Water Related**	**Mass Related**	**Wind Related**
Chronic	Temperature changes	Change in precipitation	Coastal erosion	-
		Rising sea levels	Land erosion	
Urgent	Heatwave	Extreme precipitation	Landslides	-
	Forest fire	Flooding		

2.4 Future Climate Scenarios

The Representative Concentration Pathways (RCP) are used for climate modeling and include data on future climate scenarios. Four scenarios are used to predict possible climate impacts and to identify mitigation options (Van Vuuren et al., 2011). They are based on assumptions on the progress of greenhouse gas emissions, land use, and the advancements of air pollutants (SMHI, 2023c).

Shared Socioeconomic Pathways (SSP) is another scenario used when studying the future effect of climate change (IPCC, 2023b). SSP includes five scenarios and is used in recent publications as it fills with information missing in the RCPs. They include socioeconomic factors such as education, pollution, and economic growth (Harrisson, 2018). SSP scenarios were used in the Intergovernmental Panel on Climate Change's (IPCC) sixth assessment report to cover areas that the RCP scenarios did not (IPCC, 2023b).

3 Materials and Methods

The guidelines given by Fastighetsägarna et al. (2023) lay the foundation for the risk analysis. The methodology was used to achieve the objectives of the study. The first step was to identify the climate-related risks relevant for Ängelholm and Båstad (objective 1). Fastighetsägarna et al. (2023) listed several risks related to properties in Sweden, which were used as a framework when finding risks. To determine the climate-related risks, a literature review was conducted on future climates and on the study area.

After finding the climate-related risks to use in the project, Geographical Information Systems (GIS) was used to conduct the actual risk analysis (objective 2). Data for all the identified risks was found and either downloaded to GIS or studied as interactive maps. Thresholds were chosen for RC 1, RC 2, RC 3 (objective 3). By comparing the data of each risk with Backahill's properties, classification of the properties could be carried out. Each property was then classified based on the number of risks it was threatened by (objective 4).

3.1 Literature Review

A literature review was conducted to achieve objective 1 of this study: identify climate-related risks in the study area. To detect relevant literature, specific keywords related to the study were utilized, such as 'EU taxonomy', 'climate scenario(s)', 'IPCC', 'Ängelholm', 'Båstad', and 'climate change'. ScienceDirect was used for sourcing scientific articles. Publications and other sources used in the study were selected based on the following criteria:

- Authentic – genuine and transparent
- Unbiased – information free from bias
- Reliability – information from a credible source

- Published within the last five years, to the extent possible

Information from each source was retrieved by reading the text and summarizing the appropriate key points. As some of the literature was written in Swedish, translation to English was necessary. Information was also retrieved from interactive maps produced by SGI and SGU. Solely information germane to this study was curated from the sources.

3.2 Risk Analysis

3.2.1 Software

The software used to conduct the risk analysis: ArcGIS Pro software (2.7.0, 2020 Esri Inc.)

3.2.2 Property Mapping

The initial step involved creating a layer in GIS depicting Backahill's properties in Ängelholm and Båstad. Two separate maps were produced, one for each municipality (Figure A1 & A2). To locate and identify all buildings, an Excel sheet with all property designations and two images showing the properties provided by Backahill were utilized, supplemented by the property names listed on their website (Backahill, n.d.).

A dataset from *Fastighetskartan* was added to GIS (Lantmäteriet, n.d.). Each property in the study area was distinguished, exported, and then merged into a single layer. This was done separately for Ängelholm and Båstad, creating two individual property layers for each municipality.

3.2.3 Risk Layers

The second step in GIS was to add all the risk layers to the maps to address objective 2: conduct a risk analysis to determine what risks each property will be threatened by. As some of the data included excess information, any unnecessary material was removed. The symbology was also modified to enhance interpretability.

In GIS, 13 new columns were created in the attribute tables of the property layers. 12 columns were named after each climate-related risk, and the last one was named *total*. Each property was then categorized based on what risks it would be affected by. This was decided by studying each individual risk layer together with the property layer. If the property polygons overlapped with the features on the risk layers, or the property polygon is so close to the feature of the risk layer that there is a chance it may be affected, it was considered a risk relevant to the property.

The risk for coastal erosion and land erosion was decided by studying the interactive map and comparing it to the property map. If an area in the interactive map would overlap with a property polygon, it was considered a risk to the property. After identifying each property's risks, they were summed up in the total column.

3.2.4 Thresholds and Classification

This section addresses the last two objectives of the study: (3) decide on suitable classifications thresholds for the categorization of the properties, and (4) categorize the properties into risk class (RC) 1, RC 2, and RC 3 based on the number of risks they are exposed to.

The results of the risk analysis will be presented by classifying properties into RC 1, RC 2, or RC 3. In the guidelines by Fastighetsägarna et al. (2023), it is stated that thresholds are to be decided upon individually by the performer. In total, 12 climate-related risks and scenarios were used in the analysis. The classification thresholds were decided by simply dividing the number of risks by the number of classes, i.e. dividing 12 by three. That way, intervals of four risks per class were created and further used when classifying the properties (Table 2).

Table 2. Classification thresholds (RC 1, RC 2, and RC 3) based on the number of risks a property is threatened by.

	Number of Risks
Risk Class 1	1-4
Risk Class 2	5-8
Risk Class 3	9-12

As some property designations were divided into several polygons, the average of these polygons was used to assign each property designation its classification. Table A1 shows each property designation along with its corresponding number of risks and assigned risk class.

3.3 Data and Property Risk Determination

The data used in the risk analysis was selected based on the method from Fastighetsägarna et al. (2023). Exceptions were made when data better suited for this risk analysis was encountered (Table 3). Fastighetsägarna et al. (2023) was also used when deciding on what measures to use when determining if a risk posed a threat to a property.

Table 3. The 12 data layers used in the risk analysis with their source, data type, and resolution/cell size.

	Source	Data Type	Resolution/ Cell size (m)
Base map	Esri (2024)	Aerial imagery	0.6-1.2
Property Map	Lantmäteriet (2021)	Vector	-
General Map	Lantmäteriet (n.d.)	Vector	-
Maximum Air Temperature	MSB (2024a)	Raster	30
Maximum Surface Temperature	MSB (2024b)	Vector	-
Forest Fire	Metria (n.d.)	Raster	10
Downpour	Scalgo (n.d. c)	Raster	1
Extreme Precipitation	Scalgo (n.d. c)	Raster	1
100-year Flooding	MSB (2014)	Vector	-
200-year Flooding	MSB (2014)	Vector	-
Maximum Estimated Flow	MSB (2014)	Vector	-
Sea Level Rise SSP2 2080	SMHI (2024a)	Vector	-
Sea Level Rise SSP5 2130	SMHI (2024b)	Vector	-
Coastal Erosion	SGI (2022a)	Vector	-
Land Erosion	SGI (2022b, c, d)	Vector	-

3.3.1 Base Maps

The base map used is from Esri and provides satellite and aerial imagery with a resolution of 0.6 –1.2 meters over Ängelholm and Båstad. The item was created in 2009 with the latest update being the end of March 2024. Alongside serving as a base map, the layer was also used to identify properties and study other area features (Esri, 2024).

Fastighetskartan (Property map Real property classification) and *Översiktskartan* (General map) are produced by Lantmäteriet (2021; n.d.), the Swedish Surveying and Cadastral Agency *Fastighetskartan*, published in 2021, was used to obtain property divisions and property boundaries. *Översiktskartan* was used to extract the municipality boundaries of Ängelhom and Båstad used in the map of the study area (Figure 1) (Lantmäteriet, n.d.).

3.3.2 Risk maps

Data on different temperature, precipitation, flooding, and sea level rise risks were used in the risk analysis. Temperature data was retrieved from *Värmekartreringskartan* (a heat map) produced by Metria for Myndigheten för Samhällsskydd och Beredskap (MSB), the Swedish Civil Contingencies Agency (MSB & Metria, 2024). The map is composed of data retrieved by the satellite Landsat 8 which orbits around the world, passing Sweden 9 CET every 16th day. Data is only collected on days with less than 70% cloud cover (MSB & Metria, 2024). Landsat 8 could not collect enough cloud-free data 2017-2018, therefore satellite images from Landsat 7 were used. Due to a sensor fault, the map layer from 2017-2023 is thus striped (MSB & Metria, 2024).

Because of the fault in the map layer from 2017-2023, a layer with less information had to be chosen. The chosen raster layer is called *Maxtemperatur 2021-2023* (Maximum temperature 2021-2023), and stores values of maximum reached temperatures between 2021-06-01 and 2023-08-30 (MSB, 2024a). The raster has a cell size of 30 m with each cell representing a temperature ranging from <0°C to >50°C (Figure A3 & A4). In this risk analysis, a daily maximum temperature of ≥25°C is seen as a risk to the property as that is a temperature defining a heatwave (SMHI, 2023f). A second layer by MSB was also used when conducting the risk analysis. This is a vector layer called *Markytetemperaturer 2017-2023* (Surface temperatures 2017-2023) that shows contours with 5°C intervals between 35°C and >50°C of the maximum surface temperatures (Figure A5 & A6) (MSB, 2024b). All property polygons overlapping with the layer for maximum surface temperatures were considered at risk.

When identifying the risk of forest fires, MSB's map *Brandbränsleklassificering* (BBK), or fire fuel classification, was used. The data is in raster format with a 10 m resolution (Metria, n.d.). A corresponding document provides information on how the forests are classified and how prone they are to start and spread forest fires (Metria, 2016). First, the forest classes were divided into low, medium, or high based on their risk of starting and spreading forest fires. Low-risk classes, which have a low probability of starting and spreading forest fires, are excluded and not part of the risk analysis. Medium-risk exhibit characteristics that may limit forest fires, such as seasonal variations, leaf cover, ditching, etc. High-risk forest types, on the other hand, have a high propensity for starting and spreading fires (Metria, 2016). Furthermore, forest types relevant to the study area were identified (Table A2; Figure A7 & A8).

Data layers for downpours and extreme precipitation were retrieved from Scalgo live, a tool used to map various water-related occasions in the landscape (Scalgo n.d. c; Scalgo, n.d. a). The map has a cell size of 1x1 meters, and the ground data is seized from airborne LIDAR scans from 2009 Scalgo (n.d. b). To retrieve data of downpours, the raster layer Flash Flood Mapping was activated in Scalgo live, and Flooded Areas were chosen. The Rain scale bar, indicating the amount of precipitation in the event (Scalgo, n.d. a), was then set to 50 mm (Figure A9 & A10). After that, a raster layer covering the study area was downloaded. This procedure was repeated for extreme precipitation, apart from the Rain scale bar being set to 90 mm (Figure A11 & A12). All property polygons overlapping with the layers for downpours and extreme precipitation were considered at risk.

MSB's *Översvämningsportalen* (flood portal) was used to gather data on 100-year flood (Figure A13), 200-year flood (Figure A14), and beräknat högsta flöde (BHF) (estimated maximum flow) (Figure A15). These three flood estimations are recommended to be used in a risk analysis by Fastighetsägarna et al. (2023). For Ängelholm and Båstad, this information is only applicable to Rönne Å, therefore data was downloaded for the river alone (MSB, 2014). Here, any property polygon overlapping with a flood layer was perceived as threatened.

Maps of sea level rise were derived from SMHI's open data source: *Index of framtida medelvattenstånd baserat på IPCC* (Index of future mean sea level based on IPCC) (SMHI, 2024a, b). Fastighetsägarna et al. (2023) suggest that already existing buildings should be evaluated 50 years ahead (2074) using RCP 4.5 and that properties near the coast should be analyzed after the year 2100 using RCP 8.5. However, it was challenging to find data that corresponded with these criteria, therefore SSP scenarios were used instead. SSP2 was used as an alternative for RCP 4.5 for buildings 50 years ahead, and as no data was found for the year 2074, the year 2080 was chosen (Figure A16 & A17). SSP 5 was used in the place of RCP 8.5 for coastal buildings, and since no further specification on what year to choose was given, year 2130 is used as it is approximately 100 years ahead (Figure A18 & A19). In conclusion, the following sea level rise layers were used in the risk analysis: SSP2 2080 and SSP5 2130 (SMHI, 2024a, b). If any of the sea level layers intersected with a property polygon, it was deemed as threatened.

3.3.3 Other Material

No downloadable data on coastal erosion was found. Therefore, an interactive map produced by SGI (2022a) was used. Here, the layer *Kustsårbarhetsindex - Skåne 2016*, CVI - Scania 2016, was used to study areas of coastal erosion (SGI, 2022a). By studying the map and comparing it to the location of the properties, any property that was close or overlapped with the erosion layers were considered at risk.

The procedure was reiterated for land erosion and landslides (SGI, 2022b, c, d). Here, the layers *Förutsättningar för skred i finkornig jordart - lutning analys* (Conditions for landslides in fine-grained soil - slope analysis), *Slänter - Områden som kan påverkas av ras* (Slopes - Areas that can be affected by landslides), and *Förutsättningar för skred i finkornig jordart - strandnära områden* (Conditions for landslides in fine-grained soil - coastal areas) (SGI, 2022b, c, d) were used. In the risk analysis, they are weighed together and evaluated as a single risk: land erosion.

4 Results

The results show that 74% (56) of Backahill's properties in Ängelholm and Båstad are classified as RC 1. The remaining 26% (16) of the properties are classified as RC 2 (Figure 2).

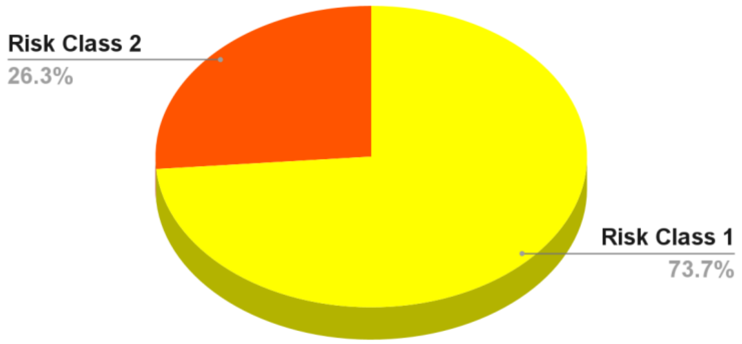

Figure 2. Pie chart showing the total percentages of RC 1 and RC 2 properties in the study area.

4.1 Ängelholm

Ängelholm has 28 RC 1 properties, and 10 RC 2 (Figure A20). Figure 3 shows the risk classification of Backahill's properties in Western Ängelholm. Most properties classified as RC 2 are found close to Rönne Å in the central part of Ängelholm city. Further, one property in the East and one in the South are also classified as RC 2.

Figure 3. Map showing the RC 1 and RC 2 classification of Backahill's properties in Western Ängelholm.

Figure 4 shows a property classified as RC 1, located in Southern Ängelholm. The map shows the property's location in comparison with the other properties in Western Ängelholm (Figure 3).

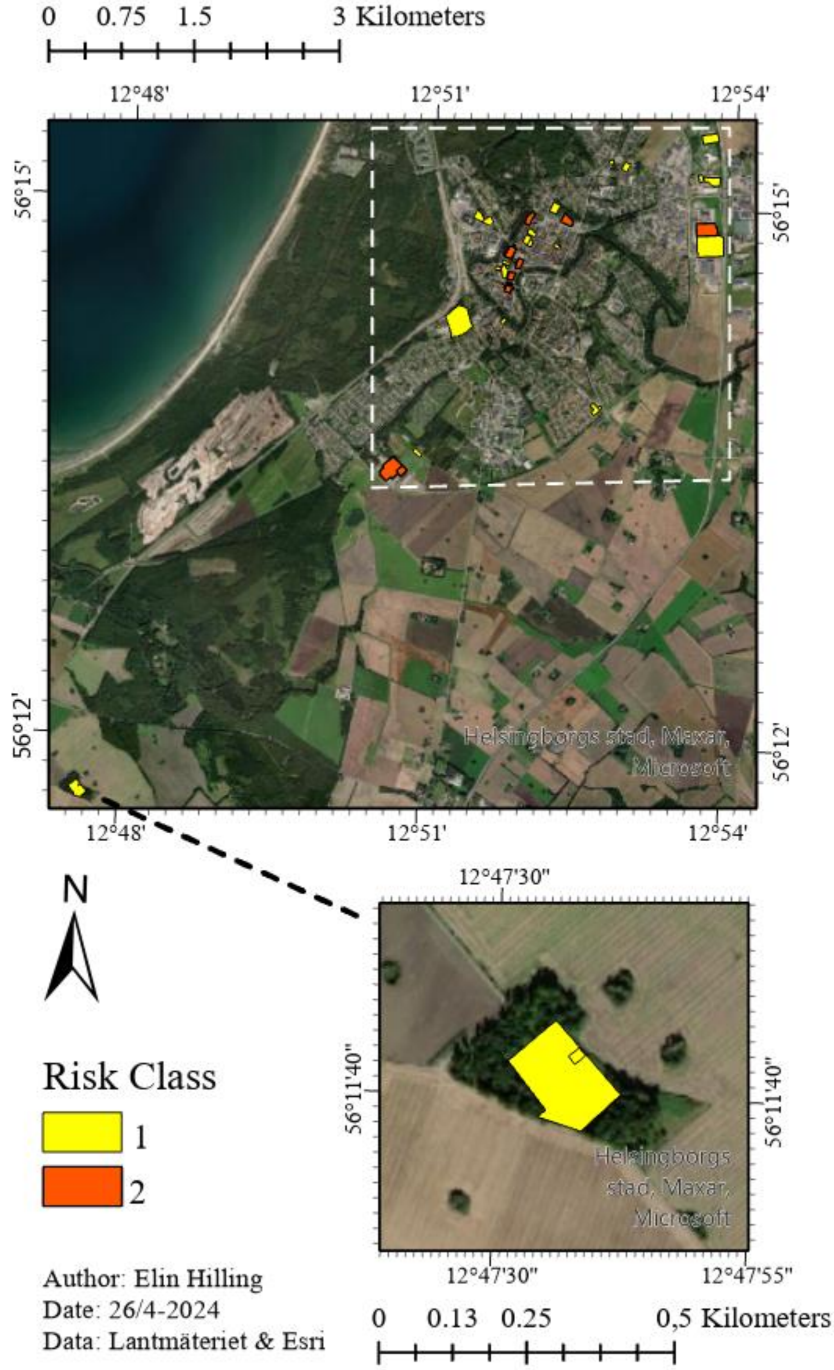

Figure 4. Map showing the RC 1 and RC 2 classification of Backahill's properties in Southern Ängelholm in relation to the properties in Figure 3, which are outlined by the dashed white line.

Table 4 shows property designations with RC 2 in Ängelholm and to what risks they are threatened by. As seen in the table, all RC 2 properties are vulnerable to high surface temperatures, downpours, and extreme precipitation. All properties but one have land erosion as a risk. Seven properties are threatened by high surface temperatures, four by forest fires, two by 100-year flooding, two by 200-year flooding, and four by maximum estimated flow. None of the properties are at risk for rising seas levels (SSP2 2080 and SSP5 2130) or coastal erosion. Falken 24 and Fågelsången 3 are threatened by eight risks, which makes them most vulnerable in this scenario.

Table 4. What risks each property designation classified as RC 2 in Ängelholm is threatened by. Red indicates that the risk is a threat to the property, grey indicates that it is not. A= Max. Air Temp. B= Max. Surface Temp. C= Forest Fire. D= Downpour. E= Extreme Precipitation. F= 100-year Flood. G= 200-year Flood. H= Maximum Estimated Flow. I= Sea Level Rise SSP2 2080. J= Sea Level Rise SSP5 2130. K= Coastal Erosion. L=Land Erosion.

	A	B	C	D	E	F	G	H	I	J	K	L
Falken 24	Red	Red	Grey	Red	Red	Red	Red	Red	Grey	Grey	Grey	Red
Fågelsången 3	Red	Grey	Red	Red	Red	Red	Red	Red	Grey	Grey	Grey	Red
Förmannen 6	Red	Red	Grey	Red	Red	Grey	Grey	Grey	Grey	Grey	Grey	Red
Idrotten 1	Red	Red	Red	Red	Red	Grey	Grey	Grey	Grey	Grey	Grey	Red
Påfågeln 13	Red	Red	Grey	Red	Red	Grey	Grey	Red	Grey	Grey	Grey	Red
Påfågeln 16	Red	Grey	Grey	Red	Red	Grey	Grey	Red	Grey	Grey	Grey	Red
Samskolan 5	Red	Grey	Grey	Red	Red	Grey	Grey	Red	Grey	Grey	Grey	Red
Steglisten 1	Red	Red	Red	Red	Red	Grey	Grey	Grey	Grey	Grey	Grey	Grey
Vilhelmsfält 2:17	Red	Red	Red	Red	Red	Grey	Grey	Grey	Grey	Grey	Grey	Red
Örnen 28	Red	Red	Grey	Red	Red	Grey	Grey	Grey	Grey	Grey	Grey	Red

4.2 Båstad

Båstad has 28 RC 1 properties, and six RC 2 (Figure A20). Figure 5 shows the risk classification of Backahill's properties in Northern Båstad. Here, the majority of the properties classified as RC 2 are found near the coast, but one property further inland, in the South is also classified as RC 2.

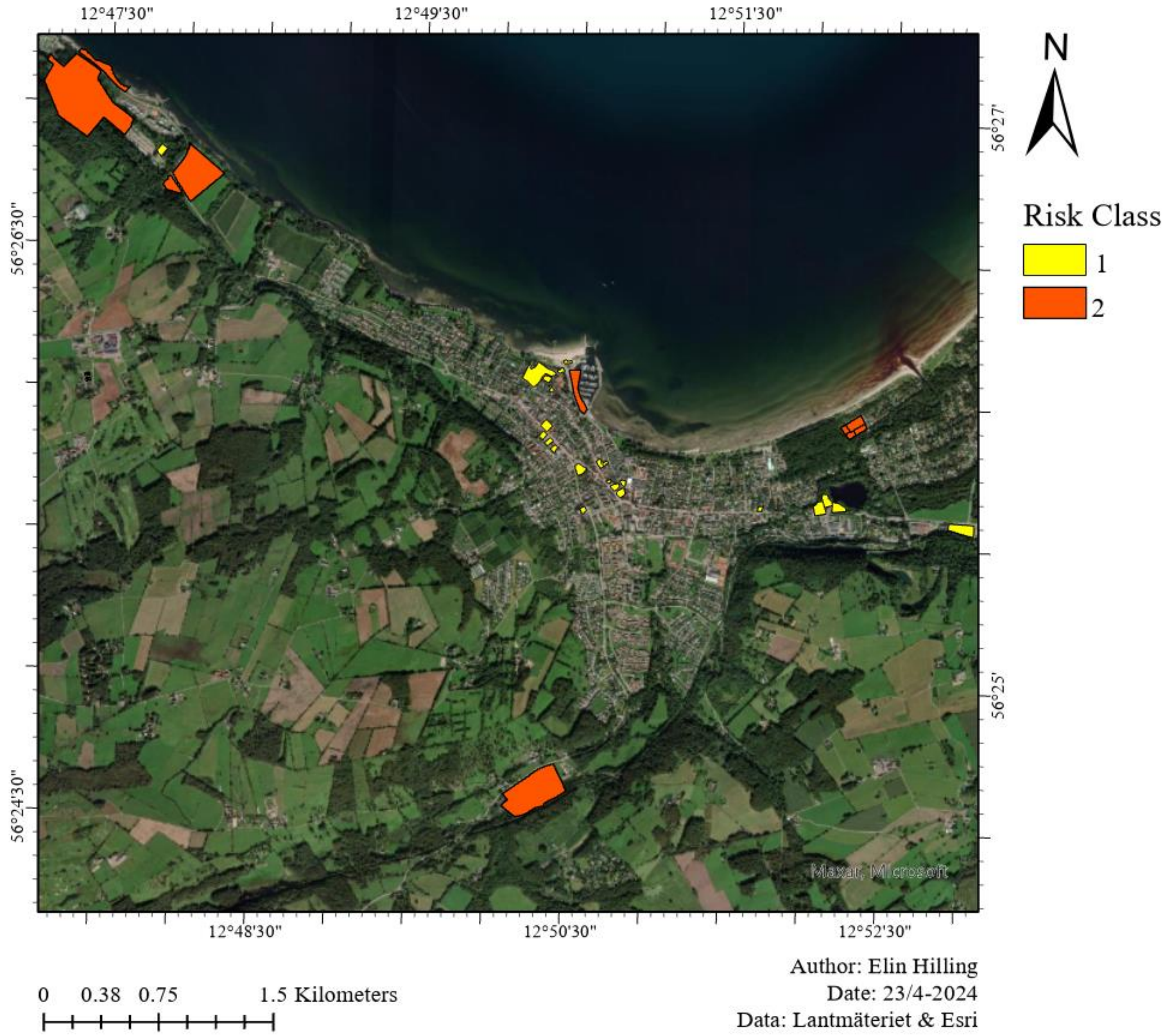

Figure 5. Map showing the RC 1 and RC 2 classification of Backahill's properties in Northern Båstad.

Figure 6 shows a property classified as RC 1, located in Western Båstad. The map shows the property's location in comparison with the properties in Northern Båstad (Figure 5).

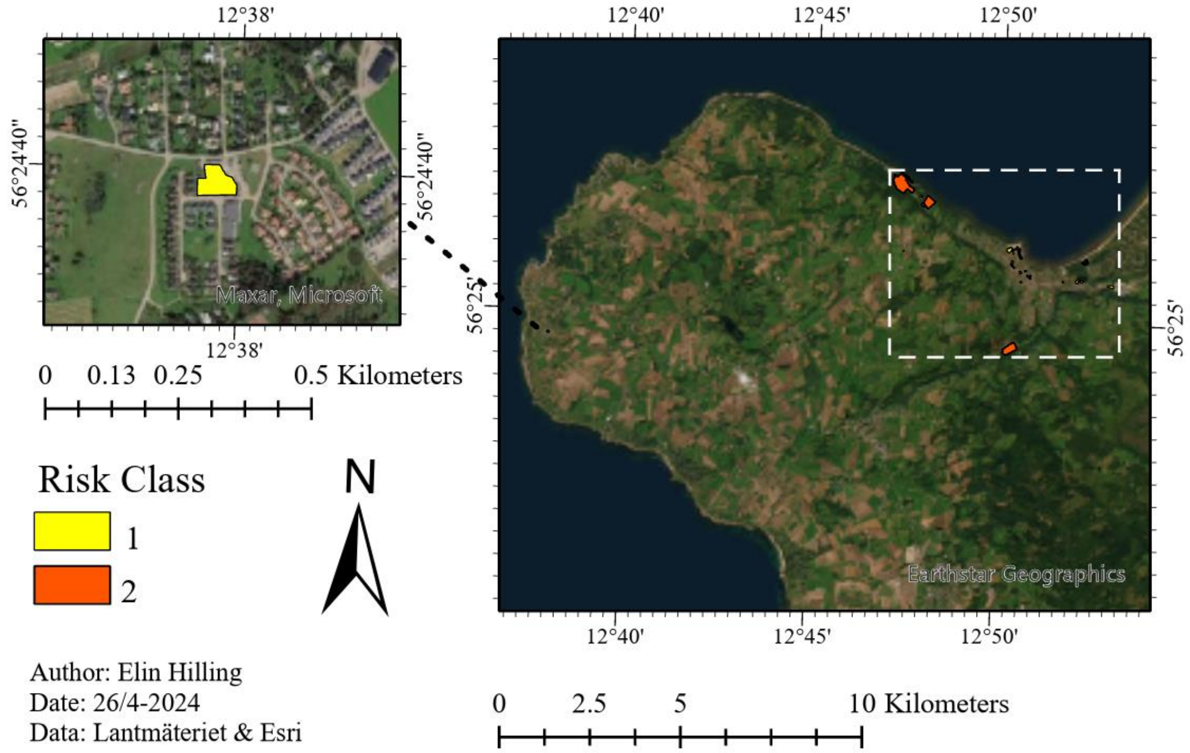

Figure 6. Map showing the RC 1 and RC 2 classification of Backahill's property in Western Båstad, relation to the properties in Figure 5, which are outlined by the dashed white line.

Table 5 shows property designations with RC 2 in Båstad and to what risks they are threatened by. The table shows that all RC 2 properties are threatened by downpours, extreme precipitation, and land erosion. All properties but one are also threatened by coastal erosion. Three properties have high air temperatures as a risk, one has high surface temperatures, two have forest fires, and two have rising sea levels (SSP2 2080 and SSP5 2130). None of the properties are in danger of 100-year flooding, 200-year flooding or maximum estimated flow.

Table 5. What risks each property designation classified as RC 2 in Båstad is threatened by. Red indicates that the risk is a threat to the property, green indicates that it is not. A= Max. Air Temp. B= Max. Surface Temp. C= Forest Fire. D= Downpour. E= Extreme Precipitation. F= 100-year Flood. G= 200-year Flood. H= Maximum Estimated Flow. I= Sea Level Rise SSP2 2080. J= Sea Level Rise SSP5 2130. K= Coastal Erosion. L=Land Erosion.

	A	B	C	D	E	F	G	H	I	J	K	L
Apelrydsskolan												
Båstad hamn												
Elestorp 6:6												
Riviera strand												
Småryd 1:26												
Östra Varegården 1:36												

5 Discussion

5.1 Properties at Risk in Ängelholm and Båstad

There are a few general things to say about the RC 2 properties in Ängelholm and Båstad. First, a threat relevant to all RC 2 properties in Ängelholm is high air temperatures (Table 4). As Ängelholm city, where the RC 2 properties are located, is an urban area, this affects the overall higher temperatures due to e.g. human activities and the energy demand of the buildings (Yang et al., 2024). Big temperature variations between the seasons can potentially cause the building material to expand and contract, resulting in a lowered quality (Boverket, 2007). Only half of the RC 2 properties in Båstad have high air temperatures as a risk (Table 5). This may be explained by the properties distance to the ocean. The cool temperature of the water influences the air temperatures and makes them generally cooler than the ones inland (Ahrens & Henson, 2021).

Further, several of the RC 2 properties along Rönne Å in central Ängelholm are large, have dark rooftops, and/or are surrounded by areas of asphalt, allowing high surface temperatures as sunlight is absorbed (Ahrens & Henson, 2021). This applies for seven of RC 2 properties in Ängelholm (Table 4). One of the RC 2 properties, Förmannen 6, is located along highway E6 (Figure 3) with an extensive region of businesses and warehouse shops surrounding it. The property next to Förmannen 6 is classified as RC 1, even though they are situated so close. This has to do with the risk of land erosion. The RC 2 property is at higher risk when it comes to land erosion than the RC 1 property according to the slope analysis by SGI (2022b) used in the methods (Table 4). Only one property in Båstad, Östra Varegården 1:36, has high surface temperatures as a risk (Table 5). It is a business village located South of central Båstad (Figure 5), an area that absorbs sunlight due to its features and surroundings, causing these high surface temperatures.

The following trends were found amongst RC 2 properties in Ängelholm and Båstad: location close to, or in, an urban area, and located close to a water body. These two factors appear to play a significant role in the properties' overall threat to the climate-related risks as they affect temperatures and the effect of flooding.

Six of the RC 2 properties in Ängelhom and Båstad are in danger of forest fires (Table 4 & 5). These properties are located near forest types identified as medium-high risk of starting and/or spreading forest fires. Forest fires can burn down entire properties and cause great damage to their surroundings. The materials and the construction of the properties influence the extent of the fire damage (Mikkola, 2008).

All RC 2 properties in Ängelholm and Båstad are threatened by downpours and extreme precipitation (Table 4 & 5). As precipitation patterns multiply and intensify, a lot of it will accumulate on the ground around the properties. It is hard to say how long the water will remain on the ground as it depends on the drainage option and its ability to infiltrate, but this may disturb both property owners and businesses. The water may prohibit individuals from entering the property as well as disturb their daily activities. The precipitating water may also leak through roofs, doors, and windows of buildings, causing damage to the inside (Universiti Malaya, n.d). A combination of moisture and temperature may also cause mold growth, which may have serious effects on human health and could potentially cause business losses. Further, a severe situation can result in extensive renovation projects of the affected properties (Vecherin et al., 2024).

Figure 3 shows the risk classification of the properties in Western Ängelholm, where the city is located. Most properties classified as RC 2 are in the city center, along Rönne Å. A reason for this is the flooding of Rönne Å. With the 100-year flooding, 200-year flooding, and maximum estimated flow, most properties near the river are at a higher risk than those located further away (Table 4). Flooding may result in great economic loss and damage to the properties (Paulik et al., 2023). In Båstad on the other hand, 100-year flooding, 200-year flooding, and maximum estimated flow did not affect any of the properties since there is no large river in the area.

Two RC 2 properties in Båstad, Båstad hamn and Elestorp 6:6, are vulnerable to both scenarios of rising sea levels, SSP2 for 2080 and SSP5 for 2130 (Table 5). Rising sea levels are an irreversible effect of climate change and result in coastal flooding, threatening coastal communities, buildings, and infrastructure (Garcia-Jorcano & Sanchis-Marco, 2024). The flooding caused by sea level rise may affect properties both instant and long-term (Paulik et al., 2021). Five out of the six RC 2 properties in Båstad are threatened by coastal erosion (Table 5). These properties are located near the coastline, which experiences erosion both long-term and more immediately in the case of weather hazards (Haddow et al., 2020). In Ängelholm the properties were located away from the coast, resulting in none of them being threatened by rising sea levels nor coastal erosion.

Lastly, land erosion is an issue in Ängelholm and in Båstad. Several factors cause land erosion, one of them being soil texture. Finer soils are less resistant to land erosion than coarser ones (Zuo et al., 2024). And as the dominating soil types in Ängelholm and Båstad are fine-grained, land erosion is a threat to the area. Intense rain events, such as extreme precipitation, also increase the risk for land erosion through both the raindrop impact on the soil particles and through detachment of soil particles by runoff (Eekhout & Vente, 2022). Soil erosion may cause, e.g. landslides and loss of river walls, which may long-and short-term affect the properties in the area. Steglisten, located in Ängelholm, is the only RC 2 property not threatened by land erosion. This could be due to the closeness to the forest since vegetation reduces erosion (Wang et al., 2024).

5.2 Limitations

As this is the initial risk analysis of the area, there are several limitations in the study. First, it is the methodology from Fastighetsägarna et al. (2023). Their methodology gives guidelines on how to implement the TR on properties by suggesting how the risk analysis and vulnerability analysis should be conducted (Fastighetsägarna et al., 2023). This study was limited to the risk analysis part, which means that no conclusions regarding vulnerability can be drawn.

A literature study was conducted to identify the climate-related risks in Ängelholm and Båstad. This constitutes a limitation in the study since there is a risk that some climate-related risks were not considered due to choice of sources used. Furthermore, all wind-related risks were excluded due to the lack of information on future wind patterns and alterations caused by climate change. Both Ängelholm and Båstad experience, and have historically experienced, strong winds and will most likely see an effect of these on properties in the area due to extreme weathers and similar phenomena. Taking this factor into account could provide a more accurate estimation for this risk analysis.

The scarcity of relevant data available made it challenging to follow the method of Fastighetsägarna et al. (2023). Fastighetsägarna et al. (2023) suggested that the scenarios RCP 4.5 and RCP 8.5 should be the basis of the data used in the risk analysis. Most of their recommended data sources, on the other hand, were either based on already existing climate measurements, predictions, and/or assumptions. Instead, it was assumed that properties already experiencing the effects of ≥1 of the risks, would keep on doing so in the future as the climate extremes and variations will multiply and intensify (Deng et al., 2024; IPCC, 2023a). In other words, properties subducted to e.g. the high surface temperatures today will most likely be the ones with the highest surface temperatures in the future. For that reason, several of the used data sources are not based on future climate scenarios.

SMHI has a tool called *Fördjupad klimatscenariotjänst* (advanced climate scenario services) that allows the user to choose an RCP scenario, a timeframe, and the type of climate to project (SMHI, 2023b). This is an example of a source that could have been very useful for the risk analysis as it would provide the desired future climate information. However, in this study, downloadable data was prioritized, and therefore *Fördjupad klimatscenariotjänst* was not used as the results yielded tables and not data layers suitable to use in GIS.

How the risks are weighed is another limitation of the study. In this risk analysis, all risks are seen as equal, i.e. they are weighed the same. The risks do vary in the extent of damage they could cause, which complicates the classification of the properties. A RC 1 property, for instance, might be threatened by forest fires, which can destroy the entire property. On the other hand, a RC 2 property might be affected by less hazardous risks, such as downpours or high air temperatures, which are likely to only cause minor damage to the property. Alternatives to this limitation are further discussed in section 5.4.

As the guidelines of Fastighetsägarna et al. (2023) did not include an assessment of the impact of each risk, no evaluation was carried out. When it comes to classification, the guidelines propose that the properties should be categorized into low, medium, or high risk. However, this type of labeling system could be interpreted as misleading since a “low” property then would be seen as “safe”, when in fact it could be threatened by 1-4 severely destructive risks. It was then decided to not follow the method by Fastighetsägarna et al. (2023) in this stage of the risk analysis and instead rename the categories RC 1, RC 2, and RC 3 to obtain neutrality toward the actual danger posed by the risks.

Yet another limitation is the correlation between the different risks. As several of the risks have similar impacts and are caused by similar circumstances, one can assume that they correlate with each other. The following risks are believed to correlate with each other:

- Maximum air temperature and maximum surface temperature
- Downpours and extreme precipitation
- 100-year flooding, 200-year flooding, and maximum estimated flow
- Sea level rise SSP2 2080 and sea level rise SSP5 2130

In this analysis, the correlation between risks was unavoidable as the Fastighetsägarna et al. (2023) method suggested using these data layers, even though they are based on the same and/or similar parameters. However, since this risk analysis is conducted on properties, it may be necessary to use correlating data. For the risk analysis to be useful in the future, it is crucial to consider the extreme risk events as they pose a threat to both old and new properties.

As discussed in section 3.2.3, the number of risks for each property was decided by observations of the property in relation to the risk layer. Criteria for a risk to be considered a threat to a property were: the property polygon overlaps the features of the risk layer, or the property polygon is so close to the feature of the risk layer that there is a chance it may be affected. As these decisions were manually made, they introduce the potential of human error to the risk analysis.

The need for local knowledge of the area is another limitation of this study. With the help of local knowledge, more accurate predictions and assumptions could have been made regarding the results. Knowing the general landscape features of Ängelhom and Båstad would help explain some of the results of the risk analysis. Further, information on what the properties are used for and what is in their surrounding areas would also provide useful information to the study. It would be particularly beneficial in future studies as adapting properties to climate change will be vital. Future studies are further discussed in section 5.4.

It is challenging to determine precisely how much the limitations have affected the results of the risk analysis. However, it may be assumed that some limitations have more significant effects than others. The limitation in data availability is presumed to have a large effect on the results as the risk analysis and the classifications has relied primarily on it. Two other limitations with significant effects on the results are the weight of the risks and the correlation between several of them. Just like with the data, it is likely that these two factors affected the outcome significantly.

5.3 Sources of Error

There are sources of errors in this study to be addressed. The property polygons in the property layer are one source of error. The polygons were imported from *Fastighetskartan* (SMHI, 2021) and identified by their property designation. For some properties, several polygons belong to the same property designation (Table A1). In the risk analysis, the number of risks for these polygons was averaged and the property designation was given one single classification. In the cases where the polygons of a property designation had different numbers of risks, the mean value might be slightly misleading. If instead, the maximum number of risks of a polygon would classify the property, the chances of unnecessary precautions would be high, and in that case also misleading. The risks of each property in the risk analysis are not definite but should be seen and interpreted as predictions of the future.

Another source of error with the property polygons is that they do not only cover buildings, but also vegetation and other surroundings. This means that the "properties" in this risk analysis are not purely properties, but rather property designations. When identifying what properties would be affected by what risks, some of the property polygons were only slightly overlapping with the features of the risk layers. This means that the risk may only reach the surroundings of an actual property. Although this is the case for some of the property designations, the risk is still judged as applicable even if it could be perceived as being deceptive.

Applying all 12 risks to both Ängelholm and Båstad may also become a source of error. Since the total study area is extensive, all 12 risks do not apply to both municipalities. Rising sea levels and coastal erosion are not relevant för Ängelholm, while 100-year flooding, 200-year flooding, and maximum estimated flow are not relevant for Båstad. This makes it impossible for a property to be threatened by all 12 risks. Properties can be threatened by a maximum of nine risks. Despite that, it was decided together with Backahill to include all risks for the municipalities as it should be noted if a property is not affected by a particular risk.

5.4 Future Studies and Climate Adaption

As mentioned in the previous text, this is an initial risk analysis of Backahill's properties in Ängelholm and Båstad. Although the results from the risk analysis did not generate any RC 3 properties, the next step to fully implement the TR would be vulnerability analysis of "high" risk (RC 3) properties (Fastighetsägarna et al., 2023). However, a vulnerability analysis could still be carried out but on the RC 2 properties instead, as these properties are of risk for multiple climate-related issues. Such an analysis would provide a solid foundation when developing adaptation strategies for the properties and their surroundings.

Weighing the risks against each other based on the damage they cause would be interesting to study further. By evaluating what damage each risk may cause to a property, risks could be categorized by, for instance, using a 1-10 scale with 1 being "minor" damage and 10 being "major" damage, based on set given factors. This type of evaluation and classification of risk would yield a more reliable result when it comes to what risk each property has. Further, it could be relevant to establishing two types of classifications for the properties: one for the property itself and one for the property owners. The one for the property would be similar to the risk analysis conducted in this study, i.e. what damage the climate-related risks may cause to the property. The one for the property owners would include the economic losses as well as insurance issues related to the damage that may be caused by the climate-related risks. Yet another possibility is to establish more classification thresholds, e.g. RC 1- RC 5. This would yield a more representative way to classify each property as it would be simpler to distinguish the number of risks they are exposed to.

A future study that would be very useful for Backahill is to develop adaptation strategies for their properties, and this risk analysis can be utilized as the groundwork. Adaptations need to be made to both the properties and their surroundings. Earlier research provides several examples of climate change adaptations that are relevant for Ängelholm and Båstad. To cool down the high temperatures in urban areas, vegetational ecological services have proven to be beneficial (Yang et al., 2024; Li & Sun, 2023). Plants' evapotranspiration may cool high surface temperatures and vegetation shade lowers the temperature of the shaded areas (Li & Sun, 2023).

Adapting the building structure and materials is another way to adapt the buildings to climate-related risks. To minimize the destruction of forest fires, Mikkola (2008) suggests that large areas on structures, such as the outer walls and roofs, should be built with more fire-resistant materials, i.e. not wood or plastics. Further, protective means include strong windows that are hard to break in a fire. Broken windows tend to spread fires to the ventilation systems and attics of buildings (Mikkola, 2008).

Adaptation and mitigation strategies for coastal flooding include both structural and legal approaches (Bezboruah et al., 2024). Sea walls, levees, breakwaters, groynes, and bulkheads are some of the engineered solutions that protect coastal settlements from rising sea levels (Bezboruah et al., 2024; Chen et al., 2024). Communities have also implemented policies and initiatives to raise awareness of the issue among the public (Bezboruah et al., 2024). For other types of flooding, both gray and green infrastructures have been used (Su et al., 2024). Gray infrastructure entails drainage systems, channels, retention structures, and culverts meant to eliminate the water on the surface. As urbanized areas get flooded, the water obtains pollutants from the surrounding area (Kumar et al., 2024). Green infrastructure helps improve the water quality and at the same time mitigate the water away from the surface. Permeable pavements, green roofs, restored wetlands, rain barrels, sand filters, and rain gardens are some examples of green infrastructure used for this purpose (Su et al., 2024; Kumar et al., 2024).

These are some of the adaptation strategies used to protect properties today. This risk analysis and further research on the study area can be utilized to find the most suitable adaptation strategies for Backahill's properties.

6 Conclusion

The results showed that 26% of the properties were categorized as RC 2, which was the highest class identified in this assessment, and 74% were categorized as RC 1. Some trends amongst the RC 2 properties were noticed related to urban locations and/or closeness to a water body. Downpours, extreme precipitation, and land erosion were shown to be risks for all but one of the RC 2 properties in Ängelholm and Båstad.

This is the initial risk analysis of Backahill's properties and should therefore be used with caution. This study does though provide Backahill with a sloid foundation for further work towards sustainability and climate adaptation and may also be used by other companies and authorities in Ängelholm and Båstad. To get a more accurate classification the risk should be weighed and ranked after the danger they pose.

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8 Appendix

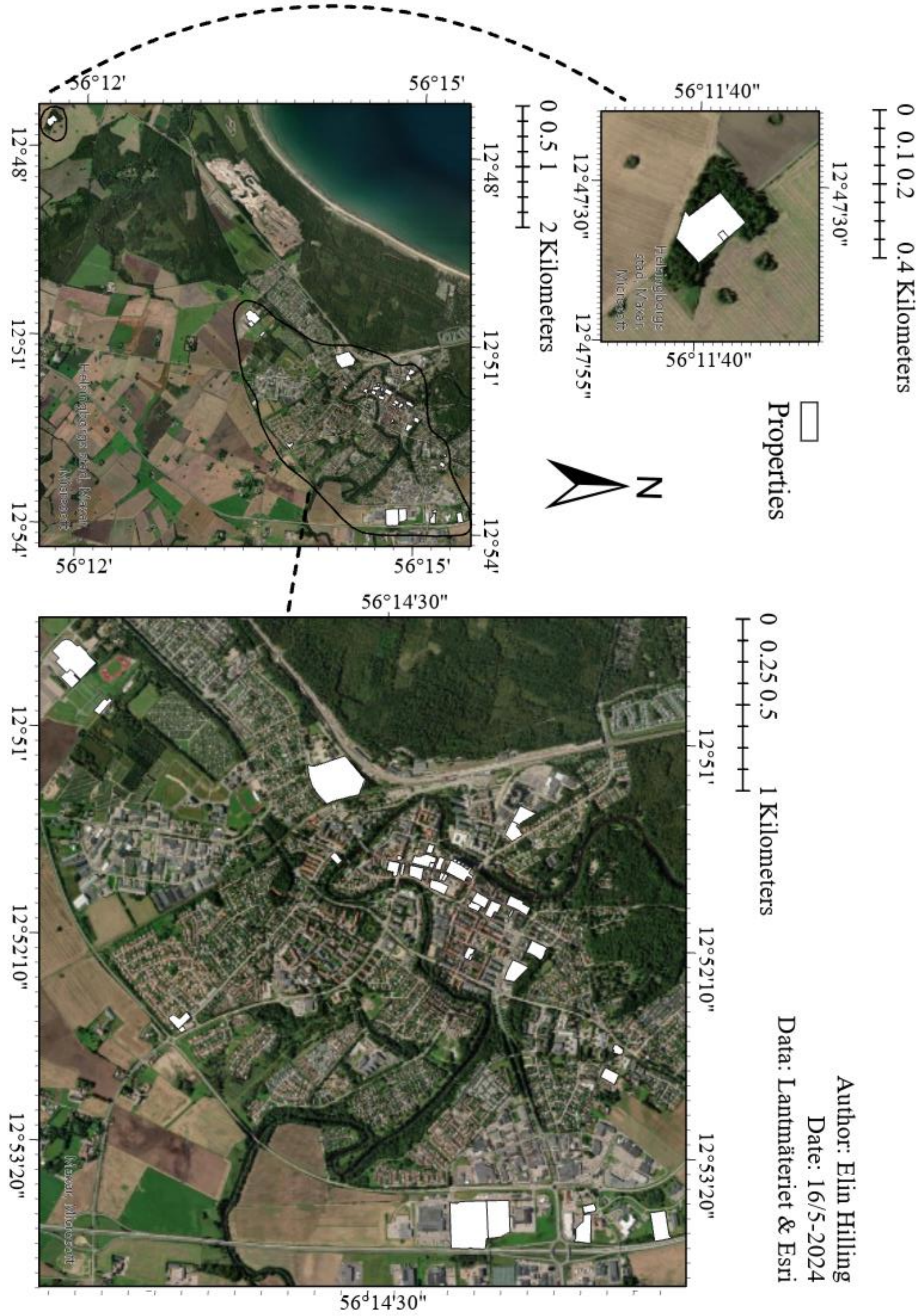

Figure A1. Overview map of Backahill's properties in Ängelholm.

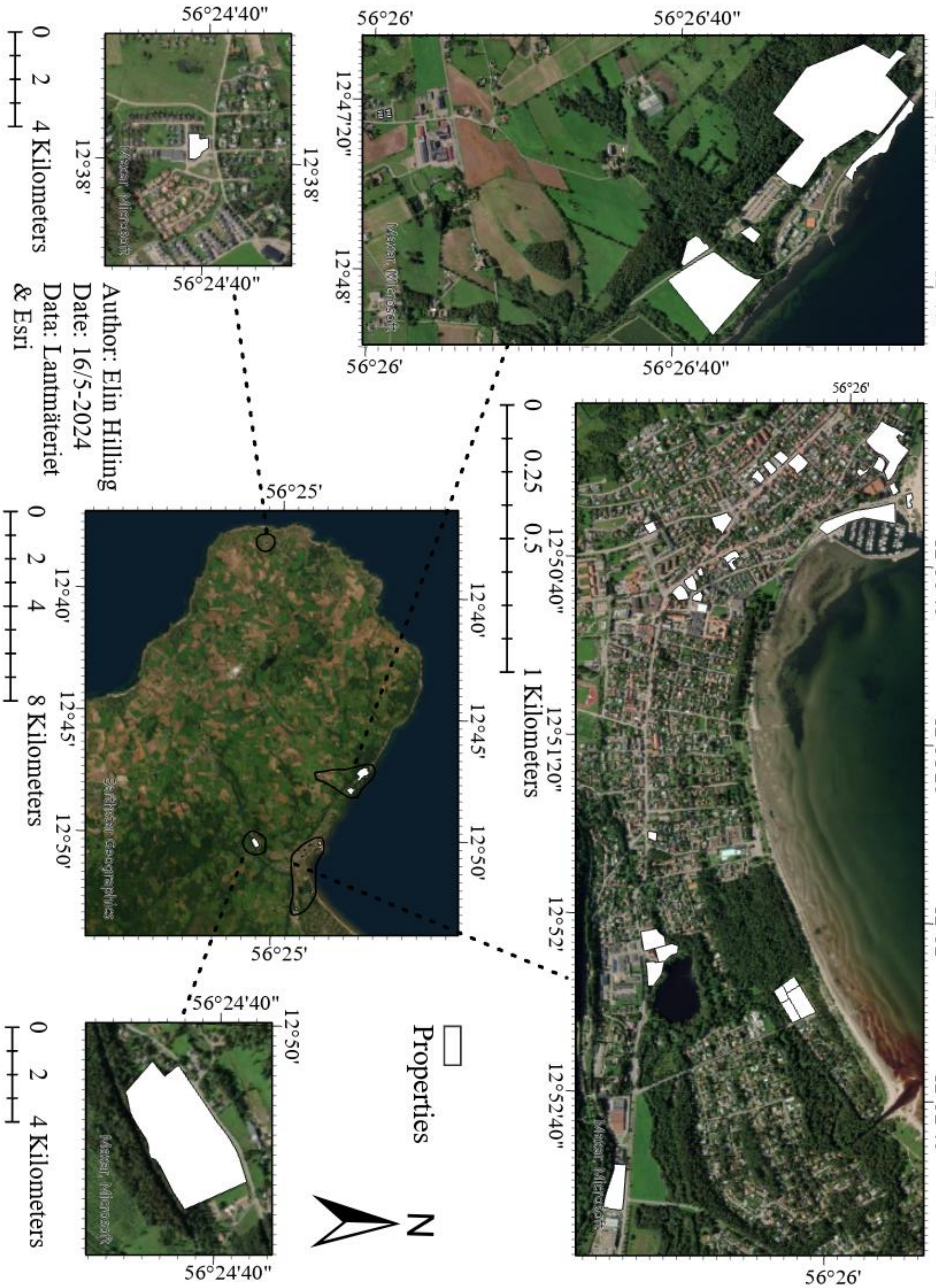

Figure A2. Overview map of Backahill's properties in Båstad.

Table A1. The number of relevant risks for each of Backahill's properties in Ängelholm and Båstad with corresponding risk class.
** These properties are given the average value of total risks as the property designation is covered by several polygons.*

Risks	Class	Property Designation Ängelholm	Risks	Class	Property Designation Båstad
4	RC 1	Blåhaken 11	4	RC 1	Agardhsgården 1
4	RC 1	Duvan 28	4	RC 1	Agardhsgården 2
4	RC 1	Duvan 29	4	RC 1	Akvarellen 19
4	RC 1	Eldfågeln 7	5	RC 2	Apelrydsskolan
6	RC 2	Falken 24*	4	RC 1	Argus 6
8	RC 2	Fågelsången 3	4	RC 1	Badkrukan
4	RC 1	Förmannen 3	4	RC 1	Banken 1
5	RC 2	Förmannen 6	2	RC 1	Barret 12
6	RC 2	Idrotten 1	2	RC 1	Boarp 2:31
3	RC 1	Karslund 1	6	RC 2	Båstad hamn
4	RC 1	Körsbärsträdet 5	2	RC 1	Båtsmannen 5
4	RC 1	Körsbärsträdet 6	2	RC 1	Båtsmannen 6
4	RC 1	Loglängan 6	6	RC 2	Elestorp 6:6*
2	RC 1	Lärkan 18	2	RC 1	Evald 3
2	RC 1	Lärkan 22	4	RC 1	Evald 5
4	RC 1	Midgården 2	2	RC 1	Evald 7
3	RC 1	Norregården 1	3	RC 1	Hemmeslöv 5:10
6	RC 2	Påfågeln 13	1	RC 1	Hinden 6

5	RC 2	Påfågeln 16	3	RC 1	Kalkugnen 2*
2	RC 1	Ridskolan 3*	4	RC 1	Lyckebacken 2
5	RC 2	Samskolan 5	3	RC 1	Repslagaren 22*
5	RC 2	Steglisten 1	6	RC 2	Riviera strand*
3	RC 1	Strutsen 18	5	RC 2	Småryd 1:26
3	RC 1	Strutsen 6	4	RC 1	Torekov Hotell
4	RC 1	Taktäckaren 7	1	RC 1	Turisten 1
1	RC 1	Tinghuset 18	3	RC 1	Västra Karup 1:124
3	RC 1	Trasten 25	1	RC 1	Västra Karup 1:125
4	RC 1	Trasten 9	1	RC 1	Västra Karup 1:126
4	RC 1	Vakteln 28	3	RC 1	Västra Karup 1:127
4	RC 1	Vegeholm 1:6	3	RC 1	Västra Karup 1:128
4	RC 1	Vegeolm 1:5	3	RC 1	Västra Karup 1:129
6	RC 2	Vilhelmsfält 2:17	3	RC 1	Västra Karup 1:130
2	RC 1	Vråken 13	3	RC 1	Västra Karup 1:131
4	RC 1	Vråken 18	6	RC 2	Östra Varegården 1:36
4	RC 1	Ängelholm 3:142			
3	RC 1	Ängelholm 5:63			
5	RC 2	Örnen 28			
4	RC 1	Öster skans 1			

Table A2. Class code and description of forest types with medium-high risk of starting and/or spreading forest fires in Ängelholm and Båstad. Based on documentation produced by Metria for MSB (2016).

	Class Code	Description
High Risk	BR 1	Coniferous forest, dominated by lichen and undergrowth
	BR 2	Coniferous forest, dominated by mosses and undergrowth
	TV 1	Tree-covered peatland, pine-dominated
Medium Risk	BR 3	Coniferous forest, dominated by herbs and undergrowth
	LV 3	Deciduous or mixed forest, dominated by herbs and undergrowth
	TV 2	Tree-covered peatland, without pine

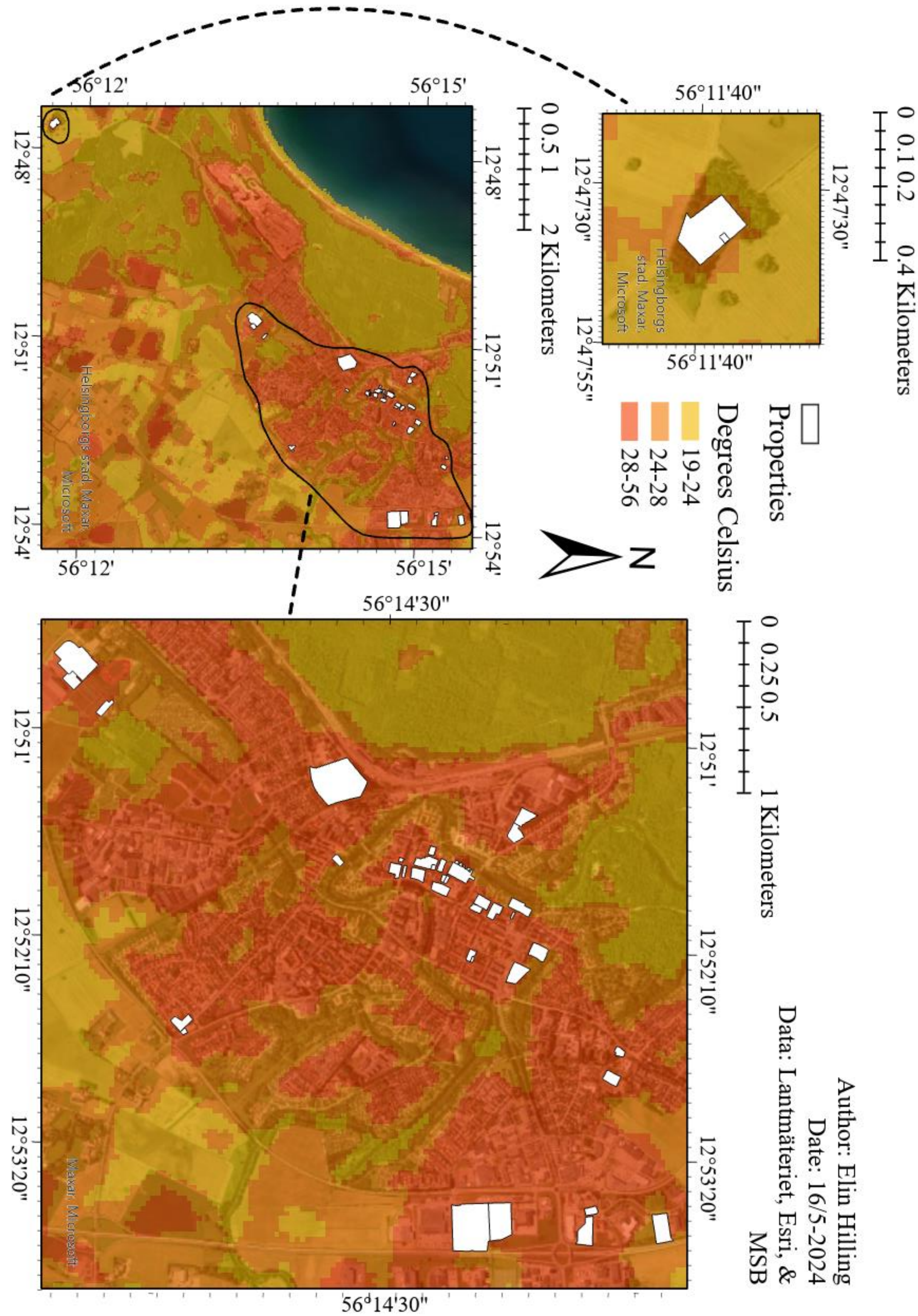

Figure A3. Maximum air temperatures reached in Ängelhom between the years 2021 and 2023.

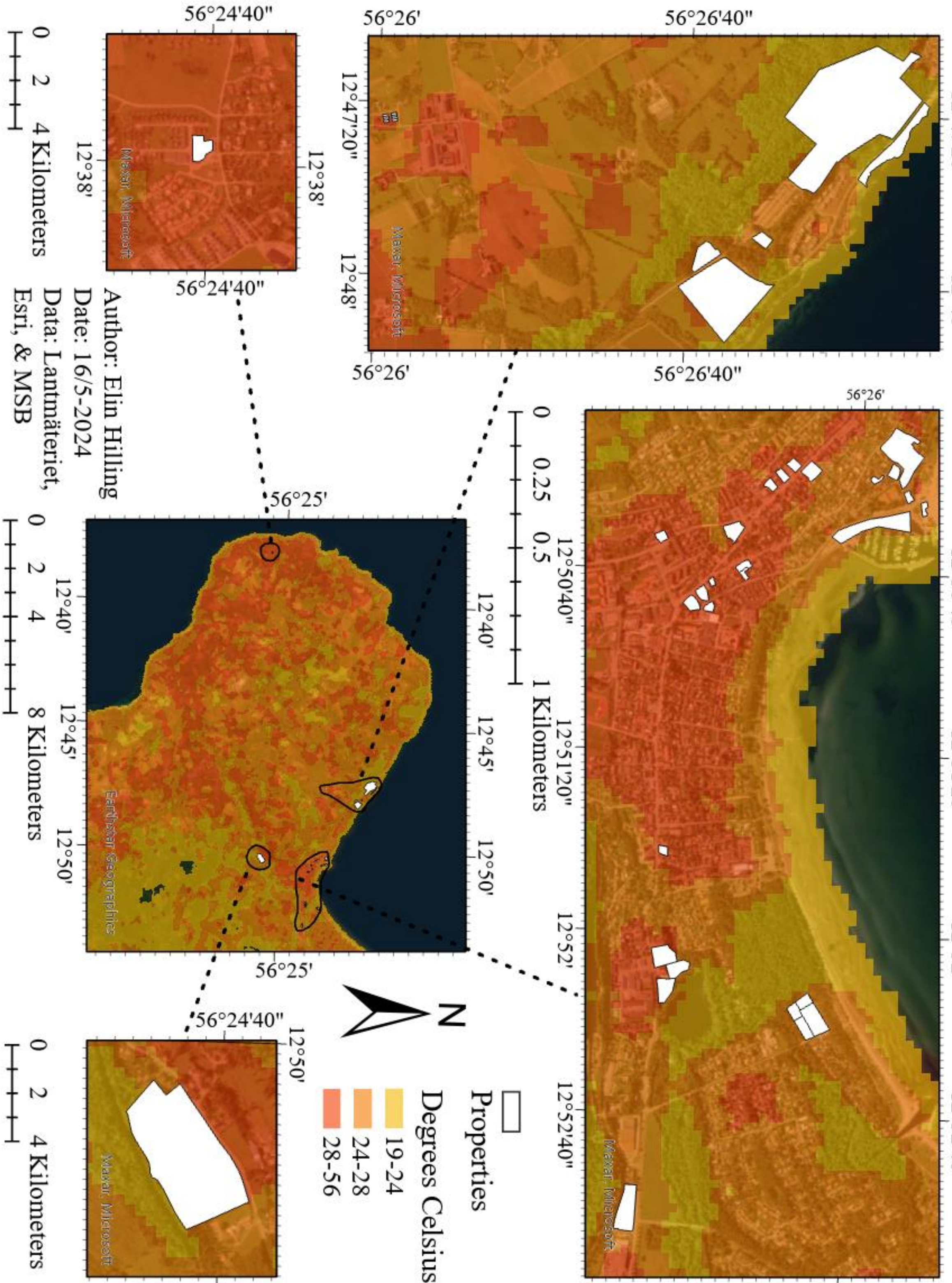

Figure A4. Maximum air temperature reached in Båstad bewtween the years 2021 and 2023.

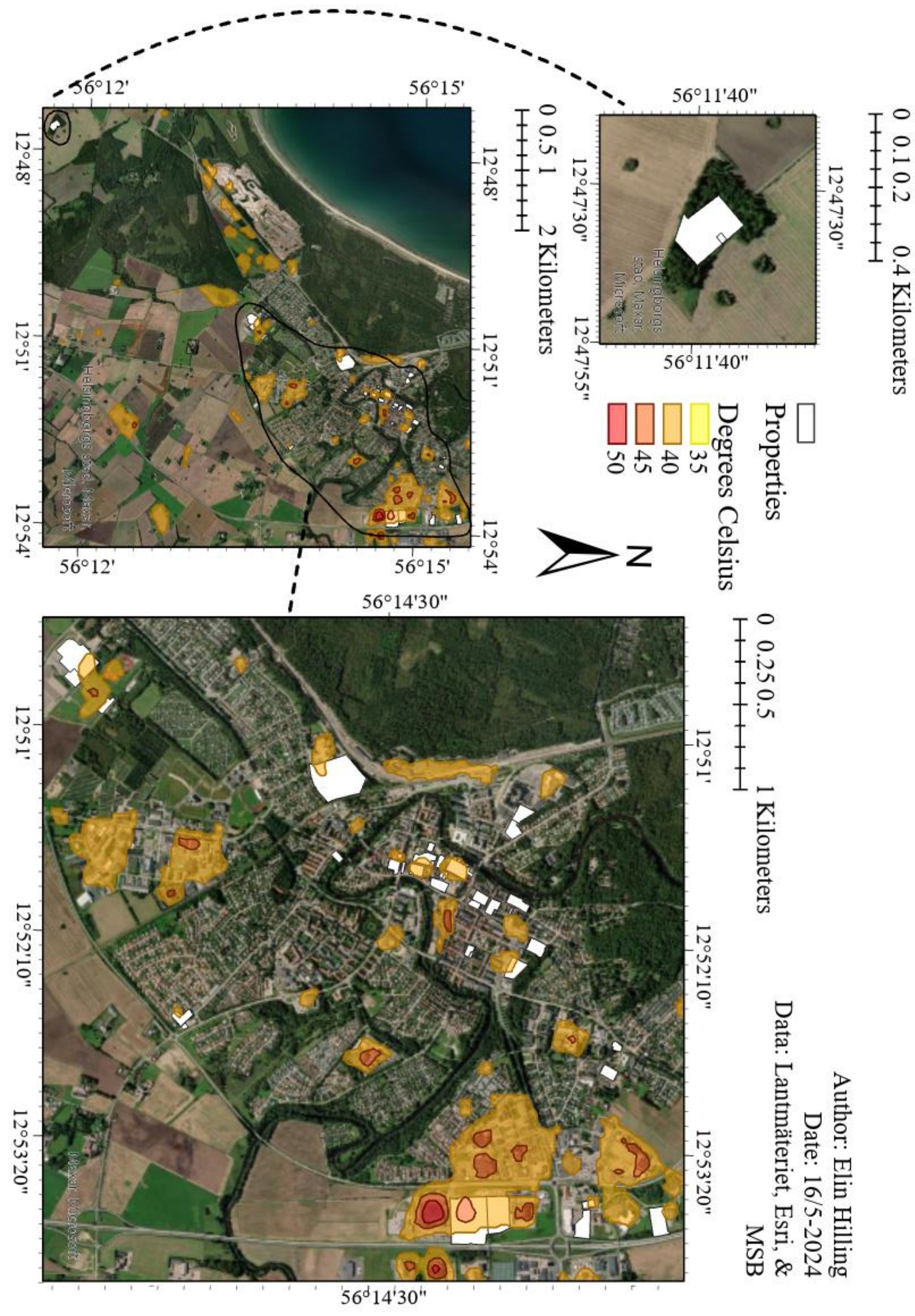

Figure A5. Maximum surface temperatures recahed in Ängelholm between the years 2017 and 2023.

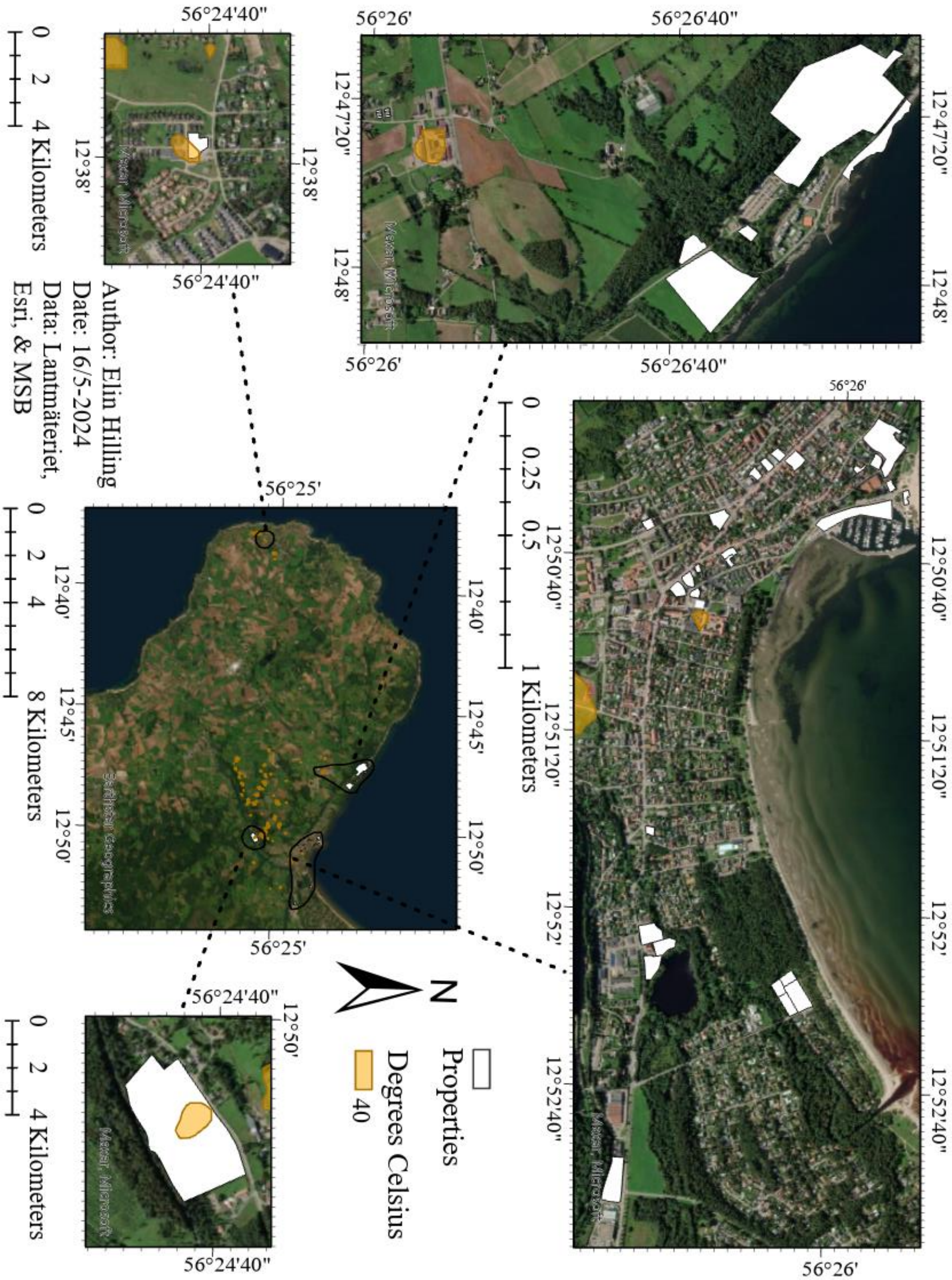

Figure A6. Maximum surface temperatures recahed in Båstad between the years 2017 and 2023.

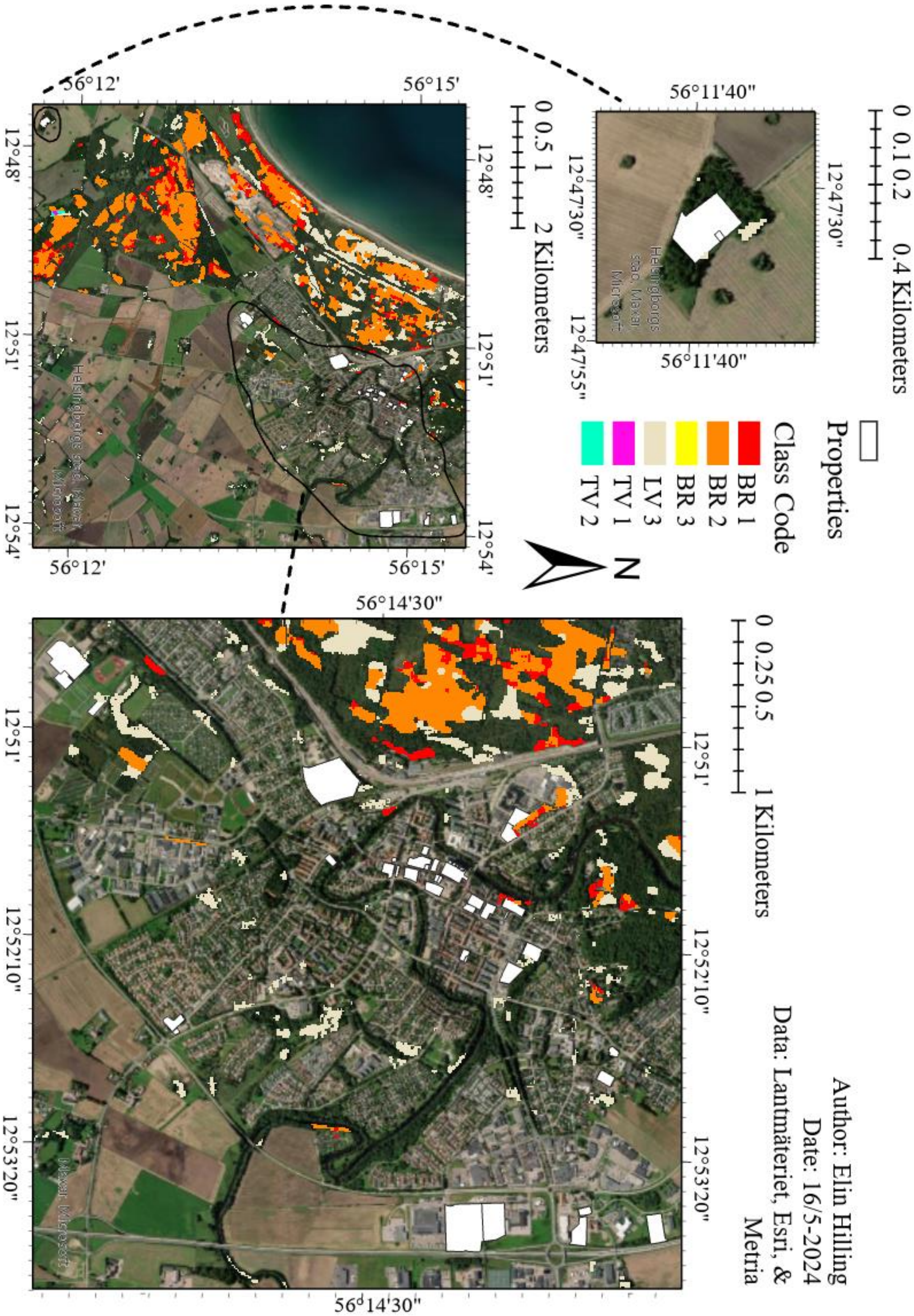

Figure A7. Forest types in Ängelholm classified as medium-high risk of starting and spreading forest fires (Table A1).

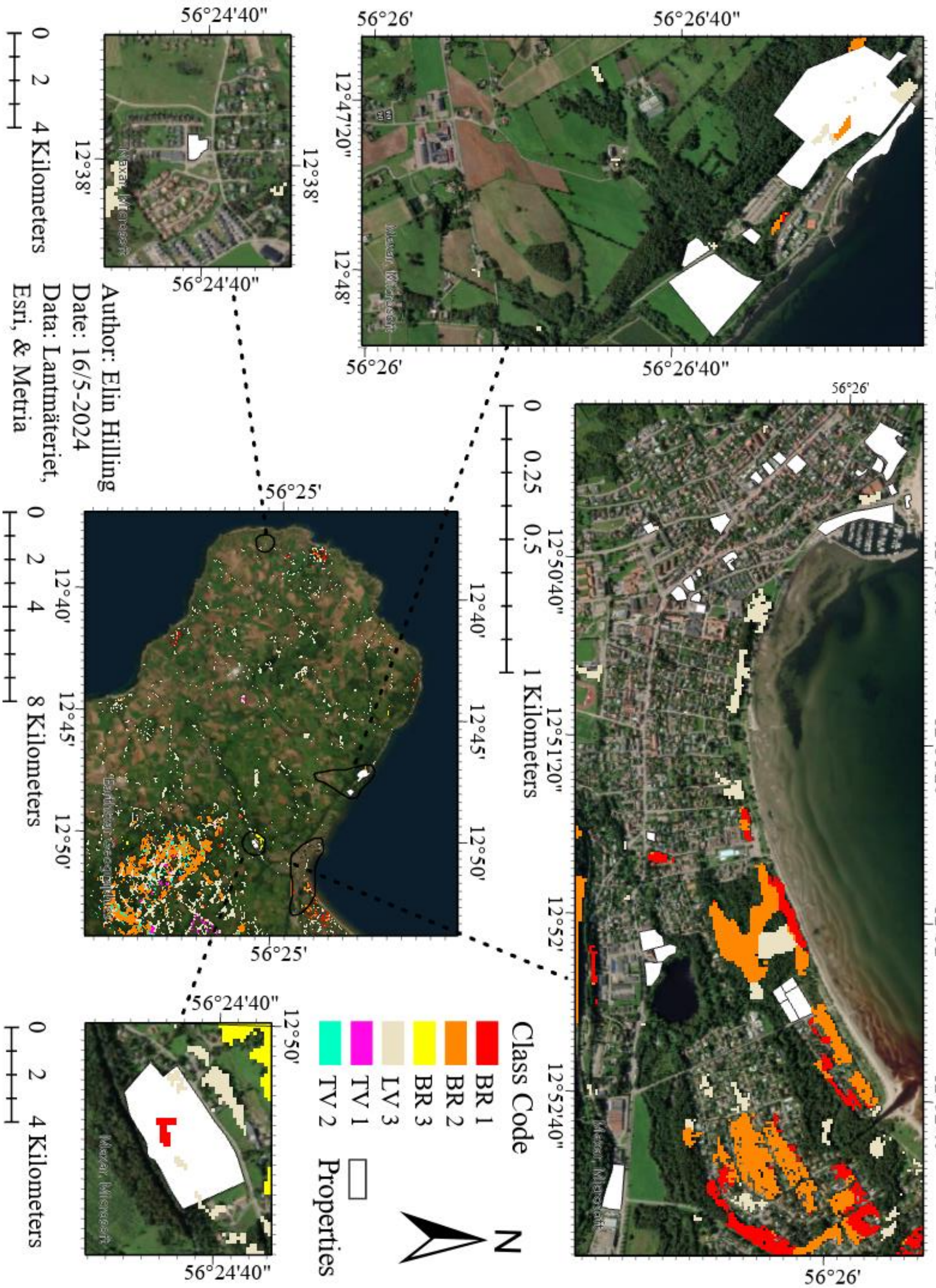

Figure A8. Forest types in Båstad classified as medium-high risk of starting and spreading forest fires (Table A1).

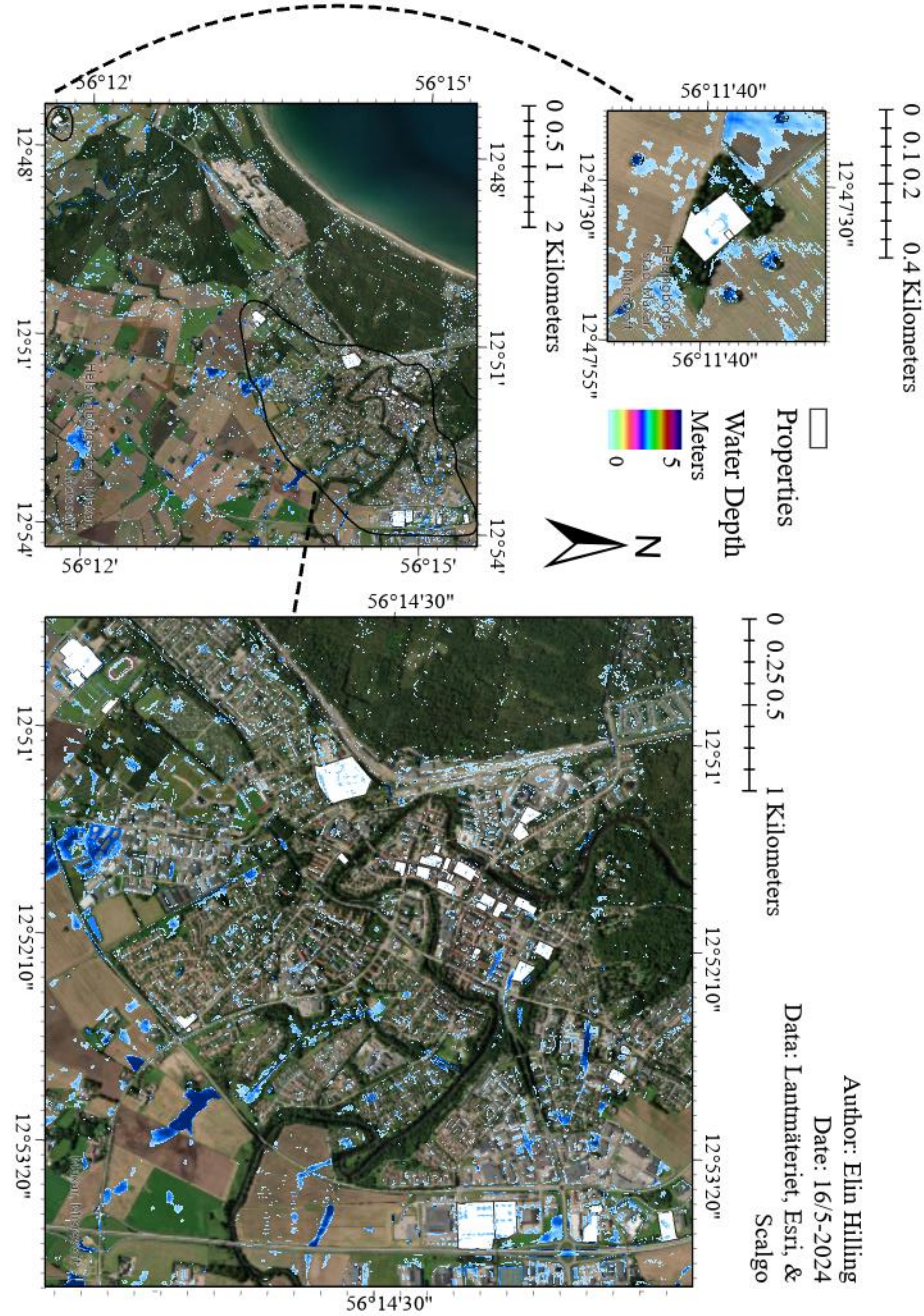

Figure A9. Water depth of downpours (50mm rain) in Ängelholm.

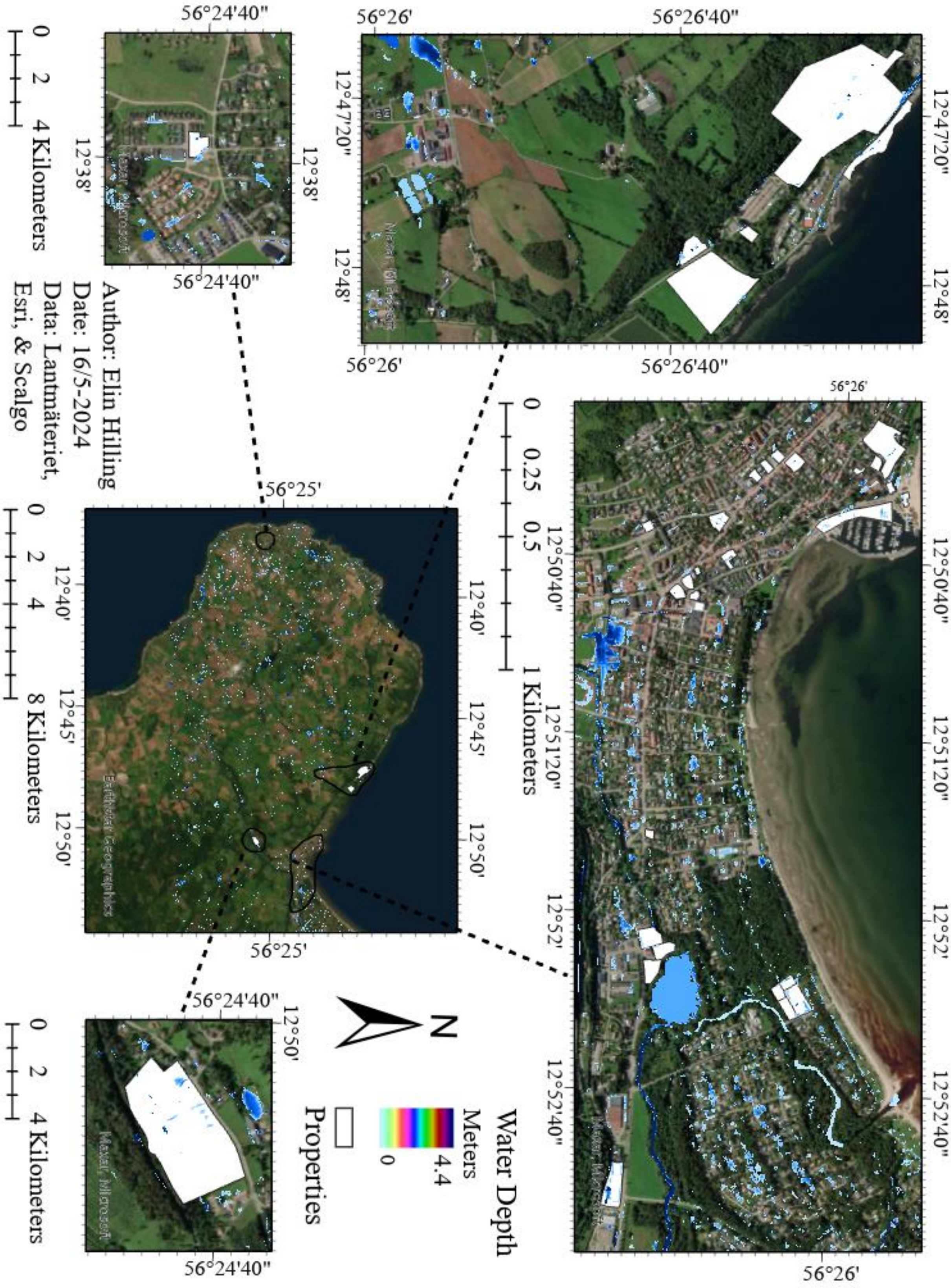

Figure A10. Water depth of downpours (50mm rain) in Båstad.

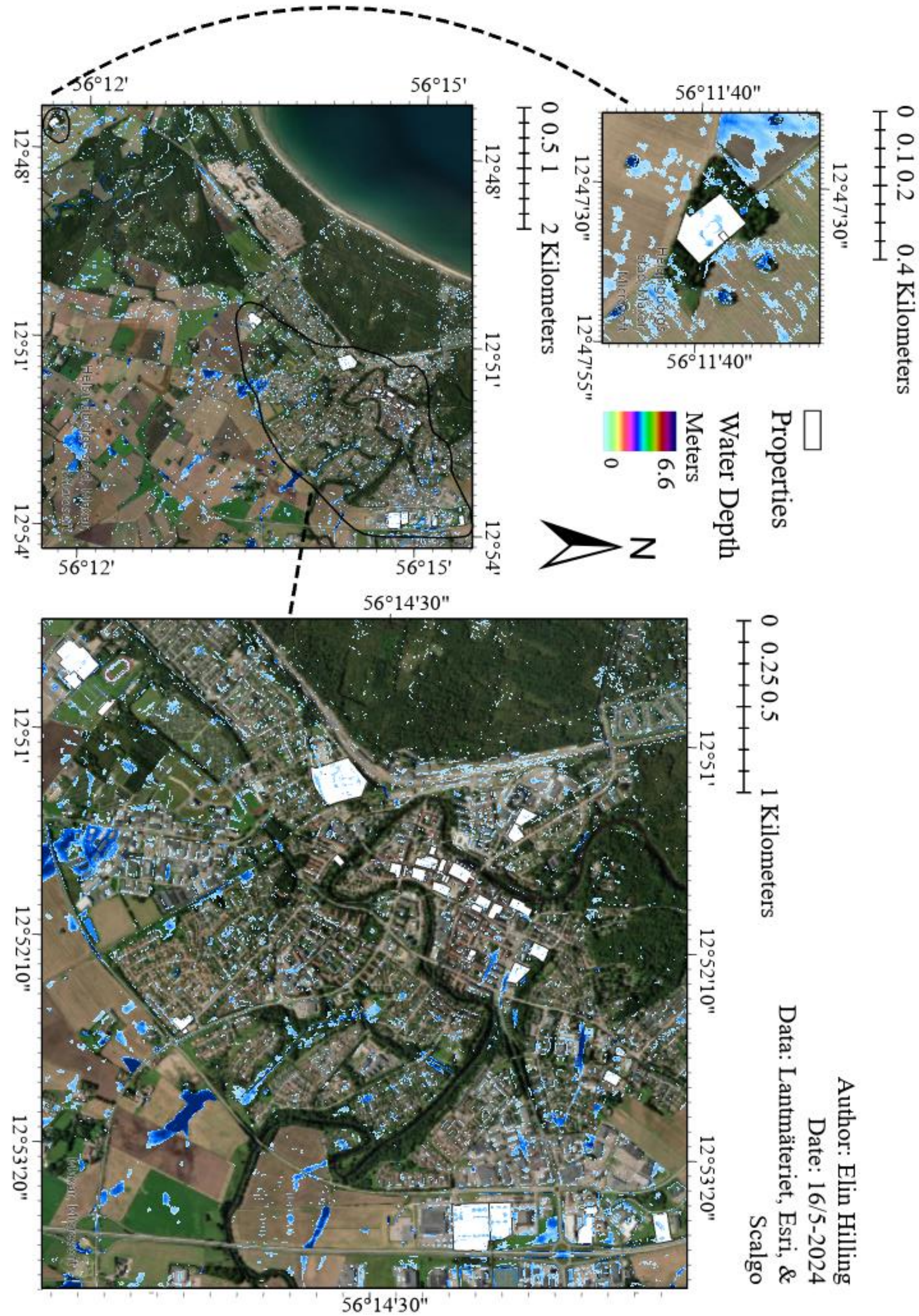

Figure A11. Water depth of extreme precipitation (90mm rain) in Ängelholm.

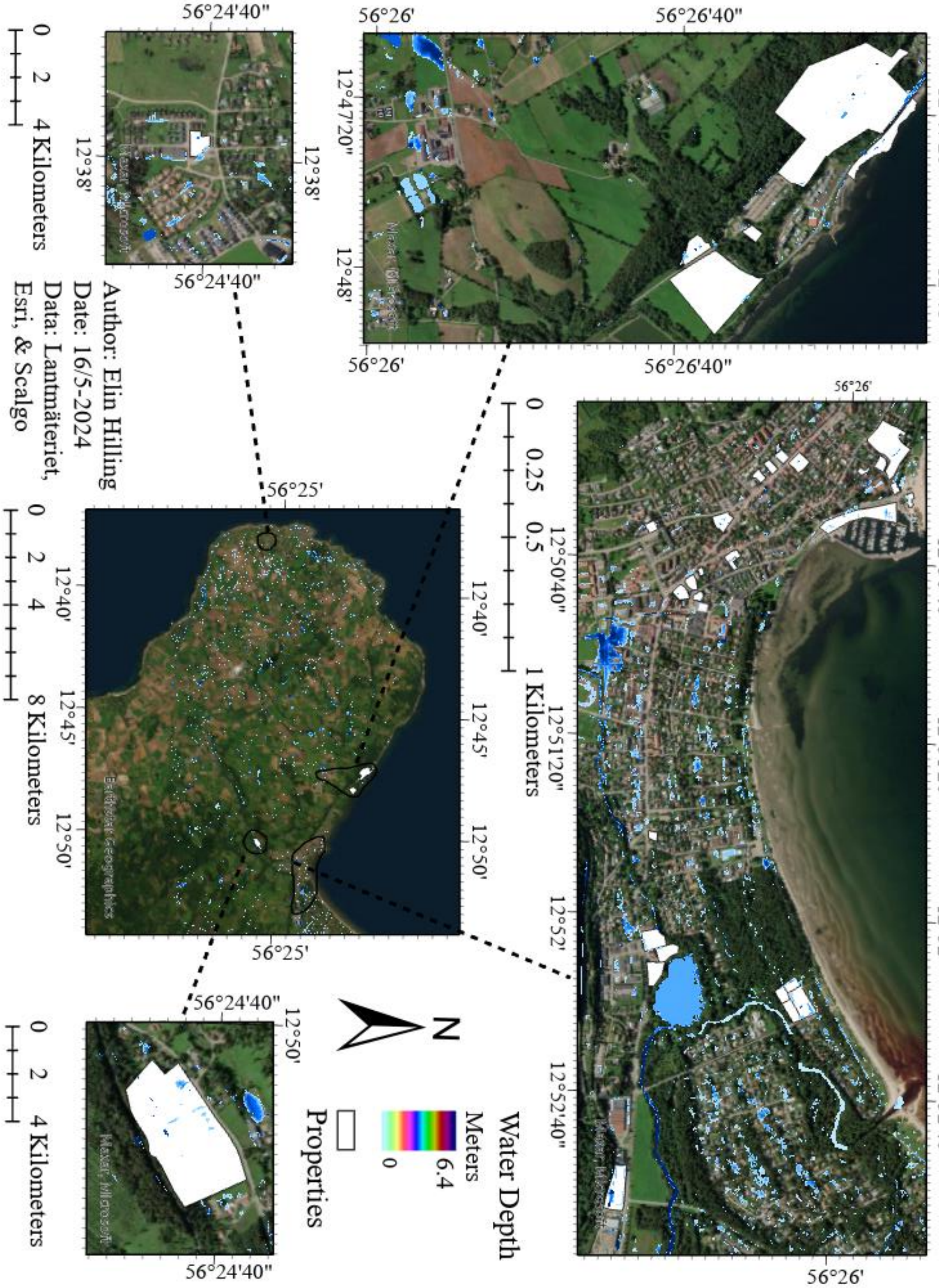

Figure A12. Water depth of extreme precipitation (90mm rain) in Båstad.

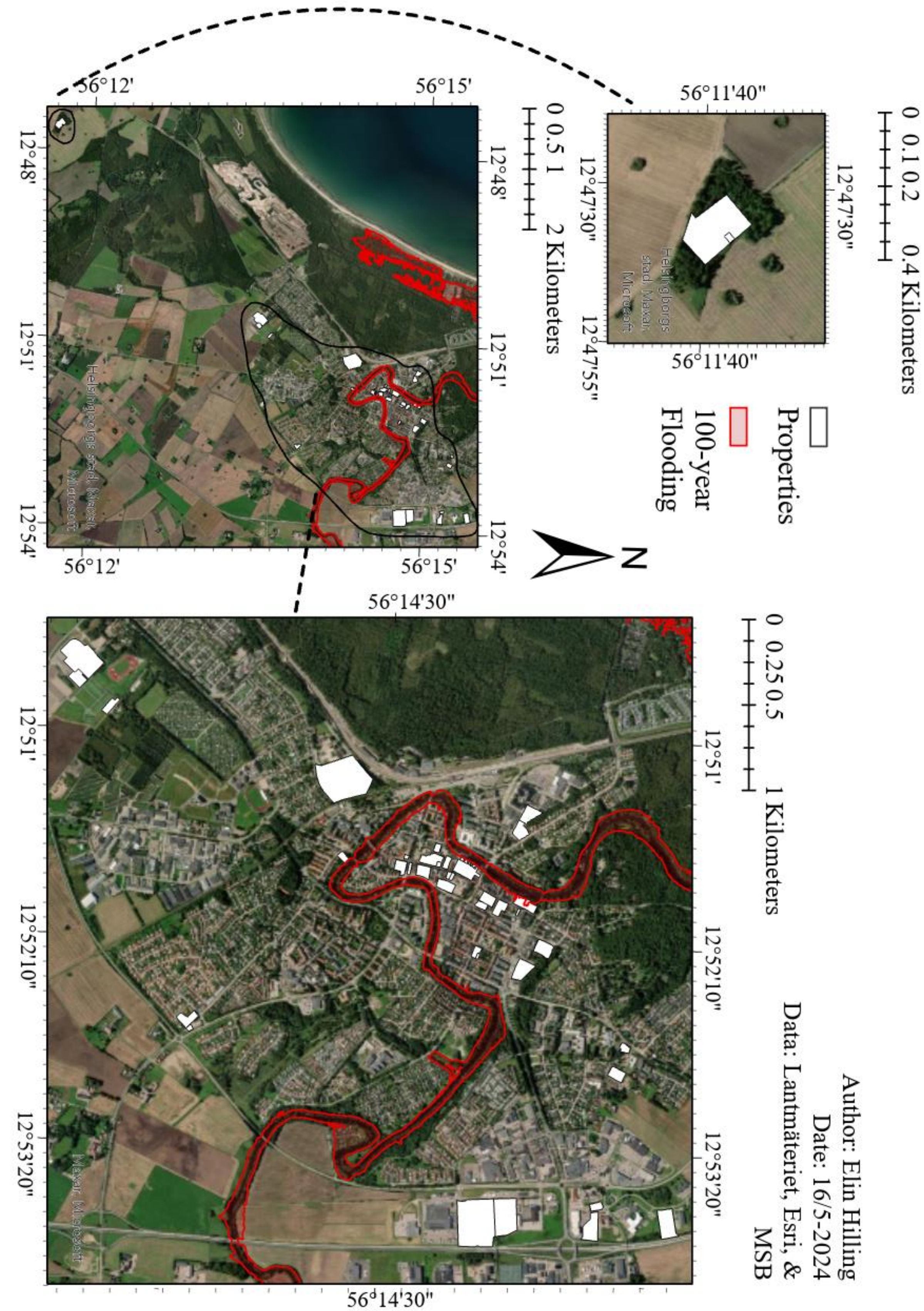

Figure A13. 100-year flooding of Rönne Å in Ängelholm

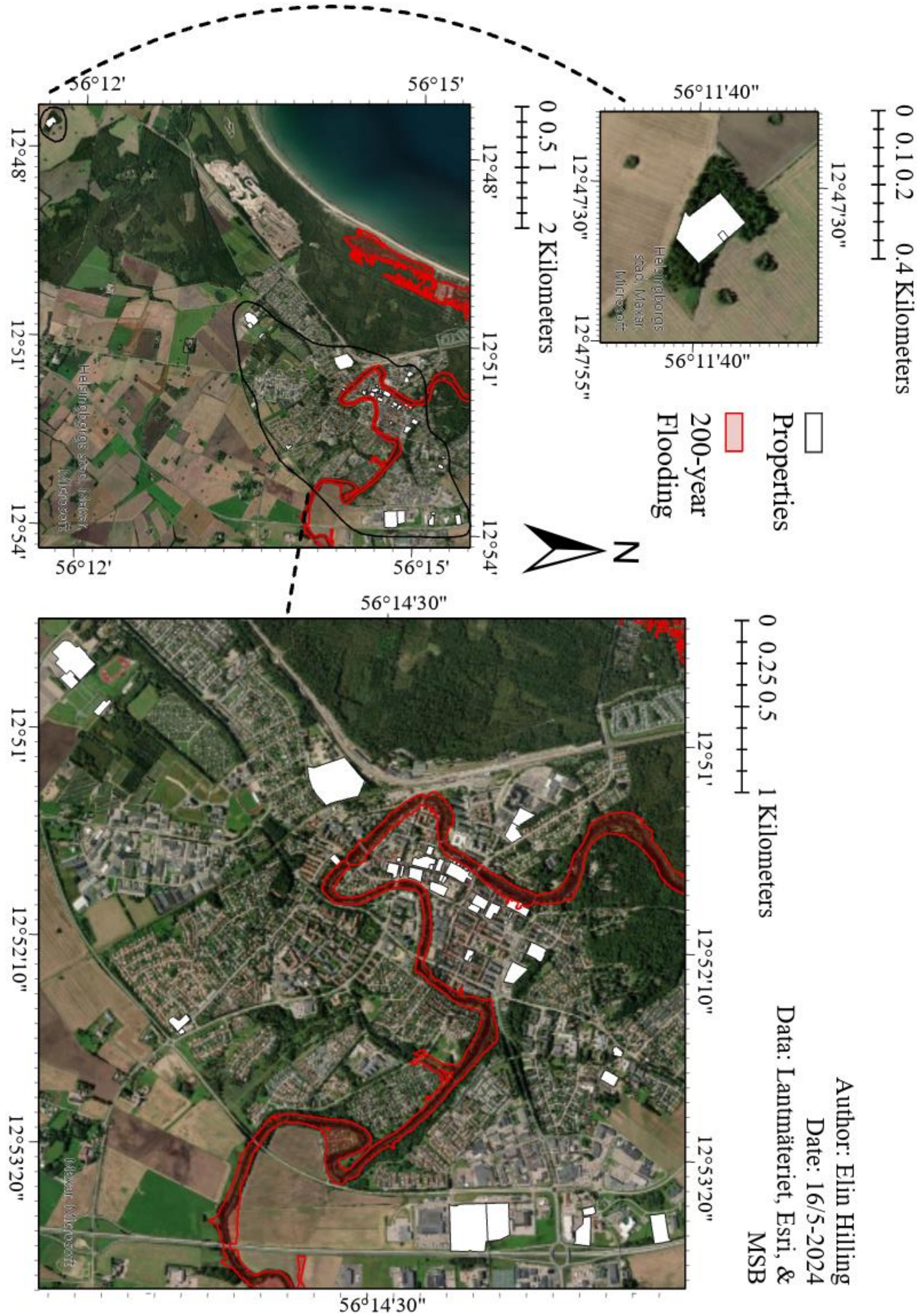

Figure A14. 200-year flooding of Rönne Å in Ängelholm.

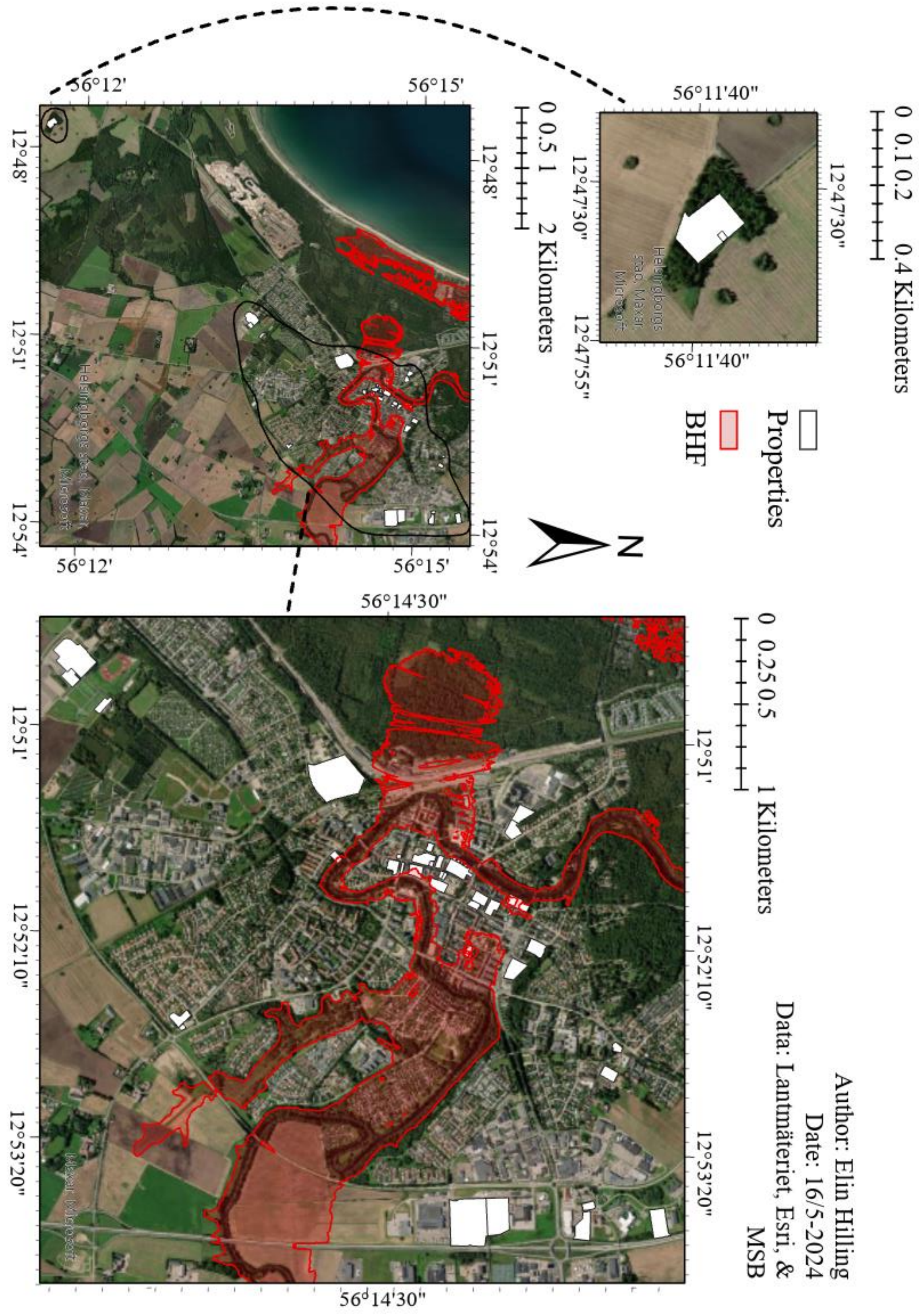

Figure A15. Maximum estimated flow (BHF) of Rönne Å in Ängelholm.

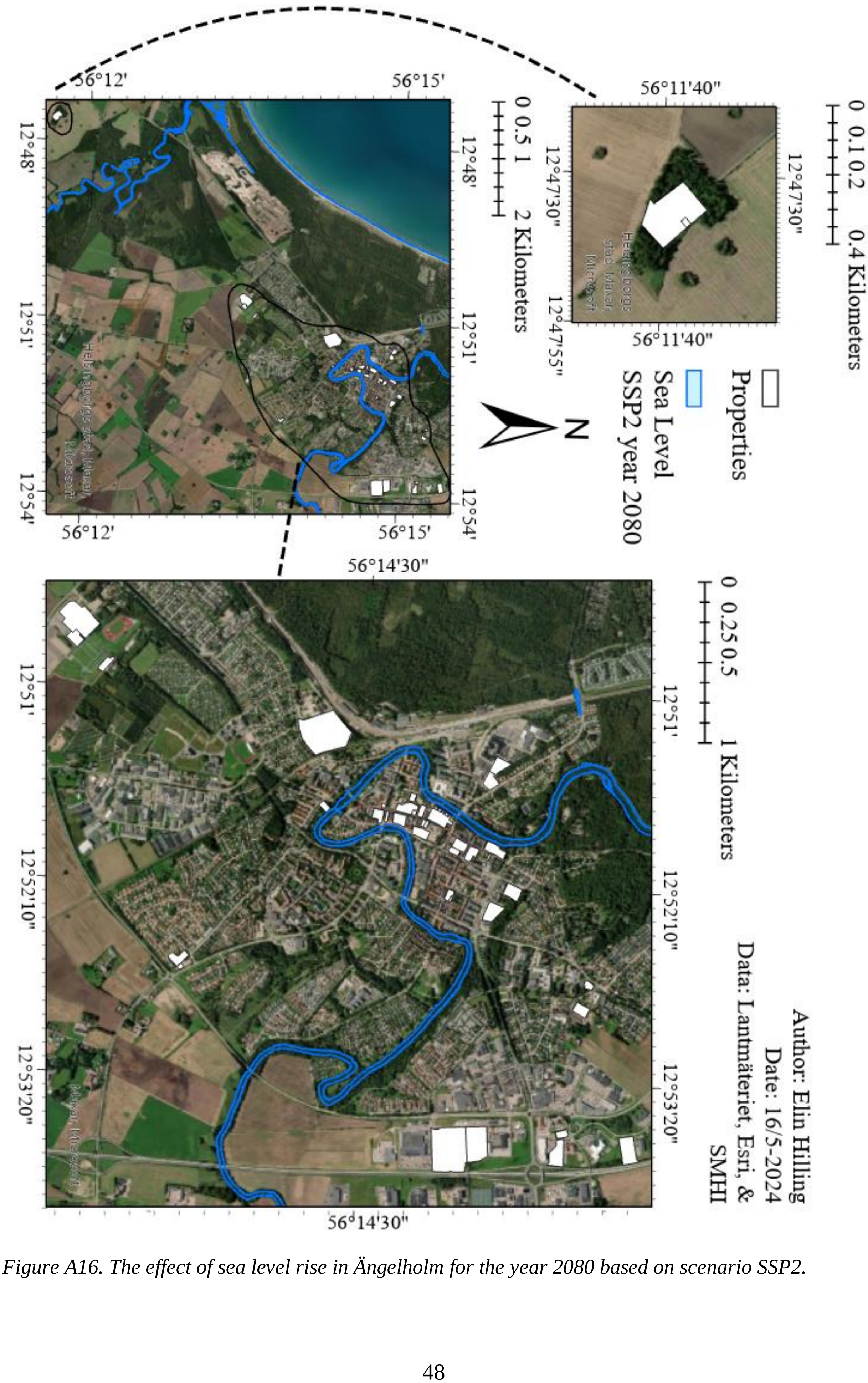

Figure A16. The effect of sea level rise in Ängelholm for the year 2080 based on scenario SSP2.

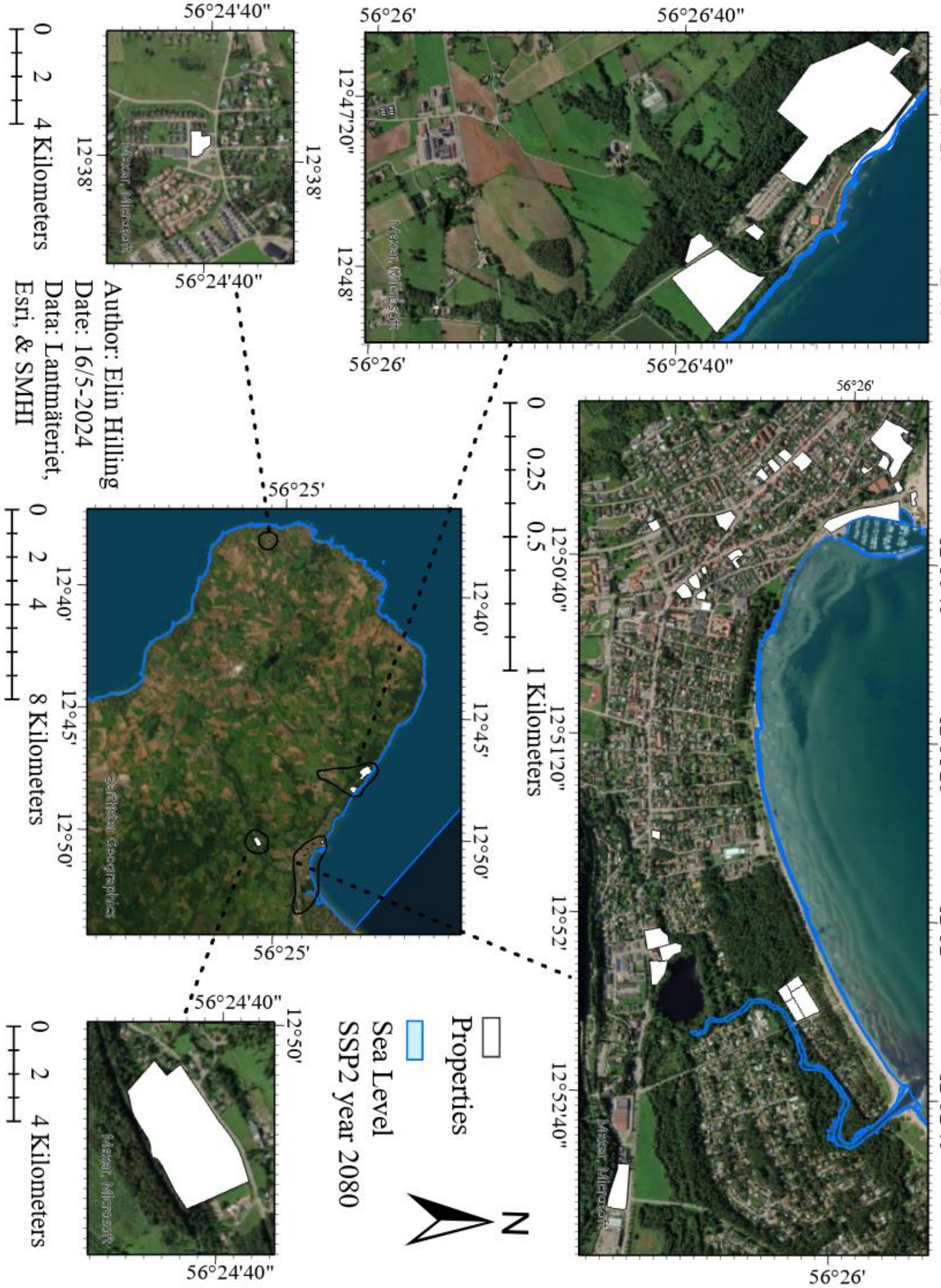

Figure A17. The effect of sea level rise in Båstad for the year 2080 based on scenario SSP2.

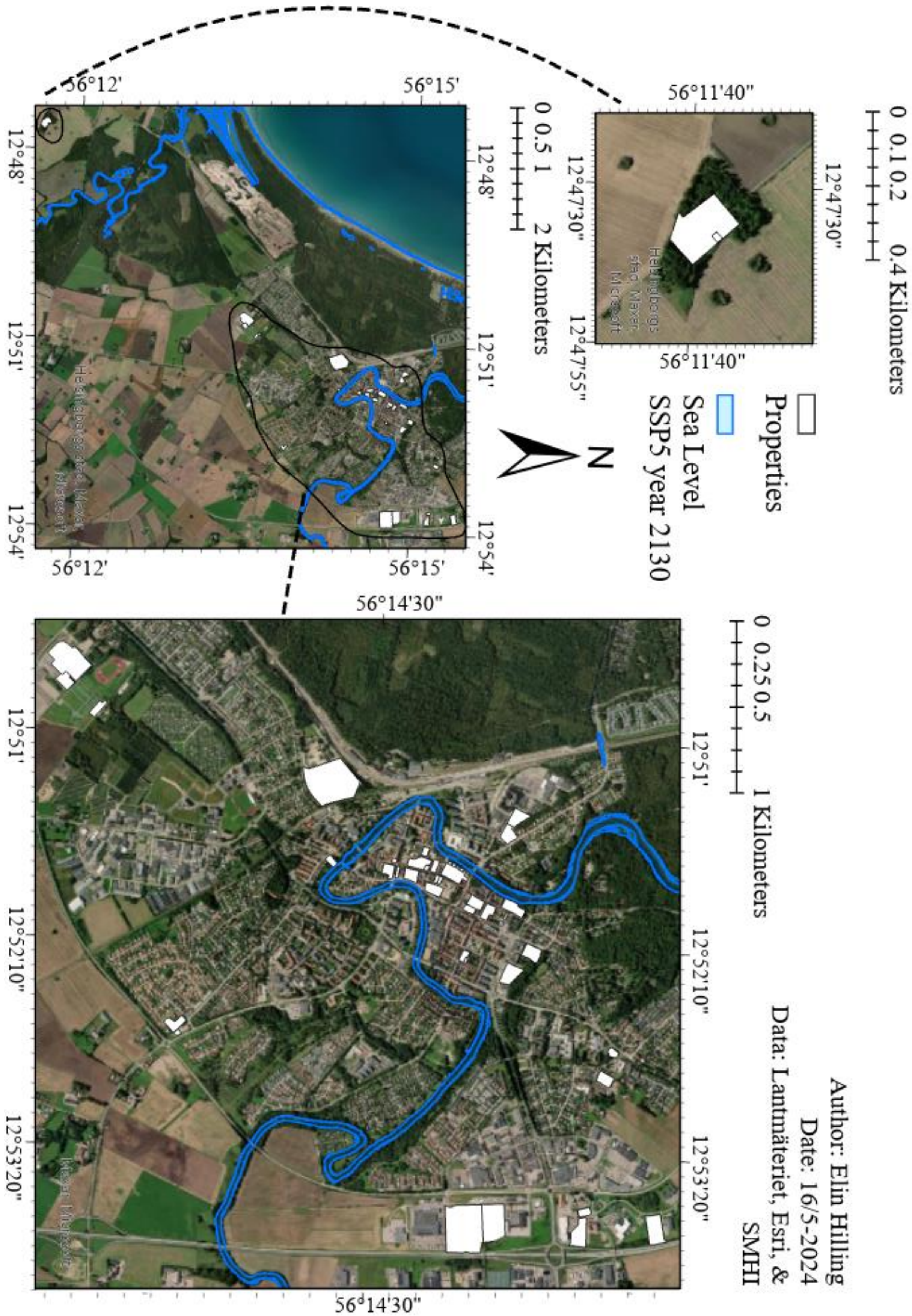

Figure A18. The effect of sea level rise in Ängelholm for the year 2130 based on scenario SSP5.

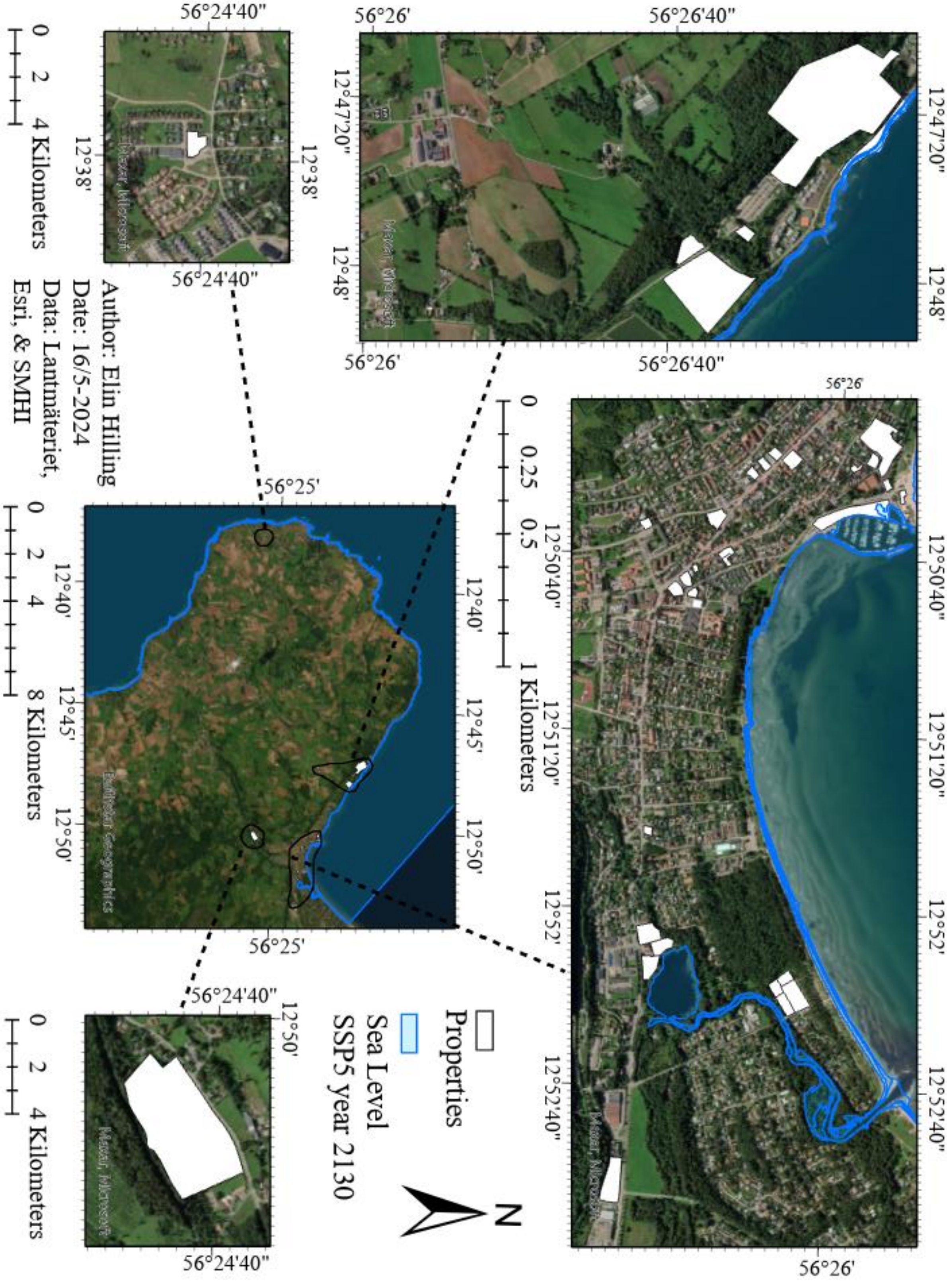

Figure A19. The effect of sea level rise in Båstad for the year 2130 based on scenario SSP5.

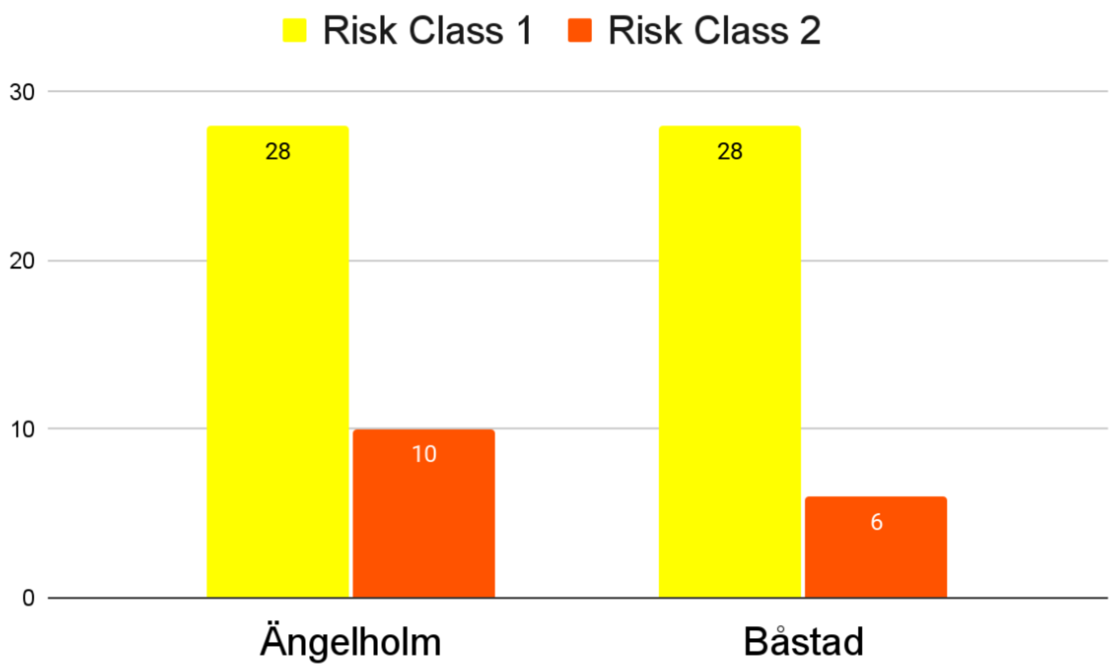

Figure A20. The number of properties classified as RC 1 and RC 2 in Ängelholm and in Båstad.