

NORRA KYMLINGE

Site analysis

May 2017



VASAKRONAN

Foreword

Norra Kymlinge is a greenfield site adjoining a nature reserve and with an unopened underground station in the centre. This makes it a unique location in the Stockholm region. Vasakronan is currently running a project aimed at developing know-how as part of the drive to build sustainable, resilient city districts that are at the forefront of innovation and development, with Norra Kymlinge as an applied example.

This site analysis synthesises the knowledge surrounding Norra Kymlinge that has been built up over the past 20 years. The primary aim is to understand the area in the light of the challenges and opportunities that exist in terms of sustainability.

Stockholm, May 2017

Project organisation

/ Project

Norra Kymlinge.

/ Client

Vasakronan, through Mats Enander.

/ Consultants

» Urban Minds, through Joakim Lindmarker, architect; Johanna Lundberg, planning architect; Peter Lindroos, planning architect; Anna Kika, planning architect.

» Landskapslaget, through Emily Wade, landscape architect; Annelie Landin Lindroos, landscape architect/planning architect.

» Iterio, through Pernilla Troberg, environmental consultant.

» Calluna, through Magnus Tuvendal, environmental consultant/ecosystem service specialist.

» White, through Yaël Bratel, spatial planner; Viktoria Walldin, social anthropologist.

» Spacescape, through Karin Lundgren, spatial planner.

/ Maps

Urban Minds, Landskapslaget, Iterio and Calluna, unless stated otherwise.

/ Tables, graphs etc.

See source beside each figure.

/ Photographs

Vasakronan, unless stated otherwise.

/ Editing and layout

Joakim Lindmarker and Anna Kika

/ Translation

Patrick O'Malley

/ Review

Peter Lindroos

/ Version

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VASAKRONAN

Vasakronan AB (publ) | Phone 08-566 205 00 | Fax 08-566 205 01 | www.vasakronan.se
Mäster Samuelsg 56 | Box 30074 | 104 25 Stockholm | Reg. no. 556061-4603 | Registered office Stockholm

urban minds

 LANDSKAPSLAGET

iterio

 CALLUNA

white

SPACESCAPE

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Reading instructions

Each of the four chapters begins with an introduction, which contains a brief description of the sections that are included in the chapter, as well as key conclusions. The chapters are divided into sections, each comprising one or two 2-page spreads with a map, text and sources.

Bear in mind!

These boxes describe the strengths, weaknesses, opportunities and limitations that have been identified within each section.



*Concept clarification

Text under these lines defines specific concepts and terms.

A **site analysis** is a way of objectively understanding a geographically delimited area based on a number of relevant aspects.

/ Introduction

Purpose

In this site analysis, new and previously produced material is summarised and analysed. This allows know-how and data produced by Vasakronan and other parties over the past few decades to be utilised.

The purpose has been to acquire an understanding of Norra Kymlinge in the light of the issues that are most relevant in an effort to build up know-how relating to sustainable and resilient districts that are at the very forefront of innovation and development.

Approach

In autumn 2016, two workshops were run to define which site-specific aspects are most important to achieve the objective of building a sustainable and resilient city district.

The 20 or so aspects that were assessed to be the most relevant were arranged under four main headings, which in turn constitute the chapters in this report: **Identity of the location**, **Cohesive city**, **Green city** and **Healthy city**. The chapters are divided into sections based on the site-specific sustainability aspects. As sustainability is very much an interconnected concept, a great deal can be gained by reading the chapters together.

Scope

This site analysis is an ongoing project that needs to be developed as new questions arise regarding the site. This report should be viewed as an initial analysis, where we include issues that are of interest and which could be worth pursuing. The sustainability aspects that are important but which cannot be linked directly to the site are not included in this analysis, and they need to be examined and understood using other means, such as an analysis of external factors.

Analysis area

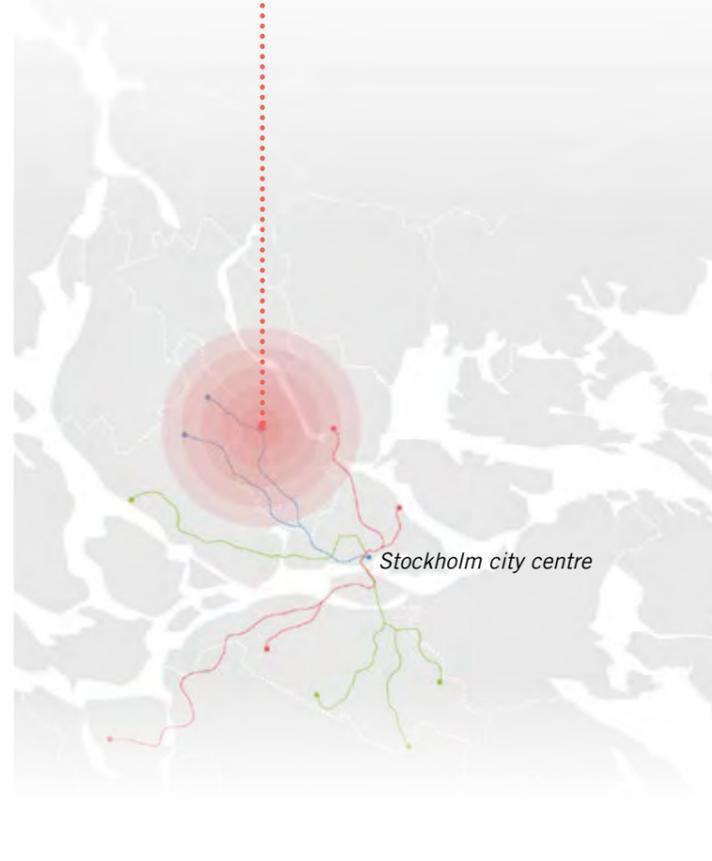
The area covered by the analyses has been divided into a primary analysis area and a secondary analysis area, where the primary area is Norra Kymlinge, delimited by the E4 motorway to the east, the E18 motorway/Kymlinge Link Road to the north and north-west, and the Igelbäcken nature reserve to the west and south. The area, which can be seen in the centre of the aerial photo to the right, mainly comprises the Vasakronan property Sundbyberg 2:44, although it also includes parts of the Sundbyberg 2:45 property owned by the Municipality of Sundbyberg, the Akalla 4:1 and 4:2 properties owned by the Municipality of Stockholm, and the Helenelund 7:5 property owned by the Municipality of Sollentuna.

The secondary analysis area comprises the whole of the view in the aerial photograph to the right. This includes the other parts of Kymlinge (including the Igelbäcken nature reserve) and the surrounding districts – from Helenelund to Hallonbergen in a north-south direction, and from Ulriksdal to Rinkeby in an east-west direction. The area thus includes parts of the municipalities of Sundbyberg, Solna, Stockholm and Sollentuna.



Norra Kymlinge

Norra Kymlinge is part of south-east Järvafältet, which is located in the semi-central belt that extends around central Stockholm. The area covered by this site analysis includes parts of four municipalities.



IDENTITY OF THE AREA

What spaces exist between the city and the natural environment? Where are the views and forests?



Each location and area has its own identity and character. The character is linked to the site-specific features of the landscape and human activity over time. The landscape, nature in its different forms, land use and historical contexts and structures give the area its soul and its environmental, architectural and spatial expression. By highlighting the different features, the sense of identity can be reinforced and the values can be preserved and developed for the future.

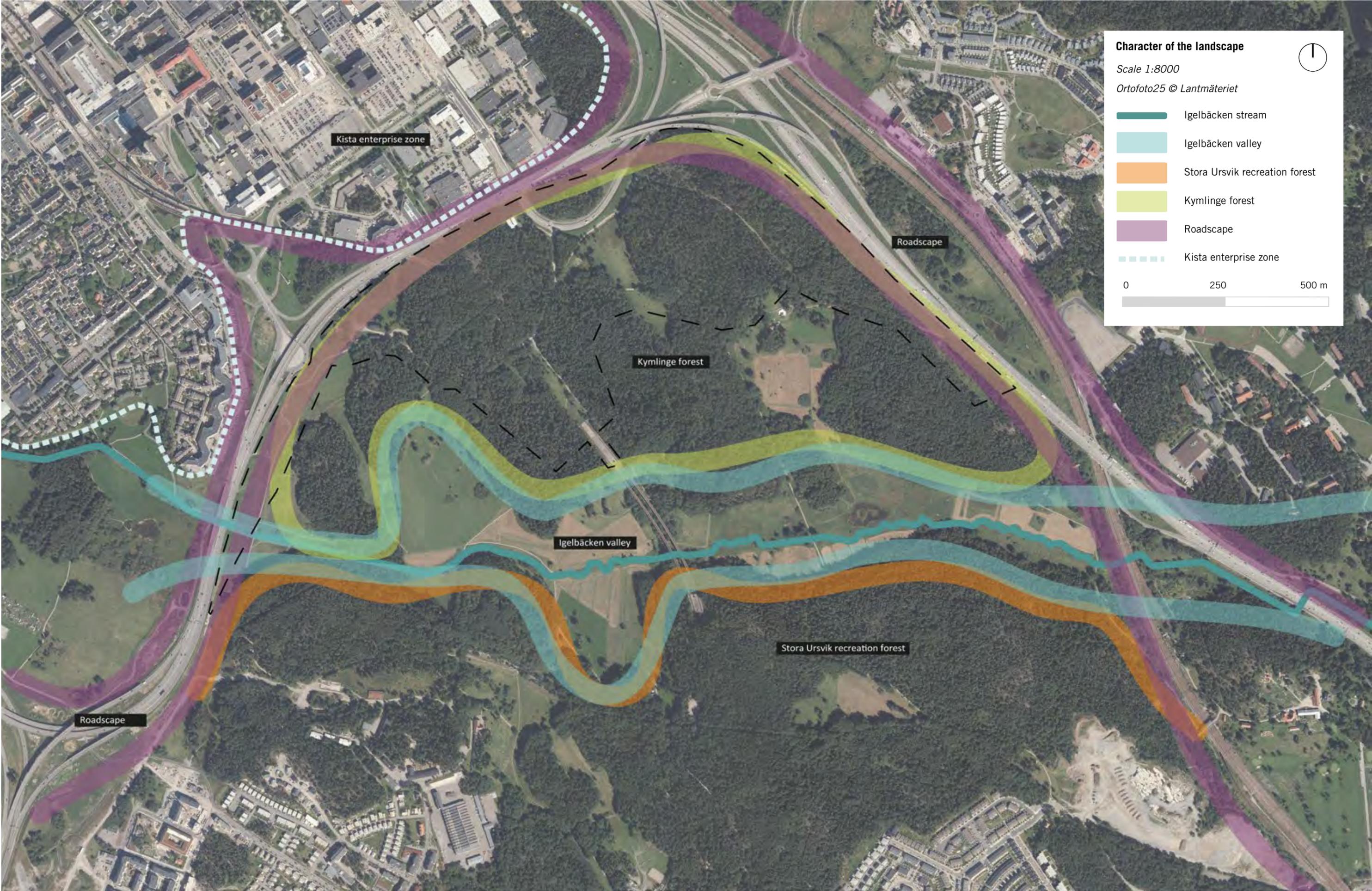
/ Identity of the area

This section describes Norra Kymlinge's site-specific identity and character. In the first instance, the description has its starting point in the physical content of the landscape and does not address the social or cultural identity, which can be described by those who use the area. Norra Kymlinge is situated in a hilly, patchwork landscape, which in many respects has retained its natural land forms and older land use as a result of military operations and state ownership during the 20th century. In relation to the central parts of Sundbyberg, it is a peripheral green space and is clearly cut off by roads and railways from Kista and Silverdal. At the same time, there is a rich network of paths and focal points for outdoor pursuits and recreation, which offer a different range of experiences compared with the surrounding built environments. The underground station at Kymlinge was completed but never opened. It remains as an ever-present reminder of the expansion plans of a bygone era, harking back to the large-scale development of Kista, Husby and Akalla during the 1960s and 1970s.

This section begins with a description of the character of the landscape, which provides an introduction to how different sub-areas are experienced and how they differ and interact. The description is a collective account of the shape of the landscape, the land use, nature in its different forms, and the sense of scale, structure and identity. The character of the landscape can be used as a starting point for adopting a position on which features should be reinforced, developed or changed.

The landscape profile describes the topography of the area, relative height differences, spatial features and local climate. The information is based on height studies and observations. This information provides a basis for developing accessibility, wayfinding, security, a good local climate and biological diversity.

The time depth of the area is founded on general studies of the historical emergence of the area. Texts and maps highlight physical evidence of human activity during different eras. Historic remains, sites and land use make the history of the area more legible. Knowledge of land use in the past is an important starting point for developing the identity of the area and future ecosystem services.



Character of the landscape

Scale 1:8000

Ortofoto25 © Lantmäteriet

- Igelbäcken stream
- Igelbäcken valley
- Stora Ursvik recreation forest
- Kymlinge forest
- Roadscape
- Kista enterprise zone

0 250 500 m

Character of the landscape

Norra Kymlinge is part of the Järva green wedge. To the west is Järvafältet in the Igelbäcken valley, to the east is Överjärva and the Royal National City Park, and to the south is the Ursvik forest. The map shows five character areas* with different site-specific identities.

Igelbäcken valley

The Igelbäcken valley is a cohesive landscape running in an east-west direction. It is delimited by hills and forest fringes. The clay and gyttja clay terrain is flat, with small relative height differences of 5-10 m. The valley was previously an inlet bay and navigable channel. Within the Igelbäcken nature reserve, meadowland and grazing land have been kept open by means of mowing and clearance. The combination of sloping forest fringes and open land are vitally important for pollinating insects. The Igelbäcken stream and small wetland areas are the only examples of open water. Several burial grounds dating from the later Iron Age can be found on the slopes. The valley is used extensively for recreation. A number of paths follow the edge zones and cross the Igelbäcken stream at various points. The underground railway passes over a bridge that crosses the valley and when grouped together with the Kymlinge Link Road and the railway, the valley could be regarded as being located in an urban environment. The growing population in the surrounding area will result in an increase in the number of visitors to the area.

Ursvik recreation forest

The Ursvik recreation forest has a varied topography with relative height differences of 10-20 m. The area has a mixture of soils. The structure is of a patchwork nature without any clear alignments, and parts of the area are covered by forest on outcrops of bedrock. In the past, the area was sparsely populated, with a number of smallholdings and two large farms in the southern part – Lilla Ursvik and Stora Ursvik. The area has remnants of military activity in the form of fortifications and defences. Prehistoric remains in the area are evidence of a long period of human settlement with small-scale farming, ancient fields and burial grounds. The large areas of forest (>10 hectares) offer people the opportunity to experience the forest as well as forest values for different species. These areas correspond to the forests of Grimsta and Hansta. The area is currently characterised by its use as an outdoor recreation area, located close to urban areas and with paths and trails for a variety of outdoor activities, including running, horse riding and cycling.

Kymlinge forest

Kymlinge forest is a very hilly area with relative height differences of 10-40 m. The area is made up in equal parts of moraine and clay with elements of exposed rock and sand. The area has a patchwork structure, without any clear alignments, and a number of open areas among the forest-clad hills. There are small bodies of water that could be of importance for amphibians. The large areas of forest (>10 hectares) offer people the opportunity to experience the forest as well as forest values for different species. Large sections of the eastern and western parts of the area are disrupted by noise. The area is intersected by various paths and trails for mountain biking, riding and other recreational pursuits, and several small roads for vehicles. The area is only sparsely developed with just three farms: Övre Kymlinge, Killingstorp and Dammtorp. It was also part of a former military area with remains in the form of firing trenches. Orientation in the area is difficult and it is cut off from Kista and Silverdal by the E4 motorway and the Kymlinge Link Road.

Kista enterprise zone

Kista enterprise zone is a relatively flat area that has been cut and filled. A small number of hills with exposed rock and moraine still remain in the area and eastwards towards the E4 motorway. The area is characterised by large-scale development with streets and blocks in a grid pattern and where the majority of the streets have long sightlines. The area is largely paved, and the few green elements that exist are concentrated in the streets and courtyards and in the forest beside the Kista junction to the north-east. As an urban area, the Kista enterprise zone is regarded as large scale. There is a total absence of open water in the area and a distinct lack of parkland.

Roadscape

The road landscape is an entirely built landscape characterised by main roads and a railway – the East Coast Line. The surrounding areas are affected by noise and traffic. Within the road landscape there is an unbroken sequence of landscape spaces that allow road users to orientate themselves and maintain their concentration. As the roads are so large and wide, they generate their own scale in what is otherwise quite a small-scale setting. The road space creates its own landscape elements that give the patchwork landscape a clear orientation. The design of the peripheral areas is of crucial significance to how the road is experienced from the surroundings.

The varied, site-specific features will prove to be an asset in future development.

The forest fringes play an important role in shaping the character of the valley.

The relatively few flat areas have the potential for being developed into social focal points.

There is considerable potential to improve links with surrounding areas by creating more/wider routes under the Kymlinge Link Road, the E4 motorway and the East Coast Line.

The experience of the area can be improved considerably if disruption from traffic noise is reduced.



*Character area

Specific interaction between landscape elements (parts, types) generated by the natural conditions, the historically determined land use and the spatial and visual/experiential conditions that characterise an area and which set it apart from the surrounding areas.

M. Clemetsen. (2010) (translated from Norwegian)

Sources

SGU, Soil map.

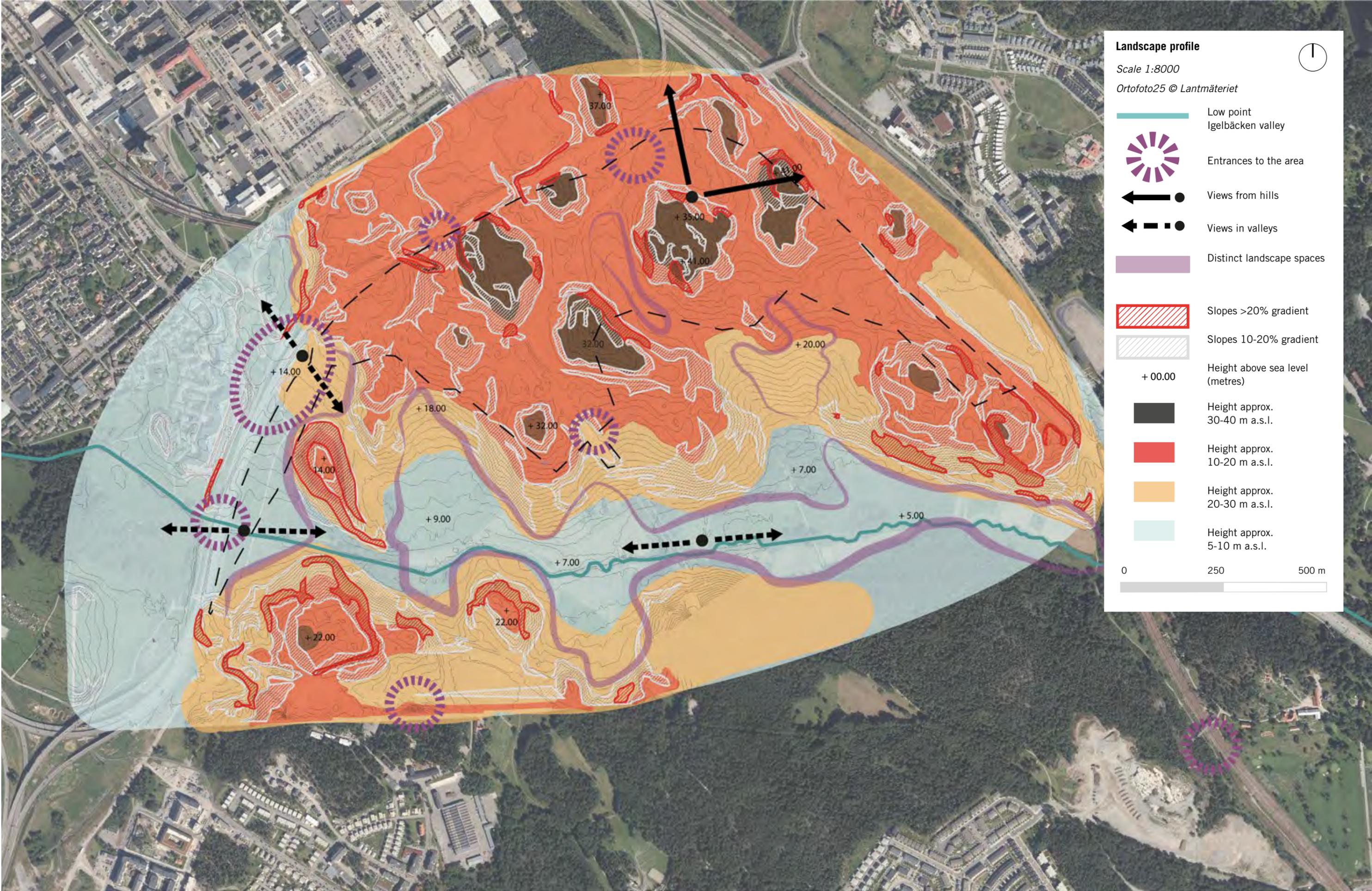
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Landscape profile

Scale 1:8000

Ortofoto25 © Lantmäteriet

-  Low point
-  Entrances to the area
-  Views from hills
-  Views in valleys
-  Distinct landscape spaces
-  Slopes >20% gradient
-  Slopes 10-20% gradient
-  Height approx. 30-40 m a.s.l.
-  Height approx. 10-20 m a.s.l.
-  Height approx. 20-30 m a.s.l.
-  Height approx. 5-10 m a.s.l.

0 250 500 m

Landscape profile

Kymlinge is located in the Stockholm area's characteristic patchwork, joint valley landscape. The Kymlinge forest to the north is very hilly with relative height differences of 20-40 m above sea level. The topography and the soil type distribution derive from geological processes, such as fragmentation of the bedrock, erosion, land rise and overlay of different soil types after the most recent glacial period. The varied terrain means that the area lacks clear lines, making it difficult to acquire an overview. The E4 motorway, the Kymlinge Link Road, the underground line and the Igelbäcken stream are the linear structures that offer a certain degree of orientation. Sightlines and views are limited to the Igelbäcken valley and a number of high points in the area. As the area is delimited by large highways that constitute physical barriers, entrances to the area are restricted to a small number of places. In the hilly terrain, several slopes have a gradient of more than 10%, some with a gradient of more than 20% (i.e. the height increases by 1 metre for every 5 metres in distance) – see red and white areas marked on the map. On the slopes, it is more difficult to establish accessible paths, create usable outdoor environments or to build roads with suitable gradients.

Typical of Kymlinge forest are the many south-facing slopes. Here the local climate is favourable to humans, animals and insects. The area also has several steep slopes facing northwards, which are exposed to a certain amount of noise. Here the local climate is less favourable. In hollows that are rich in clay, such as the Igelbäcken valley, the temperature is lower than on the hills. The patchwork structure with a varied topography, multilayer forests and forest fringes helps to reduce the impact of strong winds.

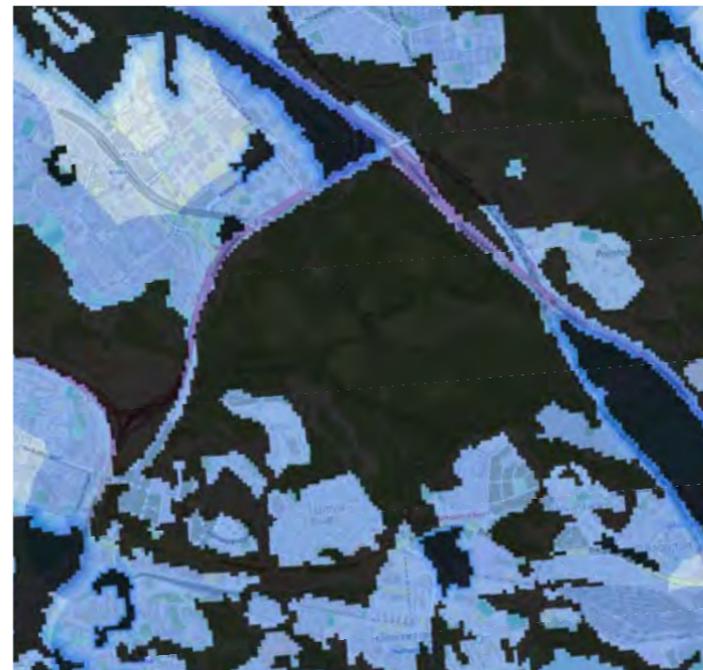
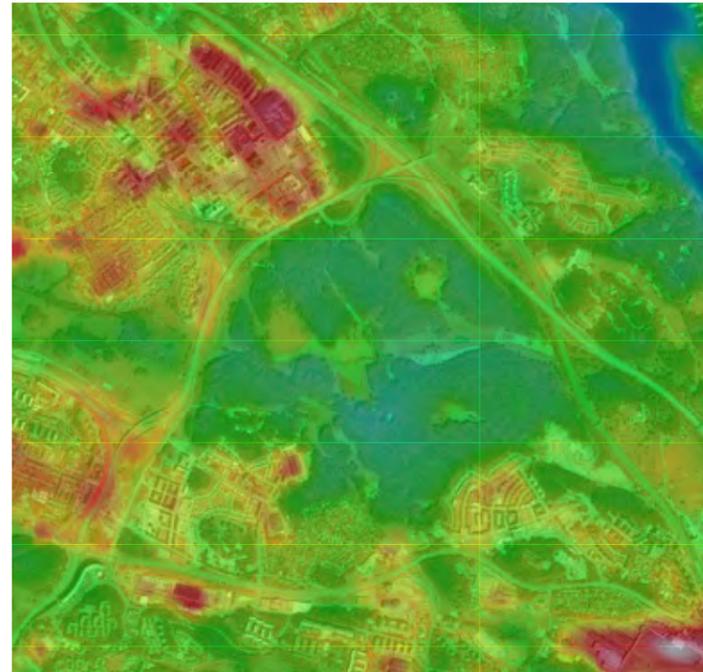
Surface temperature (upper map)

The highest surface temperature during the period 2013-2016, measured at 11am using IR sensors on Landsat 8. The temperature range in the image is 18-38°C, where blue is the coldest and red the warmest.

Source: © USGS/NASA, Lantmäteriet, Geographical Information Office

Temperature regulation (lower map)

Modelling that shows a considerable cooling effect (dark red) down to a certain cooling effect (light blue). Larger unbroken green areas (black) regulate the temperature farther out into the surrounding urban landscape. Illustration: Calluna AB.



The topography of the landscape dictates the conditions and the limitations on how the area can be developed. The varied topography is a precondition for the existence of the many different natural environments in the area.

The small-scale character and the very hilly landscape ought to be a starting point for future development although at the same time the topography makes orientation difficult.

Evening out the land in the area, using blasted rock to fill in hollows, is possible but could change the character of the site.

As in other parts of Sundbyberg, there are views from hills and in open valleys.

The hilly nature of the landscape could make noise-reduction initiatives more difficult.

The local climate is favourable for humans and animals on the south-facing slopes and less favourable on the north-facing slopes, which are affected by noise disruption

Sources

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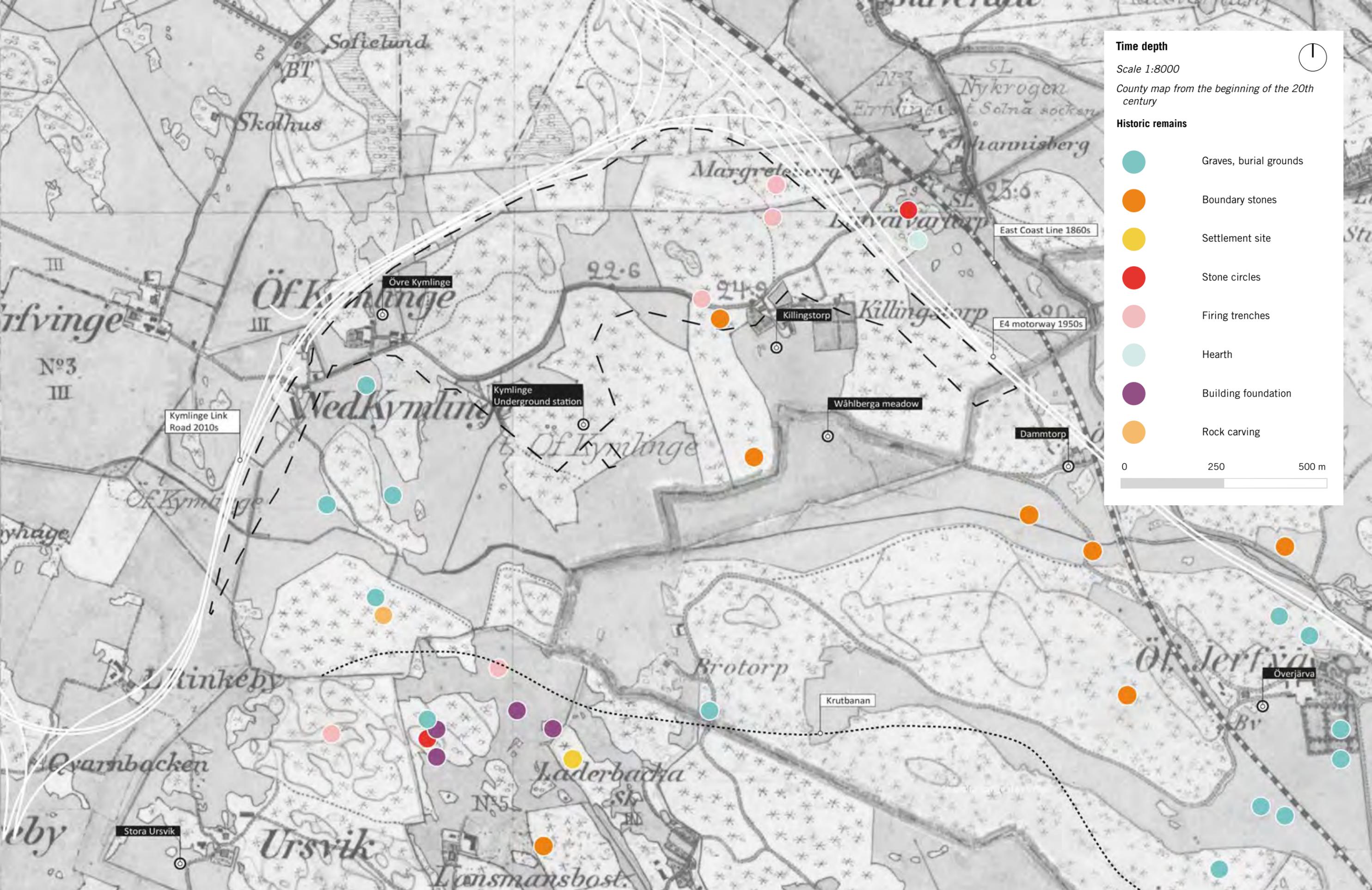
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Ekologigruppen/Upplands Väsby kommun (2010) Järvakilen, Prioritering av regionala värden i grönstrukturen.



Time depth

During the Stone Age (approx. 5,000 years BC), the county of Stockholm had a distinct archipelago landscape. The sea level was 25-80 m higher than it is today. During the Bronze Age (approx. 1,000 years BC), it was 15-30 m higher. Hunting, fishing and gathering of herbs and other types of food had begun to decline in favour of the rearing of livestock. Extensive cultivation on large areas of land was common, with long crop rotation periods of around 20 years.

At the beginning of the late Iron Age (500 AD), land rise led to the north Stockholm area acquiring its first permanent population. The Igelbäcken nature reserve has graves and burial grounds dating back to 500 AD. At the end of the late Iron Age (1000 AD) the land had risen to such an extent that the present-day Igelbäcken valley was simply a narrow inlet from Edsviken. Large flat areas had become available that could be cultivated and maintained.



The economic map from 1951 (above) shows what the area was like before the large-scale expansion of Kista, the underground and Ursvik, and other developments. Järvafältet was used during this period by the military. The yellow areas represent meadowland or building plots. Overlay with the main roads.

< The county map from the beginning of the 20th century shows the patchwork agricultural landscape, which includes the smallholdings of Killingstorp and Dammtorp and the five farms, Övre Kymlinge, Nedre Kymlinge, Ärvinge, Över Järva and Ursvik. The map also shows the road network that is still in existence in certain areas. Overlay with the main roads.

The landscape has been characterised by continuous cultivation ever since. The clearest evidence of agriculture can be seen around Killingstorp, Dammtorp, Överjärva farm and along the Igelbäcken stream. Dammtorp, located in the east of the area, is the oldest settlement. Stockholm County Museum confirms that Dammtorp is of “priceless cultural and historical significance” as both the exterior and interior are well preserved from early times. During the 18th century, the building acquired its present-day appearance. North-west of Dammtorp is Killingstorp, with elements dating back to the mid-17th century.

At the beginning of the 20th century, the area was purchased by the state. At that time, it was agricultural land mixed with areas of forest, comprising both deciduous and coniferous trees. Military activities also left their mark on the landscape. Firing trenches, bunkers and railway lines used for transport and other purposes have shaped the landscape in various parts of the area. Military activities continued until 1965. The military presence also resulted in large areas of forest being left untouched and certain parts of the forest are very old – some coniferous trees date back 200 years.

At the end of the 1960s and the beginning of the 1970s, there were plans to create a district south of Kista. When the Blue underground line was built, an underground station was located at Kymlinge. The idea was for the new district to be a location for various government agencies and public authorities. However, the plans were changed. The unopened underground station is nowadays a popular destination for what is termed ‘urban exploration culture’.

In the south, Norra Kymlinge borders on the Igelbäcken nature reserve in Sundbyberg, created in 2004. The idea of establishing a nature reserve came about back in 1985 when the Swedish Natural History Museum discovered the stone loach - a rare species of fish on these latitudes - in Igelbäcken.

The Solna-Sundbyberg Nature Conservation Association is active in the area and it has recreated a section of ancient meadow land, known as Wåhlberga meadow.

Kymlinge and the Igelbäcken nature reserve are cut off by roads and railways. This began back in 1860 when the railway was built to the east. The E18 and E4 motorways were built later, running parallel to the railway.

Ancient remains, as well as objects, structures and links of cultural and historical importance, come together to provide a picture of how the area was used by past generations.

There is potential to retain legibility and to reinforce and develop ecosystem services if the land is maintained and objects that are of cultural value are preserved.

Military objects have a documentary value as they tell us about the country's defence contingency plans.



Sources

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COHESIVE CITY

How is Norra Kymlinge linked to the surrounding urban landscape? What other functions exist in the surrounding areas and which functions are emerging?



A **cohesive city** is a precondition for a sustainable city – a city that is available to everyone. Cohesive districts are easily accessible and are distinct. They are secure and vibrant and have a clear link to other parts of the city.

/ Cohesive city

This section aims to analyse the relationship between the site and the surrounding districts with a focus on urban features, as well as links to and orientation within the area.

Norra Kymlinge is located in the south-east part of Järfället, which is included in the semi-central urban structure around Stockholm, comprising the municipalities of Sundbyberg, Solna, Danderyd and Lidingö, as well as the boroughs of Bromma, Spånga and Kista.

Despite its central location in the region, Norra Kymlinge currently has weak links with the surrounding areas and the urban features are very limited. This can be attributed to the fact that the area is largely cut off from the surrounding districts by traffic barriers, distance and topography, and that the area is generally undeveloped.

This chapter begins by describing pathways and links in general. This provides a basis for understanding the physical conditions in the area and creating a living, integrated urban fabric. The physical links are a starting point for the features that ought to be reinforced, developed and changed if this ambition is to be achieved.

This will be followed by an examination of the urban context of the area to acquire an understanding of the functions, content and types of development that already exist – and the degree to which the surrounding areas meet the diverse needs of the population. Planned development is described to facilitate an understanding of the impact of the current wave of urbanisation in the Stockholm region and widespread housing construction at local level.

Mobility has been analysed using various means, including the concept of walkability (see definition, page 23). This concept focuses on the physical potential of human beings at the present time to make their way to the area and then make use of it, as well as the preconditions for establishing sustainable transport patterns.

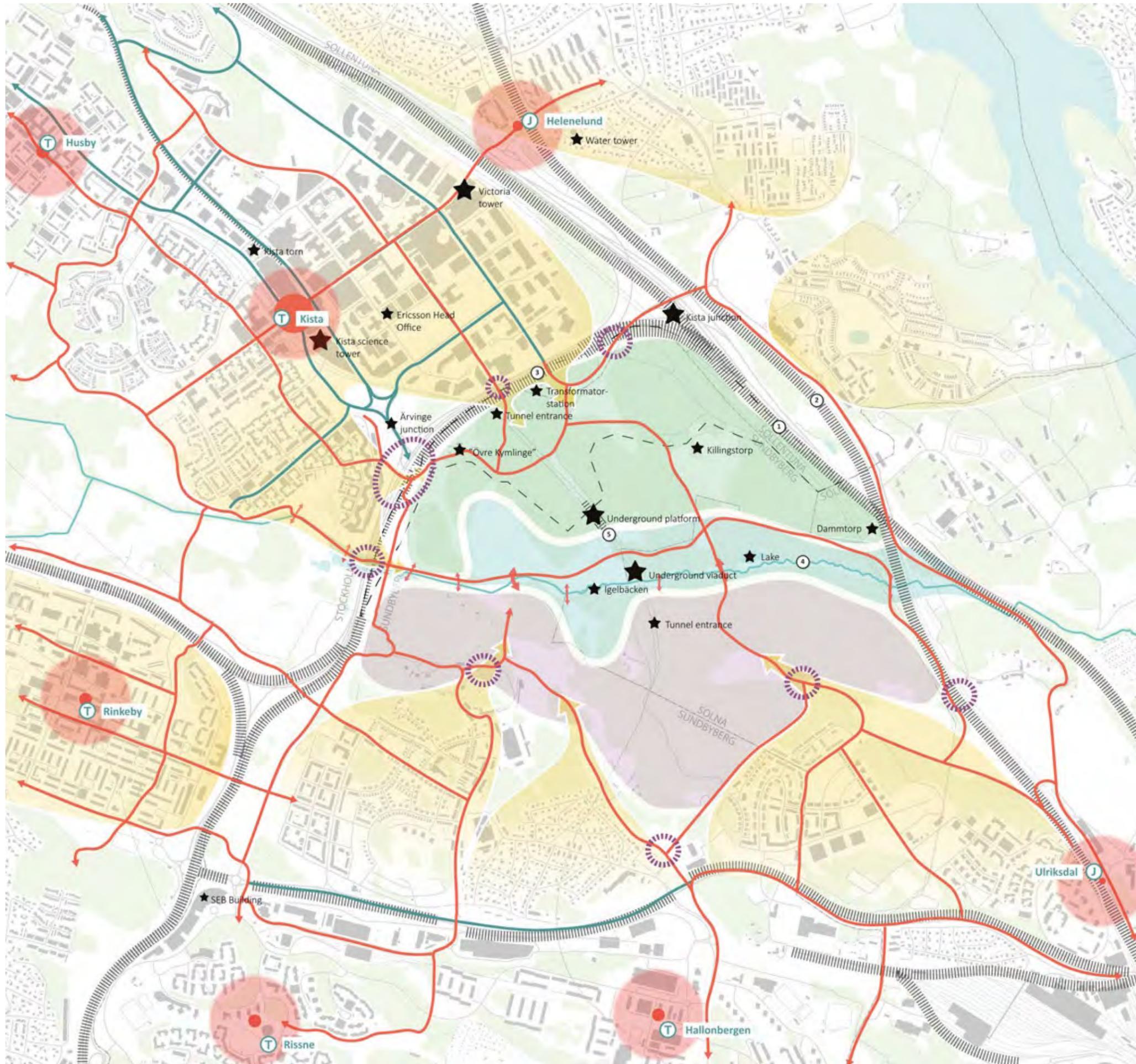
The planned extension of the Tvärbanan light railway will result in major changes.

The focus in this part has primarily been on the surrounding urban landscape and how this is linked to Norra Kymlinge. Using the majority of the urban analysis concepts as a starting point (nodes, pathways, barriers, landmarks, districts) in accordance with the Kevin Lynch method, the area has been mapped with the aid of site visits, aerial photographs and the materials produced previously.

In the analysis of the surrounding urban landscape, the relevance of the objects has been deemed to decrease in proportion to the distance to the primary analysis area of Norra Kymlinge. It is the impact on the site that has determined the type of information that has been included. The farms within or bordering on Norra Kymlinge have been included as landmarks whilst farms located far away from the area have not been included.

Sources

Vasakronan & VBB (1997) Land-use plan for south-west Järfället.



Cityscape and links



Scale 1:16000

Property Map Vector © Lantmäteriet

-  Link, pedestrians and cyclists only
-  Link, mixed traffic
-  Links or pathways between surrounding districts and Norra Kymlinge that already exist or can be developed.
-  Node* — a location with at least three key functions within 200 m. The size of the inner circle indicates the importance of the node.
-  Physical barrier
-  Station for rail-bound public transport
-  Spatial entrance to Kymlinge
-  Landmark of major significance
-  Landmark of minor significance
-  Kymlinge forest
-  Igelbäcken valley
-  Igelbäcken stream
-  Stora Ursvik recreation forest



Cityscape and links

Norra Kymlinge is located immediately south of Kista, about 3.6 km from the centre of Sundbyberg and about 9.2 km from Stockholm city centre. The area is bounded by the E4 motorway and the East Coast Line to the east, the E18 motorway/Kymlinge Link Road to the north and north-west, and the Igelbäcken nature reserve to the west and south. South of the nature reserve are the districts of Ursvik, Järvastaden and Ulriksdal, with links into the area via the Ursvik outdoor pursuits area. On the other side of the E18 motorway are Rissne and Hallonbergen. East of the E4 motorway are the districts of Silverdal and Helenelund in the municipality of Sollentuna. Along the Igelbäcken valley and on the other side of the E18 motorway/Kymlinge Link Road to the west is Rinkeby.

Nodes*

Kista is one of the most important enterprise zones in the Stockholm region. It has an indoor shopping centre with 180 stores, institutes of higher education and several other key community functions. It is by far the strongest node in the area and it is the only true urban location. The other nodes are largely district centres located beside the underground or commuter stations. As Ursvik and Järvastaden are developed, nodes could also be developed.

Character areas**

The surrounding area is clearly divided into different character areas with varying identities. Only some of these areas or districts in the surrounding urban landscape have a clear link via pathways to Norra Kymlinge. The strongest physical links are with Kista and Ursvik, whilst Silverdal, Rinkeby and the area south of Enköpingsvägen have very weak links with Norra Kymlinge.

Pathways***

The most important pathways for pedestrian and cycle traffic in the area are in Kista and beside the underground stations. Only a small number of pathways have an urban content with mixed activities. The pathways along the main roads are used by many people but due to traffic separation there is a lack of contact with the surroundings and the pathways function mainly as commuter routes. There are several paths through the nature reserve and Norra Kymlinge that are more well used and/or shorter than other paths.

Ursvik, Järvastaden and Ulriksdal can be reached via smaller roads through the forest and across the valley. Igelbäcken can be crossed at seven points although the link from the south is restricted by Enköpingsvägen. There is one link across the East Coast Line at Överjärva farm in the direction of Ulriksdal.

There is only one link to the east towards Silverdal over the E4 motorway/East Coast Line – a pedestrian/cycle track along a bridge over the E4 motorway at the Kista junction. Southwards and eastwards from Kista there are four links: Torshamnsgatan from the north (a two-lane road through a tunnel with a pedestrian/cycle track on either side), Grönlandsgången (a gravel track through a tunnel, pedestrians only), at the Årvinge junction (a pedestrian/cycle track through a tunnel) and north of Igelbäcken (through a tunnel, pedestrians/cyclists only). There is also a direct link via Torshamnsgatan for road traffic to the E4 motorway in a north and south direction.

Barriers****

The area is intersected by a number of barriers, making ecological and social links more difficult.

- » 1. E4/E18 Uppsalavägen. An urban motorway with a high road embankment and noise reduction barriers that impede both intervisibility and movement. There is a link to the Kymlinge Link Road at the very large Kista junction.
- » 2. East Coast Line. Four tracks, used by two commuter services, Arlanda Express and regional and long-distance trains. Around 18 trains per hour in both directions at peak times.
- » 3. E18 Kymlinge Link Road is an urban motorway with a high road embankment that impedes intervisibility and movement. Runs in the form of a viaduct over the Igelbäcken valley.
- » 5. The underground operates mostly in tunnels. Over the Igelbäcken valley and north of the Kymlinge Link Road it runs across a viaduct. The only barrier is the station at Kymlinge. There are 2-12 trains per hour in both directions.

Landmarks *****

Around Norra Kymlinge there are orientation landmarks, mainly to the north in the form of the high-rise buildings in Kista and along the large open landscape spaces and road junctions. Within Norra Kymlinge, the orientation features are mainly along the Igelbäcken valley in the form of small farms and the viaduct for underground trains.

The area is largely separated from the surrounding districts by traffic barriers, distance and topography – mainly from the east. There are relatively few links and they would need to be developed in order to be distinct and secure.

The area borders on two very busy roads and a very busy stretch of railway, both of which create barriers.



*Node

Nodes in this analysis mean places which within a radius of approximately 200 m contain three or more of the following functions: high-capacity public transport, municipal service facilities, retail facilities, culture, education, sports/recreation.

**Character area

Character areas are clearly delimited areas with a specific identity. See also definition in the Landscape character section.

***Pathway

In this analysis, pathways are understood to be areas between focal points or nodes along which pedestrians and cyclists can move.

****Barrier

Barriers are defined here as objects that cannot be crossed by pedestrians without difficulty and/or considerable danger.

*****Landmark

Landmarks are physical objects that help us to find our way around in the city but which could also create a site-specific identity.

Sources

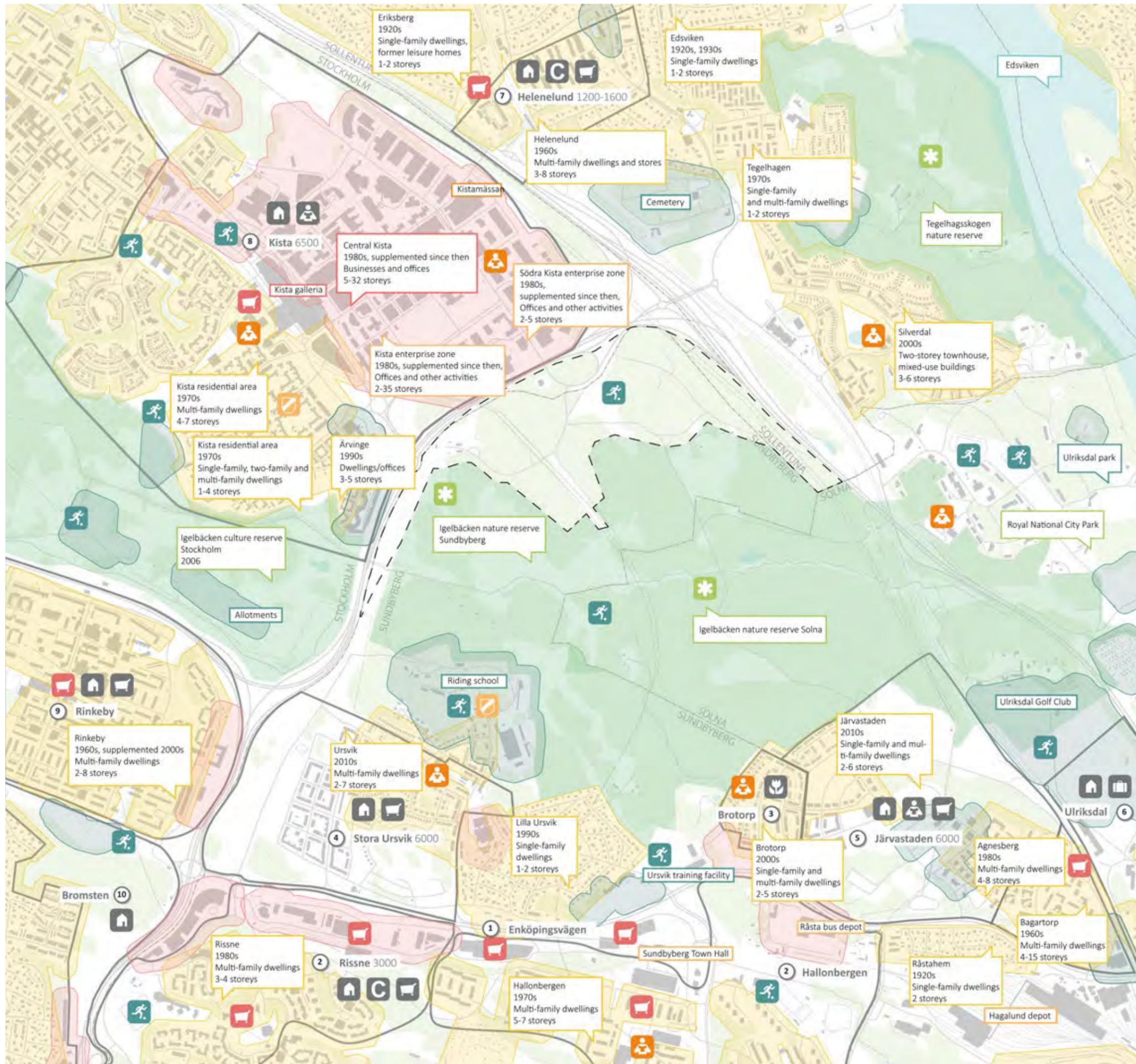
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Urban functions

Scale 1:16000

Property Map Vector © Lantmäteriet



- Homes
- Office/industry
- Other activities
- Nature reserve
- Description of a function area
- Municipal service
- Education
- Recreation
- Retailing
- Nature reserve
- Approx. development area (based on each municipality's comprehensive plan)
- 1 Development area, with the total number of planned homes
- Planned homes
- Planned education facilities
- Planned urban service centre facilities
- Planned retail facilities
- Planned green spaces
- Planned office/industry

0 250 500 1000 m



Urban functions

An inventory has been made of the physical conditions that exist for achieving a vibrant, cohesive city. The inventory can then be used as a basis for assessing which features ought to be reinforced, developed and changed as part of future development.

Function areas

An overall classification has been made of the different parts of the secondary analysis area. These have been divided into function areas and are described according to their primary function, the age of the buildings, the type of buildings and the number of storeys. The more dominant types of function areas are areas with single-family dwellings dating from the first half of the 20th century (e.g. Eriksberg, Kummelby, Råstahem), low-rise multi-family dwellings arranged in rows dating from the 1960s (e.g. Hallonbergen, Bagartorp), newly developed districts (e.g. Silverdal, Ursvik), as well as industrial areas and areas used for other activities that extend along the more important rail routes. These areas often have distinct borders.

Key functions

Public functions have been identified: municipal service functions, retailing, culture, education and sports and recreation. The most important of these are the points in Kista designated for retailing and education, as well as the recreation areas in the Järva green wedge and the Igelbäcken nature reserve. There are plans to expand several functions or add them in line with the development of the districts within the area (see below).

Current urban development

Large parts of the secondary analysis area are undergoing change. Ideas have been put forward for an extensive programme of changes, including densification in Kista to the north of the Kymlinge Link Road. Kista-Sollentuna-Häggvik has been highlighted as one of the regional cores in RUF 2010 (the regional development plan for the Stockholm region), and in the consultation version of RUF 2050 the same area is stated as being a regional urban core with a specific supraregional function. The upcoming development of Barkarbystaden, and the extension of the underground system to Barkarby, could have an impact on the area.

» Sundbyberg

1. According to the comprehensive plan, it has been proposed that Enköpingsvägen is changed in the light of the fact that the road came under municipal control in 2015.
2. Urban development projects are taking place in Rissne, Hallonberg and Ör in order to consolidate and reinforce the areas. The work includes creating good communications and reinforcing urban service centre functions. The districts will undergo relatively wide-ranging expansion measures with the addition of further dwellings. Links within the districts can be created that are in keeping with existing conditions and values.
3. Brotorp (the Sundbyberg part of Järvastaden). The important green corridor is to be preserved and the area will be developed to improve the links between Brotorp and Hallonbergen. Residents of Sundbyberg should be able to move easily and naturally between the districts. A mixture of homes and workplaces is sought. A natural link between the sports facility in Ör and the Ursvik outdoor recreation area is also sought.
4. Stora Ursvik is one of the largest expansion projects in Stockholm. Construction will take place in stages and is due for completion around 2026. By that time, around 17,000 people will be living in the area. At present, Stora Ursvik has a population of just over 4,000. Expansion will mainly take the form of dwellings and municipal and commercial service facilities. The Tvärbanan light railway to Kista will be extended through the district and is due for completion in 2021.

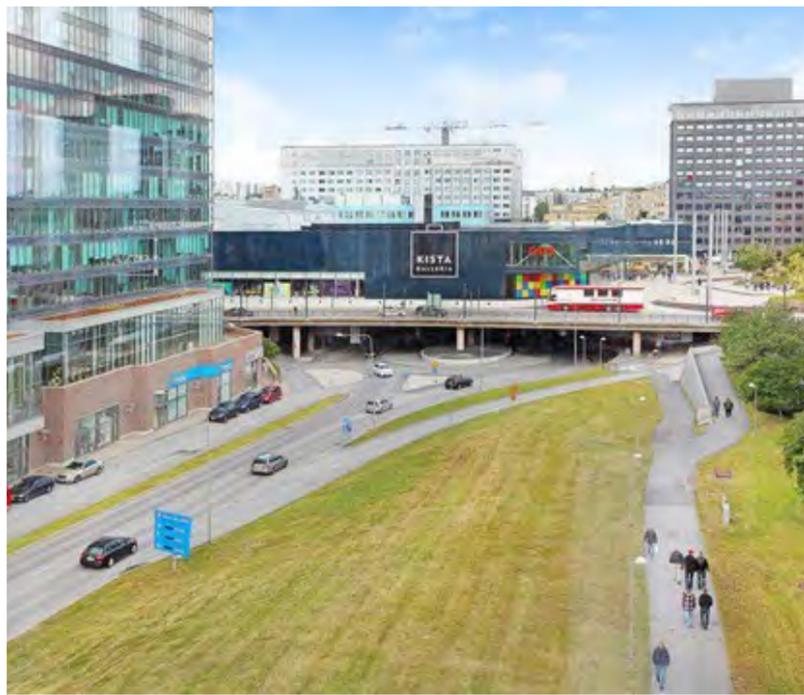
» Solna

5. Järvastaden is another of the largest expansion projects in Stockholm. Construction will take place in phases and is due for completion around 2030. By that time, around 15,000 people will be living in the area. Järvastaden currently has a population of just over 5,000. Expansion will mainly take the form of dwellings and municipal and commercial service facilities.
6. Both homes and offices will be built in Nya Ulriksdal. The area closest to the Ulriksdal commuter station will be developed to a higher density to make optimum use of its excellent public transport location. Farther away from the station, more small-scale development is planned and parts of the area are also considered to be suitable for the construction of dwellings with direct street access. Immediately beside the E4 and E18

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Photo: Richard Hammarskiöld



Site analysis / Norra Kymlinge / Vasakronan 05/2017
Photo: Johan Fredriksson

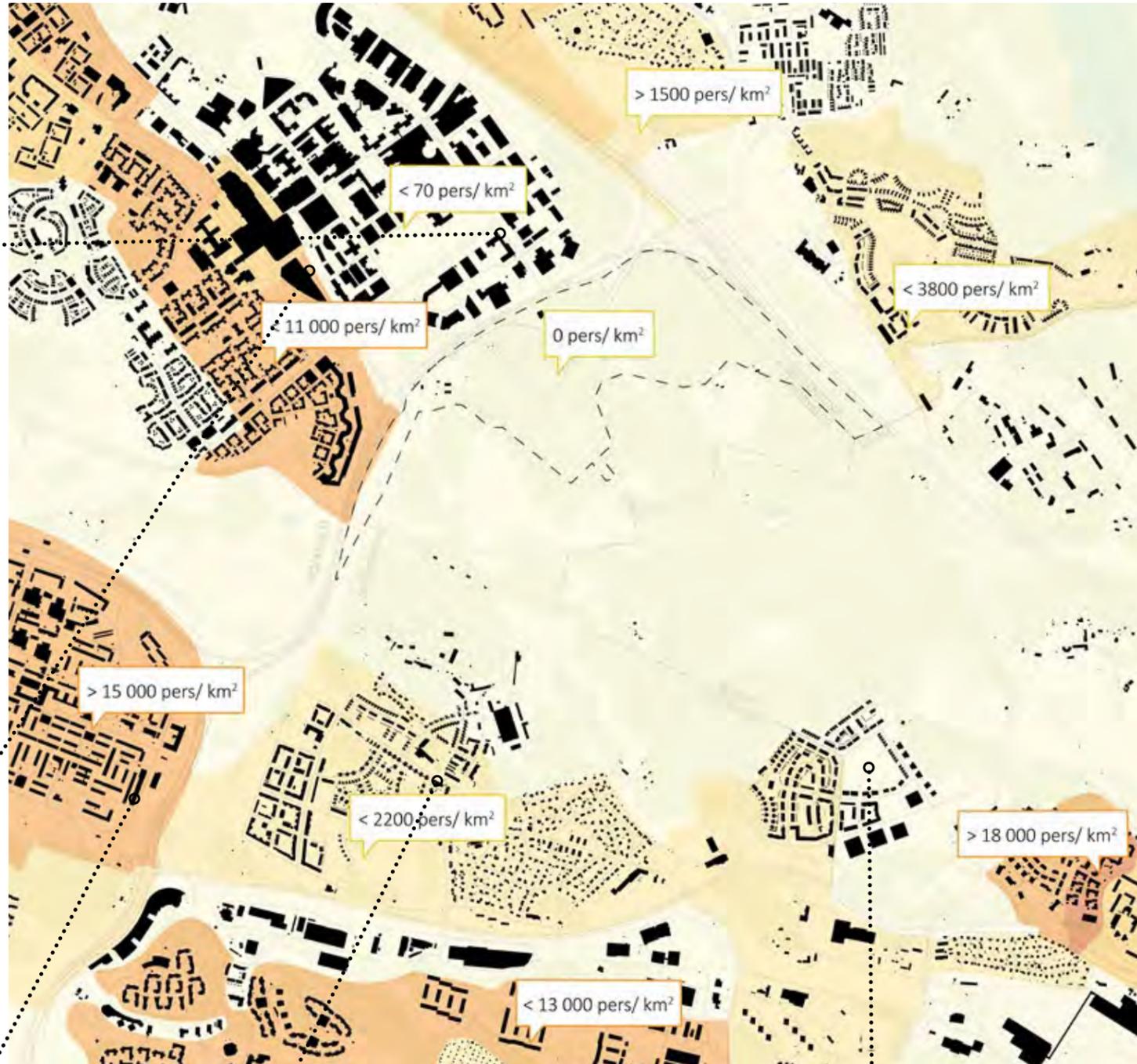


Photo: Urban Minds

City functions (cont'd)

motorways there are plans to build offices and other workplaces that could function as noise barriers.

There will be additional construction and development in Bagartorp, Agnesberg and along Enköpingsvägen.

» **Sollentuna**

7. Work is in progress in Helenelund on developing the central part into a more dense, vibrant urban setting. One of the aims is to add more dwellings and workplaces to provide a foundation for a better level of service in the centre, to reinforce the link to Kista with the aid of an urban pathway, and the establishment of a new retail and service precinct linked to the Tvärbanan light railway.

» **Stockholm**

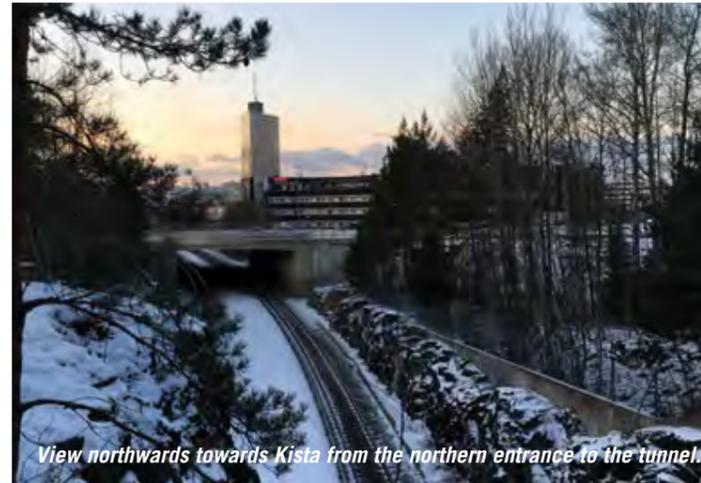
8. In Kista, planning is currently taking place to make way for 6,000 dwellings. This development is entirely in line with the comprehensive plan for the Municipality of Stockholm, where Kista is highlighted as an important node. Further dwellings in Kista will also give rise to a need for new preschools and schools. This development will include reinforcement of links to nearby areas, such as Spånga, Barkarby and Sollentuna.

9. Further dwellings and service facilities will be built in the districts of Rinkeby and Tensta.

10. In Bromsten, programme work has commenced for the eastern part of the area along Ulvsundavägen. The Municipality of Stockholm has identified significant potential for further development and reinforcement of the link to the underground system in Rissne-Sundbyberg and to link the districts together.

Population density

The map shows a considerable variation in population density within the area. Within the Järva green wedge and in the enterprise zones, the population is less than 1,500 persons per square kilometre. In the most densely populated parts the figure is 18,000. The average for Västerort (in the Stockholm area) is approximately 3,100. By comparison, the average population density in the inner-city areas of Stockholm is around 8,800 persons per square kilometre. Kista has a daytime population of around 35,000 – almost three times as high as its nighttime population.



View northwards towards Kista from the northern entrance to the tunnel.

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The surrounding areas are largely characterised by functional separation and/or typological one-sidedness. Urban development is fragmented and it is not a mixed urban area.

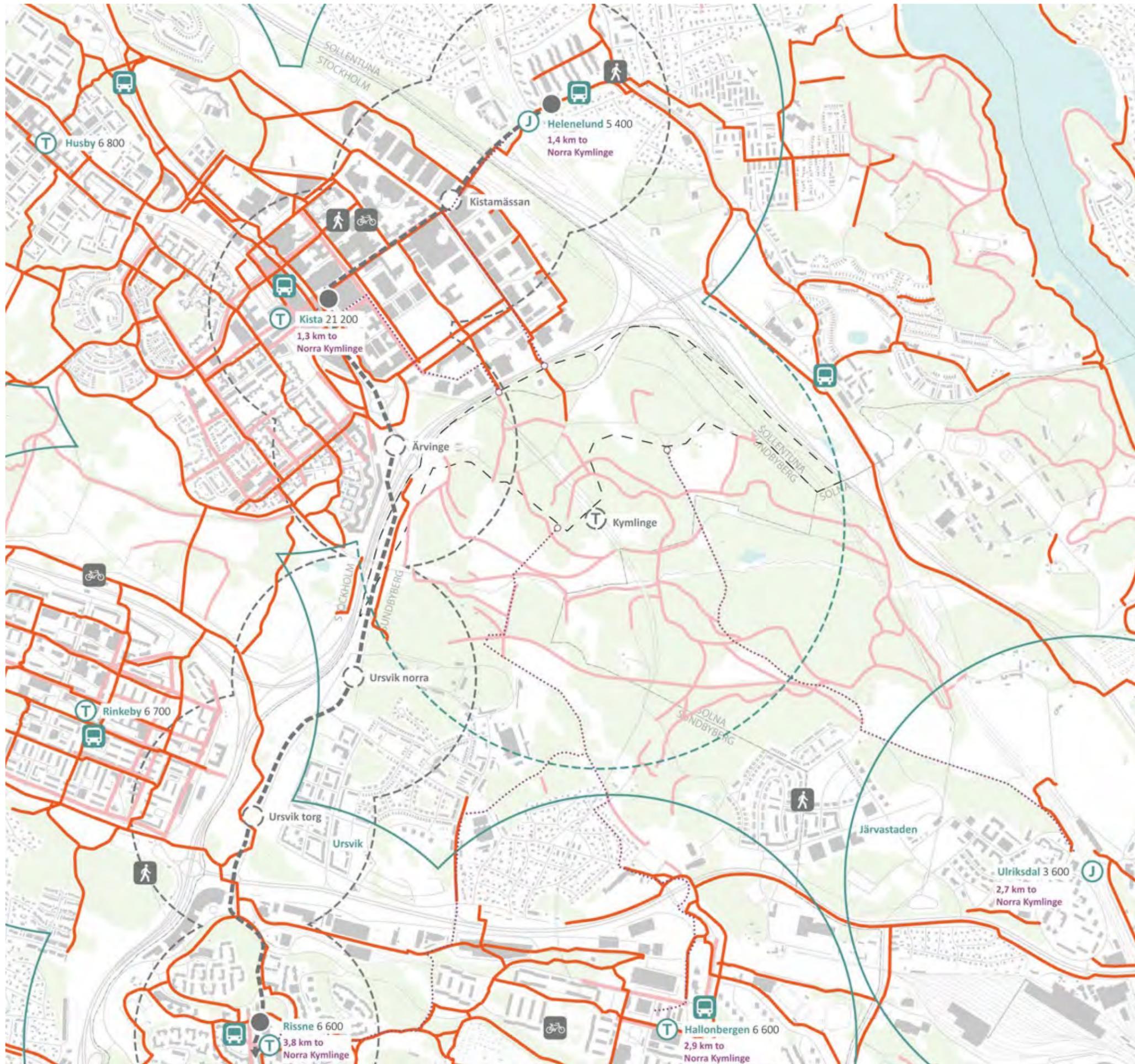
There are few focal points directly adjacent to Norra Kymlinge, and it is difficult to reach several focal points in any other way than by road.

There are several existing and emerging surrounding areas with a population sufficient to justify the creation of a service base.

The surrounding area has a relatively large number of locations that offer opportunities for sports and recreation, although cultural establishments and higher education institutes are few in number.

Large parts of the surrounding areas will be intensified or changed in some way in the years to come.





Mobility

Scale 1:16 000

Property Map Vector © Lantmäteriet



-  Cycle track
-  Pedestrian path
-  Walking distance to Norra Kymlinge
-  500/1,000 m from rail-bound public transport
-  Main bus stop
-  Existing/planned station
-  500/1,000 m from rail-bound public transport, planned
-  Planned route for the Tvärbanan light railway
-  Planned infrastructure for pedestrians
-  Planned infrastructure for cyclists



Mobility

A space syntax analysis* of accessibility in the pedestrian and street networks reveals that Norra Kymlinge is very poorly integrated with the surrounding districts. The exception is Torshamnsgatan in Kista. However, no further investigations have been carried out into the effect the current expansion of Ursvik and Järvastaden is having on accessibility to and within the area.

The fact that the area is hilly, surrounded by roads and not linked directly to urban environments, makes the potential for achieving sustainable mobility more difficult.

Large parts of the area currently have a gradient exceeding 1:20 (5%), and can therefore not be regarded as being fully accessible in the sense that they can be reached by a person in a wheelchair or with other functional variations (see also Shape of the landscape section).

Walkability** is a term normally used in urban environments and apart from a very small area of central Kista, no part of the area can be assumed to have any urban content. Consequently, no analysis has been made of the number of points of entry, variation in building types or transparency.

Pedestrians

In many cases, pedestrian traffic in the surrounding districts runs alongside road traffic but remains separated from it. There are paths both large and small within Norra Kymlinge.

The walking distance has been measured from a number of the area's nodes (see Pathways and links section) via the shoptest route to Norra Kymlinge. The basic idea is to acquire an understanding of a possible basis for establishing pathways between the different parts of the immediate area. Kista, the most important node in the area, is also the node that is located closest to Norra Kymlinge. There is a strong physical link between Norra Kymlinge and Kista.

Cyclists

The area is connected to the regional cycle network. There is a fine-mesh network within certain districts although there are a small number of links between the areas. The cycle track network within Ursvik and Järvastaden is being developed and has not yet been mapped. There are no cycle tracks within Norra Kymlinge, apart from tracks used for mountain biking (see also Recreational infrastructure section).

Buses

Kista has a main bus terminal. A large number of buses currently operate along the E4 motorway and the Kymlinge Link Road without stopping.

Rail-bound public transport

The area is served by the Blue underground line from Kungsträdgården to Hjulsta and Akalla as well as commuter trains to Märsta. The whole of Norra Kymlinge, and the most northerly parts of Ursvik, are within 1,000 m of the platform at the unopened underground station. The most northerly parts of Norra Kymlinge are less than 1,000 m from the underground at Kista.

Current development of mobility/infrastructure

The expansion of the Tvärbanan light railway*** can be expected to have a major impact on the entire area.

Further development of Kista will mean that pedestrian, cycle and public transport facilities will need to be reinforced.

Enköpingsvägen will be supplemented by a pedestrian path and a cycle track running alongside the road, and it will be incorporated into the city's network of pedestrian paths and cycle tracks. The street space will be adapted in a way that the districts will become more interlinked in an effort to reduce the current barrier effect of Enköpingsvägen.

Sources

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Spacescape (2007) Rena fakta om Kymlinge - tillgången till naturen.

Norra Kymlinge is a very hilly area and its street network is poorly linked to surrounding areas.

The travelling time by underground from the station at Kymlinge to the T-centralen station in Stockholm would be around 15 minutes. Some 120,000 people would be able to reach Norra Kymlinge within 20 minutes.

There is a whole range of tracks and trails in the area for various outdoor pursuits (see Recreational infrastructure section).

Road traffic dominates and favours private motoring compared to more sustainable modes of transport.

The Kista section of the Tvärbanan light railway will result in more stations being built close to the area.



*Space syntax

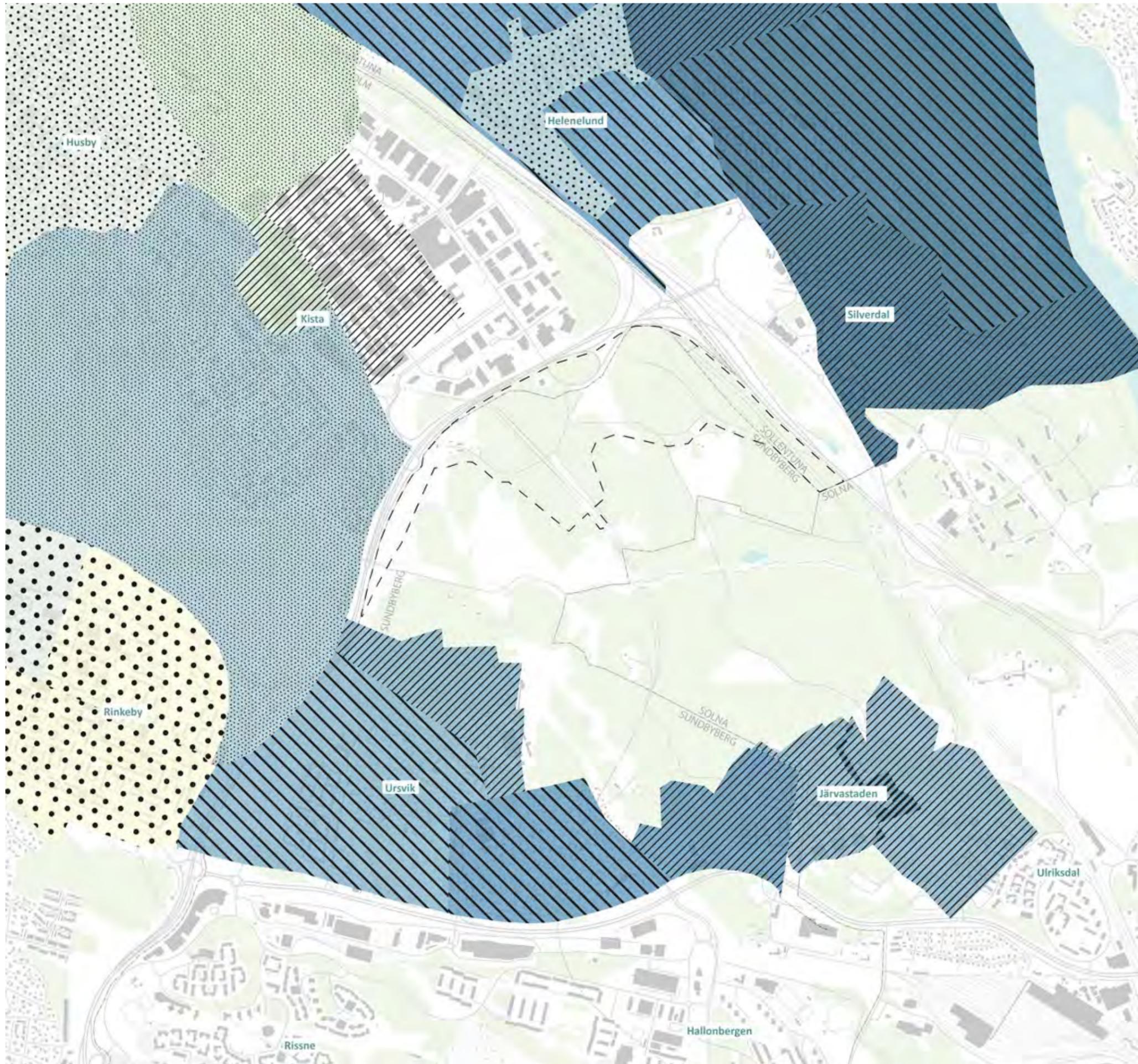
A space syntax analysis measures the degree to which the street network is integrated or interlinked, based on how many times a person needs to turn to make their way between all the streets within an area.

**Walkability

Walkability describes and quantifies the pedestrian-friendliness of an area. In this analysis, the infrastructure for pedestrians and cyclists has been included as well as public transport (it is important that pedestrians can reach large area by public transport).

***Tvärbanan Kista section

The Tvärbanan light railway will be extended between Norra Ulvsunda and Helenelund, with stations at Rissne, Ursviks torg, Ursvik norra, Årvinge, Kista centrum, Kistamässan and Helenelund. The route between Årvinge and Kista centrum has not yet been decided.



Socioeconomy

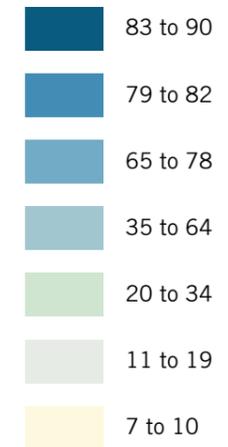


Scale 1:16 000

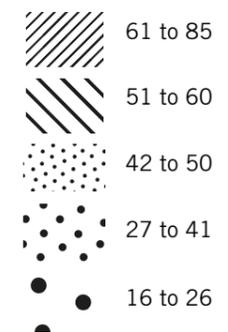
Property Map Vector © Lantmäteriet

Map: White and Urban Minds based on data from SLL

Proportion of the population with one/two Swedish-born parents



Proportion of the population with a post-high school education (16-74 years, %)



Socioeconomy

In both Silverdal and large parts of Järvastaden and Ursvik, a high proportion of the population have one/two Swedish-born parents. In districts such as Rinkeby, Hjulsta and Tensta, the proportion is considerably lower. Income statistics revealed roughly the same pattern.

Socioeconomically, the northern part of Greater Stockholm is varied and certain areas stand out. These include Kista, where a significant proportion of the population have a post-high school education, and Tegelhagen, Helenelund and the centre of Sollentuna, which have a lower average income.

Perceived values

Intercept interviews with local inhabitants were conducted in spring 2017 in the residential areas closest to Kymlinge (Kista in Stockholm, Silverdal in Sollentuna, Järvastaden in Solna and Ursvik in Sundbyberg). A total of 58 intercept interviews were conducted. The aim of the interviews was to identify needs within the region and at the same time acquire a good overview of how Kymlinge is being used.

The shopping centre in Kista is a strong marker and the majority associate the district with the shopping centre. A good service base and the shopping centre are synonymous with Kista, both among residents and visitors.

Silverdal is quite a separate area, which can be both an advantage and a disadvantage. Many of the residents feel that the area is secure and child-friendly with good schools and preschools. Many cite the proximity to nature and recreation facilities as an advantage, although in this respect the residents are referring to natural areas other than Kymlinge.

Residents in Järvastaden mainly highlight the location of the district as an advantage. They state that it is close to Stockholm city centre as well as the countryside and leisure activities. Access to different modes of transport and communication links in Järvastaden varies depending on where you live.

Many of the residents of Ursvik feel that proximity to the forests and countryside is the area's major strength. However, families with children and the staff at the schools state that it is difficult to get to Norra Kymlinge as the paths are not easy to use if you have a pram and there are no bus services.

The majority describe Kymlinge as quiet and safe. Nevertheless, many people refrain from going there once darkness falls, especially women. It is no coincidence that women feel insecure in forest areas. Access by men and women to public spaces is affected very strongly by norms and notions about what is safe.

Another interesting aspect of equality to emerge from this study is that women to a greater degree describe the transport services and location as poor. One explanation for this is that women travel by public transport more frequently than men. It is, for example, easy and more efficient timewise to travel by car from Ursvik into the centre of Stockholm whilst it takes considerably longer to make the same journey by public transport. Women also state to a greater degree than men that there is a lack of services in their local area.

The links between Sollentuna and Sundbyberg are weak, both physically and mentally.

Residents in the local area would like, among other things, that the area had more recreation facilities, a broader range of activities for children and young people, and better services.

The interview study points out that highlighting the child and gender perspective in the plans for Kymlinge satisfies the need for increased norm-critical urban planning (e.g. unequal transport conditions and safety and security issues).

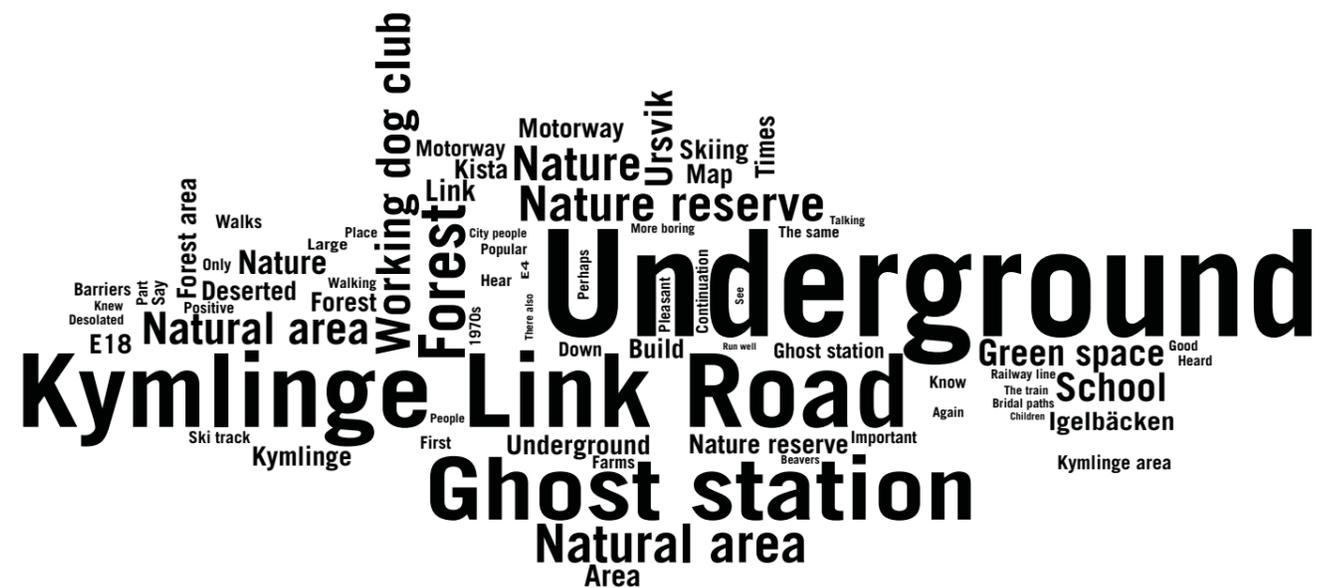


Sources:

White (2017) "Kymlinge sociala aspekter - en intervjustudie"

*Intercept interview

Intercept interviews are brief interviews aimed at 'taking the temperature' of the area by stopping and interviewing people who are either at or passing a certain location at a certain time.



"What springs to mind when you hear the word 'Kymlinge'?" The size of the words indicates how frequently they appear in people's descriptions of the area. Image: White

GREEN CITY

How are green areas in the region linked? Where are the jogging tracks and wetlands? What structures are in place that can produce ecosystem services?

Green structures in a city fulfil functions that differ from those of streets and buildings. They are the site of a range of natural processes, including the aquatic ecosystem, photosynthesis and temperature regulation. Green structures provide a habitat for a multitude of species. They offer recovery, learning and exercise for people.

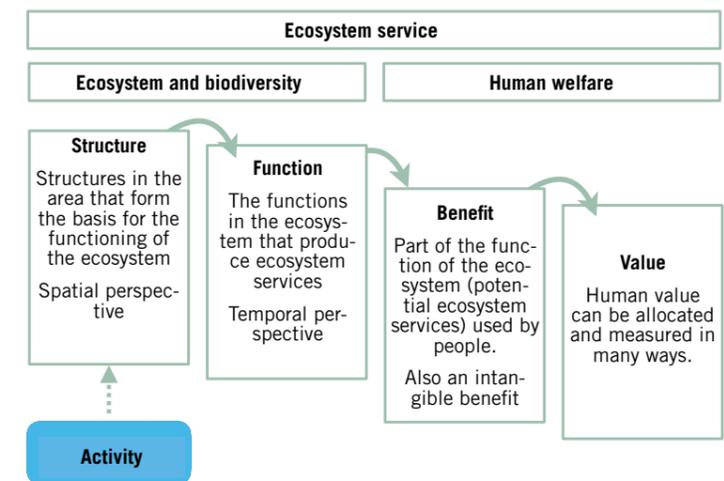
/ Green city

This section includes a description of the green features that exist within and around Norra Kymlinge: ecosystem services, experiential values, recreational infrastructure, green and blue infrastructure and pressure on and access to the surrounding districts. The Ursvik outdoor pursuits area, which includes Kymlinge forest and Igelbäcken, has an extensive network of paths for different pursuits and they offer a whole range of experiential values. Land use and the history of the area contribute tangible natural values, including forests, wetlands and open ground that attract insects. The recreation area is poorly linked to neighbouring districts and is a long way from bus stops and railway stations.

This section begins with a description of the blue and green infrastructure in this part of the Stockholm region. The information is based on a combination of a regional knowledge base and local analyses. The green structure in the area is linked to and dependent on surrounding bodies of water and green areas. Local development could therefore also have an impact on the surroundings.

Kymlinge has the capacity to provide people with a range of ecosystem services. Knowledge of the site-specific ecological structures and functions makes it possible to develop the area in order to reinforce these services, such as recreation or water retention capability. This section is based on an overall ecosystem service analysis.

Kymlinge is located in the Ursvik recreation area, which has its biggest focal points south of Igelbäcken. Using a previous survey of recreational values as a starting point, as well as a development plan for the outdoor recreation area, this section describes the network of paths, experiential values and activities. The recreational values of the area could contribute to reinforcing functions in the local green structure in the surrounding districts.



Ecosystem services

Ecosystem services is an umbrella term that covers many different values. They can be divided into provisioning, regulating and cultural ecosystem services. A special category is supportive ecosystem services, which are a prerequisite for the production of other ecosystem services.

Ecosystem services highlight how people are dependent on the surrounding ecosystem. It can be described as a value chain, extending from ecological structures and functions through to benefit and value to people. A common definition is: "Ecosystem services are the direct and indirect contribution of the ecosystem to human well-being."



Green infrastructure

Scale 1:16000

Property Map Vector © Lantmäteriet



-  Igelbäcken
-  Wetland link
-  Stepping stones forest area
-  Forest link
-  Pollination link
-  Barriers to animals and insects
-  1 >7km to Grimsta forest via Bromma Airport
-  2 Pollination link, Järva green wedge
-  3 5km till Hanstaskogen
-  4 Disrupted pollination link, Sollentuna
-  5 Presence of amphibians in Solna

0 250 500 1000 m



Green infrastructure

Kymlinge is located in the Järva green wedge, one of the large green spaces in the Stockholm area. The Järva green wedge extends from Djurgården in Stockholm via Hagaparken and Ulriksdal in Solna, Igelbäcken in Sundbyberg, Järvafältet, Hansta in Stockholm and on through Järfälla, Sollentuna, Upplands Väsby and Sigtuna. These green wedges function as the lungs in a dense urban environment and include both ecological and social values. A functioning ecosystem is necessary for our survival and the Järva green wedge is of major significance to networks that are ecologically functional. The green wedges were established in conjunction with the radial expansion of Stockholm along the underground network during the 1940s and they are continuously called into question in urban development. Due to its radial structure, access to large green areas is distributed relatively equally throughout greater Stockholm. The green wedges are included as part of the regional green structure and the Järva green wedge is largely protected by municipal nature reserves or cultural reserves.

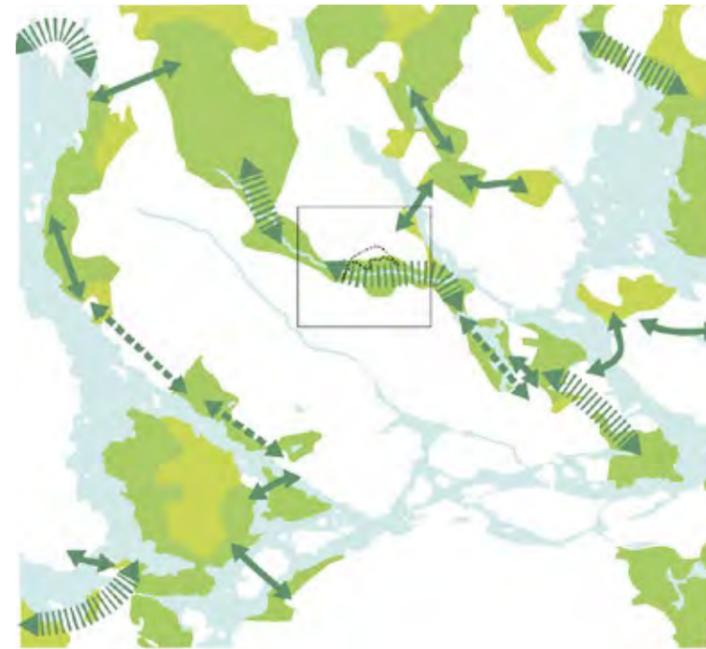
The map shows green links that maintain ecologically functional networks for pollination, forest links and water links. Unbroken forest areas greater than 10 ha are of importance in terms of their function as a habitat for the different species living in the forest. Forest areas less than 10 ha could be of significance as stepping stones for these species. The nearest larger forests are some distance away; the forest at Grimsta is more than 7 km to the south, and the forest at Hansta is 5 km to the north-west.

The patchwork structure, with open landscape spaces, closed vegetation and numerous south-facing forest fringes, offers good conditions for pollinating insects. There are also pollination links in Sollentuna, although they are cut off to insects by the E4 motorway, the Kymlinge Link Road and the railway.

Water links can be found in the Igelbäcken valley and there are small bodies of water in the forest. Water, forest and forest fringes together form habitats for amphibians. The existence of amphibians has been noted in Solna. The above-mentioned ecological landscape links are also described in the Ecosystem services section.

Sources

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Green wedges

The region's green wedges are large unbroken green spaces beside developments and have a number of overlapping values. The green wedges are the result of the retention of large unbroken areas of land and long-term regional and municipal planning. By definition, they are the undeveloped areas of land beside and between the region's developed green wedges and include different types of land use, such as cultivated land, forests, lakes, watercourses, some dispersed development, leisure homes, quarries and golf courses. The green wedges comprise green wedges, green value cores and weak, green links.

Green wedges

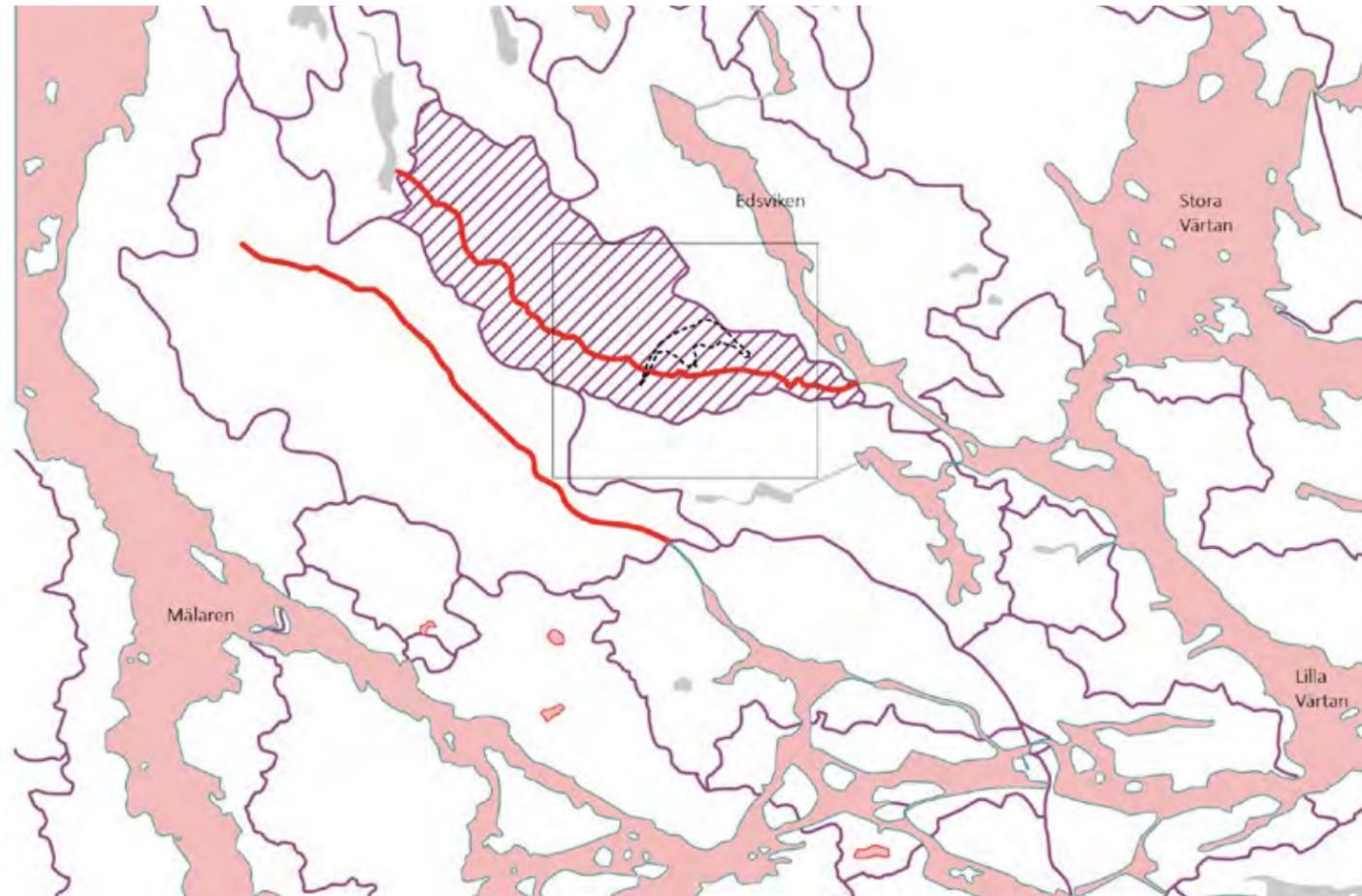
scale 1:90000

Map based on RUFSS 2010.

-  Green value core
-  Green wedge
-  Weak green link, class 1: prioritised links. Risk of fragmentation due to urbanisation.
-  Weak green link, class 2: strategic links, often protected.
-  Weak green link, class 3.
-  Approximate border of the 'Green infrastructure' map
-  Approximate border of Norra Kymlinge



Photo: Richard Hammarskiöld

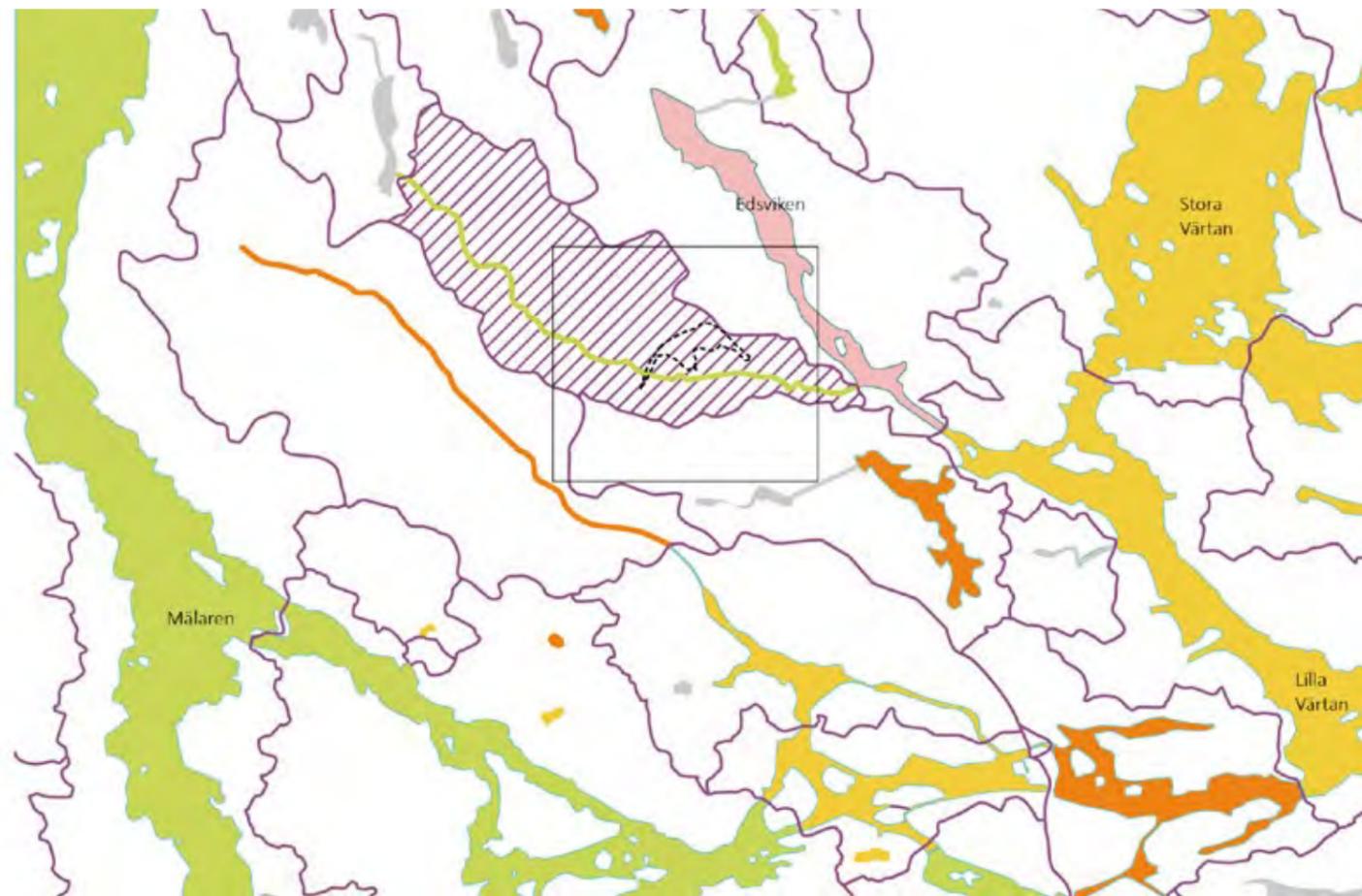


Blue infrastructure – chemical status



Scale 1:45 000

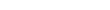
-  Drainage basin
-  Igelbäcken drainage basin
-  Good chemical status not achieved
-  Unclassified
-  Approximate border of the 'Green infrastructure' map
-  Approximate border of Norra Kymlinge



Blue infrastructure – ecological status



Scale 1:45 000

-  Drainage basin
-  Igelbäcken drainage basin
-  Good ecological status
-  Moderate ecological status
-  Unsatisfactory ecological status
-  Poor ecological status
-  Unclassified
-  Approximate border of the 'Blue infrastructure' map
-  Approximate border of Norra Kymlinge

Blue infrastructure

At present, Norra Kymlinge comprises natural land that to a large extent allows infiltration by rainwater, which is then channelled into Igelbäcken via the groundwater system and via small ditches and pools of water contained in hollows. As the area is very hilly, with relatively large height differences, water collects at low points and valleys. The patchwork landscape in Norra Kymlinge currently provides vital ecosystem services, including water regulation, water purification and biodiversity.

Igelbäcken drainage basin

Igelbäcken is a watercourse that is of significant conservation value. It has its origin in Säbysjön, a lake in Järfälla, and its estuary is at Edsviken, beside the manor house at Ulriksdal. South-west of Norra Kymlinge, Igelbäcken is intersected by the Kymlinge Link Road, which runs over a viaduct. It then flows for around 2.5 km through open grassland (Igelbäcken valley) as far as the railway and the E4 motorway south-east of Kymlinge, where it is then channelled through a culvert.

Kymlinge is located within the Igelbäcken drainage basin. Water from the drainage basin flows into the sea at Edsviken. According to the EU Water Framework Directive, Edsviken is classified as a body of water, and has an unsatisfactory ecological status and a poor chemical status. Igelbäcken (preliminary water course September 2016) is considered to have a good ecological status but not a good chemical status. The water quality in the receiving bodies of water must not be worsened in the future, which requires extensive surface water measures to be implemented in conjunction with any changes that take place within the drainage basin. In the past, the drainage basin was larger, but following development within the area, surface water was channelled across to the Järva surface water tunnel and out at Edsviken instead of being channelled into Igelbäcken. There is also seepage of groundwater to the surface water tunnel upstream, which reduces the influx of groundwater into the stream. The reduced addition of water to Igelbäcken has led to a fall in discharge. Particularly during the summer, there is a problem of low discharge and, when necessary, the water utility company Stockholm Vatten AB adds around 5 l/s to prevent the discharge in the stream reaching levels that are far too low.

Strong populations of amphibians are a good general indication that the landscape has functioning ecosystems. The reason for this is that the amphibians are dependent on different environments for their life cycle; in water for breeding and the fry stage,

and on land for feeding grounds and wintering environments. The amphibians are also strongly dependent on accessible links at ground level between the different habitats. Large and small aquatic salamanders were observed in Igelbäcken in 2016.

The volume of water that flows from Norra Kymlinge to Igelbäcken is of significance. Igelbäcken is particularly well known for the stone loach, which on these latitudes is a rare fish species. The stone loach falls into the Near Threatened category in the Swedish Environmental Protection Agency Red List published in 2000. The stone loach is a bottom-living fish that lives in clear, running water and normally remains in fast-flowing sections with stony beds. The poor water flow in certain years is one of the more serious threats to the future existence of the stone loach in Igelbäcken.

Sources

Calluna (2016) Ekologisk utredning av Norra Kymlinge, NVI.

VISS, Vatteninformationssystem Sverige, Vattenmyndigheten och länsstyrelserna

Stockholm Vatten (2008) Igelbäcken -uppbyggnad av hydrologisk modell samt beräkningar av vattenbalans, geohydrologi och föroreningar.

Ecologically functional networks are site-specific and certain networks, such as large forest links, are difficult to recreate.

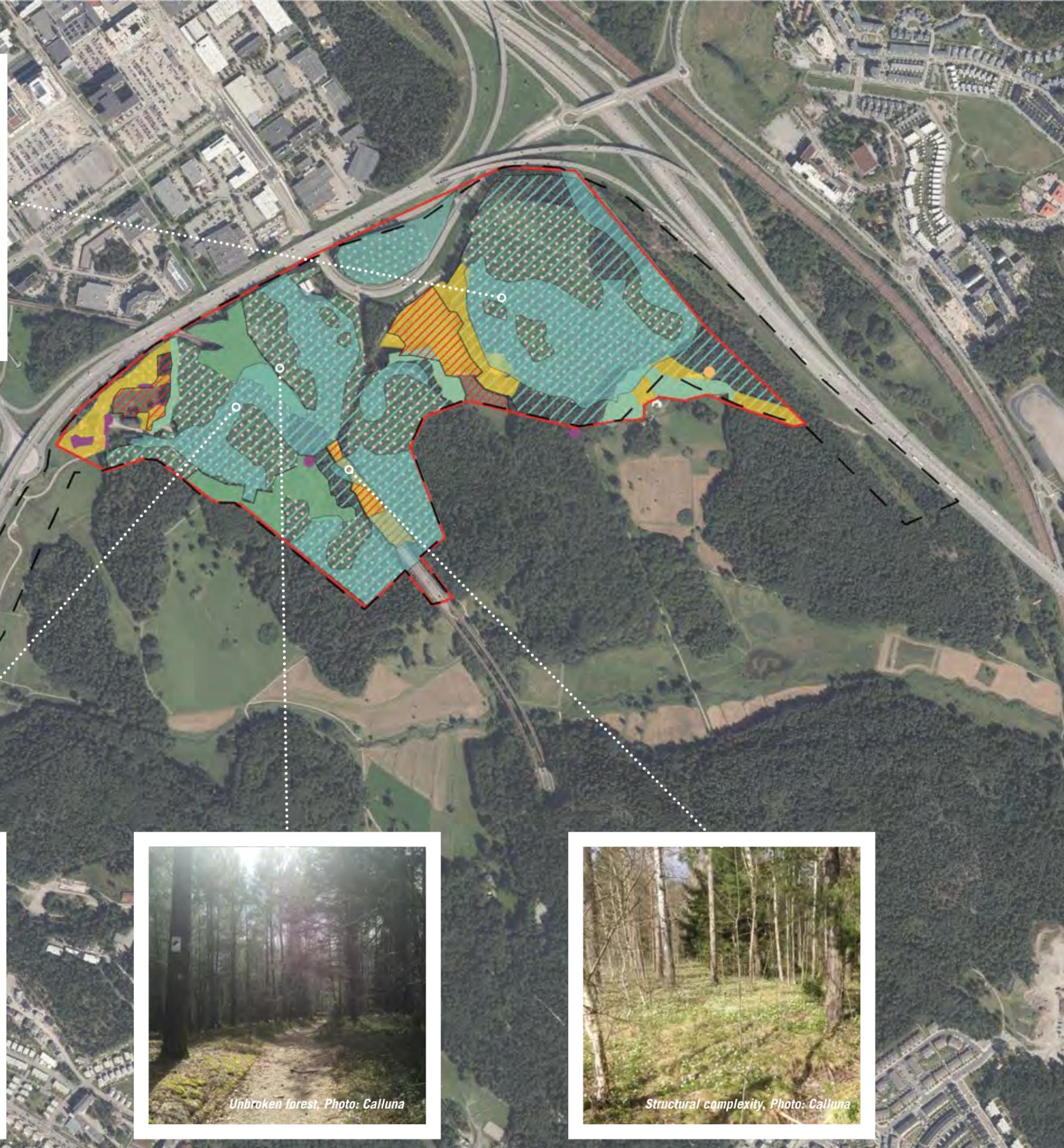
When the width of the green wedge is less than 500 m, it is deemed to be a weak link. Weak links can be reinforced by reducing the barrier effect of roads and/or enriching and assuring ecological building blocks and structures within the area.

Certain ecological functions can be integrated into built environments, e.g. pollination links or wetlands.

Low points in the valley have the potential to develop aquatic ecosystem services.

The water quality in the receiving bodies of water must not deteriorate in the future. This would require extensive surface water measures to be taken in conjunction with any changes that may be made within the drainage basin.





Ecosystem services

Scale 1:8000
Ortofoto25 © Lantmäteriet

Inventory area

Multilayer context

- Multilayer forest
- Unbroken forest

Old trees

- Forest with older trees
- Older trees (not complete)
- Broad-crowned solitary trees (not complete)

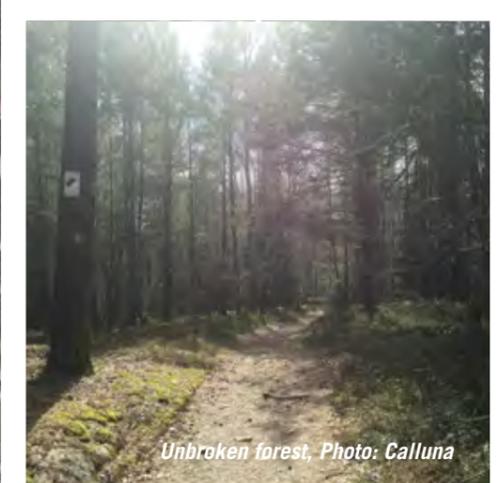
Forest fringes and habitat

- Forest fringe environment
- Freestanding bushes
- Arable land
- Habitat, pollinating insects (not forest)

Permeable land

- Permeable land (good infiltration)

0 250 500 m



Ecosystem services

A green and blue infrastructure supports robust ecosystems and reinforces biodiversity in the area by linking Norra Kymlinge to the surrounding ecology. The long-term production of ecosystem services is dependent on this infrastructure.

All ecosystem services are founded on ecological structures that are site-specific. The benefits and the values produced by the structures can reach human beings in close association with these structures although sometimes benefit and ecological structures are temporally and spatially separated.

In Kymlinge, there are several examples of nature in its different forms as well as structures that have been developed over a long period of time as a result of conditions created by nature and human activity. Ecological structures with extensive diversity and complexity perform the majority of the services. A site within the area could at the same time contribute to several different ecosystem services. The ecosystem services presented in the table are those that are considered to be particularly important.

Older trees and broad-crowned solitary trees are production areas for the regulating ecosystem services, i.e. temperature regulation, ecological stability and resilience and habitat; for the cultural ecosystem services play and socialising, spiritual enrichment, alleviation of stress and learning. Older trees are also important for the provisioning ecosystem service genetic resources (this includes pine trees that do not originate from planted production forests)

Multilayer forest and unbroken forest are production areas for several regulating ecosystem services: temperature regulation, ecological stability and resilience, habitat, visual regulation, noise regulation and water flow regulation, and for two cultural ecosystem services, birdwatching and alleviation of stress (mental recreation).

A habitat for pollinating insects, where forest fringe environments and solitary bushes are highlighted in particular, are production areas for the regulating ecosystem service pollination and are important for the provisioning ecosystem service cultivation. Cultivable land is also highlighted. It should be noted that in a multilayer forest, bushes with berries and flowers are of importance to pollinating insects. The same applies in natural forest with high natural values, see NVI (Calluna, 2016) for the area.

Permeable land is a production area for the provisioning ecosystem service cultivation and for the regulating ecosystem services water purification and water regulation.

Sources

Calluna (2016) Ekosystemtjänstanalyt

Calluna (2016) Ekologisk utredning av Norra Kymlinge, NVI.

Ecosystems that will benefit human well-being must have stable structures and be able to perform. Certain services have a greater chance of succeeding in conjunction with development – see table.

Size could be of crucial significance if the ecosystem is to work.

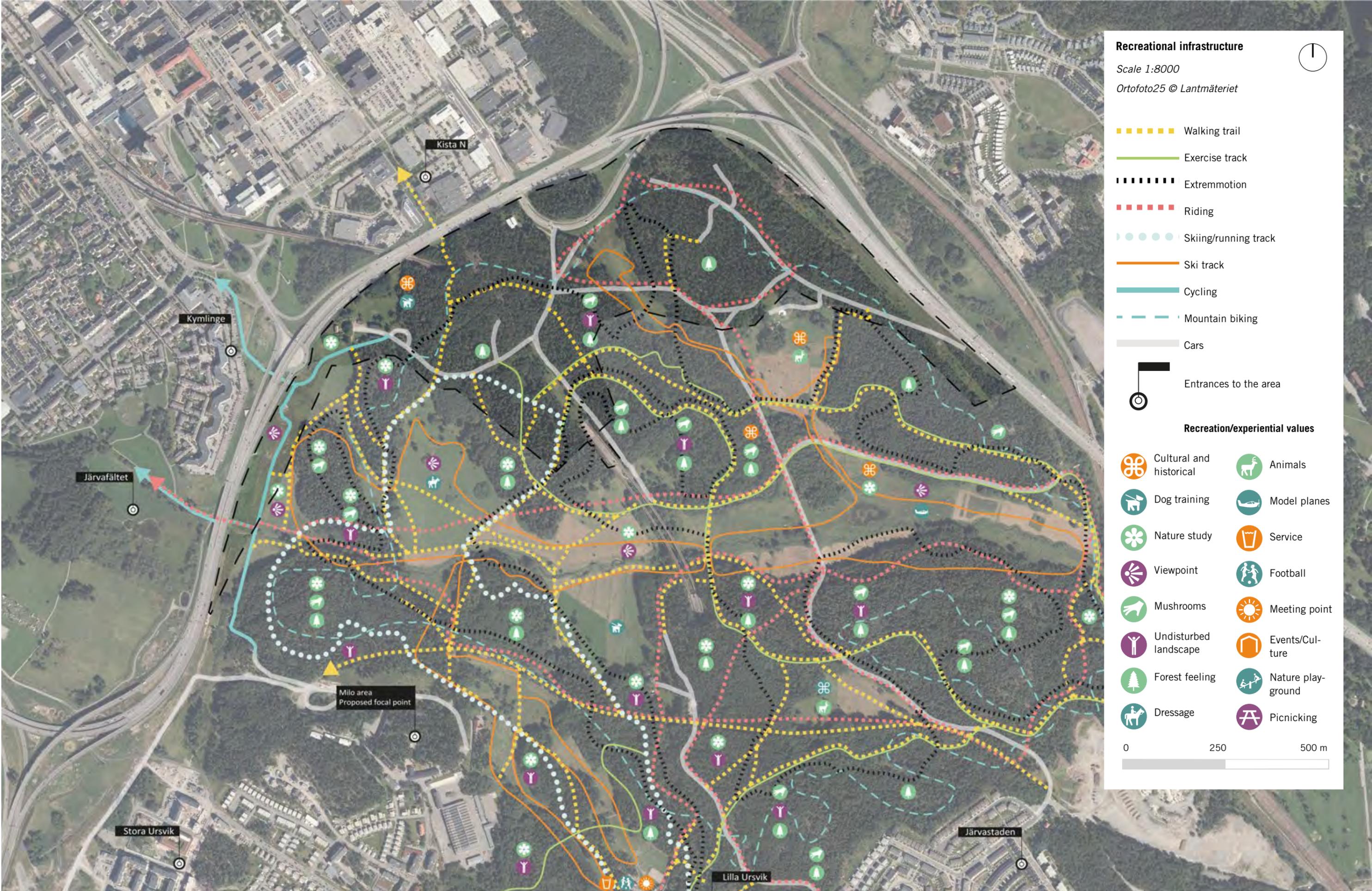
Account must be taken of whether the site-specific ecosystem services can be retained, protected, created or weakened.

Ecological structures in Norra Kymlinge and related ecosystem services that are of particular interest		Ecological structures												
		Arable land	Habitat, pollinating insects*	Blooming bushes	Forest fringe environments	Multilayer forest	Unbroken forest	Vegetation volume	Broad-crowned solitary trees	Older trees	Permeable land	Undisturbed profile w soil organisms	Small bodies of water/wetland	Structural complexity, varied nature
Provisioning	Cultivation, cereals, vegetables	2	2							2	2			
	Timber, decorative material			2		1					1			
	Genetic resources									1	2			
Regulating	Pollination	1	2	1	2					1				
	Temperature regulation	1		1		1	2	2	1	1	1		1	
	Ecological stability and resilience		1	1		1	2			2		1		2
	Habitat	1	1	1	2	2	2		2	2		1		2
	Biological diversity		1	1	2	2	1		1	2		1	1	2
	Maintaining good air quality			1	2	1	1	2	1	1				
	Visual regulation			1		1	2	2		1				
	Water purification										2	2	2	
	Water flow regulation	1				2	1	2		1	2		2	
	Cultural	Physical recreation (running, mountain-biking, walking)				1				1				
Birdwatching			1	1	2	2	2		1	1				2
Play and socialising			1	1		1			2	1				2
Alleviation of stress, recovery		1	1	1		2	2		1	2				2
Spiritual enrichment		1	1		1	1			1	2	2		1	1
Learning, teaching, research		1	1		1	1	1			2	2		1	1

Ecological structures
 Table: Calluna
 No relevant capacity
 Relevant capacity
 Highly relevant capacity

The term capacity refers to the significance of a structure to the production of a certain ecosystem service. See map for the spatial spread of structures in Norra Kymlinge.

*'Habitat for pollinating species' does not include forests.



Recreational infrastructure

Scale 1:8000

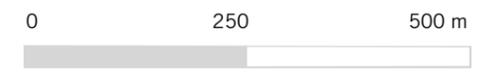
Ortofoto25 © Lantmäteriet



- Walking trail
- Exercise track
- - - - - Extremotion
- - - - - Riding
- - - - - Skiing/running track
- Ski track
- Cycling
- - - - - Mountain biking
- Cars
- Entrances to the area

Recreation/experiential values

- | | | | |
|--|-------------------------|--|-------------------|
| | Cultural and historical | | Animals |
| | Dog training | | Model planes |
| | Nature study | | Service |
| | Viewpoint | | Football |
| | Mushrooms | | Meeting point |
| | Undisturbed landscape | | Events/Culture |
| | Forest feeling | | Nature playground |
| | Dressage | | Picnicking |



Recreational infrastructure

The Ursvik recreation area extends from Lilla Ursvik in the south to the tip of the Kymlinge forest in the north. It is a regional focal point for outdoor life in the north Stockholm area. Located in the centre of Kymlinge is the unopened Kymlinge underground station, which has considerable potential for improving accessibility to the area. There is an extensive network of tracks and trails for various outdoor activities. The network also has contact with connecting tracks and trails, e.g. the Järva green wedge and the Järva cycle track under the Kymlinge Link Road to the west and towards the Royal National City Park to the east.

The area has weak links with the surroundings and indistinct entrances, making it inaccessible, and orientation is difficult. The recreational infrastructure includes walking paths, running tracks 2.5-10 km, ski tracks, bridleways, cycle tracks and mountain biking tracks. The starting point for many of the trails and activities is the Lilla Ursvik recreation centre. In the old Milo military area at Stora Ursvik, a new riding facility is planned with accommodation for up to 40 horses. The Ursvik outdoor recreation area functions as local recreation amenity for the people of Kista, Ursvik and Järvastaden.

The nearby districts, in particular the Kista enterprise zone, have a distinct lack of parkland – 4 square metres per person compared to the UN Habitat recommendation of 10 square metres per person. As Kista is undergoing urban transformation from



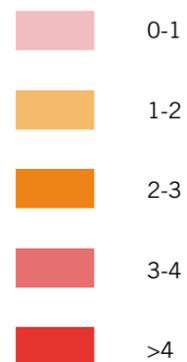
an enterprise zone into a mixed district, and with densification taking place in Västra Ursvik, the pressure from visitors will also increase in the Ursvik outdoor recreation area.

The size of the area and the varied composition of forest and an open valley make it an area rich in experiential values. In the map below, the density of the recreation value is shown according to the Spacescape study from 2008. The fact that there are fewer experiential values in the northern part of the area can probably be attributed to the noise disruption from the roads and railways and the fact that there are few or non-existent entrances to the northern part. There is a very tangible historical presence in the form of old objects and settlement sites, burial grounds, old agricultural practices and military activity. There are opportunities in the area to experience a feeling of being undisturbed as there is a distinct 'forest feeling'. It is a place where you can pick mushrooms, go mountain biking, train dogs and horses, fly model planes, study aquatic life and a great deal besides. Entrances and accessibility to the area from the north are limited to just a few locations.

It is a relatively long way to public transport facilities. It is more than 1 km to Kista, Helenelund, Hallonbergen and Rinkeby.* The exception is Kymlinge station, which was never brought into use – the whole of Norra Kymlinge is within 1 km of the platform. The planned station at Ärvinge on the Tvärbanan light railway is located at the western edge of the area.

Recreation values

Property Map Vector © Lantmäteriet



The growth in population in the surrounding districts will increase the number of visitors to Norra Kymlinge and the Igelbäcken nature reserve. There is potential to improve accessibility to the area through the creation of broader openings, a clear link to public transport and connecting roads for pedestrians and cyclists.

There is a difference between parkland and nature – parkland is a form of development.

Visitors are not concerned about administrative and legal boundaries and planning and focal points for outdoor pursuits need to be coordinated between the municipalities and the owners of the various amenities.

Experiential values are strongly linked to the cultural and natural environments in the area.

*Access to parks by public transport

Stockholm park guidelines state that there should be a large outdoor recreation area within 1 km of home, or that such an area is within easy reach by public transport.

Sources

ProActivity (2015) Utvecklingsplan för Ursviks friluftsområde (consultation version), Dnr: KFN 0170/2015.

Spacescape (2007) Rena fakta om Kymlinge - tillgången till naturen.

Sociotope mapping Västra Ursvik.

Spacescape/City of Stockholm (2015) Rekreation inom Stockholm stad. Analys av park och naturtillgång.



Use of the area

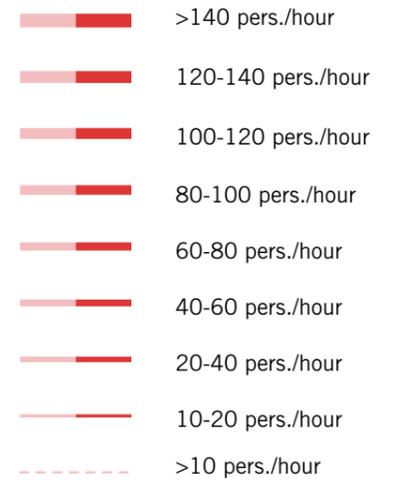
Scale: 1:16000

Property Map Vektor © Lantmäteriet

Map: Spacescape & Urban Minds



Pedestrian flows, weekday and weekend



Occupancy observation, weekday and weekend



Use of the area

A visitor calculation and occupancy observation* have been made to reach conclusions about how running tracks, trails and places within Norra Kymlinge and its surroundings are currently being occupied. The conclusions drawn are based on this winter observation and do not reflect the situation during the months of the year when people spend more time outdoors.

Conclusion

Using measured pedestrian flows and occupancy observations as a basis, the following conclusions can be drawn about flows and occupancy during the winter:

- » The areas that are closer to residential areas are used more during the week, whilst the more central parts of the nature reserve and Norra Kymlinge are less accessible and are therefore a greater attraction at weekends, particularly during the mornings.
- » Those who use the forests in Norra Kymlinge are mostly people out exercising or walking the dog and they mainly use illuminated tracks. During the evening, large parts of Kymlinge have no lighting whatsoever, which it can be assumed has an impact on the use of the area.
- » The southern parts of Kymlinge, which are used to a greater degree, have more obvious entrances with information signs and lighting.

Pedestrian and cycle flows

During the weekday observation, most activity took place close to the residential areas in Ursvik and at Ärvinge ängar between Rinkeby and Kista.

There were large groups of children around the southern entrance to the Igelbäcken nature reserve. This contributed to relatively high flows some distance into the reserve. Compared to other times of the day and night, there were high flows in the morning in the western parts of Kymlinge, along the Ursvik Extrem running track.

At the weekend, there was a greater spread of flows and more people used the running tracks despite the icy surface underfoot in the forested parts. At the weekend, there were people in the north-eastern parts although this was not the case during the week.

There were few cyclists observed although the ones that were observed were seen mainly beside the Kymlingeleden road, at

Ärvinge ängar and at the southern entrance to the nature reserve. No cyclists were seen in the northern parts of Kymlinge during the two-day observation period.

Weekday measurements showed that the temperature was around -2°C. The sun shone for most of the day with short periods of snow and wind. During the weekend observation, there was more cloud, with snow and a temperature of around -3°C.

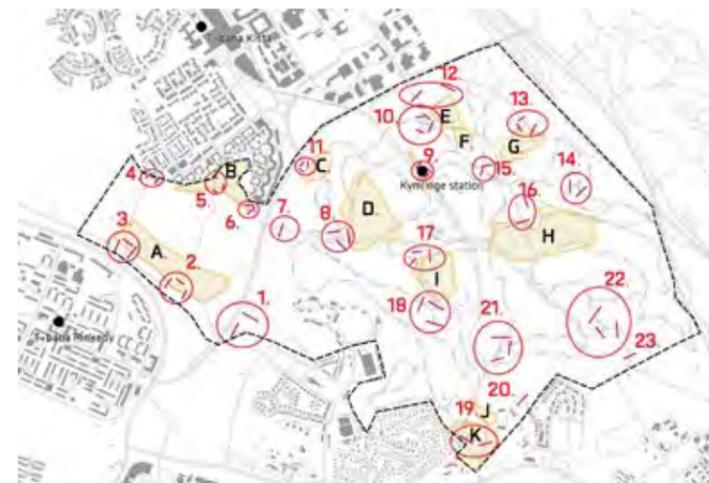
Generally, it was icy underfoot on the forest tracks and the majority of those running on the forest tracks had grips on their shoes.

Occupancy

Only a few of the 12 observed areas were being used. This can be attributed in part to the time of year but also to the fact that the areas where people were seen were generally located beside dwellings, which left large areas of Kymlinge empty.

The most used area overall was the southern entrance to the Igelbäcken nature reserve, with its outdoor gym area and places to sit. The picnic area some way in was also used by preschool classes.

Within the borders of Norra Kymlinge, few people were observed in the marked areas. There was the odd person out exercising or walking the dog. It was only during weekend evenings that all the areas were completely empty.



A clearer and more accessible entrance to Norra Kymlinge could make the public nature of the area more well defined.

Lighting is important if the area is to be considered safe in the evening and during winter.

The northern parts of Kymlinge are a relatively long way from the residential areas and are surrounded by traffic barriers, which affect accessibility and use on weekdays.



*Visitor calculation and occupancy observation

To map how the area is used, pedestrian and cyclist flows were measured at 23 measuring points, and occupancy at 12 different places was studied (see map on this page). The observations were conducted between 8am and 8pm on a weekday and on a weekend in February 2017.

Sources:

Spacescape (2017) "Användningen av Kymlinge. PM Vinterobservation"

Municipality of Sundbyberg. Map of the track system at Ursvik.

HEALTHY CITY

How do roads affect a healthy environment? Where is noise generated and how does climate change affect the risk of flooding?



The **healthy city** is a city where people can live healthily and cleanly, based on local conditions and on structural and technical systems. This analysis has focused on the aspects of public health that are affected by noise, air quality and climate change. Other aspects that fall under the heading of 'public health' have been studied in previous sections.

/ Healthy city

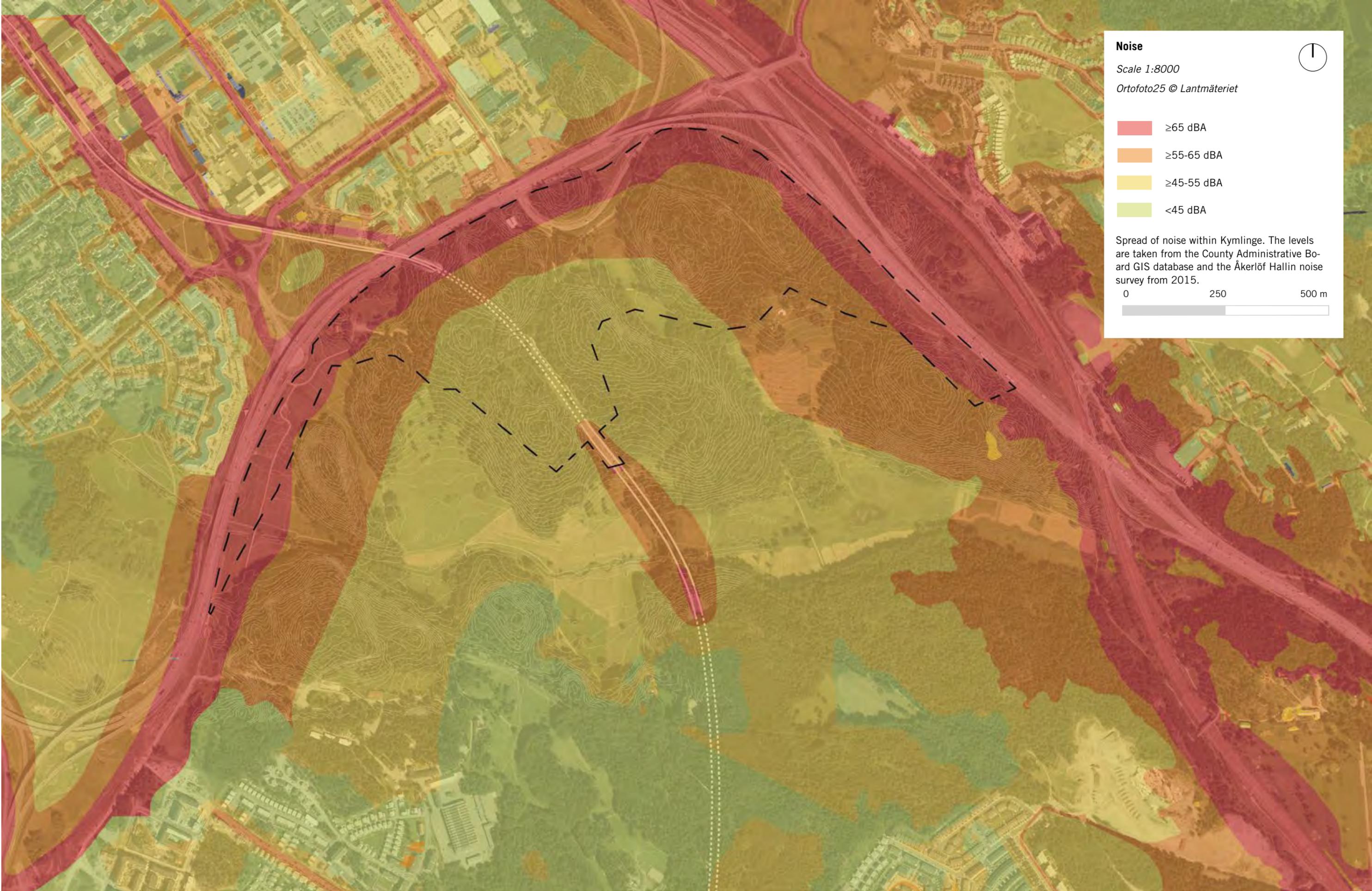
The term public health includes a whole series of factors. Public health is fundamentally a promotional and preventative task, reinforcing conditions for people to enjoy as healthy a life as possible. This can be achieved, for example, through good accessibility and the potential for exercise and recreation, which can in turn be achieved by ensuring there are pedestrian paths and cycle tracks as well as good access to parks, sports facilities and large recreation areas. Water quality could also impact on public health. This section focuses purely on the local and site-specific conditions of the area that are linked to traffic or the impact of other activities on noise levels and air quality, contaminants in soil and water, and risks deriving from the transport of hazardous goods, magnetic fields and other sources. Recreation, accessibility and water quality have been analysed in earlier sections. All these factors are of significance to the prerequisites for ensuring good public health in Norra Kymlinge.

The chapter begins by describing the impact of traffic or other activities on noise levels in the area as a means of understanding the potential for creating a healthy, comfortable noise environment. Apart from noise, traffic affects air quality, which is strongly linked to both public health and environmental goals. PM10 and NO2 levels have been mapped and the consequences of the levels have been described. To understand the overall risk level, both well-documented existing risks, such as transport of hazardous goods, and potential future risks, such as a heightened risk of flooding, are presented. This offers an opportunity to understand the potential of the site for consolidating local resilience and robustness in the face of future climate changes.

The analysis focuses on the local and site-specific features from a clean city perspective. Conditions linked to this include the impact of traffic or other activities in the area. There will be an analysis at a later stage of elements that can be incorporated and rectified in the area in the future for it to fulfil the goal of becoming a healthy city in terms of the aspects outlined above. Further aspects that are not relevant to the site at present could then be included, including sewage and waste systems and other factors.



One of the minor roads in the area



Noise

Scale 1:8000

Ortofoto25 © Lantmäteriet

- ≥65 dBA
- ≥55-65 dBA
- ≥45-55 dBA
- <45 dBA

Spread of noise within Kymlinge. The levels are taken from the County Administrative Board GIS database and the Åkerlöf Hallin noise survey from 2015.



Impact of traffic on Kymlinge

Noise situation

Norra Kymlinge is located at the intersection of the two most important motorways in the region, the E4 and the new E18/ Kymlinge Link Road. Road traffic, as well as rail traffic along the East Coast Line and on the underground, have a direct and indirect impact on the area in terms of health, risks, barrier effects and so on.

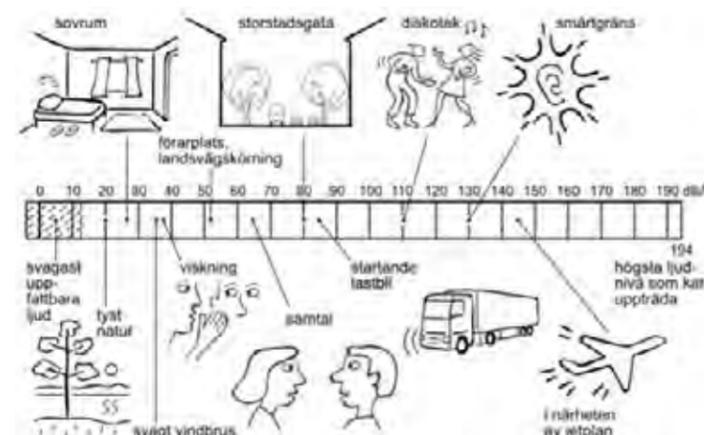
Road and rail traffic generates noise*. There has been a year-on-year increase in road traffic on the motorways and rail traffic on the East Coast Line. Even the underground, which is actually overground in the Igelbäcken valley south of Norra Kymlinge, affects the area in different ways, including noise generation.

Several different noise surveys have been carried out at Norra Kymlinge. All the noise surveys indicate that the highest noise levels, 65-70 dBA, are to be found nearest the E4 motorway. In the central parts of the area, the noise levels are 50-55 dBA. With the expansion of the Kymlinge Link Road and the E4 motorway junction, noise barriers were planned and built along the whole of the Kymlinge Link Road and along parts of the E4 motorway. These noise barriers have been taken into account when calculating the current traffic noise situation.

There is no reason to assume that conditions have changed more than marginally since the Kymlinge Link Road was opened. Following the redevelopment of the Kista junction and the merging of the Kymlinge Link Road and the E18 motorway, it can be assumed that traffic has increased and thus the noise level. The East Coast Rail Line is not considered to affect Norra Kymlinge directly due to the distance to the tracks. Traffic on the E4 motorway affects the noise experience in the eastern part of the area, where traffic noise is very noticeable. In parts of the forested area, which is very hilly, the noise experience is not quite as noticeable. Natural areas and ridges contribute to this reduction. The noise levels are also felt to be lower on days when the wind is blowing in a favourable direction (south-west). As opposed to the unrelenting background noise from road traffic, the underground can only be heard when a train is passing. These are the maximum levels. At present, there is an underground train every six minutes.

Brief facts about noise levels from road traffic (National Board of Housing, Building and Planning 2008) (translation from Swedish):

- » Affected by the type of vehicle, vehicle maintenance and tyre type (hardness, width, possible studs). There could be variations of up to 20 dBA
- » Increases by up to 10 dBA in conjunction with "aggressive driving"
- » Increases in line with the traffic volume. A doubling in the traffic volume will result in a 3 dBA increase in noise level.
- » Affected by the number of heavy vehicles. If the number of heavy vehicles increases from 0 to 10 per cent, the equivalent noise level increases by around 3 dBA, whilst the maximum noise level increases by 8-12 dBA with the biggest difference at speeds below 50 km/h (i.e. urban traffic).
- » Increases in line with vehicle speed. An increase in speed from 50 km/h to 70 km/h raises the noise level by approximately 4 dBA.
- » Increases with the road gradient. If the gradient is 5%, the noise level increases by 2-3 dBA, depending on the proportion of heavy vehicle traffic, compared with a flat road.
- » Affected by the road surface. The noise variations between normal surfaces is several dBA. The noise of traffic on what is termed drain asphalt is 2-7 dBA lower than traffic on standard asphalt. The noise reduction is best when drain asphalt is new, as over time its pores gradually become blocked. There are also other types of low-noise road surfaces.
- » Affected by the surface conditions. A wet road surface increases noise by approximately 3 dBA, a snow-covered surface reduces the noise by approximately the same amount.



The figure shows how different activities are experienced in terms of noise, measured in decibels (dBA). Source: National Board of Housing, Building and Planning 2008.

The terrain and natural land contribute to the variation in noise experience within the area.

There is the possibility of developing and maintaining quiet locations in the area.

The noisy main roads could be screened off – by buildings for example.



* Noise

Noise means sounds that are generally undesirable. At high levels, noise could also lead to impaired hearing. Low-level noise could also affect health in other ways, such as high blood pressure, reduced concentration, learning problems for children, and sleep disruption. Difficulty understanding what people are saying because of noise is a major problem, particularly for people suffering from hearing loss.

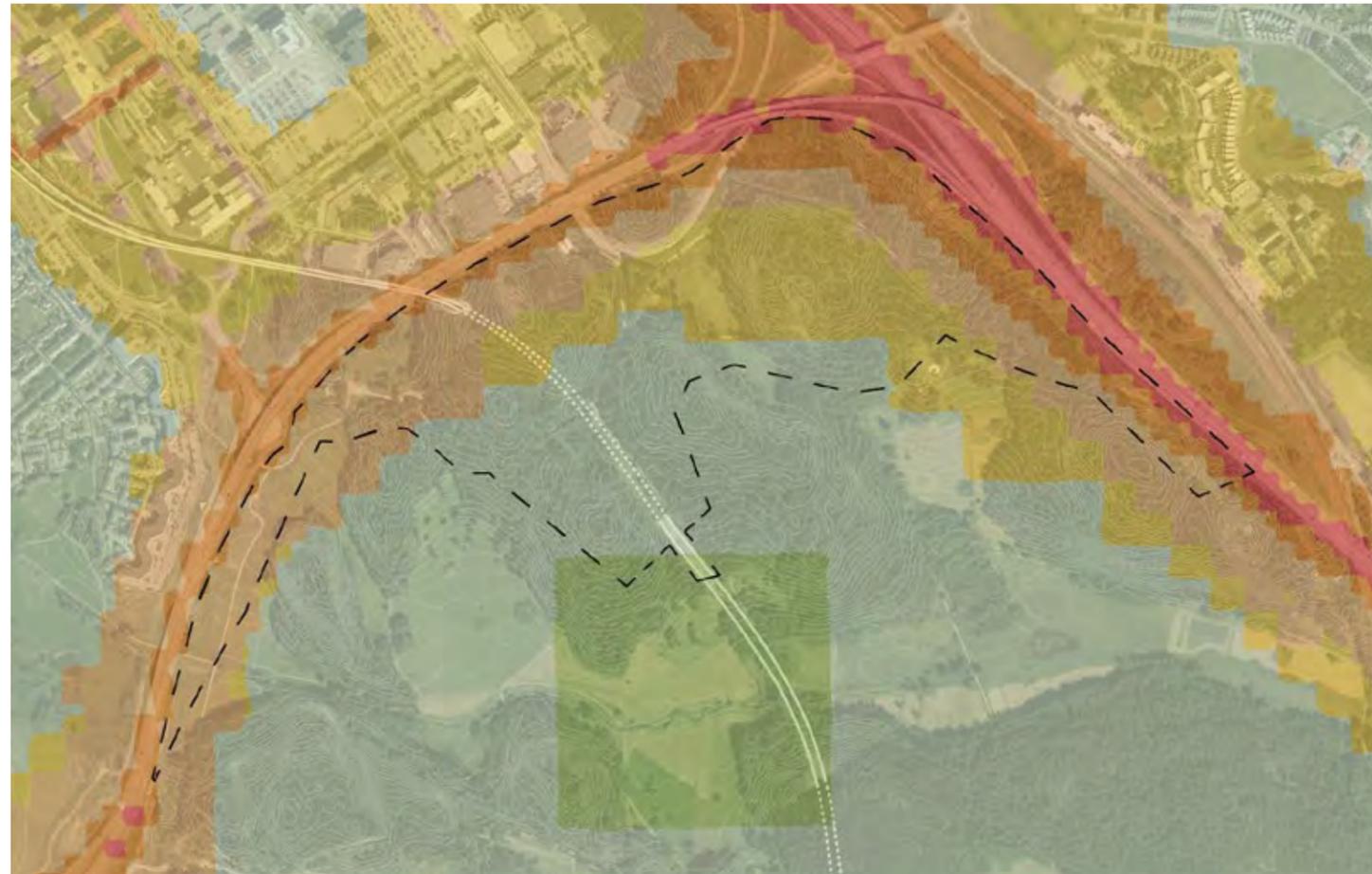
In March 1997, the Swedish Parliament adopted benchmarks for traffic noise (Bill 1996/97:53). As the benchmarks cannot be met in very built-up areas, including large parts of Sundbyberg, the Stockholm County Administrative Board, the City of Stockholm Environmental Administration and the City Planning Authority have come together to produce deviation cases that can be applied in a city environment. In simple terms, these mean that noise levels can be permitted to be higher on "the traffic side" if the side that is facing away from the road has lower noise levels.

Källor

Åkerlöf Hallin AB (2015) PM A, Trafikbullerutredning – Kymlinge.

Stockholms länsstyrelse, (2016) GIS database.

SWECO FFNS/Ingemanssons (2000) Delstudie – buller, exploatering och bebyggelse typer.



NO₂

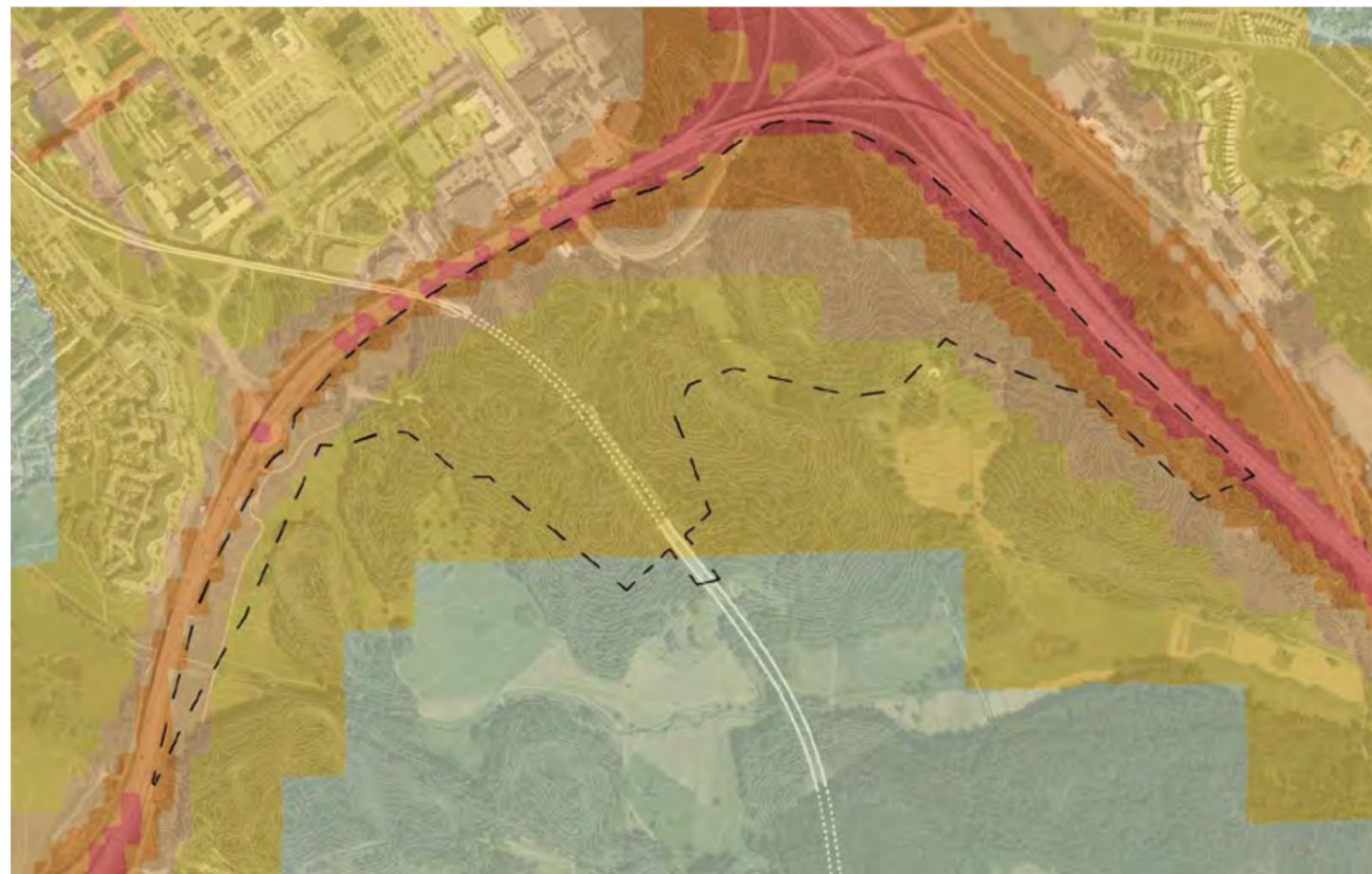


Scale 1:12000

Ortofoto25 © Lantmäteriet

Estimated level of nitrogen dioxide for the eighth worst day in 2015. The guideline value that should be met is 60 µg/m³. Source: SLB Analys.

- >60 µg/m³
- 48-60 µg/m³
- 36-48 µg/m³
- 30-36 µg/m³
- 24-30 µg/m³
- 18-24 µg/m³



Particulate matter



Scale 1:12000

Ortofoto25 © Lantmäteriet

The estimated level of particulate matter (PM10) for the worst day in 2015. The guideline value that should be met is 50 µg/m³. The environmental quality target is 30 µg/m³. Source: SLB Analys.

- >50 µg/m³
- 35-50 µg/m³
- 30-35 µg/m³
- 25-30 µg/m³
- 20-25 µg/m³

Air quality

Road traffic and industrial enterprises have a direct and indirect effect on Kymlinge through emissions into the air. Particulate matter, PM10, and nitric dioxide, NO2, are the air pollutants that have the highest levels in comparison with the mandatory environmental quality guideline values that are in place to safeguard human health. The guideline value that is most difficult to meet is the daytime average value and refers to short-term exposure to high levels. Both particulate matter and nitric dioxide exceed the guideline value along the whole of the E4 motorway and along sections of the E18 motorway.

Apart from direct road traffic, air pollution levels are affected by the design of the street space and the throughflow of the air. The “airier” the street space, the better the removal of air pollutants, thus resulting in better air quality. The denser/more enclosed the street space, the poorer the removal of air pollutants and the higher the levels of air pollutants. Street spaces today are open and airy but despite this the guideline values are still being exceeded. The maps below show the estimated average 24-hour values for PM10 and NO2 in 2015.

Ensure effective removal of air pollutants along the major highways and along busy local streets.

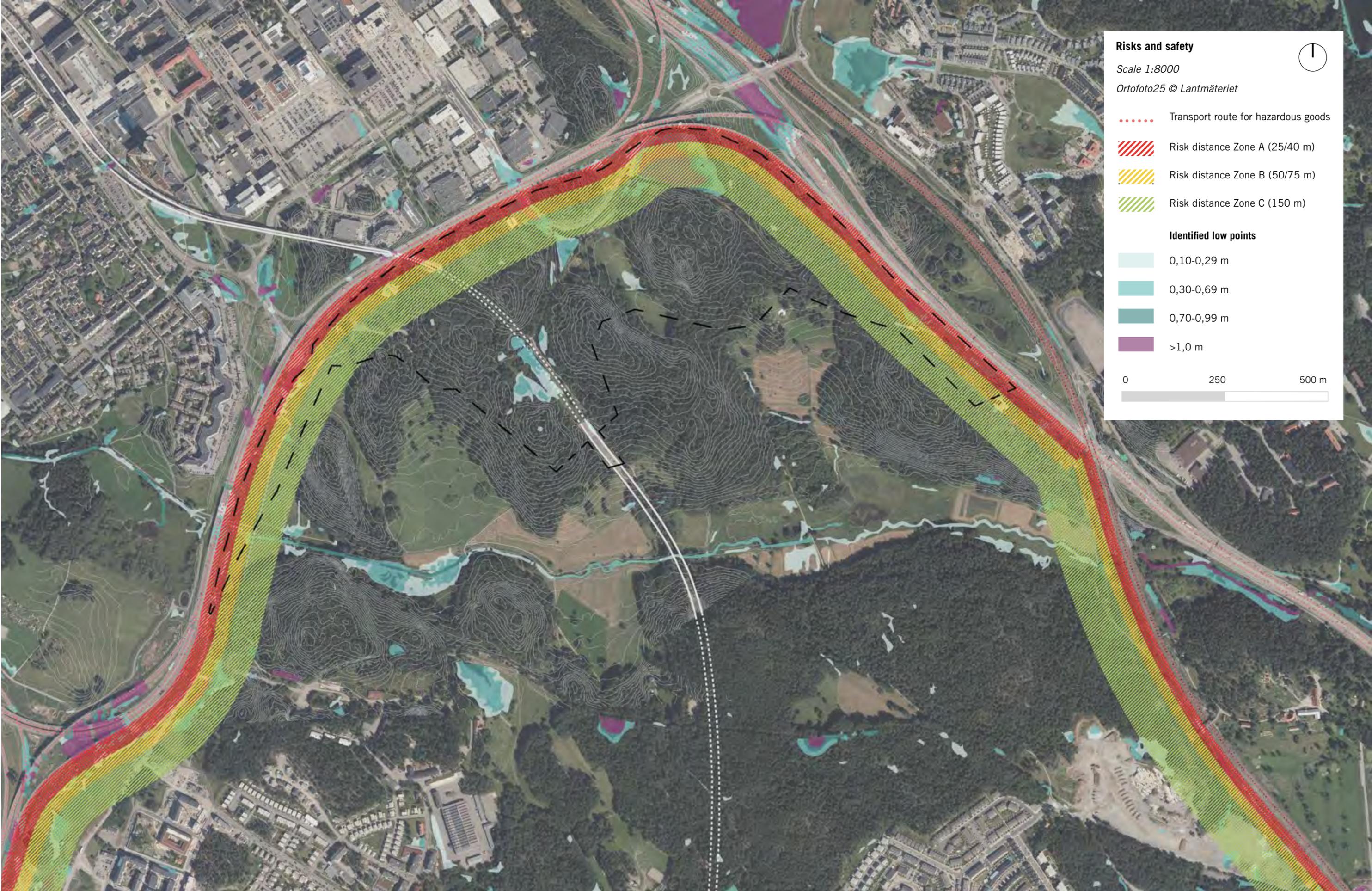
Trees and bushes contribute to a better throughflow of air and air purification.



View westwards along the Kymlinge Link Road

Källor

SLB Analys [Air Quality Management Association] (2015) Air pollution map.



Risks and safety

Scale 1:8000
Ortofoto25 © Lantmäteriet

- Transport route for hazardous goods
- ▨ Risk distance Zone A (25/40 m)
- ▨ Risk distance Zone B (50/75 m)
- ▨ Risk distance Zone C (150 m)

Identified low points

- 0,10-0,29 m
- 0,30-0,69 m
- 0,70-0,99 m
- >1,0 m

0 250 500 m

Risks and safety

Hazardous goods

Both the E18 and E4 motorways are primary transport routes for hazardous goods. These primary routes are used mainly for through traffic, where all types of hazardous goods are transported to their final destination. The Stockholm County Administrative Board has issued various recommendations governing development along roads used for the transport of hazardous goods. As regards new buildings, recommendations have been provided governing the distance between transport routes for dangerous goods and buildings. The recommendations mean that in effect 25 m on either side of roads on which dangerous goods are being transported should be kept free of buildings. The distance to office buildings should be 40 m, whilst the distance to residential buildings should be 75 m. In addition, it is stated that for development within 150 m of a transport route used for hazardous goods, a risk analysis should always be included in the documentation used in the decision-making process.

Factors that should be taken into account in individual cases, and when making an assessment of an appropriate protection zone for future buildings, include the volumes of freight transported by road, the type of freight, the use of the buildings, vegetation and topography, and if there is a need for special protection measures as part of the construction process.

Risks posed by climate change and flooding

Norra Kymlinge is currently undeveloped and comprises natural land. Nature plays an important role with regard to climate in the form of water regulation, water purification and carbon dioxide uptake. Loss of local nature and green impediments could change the local climate for the worse. A reduction in the number of trees and green areas could, for example, lead to a rise in the local temperature due to reduced circulation and a cooling effect. A denser structure and fewer green areas also mean that natural infiltration and rain gardens are removed and enclosed water areas are created. In the case of heavy rain, there is a risk this would lead to localised flooding and high water flows where surface water management measures and a lack of capacity in existing networks and at pumping stations to cope with surface water run-off, could be a problem. The risk of flooding is greatest in low-lying areas and/or areas located close to water.

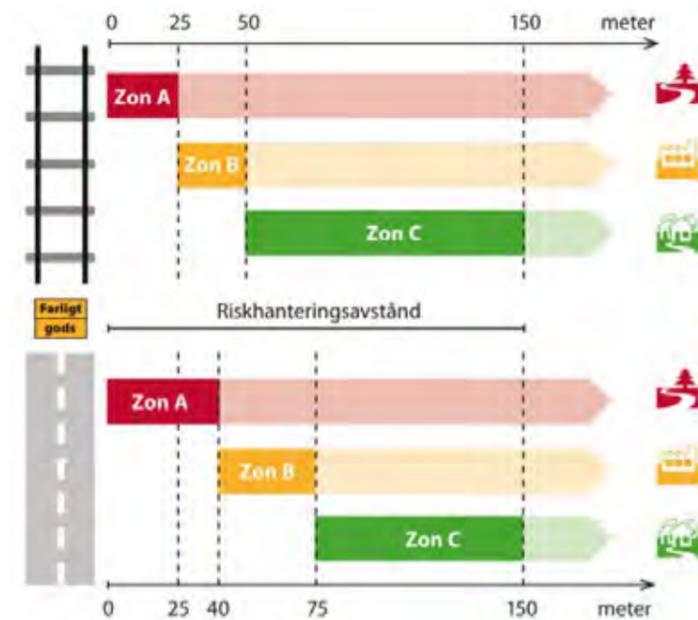
In the area around Norra Kymlinge there are a number of low-lying areas with high water levels (see map) that need to be

highlighted and addressed. Areas with high water levels and rain gardens represent a future challenge and a potential risk. If they are dealt with correctly, they could also be an asset.

Other risks

Large parts of Norra Kymlinge fall within an area with a high risk of radon in the soil, which must be taken into account in conjunction with any development of the area in the future.

At present, there is an overhead power line in the eastern part of Norra Kymlinge (north-south direction). This will be removed within the next few years. These plans are part of the Swedish Power Grid "Stockholm flow" project. The risk of radiation from magnetic fields will thus not need to be addressed if Norra Kymlinge is developed.



The image shows a division into zones for risk management distances according to the County Administrative Board risk policy. The zones represent possible land use in relation to transport routes for hazardous goods.

Source: County Administrative Board.

Small areas of water in hollows in valleys are an ecological quality in the area today.

Working with multifunctional areas, e.g. preserving and recreating areas where water is permitted to flow during certain periods but where parkland and play areas could exist during dry periods, is a way of creating flexibility and robustness in the light of higher precipitation levels in the future.



Sources

County Administrative Board (2016) GIS database..
 County Administrative Board. Riskhansyn i planeringen. <http://www.lansstyrelsen.se/Stockholm/Sv/samhallsplanering-och-kulturmiljo/planfragor/Pages/riskhansyn.aspx>



**Norra Kymlinge offers
unique potential to
develop leading edge
knowledge and insights
relating to truly sustain-
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